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## Introduction

Observations of the catch and bycatch from the Florida-Georgia shark gillnet fishery are required by law, and reports are prepared annually (e.g. Carlson and Bethea 2007 and references therein). The Atlantic Large Whale Take Reduction Plan and the Biological Opinion issued under Section 7 of the Endangered Species Act mandate 100% observer coverage of the southeast shark drift gillnet fishery during the right whale, *Eubalaena glacialis*, calving season (15 Nov-31 Mar). Outside the right whale calving season (1 Apr-14 Nov), an interim final rule (March 30, 2001; 66 FR 17370) to the Fishery Management Plan for Highly Migratory Species (NMFS, 1999) established a level of observer coverage for these vessels 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.

In 2005, the shark gillnet observer program was expanded to include all vessels that have an active directed shark permit and fish with sink gillnet gear. These vessels were not previously subject to observer coverage because they either were targeting non-highly migratory species or were not fishing gillnets in a drift or strike fashion. These vessels were selected for observer coverage in an effort to determine their impact on finetooth shark, *Carcharhinus isodon*, landings and their overall fishing impact on shark resources when the gear is not targeting sharks. In 2006, the National Marine Fisheries Service (NMFS) Southeast Regional Office requested further expansion of the scope of the shark gillnet observer program to include all vessels fishing gillnets regardless of target, and for coverage to be extended to cover the full geographic range of gillnet fishing effort in the southeast United States. This was requested because of the need to monitor (at statistically adequate levels) all gillnet fishing effort to assess risks to right whales and other protected species. Further, in 2007 the regulations implementing the Atlantic Large Whale Take Reduction Plan were amended to include the removal of the mandatory 100% observer coverage for drift gillnet vessels during the right whale calving season

and to prohibit all gillnets in an expanded southeast U.S. restricted area from Cape Canaveral, Florida to the North Carolina/South Carolina border during November 15 - April 15. The rule does possess limited exemptions, only in waters south of 29 degrees N latitude, for shark strikenet fishing during this same period and for Spanish mackerel, *Scomberomorus maculatus*, gillnet fishing in the months of December and March. Based on these regulations and on current funding levels, the shark gillnet observer program now covers all anchored (sink, stab, set), strike, or drift gillnet fishing by vessels that fish from Florida to North Carolina year-round.

Herein, we summarize fishing effort and catch and bycatch in these fisheries during January-November 2007.

## **Methods**

### *Observer protocol*

Vessels were selected on a seasonal basis (winter, spring, summer, fall) randomly from a pool of vessels that had either a current directed or indirect shark permit and reported fishing with gillnet gear during the previous year. Selection letters requiring observer coverage were issued to permit holders via U.S. Certified mail approximately one month prior to the upcoming season. Each selection letter was mailed with a trip notification form that, when returned prior to a trip, provided the observer coordinator with written information concerning the vessel's name, captain, contact persons and phone numbers, communications and safety equipment available aboard the vessel, and information about the vessel's location, dates, and times of departure and return. The form was also used to inform the observer coordinator when the vessel was active in another fishery, under repair, or no longer fishing. The written notification was necessary to document the permit holder's efforts to comply with mandatory coverage. Telephone calls were helpful, after written notification, to determine other specific details prior to the deployment of the observer to meet the vessel. Once the permit holder received the selection letter, he or she

was required to make contact with the observer coordinator and indicate intent to fish during the upcoming season. Upon notification of the intention to fish, the observer coordinator deployed an observer to the reported port of departure of permit holder's vessel. As trips are generally daily, the observer remained onboard the vessel for up to 14 days to attain a sufficient level of coverage.

Observations were made as the net was hauled aboard. The observer remained about 1-5 m forward of the stern of the vessel in a position with an unobstructed view and recorded species and numbers caught. When species identification was questionable, the crew stopped hauling 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 10 individuals from each species caught while the vessel was returning to port. Fork length (FL, measured on a straight line) in cm and sex (sharks only) were determined when possible. Biological samples (e.g. otoliths, vertebrae, reproductive organs, stomach) were removed and placed on ice after collection. Data were submitted to the NMFS Southeast Fisheries Science Center (SEFSC), Panama City staff on a weekly basis. The data were entered by SEFSC staff, examined by NMFS/SEFSC Sustainable Fisheries Division staff, and reviewed with observer contract staff to resolve any questions.

## **Results and Discussion**

### *Drift gillnet fishery*

A total of 5 drift gillnet vessels were observed making 84 sets on 11 trips in 2007. Of those trips, there were 3 vessels observed that targeted sharks, for a total of 4 trips and 4 hauls. The distribution of observed drift gillnet fishing effort is illustrated in Figure 1. The lengths of the nets on drift net vessels targeting sharks ranged from 494 – 986 m (1620-3240 ft), with a net

depth of 15.2 m (50 ft). The mesh size for all vessels targeting sharks was 12.7 cm (5.0 in). The average set time was 0.17 hr (0.07 S.D.), and haul time was 3.67 hr (1.62 S.D.). The total process, from the time that the net went in the water until the haul back was completed, averaged 9.48 hr (0.88 S.D.).

The majority of drift gillnetting trips in 2007 targeted Spanish mackerel, and carried nets ranging from 30 to 305 m (10 to 1000 ft) long. Stretched mesh sizes averaged 7.9 cm (3.1 in). Setting of the gear took 0.08 hr and was made in water depths averaging 4.5 m (1.5 S.D.). Hauls averaged 0.21 hr (0.08 S.D.). The entire drift gillnetting process targeting Spanish mackerel averaged 1.32 hr (0.55 S.D.). Observed drift gillnet effort is illustrated in Figure 1.

#### *Observed drift gillnet catches*

Total observed catch composition for sets targeting sharks was 86.7 % shark, 13.3 % teleosts, 0.0 % non-shark elasmobranchs, and 0.0 % protected resources (i.e. marine mammals, sea turtles, smalltooth sawfish). Two species of sharks made up 98.1 % (by number) of the observed shark catch: Atlantic sharpnose shark, *Rhizoprionodon terraenovae* (96.9 %), and blacknose shark, *Carcharhinus acronotus* (1.2 %; Table 1). By weight, the shark catch was composed of Atlantic sharpnose shark (94.5 %), followed by scalloped hammerhead shark, *Sphyrna lewini* (2.6 %), blacknose shark (1.5 %), and blacktip shark, *Carcharhinus limbatus* (0.5 %). Three species of teleosts made up approximately 97 % by number of the overall non-shark species. These species were little tunny, *Euthynnus alletteratus* (80.5 %), king mackerel, *Scomberomorus cavalla* (14.2 %), and barracudas (Sphyraenidae, 3.1 %; Table 2).

Total observed catch composition for sets targeting Spanish mackerel was 84.5 % teleosts, 15.3 % sharks, 0.10 % non-shark elasmobranchs, and 0.05% protected resources. Three species of teleosts made up 96.6% of the total teleost catch: Spanish mackerel (79.1 %), bluefish, *Pomatomus saltatrix* (10.5 %), and menhaden, *Brevoortia tyrannus* (6.9 %, Table 3). The shark

catch was dominated by Atlantic sharpnose shark (96.8 % by number of total shark catch), followed by bonnethead shark (1.6 %, Table 4). By weight, the Atlantic sharpnose shark made up 94.8% of the catch, followed by bonnethead shark, *Sphyrna tiburo*, at 2.6%, and hammerhead sharks (*Sphyrna* sp., 2.3%\_.

#### *Strike gillnet fishery*

No vessels that targeted sharks were observed fishing gillnets in a strike fashion in 2007. This was likely due to the closure of the large coastal shark season during the 1<sup>st</sup> trimester season (January-March). Historically, strikenetting for sharks occurs predominately in winter when the vessels target schools of blacktip sharks off the east coast of Florida (Carlson and Bethea, 2007 and references therein).

#### *Sink gillnet fishery*

A total of 29 trips making 112 sink net sets on 6 vessels were observed in 2007. Of those, 17 trips making 60 sets targeted sharks, 3 trips making 27 sets targeted Spanish mackerel, 4 trips making 9 sets targeted Atlantic croaker, *Micropogonias undulatus*, and 6 trips making 16 sets targeted other teleost species. Observed sink gillnet fishing effort is illustrated in Figure 2.

Sink gillnet vessels that targeted sharks fished with nets 91 to 732 m (300 to 2400 ft) long and stretched mesh sizes 14.7 to 25.4 cm (5.8 to 10.0 in). The most frequently used mesh size was 17.8 cm (7.0 in). For shark targeted sets, set duration averaged 0.1 hr (0.04 S.D.). Hauls averaged 0.07 hr (0.6 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 4.5 hr (2.6 S.D.). Sets were made in waters averaging 16.7 m (15.2 S.D.) deep.

When vessels targeted teleosts, nets ranged from 92 to 1829 m (300 to 6000 ft) long. Stretched mesh sizes were 8.9-17.8 cm (3.5-7.0 in) with 9.5 cm (3.75 in) as the most frequently



used mesh. Setting of the gear averaged 0.09 hrs ( $\pm 0.03$  S.D.) and hauls averaged 0.9 hrs (0.9 S.D.). The entire process (time net was first set until time haul back was completed) averaged 1.9 hrs (1.8 S.D.).

#### *Observed sink gillnet catches*

Four main groups were targeted on observed sink gillnet vessels in 2007: (1) shark, (2) Spanish mackerel, (3) Atlantic croaker, and (4) multiple teleost species at the same time (e.g., bluefish, little tunny, and blue runner, *Caranx crysos*).

Catch composition of sink gillnet vessels targeting sharks was 97.8 % shark, 1.4 % teleosts, 0.7 % non-shark elasmobranchs, and 0.1 % protected resources (Tables 5 and 6). By number, shark catches were primarily bonnethead shark (56.5), finetooth shark, *Carcharhinus isodon* (17.1%), Atlantic sharpnose shark (11.8%), and blacknose shark (11.1%). By weight the shark catch was made up mostly of finetooth shark (81.3%), followed by bonnethead shark (11.9%), blacknose shark (4.9%), and spinner shark (1.0%). Cobia, *Rachycentron canadum*, made up 25.8% of the teleost catch, followed by Gulf kingfish, *Menticirrhus littoralis* (16.1%), and banded drum, *Larimus fasciatus* (6.5%). Cownose ray, *Rhinoptera bonasus*, Atlantic guitarfish, *Rhinobatos lentiginosus*, and other stingrays made up 100% of the non-shark elasmobranch catch.

Catch of vessels targeting Spanish mackerel was 99.4 % teleosts and 0.6 % shark (Tables 7 and 8). Shark catches were mostly Atlantic sharpnose shark by number (50.0%), blacktip shark (28.6 %), and bonnethead shark (14.2 %). By weight, spiny dogfish, *Squalus acanthias*, were the predominant catch (73.7%), followed by smooth dogfish, *Mustelus canis* (24.6%), blacktip shark (0.9%), and bonnethead shark (0.4%). Spanish mackerel (39.8% by number), butterfish, *Peprilus* sp. (39.4%), and bluefish (17.8%) made up majority of the teleost catch.

Sink gillnet vessels targeting croaker caught 3.2 % sharks, 96.7 % teleosts, and 0.01 % non-shark elasmobranchs (Tables 9 and 10). Spiny dogfish and smooth dogfish were the only shark species caught (62.2 and 37.8% by number, respectively). Atlantic croaker was the most commonly caught teleost (98.7%), followed by butterfish (0.8%), and menhaden (*Brevoortia* sp., 0.2%).

Sink gillnet vessels that targeted species other than sharks, Spanish mackerel, and Atlantic croaker caught mostly bluefish (84.9%) and Atlantic croaker (9.8%; Table 11). Spiny dogfish were the most commonly caught shark species (61.1%), followed by smooth dogfish (36.5%; Table 12).

#### *Average size*

The average (S.D.) lengths of sharks measured by gear type and target can be found in Table 13. Average (S.D.) lengths of teleosts (n>5) measured by gear type and target can be found in Table 14.

#### *Protected resources interactions*

Interactions with protected resources were observed in 2007. Four loggerhead sea turtles, *Caretta caretta*, were observed caught overall, three on vessels fishing with sink gillnet gear targeting shark, and one on a vessel while drift gillnetting for Spanish mackerel. Of those four sea turtles, three were released alive, uninjured, and one was released, freshly dead (Table 15).

#### Discussion

Historically observer coverage has focused primarily on drift gillnet vessels targeting shark in coastal waters off the southeast U.S. Since the observer program's inception in 1993, there has been a considerable decline in the amount of drift gillnet effort, particularly during the

right whale calving season, with a concurrent increase in the number of strike sets. As a result of the decrease in gillnet effort, observer coverage has expanded to cover more vessels fishing with different gillnetting techniques (i.e. sink, stab) and targeting species other than sharks. This has proven to be very beneficial not only in providing information to support shark stock assessments but to evaluate these fisheries and any impacts these fisheries have on protected species (i.e. sea turtle, sea bird, marine mammal, and smalltooth sawfish).

The NMFS HMS division is considering changes in the management of the Atlantic shark fishery to comply with the recent stock assessment for sandbar sharks. Management alternatives range from status quo (i.e. no change in quotas or seasons for large coastal sharks) to closing the Atlantic shark fishery. It is likely the dynamics of the Atlantic shark fishery will change. How vessels that target sharks with gillnet gear will respond is currently unknown. Effort will probably remain unchanged for those vessels that target sharks with drift or sink gillnet gear, as the dominant sharks caught in these fisheries are small coastal sharks. However, vessels that target sharks utilizing strikenet gear may no longer employ this technique because it is primarily used to target large coastal sharks and it may not be cost effective if catch limits are implemented. There is some indication that vessels may attempt to strikenet for some small coastal sharks, such as finetooth shark (A. Santiago, personal observation). Nevertheless, observer coverage of these fisheries will continue to better understand the changing dynamics of this fishery and its impact on all marine resources

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Table 1. Total shark directed drift gillnet shark catch by species and species disposition in order of decreasing abundance for all observed trips, 2007. Catch disposition by is by percent kept (Kept %), percent discard alive (D.A. %), and percent discard dead (D.D. %).

Species	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose	1643	99.5	0.3	0.2
<i>Carcharhinus acronotus</i>	Blacknose	20	100.0	0.0	0.0
<i>Sphyrna lewini</i>	Scalloped hammerhead	12	100.0	0.0	0.0
<i>Sphyrna tiburo</i>	Bonnethead	8	100.0	0.0	0.0
<i>Carcharhinus limbatus</i>	Blacktip	7	85.7	14.3	0.0
<i>Carcharhinus brevipinna</i>	Spinner	5	80.0	20.0	0.0

Table 2. Total shark directed drift gillnet teleost and ray bycatch by species in order of decreasing abundance and species disposition for all observed trips, 2007. Catch disposition by is by percent kept (Kept %), percent discard alive (D.A. %), and percent discard dead (D.D. %).

Species	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Euthynnus alletteratus</i>	Little tunny	210	99.0	0.0	1.0
<i>Scomberomorus cavalla</i>	King mackerel	37	81.1	0.0	18.9
Sphyraenidae	Barracudas	8	100.0	0.0	0.0
<i>Selene setapinnis</i>	Moonfish	4	0.0	0.0	100.0
Echeneidae	Remora family	2	0.0	50.0	50.0

Table 3. Total observed non-shark catch for drift gillnets targeting Spanish mackerel in order of decreasing abundance by species and species disposition, 2007. Catch disposition by is by percent kept (Kept %), percent discard alive (D.A. %), and percent discard dead (D.D. %).

Species	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Scomberomorus maculatus</i>	Spanish mackerel	1373	98.7	0.0	1.3
<i>Pomatomus saltatrix</i>	Bluefish	183	26.2	3.8	70.0
<i>Brevoortia tyrannus</i>	Atlantic menhaden	120	0.0	12.5	87.5
<i>Larimus fasciatus</i>	Banded drum	24	0.0	4.2	95.8
<i>Rachycentron canadum</i>	Cobia	13	0.0	100.0	0.0
<i>Strongylura marina</i>	Atlantic needlefish	5	100.0	0.0	0.0
<i>Selene vomer</i>	Lookdown	3	33.3	0.0	66.7
<i>Cynoscion regalis</i>	Weakfish	2	0.0	0.0	100.0
<i>Paralichthys</i> sp.	Flounder family	2	0.0	100.0	0.0
<i>Prionotus</i> sp.	Searobin family	2	0.0	50.0	50.0
<i>Scomberomorus cavalla</i>	King mackerel	2	0.0	50.0	50.0
<i>Elops saurus</i>	Ladyfish	1	0.0	100.0	0.0
<i>Lagodon rhomboides</i>	Pinfish	1	0.0	100.0	0.0
<i>Remora remora</i>	Remora	1	0.0	100.0	0.0
<i>Eleganyis bipinnulata</i>	Rainbow runner	1	100.0	0.0	0.0
Trachipteridae	Ribbonfish family	1	100.0	0.0	0.0
<i>Dasyatis americana</i>	Southern stingray	1	0.0	100.0	0.0
<i>Raja eglanteria</i>	Clearnose skate	1	0.0	100.0	0.0
<i>Mobula hypostoma</i>	Devil ray	1	0.0	100.0	0.0

Table 4. Total observed shark catch for drift gillnets targeting Spanish mackerel in order of decreasing abundance by species and species disposition, 2007. Catch disposition by is by percent kept (Kept %), percent discard alive (D.A. %), and percent discard dead (D.D. %).

Species	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose	305	52.1	43.6	4.3
<i>Sphyrna tiburo</i>	Bonnethead	5	40.0	60.0	0.0
<i>Carcharhinus brevipinna</i>	Spinner	2	0.0	100.0	0.0
<i>Sphyrna</i> sp.	Hammerhead family	2	0.0	100.0	0.0
<i>Sphyrna lewini</i>	Scalloped hammerhead	1	0.0	100.0	0.0

Table 5. Total observed sink gillnet shark catch by species and species disposition in order of decreasing abundance for all trips targeting sharks, 2007. Catch disposition by is by percent kept (Kept %), percent discard alive (D.A. %), and percent discard dead (D.D. %).

Species	Common name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Sphyrna tiburo</i>	Bonnethead	1223	99.7	0.2	0.2
<i>Carcharhinus isodon</i>	Finetooth	371	99.7	0.3	0.0
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose	256	99.6	0.0	0.4
<i>Carcharhinus acronotus</i>	Blacknose	240	100.0	0.0	0.0
<i>Carcharhinus brevipinna</i>	Spinner	40	60.0	10.0	30.0
<i>Carcharhinus limbatus</i>	Blacktip	26	38.5	26.9	34.6
<i>Sphyrna lewini</i>	Scalloped hammerhead	7	14.3	14.3	71.4
<i>Ginglymostoma cirratum</i>	Nurse	1	100.0	0.0	0.0
<i>Carcharhinus leucas</i>	Bull	1	100.0	0.0	0.0
<i>Galeocerdo cuvier</i>	Tiger	1	0.0	100.0	0.0

Table 6. Total observed sink gillnet teleost and ray bycatch by species and species disposition in order of decreasing abundance for all trips targeting sharks, 2007. Catch disposition by is by percent kept (Kept %), percent discard alive (D.A. %), and percent discard dead (D.D. %).

Species	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Rhinoptera bonasus</i>	Cownose ray	10	0.0	0.0	100.0
<i>Rachycentron canadum</i>	Cobia	8	50.0	50.0	0.0
<i>Menticirrhus littoralis</i>	Gulf kingfish	5	100.0	0.0	0.0
Dasyatidae	Stingray family	4	0.0	100.0	0.0
<i>Larimus fasciatus</i>	Banded drum	2	0.0	0.0	100.0
<i>Menticirrhus americanus</i>	Southern kingfish	4	100.0	0.0	0.0
<i>Cynoscion nothus</i>	Silver seatrout	3	0.0	0.0	100.0
<i>Pomatomus saltatrix</i>	Bluefish	2	50.0	0.0	50.0
<i>Scomberomorus maculatus</i>	Spanish mackerel	2	50.0	0.0	50.0
<i>Selene setapinnis</i>	Moonfish	2	0.0	0.0	100.0
Batrachoididae	Toadfish family	1	0.0	100.0	0.0
<i>Paralichthys lethostigma</i>	Southern flounder	1	100.0	0.0	0.0
<i>Rhinobatos lentiginosus</i>	Atlantic guitarfish	1	0.0	100.0	0.0
<i>Sciaenops ocellatus</i>	Red drum	1	0.0	100.0	0.0

Table 7. Total observed sink gillnet shark catches by species and species disposition in order of decreasing abundance for all trips targeting Spanish mackerel, 2007. Catch disposition by is by percent kept (Kept %), percent discard alive (D.A. %), and percent discard dead (D.D. %).

Species	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose	7	0.0	28.6	71.4
<i>Carcharhinus limbatus</i>	Blacktip	4	0.0	100.0	0.0
<i>Sphyrna tiburo</i>	Bonnethead	2	50.0	0.0	50.0
<i>Carcharhinus acronotus</i>	Blacknose	1	100.0	0.0	0.0



Table 8. Total observed sink gillnet teleost and ray catch by species and species disposition in order of decreasing abundance for all trips targeting Spanish mackerel, 2007. Catch disposition by is by percent kept (Kept %), percent discard alive (D.A. %), and percent discard dead (D.D. %).

Species	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Scomberomorus maculatus</i>	Spanish mackerel	920	99.7	0.0	0.3
<i>Peprilus burti</i>	Gulf butterfish	801	100.0	0.0	0.0
<i>Pomatomus saltatrix</i>	Bluefish	411	98.8	0.0	1.2
<i>Brevoortia smithi</i>	Yellowfin menhaden	110	97.3	0.0	2.7
<i>Peprilus alepidotus</i>	Harvestfish	14	100.0	0.0	0.0
<i>Caranx</i> sp.	Jack family	11	100.0	0.0	0.0
<i>Menticirrhus americanus</i>	Southern kingfish	8	100.0	0.0	0.0
<i>Micropogonias undulatus</i>	Gulf kingfish	4	100.0	0.0	0.0
<i>Archosargus probatocephalus</i>	Sheepshead	3	0.0	66.7	33.3
<i>Cynoscion</i> sp.	Seatrout family	3	100.0	0.0	0.0
<i>Chaetodipturus faber</i>	Spadefish	2	100.0	0.0	0.0
<i>Caranx chrysos</i>	Blue runner	2	100.0	0.0	0.0
<i>Selene setapinnis</i>	Moonfish	2	100.0	0.0	0.0
<i>Centropristis striata</i>	Banded drum	1	100.0	0.0	0.0
<i>Echeneis naucrates</i>	Sharksucker	1	0.0	100.0	0.0
<i>Lagodon rhomboides</i>	Pinfish	1	100.0	0.0	0.0
<i>Calamus leucosteus</i>	Whitebone porgy	1	0.0	100.0	0.0
<i>Paralichthys albigutta</i>	Southern flounder	1	0.0	0.0	100.0

Table 9. Total observed sink gillnet shark catches by species and species disposition in order of decreasing abundance for all trips targeting Atlantic croaker, 2007. Catch disposition by is by percent kept (Kept %), percent discard alive (D.A. %), and percent discard dead (D.D. %).

Species	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Squalus acanthias</i>	Spiny dogfish	381	0.0	100.0	0.0
<i>Mustelus canis</i>	Smooth dogfish	232	33.6	66.4	0.0

Table 10. Total observed sink gillnet teleost, skate, and invertebrate catch by species and species disposition in order of decreasing abundance for all trips targeting Atlantic croaker, 2007. Catch disposition by is by percent kept (Kept %), percent discard alive (D.A. %), and percent discard dead (D.D. %).

Species	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Micropogonias undulatus</i>	Atlantic croaker	18151	100.0	0.0	0.0
<i>Peprilus triacanthus</i>	Butterfish	158	100.0	0.0	0.0
<i>Brevoortia</i> sp.	Menhaden family	46	41.3	58.7	0.0
<i>Cynoscion</i> sp.	Seatrout family	9	11.1	88.9	0.0
<i>Alosa</i> sp.	Shad family	6	100.0	0.0	0.0
<i>Pomatomus saltatrix</i>	Bluefish	6	66.7	33.3	0.0
<i>Euthynnus alletteratus</i>	Little tunny	5	100.0	0.0	0.0
<i>Lophius piscatorius</i>	Monkfish	5	100.0	0.0	0.0
Rajiformes	Ray or skate order	2	0.0	100.0	0.0

Table 11. Total observed sink gillnet teleost catch by species and species disposition in order of decreasing abundance for all trips targeting species other than sharks, Spanish mackerel, or croaker, 2007. Catch disposition by is by percent kept (Kept %), percent discard alive (D.A. %), and percent discard dead (D.D. %).

Species	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Pomatomus saltatrix</i>	Bluefish	2207	99.9	0.1	0.0
<i>Micropogonias undulatus</i>	Atlantic croaker	256	100.0	0.0	0.0
<i>Brevoortia</i> sp.	Menhaden family	70	4.3	25.7	70.0
<i>Peprilus triacanthus</i>	Butterfish	47	98.0	2.0	0.0
<i>Scomberomorus maculatus</i>	Spanish mackerel	4	100.0	0.0	0.0
<i>Scomber scombrus</i>	Atlantic mackerel	3	100.0	0.0	0.0
<i>Peprilus alepidotus</i>	Harvestfish	3	100.0	0.0	0.0
<i>Leiostomus xanthurus</i>	Spot	1	0.0	100.0	0.0
<i>Caranx crysos</i>	Blue runner	1	0.0	0.0	100.0
<i>Alosa</i> sp.	Shad family	1	100.0	0.0	0.0
<i>Myliobatis</i> sp.	Eagle ray family	1	0.0	100.0	0.0
<i>Synodus foetens</i>	Inshore lizardfish	1	0.0	100.0	0.0

Table 12. Total observed sink gillnet shark catches by species and species disposition in order of decreasing abundance for all trips targeting species other than sharks, Spanish mackerel, or croaker, 2007. Catch disposition by is by percent kept (Kept %), percent discard alive (D.A. %), and percent discard dead (D.D. %).

Species	Common name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
<i>Squalus acanthias</i>	Spiny dogfish	129	0.0	100.0	0.0
<i>Mustelus canis</i>	Smooth dogfish	77	0.0	100.0	0.0
<i>Sphyrna tiburo</i>	Bonnethead	3	0.0	100.0	0.0
<i>Carcharhinus limbatus</i>	Blacktip	1	0.0	100.0	0.0
<i>Carcharhinus isodon</i>	Finetooth	1	100.0	0.0	0.0

Table 13. Average size (fork length, FL) and standard deviation (S.D.) of sharks measured for all observed trips by gear type and target species, 2007. Target species are listed as shark (SHX), Spanish mackerel (SMK), or Atlantic croaker (CRO).

Gear	Target	Species	N	Average FL (cm)	S.D.
Drift gillnet	SHX	<i>Carcharhinus limbatus</i>	1	62.0	0.0
		<i>Rhizoprionodon terraenovae</i>	36	72.4	6.7
Sink gillnet	SHX	<i>Carcharhinus acronotus</i>	48	99.6	8.8
		<i>Carcharhinus brevipinna</i>	1	80.0	0.0
		<i>Carcharhinus isodon</i>	32	101.7	13.4
		<i>Rhizoprionodon terraenovae</i>	10	76.0	13.3
		<i>Sphyrna tiburo</i>	9	83.1	13.4
Drift gillnet	SMK	<i>Rhizoprionodon terraenovae</i>	141	51.2	21.2
		<i>Sphyrna tiburo</i>	4	71.8	7.8
		<i>Sphyrna lewini</i>	2	62.5	0.7
Sink gillnet	SMK	<i>Rhizoprionodon terraenovae</i>	4	79.3	6.7
Sink gillnet	CRO	<i>Mustelus canis</i>	15	79.1	4.6
		<i>Squalus acanthias</i>	14	76.1	5.6

Table 14. Average size (fork length, FL) and standard deviation (S.D.) of non-sharks measured for all observed trips by gear type and target species, where N>5, 2007. Target species are listed as Spanish mackerel (SMK), Atlantic croaker (CRO).

Gear	Target	Species	N	Average FL (cm)	S.D.
Sink gillnet	CRO	<i>Micropogonias undulatus</i>	10	31.7	1.1
Sink gillnet	SMK & MIX	<i>Pomatomus saltatrix</i>	8	32.8	1.3
		<i>Scomberomorus maculatus</i>	13	42.7	5.0
Drift gillnet	SMK	<i>Scomberomorus maculatus</i>	579	43.0	4.7
		<i>Brevoortia tyrannus</i>	77	18.8	2.4
		<i>Larimus fasciatus</i>	14	12.8	1.2
		<i>Peprilus triacanthus</i>	44	13.8	2.1
		<i>Pomatomus saltatrix</i>	35	28.1	6.6

Table 15. Protected species interactions in the shark gillnet fishery for all observed trips, 2007. Target species are listed as shark (SHX) or Spanish mackerel (SMK).

Species	Landing Date	N Latitude	W Longitude	Disposition	Gear	Target Species
<i>Caretta caretta</i>	8/5/2007	30.4417	81.3247	Dead, fresh	Sink gillnet	SHX
<i>Caretta caretta</i>	8/5/2007	35.1952	75.7220	Alive, uninjured	Drift gillnet	SMK
<i>Caretta caretta</i>	8/14/2007	30.7326	81.3717	Alive, uninjured	Sink gillnet	SHX
<i>Caretta caretta</i>	8/14/2007	30.5067	81.3750	Alive, uninjured	Sink gillnet	SHX

Figure 1. Distribution of observed drift gillnets sets, 2007.

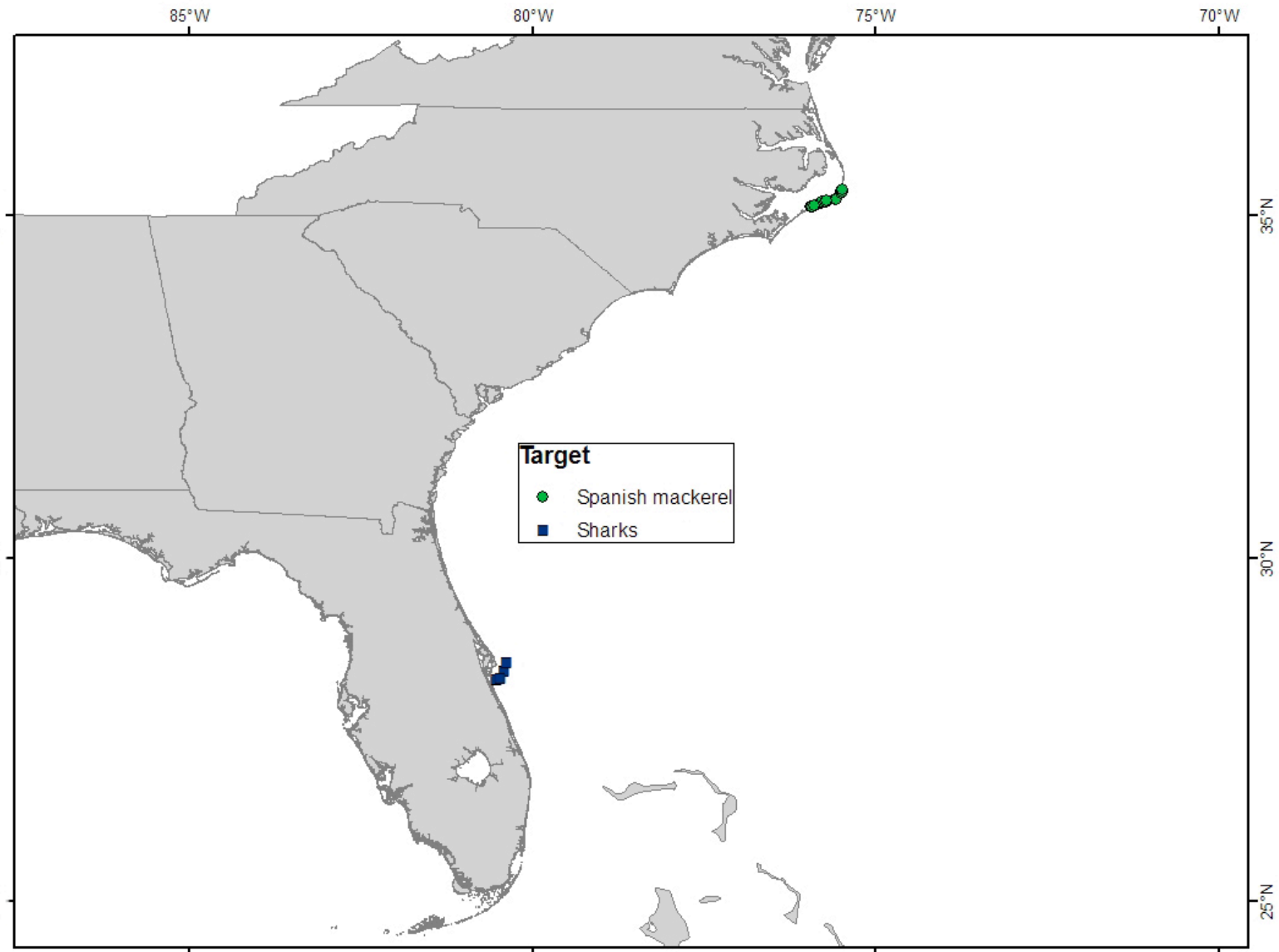


Figure 2. Distribution of observed sink gillnets sets, 2007.

