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Introduction

The shark drift gillnet fishery developed off the east coast of Florida and Georgia in the late 1980's. Initially, vessels in this fishery strike netted and drift netted for king mackerel, *Scomberomorus cavalla*, Spanish mackerel, *S. maculatus*, bluefish, *Pomotomus saltatrix*, and occasionally for sharks November through March. As the fishery developed, some fishers drift gillnetted for sharks October through April before and after the mackerel seasons (Schaefer et al., 1989; Parrack et al., 1992). By 1987, many fishers were drift gillnetting for king mackerel April through September to compensate for the reduction in quotas in the winter fisheries. However, as the king mackerel drift gillnet fishery was further restricted in 1990, more fishers began drift gillnetting for sharks during all times of the year (Trent et al., 1997). In 1999, some vessels involved in this fishery also began strike netting for sharks during winter months (Carlson and Lee, 1999). Originally, there were about 11 shark driftnet vessels operating between Cape Canaveral and Jacksonville, Florida, but currently only about 4 to 6 vessels fish drift or strike gillnets for sharks off the east coast of Florida.

Observations of the catch and bycatch from the east Florida-Georgia shark drift and strike gillnet fishery are required by law, and reports are prepared annually (i.e., Carlson and Bethea¹ and references therein). The shark driftnet observer program is currently structured to cover 100 % of drift and strike gillnetting effort in the southeast U.S. restricted area from November 15 to March 31. This was in response to The Atlantic Large Whale Take Reduction Plan and the Biological Opinion issued under Section 7 of the Endangered Species Act, focusing on the predominant fishing activity occurring in this area (drift gillnetting for sharks) and the risks this gear posed to the northern right whale, *Eubalaena glacialis*, during the calving season and sea turtle species year-round. Outside the right whale calving season (April 1 to November 14), an interim final rule (March 30, 2001; 66 FR 17370) to the Fishery Management Plan for Highly Migratory Species (i.e. tunas, billfish, sharks; 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 marine mammal or sea turtle interactions with an expected coefficient of variation of 0.3. Currently, coverage of 33-38 % of drift gillnetting in this area is required (Carlson and

¹ Carlson, J. K., and D.M. Bethea. 2005. The directed shark gillnet fishery: catch and bycatch, 2004. National Marine Fisheries Service Panama City Laboratory Contribution 05-01. Panama City, FL. 7 p.

Baremore²). In 2005, the observer program was expanded to include all vessels that have an active directed shark permit and fish with sink gillnet gear. These vessels were selected for observer coverage in an effort to determine their impact on shark resources when the fishing method is not drift or strike gillnet or not targeting sharks and to assess any potential risks to northern right whales and other protected species. These vessels were not previously subject to observer coverage because they were either targeting non-highly migratory species or were not fishing gillnets in a drift or strike fashion.

Herein, we summarize fishing effort and catch and bycatch in the shark gillnet fishery in 2005 and 2006.

Methods

Fishing Techniques

When a vessel fishes drift gillnet gear, the vessel sets the net in a straight line off the stern. The net soaks at the surface for a period of time, is inspected at various occasions during the soak, and is then hauled onto the vessel when the captain or crew feels the catch is adequate.

When a vessel fishes a strike gillnet, the vessel uses the net to encircle a school of sharks. The net generally fishes from the surface to the bottom to prevent sharks from escaping either under or over the net. This is done usually during daylight hours, using visual sighting of shark schools from the vessel and or a spotter plane. The gear is hauled back onto the vessel without much soak time. A complete description of drift and strike net boats, nets, and fishing techniques can be found in Trent et al. (1997).

All sink gillnets are fished on the bottom regardless of target species. Vessels fishing sink gillnet gear on the bottom are some of the same vessels in the shark drift gillnet fishery. The net is set off the stern of the vessel and checked by hand every 15 to 20 minutes. Large floats with drop lines are located at both ends of the gear. Vessels sometimes fish several sink gillnets at once.

² Carlson, J. K. and I. Baremore. 2002. The directed shark gillnet fishery: non-right whale season, 2002 (catch, bycatch and estimates of sample size). National Marine Fisheries Service/Southeast Fisheries Science Center/Sustainable Fisheries Division Contribution PCB 02/12. Panama City, FL. 10 p.

Observer protocol

During the 100% observer requirement period, observers are deployed in ports where the drift gillnet vessels are currently active. Observers board all drift or strike vessels for all trips during this time period. Outside the 100% requirement period, vessels were selected randomly from a pool of vessels that (1) had a current directed shark permit, (2) reported fishing for sharks with gillnet gear, and (3) reported greater than 25% of landings from sharks during the previous year.

The SEFSC observer coordinator issues selection letters requiring observer coverage seasonally. After the fisher made initial contact with the observer coordinator, an observer was deployed to the port where the vessel was currently active. As trips are generally daily, the observer covered the vessel for up to 10-14 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, 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 (see appendix 1 for sample data form). 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) in cm and sex were determined for each shark. Biological samples (e.g. vertebrae, reproductive organs, stomach) were removed and placed on ice after collection. Data are submitted to the NMFS/SEFSC Sustainable Fisheries Division on a weekly basis. The data are 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 gillnets

A total of 4 drift gillnet vessels were observed making 35 sets on 34 trips in 2005 and 2006. Sets were made from St. Augustine to Ft. Pierce, Florida (Figure 1). Vessels drift

gillnetting for sharks carried nets ranging from 182-2645 m long with depths of about 12 m. Stretched mesh sizes measured 12.7-25.4 cm. Setting of the gear averaged 0.3 hrs and was made in water depths averaging 20.9 m. Hauls averaged 3.3 hrs. The entire drift gillnetting process (time net was first set until time haul back was completed) averaged 10.2 hrs.

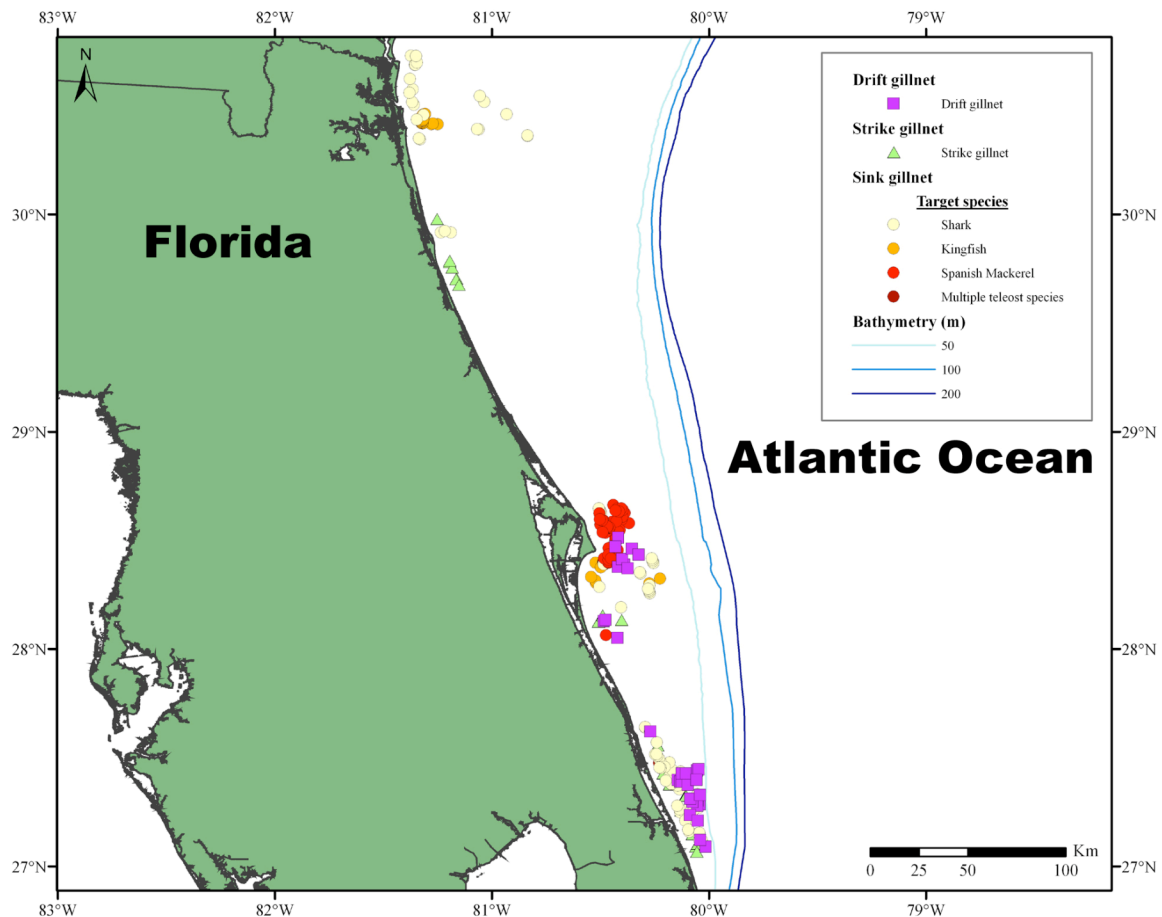


Figure 1. Distribution of observed strike, sink, and drift gillnet sets.

Drift gillnet catches observed

Total observed catch composition by number was 88.7 % shark, 10.8 % teleosts, 0.5% non-shark elasmobranchs, and 0.03 % protected resources (i.e. marine mammals, sea turtles, smalltooth sawfish).

Three species of sharks made up 91.3 % (by number) of the observed shark drift gillnet catch: Atlantic sharpnose, *Rhizoprionodon terraenovae*, blacktip, *Carcharhinus limbatus*, and

bonnethead shark, *Sphyrna tiburo* (Table 1). Two species of teleosts made up majority of the catch. These species were little tunny, *Euthynnus alletteratus*, and king mackerel. Cownose ray, *Rhinoptera bonasus*, spotted eagle ray, *Aetobatus narinari*, and manta ray, *Manta birostris*, were the non-shark elasmobranchs caught. One lobster, Family Nephropidae was caught. Four loggerhead sea turtles, *Caretta caretta*, and one leatherback sea turtle, *Dermochelys coriacea*, were encountered (Table 2).

Strike gillnets

A total of 8 strike gillnet vessels were observed making 84 sets on 106 trips in 2005 and 2006. The distribution of observed strike gillnet fishing effort is illustrated in Figure 1. Vessels strike gillnetting for sharks carried nets ranging from 14 to 1372 m long and 21 to 30 m deep. Stretched mesh sizes ranged from 22.9 to 30.4 cm. Setting of the gear averaged 0.1 hrs and was made in water depths averaging 21.2 m. Hauls averaged 0.9 hrs (± 0.7 S.D.). The entire strike gillnetting process (time net was first set until time haul back was completed) averaged 3.2 hrs.

Strike gillnet catches observed

Total observed catch composition by number for vessels strike gillnetting was 99.7 % shark, 0.15 % teleosts, 0.07 % non-shark elasmobranchs, and 0.04 % protected resources.

The blacktip, finetooth, *Carcharhinus isodon*, and spinner shark made up over 94 % of the observed shark strike net catch by number and weight (Table 3). Tarpon, *Megalops atlanticus*, and little tunny were the most often encountered teleosts. Cownose ray, spotted eagle ray, and manta ray were encountered. Four loggerhead sea turtles were caught (Table 4).

Sink gillnets

A total of 72 trips making 249 sink net sets on 11 vessels were observed in 2006. Of those, 37 trips making 96 sets targeted sharks. Other species observed targeted in 2005 and 2006 were kingfish, *Menticirrhus* spp., bluefish, *Pomatomus saltatrix*, little tunny, *Euthynnus alletteratus*, and spanish mackerel, *Scomberomorus maculatus*. Observed sink gillnet fishing effort is given in Figures 1 and 2.

Sink gillnet vessels that targeted sharks fished with nets 137 to 2051 m long and 2 to 8 m deep. Stretched mesh sizes utilized were 7.3-20.3 cm. For shark targeted sets, set duration

averaged 0.1 hrs (± 0.1 S.D.). Hauls averaged 1.1 hrs (± 1.0 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 6.1 hrs (± 6.5 S.D.). Sets were made in waters averaging 17.5 m (± 21.3 S.D.) deep.

When vessels targeted teleosts, nets ranged from 91.4 to 1828.8 m (300 to 600 ft) long. Stretched mesh sizes were 6.4-12.7 cm (2.5-5 in) with 8.9 cm (3.5 in) as the most frequently used mesh. Setting of the gear averaged 0.1 hrs (± 0.1 S.D.) and hauls averaged 0.6 hrs (± 0.4 S.D.). The entire process (time net was first set until time haul back was completed) averaged 2.3 hrs (± 1.4 S.D.).

Sink gillnet catches observed

Four main groups were targeted on observed sink gillnet vessels in 2005 and 2006: (1) shark, (2) Spanish mackerel (3) kingfish, and (4) multiple teleost species at the same time (e.g., bluefish, little tunny, and blue runner, *Caranx crysos*).

Observed catch composition of sink gillnet vessels targeting sharks was 79.3 % shark, 17.6 % teleosts, 3.1 % non-shark elasmobranchs, and 0.02 % protected resources. Shark catches were primarily Atlantic sharpnose, blacktip, bonnethead, blacknose and finetooth shark (Table 5). Little tunny, king mackerel, bluefish, and banded drum, *Larimus fasciatus*, made up majority of the teleost catch. Non-shark elasmobranchs caught were Atlantic guitarfish, *Rhinobatus lentiginosus*, cownose ray, clearnose skate, manta ray, and spotted eagle ray. One loggerhead sea turtle was encountered (Table 6).

Observed catch of vessels targeting Spanish mackerel was 10.4 % shark, 89.5 % teleosts, 0.02 % non-shark elasmobranchs, and 0.0 % protected resources. Shark catches were mostly Atlantic sharpnose, bonnethead, and spinner shark (Table 7). Spanish mackerel, Atlantic bumper, *Chloroscombrus chrysurus*, Atlantic lookdown, *Selene setapinnis*, and blue runner made up majority of the teleost catch. Cownose ray and Atlantic guitarfish were the only non-shark elasmobranch species caught (Table 8).

Sink gillnet vessels targeting kingfish caught 3.9 % shark, 90.5 % teleosts, 6.1 % non-shark elasmobranchs, and 0.0 % protected resources. Atlantic sharpnose and bonnethead were the most frequently encountered shark species (Table 9). *Menticirrhus* sp. and spot, *Leiostomus xanthurus*, made up majority of the catch. Clearnose skate, bullnose ray, *Myliobatis freminvillei*,

and spotted eagle ray were the non-shark elasmobranchs caught. Five blue crabs, *Callinectes sapidus*, were collected (Table 10).

Vessels that fished with sink gillnet while targeting multiple teleost species at the same time caught 2.0 % shark, 98.0 % teleosts, 0.0 % non-shark elasmobranchs, and 0.0 % protected resources. Shark catches were made up of three species: Atlantic sharpnose, smooth dogfish, *Mustelus canis*, and blacknose shark (Table 11). Teleost catches were dominated by bluefish and little tunny (Table 12).

Average size

In 2005 and 2006, sharks were measured for fork length (FL) in cm on drift, strike, and sink gillnet vessels targeting shark and sink gillnet vessels targeting Spanish mackerel. The average (\pm S.D.) lengths of shark species measured by gear type and target species can be found in Table 13.

Protected resources interactions

Interactions with protected resources were observed in 2005 and 2006 (Table 14). Four loggerhead sea turtles (3 released alive, 1 assumed dead) and one leatherback sea turtle (released alive) were observed caught in drift gillnet gear in 2005. Three loggerhead sea turtles (two released alive, 1 assumed dead) were observed caught on vessels fishing with strike gillnet gear targeting shark in 2006.

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Table 1. Total directed driftnet shark catch by species and species disposition in order of decreasing abundance for all observed trips, 2005-2006

Species	Common Name	Total Number Caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose	11,320	98.7	>0.1	1.3
<i>Carcharhinus limbatus</i>	Blacktip	2583	95.9	1.6	2.5
<i>Sphyrna tiburo</i>	Bonnethead	567	98.4	0.0	1.6
<i>Carcharhinus brevipinna</i>	Spinner	474	94.1	2.1	3.8
<i>Carcharhinus isodon</i>	Finetooth	413	95.6	0.0	4.4
<i>Carcharhinus acronotus</i>	Blacknose	407	99.5	0.0	0.5
<i>Sphyrna lewini</i>	Scalloped hammerhead	77	85.7	2.6	11.7
<i>Sphyrna mokarran</i>	Great hammerhead	11	63.6	18.2	18.2
<i>Carcharhinus falciformis</i>	Silky	2	100.0	0.0	0.0
<i>Carcharhinus leucas</i>	Bull	1	100.0	0.0	0.0
<i>Carcharodon carcharias</i>	White	1	0.0	0.0	100.0

Table 2. Total driftnet non-shark catch caught by species in order of decreasing abundance and species disposition for all observed trips, 2005-2006

Species	Common name	Total number caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
<i>Euthynnus alletteratus</i>	Little tunny	1008	99.6	0.0	0.4
<i>Scomberomorus cavalla</i>	King mackerel	597	47.9	0.7	51.4
<i>Rachycentron canadum</i>	Cobia	95	86.3	3.2	10.5
Sphyraenidae	Barracudas	89	100.0	0.0	0.0
<i>Rhinoptera bonasus</i>	Cownose ray	65	0.0	76.9	23.1
<i>Selene setapinnis</i>	Atlantic moonfish	35	2.9	0.0	97.1
<i>Istiophorus platypterus</i>	Sailfish	25	0.0	0.0	100.0
<i>Pomatomus saltatrix</i>	Bluefish	24	95.8	4.2	0.0
<i>Sphyraena barracuda</i>	Great barracuda	17	100.0	0.0	0.0
<i>Scomberomorus maculatus</i>	Spanish mackerel	11	100.0	0.0	0.0
Echeneidae	Remoras	8	0.0	62.5	37.5
<i>Megalops atlanticus</i>	Tarpon	7	0.0	0.0	100.0
<i>Aetobatus narinari</i>	Spotted eagle ray	6	0.0	100.0	0.0
<i>Caretta caretta</i>	Loggerhead seaturtle	4	0.0	75.0	25.0
<i>Coryphaena hippurus</i>	Common dolphinfish	4	100.0	0.0	0.0
<i>Manta birostris</i>	Atlantic manta ray	4	0.0	100.0	0.0
<i>Thunnus atlanticus</i>	Blackfin tuna	3	100.0	0.0	0.0
<i>Acanthocybium solanderi</i>	Wahoo	2	100.0	0.0	0.0
Carangidae	Jacks	1	100.0	0.0	0.0
<i>Caranx crysos</i>	Blue runner	1	100.0	0.0	0.0
<i>Caranx hippos</i>	Crevalle jack	1	100.0	0.0	0.0
<i>Dermochelys coriacea</i>	Leatherback seaturtle	1	0.0	100.0	0.0
<i>Lobotes surinamensis</i>	Tripletail	1	100.0	0.0	0.0
Nephropidae	Lobsters	1	100.0	0.0	0.0

Table 3. Total strikenet shark catch by species and species disposition in order of decreasing abundance for all observed trips, 2005-2006

Species	Common name	Total number caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
<i>Carcharhinus limbatus</i>	Blacktip	9831	89.5	0.2	10.3
<i>Carcharhinus isodon</i>	Finetooth	1687	100.0	0.0	0.0
<i>Carcharhinus brevipinna</i>	Spinner	1108	100.0	0.0	0.0
<i>Carcharhinus acronotus</i>	Blacknose	541	100.0	0.0	0.0
<i>Carcharhinus obscurus</i>	Dusky	20	0.0	25.0	75.0
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose	7	100.0	0.0	0.0
<i>Sphyrna lewini</i>	Scalloped hammerhead	7	71.4	0.0	28.6
<i>Sphyrna tiburo</i>	Bonnethead	3	100.0	0.0	0.0
<i>Carcharhinus leucas</i>	Bull	2	100.0	0.0	0.0
<i>Ginglymostoma cirratum</i>	Nurse	1	100.0	0.0	0.0

Table 4. Total strikenet non-shark catch by species and species disposition in order of decreasing abundance for all observed trips, 2005-2006

Species	Common name	Total number caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
<i>Megalops atlanticus</i>	Tarpon	5	0.0	0.0	100.0
<i>Thunnus atlanticus</i>	Blackfin tuna	5	100.0	0.0	0.0
<i>Caretta caretta</i>	Loggerhead turtle	4	0.0	75.0	25.0
<i>Manta birostris</i>	Atlantic manta ray	4	0.0	100.0	0.0
<i>Rachycentron canadum</i>	Cobia	3	66.7	0.0	33.3
<i>Rhinoptera bonasus</i>	Cownose ray	3	0.0	33.3	66.7
<i>Aetobatus narinari</i>	Spotted eagle ray	2	0.0	100.0	0.0
<i>Sciaenops ocellatus</i>	Red drum	2	0.0	50.0	50.0
<i>Anclopsetta quadrocellata</i>	Ocellated flounder	1	0.0	0.0	100.0
<i>Caranx hippos</i>	Crevalle jack	1	100.0	0.0	0.0
Echeneidae	Remoras	1	0.0	0.0	100.0
<i>Paralichthys lethostigma</i>	Southern flounder	1	100.0	0.0	0.0
Sphyraenidae	Barracudas	1	0.0	0.0	100.0

Table 5. Total observed sinknet shark catch by species and species disposition in order of decreasing abundance for all trips targeting sharks, 2005-2006

Species	Common name	Total number caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose	2245	99.5	0.1	0.4
<i>Sphyrna tiburo</i>	Bonnethead	892	89.6	3.7	6.7
<i>Carcharhinus limbatus</i>	Blacktip	767	72.9	6.4	20.7
<i>Carcharhinus acronotus</i>	Blacknose	346	100.0	0.0	0.0
<i>Carcharhinus isodon</i>	Finetooth	199	98.5	1.0	0.5
<i>Sphyrna lewini</i>	Scalloped hammerhead	97	38.1	26.8	35.1
<i>Carcharhinus brevipinna</i>	Spinner	39	48.7	28.2	23.1
<i>Mustelus canis</i>	Smooth dogfish	23	69.6	30.4	0.0
<i>Galeocerdo cuvieri</i>	Tiger	10	20.0	70.0	10.0
<i>Carcharhinus falciformis</i>	Silky	3	0.0	33.3	66.7
<i>Carcharhinus obscurus</i>	Dusky	1	0.0	0.0	100.0
<i>Carcharhinus plumbeus</i>	Sandbar	1	0.0	0.0	100.0
<i>Carcharias taurus</i>	Sand tiger	1	0.0	100.0	0.0
<i>Ginglymostoma cirratum</i>	Nurse	1	0.0	100.0	0.0
<i>Negaprion brevirostris</i>	Lemon	1	0.0	100.0	0.0
<i>Squatina dumerili</i>	Atlantic angel	1	0.0	100.0	0.0

Table 6. Total observed sinknet non-shark catch by species and species disposition in order of decreasing abundance for all trips targeting sharks, 2005-2006

Species	Common name	Total number caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
<i>Euthynnus alletteratus</i>	Little tunny	162	97.5	0.0	2.5
<i>Scomberomorus cavalla</i>	King mackerel	115	44.3	0.0	55.7
<i>Pomatomus saltatrix</i>	Bluefish	109	78.9	2.8	18.3
<i>Larimus fasciatus</i>	Banded drum	75	0.0	22.7	77.3
<i>Rhinobatos lentiginosus</i>	Atlantic guitarfish	67	100.0	0.0	0.0
<i>Menticirrhus saxatilis</i>	Northern kingfish	65	90.8	0.0	9.2
<i>Rhinoptera bonasus</i>	Cownose ray	63	0.0	100.0	0.0
<i>Rachycentron canadum</i>	Cobia	53	32.0	34.0	34.0
<i>Raja eglanteria</i>	Clearnose skate	47	14.9	85.1	0.0
<i>Scomberomorus maculatus</i>	Spanish mackerel	40	97.5	0.0	2.5
<i>Paralichthys albigutta</i>	Gulf flounder	38	73.7	26.3	0.0
<i>Arius felis</i>	Hard head catfish	34	0.0	76.5	23.5
<i>Calamus leucosteus</i>	Whitebone porgy	31	90.3	9.7	0.0
<i>Paralichthys lethostigma</i>	Southern flounder	27	100.0	0.0	0.0
<i>Leiostomus xanthurus</i>	Spot	26	92.3	0.0	7.7
<i>Caranx hippos</i>	Crevalle jack	24	100.0	0.0	0.0
<i>Menticirrhus americanus</i>	Southern kingish	23	100.0	0.0	0.0
<i>Cynoscion regalis</i>	Weakfish	18	55.6	11.1	33.3
<i>Selene setapinnis</i>	Atlantic moonfish	17	88.2	11.8	0.0
<i>Chaetodipterus faber</i>	Spadefish	16	18.8	43.7	37.5
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	13	0.0	53.8	46.2

Table 6. Con't.

Species	Common name	Total number caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
Sphyraenidae	Baracudas	12	100.0	0.0	0.0
<i>Lutjanus campechanus</i>	Red snapper	11	18.2	45.4	36.4
<i>Peprilus alepidotus</i>	Harvestfish	11	90.9	0.0	9.1
<i>Bagre marinus</i>	Gafftopsail catfish	9	11.1	0.0	88.9
<i>Lactophrys quadricornis</i>	Scrawled cowfish	8	50.0	50.0	0.0
<i>Synodus feotens</i>	Inshore lizardfish	8	100.0	0.0	0.0
<i>Sciaenops ocellatus</i>	Red drum	7	0.0	100.0	0.0
<i>Caranx crysos</i>	Blue runner	6	100.0	0.0	0.0
<i>Centropristis striata</i>	Black sea bass	5	0.0	40.0	60.0
Echeneidae	Remoras	5	0.0	60.0	40.0
<i>Calamus proridens</i>	Littlehead porgy	4	75.0	25.0	0.0
<i>Lutjanus analis</i>	Mutton snapper	4	100.0	0.0	0.0
<i>Pogonias cromis</i>	Black drum	4	0.0	75.0	25.0
<i>Archosargus probatocephalus</i>	Sheepshead	3	100.0	0.0	0.0
<i>Elops saurus</i>	Ladyfish	3	100.0	0.0	0.0
<i>Hippocampus erectus</i>	Lined seahorse	3	0.0	100.0	0.0
<i>Mycteroperca bonaci</i>	Black grouper	3	66.7	33.3	0.0
Sparidae	Porgies	3	0.0	33.3	66.7
<i>Aluterus monoceros</i>	Unicorn filefish	2	50.0	0.0	50.0
<i>Calamus bajonado</i>	Jolthead porgy	2	100.0	0.0	0.0
<i>Dasyatis sabina</i>	Southern stingray	2	0.0	100.0	0.0
<i>Epinephelus morio</i>	Red grouper	2	100.0	0.0	0.0
<i>Haemulon album</i>	Margaret grunt	2	0.0	0.0	100.0
<i>Haemulon aurolineatum</i>	Tomtate grunt	2	50.0	0.0	50.0
<i>Myliobatis</i> sp.	Manta ray	2	0.0	100.0	0.0

Table 6. Con't.

Species	Common name	Total number caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
Ogcocephalidae	Batfishes	2	0.0	100.0	0.0
<i>Aetobatus narinari</i>	Spotted eagle ray	1	0.0	100.0	0.0
<i>Alectis ciliaris</i>	African pompano	1	100.0	0.0	0.0
<i>Calamus calamus</i>	Saucereye porgy	1	0.0	100.0	0.0
<i>Caretta caretta</i>	Loggerhead sea turtle	1	0.0	100.0	0.0
Clupeidae	Herrings	1	0.0	0.0	100.0
<i>Cynoscion nothus</i>	Silver seatrout	1	0.0	0.0	100.0
<i>Haemulon sciurus</i>	Bluestriped grunt	1	100.0	0.0	0.0
<i>Lobotes surinamensis</i>	Tripletail	1	100.0	0.0	0.0
<i>Lutjanus griseus</i>	Grey snapper	1	100.0	0.0	0.0
<i>Lutjanus vivanus</i>	Silk snapper	1	0.0	0.0	100.0
<i>Menticirrhus</i> sp.	Kingfish	1	0.0	100.0	0.0
<i>Mycteroperca phenax</i>	Scamp	1	0.0	0.0	100.0
<i>Neomerinthe hemingwayi</i>	Spinycheek scorpionfish	1	0.0	100.0	0.0
<i>Ogcocephalus radiatus</i>	Polka-dot batfish	1	0.0	0.0	100.0
<i>Remora remora</i>	Remora	1	0.0	0.0	100.0
<i>Rhomboplites aurorubens</i>	Vermillion snapper	1	0.0	100.0	0.0
<i>Seriola dumerili</i>	Greater amberjack	1	100.0	0.0	0.0
<i>Sphyrnaena barracuda</i>	Great barracuda	1	100.0	0.0	0.0
<i>Trichiurus lepturus</i>	Atlantic cutlassfish	1	100.0	0.0	0.0

Table 7. Total observed sinknet shark catches by species and species disposition in order of decreasing abundance for all trips targeting Spanish mackerel, 2005-2006

Species	Common name	Total number caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose	1440	57.0	12.1	30.9
<i>Sphyrna tiburo</i>	Bonnethead	650	56.6	3.1	40.3
<i>Carcharhinus brevipinna</i>	Spinner	75	37.4	41.3	21.3
<i>Sphyrna lewini</i>	Scalloped hammerhead	13	61.5	23.1	15.4
<i>Carcharhinus acronotus</i>	Blacknose	7	100.0	0.0	0.0
<i>Carcharhinus limbatus</i>	Blacktip	7	28.6	14.3	57.1
<i>Carcharhinus isodon</i>	Finetooth	1	100.0	0.0	0.0

Table 8. Total observed sinknet non-shark catch by species and species disposition in order of decreasing abundance for all trips targeting Spanish mackerel, 2005-2006

Species	Common name	Total number caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
<i>Scomberomorus maculatus</i>	Spanish mackerel	11,862	98.3	0.0	1.7
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	1864	96.6	0.8	2.6
<i>Selene setapinnis</i>	Atlantic moonfish	1088	95.0	1.8	3.2
<i>Caranx crysos</i>	Blue runner	1046	100.0	0.0	0.0
<i>Pomatomus saltatrix</i>	Bluefish	828	86.2	0.2	13.6
<i>Brevoortia smithi</i>	Yellowfin menhaden	458	1.5	0.0	98.5
<i>Chaetodipterus faber</i>	Spadefish	299	51.5	5.0	43.5
<i>Menticirrhus americanus</i>	Southern kingfish	204	98.5	0.0	1.5
<i>Micropogonias undulatus</i>	Atlantic croaker	192	100.0	0.0	0.0
<i>Elops saurus</i>	Ladyfish	110	87.3	4.5	8.2
<i>Selene vomer</i>	Lookdown	96	86.5	1.0	12.5
<i>Peprilus alepidotus</i>	Harvestfish	91	95.6	0.0	4.4
Balistidae	Leatherjackets	82	100.0	0.0	0.0
<i>Trichiurus lepturus</i>	Atlantic cutlassfish	76	40.8	3.9	55.3
<i>Cynoscion regalis</i>	Weakfish	58	91.4	5.2	3.4
<i>Larimus fasciatus</i>	Banded drum	53	0.0	1.9	98.1
<i>Synodus foetens</i>	Inshore lizardfish	39	20.5	5.1	74.3
<i>Scomberomorus cavalla</i>	King mackerel	36	25.0	2.8	72.2
<i>Leiostomus xanthurus</i>	Spot	28	75.0	0.0	25.0
<i>Peprilus burti</i>	Gulf butterfish	26	96.2	0.0	3.8
<i>Caranx hippos</i>	Crevalle jack	22	90.9	9.1	0.0
<i>Peprilus triacanthus</i>	Butterfish	22	40.9	9.1	50.0
<i>Arius felis</i>	Hard head catfish	18	0.0	83.3	16.7

Table 8. Con't.

Species	Common name	Total number caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
<i>Opisthonema oglinum</i>	Atlantic thread herring	13	0.0	15.4	84.6
<i>Trachinotus carolinus</i>	Florida pompano	10	0.0	100.0	0.0
<i>Rachycentron canadum</i>	Cobia	9	44.5	33.3	22.2
<i>Euthynnus alletteratus</i>	Little tunny	5	100.0	0.0	0.0
<i>Lutjanus campechanus</i>	Red snapper	5	0.0	0.0	100.0
<i>Prionotus</i> sp.	Searobin	5	0.0	40.0	60.0
Echeneidae	Remoras	4	0.0	50.0	50.0
<i>Trachinocephalus myops</i>	Snakefish	4	0.0	0.0	100.0
<i>Rhinoptera bonasus</i>	Cownose ray	3	0.0	33.3	66.7
<i>Bagre marinus</i>	Gafftopsail catfish	2	100.0	0.0	0.0
<i>Citharichthys spilopterus</i>	Bay wiff	2	100.0	0.0	0.0
<i>Menticirrhus littoralis</i>	Gulf kingfish	2	100.0	0.0	0.0
<i>Paralichthys</i> sp.	Flounder	2	50.0	50.0	0.0
<i>Alectis ciliaris</i>	African pompano	1	0.0	100.0	0.0
<i>Anclpsetta quadrocellata</i>	Ocellated flounder	1	0.0	100.0	0.0
<i>Centropristis striata</i>	Black sea bass	1	0.0	100.0	0.0
<i>Cynoscion nothus</i>	Silver seatrout	1	0.0	100.0	0.0
<i>Haemulon aurolineatum</i>	Tomtate	1	0.0	100.0	0.0
<i>Lutjanus griseus</i>	Grey snapper	1	100.0	0.0	0.0
<i>Megalops atlanticus</i>	Tarpon	1	0.0	0.0	100.0
<i>Prionotus scitulus</i>	Leopard searobin	1	0.0	0.0	100.0
<i>Rhinobatus lentiginosus</i>	Atlantic guitarfish	1	0.0	100.0	0.0
<i>Sphyaena barracuda</i>	Great barracuda	1	100.0	0.0	0.0

Table 9. Total observed sinknet shark catches by species and species disposition in order of decreasing abundance for all trips targeting kingfish, 2005-2006

Species	Common name	Total number caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose	893	55.9	8.5	35.6
<i>Sphyrna tiburo</i>	Bonnethead	116	76.7	13.0	10.3
<i>Carcharhinus limbatus</i>	Blacktip	21	66.7	33.3	0.0
<i>Carcharhinus acronotus</i>	Blacknose	14	100.0	0.0	0.0
<i>Carcharhinus isodon</i>	Finetooth	13	100.0	0.0	0.0
<i>Mustelus canis</i>	Smooth dogfish	11	72.7	18.2	9.1
<i>Sphyrna lewini</i>	Scalloped hammerhead	10	0.0	80.0	20.0
<i>Galeocerdo cuvieri</i>	Tiger	1	0.0	100.0	0.0

Table 10. Total observed sinknet non-shark catch by species and species disposition in order of decreasing abundance for all trips targeting kingfish, 2005-2006

Species	Common name	Total number caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
<i>Menticirrhus</i> sp.	Kingfish	14,702	89.2	0.0	10.8
<i>Leiostomus xanthurus</i>	Spot	6198	99.0	0.0	1.0
<i>Menticirrhus saxatilis</i>	Northern kingfish	3725	100.0	0.0	0.0
<i>Peprilus triacanthus</i>	Butterfish	503	100.0	0.0	0.0
<i>Larimus fasciatus</i>	Banded drum	278	83.1	7.6	9.3
<i>Menticirrhus americanus</i>	Southern kingfish	259	99.2	0.0	0.8
<i>Pomatomus saltatrix</i>	Bluefish	187	100.0	0.0	0.0
<i>Cynoscion regalis</i>	Weakfish	177	95.5	3.4	1.1
<i>Brevoortia smithi</i>	Yellowfin menhaden	112	27.7	9.8	62.5
<i>Brevoortia tyranus</i>	Atlantic menhaden	82	97.6	2.4	0.0
<i>Menticirrhus littoralis</i>	Gulf kingfish	82	100.0	0.0	0.0
<i>Scomberomorus maculatus</i>	Spanish mackerel	74	86.5	1.3	12.2
<i>Peprilus burti</i>	Gulf butterfish	50	100.0	0.0	0.0
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	45	0.0	37.8	62.2
<i>Caranx crysos</i>	Blue runner	32	100.0	0.0	0.0
<i>Cynoscion nothus</i>	Silver seatrout	21	0.0	0.0	100.0
<i>Caranx hippos</i>	Crevalle jack	19	100.0	0.0	0.0
<i>Micropogonias undulatus</i>	Atlantic croaker	19	89.5	0.0	10.5
<i>Raja eglanteria</i>	Clearnose skate	16	93.8	6.2	0.0
<i>Paralichthys lithostigma</i>	Southern flounder	14	100.0	0.0	0.0
<i>Bagre marinus</i>	Gafftopsail catfish	10	0.0	0.0	100.0
<i>Centropristis striata</i>	Black sea bass	7	0.0	0.0	100.0
<i>Euthynnus alletteratus</i>	Little tunny	7	100.0	0.0	0.0

Table 10. Con't.

Species	Common name	Total number caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
<i>Selene vomer</i>	Lookdown	6	0.0	50.0	50.0
<i>Callinectes sapidus</i>	Blue crab	5	0.0	100.0	0.0
<i>Myliobatis freminvillei</i>	Bullnose ray	5	0.0	80.0	20.0
<i>Scomberomorus cavalla</i>	King mackerel	5	0.0	40.0	60.0
<i>Chaetodipterus faber</i>	Harvestfish	3	0.0	0.0	100.0
<i>Orthopristis chrysoptera</i>	Pigfish	3	100.0	0.0	0.0
<i>Prionotus</i> sp.	Searobins	3	0.0	100.0	0.0
<i>Haemulon aurolineatum</i>	Tomtate grunt	2	0.0	0.0	100.0
<i>Trachinocephalus myops</i>	Snakefish	2	100.0	0.0	0.0
<i>Aetobatus narinari</i>	Spotted eagle ray	1	0.0	100.0	0.0
<i>Archosargus probatocephalus</i>	Sheepshead	1	100.0	0.0	0.0
<i>Echeneis naucrates</i>	Sharksucker	1	0.0	100.0	0.0
<i>Elops saurus</i>	Ladyfish	1	100.0	0.0	0.0
<i>Equetus umbrosus</i>	Cubbyu	1	0.0	0.0	100.0
<i>Haemulon album</i>	White margate	1	0.0	0.0	100.0
<i>Peprilus alepidotus</i>	Harvestfish	1	100.0	0.0	0.0
<i>Rachycentron canadum</i>	Cobia	1	0.0	0.0	100.0
<i>Selene setapinnis</i>	Atlantic moonfish	1	0.0	0.0	100.0
<i>Synodus foetens</i>	Inshore lizardfish	1	0.0	0.0	100.0

Table 11. Total observed sinknet shark catches by species and species disposition in order of decreasing abundance for all trips targeting species other than Spanish mackerel or kingfish, 2005-2006

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose	4	50.0	50.0	0.0
<i>Mustelus canis</i>	Smooth dogfish	2	0.0	0.0	100.0
<i>Carcharhinus acronotus</i>	Blacknose	1	100.0	0.0	0.0

Table 12. Total observed sinknet non-shark catch by species and species disposition in order of decreasing abundance for all trips targeting species other than Spanish mackerel or kingfish, 2005-2006

Species	Common name	Total number caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
<i>Pomatomus saltatrix</i>	Bluefish	257	85.6	6.2	8.2
<i>Euthynnus alletteratus</i>	Little tunny	23	100.0	0.0	0.0
<i>Leiostomus xanthurus</i>	Spot	15	100.0	0.0	0.0
<i>Cynoscion nothus</i>	Silver seatrout	9	0.0	33.3	66.7
<i>Larimus fasciatus</i>	Banded drum	7	0.0	71.4	28.6
<i>Brevoortia smithi</i>	Yellowfin menhaden	5	0.0	20.0	80.0
<i>Menticirrhus americanus</i>	Southern kingfish	5	100.0	0.0	0.0
<i>Caranx crysos</i>	Crevalle jack	4	100.0	0.0	0.0
<i>Peprilus aepidotus</i>	Harvestfish	3	100.0	0.0	0.0
<i>Scomberomorus cavalla</i>	King mackerel	3	100.0	0.0	0.0
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	2	100.0	0.0	0.0
<i>Cynoscion regalis</i>	Weakfish	1	100.0	0.0	0.0
<i>Micropogonias undulatus</i>	Atlantic croaker	1	100.0	0.0	0.0
<i>Scomberomorus maculatus</i>	Spanish mackerel	1	100.0	0.0	0.0

Table 13. Average size and standard deviation (S.D.) of sharks measured for all observed trips by gear type and target species, 2005-2006. Species are listed alphabetically by scientific name. N = number of sharks measured.

Gear Type	Target	Species	N	Average Size (cm FL)	S.D.
Drift net	Shark	<i>Carcharhinus acronotus</i>	2	54.5	3.5
		<i>Carcharhinus brevipinna</i>	1	114.0	--
		<i>Carcharhinus isodon</i>	6	130.8	8.8
		<i>Carcharhinus leucas</i>	2	121.5	60.1
		<i>Carcharhinus limbatus</i>	61	88.4	18.8
		<i>Rhizoprionodon terraenovae</i>	383	76.4	7.9
		<i>Sphyrna lewini</i>	15	84.0	20.7
		<i>Sphyrna tiburo</i>	10	79.5	8.7
Strike net	Shark	<i>Carcharhinus acronotus</i>	31	112.5	5.4
		<i>Carcharhinus brevipinna</i>	200	132.1	26.5
		<i>Carcharhinus isodon</i>	46	121.3	7.2
		<i>Carcharhinus leucas</i>	1	161.0	--
		<i>Carcharhinus limbatus</i>	746	124.7	20.4
		<i>Sphyrna lewini</i>	21	107.9	21.3
		<i>Sphyrna tiburo</i>	1	95.0	--
		Sink net	Shark	<i>Carcharhinus acronotus</i>	35
<i>Carcharhinus isodon</i>	31			100.8	14.4
<i>Carcharhinus limbatus</i>	99			95.7	18.1
<i>Galeocerdo cuvieri</i>	3			72.0	0.0
<i>Mustelus canis</i>	3			78.0	0.0
<i>Rhizoprionodon terraenovae</i>	1017			78.1	8.7
<i>Sphyrna lewini</i>	16			76.8	33.1
<i>Sphyrna tiburo</i>	98			85.0	13.1
Sink net	Spanish mackerel	<i>Carcharhinus acronotus</i>	8	64.5	15.5
		<i>Carcharhinus limbatus</i>	2	72.0	0.0
		<i>Rhizoprionodon terraenovae</i>	271	67.5	10.5
		<i>Sphyrna lewini</i>	10	89.2	8.2
		<i>Sphyrna tiburo</i>	114	60.8	15.4
Sink net	Kingfish	<i>Carcharhinus acronotus</i>	11	93.0	0.0
		<i>Carcharhinus isodon</i>	84	120.9	14.8
		<i>Galeocerdo cuvieri</i>	2	72.0	0.0
		<i>Mustelus canis</i>	6	55.0	0.0
		<i>Rhizoprionodon terraenovae</i>	374	72.2	15.2
		<i>Sphyrna tiburo</i>	483	77.5	13.8

Table 14. Protected species interactions in the shark gillnet fishery for all observed trips, 2005-2006

Species	Landing Date	Latitude	Longitude	Disposition	Gear	Target Species
<i>Caretta caretta</i>	1/27/2005	27° 17.1' N	080° 09.2' W	Alive, Uninjured	Strike net	Shark
<i>Caretta caretta</i>	2/05/2005	27° 29.7' N	080° 10.3' W	Alive, Uninjured	Drift net	Shark
<i>Caretta caretta</i>	2/09/2005	27° 27.8' N	080° 07.1' W	Alive, Uninjured	Drift net	Shark
<i>Dermochelys coriacea</i>	2/15/2005	27° 26.4' N	080° 09.3' W	Alive, Uninjured	Drift net	Shark
<i>Caretta caretta</i>	2/21/2005	27° 40.9' N	080° 18.5' W	Alive, Uninjured	Drift net	Shark
<i>Caretta caretta</i>	2/21/2005	27° 40.9' N	080° 18.5' W	Dead	Drift net	Shark
<i>Caretta caretta</i>	9/24/2005	27° 23.9' N	080° 06.5' W	Alive, Uninjured	Sink net	Shark
<i>Caretta caretta</i>	1/12/2006	27° 06.3' N	080° 03.2' W	Alive, Uninjured	Strike net	Shark
<i>Caretta caretta</i>	2/17/2006	27° 19.6' N	080° 06.4' W	Dead	Strike net	Shark
<i>Caretta caretta</i>	3/01/2006	27° 25.6' N	080° 07.1' W	Alive, Uninjured	Strike net	Shark