NOAA Technical Memorandum NMFS-SEFSC-657

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April 2014

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This report should be cited as follows:
Mathers, A.N., B.M. Deacy, M.S. Passerotti, J.K. Carlson. 2014. Catch and Bycatch in U.S. Southeast Gillnet Fisheries, 2013. NOAA Technical Memorandum NMFS-SEFSC-657. 24 p.

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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. 2013). There are currently about 500 total directed and incidental shark permits issued in the US Atlantic 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 all 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 2013 - December 2013, collectively referred to as '2013'.

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 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 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 2013. Set locations ranged from North Carolina to the Florida Keys in the Atlantic Ocean and the Gulf of Mexico (Figures 1-3). However, location-specific reports of trips cannot be documented herein due to vessel confidentiality laws, therefore observations will be summarized by gear type. Weights for shark and teleost catch referenced herein (Tables 5 and 6) were back-calculated using estimated length (cm FL) measurements and length-weight conversions (Wigley et al. 2003; NMFS, unpublished data).

Strike gillnet fishery

A total of 4 gillnet vessels were observed making 12 strike sets on 10 trips in 2013. These vessels targeted king mackerel exclusively. Vessels fished with nets ranging 274.3 – 548.6 m (900 - 1800 ft) long, net depths of 22.9 – 30.5 m (75 – 100 ft) and stretched mesh sizes 11.4 – 12.1 cm (4.5 – 4.875 in). Set duration averaged 1.90 hr (6.63 S.D.). Hauls averaged 3.24 hr (6.25 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 8.65 hr (5.63 S.D.). Sets were made in waters averaging 20.8 m (1.4 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 99.56 % teleosts and 0.44 % elasmobranchs (Table 1). Catch was almost completely composed of king mackerel, *Scomberomorus cavalla* (97.13 %). Other catch by number included bluefish, *Pomatomus saltatrix*, (2.01 %), Spanish mackerel, *Scomberomorus maculatus*, (0.66 %), bonito, *Sarda sarda*, (0.07 %), and red grouper, *Epinephelus morio*, (0.05 %). Shark catch by number was made up of Atlantic sharpnose shark, *Rhizoprionodon terraenovae*, (46.15 %), blacktip shark, *Carcharhinus limbatus*, (27.47 %), and blacknose shark, *Carcharhinus acronotus*, (21.98 %). Shark catch by weight (Table 5) was blacktip shark (29.45 %), Atlantic sharpnose shark (28.55 %), and great hammerhead shark, *Sphyrna mokarran*, (24.76 %). Catches by weight of commercially important teleosts are given in Table 6.

Average size from strike gillnet sets

Average (S.D.) fork lengths of teleosts caught in king mackerel targeted sets ranged from 35.3 cm (1.0) for little tunny, *Euthynnus alletteratus*, to 77.5 cm (8.1) for king mackerel. Average (S.D.) fork length of sharks ranged from 78.0 cm (2.7) for bonnethead shark, *Sphyrna tiburo*, to 82.0 cm (1.4) for blacknose shark. The average (S.D.) lengths of teleosts ($n \geq 5$) measured in king mackerel targeted sets can be found in Table 8.

Sink gillnet fishery

A total of 50 trips totaling 213 sink net sets on 20 vessels were observed in 2013. Trips were made targeting one or more of the following: Spanish mackerel, mixed teleosts (including Atlantic croaker *Micropogonias undulatus*, bluefish, Atlantic menhaden, *Brevoortia tyranus*, and

mixed species), and mixed sharks (including smooth dogfish, *Mustelus canis*, blacknose shark, and finetooth shark, *Carcharhinus isodon*). Refinement of the data by target species was possible except for mixed species targeted sets, which were excluded.

Spanish mackerel targeted sink gillnet

Thirty-six observed trips were made on 12 vessels for a total of 158 sink gillnet sets targeting Spanish mackerel. Vessels fished with nets ranging 45.7 – 1828.8 m (150 - 6000 ft) long, net depths of 3.6 – 15.2 m (11.7 – 50.0 ft) and stretched mesh sizes 8.3 – 9.5 cm (3.325 – 3.875 in). Set duration averaged 0.22 hr (1.90 S.D.). Hauls averaged 0.58 hr (1.97 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 1.41 hr (2.29 S.D.). Sets were made in waters averaging 7.2 m (3.7 S.D.) deep. Observed Spanish mackerel targeted sink gillnet fishing effort is illustrated in Figure 2.

Observed Spanish mackerel targeted sink gillnet catches

Catch composition by number of all Spanish mackerel targeted sets was 96.43 % teleosts, 2.93 % elasmobranchs, and 0.64 % invertebrates. (Table 2). By number, shark catch was made up of Atlantic sharpnose shark (43.46 %), spinner shark, *Carcharhinus brevipinna*, (17.31 %), and bonnethead shark (14.49 %). By weight the shark catch was made up of Atlantic sharpnose shark (41.91 %) followed by spinner shark (20.71 %) and bonnethead shark (12.83 %). Catches by weight of sharks are given in Table 5. Spanish mackerel made up 62.19 % of the teleost catch by number, followed by bluefish (21.58 %), Atlantic bumper, *Chloroscombrus chrysurus* (4.76 %), and harvestfish, *Peprilus alepidotus* (2.83 %). Catches by weight of commercially important teleosts can be found in Table 6.

Average size from Spanish mackerel targeted sets

Average (S.D.) fork lengths of sharks caught in Spanish mackerel targeted sets ranged from 59.4 cm (12.9) for Atlantic sharpnose shark to 82.0 cm (29.7) for blacknose shark. The average (S.D.) lengths of sharks measured by target can be found in Table 7. Average (S.D.) fork lengths of teleosts caught in Spanish mackerel targeted sets ranged from 11.5 cm (2.1) for spadefish *Chaetodipterus faber*, to 103.8 cm (7.4) for Atlantic cutlassfish, *Trichiurus lepturus*. Average (S.D.) lengths of teleosts ($n \geq 5$) measured by target can be found in Table 8.

Mixed teleost targeted sink gillnet

Eight observed trips were made on 5 vessels for a total of 43 sink gillnet sets. Vessels fished with nets 274.3 m (900 ft) long, net depths of 2.8 – 5.9 m (9.2 – 19.3 ft) and stretched mesh sizes 8.3 – 8.9 cm (3.25 – 3.5 in). Set duration averaged 0.07 hr (0.03 S.D.). Hauls averaged 0.37 hr (0.06 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 6.78 hr (0.44 S.D.). The high gear soak duration relative to the set and haul duration was due to one aberrant set. Sets were made in waters averaging 24.6 m (9.4 S.D.) deep.

Observed mixed teleost targeted sink gillnet catches

Catch composition by number of all mixed teleost targeted sets was 99.31 % teleosts, 0.40 % elasmobranchs, 0.28 % invertebrates, and 0.02 % batoids (Table 3). By number, shark catch comprised smooth dogfish (75.00 %), and Atlantic sharpnose shark (25.00 %). By weight the shark catch was smooth dogfish (79.27 %) and Atlantic sharpnose shark (20.73 %). (Table

5). Atlantic croaker made up 93.26 % of the teleost catch, by number, followed by weakfish seatrout, *Cynoscion* regalis, (2.90 %), Atlantic butterfish (2.84 %), and Atlantic menhaden (0.68 %). Catches by weight of commercially important teleosts can be found in Table 6.

Average size from mixed teleosts targeted sets

Average (S.D.) fork lengths of sharks caught in mixed teleosts targeted sets ranged from 57.5 cm (2.1) for Atlantic sharpnose shark, to 62.3 cm (8.1) for smooth dogfish. The average (S.D.) lengths of sharks measured by target can be found in Table 7. Average (S.D.) fork lengths of teleosts caught in mixed teleosts targeted sets ranged from 16.6 cm (2.3) for Atlantic butterfish, to 31.8 cm (1.7) for bluefish (Table 8).

Mixed shark targeted sink gillnet

Six observed trips were made on 3 vessels for a total of 12 sink gillnet sets. Vessels fished with nets ranging from 160.0 – 804.7 m (525 – 2640 ft) long, net depths of 2.8 – 5.9 m (12.5 – 17.4 ft) and stretched mesh sizes 8.3 – 8.9 cm (5.0 – 8.0 in). Set duration averaged 0.09 hr (0.02 S.D.). Hauls averaged 1.12 hr (0.58 S.D.). The entire fishing process (time net was first set until time haul back was completed) averaged 2.94 hr (1.20 S.D.). Sets were made in waters averaging 10.2 m (1.2 S.D.) deep. Observed mixed shark targeted sink gillnet effort 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 59.69 % teleosts, 40.13 % elasmobranchs, and 0.18 % invertebrates (Table 4). By number, shark catch comprised

Atlantic sharpnose shark (36.57 %), smooth dogfish (25.73 %), and scalloped hammerhead shark (18.06 %). By weight the shark catch was Atlantic sharpnose shark (29.63 %), scalloped hammerhead shark (23.84 %), and smooth dogfish (12.99 %, Table 5). Little tunny made up 85.28 % of the teleost catch, by number, followed by king mackerel (11.38 %), Atlantic butterfish (0.76 %), and menhadens (0.76 %). Catches by weight of commercially important teleosts can be found in Table 6.

Average size from mixed shark targeted sets

Average (S.D.) fork lengths of sharks caught in mixed shark targeted sets ranged from 58.5 cm (8.3) for bonnethead shark, to 107.6 cm (12.5) for finetooth shark. The average (S.D.) lengths of sharks measured by target can be found in Table 7. Average (S.D.) fork lengths of teleosts caught in mixed shark targeted sets ranged from 14.0 cm (1.4) for Atlantic butterfish, to 57.0 cm (5.8) for king mackerel (Table 8).

Protected resources interactions

There were no observed protected resources interactions in any gillnet sets.

Discussion

The trend of declining effort in the LCS targeted gillnet fishery continued to be observed in 2013. Strike gillnet gear was observed exclusively in teleost (king mackerel) targeted sets. There was no drift gillnet effort observed, even though there is a small fleet that still utilizes this gear. Sink gillnet fishers continued to target those shark species with less restrictive landing limitations (smooth dogfish) while a small number continued to target small coastal sharks

(finetooth and blacknose sharks); however, the majority of observed sink gillnet effort targeted teleost species. Incidental take of protected species remained a rare occurrence, with no incidental take observed in 2013. The SGOP continues to monitor catch and bycatch as the southeast US gillnet fishery continues to adapt to changing regulations.

Acknowledgments

The following observers were responsible for collection of data for this report: A. Santiago, J. Parks, C. Aguero, K. Cyr, M. Cochran, M. Enzenauer, J. Lange, A. Goggins, and M. Lee.

References

Carlson, J.K. and D.M. Bethea. 2007. Catch and bycatch in the shark gillnet fishery: 2005-2006. NOAA Technical Memorandum NMFS-SEFSC-552, 26 p.

Mathers, A.N., M.S. Passerotti, J.K. Carlson. 2013. Catch and Bycatch in U.S. Southeast Gillnet Fisheries, 2012. NOAA Technical Memorandum NMFS-SEFSC-648. 26 p.

National Marine Fisheries Service (NMFS). 2007. Amendment 2 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan. NOAA/NMFS, Office of Sustainable Fisheries, Highly Migratory Species Management Division, Silver Spring, MD. 726 p.

National Marine Fisheries Service (NMFS). 2010. Amendment 3 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan. NOAA/NMFS, Office of Sustainable Fisheries, Highly Migratory Species Management Division, Silver Spring, MD. 632 p.

Wigley, S.E., McBride, H.M., and N.J. McHugh. 2003. Length-Weight Relationships for 74 Fish Species Collected during NEFSC Research Vessel Bottom Trawl Surveys, 1992-99. NOAA Technical Memorandum NMFS-NE-171, 36 p.

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, 2013. 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	19834	84.6	0.0	15.4
Pomatomus saltatrix	Bluefish	410	66.7	0.0	33.3
Scomberomorus maculatus	Spanish mackerel	138	100.0	0.0	0.0
Rhizoprionodon terraenovae	Atlantic sharpnose shark	42	0.0	33.3	66.7
Carcharhinus limbatus	Blacktip shark	25	0.0	100.0	0.0
Carcharhinus acronotus	Blacknose shark	20	0.0	75.0	25.0
Sarda sarda	Bonito	14	0.0	0.0	100.0
Epinephelus morio	Red grouper	11	0.0	66.7	33.3
Euthynnus alletteratus	Little tunny	7	100.0	0.0	0.0
Haemulon album	Margate grunt	3	0.0	100.0	0.0
Sphyrna tiburo	Bonnethead shark	3	0.0	100.0	0.0
Pomacanthidae	Angelfish family	2	0.0	100.0	0.0
Haemulon plumieri	White grunt	1	0.0	100.0	0.0
Sphyraena barracuda	Great barracuda	1	0.0	0.0	100.0
Sphyrna mokarran	Great hammerhead shark	1	0.0	100.0	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, 2013. 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	5800	92.1	0.0	7.9
Pomatomus saltatrix	Bluefish	2013	88.4	2.9	8.7
Chloroscombrus chrysurus	Atlantic bumper	444	44.4	47.2	8.3
Peprilus alepidotus	Harvestfish	264	75.0	6.3	18.8
Brevoortia tyranus	Atlantic menhaden	230	10.0	30.0	60.0
Peprilus triacanthus	Atlantic butterfish	143	73.3	6.7	20.0
Rhizoprionodon terraenovae	Atlantic sharpnose shark	123	31.4	57.1	11.4
Cynoscion arenarius	Sand seatrout	76	0.0	53.9	46.2
Brevoortia smithi	Yellowfin menhaden	72	0.0	77.8	22.2
Carcharhinus brevipinna	Spinner shark	49	0.0	76.5	23.5
Sphyrna tiburo	Bonnethead shark	41	9.1	45.5	45.5
Majidae	Spider crabs	39	0.0	100.0	0.0
Carcharhinus isodon	Finetooth shark	34	0.0	81.8	18.2
Larimus fasciatus	Banded drum	31	0.0	50.0	50.0
Selene setapinnis	Moonfish	30	11.1	66.7	22.2
Bagre marinus	Gafftopsail catfish	24	0.0	70.0	30.0
Trichiurus lepturus	Atlantic cutlassfish	24	88.9	0.0	11.1
Carcharhinus limbatus	Blacktip shark	20	35.7	42.9	21.4
Menticirrhus americanus	Southern kingfish	20	75.0	8.3	16.7
Caranx crysos	Bluerunner jack	18	12.5	62.5	25.0
Cynoscion regalis	Weakfish seatrout	14	50.0	0.0	50.0
Asteroidea	Sea stars	13	0.0	50.0	50.0
Cynoscion nothus	Silver seatrout	13	60.0	0.0	40.0
Euthynnus alletteratus	Little tunny	13	100.0	0.0	0.0
Tylosurus crocodilus	Houndfish	13	100.0	0.0	0.0
Rachycentron canadum	Cobia	12	40.0	60.0	0.0
Sphyrna lewini	Scalloped hammerhead shark	12	22.2	55.6	22.2
Chaetodipterus faber	Spadefish	11	0.0	100.0	0.0
Scomberomorus cavalla	King mackerel	10	0.0	16.7	83.3
Arius felis	Hardhead catfish	9	0.0	100.0	0.0
Micropogonias undulatus	Atlantic croaker	9	40.0	20.0	40.0
Caranx hippos	Crevalle jack	8	40.0	40.0	20.0
Mugil curema	Silver mullet	8	66.7	33.3	0.0
Trachinotus carolinus	Florida pompano	7	100.0	0.0	0.0
Decapoda	Shrimp	5	100.0	0.0	0.0
Scyphozoa	Jellyfish	5	0.0	0.0	100.0
Carcharhinus acronotus	Blacknose shark	4	66.7	33.3	0.0

Scianops ocellatus	Red drum	3	0.0	100.0	0.0
Synodus foetens	Inshore lizardfish	3	0.0	0.0	100.0
Prionotus sp.	Searobins	2	0.0	100.0	0.0
Leiostomus xanthurus	Spot	1	100.0	0.0	0.0
Menticirrhus saxatilis	Northern kingfish	1	100.0	0.0	0.0
Selene vomer	Lookdown	1	100.0	0.0	0.0

Table 3. Total sink gillnet catch from mixed teleost targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2013. 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	4666	100.0	0.0	0.0
Cynoscion regalis	Weakfish seatrout	145	100.0	0.0	0.0
Peprilus triacanthus	Atlantic butterfish	142	100.0	0.0	0.0
Brevoortia tyranus	Atlantic menhaden	34	70.6	0.0	29.4
Mustelus canis	Smooth dogfish	15	75.0	25.0	0.0
Callinectes sapidus	Blue crab	14	100.0	0.0	0.0
Pomatomus saltatrix	Bluefish	10	100.0	0.0	0.0
Rhizoprionodon terraenovae	Atlantic sharpnose shark	5	0.0	100.0	0.0
Menticirrhus americanus	Southern kingfish	4	100.0	0.0	0.0
Lophius sp.	Monkfish anglerfish	1	100.0	0.0	0.0
Raja eglanteria	Clearnose skate	1	0.0	100.0	0.0
Tylosurus crocodilus	Houndfish	1	100.0	0.0	0.0

Table 4. Total sink gillnet catch from mixed shark targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2013. 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. (%)
Euthynnus alletteratus	Little tunny	562	100.0	0.0	0.0
Rhizoprionodon terraenovae	Atlantic sharpnose shark	162	100.0	0.0	0.0
Mustelus canis	Smooth dogfish	114	60.0	40.0	0.0
Sphyrna lewini	Scalloped hammerhead shark	80	28.6	42.9	28.6
Scomberomorus cavalla	King mackerel	75	100.0	0.0	0.0
Carcharhinus brevipinna	Spinner shark	155	36.8	63.2	0.0
Carcharhinus limbatus	Blacktip shark	27	40.7	59.3	0.0
Carcharhinus isodon	Finetooth shark	21	66.7	33.3	0.0
Sphyrna tiburo	Bonnethead shark	9	100.0	0.0	0.0
Carcharhinus acronotus	Blacknose shark	8	100.0	0.0	0.0
Brevoortia sp.	Menhadens	5	0.0	0.0	100.0
Peprilus triacanthus	Atlantic butterfish	5	100.0	0.0	0.0
Bagre marinus	Gafftopsail catfish	5	0.0	80.0	20.0
Paralichthys dentatus	Summer Flounder	3	100.0	0.0	0.0
Rachycentron canadum	Cobia	3	100.0	0.0	0.0
Limulus polyphemus	Horseshoe crab	2	100.0	0.0	0.0
Squatina dumeril	Atlantic angel shark	2	0.0	100.0	0.0
Scianops ocellatus	Red drum	1	0.0	100.0	0.0
Carcharodon carcharias	Great white shark	1	0.0	100.0	0.0

Table 5. 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, 2013.

Target Species	Species Caught	Common Name	Total Number Caught	Kg	%
King mackerel	*Rhizoprionodon terraenovae*	Atlantic sharpnose shark	42	94.60	28.6
	Carcharhinus limbatus	Blacktip shark	25	97.57	29.5
	Carcharhinus acronotus	Blacknose shark	20	50.49	15.2
	Sphyrna tiburo	Bonnethead shark	3	6.63	2.0
	Sphyrna mokarran	Great hammerhead shark	1	82.03	24.8
		Total	**91**	**331.32**	**-**
Spanish mackerel	*Rhizoprionodon terraenovae*	Atlantic sharpnose shark	123	245.18	41.9
	Carcharhinus brevipinna	Spinner shark	49	121.18	20.7
	Sphyrna tiburo	Bonnethead shark	41	75.04	12.8
	Carcharhinus isodon	Finetooth shark	34	42.69	7.3
	Carcharhinus limbatus	Blacktip shark	20	51.77	8.8
	Sphyrna lewini	Scalloped hammerhead shark	12	28.29	4.8
	Carcharhinus acronotus	Blacknose shark	4	20.86	3.6
		Total	**283**	**585.00**	**-**
Mixed teleosts	*Rhizoprionodon terraenovae*	Atlantic sharpnose shark	5	5.36	20.7
	Mustelus canis	Smooth dogfish	15	20.50	79.3
		Total	**20**	**25.86**	**-**
Mixed sharks	*Rhizoprionodon terraenovae*	Atlantic sharpnose shark	162	460.44	29.6
	Mustelus canis	Smooth dogfish	114	201.83	13.0
	Sphyrna lewini	Scalloped hammerhead shark	80	370.52	23.8
	Carcharhinus limbatus	Blacktip shark	27	116.26	7.5
	Carcharhinus isodon	Finetooth shark	21	84.41	5.4
	Carcharhinus brevipinna	Spinner shark	19	105.38	6.8
	Sphyrna tiburo	Bonnethead shark	9	14.57	0.9
	Carcharhinus acronotus	Blacknose shark	8	62.41	4.0
	Squatina dumeril	Atlantic angel shark	2	1.52	0.1
	Carcharodon carcharias	Great white shark	1	136.61	8.8
		Total	**443**	**1553.94**	**-**

Table 6. 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, 2013.

Target Species	Species Caught	Common Name	Total Number Caught	Kg
King mackerel	*Scomberomorus cavalla*	King mackerel	19834	67064.04
	Pomatomus saltatrix	Bluefish	410	509.45
	Scomberomorus maculatus	Spanish mackerel	138	131.51
	Euthynnus alletteratus	Little tunny	7	8.67
Spanish mackerel	*Scomberomorus maculatus*	Spanish mackerel	5800	5106.64
	Pomatomus saltatrix	Bluefish	2013	2412.64
	Chloroscombrus chrysurus	Atlantic bumper	444	26.63
	Brevoortia tyranus	Atlantic menhaden	230	13.79
	Peprilus triacanthus	Atlantic butterfish	143	9.45
	Cynoscion arenarius	Sand seatrout	76	2.52
	Larimus fasciatus	Banded drum	31	1.49
	Menticirrhus americanus	Southern kingfish	20	15.16
	Cynoscion regalis	Weakfish seatrout	14	6.21
	Cynoscion nothus	Silver seatrout	13	7.82
	Euthynnus alletteratus	Little tunny	13	11.75
	Rachycentron canadum	Cobia	12	27.70
	Micropogonias undulatus	Atlantic croaker	9	0.36
	Prionotus sp.	Searobins	2	0.05
	Leiostomus xanthurus	Spot	1	0.06
Mixed teleosts	*Micropogonias undulatus*	Atlantic croaker	4666	828.31
	Cynoscion regalis	Weakfish seatrout	145	107.45
	Peprilus triacanthus	Atlantic butterfish	142	9.38
	Brevoortia tyranus	Atlantic menhaden	34	6.02
	Pomatomus saltatrix	Bluefish	10	7.49
	Menticirrhus americanus	Southern kingfish	4	0.11
	Lophius sp.	Monkfish anglerfish	1	1.51
Mixed sharks	*Euthynnus alletteratus*	Little tunny	562	807.48
	Scomberomorus cavalla	King mackerel	75	116.39
	Brevoortia sp.	Menhadens	5	0.30
	Peprilus triacanthus	Atlantic butterfish	5	0.33
	Rachycentron canadum	Cobia	3	30.77

Table 7. 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, 2013.

Target	Species	Common Name	n	Avg FL (cm)	S.D.
King mackerel	*Sphyrna tiburo*	Bonnethead shark	3	78.0	2.7
	Carcharhinus acronotus	Blacknose shark	2	82.0	1.4
Spanish mackerel	*Rhizoprionodon terraenovae*	Atlantic sharpnose shark	64	59.4	12.9
	Carcharhinus brevipinna	Spinner shark	18	67.0	6.4
	Sphyrna tiburo	Bonnethead shark	17	72.0	11.0
	Carcharhinus limbatus	Blacktip shark	16	77.1	21.0
	Carcharhinus isodon	Finetooth shark	14	61.2	7.7
	Sphyrna lewini	Scalloped hammerhead shark	6	65.3	13.3
	Carcharhinus acronotus	Blacknose shark	2	82.0	29.7
Mixed teleosts	*Mustelus canis*	Smooth dogfish	15	62.3	8.1
	Rhizoprionodon terraenovae	Atlantic sharpnose shark	2	57.5	2.1
Mixed sharks	*Rhizoprionodon terraenovae*	Atlantic sharpnose shark	52	77.2	2.8
	Mustelus canis	Smooth dogfish	30	65.5	5.2
	Carcharhinus isodon	Finetooth shark	13	107.6	12.5
	Sphyrna lewini	Scalloped hammerhead shark	12	63.6	2.4
	Carcharhinus limbatus	Blacktip shark	9	96.3	34.2
	Carcharhinus acronotus	Blacknose shark	6	95.5	3.1
	Carcharhinus brevipinna	Spinner shark	5	71.8	3.5
	Sphyrna tiburo	Bonnethead shark	4	58.5	8.3

Table 8. 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, 2013, where sample size ≥ 5.

Target	Species	Common Name	n	Avg FL (cm)	S.D.
King mackerel	*Scomberomorus cavalla*	King mackerel	140	77.5	8.1
	Scomberomorus maculatus	Spanish mackerel	31	48.8	3.1
	Pomatomus saltatrix	Bluefish	16	53.5	6.7
Spanish mackerel	*Scomberomorus maculatus*	Spanish mackerel	796	39.7	6.6
	Pomatomus saltatrix	Bluefish	346	34.7	4.0
	Peprilus alepidotus	Harvestfish	78	11.9	1.5
	Peprilus triacanthus	Atlantic butterfish	57	15.2	1.6
	Chloroscombrus chrysurus	Atlantic bumper	41	20.2	2.1
	Menticirrhus americanus	Southern kingfish	19	30.3	5.9
	Trichiurus lepturus	Atlantic cutlassfish	18	103.8	7.4
	Brevoortia tyranus	Atlantic menhaden	15	21.0	4.1
	Tylosurus crocodilus	Houndfish	13	66.9	4.7
	Cynoscion nothus	Silver seatrout	13	38.1	10.6
	Euthynnus alletteratus	Little tunny	13	30.4	1.9
	Cynoscion arenarius	Sand seatrout	13	23.6	1.7
	Cynoscion regalis	Weakfish seatrout	11	36.2	7.5
	Brevoortia smithi	Yellowfin menhaden	9	27.6	1.4
	Rachycentron canadum	Cobia	7	47.0	28.5
	Mugil curema	Silver mullet	7	27.0	1.2
	Trachinotus carolinus	Florida pompano	7	17.0	1.6
Mixed teleosts	*Micropogonias undulatus*	Atlantic croaker	219	27.0	2.4
	Cynoscion regalis	Weakfish seatrout	75	31.2	1.7
	Peprilus triacanthus	Atlantic butterfish	46	16.6	1.5
	Brevoortia tyranus	Atlantic menhaden	18	25.5	3.6
	Pomatomus saltatrix	Bluefish	10	31.8	1.7
Mixed sharks	*Euthynnus alletteratus*	Little tunny	27	39.9	3.8
	Scomberomorus cavalla	King mackerel	20	57.0	5.8
	Peprilus triacanthus	Atlantic butterfish	5	14.0	1.4

Figure 1. Distribution of observed strike gillnet sets targeting king mackerel, *Scomberomorus cavalla*, 2013 (n=12 sets).

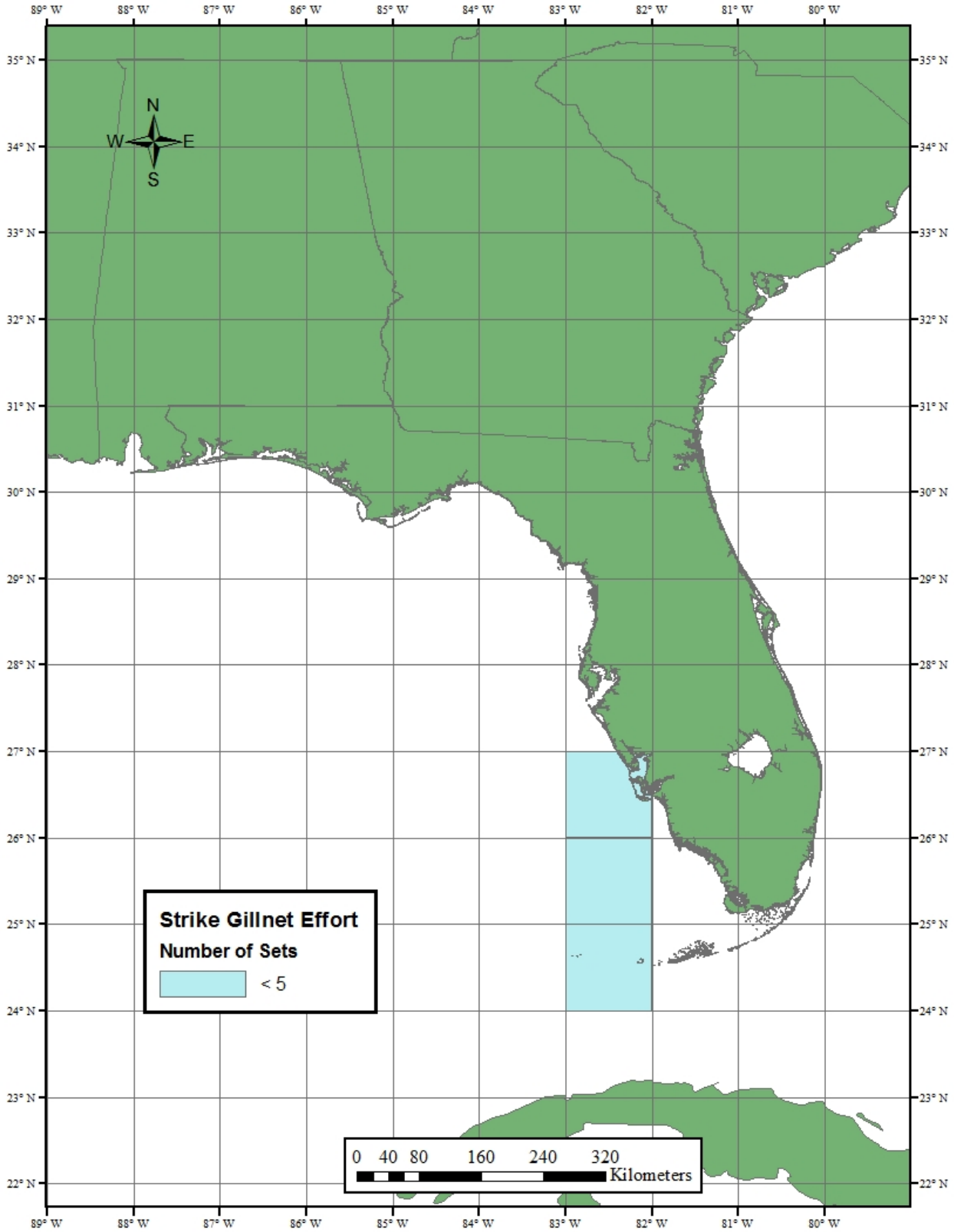

Figure 2. Distribution of observed sink gillnet sets targeting Spanish mackerel, *Scomberomorus maculatus*, 2013 (n=157 sets).

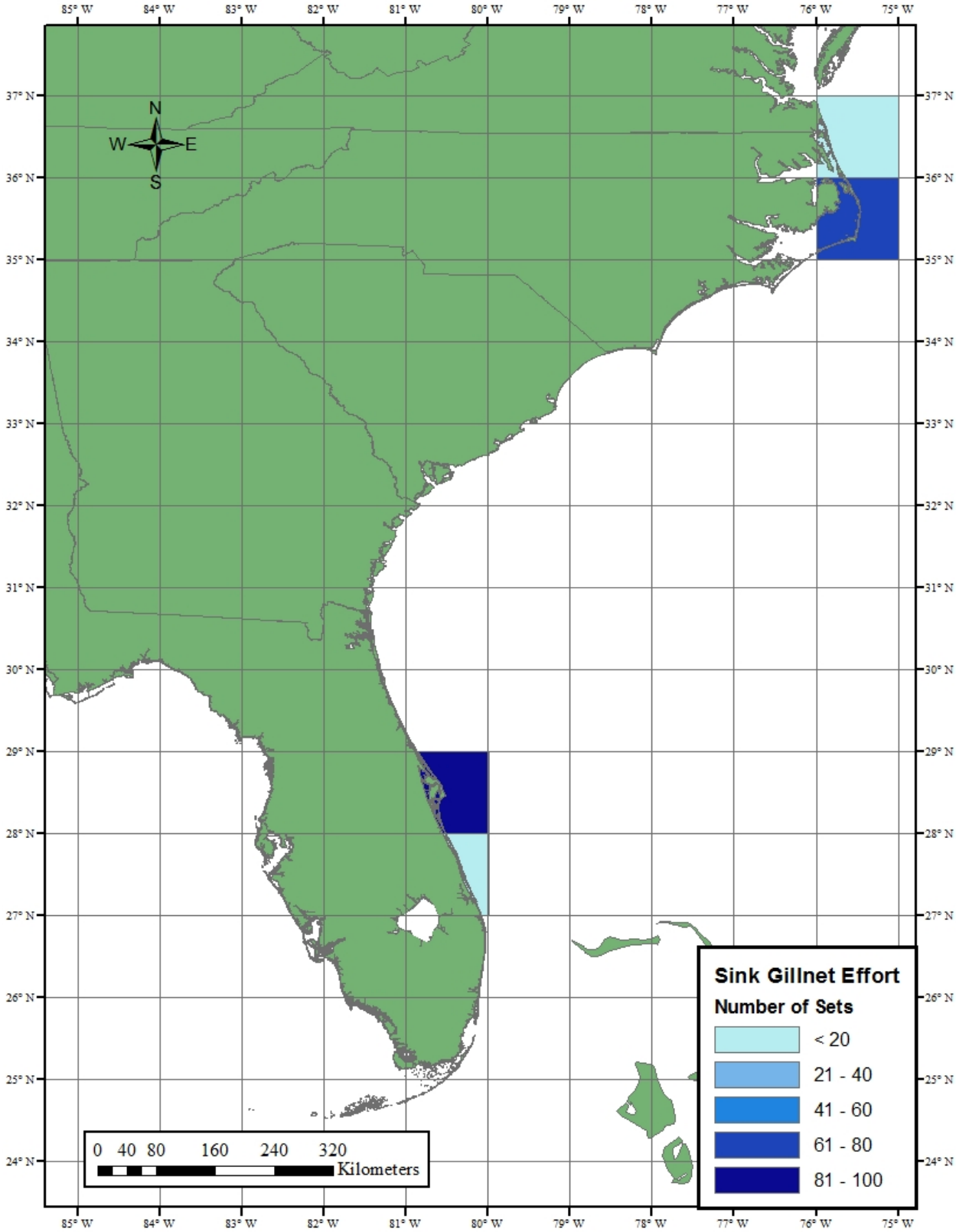
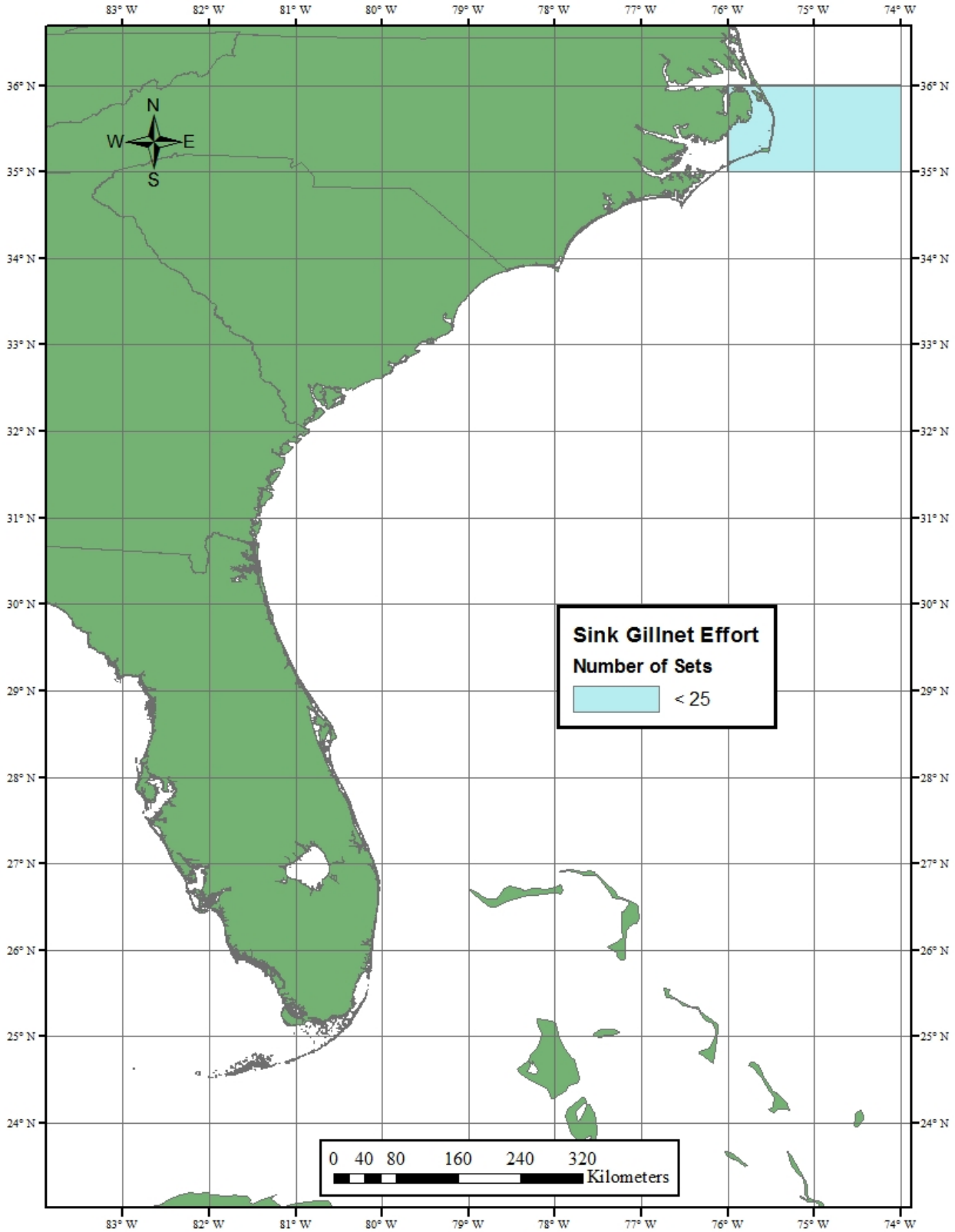
Figure 3. Distribution of observed sink gillnet sets targeting mixed teleosts, 2013 (n=42 sets).