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CATCH AND BYCATCH IN THE SHARK GILLNET FISHERY: 2005-2006

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JOHN K. CARLSON
AND
DANA M. BETHEA

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
Panama City Laboratory
3500 Delwood Beach Rd.
Panama City, FL 32408

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U. S. DEPARTMENT OF COMMERCE
Donald L. Evans, Secretary

National Oceanic and Atmospheric Administration
Conrad C. Lautenbacher, Jr., Under Secretary for Oceans and Atmosphere

National Marine Fisheries Service
William T. Hogarth, Assistant Administrator for Fisheries

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Copies may be obtained by writing:

John Carlson, Ph.D.
Research Fishery Biologist
National Marine Fisheries Service
Panama City Laboratory
3500 Delwood Beach Rd.
Panama City, FL 32408
Voice: 850-234-6541 ext. 221
FAX: 850-235-3559

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). 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. 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 Bethea[1] 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.

Baremore[2]). 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.

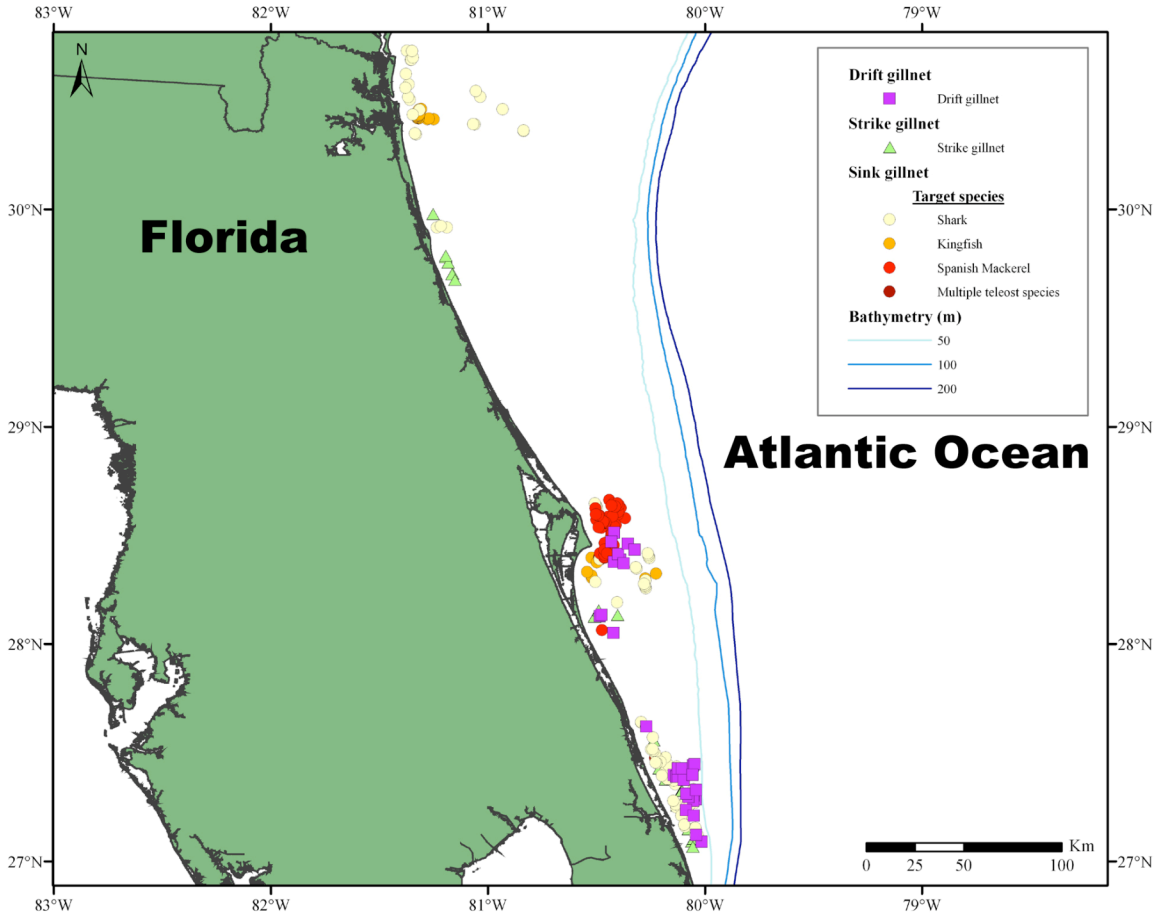

Figure 1. Distribution of observed strike, sink, and drift gillnet sets.

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 upmajority of the catchg. 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, *Pomatomous saltatrix*, little tunny, *Euthynnus allerattus*, 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 (+/-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 (%)
Rhizoprionodon terraenovae	Atlantic sharpnose	11,320	98.7	>0.1	1.3
Carcharhinus limbatus	Blacktip	2583	95.9	1.6	2.5
Sphyrna tiburo	Bonnethead	567	98.4	0.0	1.6
Carcharhinus brevipinna	Spinner	474	94.1	2.1	3.8
Carcharhinus isodon	Finetooth	413	95.6	0.0	4.4
Carcharhinus acronotus	Blacknose	407	99.5	0.0	0.5
Sphyrna lewini	Scalloped hammerhead	77	85.7	2.6	11.7
Sphyrna mokarran	Great hammerhead	11	63.6	18.2	18.2
Carcharhinus falciformis	Silky	2	100.0	0.0	0.0
Carcharhinus leucas	Bull	1	100.0	0.0	0.0
Carcharodon carcharias	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 (%)
Euthynnus alletteratus	Little tunny	1008	99.6	0.0	0.4
Scomberomorus cavalla	King mackerel	597	47.9	0.7	51.4
Rachycentron canadum	Cobia	95	86.3	3.2	10.5
Sphyraenidae	Barracudas	89	100.0	0.0	0.0
Rhinoptera bonasus	Cownose ray	65	0.0	76.9	23.1
Selene setapinnis	Atlantic moonfish	35	2.9	0.0	97.1
Istiophorus platypterus	Sailfish	25	0.0	0.0	100.0
Pomatomus saltatrix	Bluefish	24	95.8	4.2	0.0
Sphyraena barracuda	Great barracuda	17	100.0	0.0	0.0
Scomberomorus maculatus	Spanish mackerel	11	100.0	0.0	0.0
Echeneidae	Remoras	8	0.0	62.5	37.5
Megalops atlanticus	Tarpon	7	0.0	0.0	100.0
Aetobatus narinari	Spotted eagle ray	6	0.0	100.0	0.0
Caretta caretta	Loggerhead seaturtle	4	0.0	75.0	25.0
Coryphaena hippurus	Common dolphinfish	4	100.0	0.0	0.0
Manta birostris	Atlantic manta ray	4	0.0	100.0	0.0
Thunnus atlanticus	Blackfin tuna	3	100.0	0.0	0.0
Acanthocybium solanderi	Wahoo	2	100.0	0.0	0.0
Carangidae	Jacks	1	100.0	0.0	0.0
Caranx crysos	Blue runner	1	100.0	0.0	0.0
Caranx hippos	Crevalle jack	1	100.0	0.0	0.0
Dermochelys coriacea	Leatherback seaturtle	1	0.0	100.0	0.0
Lobotes surinamensis	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 (%)
Carcharhinus limbatus	Blacktip	9831	89.5	0.2	10.3
Carcharhinus isodon	Finetooth	1687	100.0	0.0	0.0
Carcharhinus brevipinna	Spinner	1108	100.0	0.0	0.0
Carcharhinus acronotus	Blacknose	541	100.0	0.0	0.0
Carcharhinus obscurus	Dusky	20	0.0	25.0	75.0
Rhizoprionodon terraenovae	Atlantic sharpnose	7	100.0	0.0	0.0
Sphyrna lewini	Scalloped hammerhead	7	71.4	0.0	28.6
Sphyrna tiburo	Bonnethead	3	100.0	0.0	0.0
Carcharhinus leucas	Bull	2	100.0	0.0	0.0
Ginglymostoma cirratum	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 (%)
Megalops atlanticus	Tarpon	5	0.0	0.0	100.0
Thunnus atlanticus	Blackfin tuna	5	100.0	0.0	0.0
Caretta caretta	Loggerhead turtle	4	0.0	75.0	25.0
Manta birostris	Atlantic manta ray	4	0.0	100.0	0.0
Rachycentron canadum	Cobia	3	66.7	0.0	33.3
Rhinoptera bonasus	Cownose ray	3	0.0	33.3	66.7
Aetobatus narinari	Spotted eagle ray	2	0.0	100.0	0.0
Sciaenops ocellatus	Red drum	2	0.0	50.0	50.0
Anclopsetta quadrocellata	Ocellated flounder	1	0.0	0.0	100.0
Caranx hippos	Crevalle jack	1	100.0	0.0	0.0
Echeneidae	Remoras	1	0.0	0.0	100.0
Paralichthys lethostigma	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 (%)
Rhizoprionodon terraenovae	Atlantic sharpnose	2245	99.5	0.1	0.4
Sphyrna tiburo	Bonnethead	892	89.6	3.7	6.7
Carcharhinus limbatus	Blacktip	767	72.9	6.4	20.7
Carcharhinus acronotus	Blacknose	346	100.0	0.0	0.0
Carcharhinus isodon	Finetooth	199	98.5	1.0	0.5
Sphyrna lewini	Scalloped hammerhead	97	38.1	26.8	35.1
Carcharhinus brevipinna	Spinner	39	48.7	28.2	23.1
Mustelus canis	Smooth dogfish	23	69.6	30.4	0.0
Galeocerdo cuvieri	Tiger	10	20.0	70.0	10.0
Carcharhinus faliciformis	Silky	3	0.0	33.3	66.7
Carcharhinus obscurus	Dusky	1	0.0	0.0	100.0
Carcharhinus plumbeus	Sandbar	1	0.0	0.0	100.0
Carcharias taurus	Sand tiger	1	0.0	100.0	0.0
Ginglymostoma cirratum	Nurse	1	0.0	100.0	0.0
Negaprion brevirostris	Lemon	1	0.0	100.0	0.0
Squatina dumerili	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 (%)
Euthynnus alletteratus	Little tunny	162	97.5	0.0	2.5
Scomberomorus cavalla	King mackerel	115	44.3	0.0	55.7
Pomatomus saltatrix	Bluefish	109	78.9	2.8	18.3
Larimus fasciatus	Banded drum	75	0.0	22.7	77.3
Rhinobatos lentiginosus	Atlantic guitarfish	67	100.0	0.0	0.0
Menticirrhus saxatilis	Northern kingfish	65	90.8	0.0	9.2
Rhinoptera bonasus	Cownose ray	63	0.0	100.0	0.0
Rachycentron canadum	Cobia	53	32.0	34.0	34.0
Raja eglanteria	Clearnose skate	47	14.9	85.1	0.0
Scomberomorus maculatus	Spanish mackerel	40	97.5	0.0	2.5
Paralichthys albigutta	Gulf flounder	38	73.7	26.3	0.0
Arius felis	Hard head catfish	34	0.0	76.5	23.5
Calamus leucosteus	Whitebone porgy	31	90.3	9.7	0.0
Paralichthys lethostigma	Southern flounder	27	100.0	0.0	0.0
Leiostomus xanthurus	Spot	26	92.3	0.0	7.7
Caranx hippos	Crevalle jack	24	100.0	0.0	0.0
Menticirrhus americanus	Southern kingish	23	100.0	0.0	0.0
Cynoscion regalis	Weakfish	18	55.6	11.1	33.3
Selene setapinnis	Atlantic moonfish	17	88.2	11.8	0.0
Chaetodipterus faber	Spadefish	16	18.8	43.7	37.5
Chloroscombrus chrysurus	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
Lutjanus campechanus	Red snapper	11	18.2	45.4	36.4
Peprilus alepidotus	Harvestfish	11	90.9	0.0	9.1
Bagre marinus	Gafftopsail catfish	9	11.1	0.0	88.9
Lactophrys quadricornis	Scrawled cowfish	8	50.0	50.0	0.0
Synodus feotens	Inshore lizardfish	8	100.0	0.0	0.0
Sciaenops ocellatus	Red drum	7	0.0	100.0	0.0
Caranx crysos	Blue runner	6	100.0	0.0	0.0
Centropristis striata	Black sea bass	5	0.0	40.0	60.0
Echeneidae	Remoras	5	0.0	60.0	40.0
Calamus proridens	Littlehead porgy	4	75.0	25.0	0.0
Lutjanus analis	Mutton snapper	4	100.0	0.0	0.0
Pogonias cromis	Black drum	4	0.0	75.0	25.0
Archosargus probatocephalus	Sheepshead	3	100.0	0.0	0.0
Elops saurus	Ladyfish	3	100.0	0.0	0.0
Hippocampus erectus	Lined seahorse	3	0.0	100.0	0.0
Mycteroperca bonaci	Black grouper	3	66.7	33.3	0.0
Sparidae	Porgies	3	0.0	33.3	66.7
Aluterus monoceros	Unicorn filefish	2	50.0	0.0	50.0
Calamus bajonado	Jolthead porgy	2	100.0	0.0	0.0
Dasyatis sabina	Southern stingray	2	0.0	100.0	0.0
Epinephelus morio	Red grouper	2	100.0	0.0	0.0
Haemulon album	Margaret grunt	2	0.0	0.0	100.0
Haemulon aurolineatum	Tomtate grunt	2	50.0	0.0	50.0
Myliobatis 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
Aetobatus narinari	Spotted eagle ray	1	0.0	100.0	0.0
Alectis ciliaris	African pompano	1	100.0	0.0	0.0
Calamus calamus	Saucereye porgy	1	0.0	100.0	0.0
Caretta caretta	Loggerhead sea turtle	1	0.0	100.0	0.0
Clupeidae	Herrings	1	0.0	0.0	100.0
Cynoscion nothus	Silver seatrout	1	0.0	0.0	100.0
Haemulon sciurus	Bluestriped grunt	1	100.0	0.0	0.0
Lobotes surinamensis	Tripletail	1	100.0	0.0	0.0
Lutjanus griseus	Grey snapper	1	100.0	0.0	0.0
Lutjanus vivanus	Silk snapper	1	0.0	0.0	100.0
Menticirrhus sp.	Kingfish	1	0.0	100.0	0.0
Mycteroperca phenax	Scamp	1	0.0	0.0	100.0
Neomerinthe hemingwayi	Spinycheek scorpionfish	1	0.0	100.0	0.0
Ogcocephalus radiatus	Polka-dot batfish	1	0.0	0.0	100.0
Remora remora	Remora	1	0.0	0.0	100.0
Rhomboplites aurorubens	Vermillion snapper	1	0.0	100.0	0.0
Seriola dumerili	Greater amberjack	1	100.0	0.0	0.0
Sphyraena barracuda	Great barracuda	1	100.0	0.0	0.0
Trichiurus lepturus	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 (%)
Rhizoprionodon terraenovae	Atlantic sharpnose	1440	57.0	12.1	30.9
Sphyrna tiburo	Bonnethead	650	56.6	3.1	40.3
Carcharhinus brevipinna	Spinner	75	37.4	41.3	21.3
Sphyrna lewini	Scalloped hammerhead	13	61.5	23.1	15.4
Carcharhinus acronotus	Blacknose	7	100.0	0.0	0.0
Carcharhinus limbatus	Blacktip	7	28.6	14.3	57.1
Carcharhinus isodon	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 (%)
Scomberomorus maculatus	Spanish mackerel	11,862	98.3	0.0	1.7
Chloroscombrus chrysurus	Atlantic bumper	1864	96.6	0.8	2.6
Selene setapinnis	Atlantic moonfish	1088	95.0	1.8	3.2
Caranx crysos	Blue runner	1046	100.0	0.0	0.0
Pomatomus saltatrix	Bluefish	828	86.2	0.2	13.6
Brevoortia smithi	Yellowfin menhaden	458	1.5	0.0	98.5
Chaetodipterus faber	Spadefish	299	51.5	5.0	43.5
Menticirrhus americanus	Southern kingfish	204	98.5	0.0	1.5
Micropogonias undulatus	Atlantic croaker	192	100.0	0.0	0.0
Elops saurus	Ladyfish	110	87.3	4.5	8.2
Selene vomer	Lookdown	96	86.5	1.0	12.5
Peprilus alepidotus	Harvestfish	91	95.6	0.0	4.4
Balistidae	Leatherjackets	82	100.0	0.0	0.0
Trichiurus lepturus	Atlantic cutlassfish	76	40.8	3.9	55.3
Cynoscion regalis	Weakfish	58	91.4	5.2	3.4
Larimus fasciatus	Banded drum	53	0.0	1.9	98.1
Synodus foetens	Inshore lizardfish	39	20.5	5.1	74.3
Scomberomorus cavalla	King mackerel	36	25.0	2.8	72.2
Leiostomus xanthurus	Spot	28	75.0	0.0	25.0
Peprilus burti	Gulf butterfish	26	96.2	0.0	3.8
Caranx hippos	Crevalle jack	22	90.9	9.1	0.0
Peprilus triacanthus	Butterfish	22	40.9	9.1	50.0
Arius felis	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 (%)
Opistonema oglinum	Atlantic thread herring	13	0.0	15.4	84.6
Trachinotus carolinus	Florida pompano	10	0.0	100.0	0.0
Rachycentron canadum	Cobia	9	44.5	33.3	22.2
Euthynnus alletteratus	Little tunny	5	100.0	0.0	0.0
Lutjanus campechanus	Red snapper	5	0.0	0.0	100.0
Prionotus sp.	Searobin	5	0.0	40.0	60.0
Echeneididae	Remoras	4	0.0	50.0	50.0
Trachinocephalus myops	Snakefish	4	0.0	0.0	100.0
Rhinoptera bonasus	Cownose ray	3	0.0	33.3	66.7
Bagre marinus	Gafftopsail catfish	2	100.0	0.0	0.0
Citharichthys spilopterus	Bay wiff	2	100.0	0.0	0.0
Menticirrhus littoralis	Gulf kingfish	2	100.0	0.0	0.0
Paralichthys sp.	Flounder	2	50.0	50.0	0.0
Alectis ciliaris	African pompano	1	0.0	100.0	0.0
Anclyopsetta quadrocellata	Ocellated flounder	1	0.0	100.0	0.0
Centropristis striata	Black sea bass	1	0.0	100.0	0.0
Cynoscion nothus	Silver seatrout	1	0.0	100.0	0.0
Haemulon aurolineatum	Tomtate	1	0.0	100.0	0.0
Lutjanus griseus	Grey snapper	1	100.0	0.0	0.0
Megalops atlanticus	Tarpon	1	0.0	0.0	100.0
Prionotus scitulus	Leopard searobin	1	0.0	0.0	100.0
Rhinobatus lentiginosus	Atlantic guitarfish	1	0.0	100.0	0.0
Sphyraena barracuda	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 (%)
Rhizoprionodon terraenovae	Atlantic sharpnose	893	55.9	8.5	35.6
Sphyrna tiburo	Bonnethead	116	76.7	13.0	10.3
Carcharhinus limbatus	Blacktip	21	66.7	33.3	0.0
Carcharhinus acronotus	Blacknose	14	100.0	0.0	0.0
Carcharhinus isodon	Finetooth	13	100.0	0.0	0.0
Mustelus canis	Smooth dogfish	11	72.7	18.2	9.1
Sphyrna lewini	Scalloped hammerhead	10	0.0	80.0	20.0
Galeocerdo cuvieri	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 (%)
Menticirrhus sp.	Kingfish	14,702	89.2	0.0	10.8
Leiostomus xanthurus	Spot	6198	99.0	0.0	1.0
Menticirrhus saxatilis	Northern kingfish	3725	100.0	0.0	0.0
Peprilus triacanthus	Butterfish	503	100.0	0.0	0.0
Larimus fasciatus	Banded drum	278	83.1	7.6	9.3
Menticirrhus americanus	Southern kingfish	259	99.2	0.0	0.8
Pomatomus saltatrix	Bluefish	187	100.0	0.0	0.0
Cynoscion regalis	Weakfish	177	95.5	3.4	1.1
Brevoortia smithi	Yellowfin menhaden	112	27.7	9.8	62.5
Brevoortia tyranus	Atlantic menhaden	82	97.6	2.4	0.0
Menticirrhus littoralis	Gulf kingfish	82	100.0	0.0	0.0
Scomberomorus maculatus	Spanish mackerel	74	86.5	1.3	12.2
Peprilus burti	Gulf butterfish	50	100.0	0.0	0.0
Chloroscombrus chrysurus	Atlantic bumper	45	0.0	37.8	62.2
Caranx crysos	Blue runner	32	100.0	0.0	0.0
Cynoscion nothus	Silver seatrout	21	0.0	0.0	100.0
Caranx hippos	Crevalle jack	19	100.0	0.0	0.0
Micropogonias undulatus	Atlantic croaker	19	89.5	0.0	10.5
Raja eglanteria	Clearnose skate	16	93.8	6.2	0.0
Paralichthys lithostigma	Southern flounder	14	100.0	0.0	0.0
Bagre marinus	Gafftopsail catfish	10	0.0	0.0	100.0
Centropristis striata	Black sea bass	7	0.0	0.0	100.0
Euthynnus alletteratus	Little tunny	7	100.0	0.0	0.0

Table 10. Con't.

Species	Common name	Total number caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
Selene vomer	Lookdown	6	0.0	50.0	50.0
Callinectes sapidus	Blue crab	5	0.0	100.0	0.0
Myliobatis freminvillei	Bullnose ray	5	0.0	80.0	20.0
Scomberomorus cavalla	King mackerel	5	0.0	40.0	60.0
Chaetodipterus faber	Harvestfish	3	0.0	0.0	100.0
Orthopristis chrysoptera	Pigfish	3	100.0	0.0	0.0
Prionotus sp.	Searobins	3	0.0	100.0	0.0
Haemulon aurolineatum	Tomtate grunt	2	0.0	0.0	100.0
Trachinocephalus myops	Snakefish	2	100.0	0.0	0.0
Aetobatus narinari	Spotted eagle ray	1	0.0	100.0	0.0
Archosargus probatocephalus	Sheepshead	1	100.0	0.0	0.0
Echeneis naucrates	Sharksucker	1	0.0	100.0	0.0
Elops saurus	Ladyfish	1	100.0	0.0	0.0
Equetus umbrosus	Cubbyu	1	0.0	0.0	100.0
Haemulon album	White margate	1	0.0	0.0	100.0
Peprilus alepidotus	Harvestfish	1	100.0	0.0	0.0
Rachycentron canadum	Cobia	1	0.0	0.0	100.0
Selene setapinnis	Atlantic moonfish	1	0.0	0.0	100.0
Synodus foetens	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 (%)
Rhizoprionodon terraenovae	Atlantic sharpnose	4	50.0	50.0	0.0
Mustelus canis	Smooth dogfish	2	0.0	0.0	100.0
Carcharhinus acronotus	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 (%)
Pomatomus saltatrix	Bluefish	257	85.6	6.2	8.2
Euthynnus alletteratus	Little tunny	23	100.0	0.0	0.0
Leiostomus xanthurus	Spot	15	100.0	0.0	0.0
Cynoscion nothus	Silver seatrout	9	0.0	33.3	66.7
Larimus fasciatus	Banded drum	7	0.0	71.4	28.6
Brevoortia smithi	Yellowfin menhaden	5	0.0	20.0	80.0
Menticirrhus americanus	Southern kingfish	5	100.0	0.0	0.0
Caranx crysos	Crevalle jack	4	100.0	0.0	0.0
Peprilus alepidotus	Harvestfish	3	100.0	0.0	0.0
Scomberomorus cavalla	King mackerel	3	100.0	0.0	0.0
Chloroscombrus chrysurus	Atlantic bumper	2	100.0	0.0	0.0
Cynoscion regalis	Weakfish	1	100.0	0.0	0.0
Micropogonias undulatus	Atlantic croaker	1	100.0	0.0	0.0
Scomberomorus maculatus	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	*Carcharhinus acronotus*	2	54.5	3.5
		Carcharhinus brevipinna	1	114.0	--
		Carcharhinus isodon	6	130.8	8.8
		Carcharhinus leucas	2	121.5	60.1
		Carcharhinus limbatus	61	88.4	18.8
		Rhizoprionodon terraenovae	383	76.4	7.9
		Sphyrna lewini	15	84.0	20.7
		Sphyrna tiburo	10	79.5	8.7
Strike net	Shark	*Carcharhinus acronotus*	31	112.5	5.4
		Carcharhinus brevipinna	200	132.1	26.5
		Carcharhinus isodon	46	121.3	7.2
		Carcharhinus leucas	1	161.0	--
		Carcharhinus limbatus	746	124.7	20.4
		Sphyrna lewini	21	107.9	21.3
		Sphyrna tiburo	1	95.0	--
Sink net	Shark	*Carcharhinus acronotus*	35	102.5	18.8
		Carcharhinus isodon	31	100.8	14.4
		Carcharhinus limbatus	99	95.7	18.1
		Galeocerdo cuvieri	3	72.0	0.0
		Mustelus canis	3	78.0	0.0
		Rhizoprionodon terraenovae	1017	78.1	8.7
		Sphyrna lewini	16	76.8	33.1
		Sphyrna tiburo	98	85.0	13.1
Sink net	Spanish mackerel	*Carcharhinus acronotus*	8	64.5	15.5
		Carcharhinus limbatus	2	72.0	0.0
		Rhizoprionodon terraenovae	271	67.5	10.5
		Sphyrna lewini	10	89.2	8.2
		Sphyrna tiburo	114	60.8	15.4
Sink net	Kingfish	*Carcharhinus acronotus*	11	93.0	0.0
		Carcharhinus isodon	84	120.9	14.8
		Galeocerdo cuvieri	2	72.0	0.0
		Mustelus canis	6	55.0	0.0
		Rhizoprionodon terraenovae	374	72.2	15.2
		Sphyrna tiburo	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
Caretta caretta	1/27/2005	27˚ 17.1' N	080˚ 09.2' W	Alive, Uninjured	Strike net	Shark
Caretta caretta	2/05/2005	27˚ 29.7' N	080˚ 10.3' W	Alive, Uninjured	Drift net	Shark
Caretta caretta	2/09/2005	27˚ 27.8' N	080˚ 07.1' W	Alive, Uninjured	Drift net	Shark
Dermochelys coriacea	2/15/2005	27˚ 26.4' N	080˚ 09.3' W	Alive, Uninjured	Drift net	Shark
Caretta caretta	2/21/2005	27˚ 40.9' N	080˚ 18.5' W	Alive, Uninjured	Drift net	Shark
Caretta caretta	2/21/2005	27˚ 40.9' N	080˚ 18.5' W	Dead	Drift net	Shark
Caretta caretta	9/24/2005	27˚ 23.9' N	080˚ 06.5' W	Alive, Uninjured	Sink net	Shark
Caretta caretta	1/12/2006	27^{o} 06.3' N	080^{o} 03.2' W	Alive, Uninjured	Strike net	Shark
Caretta caretta	2/17/2006	27^{o} 19.6' N	080^{o} 06.4' W	Dead	Strike net	Shark
Caretta caretta	3/01/2006	27^{o} 25.6' N	080^{o} 07.1' W	Alive, Uninjured	Strike net	Shark