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Introduction

The Southeast Gillnet Observer Program has adapted to the changes of the Florida-Georgia shark gillnet fishery since the program began in 1993 (e.g. Carlson and Bethea 2007 and references therein, Mathers et al. 2015). There are currently about 500 total directed and incidental shark permits issued for the southeastern U.S. Atlantic coast and Gulf of Mexico, while the number of gillnet fishers changes from year to year. Gillnet effort targeting large coastal (LCS) and small coastal (SCS) sharks declined as a result of Amendments 2 and 3 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan (NMFS 2007, 2010). LCS and SCS targeted gillnet effort has continued to decline in the last five years, such that it has become almost nonexistent. Fishers have consequently increased effort targeting finfish, including Spanish mackerel *Scomberomorus maculatus*, king mackerel *Scomberomorus cavalla*, and bluefish *Pomatomus saltatrix*, with varying types of gillnet gear. However, a small amount of shark targeted gillnet effort continues to be observed. The Southeast Gillnet Observer Program, in its continuing efforts to adapt to the fishery, currently covers anchored (sink and stab), strike, or drift gillnet fishing, regardless of target, by vessels that fish year-round from Florida to North Carolina and the Gulf of Mexico.

Herein, we summarize fishing effort and catch and bycatch in these fisheries during January 2016 - December 2016, collectively referred to as '2016'.

Methods

Observer protocol

Vessels were randomly selected on a quarterly basis (January, April, July, and October) from a pool of vessels that had reported fishing with gillnet gear during the same quarter in the

previous year in the NMFS Coastal Fisheries Logbook. Selection letters notifying permit holders of required observer coverage were issued via U.S. Certified mail approximately one month prior to the upcoming selection period. Receipt of selection letters was confirmed via signature upon acceptance by the permit holder or their proxy. 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 selection period. Contact was usually made by phone, and the observer coordinator gathered 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. Additional information collected included whether the vessel was active in another fishery, under repair, or no longer fishing. Upon notification of the intention to fish, the observer coordinator deployed an observer to the reported port of departure of the permit holder's vessel. Because gillnet trips are generally 24 hours or less (from the time of departure from port to the time of return), the observer remained assigned to the vessel for a minimum of 3 trips.

Observations were made as the net was hauled aboard. The haul target species was determined by the captain and recorded by the observer. The observer remained on the deck of the vessel in a position with an unobstructed view and recorded species and numbers of individuals caught. When species identification was questionable, the crew stopped hauling so that the observer could examine the animal(s) for positive identification. Status (alive or dead when boated) of individuals was recorded, and disposition of individuals brought onboard was recorded as kept, discarded alive, or discarded dead. Fork lengths (cm FL) were estimated for the entire catch. When time permitted after the haulback was complete, observers directly measured a random group of 10 individuals from each species for fork length (FL, measured on a straight

line) in cm. Sex (sharks only) was determined when possible. Biological samples (e.g. otoliths, vertebrae, reproductive organs, stomach), when taken, were removed and placed on ice after collection. Data and samples were submitted to the NMFS Southeast Fisheries Science Center (SEFSC) Panama City staff immediately upon completion of observed trips. The data were entered and proofed by SEFSC staff, examined by NMFS/SEFSC Sustainable Fisheries Division staff, and reviewed with observer contract staff to resolve any questions.

Results

A total of 256 sets comprising various gillnet fisheries was observed in 2016. Set locations ranged from North Carolina to the Florida Keys in the Atlantic Ocean, as well as the Gulf of Mexico (Figures 1-5). Location-specific reports of trips cannot be documented herein due to vessel confidentiality laws, therefore observations are summarized by gear type. Weights for shark and teleost catch referenced herein (Tables 7 and 8) were back-calculated using estimated length (cm FL) measurements and length-weight conversions (Wigley et al. 2003; NMFS, unpublished data).

Drift gillnet fishery

There were no trips observed in the drift gillnet fishery in 2016.

Strike gillnet fishery

A total of 5 gillnet vessels were observed making 13 strike sets on 6 trips in 2016. Trips were made targeting one or more of the following: Spanish mackerel, king mackerel, and mixed

shark species. The trips targeting Spanish mackerel and mixed sharks could not be described due to vessel confidentiality.

King mackerel targeted strike gillnet

Three observed trips were made on 3 vessels for a total of 5 strike gillnet sets targeting king mackerel. Vessels fished with nets ranging 137.2 – 640.1 m (450 - 2100 ft) long, net depths of 24.4 – 30.5 m (80.0 – 100.0 ft) and 11.4 – 12.1 cm (4.5 – 4.75 in) stretched mesh size. Set duration averaged 0.03 hr (0.02 S.D.). Hauls averaged 1.71 hr (1.05 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 9.43 hr (2.62 S.D.). Sets were made in waters averaging 19.3 m (0.8 S.D.) deep. The distribution of observed strike gillnet fishing effort is illustrated in Figure 1.

Observed king mackerel strike gillnet fishery catches

Catch composition by number of all king mackerel targeted sets was 99.96 % teleosts and 0.04 % elasmobranchs (Table 1). Catch was almost completely composed of king mackerel (99.51 %). Other catch by number included Spanish mackerel (0.21 %) and bluerunner jack, *Caranx crysos*, (0.14 %). Shark catch by number was blacktip shark, *Carcharhinus limbatus* (75.00 %), and nurse shark, *Ginglymostoma cirratum* (25.00 %). Catches by weight of commercially important teleosts are given in Table 8.

Average size from king mackerel targeted strike gillnet sets

Average (S.D.) fork lengths of sharks caught in king mackerel targeted sets ranged from 29.0 cm (0.0) for nurse shark, to 98.0 cm (0.0) for blacktip shark. The average (S.D.) lengths of

sharks measured by target can be found in Table 9. Average (S.D.) fork lengths of teleosts caught in king mackerel targeted sets ranged from 33.3 cm (1.2) for banded rudderfish, *Seriola zonata*, to 74.6 cm (8.2) for king mackerel. Average (S.D.) lengths of teleosts ($n \geq 5$) measured by target can be found in Table 10.

Sink gillnet fishery

A total of 57 trips totaling 195 sink net sets on 25 vessels were observed in 2016. Trips were made targeting one or more of the following: Spanish mackerel, Atlantic croaker, *Micropogonias undulatus*, Southern kingfish, *Menticirrhus americanus*, king mackerel, and mixed sharks (including spiny dogfish, *Squalus acanthias*).

Spanish mackerel targeted sink gillnet

Thirty-two observed trips were made on 11 vessels for a total of 149 sink gillnet sets targeting Spanish mackerel. Vessels fished with nets ranging 30.5 – 731.5 m (100 - 2400 ft) long, net depths of 3.6 – 5.5 m (11.7 – 18.0 ft) and stretched mesh sizes 7.6 – 8.9 cm (3.0 – 3.5 in). Set duration averaged 0.08 hr (0.05 S.D.). Hauls averaged 0.42 hr (0.57 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 1.32 hr (1.12 S.D.). Sets were made in waters averaging 8.5 m (4.1 S.D.) deep. Observed Spanish mackerel targeted sink gillnet fishing effort is illustrated in Figure 2. Two sets were excluded due to vessel confidentiality.

Observed Spanish mackerel targeted sink gillnet catches

Catch composition by number of all Spanish mackerel targeted sets was 98.44 % teleosts, 1.11 % elasmobranchs, 0.36 % invertebrates, and 0.09 % batoids (Table 2). By number, shark catch was made up of Atlantic sharpnose shark, *Rhizoprionodon terraenovae* (57.95 %), bonnethead shark, *Sphyrna tiburo* (24.43 %), and blacktip shark, (6.25 %). By weight the shark catch was made up of sandbar shark, *Carcharhinus plumbeus*, (33.66 %), followed by Atlantic sharpnose shark (26.98 %) and blacktip shark (15.42 %). Catches by weight of sharks are given in Table 7. Spanish mackerel made up 63.55 % of the teleost catch by number, followed by Atlantic menhaden, *Brevoortia tyrannus* (11.91 %), bluefish (10.92 %), and Atlantic bumper, *Chloroscombrus chrysurus* (3.07 %). Catches by weight of commercially important teleosts can be found in Table 8.

Average size from Spanish mackerel targeted sets

Average (S.D.) fork lengths of sharks caught in Spanish mackerel targeted sets ranged from 73.8 cm (15.0) for bonnethead shark, to 111.0 cm (67.9) for spinner shark, *Carcharhinus brevipinna*. The average (S.D.) lengths of sharks measured by target can be found in Table 9. Average (S.D.) fork lengths of teleosts caught in Spanish mackerel targeted sets ranged from 16.0 cm (1.4) for pinfish *Lagodon rhomboides*, to 78.0 cm (38.2) for cobia, *Rachycentron canadum*. Average (S.D.) lengths of teleosts ($n \geq 5$) measured by target can be found in Table 10.

Atlantic croaker targeted sink gillnet

Six observed trips were made on 4 vessels for a total of 13 sink gillnet sets targeting Atlantic croaker. Vessels fished with nets 274.3 m (900 ft) long, net depths of 2.7 – 4.0 m (9.0 –

13.0 ft) and stretched mesh sizes 8.0 – 9.0 cm (3.13 – 3.5 in). Set duration averaged 0.07 hr (0.02 S.D.). Hauls averaged 1.03 hr (0.61 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 3.39 hr (2.0 S.D.). Sets were made in waters averaging 23.0 m (7.7 S.D.) deep. Observed Atlantic croaker targeted sink gillnet fishing effort is illustrated in Figure 3.

Observed Atlantic croaker targeted sink gillnet catches

Catch composition by number of all Atlantic croaker targeted sets was 99.79 % teleosts, 0.2 % elasmobranchs, and 0.01 % batoids (Table 3). By number, shark catch was made up of smooth dogfish, *Mustelus canis* (92.86 %), and sand tiger shark, *Carcharias taurus*. By weight, shark catch was made up of smooth dogfish (81.84 %) and sand tiger shark (18.16 %). Catches by weight of sharks are given in Table 7. Atlantic croaker made up 95.17 % of the teleost catch by number, followed by Atlantic menhaden (4.74 %), and southern kingfish (0.04 %). Catches by weight of commercially important teleosts can be found in Table 8.

Average size from Atlantic croaker targeted sets

Average (S.D.) fork lengths of sharks caught in Atlantic croaker targeted sets were exclusively smooth dogfish with an average length of 69.1 cm (4.6). The average (S.D.) lengths of sharks measured by target can be found in Table 9. Average (S.D.) fork lengths of teleosts caught in Atlantic croaker targeted sets ranged from 18.0 cm (0.0) for southern flounder, *Paralichthys lethostigma*, to 39.3 cm (1.5) for monkfish anglerfish, *Lophius sp*. Average (S.D.) lengths of teleosts ($n \geq 5$) measured by target can be found in Table 10.

Southern kingfish targeted sink gillnet

Five observed trips were made on 3 vessels for a total of 12 sink gillnet sets targeting southern kingfish. Vessels fished with nets ranging 91.4 – 274.3 m (300 - 900 ft) long, a net depth of 2.7 – 4.0 m (9.0 – 13.0 ft) and a stretched mesh size of 6.4 – 8.0 cm (2.5 – 3.13 in). Set duration averaged 0.06 hr (0.02 S.D.). Hauls averaged 0.93 hr (0.45 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 4.77 hr (2.68 S.D.). Sets were made in waters averaging 8.3 m (4.7 S.D.) deep. Observed southern kingfish targeted sink gillnet fishing effort is illustrated in Figure 4.

Observed Southern kingfish targeted sink gillnet catches

Catch composition by number of all southern kingfish targeted sets was 98.22 % teleosts, 1.08 % invertebrates, and 0.71 % elasmobranchs (Table 4). By number, shark catch was made up of sandbar shark and smooth dogfish (34.78 %), followed by Atlantic sharpnose shark (30.43 %). By weight the shark catch was made up of sandbar shark (51.51 %), followed by Atlantic sharpnose shark (25.60 %), and smooth dogfish (22.89 %). Catches by weight of sharks are given in Table 7. Southern kingfish made up 89.64 % of the teleost catch by number, followed by bluefish with 4.19 %, and weakfish seatrout, *Cynoscion regalis*, with 2.97 %. Catches by weight of commercially important teleosts can be found in Table 8.

Average size from Southern kingfish targeted sets

Average (S.D.) fork lengths of sharks caught in southern kingfish targeted sets were exclusively smooth dogfish with an average length of 70.7 cm (3.1). The average (S.D.) lengths of sharks measured by target can be found in Table 9. Average (S.D.) fork lengths of teleosts

caught in southern kingfish targeted sets ranged from 12.5 cm (1.2) for Atlantic butterfish *Peprilus triacanthus*, to 63.0 cm (0.0) for houndfish, *Tylosurus crocodilus*. Average (S.D.) lengths of teleosts ($n \geq 5$) measured by target can be found in Table 10.

King mackerel targeted sink gillnet

Seven observed trips were made on 3 vessels for a total of 9 sink gillnet sets. Vessels fished with nets 274.3 m (900 ft) long, net depths of 6.1 – 6.4 m (20.0 – 21.0 ft) and stretched mesh sizes 12.7 cm (5.0 in). Set duration averaged 0.06 hr (0.02 S.D.). Hauls averaged 0.49 hr (0.18 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 2.26 hr (0.83 S.D.). Sets were made in waters averaging 13.9 m (2.6 S.D.) deep. Observed king mackerel targeted sink gillnet fishing effort is illustrated in Figure 5.

Observed king mackerel targeted sink gillnet catches

Catch composition by number of all king mackerel targeted sets was 56.52 % teleosts, 29.57 % elasmobranchs, and 13.91 % batoids (Table 5). By number, shark catch was comprised of spinner shark (35.29 %), smooth dogfish (35.29 %), and sandbar shark (17.65 %). By weight the shark catch was spinner shark (29.02 %), tiger shark (24.95 %), and sandbar shark (21.29 %) (Table 7). King mackerel made up 84.62 % of the teleost catch, by number, followed by little tunny, *Euthynnus alletteratus* (10.77 %). Catches by weight of commercially important teleosts can be found in Table 8.

Average size from king mackerel targeted sets

Average (S.D.) fork lengths of sharks caught in king mackerel targeted sets ranged from 73.0 cm (6.2) for spinner shark to 91.0 cm (0.0) for sandbar shark. The average (S.D.) lengths of sharks measured by target can be found in Table 9. Average (S.D.) fork lengths of teleosts caught in mixed teleost targeted sets ranged from 48.0 cm (0.0) for remora, *Remora remora*, to 67.5 cm (6.3) for king mackerel (Table 10).

Mixed shark targeted sink gillnet

Seven observed trips were made on 4 vessels for a total of 12 sink gillnet sets. Vessels fished with nets 91.4 – 914.4 m (300 – 3000 ft) long, net depths of 3.1 – 6.1 m (10.0 – 20.0 ft) and stretched mesh sizes 12.7 – 30.1 cm (5.0 – 12.0 in). Set duration averaged 0.08 hr (0.03 S.D.). Hauls averaged 0.91 hr (0.54 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 3.94 hr (3.00 S.D.). Sets were made in waters averaging 11.2 m (4.5 S.D.) deep. Observed mixed shark targeted sets could not be illustrated due to vessel confidentiality.

Observed mixed shark targeted sink gillnet catches

Catch composition by number of all mixed shark targeted sets was 99.83 % elasmobranchs and 0.17 % batoids (Table 6). By number, shark catch was comprised of spiny dogfish (99.05 %), smooth dogfish (0.37 %), and Atlantic sharpnose shark (0.12 %). By weight the shark catch was spiny dogfish (95.09 %), scalloped hammerhead shark, *Sphyrna lewini* (1.35 %), and spinner shark (0.95 %) (Table 7). There was no teleost catch in mixed shark targeted sets.

Average size from mixed shark targeted sets

Average (S.D.) fork lengths of sharks caught in mixed shark targeted sets ranged from 52.0 cm (0.0) for Atlantic sharpnose shark, to 133.5 cm (2.1) for blacktip shark. The average (S.D.) lengths of sharks measured by target can be found in Table 9. There were no directly measured teleosts in mixed shark targeting sink gillnet sets.

Discussion

The trend of declining effort in the LCS targeted gillnet fishery continued to be observed in 2016. Strike gillnet gear was observed exclusively in teleost (king mackerel) targeted sets. The majority of sink gillnet fishers continued to target teleost species. Incidental take of protected species, such as sea turtles and marine mammals, remained a rare occurrence, with none observed in 2016.

The general gillnet fishing effort has decreased significantly in the last 5 years. Based on the NMFS Coastal Logbook System, gillnet fishing trips decreased by over half, from 669 trips in 2011, to 302 trips in 2015. The number of active gillnet fishers has also decreased, suggesting that some of the older generation are retiring and younger fishers are not replacing them. Some fishers off the east coast of Florida have cited worse weather than usual and fish not showing up when expected, or even not at all, as reasons for the decline in effort. The SGOP continues to monitor catch and bycatch as the Southeast US gillnet fishery continues to adapt to changing regulations.

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Table 1. Total strike gillnet catch from king mackerel targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2016. Catch disposition is by percent kept (Kept %), percent discarded alive (D.A. %), and percent discarded dead (D.D. %).

Species Caught	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
Scomberomorus cavalla	King Mackerel	9136	96.79	0	3.21
Scomberomorus maculatus	Spanish Mackerel	19	100	0	0
Caranx crysos	Bluerunner Jack	13	0	0	100
Euthynnus alletteratus	Little Tunny	9	100	0	0
Carcharhinus limbatus	Blacktip Shark	3	0	33.33	66.67
Seriola zonata	Banded Rudderfish	3	100	0	0
Ginglymostoma cirratum	Nurse Shark	1	0	100	0
Sphyraena barracuda	Great Barracuda	1	100	0	0

Table 2. Total sink gillnet catch from Spanish mackerel targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2016. Catch disposition is by percent kept (Kept %), percent discarded alive (D.A. %), and percent discarded dead (D.D. %).

Species Caught	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
Scomberomorus maculatus	Spanish Mackerel	7652	97.79	0	2.21
Pomatomus saltatrix	Bluefish	2944	98.37	0.34	1.29
Peprilus paru	Harvestfish	1598	98.62	1.19	0.19
Chloroscombrus chrysurus	Atlantic Bumper	475	87.58	12.21	0.21
Peprilus triacanthus	Atlantic Butterfish	117	90.6	9.4	0
Brevoortia tyrannus	Atlantic Menhaden	111	16.22	82.88	0.9
Menticirrhus americanus	Southern Kingfish	90	100	0	0
Rhizoprionodon terraenovae	Atlantic Sharpnose Shark	90	25.56	67.78	6.67
Caranx crysos	Bluerunner Jack	84	100	0	0
Cynoscion regalis	Weakfish Seatrout	60	43.33	6.67	50
Leiostomus xanthurus	Spot	60	96.67	0	3.33
Callinectes sapidus	Blue Crab	48	4.17	95.83	0
Larimus fasciatus	Banded Drum	47	0	68.09	31.91
Sphyrna tiburo	Bonnethead Shark	28	14.29	60.71	25
Calamus arctifrons	Grass Porgy	18	0	94.44	5.56
Selene setapinnis	Moonfish	12	33.33	66.67	0
Sphyrna lewini	Scalloped Hammerhead Shark	12	8.33	75	16.67
Chaetodipterus faber	Spadefish	11	0	100	0
Bagre marinus	Gafftopsail Catfish	10	0	70	30
Carcharhinus limbatus	Blacktip Shark	10	0	100	0
Euthynnus alletteratus	Little Tunny	10	90	0	10
Caranx hippos	Crevalle Jack	9	77.78	22.22	0
Arius felis	Hardhead Catfish	8	0	100	0
Paralichthys dentatus	Summer Flounder	8	25	75	0
Trichiurus lepturus	Atlantic Cutlassfish	8	50	50	0
Tylosurus crocodilus	Houndfish	7	100	0	0
Brevoortia smithi	Yellowfin Menhaden	6	0	0	100
Elops saurus	Ladyfish	6	100	0	0
Rachycentron canadum	Cobia	5	20	60	20
Raja eglanteria	Clearnose Skate	5	0	100	0
Micropogonias undulatus	Atlantic Croaker	4	75	25	0
Mobula hypostoma	Devil Ray	3	0	100	0
Carcharias taurus	Sand Tiger Shark	3	0	100	0
Alopias vulpinus	Common Thresher Shark	2	0	100	0

Carcharhinus acronotus	Blacknose Shark	2	0	100	0
Carcharhinus brevipinna	Spinner Shark	2	50	50	0
Cynoscion arenarius	Sand Seatrout	2	0	50	50
Cynoscion nebulosus	Spotted Seatrout	2	0	100	0
Dasyatis americana	Southern Stingray	2	0	100	0
Opisthonema oglinum	Atlantic Thread Herring	2	0	100	0
Scomberomorus cavalla	King Mackerel	2	0	0	100
Tetraodontidae	Puffers	2	0	100	0
Trachinotus carolinus	Florida Pompano	2	50	50	0
Ancylopsetta quadrocellata	Ocellated Flounder	1	0	100	0
Archosargus probatocephalus	Sheepshead	1	100	0	0
Carcharhinus isodon	Finetooth Shark	1	100	0	0
Decapoda	Crabs	1	100	0	0
Echeneis naucrates	Sharksucker	1	0	100	0
Gymnura	Butterfly Ray	1	0	100	0
Hippocampus erectus	Lined Seahorse	1	0	100	0
Lagodon rhomboides	Pinfish	1	0	100	0
Paralichthys lethostigma	Southern Flounder	1	0	100	0
Prionotus scitulus	Leopard Searobin	1	0	100	0
Rhinoptera bonasus	Cownose Ray	1	0	100	0
Scophthalmus aquosus	Windowpane Flounder	1	0	100	0
Squatina dumeril	Atlantic Angel Shark	1	0	100	0
Trachinotus falcatus	Permit	1	0	100	0

Table 3. Total sink gillnet catch from Atlantic croaker targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2016. Catch disposition is by percent kept (Kept %), percent discarded alive (D.A. %), and percent discarded dead (D.D. %).

Species Caught	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
Micropogonias undulatus	Atlantic Croaker	13219	99.67	0.07	0.26
Brevoortia tyrannus	Atlantic Menhaden	658	7.45	28.57	63.98
Mustelus canis	Smooth Dogfish	26	69.23	30.77	0
Menticirrhus americanus	Southern Kingfish	6	100	0	0
Lophius sp.	Monkfish Anglerfish	3	100	0	0
Cynoscion regalis	Weakfish Seatrout	2	100	0	0
Carcharias taurus	Sand Tiger Shark	2	0	100	0
Dasyatis americana	Southern Stingray	1	0	100	0
Leiostomus xanthurus	Spot	1	100	0	0
Paralichthys lethostigma	Southern Flounder	1	0	100	0

Table 4. Total sink gillnet catch from southern kingfish targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2016. Catch disposition is by percent kept (Kept %), percent discarded alive (D.A. %), and percent discarded dead (D.D. %).

Species Caught	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
Menticirrhus americanus	Southern Kingfish	2865	99.93	0.07	0
Pomatomus saltatrix	Bluefish	134	97.01	0	2.99
Cynoscion regalis	Weakfish Seatrout	95	95.79	0	4.21
Peprilus triacanthus	Atlantic Butterfish	63	100	0	0
Limulus polyphemus	Horseshoe Crab	35	100	0	0
Brevoortia tyrannus	Atlantic Menhaden	17	0	17.65	82.35
Micropogonias undulatus	Atlantic Croaker	15	100	0	0
Carcharhinus plumbeus	Sandbar Shark	8	0	100	0
Mustelus canis	Smooth Dogfish	8	75	25	0
Rhizoprionodon terraenovae	Atlantic Sharpnose Shark	7	0	100	0
Leiostomus xanthurus	Spot	6	83.33	16.67	0
Tylosurus crocodilus	Houndfish	1	0	100	0

Table 5. Total sink gillnet catch from king mackerel targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2016. Catch disposition is by percent kept (Kept %), percent discarded alive (D.A. %), and percent discarded dead (D.D. %).

Species Caught	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
Scomberomorus cavalla	King Mackerel	55	96.36	1.82	1.82
Raja eglanteria	Clearnose Skate	16	0	100	0
Carcharhinus brevipinna	Spinner Shark	12	0	100	0
Mustelus canis	Smooth Dogfish	12	0	100	0
Euthynnus alletteratus	Little Tunny	7	85.71	14.29	0
Carcharhinus plumbeus	Sandbar Shark	6	0	100	0
Auxis thazard	Frigate Mackerel	1	0	0	100
Carcharhinus obscurus	Dusky Shark	1	0	100	0
Galeocerdo cuvier	Tiger Shark	1	0	100	0
Carcharias taurus	Sand Tiger Shark	1	0	100	0
Remora remora	Remora	1	0	100	0
Scomberomorus maculatus	Spanish Mackerel	1	100	0	0
Squatina dumeril	Atlantic Angel Shark	1	0	100	0

Table 6. Total sink gillnet catch from mixed sharks targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2016. Catch disposition is by percent kept (Kept %), percent discarded alive (D.A. %), and percent discarded dead (D.D. %).

Species Caught	Common Name	Total Number Caught	Kept (%)	D.A. (%)	D.D. (%)
Squalus acanthias	Spiny Dogfish	3436	99.97	0.03	0
Mustelus canis	Smooth Dogfish	13	92.31	7.69	0
Raja eglanteria	Clearnose Skate	6	0	100	0
Rhizoprionodon terraenovae	Atlantic Sharpnose Shark	4	0	100	0
Carcharias taurus	Sand Tiger Shark	3	0	100	0
Alopias vulpinus	Common Thresher Shark	1	100	0	0
Sphyrna tiburo	Bonnethead Shark	3	100	0	0
Carcharhinus acronotus	Blacknose Shark	2	100	0	0
Carcharhinus brevipinna	Spinner Shark	2	100	0	0
Carcharhinus limbatus	Blacktip Shark	2	100	0	0
Sphyrna lewini	Scalloped Hammerhead Shark	2	0	0	100
Carcharhinus isodon	Finetooth Shark	1	0	100	0

Table 7. Estimated shark catch by weight (kg), back-calculated from estimated lengths of all sharks observed caught in sink and strike (king mackerel at top) gillnet gear by target, 2016.

Target Species	Species Caught	Common Name	Total Number Caught	kg	%
King mackerel	*Carcharhinus limbatus*	Blacktip Shark	3	40.64	100.0
	Ginglymostoma cirratum	Nurse Shark	1	0.02	0.0
		Total	**4**	**40.66**	
Spanish mackerel	*Rhizoprionodon terraenovae*	Atlantic Sharpnose Shark	90	264.37	24.3
	Sphyrna tiburo	Bonnethead Shark	28	28.61	2.6
	Sphyrna lewini	Scalloped Hammerhead Shark	12	383.32	35.3
	Carcharhinus limbatus	Blacktip Shark	10	100.86	9.3
	Carcharias taurus	Sand Tiger Shark	3	84.43	7.8
	Alopias vulpinus	Common Thresher Shark	2	116.16	10.7
	Carcharhinus acronotus	Blacknose Shark	2	5.26	0.5
	Carcharhinus brevipinna	Spinner Shark	2	80.65	7.4
	Carcharhinus isodon	Finetooth Shark	1	11.83	1.1
	Squatina dumeril	Atlantic Angel Shark	1	10.53	1.0
		Total	**151**	**1086.03**	
King mackerel	*Carcharhinus brevipinna*	Spinner Shark	12	86.00	29.0
	Mustelus canis	Smooth Dogfish	12	27.38	9.2
	Carcharhinus plumbeus	Sandbar Shark	6	63.09	21.3
	Carcharhinus obscurus	Dusky Shark	1	13.87	4.7
	Galeocerdo cuvier	Tiger Shark	1	73.96	25.0
	Carcharias taurus	Sand Tiger Shark	1	28.14	9.5
	Squatina dumeril	Atlantic Angel Shark	1	3.93	1.3
		Total	**34**	**296.37**	
Atlantic croaker	*Mustelus canis*	Smooth Dogfish	26	68.24	81.8
	Carcharias taurus	Sand Tiger Shark	2	15.14	18.2
		Total	**28**	**83.39**	
Southern kingfish	*Carcharhinus plumbeus*	Sandbar Shark	8	47.26	51.5
	Mustelus canis	Smooth Dogfish	8	21.00	22.9
	Rhizoprionodon terraenovae	Atlantic Sharpnose Shark	7	23.49	25.6
		Total	**23**	**91.75**	

Mixed sharks	*Squalus acanthias*	Spiny Dogfish	3436	9248.24	95.1
	Mustelus canis	Smooth Dogfish	13	34.12	0.4
	Rhizoprionodon terraenovae	Atlantic Sharpnose Shark	4	5.36	0.1
	Carcharias taurus	Sand Tiger Shark	3	84.43	0.9
	Alopias vulpinus	Common Thresher Shark	1	23.21	0.2
	Sphyrna tiburo	Bonnethead Shark	3	12.64	0.1
	Carcharhinus acronotus	Blacknose Shark	2	10.43	0.1
	Carcharhinus brevipinna	Spinner Shark	2	92.83	1.0
	Carcharhinus limbatus	Blacktip Shark	2	58.33	0.6
	Sphyrna lewini	Scalloped Hammerhead Shark	2	131.18	1.3
	Carcharhinus isodon	Finetooth Shark	1	25.21	0.3
		Total	**3469**	**9725.98**	

Table 8. Estimated catch by weight (kg) of commercially important teleosts, back-calculated from estimated lengths of all individuals observed caught in sink and strike (king mackerel at top) gillnet gear by target, 2016.

Target Species	Species Caught	Common Name	Total Number Caught	kg
King mackerel	*Scomberomorus cavalla*	King Mackerel	9136	33242.97
	Scomberomorus maculatus	Spanish Mackerel	19	23.27
	Euthynnus alletteratus	Little Tunny	9	12.93
Spanish Mackerel	*Scomberomorus maculatus*	Spanish Mackerel	7652	6752.30
	Pomatomus saltatrix	Bluefish	2944	3541.55
	Chloroscombrus chrysurus	Atlantic Bumper	475	28.49
	Peprilus triacanthus	Atlantic Butterfish	117	7.73
	Brevoortia tyrannus	Atlantic Menhaden	111	122.25
	Menticirrhus americanus	Southern Kingfish	90	104.75
	Cynoscion regalis	Weakfish Seatrout	60	30.73
	Leiostomus xanthurus	Spot	60	3.41
	Larimus fasciatus	Banded Drum	47	2.26
	Chaetodipterus faber	Spadefish	11	3.94
	Euthynnus alletteratus	Little Tunny	10	16.93
	Rachycentron canadum	Cobia	5	29.06
	Scomberomorus cavalla	King Mackerel	2	1.42
	Micropogonias undulatus	Atlantic Croaker	4	0.16
King mackerel	*Scomberomorus cavalla*	King Mackerel	55	157.55
	Euthynnus alletteratus	Little Tunny	7	10.06
	Scomberomorus maculatus	Spanish Mackerel	1	0.88
Atlantic croaker	*Micropogonias undulatus*	Atlantic Croaker	13219	1048.00
	Brevoortia tyrannus	Atlantic Menhaden	658	159.04
	Menticirrhus americanus	Southern Kingfish	6	2.60
	Lophius sp.	Monkfish Anglerfish	3	4.54
	Cynoscion regalis	Weakfish Seatrout	2	0.07
	Leiostomus xanthurus	Spot	1	0.06
Southern kingfish	*Menticirrhus americanus*	Southern Kingfish	2865	2953.59
	Pomatomus saltatrix	Bluefish	134	163.50
	Cynoscion regalis	Weakfish Seatrout	95	79.51
	Peprilus triacanthus	Atlantic Butterfish	63	4.16
	Brevoortia tyrannus	Atlantic Menhaden	17	34.90
	Micropogonias undulatus	Atlantic Croaker	15	0.60
	Leiostomus xanthurus	Spot	6	0.34

Table 9. Average size (fork length, FL) and standard deviation (S.D.) of sharks measured for all observed sink and strike (first king mackerel target) gillnet trips by target, 2016.

Target	Species	Common Name	n	Avg FL (cm)	S.D.
King mackerel	*Carcharhinus limbatus*	Blacktip Shark	1	98.0	0.0
	Ginglymostoma cirratum	Nurse Shark	1	29.0	0.0
Spanish mackerel	*Rhizoprionodon terraenovae*	Atlantic Sharpnose Shark	23	79.7	2.8
	Sphyrna tiburo	Bonnethead Shark	4	73.8	15.0
	Carcharhinus brevipinna	Spinner Shark	2	111.0	68.0
	Sphyrna lewini	Scalloped Hammerhead Shark	2	79.0	13.0
	Carcharhinus acronotus	Blacknose Shark	1	83.0	0.0
	Carcharhinus isodon	Finetooth Shark	1	104.0	0.0
	Squatina dumeril	Atlantic Angel Shark	1	99.0	0.0
Atlantic croaker	*Mustelus canis*	Smooth Dogfish	18	69.1	4.6
Southern kingfish	*Mustelus canis*	Smooth Dogfish	6	70.7	3.1
Mixed Sharks	*Squalus acanthias*	Spiny Dogfish	80	68.7	5.0
	Mustelus canis	Smooth Dogfish	12	75.3	4.0
	Carcharhinus acronotus	Blacknose Shark	2	89.5	11.0
	Carcharhinus brevipinna	Spinner Shark	2	129.5	37.0
	Carcharhinus limbatus	Blacktip Shark	2	133.5	2.1
	Sphyrna tiburo	Bonnethead Shark	2	91.5	0.7
	Carcharhinus isodon	Finetooth Shark	1	123.0	0.0
	Alopias vulpinus	Common Thresher Shark	1	106.0	0.0
	Rhizoprionodon terraenovae	Atlantic Sharpnose Shark	1	52.0	0.0

Table 10. Average size (fork length, FL) and standard deviation (S.D.) of non-sharks measured for all observed sink and strike (first king mackerel target) gillnet trips by target, 2016, where sample size ≥ 5.

Target	Species	Common Name	n	Avg FL (cm)	S.D.
King mackerel	*Scomberomorus cavalla*	King Mackerel	257	74.6	8.2
	Scomberomorus maculatus	Spanish Mackerel	10	57.1	4.8
Spanish mackerel	*Scomberomorus maculatus*	Spanish Mackerel	818	43.1	6.0
	Pomatomus saltatrix	Bluefish	460	39.2	5.0
	Chloroscombrus chrysurus	Atlantic Bumper	80	24.4	3.0
	Menticirrhus americanus	Southern Kingfish	64	33.4	2.6
	Caranx crysos	Bluerunner Jack	51	28.2	3.7
	Peprilus paru	Harvestfish	37	25.7	6.3
	Leiostomus xanthurus	Spot	27	25.4	3.0
	Cynoscion regalis	Weakfish Seatrout	25	36.8	4.4
	Calamus arctifrons	Grass Porgy	18	21.5	1.5
	Peprilus triacanthus	Atlantic Butterfish	18	18.1	1.4
	Brevoortia tyrannus	Atlantic Menhaden	11	30.8	2.2
	Bagre marinus	Gafftopsail Catfish	10	32.0	6.0
	Euthynnus alletteratus	Little Tunny	9	50.6	12.9
	Arius felis	Hardhead Catfish	8	29.3	4.7
	Caranx hippos	Crevalle Jack	7	30.9	1.7
	Tylosurus crocodilus	Houndfish	7	69.6	4.3
	Elops saurus	Ladyfish	6	48.7	4.7
	Brevoortia smithi	Yellowfin Menhaden	5	28.0	2.0
	Paralichthys dentatus	Summer Flounder	5	28.4	4.5
Atlantic croaker	*Micropogonias undulatus*	Atlantic Croaker	100	26.3	2.6
	Brevoortia tyrannus	Atlantic Menhaden	25	31.1	3.6
	Menticirrhus americanus	Southern Kingfish	6	28.7	3.7
Southern kingfish	*Menticirrhus americanus*	Southern Kingfish	90	33.1	2.8
	Pomatomus saltatrix	Bluefish	55	34.0	2.4
	Peprilus triacanthus	Atlantic Butterfish	49	12.5	1.2
	Cynoscion regalis	Weakfish Seatrout	45	36.4	2.2
	Micropogonias undulatus	Atlantic Croaker	15	28.2	0.6
	Leiostomus xanthurus	Spot	5	25.0	1.0
King mackerel	*Scomberomorus cavalla*	King Mackerel	42	67.5	6.3
	Euthynnus alletteratus	Little Tunny	6	55.8	1.3

Figure 1. Distribution of observed strike gillnet sets targeting king mackerel, *Scomberomorus cavalla*, 2016 (n=5 sets).

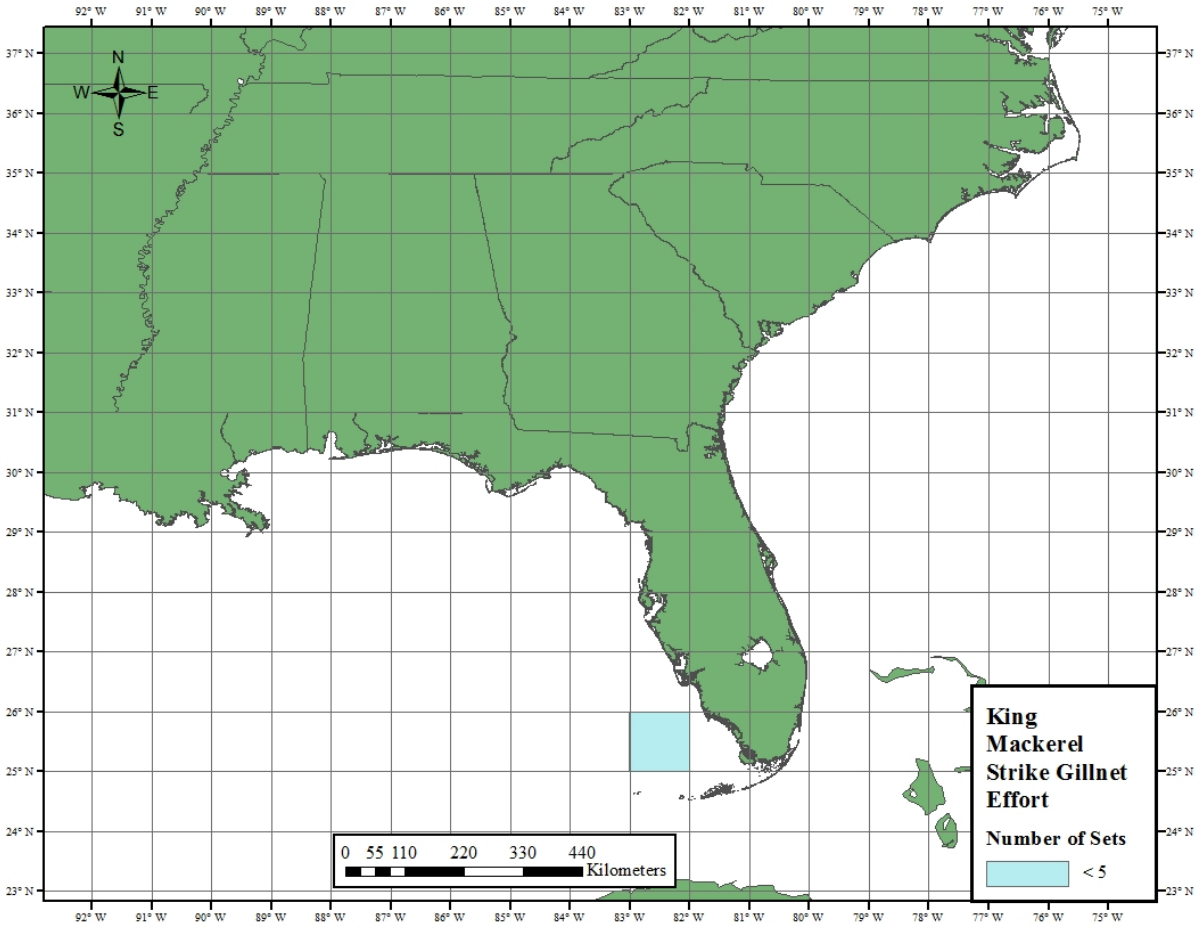

Figure 2. Distribution of observed sink gillnet sets targeting Spanish mackerel, *Scomberomorus maculatus*, 2016 (n=147 sets).

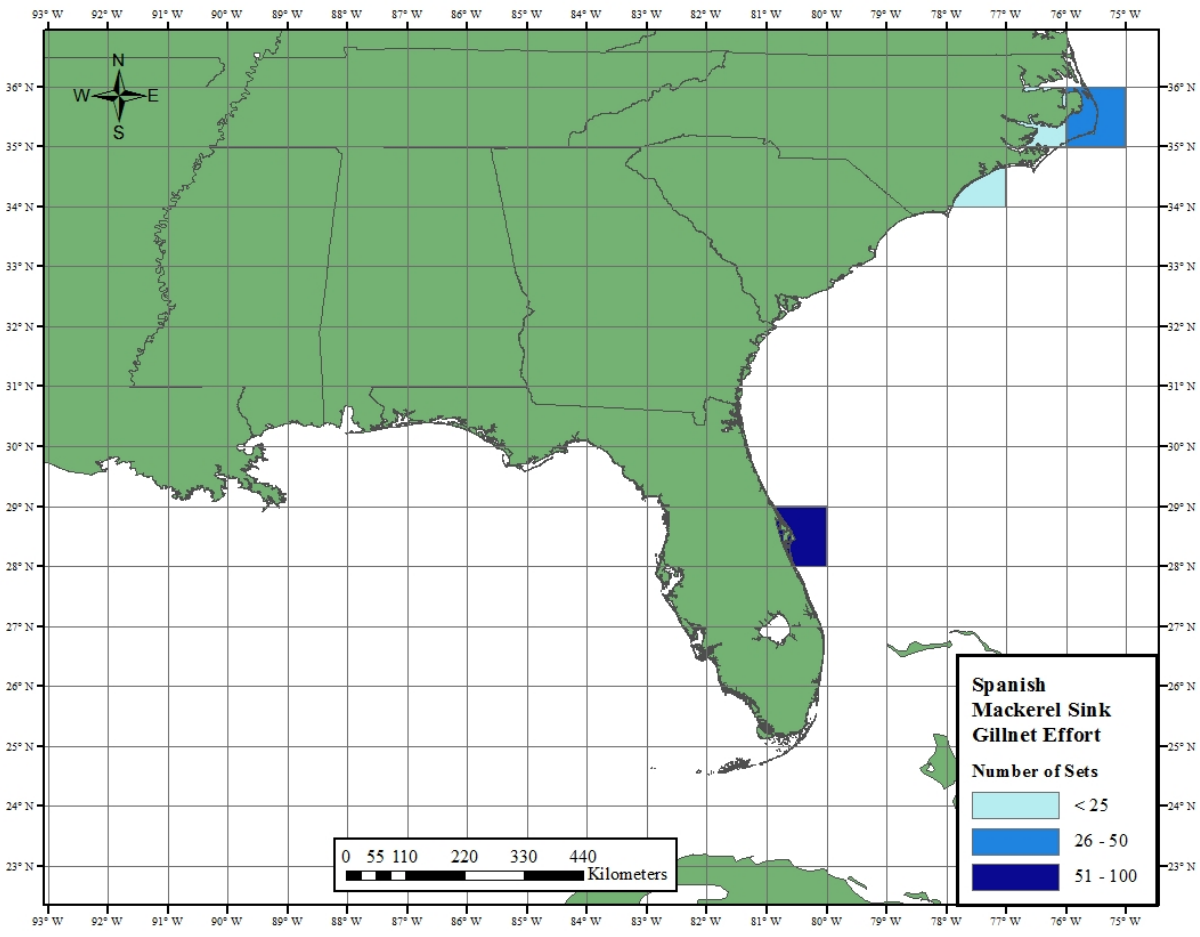

Figure 3. Distribution of observed sink gillnet sets targeting Atlantic croaker, *Micropogonias undulates*, 2016 (n=13 sets).

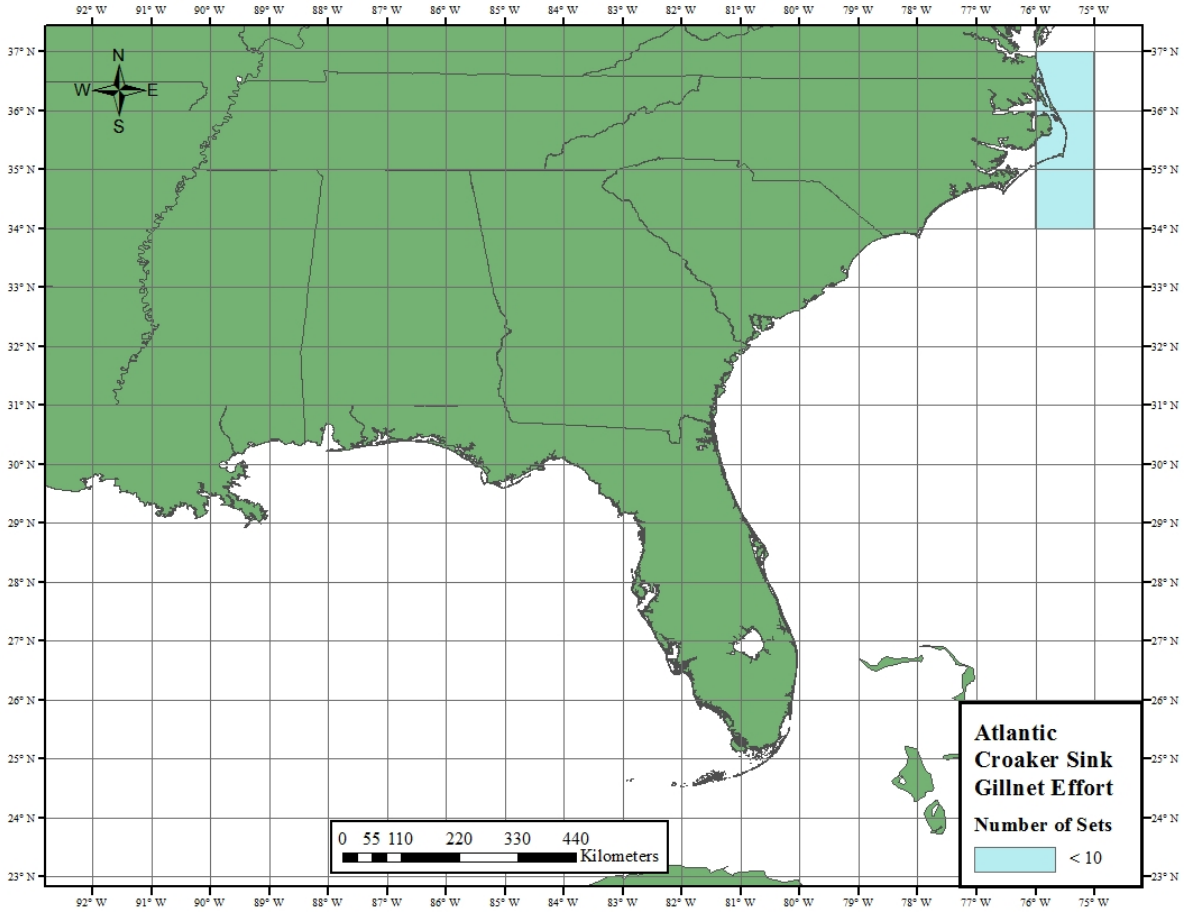

Figure 4. Distribution of observed sink gillnet sets targeting southern kingfish, *Menticirrhus americanus*, 2016 (n=12 sets).

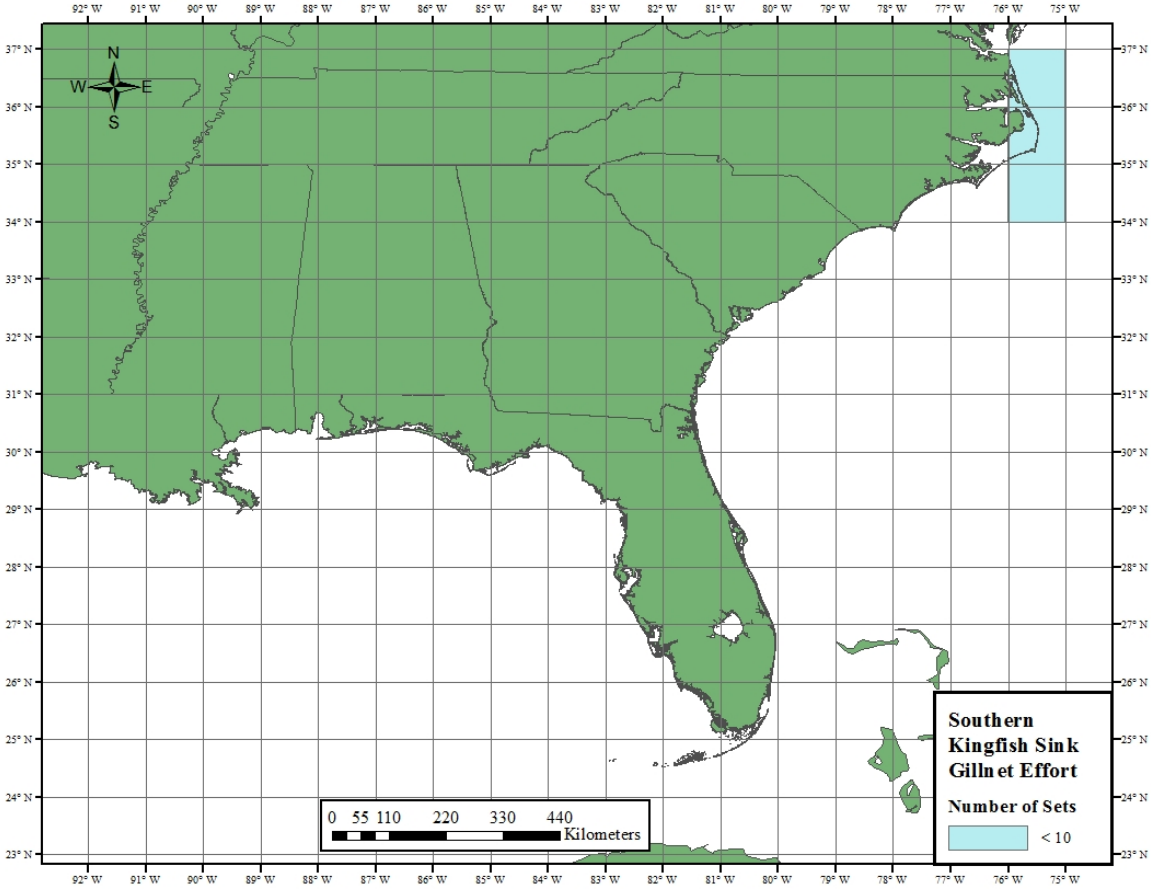

Figure 5. Distribution of observed sink gillnet sets targeting king mackerel, *Scomberomorus cavalla*, 2016 (n=9 sets).