



NOAA Technical Memorandum NMFS-SEFSC-690

CATCH AND BYCATCH IN U.S. SOUTHEAST GILLNET FISHERIES, 2015.

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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, has declined in recent years as a result of Amendments 2 and 3 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan (NMFS 2007, 2010). 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 from Florida to North Carolina and the Gulf of Mexico year-round.

Herein, we summarize fishing effort and catch and bycatch in these fisheries during January 2015 - December 2015, collectively referred to as '2015'.

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 225 sets comprising various gillnet fisheries were observed in 2015. Set locations ranged from North Carolina to the Florida Keys in the Atlantic Ocean and 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 2015.

Strike gillnet fishery

A total of 3 gillnet vessels were observed making 5 strike sets on 8 trips in 2015. These vessels targeted king mackerel exclusively. Vessels fished with nets ranging 137.2 – 731.5 m (450 - 2400 ft) long, net depths of 27.4 – 30.2 m (90.0 – 99.0 ft) and 12.1 cm (4.75 in) stretched mesh size. Set duration averaged 0.03 hr (0.01 S.D.). Hauls averaged 0.93 hr (0.32 S.D.). The

entire fishing process (time net was first set until time haul back was completed) averaged 5.09 hr (1.54 S.D.). Sets were made in waters averaging 20.4 m (1.2 S.D.) deep. The distribution of observed strike gillnet fishing effort is illustrated in Figure 1.

Observed strike gillnet fishery catches

Catch composition by number of all king mackerel targeted sets was 99.70 % teleosts, 0.29 % invertebrates, and 0.01 % elasmobranchs (Table 1). Catch was almost completely composed of king mackerel (99.71 %). Other catch by number included red grouper, *Epinephelus morio* (0.12 %), and little tunny, *Euthynnus alletteratus*, (0.10 %). Shark catch by number and weight was exclusively blacktip shark, *Carcharhinus limbatus*, (100.00 %). Catches by weight of commercially important teleosts are given in Table 8.

Average size from strike gillnet sets

Average (S.D.) fork lengths of teleosts caught in king mackerel targeted sets was 76.0 cm (8.1) for king mackerel. There were no sharks directly measured in strike gillnet sets. The average (S.D.) lengths of teleosts ($n \geq 5$) measured in king mackerel targeted sets can be found in Table 10.

Sink gillnet fishery

A total of 66 trips totaling 220 sink net sets on 21 vessels were observed in 2015. Trips were made targeting one or more of the following: Spanish mackerel, Southern kingfish, *Menticirrhus americanus*, spiny dogfish, *Squalus acanthias*, mixed teleosts (including king

mackerel, bluefish, Atlantic cutlassfish, *Trichiurus lepturus*), and mixed sharks (including smooth dogfish, *Mustelus canis*, sharks, and blacknose shark.

Spanish mackerel targeted sink gillnet

Thirty six observed trips were made on 14 vessels for a total of 131 sink gillnet sets targeting Spanish mackerel. Vessels fished with nets ranging 91.4 – 731.5 m (150 - 2400 ft) long, net depths of 2.7 – 7.4 m (6.0 – 16.0 ft) and stretched mesh sizes 7.6 – 8.9 cm (2.5 – 3.625 in). Set duration averaged 0.07 hr (0.06 S.D.). Hauls averaged 0.48 hr (0.57 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 1.58 hr (1.35 S.D.). Sets were made in waters averaging 6.6 m (3.3 S.D.) deep. Observed Spanish mackerel targeted sink gillnet fishing effort is illustrated in Figure 2. Fifty-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 97.45 % teleosts, 1.62 % elasmobranchs, 0.89 % invertebrates, 0.04 % batoids, and 0.01 marine mammals (Table 2). By number, shark catch was made up of Atlantic sharpnose shark, *Rhizoprionodon terraenova* (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 35.0 cm (0.0) for shortfin mako shark, *Isurus oxyrinchus*, to 85.5 cm (24.8) for bonnethead 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 Spanish mackerel targeted sets ranged from 12.8 cm (2.0) for harvestfish *Chaetodipterus faber*, to 113.5 cm (3.5) for houndfish, *Tylosurus crocodilus*. Average (S.D.) lengths of teleosts ($n \geq 5$) measured by target can be found in Table 10.

Protected resources interactions from Spanish mackerel targeted sets

One interaction with protected resources was documented in 131 sets observed targeting Spanish mackerel with sink gillnets in 2015. One bottlenose dolphin, *Tursiops truncatus*, was caught and released alive (0.01 % of the total catch; Table 2).

Southern kingfish targeted sink gillnet

Seven observed trips were made on 4 vessels for a total of 34 sink gillnet sets targeting Southern kingfish. Vessels fished with nets ranging 228.6 – 365.8 m (750 - 1200 ft) long, net depths of 1.5 – 4.3 m (5.0 – 14.0 ft) and stretched mesh sizes 3.2 – 8.3 cm (1.25 – 3.25 in). Set duration averaged 2.10 hr (5.02 S.D.). Hauls averaged 0.57 hr (0.39 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 10.44 hr (11.42

S.D.). Sets were made in waters averaging 11.2 m (2.7 S.D.) deep. Observed southern kingfish targeted sink gillnet fishing effort is illustrated in Figure 3.

Observed southern kingfish targeted sink gillnet catches

Catch composition by number of all southern kingfish targeted sets was 98.36 % teleosts, 1.60 % elasmobranchs, 0.02 % batoids, and 0.02 % sea birds. (Table 3). By number, shark catch was made up of Atlantic sharpnose shark, *Rhizoprionodon terraenovae* (55.43 %), spiny dogfish (40.43 %), and smooth dogfish (13.03 %). By weight the shark catch was made up of Atlantic sharpnose shark (62.42 %), followed by spiny dogfish (30.12 %) and smooth dogfish (7.41 %). Catches by weight of sharks are given in Table 7. Southern kingfish made up 36.65 % of the teleost catch by number, followed by Atlantic menhaden (26.12 %), and Atlantic bumper (22.81 %). 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 ranged from 26.0 cm (0.0) for blacktip shark to 51.0 cm (3.6) for smooth dogfish. 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 15.1 cm (0.7) for harvestfish, to 67.8 cm (3.7) for little tunny. Average (S.D.) lengths of teleosts ($n \geq 5$) measured by target can be found in Table 10.

Protected resources interactions from southern kingfish targeted sets

One interaction with protected resources was documented in 34 sets observed targeting southern kingfish with sink gillnets in 2015. One brown pelican, *Pelecanus occidentalis*, was caught and released alive (0.02 % of the total catch; Table 2).

Spiny dogfish targeted sink gillnet

Eight observed trips were made on 3 vessels for a total of 9 sink gillnet sets targeting spiny dogfish. Vessels fished with nets ranging 274.3 – 365.8 m (900 - 1200 ft) long, a net depth of 6.4 m (21.0 ft) and a stretched mesh size of 12.7 cm (5.0 in). Set duration averaged 0.09 hr (0.02 S.D.). Hauls averaged 1.47 hr (1.11 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 4.23 hr (1.45 S.D.). Sets were made in waters averaging 16.5 m (3.8 S.D.) deep. Observed spiny dogfish targeted sink gillnet fishing effort is illustrated in Figure 4.

Observed spiny dogfish targeted sink gillnet catches

Catch composition by number of all spiny dogfish targeted sets was 92.71 % elasmobranchs, 6.96 % batoids, and 0.33 % teleosts (Table 4). By number, shark catch was made up of spiny dogfish (94.16 %), sandbar shark (2.81 %), and smooth dogfish (1.36 %). By weight the shark catch was made up of spiny dogfish (86.14 %), followed by sandbar shark (6.36 %) and sand tiger shark, *Carcharias taurus* (4.89 %). Catches by weight of sharks are given in Table 7. Atlantic menhaden made up 50.00 % of the teleost catch by number, followed by monkfish anglerfish (*Lophius sp.*) with 25.00 %. Catches by weight of commercially important teleosts can be found in Table 8.

Average size from spiny dogfish targeted sets

Average (S.D.) fork lengths of sharks caught in spiny dogfish targeted sets ranged from 52.7 cm (5.3) for smooth dogfish to 70.0 cm (0.0) for tiger shark, *Galeocerdo cuvier*. 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 spiny dogfish targeted sets ranged from 33.0 cm (0.0) for Atlantic menhaden, to 52.0 cm (0.0) for remora, *Remora remora*. Average (S.D.) lengths of teleosts ($n \geq 5$) measured by target can be found in Table 10.

Mixed teleost targeted sink gillnet

Nine observed trips were made on 5 vessels for a total of 24 sink gillnet sets. Vessels fished with nets 45.7 – 731.5 m (150 – 2400 ft) long, net depths of 4.3 – 5.2 m (14.0 – 17.0 ft) and stretched mesh sizes 8.0 – 12.7 cm (3.13 – 5.0 in). Set duration averaged 0.07 hr (0.03 S.D.). Hauls averaged 0.94 hr (0.60 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 2.59 hr (1.47 S.D.). Sets were made in waters averaging 10.1 m (1.5 S.D.) deep. Observed mixed teleost targeted sink gillnet fishing effort is illustrated in Figure 5.

Observed mixed teleost targeted sink gillnet catches

Catch composition by number of all mixed teleost targeted sets was 91.24 % teleosts, 8.67 % elasmobranchs, and 0.08 % batoids (Table 5). By number, shark catch was comprised of Atlantic sharpnose shark (93.20 %), bonnethead shark (2.91 %), and blacktip shark (1.94 %). By weight the shark catch was Atlantic sharpnose shark (63.87 %), sand tiger shark (24.11 %), and blacktip shark (8.38 %). (Table 7). Bluefish made up 29.58 % of the teleost catch, by number,

followed by Atlantic cutlassfish (16.34 %), and Spanish mackerel (13.34 %). Catches by weight of commercially important teleosts can be found in Table 8.

Average size from mixed teleost targeted sets

Average (S.D.) fork lengths of sharks caught in mixed teleost targeted sets ranged from 52.5 cm (4.3) for Atlantic sharpnose shark to 83.0 cm (6.4) 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 mixed teleost targeted sets ranged from 14.0 cm (0.0) for lookdown, *Selene vomer*, to 78.4 cm (5.3) for Atlantic cutlassfish (Table 10).

Mixed shark targeted sink gillnet

Nine observed trips were made on 4 vessels for a total of 22 sink gillnet sets. Vessels fished with nets 45.7 – 1097.3 m (150 – 3600 ft) long, net depths of 4.3 – 11.4 m (14.0 – 37.5 ft) and stretched mesh sizes 12.7 – 19.1 cm (5.0 – 7.5 in). Set duration averaged 0.11 hr (0.01 S.D.). Hauls averaged 2.76 hr (0.24 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 6.76 hr (0.62 S.D.). Sets were made in waters averaging 18.7 m (1.16 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 92.12 % elasmobranchs, 3.40 % invertebrates, 2.65 % batoids, and 1.82 % teleosts (Table 6). By number, shark catch was comprised of Atlantic sharpnose shark (59.86 %), blacknose shark (25.74 %),

and smooth dogfish (5.58 %). By weight the shark catch was spinner shark, *Carcharhinus brevipinna* (44.84 %), blacknose shark (23.28 %), and Atlantic sharpnose shark (22.37 %), (Table 7). Southern kingfish made up 54.55 % of the teleost catch, by number, followed by cobia, *Rachycentron canadum* (22.72 %). Catches by weight of commercially important teleosts can be found in Table 8.

Average size from mixed shark targeted sets

Average (S.D.) fork lengths of sharks caught in mixed shark targeted sets ranged from 55.3 cm (7.6) for smooth dogfish, to 110.0 cm (5.7) for finetooth shark, *Carcharhinus isodon*. 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 shark targeted sets ranged from 24.5 cm (3.1) for southern kingfish, to 56.0 cm (3.6) for cobia (Table 10).

Discussion

The trend of declining effort in the LCS targeted gillnet fishery continued to be observed in 2015. 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 remained a rare occurrence, with one incidental take of a bottlenose dolphin and one incidental take of a brown pelican observed in 2015. 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, 2015. 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. %
<i>Scomberomorus cavalla</i>	King mackerel	8801	99.8	0.0	0.3
<i>Anthozoa</i>	Coral	23	0.0	0.0	100.0
<i>Epinephelus morio</i>	Red grouper	11	9.1	54.6	36.4
<i>Euthynnus alletteratus</i>	Little tunny	9	77.8	0.0	22.2
<i>Anisotremus virginicus</i>	Porkfish	2	0.0	0.0	100.0
<i>Asteroidea</i>	Sea stars	2	0.0	100.0	0.0
<i>Lachnolaimus maximus</i>	Hogfish	2	0.0	50.0	50.0
<i>Carcharhinus limbatus</i>	Blacktip shark	1	0.0	0.0	100.0
<i>Mollusca</i>	Molluscs	1	0.0	100.0	0.0
<i>Monacanthidae</i>	Filefishes	1	0.0	100.0	0.0
<i>Scomberomorus maculatus</i>	Spanish mackerel	1	100.0	0.0	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, 2015. 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. %
<i>Scomberomorus maculatus</i>	Spanish mackerel	6741	99.1	0.0	0.9
<i>Brevoortia tyrannus</i>	Atlantic menhaden	1263	9.7	20.8	69.4
<i>Pomatomus saltatrix</i>	Bluefish	1158	98.2	1.0	0.8
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	326	79.5	6.8	13.8
<i>Caranx crysos</i>	Bluerunner jack	235	100.0	0.0	0.0
<i>Brevoortia sp.</i>	Menhadens	184	38.0	43.5	18.5
<i>Brevoortia patronus</i>	Gulf menhaden	172	15.1	72.1	12.8
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	102	1.0	76.5	22.6
<i>Peprilus alepidotus</i>	Harvestfish	71	81.7	18.3	0.0
<i>Lagodon rhomboides</i>	Pinfish	66	0.0	100.0	0.0
<i>Bagre marinus</i>	Gafftopsail catfish	65	0.0	70.8	29.2
<i>Scyphozoa</i>	Jellyfish	65	0.0	100.0	0.0
<i>Calamus arctifrons</i>	Grass porgy	48	0.0	100.0	0.0
<i>Sphyrna tiburo</i>	Bonnethead shark	43	0.0	51.2	48.8
<i>Cynoscion nothus</i>	Silver seatrout	36	0.0	72.2	27.8
<i>Selene setapinnis</i>	Moonfish	28	78.6	17.9	3.6
<i>Peprilus triacanthus</i>	Atlantic butterflyfish	27	48.2	51.9	0.0
<i>Brevoortia smithi</i>	Yellowfin menhaden	26	0.0	65.4	34.6
<i>Larimus fasciatus</i>	Banded drum	24	0.0	20.8	79.2
<i>Callinectes sapidus</i>	Blue crab	21	0.0	100.0	0.0
<i>Caranx hippos</i>	Crevalle jack	21	95.2	4.8	0.0
<i>Menticirrhus americanus</i>	Southern kingfish	21	100.0	0.0	0.0
<i>Cynoscion regalis</i>	Weakfish seatrout	17	47.1	23.5	29.4
<i>Trachinotus carolinus</i>	Florida pompano	13	100.0	0.0	0.0
<i>Carcharhinus limbatus</i>	Blacktip shark	11	54.6	18.2	27.3
<i>Cynoscion nebulosus</i>	Spotted seatrout	11	63.6	36.4	0.0
<i>Mustelus canis</i>	Smooth dogfish	9	0.0	100.0	0.0
<i>Elops saurus</i>	Ladyfish	7	100.0	0.0	0.0
<i>Leiostomus xanthurus</i>	Spot	7	85.7	14.3	0.0
<i>Carcharhinus plumbeus</i>	Sandbar shark	6	0.0	100.0	0.0
<i>Dendrobranchia</i>	Shrimp	6	100.0	0.0	0.0
<i>Menticirrhus littoralis</i>	Gulf kingfish	6	100.0	0.0	0.0
<i>Synodus foetens</i>	Inshore lizardfish	5	0.0	40.0	60.0
<i>Euthynnus alletteratus</i>	Little tunny	4	100.0	0.0	0.0
<i>Monacanthidae</i>	Filefishes	4	0.0	100.0	0.0
<i>Chilomycterus schoepfi</i>	Striped burrfish	3	0.0	100.0	0.0
<i>Dasyatis americana</i>	Southern stingray	3	0.0	100.0	0.0
<i>Majidae</i>	Spider crabs	3	0.0	100.0	0.0
<i>Pogonias cromis</i>	Black drum	3	0.0	100.0	0.0
<i>Scomberomorus cavalla</i>	King mackerel	3	0.0	0.0	100.0

<i>Carcharhinus brevipinna</i>	Spinner shark	2	50.0	50.0	0.0
<i>Paralichthys albigutta</i>	Gulf flounder	2	100.0	0.0	0.0
<i>Tylosurus crocodilus</i>	Houndfish	2	100.0	0.0	0.0
<i>Archosargus probatocephalus</i>	Sheepshead	1	100.0	0.0	0.0
<i>Arius felis</i>	Hardhead catfish	1	0.0	100.0	0.0
<i>Carcharhinus acronotus</i>	Blacknose shark	1	0.0	100.0	0.0
<i>Carcharhinus isodon</i>	Finetooth shark	1	0.0	100.0	0.0
<i>Carcharhinus obscurus</i>	Dusky shark	1	0.0	100.0	0.0
<i>Chaetodipterus faber</i>	Spadefish	1	0.0	100.0	0.0
<i>Decapoda</i>	Crab	1	0.0	100.0	0.0
<i>Echeneis neucratoides</i>	Whitefin sharksucker	1	0.0	100.0	0.0
<i>Lactophrys ouadricornis</i>	Scrawled cowfish	1	0.0	100.0	0.0
<i>Micropogonias undulatus</i>	Atlantic croaker	1	100.0	0.0	0.0
<i>Opisthonema oglinum</i>	Atlantic thread herring	1	0.0	0.0	100.0
<i>Penaeidae</i>	Shrimp Penaeid	1	100.0	0.0	0.0
<i>Rachycentron canadum</i>	Cobia	1	0.0	100.0	0.0
<i>Raja eglanteria</i>	Clearnose skate	1	0.0	100.0	0.0
<i>Tursiops truncatus</i>	Bottlenose dolphin	1	0.0	100.0	0.0

Table 3. Total sink gillnet catch from southern kingfish targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2015. 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. %
<i>Menticirrhus americanus</i>	Southern kingfish	2068	95.8	0.0	4.2
<i>Brevoortia tyrannus</i>	Atlantic menhaden	1474	66.4	7.5	26.1
<i>Peprilus triacanthus</i>	Atlantic butterfish	1287	98.5	1.0	0.5
<i>Micropogonias undulatus</i>	Atlantic croaker	506	99.0	0.0	1.0
<i>Larimus fasciatus</i>	Banded drum	80	0.0	93.8	6.3
<i>Leiostomus xanthurus</i>	Spot	67	100.0	0.0	0.0
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	51	0.0	66.7	33.3
<i>Pomatomus saltatrix</i>	Bluefish	39	97.4	0.0	2.6
<i>Cynoscion regalis</i>	Weakfish seatrout	35	60.0	20.0	20.0
<i>Peprilus alepidotus</i>	Harvestfish	31	100.0	0.0	0.0
<i>Lagodon rhomboides</i>	Pinfish	30	0.0	100.0	0.0
<i>Squalus acanthias</i>	Spiny dogfish	28	0.0	78.6	21.4
<i>Euthynnus alletteratus</i>	Little tunny	22	100.0	0.0	0.0
<i>Mustelus canis</i>	Smooth dogfish	12	25.0	16.7	58.3
<i>Scomberomorus maculatus</i>	Spanish mackerel	3	100.0	0.0	0.0
<i>Carcharhinus limbatus</i>	Blacktip shark	1	0.0	0.0	100.0
<i>Pelecanus occidentalis</i>	Brown pelican	1	0.0	100.0	0.0
<i>Raja eglanteria</i>	Clearnose skate	1	0.0	100.0	0.0
<i>Tetraodontidae</i>	Puffer family	1	0.0	100.0	0.0

Table 4. Total sink gillnet catch from spiny dogfish targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2015. 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. %
<i>Squalus acanthias</i>	Spiny dogfish	2145	99.9	0.0	0.1
<i>Raja eglanteria</i>	Clearnose skate	160	0.0	100.0	0.0
<i>Carcharhinus plumbeus</i>	Sandbar shark	64	0.0	100.0	0.0
<i>Mustelus canis</i>	Smooth dogfish	31	0.0	90.3	9.7
<i>Sphyrna lewini</i>	Scalloped hammerhead shark	13	0.0	92.3	7.7
<i>Dasyatis americana</i>	Southern stingray	11	0.0	100.0	0.0
<i>Carcharias taurus</i>	Sand tiger shark	10	0.0	100.0	0.0
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	6	0.0	66.7	33.3
<i>Squatina dumeril</i>	Atlantic angel shark	5	0.0	100.0	0.0
<i>Brevoortia tyrannus</i>	Atlantic menhaden	4	0.0	0.0	100.0
<i>Carcharhinus brevipinna</i>	Spinner shark	2	0.0	100.0	0.0
<i>Lophius sp.</i>	Monkfish anglerfish	2	100.0	0.0	0.0
<i>Archosargus probatocephalus</i>	Sheepshead	1	100.0	0.0	0.0
<i>Galeocerdo cuvier</i>	Tiger shark	1	0.0	100.0	0.0
<i>Remora remora</i>	Remora	1	0.0	100.0	0.0
<i>Sphyrna tiburo</i>	Bonnethead shark	1	0.0	100.0	0.0

Table 5. Total sink gillnet catch from mixed teleosts targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2015. 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. %
<i>Pomatomus saltatrix</i>	Bluefish	641	99.1	0.3	0.6
<i>Trichiurus lepturus</i>	Atlantic cutlassfish	354	96.9	0.6	2.5
<i>Scomberomorus maculatus</i>	Spanish mackerel	289	99.3	0.0	0.7
<i>Brevoortia smithi</i>	Yellowfin menhaden	279	0.0	19.7	80.3
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	252	100.0	0.0	0.0
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	192	1.6	58.3	40.1
<i>Caranx crysos</i>	Bluerunner jack	157	98.7	0.0	1.3
<i>Euthynnus alletteratus</i>	Little tunny	47	97.9	2.1	0.0
<i>Scomberomorus cavalla</i>	King mackerel	45	97.8	0.0	2.2
<i>Caranx hippos</i>	Crevalle jack	34	100.0	0.0	0.0
<i>Elops saurus</i>	Ladyfish	16	100.0	0.0	0.0
<i>Diplectrum formosum</i>	Sand perch	11	100.0	0.0	0.0
<i>Selene setapinnis</i>	Moonfish	9	100.0	0.0	0.0
<i>Sphyrna tiburo</i>	Bonnethead shark	6	0.0	50.0	50.0
<i>Bagre marinus</i>	Gafftopsail catfish	5	0.0	100.0	0.0
<i>Rachycentron canadum</i>	Cobia	5	60.0	20.0	20.0
<i>Carcharhinus limbatus</i>	Blacktip shark	4	100.0	0.0	0.0
<i>Lutjanus griseus</i>	Gray snapper	4	0.0	75.0	25.0
<i>Chaetodipterus faber</i>	Spadefish	3	0.0	100.0	0.0
<i>Menticirrhus americanus</i>	Southern kingfish	3	100.0	0.0	0.0
<i>Carcharias taurus</i>	Sand tiger shark	2	0.0	100.0	0.0
<i>Remora remora</i>	Remora	2	0.0	50.0	50.0
<i>Seriola zonata</i>	Banded rudderfish	2	0.0	100.0	0.0
<i>Tylosurus crocodilus</i>	Houndfish	2	100.0	0.0	0.0
<i>Archosargus probatocephalus</i>	Sheepshead	1	0.0	100.0	0.0
<i>Bothus lunatus</i>	Peacock flounder	1	0.0	100.0	0.0
<i>Carcharhinus acronotus</i>	Blacknose shark	1	0.0	100.0	0.0
<i>Carcharhinus isodon</i>	Finetooth shark	1	0.0	100.0	0.0
<i>Dasyatis americana</i>	Southern stingray	1	0.0	100.0	0.0
<i>Echeneis naucrates</i>	Sharksucker	1	0.0	100.0	0.0
<i>Mugil cephalus</i>	Striped mullet	1	100.0	0.0	0.0
<i>Rhinoptera bonasus</i>	Cownose ray	1	0.0	100.0	0.0
<i>Selene vomer</i>	Lookdown	1	0.0	0.0	100.0
<i>Sphyrna barracuda</i>	Great barracuda	1	0.0	0.0	100.0
<i>Synodus foetens</i>	Inshore lizardfish	1	0.0	0.0	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, 2015. 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. %
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	665	98.7	1.1	0.3
<i>Carcharhinus acronotus</i>	Blacknose shark	286	100.0	0.0	0.0
<i>Mustelus canis</i>	Smooth dogfish	62	100.0	0.0	0.0
<i>Carcharhinus brevipinna</i>	Spinner shark	53	0.0	92.5	7.6
<i>Raja eglanteria</i>	Clearnose skate	32	0.0	100.0	0.0
<i>Scyphozoa</i>	Jellyfish	27	0.0	100.0	0.0
<i>Sphyrna tiburo</i>	Bonnethead shark	14	100.0	0.0	0.0
<i>Menticirrhus americanus</i>	Southern kingfish	12	100.0	0.0	0.0
<i>Carcharhinus limbatus</i>	Blacktip shark	8	0.0	100.0	0.0
<i>Asteroidea</i>	Sea stars	7	0.0	100.0	0.0
<i>Sphyrna lewini</i>	Scalloped hammerhead shark	7	0.0	28.6	71.4
<i>Rachycentron canadum</i>	Cobia	5	60.0	40.0	0.0
<i>Carcharhinidae</i>	Requiem shark family	4	0.0	100.0	0.0
<i>Echinodermata</i>	Sea urchins	4	0.0	100.0	0.0
<i>Carcharias taurus</i>	Sand tiger shark	3	0.0	100.0	0.0
<i>Carcharhinus isodon</i>	Finetooth shark	3	100.0	0.0	0.0
<i>Anthozoa</i>	Coral	2	0.0	0.0	100.0
<i>Bagre marinus</i>	Gafftopsail catfish	2	100.0	0.0	0.0
<i>Carcharhinus plumbeus</i>	Sandbar shark	2	0.0	100.0	0.0
<i>Paralichthys lethostigma</i>	Southern flounder	2	100.0	0.0	0.0
<i>Squatina dumeril</i>	Atlantic angel shark	2	0.0	100.0	0.0
<i>Alosa sp.</i>	Shads	1	0.0	0.0	100.0
<i>Carcharhinus leucas</i>	Bull shark	1	0.0	0.0	100.0
<i>Galeocerdo cuvier</i>	Tiger shark	1	0.0	100.0	0.0
<i>Mollusca</i>	Molluscs	1	0.0	100.0	0.0

Table 7. Estimated shark catch by weight (kg), back-calculated from estimated lengths of all sharks observed caught in sink and strike (king mackerel) gillnet gear by target, 2015.

Target Species	Species Caught	Common Name	Total Number Caught	kg	%
King mackerel	<i>Carcharhinus limbatus</i>	Blacktip shark	1	53.95	100.0
		Total	1	53.95	-
Spanish mackerel	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	102	95.97	27.0
	<i>Sphyrna tiburo</i>	Bonnethead shark	43	37.71	10.6
	<i>Carcharhinus limbatus</i>	Blacktip shark	11	54.84	15.4
	<i>Mustelus canis</i>	Smooth dogfish	9	10.72	3.0
	<i>Carcharhinus plumbeus</i>	Sandbar shark	6	119.76	33.7
	<i>Carcharhinus brevipinna</i>	Spinner shark	2	26.52	7.5
	<i>Carcharhinus acronotus</i>	Blacknose shark	1	0.50	0.1
	<i>Carcharhinus isodon</i>	Finetooth shark	1	4.31	1.2
	<i>Carcharhinus obscurus</i>	Dusky shark	1	5.43	1.5
		Total	176	355.76	-
Southern kingfish	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	51	74.39	62.4
	<i>Squalus acanthias</i>	Spiny dogfish	28	35.90	30.1
	<i>Mustelus canis</i>	Smooth dogfish	12	8.83	7.4
	<i>Carcharhinus limbatus</i>	Blacktip shark	1	0.05	0.0
		Total	92	119.17	-
Spiny dogfish	<i>Squalus acanthias</i>	Spiny dogfish	2145	3579.87	86.1
	<i>Carcharhinus plumbeus</i>	Sandbar shark	64	264.40	6.4
	<i>Mustelus canis</i>	Smooth dogfish	31	17.50	0.4
	<i>Sphyrna lewini</i>	Scalloped hammerhead shark	13	61.87	1.5
	<i>Carcharias taurus</i>	Sand tiger shark	10	203.44	4.9
	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	6	4.01	0.1
	<i>Squatina dumeril</i>	Atlantic angel shark	5	7.45	0.2
	<i>Carcharhinus brevipinna</i>	Spinner shark	2	14.33	0.3
	<i>Galeocerdo cuvier</i>	Tiger shark	1	3.28	0.1
	<i>Sphyrna tiburo</i>	Bonnethead shark	1	0.07	0.0
		Total	2278	4156.24	-
Mixed teleosts	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	192	149.14	63.9
	<i>Sphyrna tiburo</i>	Bonnethead shark	6	1.57	0.7
	<i>Carcharhinus limbatus</i>	Blacktip shark	4	19.58	8.4
	<i>Carcharias taurus</i>	Sand tiger shark	2	56.29	24.1
	<i>Carcharhinus acronotus</i>	Blacknose shark	1	2.63	1.1

	<i>Carcharhinus isodon</i>	Finetooth shark	1	4.31	1.8
		Total	206	233.51	-
Mixed sharks	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	665	1771.21	22.4
	<i>Carcharhinus acronotus</i>	Blacknose shark	286	1843.46	23.3
	<i>Mustelus canis</i>	Smooth dogfish	62	41.18	0.5
	<i>Carcharhinus brevipinna</i>	Spinner shark	53	3550.71	44.8
	<i>Sphyrna tiburo</i>	Bonnethead shark	14	20.25	0.3
	<i>Carcharhinus limbatus</i>	Blacktip shark	8	115.34	1.5
	<i>Sphyrna lewini</i>	Scalloped hammerhead shark	7	68.65	0.9
	<i>Carcharhinidae</i>	Requiem shark family	4	152.81	1.9
	<i>Carcharias taurus</i>	Sand tiger shark	3	103.52	1.3
	<i>Carcharhinus isodon</i>	Finetooth shark	3	35.50	0.4
	<i>Carcharhinus plumbeus</i>	Sandbar shark	2	9.69	0.1
	<i>Squatina dumeril</i>	Atlantic angel shark	2	7.86	0.1
	<i>Galeocerdo cuvier</i>	Tiger shark	1	42.90	0.5
	<i>Carcharhinus leucas</i>	Bull shark	1	155.94	2.0
		Total	1111	7919.01	-

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) gillnet gear by target, 2015.

Target Species	Species Caught	Common Name	Total Number Caught	kg
King mackerel	<i>Scomberomorus cavalla</i>	King mackerel	8801	30415.55
	<i>Scomberomorus maculatus</i>	Spanish mackerel	1	0.88
Spanish mackerel	<i>Scomberomorus maculatus</i>	Spanish mackerel	6741	6051.53
	<i>Brevoortia tyranus</i>	Atlantic menhaden	1263	273.04
	<i>Pomatomus saltatrix</i>	Bluefish	1158	1331.70
	<i>Chloroscombrus chrysurus</i>	Atlantic bumper	326	151.08
	<i>Peprilus triacanthus</i>	Atlantic butterflyfish	27	1.78
	<i>Menticirrhus americanus</i>	Southern kingfish	21	16.41
	<i>Cynoscion regalis</i>	Weakfish seatrout	17	7.13
	<i>Leiostomus xanthurus</i>	Spot	7	0.40
	<i>Scomberomorus cavalla</i>	King mackerel	3	2.14
	<i>Micropogonias undulatus</i>	Atlantic croaker	1	0.04
	<i>Rachycentron canadum</i>	Cobia	1	1.00
Southern kingfish	<i>Menticirrhus americanus</i>	Southern kingfish	2068	389.19
	<i>Brevoortia tyranus</i>	Atlantic menhaden	1474	475.03
	<i>Peprilus triacanthus</i>	Atlantic butterflyfish	1287	85.02
	<i>Micropogonias undulatus</i>	Atlantic croaker	506	78.77
	<i>Larimus fasciatus</i>	Banded drum	80	3.85
	<i>Leiostomus xanthurus</i>	Spot	67	3.80
	<i>Pomatomus saltatrix</i>	Bluefish	39	40.52
	<i>Cynoscion regalis</i>	Weakfish seatrout	35	18.40
	<i>Euthynnus alletteratus</i>	Little tunny	22	148.98
	<i>Scomberomorus maculatus</i>	Spanish mackerel	3	2.65
Spiny dogfish	<i>Brevoortia tyranus</i>	Atlantic menhaden	4	8.21
	<i>Lophius sp.</i>	Monkfish anglerfish	2	3.03
Mixed teleost	<i>Pomatomus saltatrix</i>	Bluefish	641	779.78
	<i>Scomberomorus maculatus</i>	Spanish mackerel	289	254.97
	<i>Chloroscombrus chrysurus</i>	Atlantic bumper	252	15.11
	<i>Euthynnus alletteratus</i>	Little tunny	47	66.14
	<i>Scomberomorus cavalla</i>	King mackerel	45	47.16
	<i>Rachycentron canadum</i>	Cobia	5	31.82
	<i>Chaetodipterus faber</i>	Spadefish	3	0.34

	<i>Menticirrhus americanus</i>	Southern kingfish	3	0.08
Mixed sharks	<i>Menticirrhus americanus</i>	Southern kingfish	12	1.55
	<i>Rachycentron canadum</i>	Cobia	5	4.98

Table 9. Average size (fork length, FL) and standard deviation (S.D.) of sharks measured for all observed sink and strike (king mackerel) gillnet trips by target, 2015.

Target	Species	Common Name	n	Avg FL (cm)	S.D.
King mackerel	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	3	53.33	3.5
	<i>Sphyrna tiburo</i>	Bonnethead shark	1	58	0
Spanish mackerel	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	33	52.9	13.0
	<i>Carcharhinus limbatus</i>	Blacktip shark	7	84.3	4.4
	<i>Mustelus canis</i>	Smooth dogfish	7	53.1	12.0
	<i>Carcharhinus plumbeus</i>	Sandbar shark	4	55	8.5
	<i>Sphyrna tiburo</i>	Bonnethead shark	2	85.5	25
	<i>Isurus oxyrinchus</i>	Shortfin mako shark	1	35	0
	<i>Carcharhinus acronotus</i>	Blacknose shark	1	56	0
	<i>Carcharhinus brevipinna</i>	Spinner shark	1	62	0
Southern kingfish	<i>Mustelus canis</i>	Smooth dogfish	3	51	3.6
	<i>Carcharhinus limbatus</i>	Blacktip shark	1	26	0
Spiny dogfish	<i>Squalus acanthias</i>	Spiny dogfish	30	60.8	5.5
	<i>Carcharhinus plumbeus</i>	Sandbar shark	24	67.3	6.8
	<i>Mustelus canis</i>	Smooth dogfish	17	52.7	5.3
	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	6	55.2	3.8
	<i>Squatina dumeril</i>	Atlantic angel shark	3	56	15
	<i>Galeocerdo cuvier</i>	Tiger shark	1	70	0
	<i>Sphyrna tiburo</i>	Bonnethead shark	1	58	0
Mixed teleosts	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	57	52.5	4.3
	<i>Carcharhinus limbatus</i>	Blacktip shark	4	83	6.4
	<i>Sphyrna tiburo</i>	Bonnethead shark	1	58	0
Mixed sharks	<i>Carcharhinus acronotus</i>	Blacknose shark	160	93.1	6.4
	<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	64	70.4	3.7
	<i>Mustelus canis</i>	Smooth dogfish	20	55.3	7.6
	<i>Sphyrna tiburo</i>	Bonnethead shark	15	75.0	9.7
	<i>Menticirrhus americanus</i>	Southern kingfish	11	24.5	3.1
	<i>Sphyrna lewini</i>	Scalloped hammerhead shark	6	78.0	18.2
	<i>Carcharhinus isodon</i>	Finetooth shark	2	110	5.7

Table 10. Average size (fork length, FL) and standard deviation (S.D.) of non-sharks measured for all observed sink and strike (king mackerel) gillnet trips by target, 2015, where sample size \geq 5.

Target	Species	Common Name	n	Avg FL (cm)	S.D.
King mackerel	<i>Scomberomorus cavalla</i>	King mackerel	58	76.0	8.1
Spanish mackerel	<i>Scomberomorus maculatus</i>	Spanish mackerel	728	42.4	6.8
	<i>Pomatomus saltatrix</i>	Bluefish	179	34.9	3.4
	<i>Brevoortia tyrannus</i>	Atlantic menhaden	69	21.9	3.1
	<i>Brevoortia sp.</i>	Menhadens	48	25.3	4.2
	<i>Caranx crysos</i>	Bluerunner jack	34	25.9	2.3
	<i>Peprilus alepidotus</i>	Harvestfish	26	12.8	2.0
	<i>Peprilus triacanthus</i>	Atlantic butterfish	15	13.4	2.8
	<i>Cynoscion nothus</i>	Silver seatrout	14	27.7	3.4
	<i>Menticirrhus americanus</i>	Southern kingfish	13	31.2	2.7
	<i>Trachinotus carolinus</i>	Florida pompano	12	24.2	2.7
	<i>Calamus arctifrons</i>	Grass porgy	9	19.9	1.8
	<i>Cynoscion regalis</i>	Weakfish seatrout	8	37.5	5.0
	<i>Leiostomus xanthurus</i>	Spot	6	22.2	2.2
Southern kingfish	<i>Menticirrhus americanus</i>	Southern kingfish	312	29.6	4.4
	<i>Peprilus triacanthus</i>	Atlantic butterfish	115	16.5	4.2
	<i>Micropogonias undulatus</i>	Atlantic croaker	67	26.7	3.8
	<i>Brevoortia tyrannus</i>	Atlantic menhaden	60	29.5	2.9
	<i>Leiostomus xanthurus</i>	Spot	54	24.5	2.3
	<i>Pomatomus saltatrix</i>	Bluefish	37	33.7	3.1
	<i>Euthynnus alletteratus</i>	Little tunny	22	67.8	3.7
	<i>Cynoscion regalis</i>	Weakfish seatrout	20	36.0	4.8
	<i>Peprilus alepidotus</i>	Harvestfish	7	15.1	0.7
Mixed teleosts	<i>Trichiurus lepturus</i>	Atlantic cutlassfish	81	78.4	5.3
	<i>Caranx crysos</i>	Bluerunner jack	50	26.8	2.3
	<i>Scomberomorus maculatus</i>	Spanish mackerel	32	42.8	4.7
	<i>Euthynnus alletteratus</i>	Little tunny	29	43.0	1.3
	<i>Pomatomus saltatrix</i>	Bluefish	27	37.2	1.2
	<i>Scomberomorus cavalla</i>	King mackerel	25	61.3	4.9
	<i>Rachycentron canadum</i>	Cobia	5	77.8	4.7
Mixed sharks	<i>Menticirrhus americanus</i>	Southern kingfish	11	24.5	3.1

Figure 1. Distribution of observed strike gillnet sets targeting king mackerel, *Scomberomorus cavalla*, 2015 (n=5 sets).

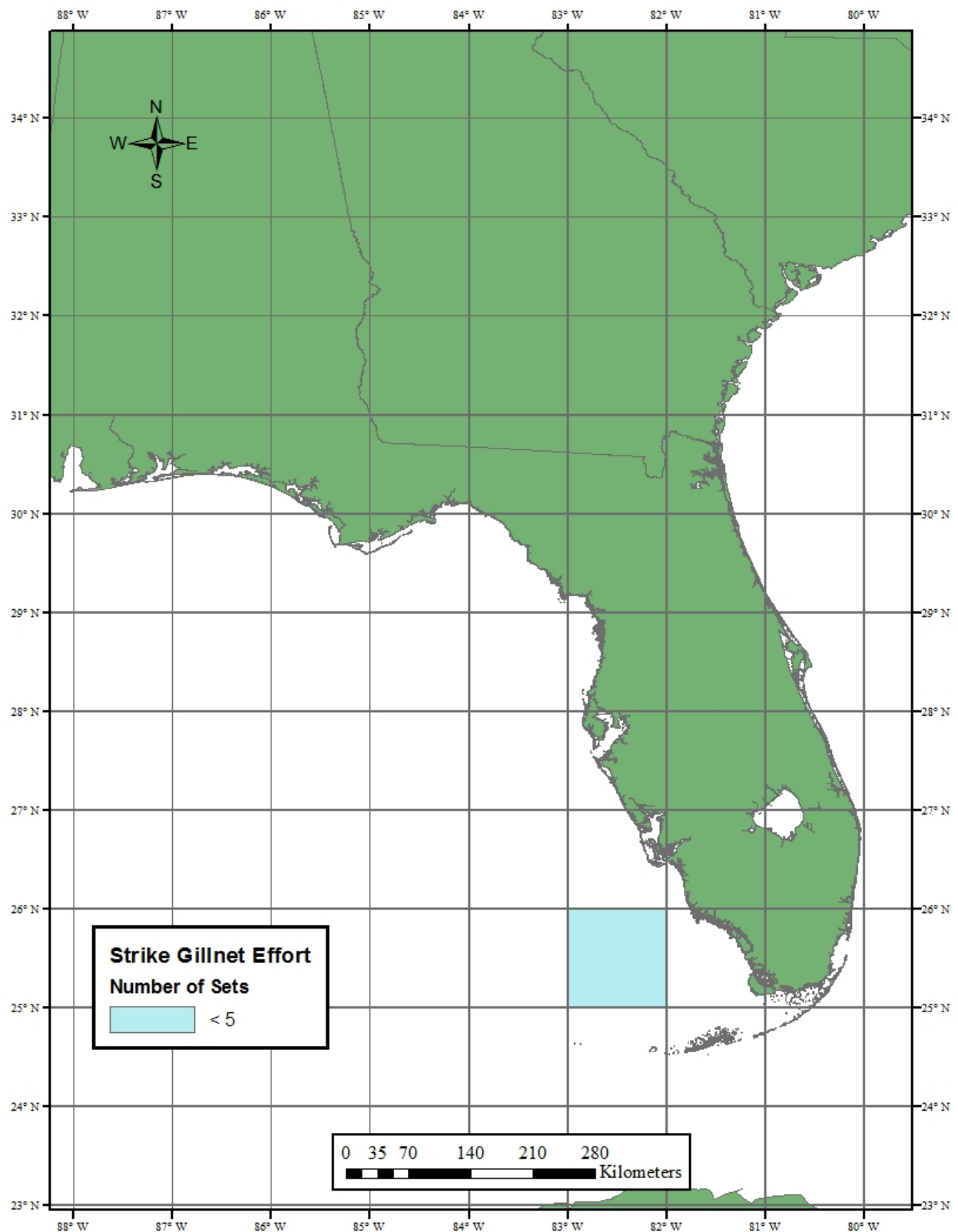


Figure 2. Distribution of observed sink gillnet sets targeting Spanish mackerel, *Scomberomorus maculatus*, 2015 (n=131 sets).

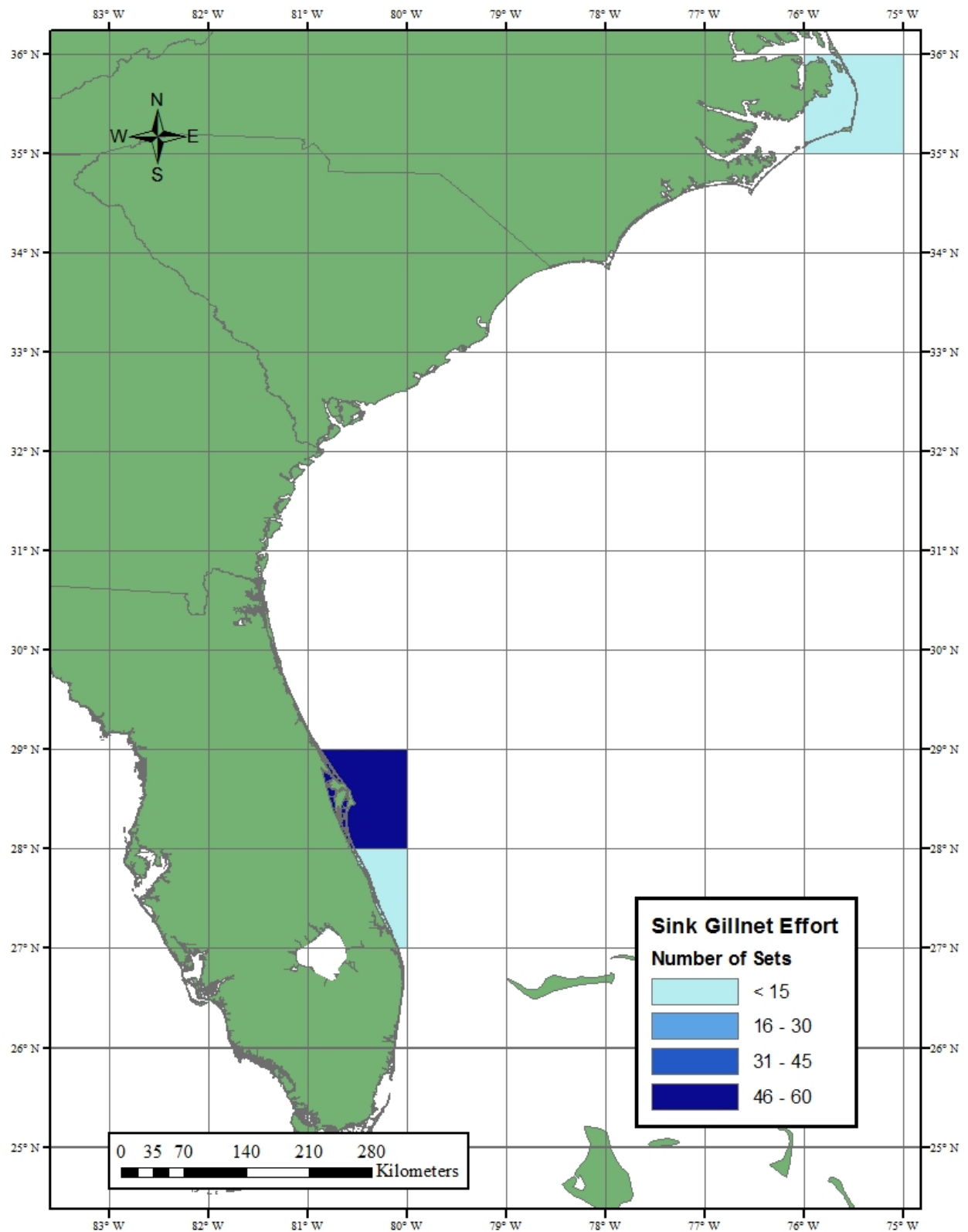


Figure 3. Distribution of observed sink gillnet sets targeting southern kingfish, 2015 (n=34 sets).

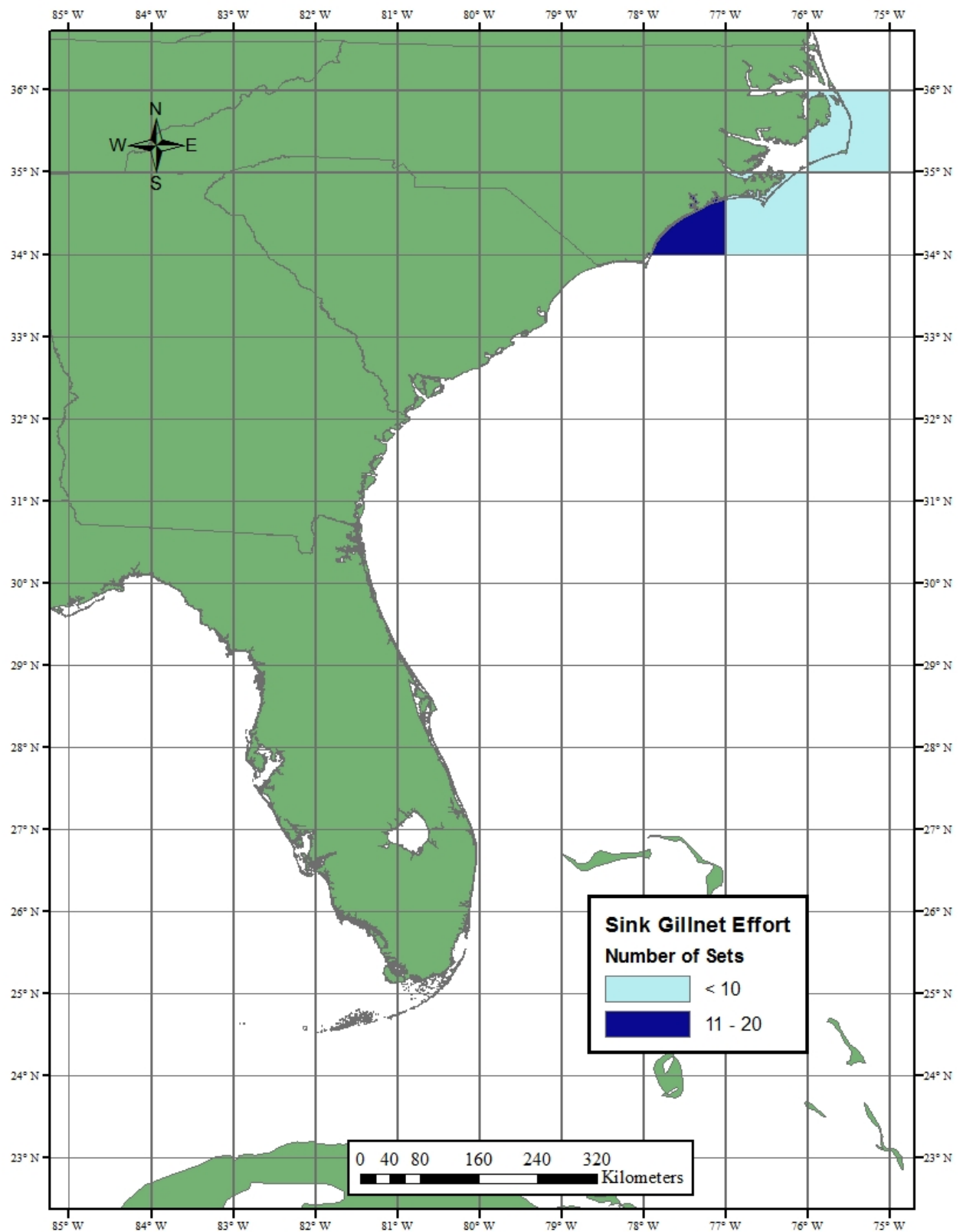


Figure 4. Distribution of observed sink gillnet sets targeting spiny dogfish, 2015 (n=9 sets).

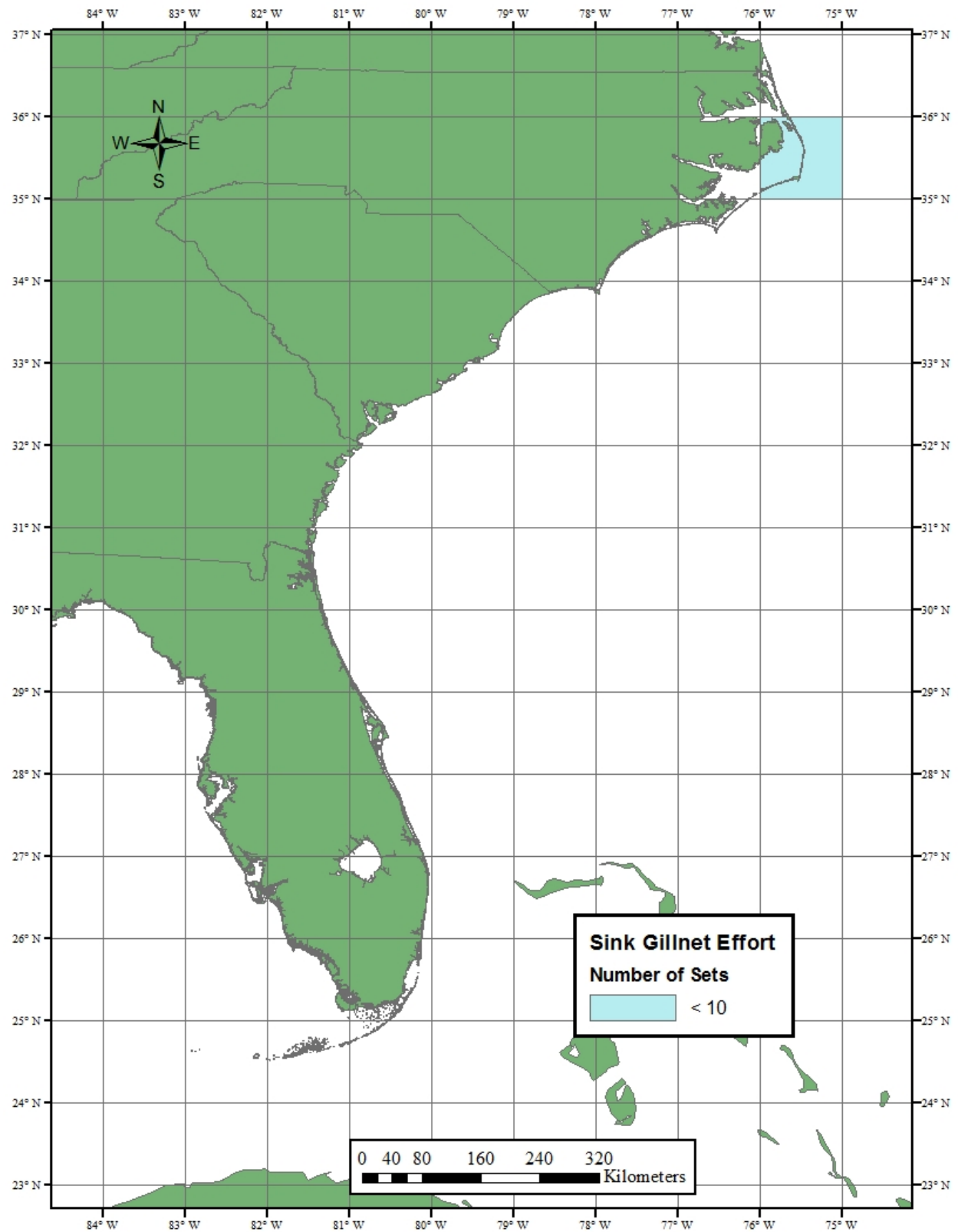


Figure 5. Distribution of observed sink gillnet sets targeting mixed teleosts, 2015 (n=24 sets).

