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CHARACTERIZATION OF CATCH AND BYCATCH IN THE STATE GILLNET FISHERIES OF ALABAMA, MISSISSIPPI, AND LOUISIANA, 2012-2015.

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This report will be posted on the SEFSC Panama City Laboratory website at URL:
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Introduction

The Southeast Gillnet Observer Program (SGOP) in the SEFSC-Panama City Laboratory has monitored coastal gillnet fisheries with on-board observers since the program began in 1993 (e.g. Mathers et al. 2015 and references therein). There are numerous active gillnet fisheries in Federal waters of the U.S. Atlantic coast and Gulf of Mexico, but the number of gillnet fishers changes from year to year. Depending on time of the year and market conditions, fishers will target a diversity of species such as Spanish mackerel *Scomberomorus maculatus*, king mackerel *Scomberomorus cavalla*, and bluefish *Pomatomus saltatrix*, as well as sharks and dogfish with varying types of gillnet gear. These fisheries have also resulted in interactions with protected species (i.e. marine mammals, sea turtles, sea birds, Atlantic sturgeon, and sawfish) with 61 observed interactions since 1993. However, most observer effort has occurred in Federal waters and little is known regarding fishing effort, catch, bycatch and interactions with protected species in gillnet vessels operating in State waters. While many states have banned gillnets in state water, some states still permit commercial fishing activities using gillnets to harvest their catch. To better characterize fishing effort, catch and bycatch, and interactions with protected resources, the Southeast Gillnet Observer Program began observer coverage on state-documented commercial gillnet vessels in coastal Louisiana, Mississippi, and Alabama in November 2012. This report describes a summary of observations from 2012 to 2015.

Methods

To establish the universe of vessels for observer coverage, the Southeast Gillnet Observer Program was provided with contact information for State gillnet license holders from Alabama, Louisiana, and Mississippi by NOAA's Marine Mammal Authorization Program (MMAP)

office. Permit information was obtained annually by the observer program. In December 2013, Alabama had 72 active gillnet permits and Louisiana had 5 active pompano strike gillnet permits. There were only 2 license holders in the state of Mississippi for 2013, despite gillnet effort being legal from 0.5 nautical miles of the state shoreline to the state water boundary of 3 nautical miles (MDMR, 2006). A portion of total license holders were randomly selected for coverage by season, and 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. Placement of Federal fisheries observers on these state documented vessels was authorized under the Marine Mammal Protection Act (MMPA), specifically due to Category II classification of gillnet fisheries in state waters of Alabama, Mississippi, and Louisiana. 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.

Observations of fishing activity and protected species

Due to the paucity of information regarding state fisheries and their potential to interact with protected species, observers also recorded observations beginning in 2014 of fleet fishing activities and encounters with protected species when the vessel was in transit to fishing grounds or the fishing vessel was waiting on retrieving their gear. No observations were made when the haulback of the gillnet occurred. Data sheets were designed based on NOAA Fisheries Service marine mammal aerial and shipboard surveys. The observer recorded data on species, activity, location, and time of day, estimated body/carapace length and animal behavior. The observer also recorded the number of fishing vessels in the area, their activity (e.g. fishing, setting gear) and noted the type of fishing vessel (e.g. shrimp, gillnet).

Results and Discussion

Characterization of fishery

Each state has multiple fisheries annually in which gillnets are utilized. All three states require state-issued limited access gillnet permits to target and harvest mullet *Mugil spp.* from October 24 – December 31. Alabama inshore gillnet fisheries also include Spanish mackerel *Scomberomorus maculatus* (year round), Florida pompano *Trachinotus carolinus* (late summer through early winter), and southern flounder *Paralichthys lethostigma* (year round). Louisiana, in addition to the mullet gillnet permit, requires a state-issued limited access gillnet permit to target and harvest Florida pompano from August 1 – October 31. These are the only two species that can be harvested with gillnets in Louisiana state waters. The state of Mississippi has total allowable catch limits (TAC) for the following species year round: flounder, red drum *Sciaenops ocellatus*, and spotted sea trout *Cynoscion nebulosus*, also allowing catch without limit of mullet and Spanish mackerel. King mackerel *Scomberomorus cavalla* has a limit of 3,000 lbs per year. Actual gillnet effort and general seasons are unknown due to the lack of Mississippi permit holder information and observer coverage.

The pompano fishery in Louisiana employs the use of trammel nets in a strike fashion, as well as strike nets. Trammel nets are defined in the Louisiana Commercial Fishing Regulations as, “any device composed of layers of netting material attached to one or more float lines or one or more weighted bottom lines, with the layers being constructed of fine mesh and of a larger mesh so that a fish attempted to pass through the device pushes the smaller mesh through the larger mesh created a pocket or compartment in which the fish is entrapped, entangled, or restricted.” (LWF, 2010). The smaller mesh size averaged 12.9 cm (5.1 in) while the larger mesh

size averaged 22.6 cm (8.9 in). The pompano fishery operates near the Chandeleur Islands, mainly the South Chandeleur Islands (Curlew, Grand Gosier, and Breton Islands). It is mainly a day fishery, operating with up to two crewmen. SGOP was unable to observe the Louisiana mullet fishery, due to focusing coverage on the pompano fishery.

The mullet and mackerel fisheries in Alabama employ the use of sink and strike nets, often searching the waters for schools of fish, and then quickly setting the net to catch them. Fishers set strike nets in a variety of shapes to catch fish, including circles, semi circles, figure eight like patterns with the net open on both ends, and straight lines perpendicular and close to shore, to catch fish schooling along the shoreline. Some fishers in Alabama targeted flounders using trammel nets but in a strike fashion. The mackerel fishery mainly operates near shore, on the Gulf of Mexico side of Dauphin Island. The mullet fishery operates both in Mobile Bay and near shore on the Gulf of Mexico side of Dauphin Island. Some striped mullet sets occurred near the Alabama Louisiana state border, near shore. Both fisheries operate in the daytime with up to three crewmen. Gear characteristics for all observed gillnet sets are found in Table 2.

Observed effort

Strike Gillnet Sets

A total of 63 trips totaling 160 strike net sets on 28 vessels were observed between November 2012 and December 2015. Trips were made targeting one or more of the following: Florida pompano, *Trachinotus carolinus*; in Alabama, Spanish mackerel, *Scomberomorus maculates*, striped mullet, *Mugil cephalus*, and mixed teleosts (including ladyfish, *Elops saurus*, silver mullet, *Mugil curema*, little tunny, *Euthynnus alletteratus*, Gulf menhaden, *Brevoortia patronus*, and Florida pompano).

A total of 27 trips totaling 75 sets on 12 vessels were observed targeting Spanish mackerel using strike gillnets. Catch composition by number was 97.26 % teleosts, 1.85 % invertebrates, 0.87 % elasmobranchs, and 0.10 % batoids (Table 3). Average (S.D.) fork lengths of the catch ranged from 11.0 cm (0.0) for searobins (*Prionotus sp.*) to 88.4 cm (34.4) for spinner shark (*Carcharhinus brevipinna*). Observed strike Spanish mackerel gillnet fishing effort is illustrated in Figure 1.

A total of 19 trips totaling 56 sets on 9 vessels were observed targeting striped mullet using strike gillnets. Catch composition by number was 97.72 % teleosts, 1.12 % invertebrates, 0.66 % batoids, and 0.49 % elasmobranchs (Table 4). Average (S.D.) fork lengths of the catch ranged from 16.9 cm (1.3) for pinfish (*Lagodon rhomboides*) to 89.0 cm (0.0) for blacktip shark (*Carcharhinus limbatus*). Observed strike striped mullet gillnet fishing effort is illustrated in Figure 2.

A total of 17 trips totaling 29 sets on 7 vessels were observed targeting mixed teleosts using strike gillnets. Catch composition by number was 99.77 % teleosts, 0.13 % invertebrates, 0.10 % elasmobranchs, and 0.01 % batoids (Table 5). Average (S.D.) fork lengths of the catch in ranged from 13.1 cm (1.4) for Atlantic menhaden (*Brevoortia tyranus*) to 110.5 cm (70.0) for spinner shark. One interaction with protected resources was documented in observed mixed teleosts strike gillnet sets. One Kemp's ridley sea turtle, *Lepidocchelys kempi,* was caught and released alive (0.01 % of the total catch; Table 5). Observed mixed teleosts strike gillnet fishing effort is illustrated in Figure 3. Six strike mixed teleosts sets were excluded due to vessel confidentiality.

Sink Gillnet Sets

A total of 30 trips totaling 76 sink net sets on 13 vessels were observed between November 2012 and December 2015. Trips were made targeting one or more of the following, all in Alabama: Spanish mackerel, *Scomberomorus maculates*, striped mullet, *Mugil cephalus*, and mixed teleosts (including flounders *Paralichthys sp.* and sheepshead *Archosargus probatocephalus*).

A total of 21 trips totaling 40 sets on 8 vessels were observed targeting Spanish mackerel using sink gillnets. Catch composition by number was 99.05 % teleosts, 0.83 % elasmobranchs, and 0.12 % invertebrates (Table 6). Average (S.D.) fork lengths of the catch ranged from 16.0 cm (1.0) for harvestfish (*Peprilus alepidotus*) to 98.0 cm (0.0) for blacktip shark. Observed sink Spanish mackerel gillnet fishing effort is illustrated in Figure 4.

A total of 5 trips totaling 30 sets on 3 vessels were observed targeting striped mullet using sink gillnets. Catch composition by number was 99.31 % teleosts, 0.64 % invertebrates, 0.03 % batoids, and 0.02 % elasmobranchs (Table 7). Average (S.D.) fork lengths of the catch ranged from 19.0 cm (0.0) for red ear sunfish (*Lepomis microlophus*) to 49.3 cm (8.1) for gar family (*Lepisosteidae*). Observed sink striped mullet gillnet fishing effort is illustrated in Figure 5.

A total of 4 trips totaling 6 sets on 2 vessels were observed targeting mixed teleosts using sink gillnets. Observed sink gillnet sets could not be described and illustrated due to vessel confidentiality requirements.

Trammel Gillnet Sets

A total of 18 trips totaling 61 sink net sets on 6 vessels were observed. Trips were made targeting one or more of the following, in Louisiana: Florida pompano; in Alabama: flounders.

A total of 13 trips totaling 38 sets on 4 vessels were observed targeting Florida pompano using trammel gillnets. Catch composition by number was 92.57 % teleosts, 5.42 % invertebrates, 1.71 % batoids, and 0.30 % elasmobranchs (Table 8). Average (S.D.) fork lengths of the catch in strike sets ranged from 16.0 cm (0.0) for Atlantic bumper (*Chloroscombrus chrysurus*) to 93.7 cm (4.2) for red drum (*Scianops ocellatus*). Observed Florida pompano trammel gillnet fishing effort is illustrated in Figure 6.

A total of 5 trips totaling 23 sets on 2 vessels were observed targeting flounders using trammel gillnets. Observed flounders trammel gillnet sets could not be described and illustrated due to vessel confidentiality requirements.

Sightings

Observers recorded a total of 212 sightings of other vessels during fishing trips from 2014-2015. Fisheries observed included shrimp skimmer trawl, crab, gillnet, and menhaden trawls. Other types of vessels sighted included sport boats, research vessels, tankers, tugboats, and oil supply boats.

Seven sea turtle sightings were recorded, all in the Louisiana inshore fishery (Figure 14). These sightings were exclusively loggerheads (*Caretta caretta*). Estimated carapace lengths ranged from 0.6 to 1.5 m (Figure 8) and animal behavior included surfacing, swimming, and resting. One hundred and three marine mammal sightings were recorded, both in Louisiana and Alabama (Figure 13). Species recorded were unidentified dolphin and bottlenose dolphin (*Tursiops truncatus*). Estimated body length ranged from 1.0 to 2.5 m (Figure 9) and animal behavior included, but was not limited to, swimming (mostly in pods), chasing schools of fish, and net feeding. There was considerable overlap in the areas where sightings of protected

resources occurred with vessels actively fishing gillnet gear (Figures 10-14). Monthly mean marine mammal sightings by hour and vessels actively fishing using gillnet gear is shown in Figure 7.

There was one interaction with a Kemp's Ridley sea turtle in a mixed teleost strike gillnet set in Louisiana. However, observed sightings of sea turtles and marine mammals show that they are present where these fisheries are active. In Alabama, 46 % of sets had observations of marine mammals present during haul back, with 7 % dolphins net feeding, sometimes swimming into the circle of the strike net to do so. When this occurred, fishermen opened the strike net to allow the animals to exit the circle. These activities did not result in marine mammals captured within the net. In Louisiana, 2 % of sets had observations with marine mammals and 4 % with sea turtles during haul back, but also without capture within the gillnet. However, it is plausible that an inexperienced fisherman may not be able to safely allow the dolphin or sea turtle to escape capture. Preliminary results of a study examining protected resources interactions in the shark gillnet fishery found that inexperienced fishers were more likely to capture sea turtles than those who were more skilled (Carlson et al. 2013).

Conclusions

Compliance was an issue in deploying observers on these vessels. Observers were placed on 34 vessels of the 331 receiving letters (10.3 %), with all coverage occurring in the states of Alabama and Louisiana. Of the vessels not covered, 109 (32.9 %) received their letters but did not make contact with the observer program. Because phone numbers were not provided from the MMAP, the observer program was limited in its ability to contact permit holders who did not call in. This then led to a high number of fishers who had no contact with the SGOP during the

selection periods. Weather also played a significant role in the inability of observers to coordinate trips, as any inclement weather precluded fishing effort of the characteristically small gillnet vessels. Further confirmation of compliance has not been completed at this time, as fishing effort data from state logbooks is unavailable. Reasons for vessels not carrying observers and total vessels selected, by selection period and state are listed in Table 1.

The difficulty in obtaining representative observer coverage in near shore waters is due primarily to the fact that many vessels are too small to carry an observer safely. Additionally, fishers using small vessels can be difficult to locate because they often launch from private or public ramps, in contrast to larger vessels that are docked at seafood dealers in major ports. This limits the observer programs' ability to contact fishers to schedule trips. All of these factors contribute to the paucity of observer trips on small gillnet vessels. Future coverage of this fleet could be enhanced by deploying observers in the ports or areas where the fleet is active for long periods of time to best make contact with the fishers. In addition, the use of alternate methods such as electronic monitoring could provide a valid alternative if the goal of increased observer coverage was strictly to monitor the interactions with protected species. Given the large size of these animals, video monitoring would have the capability to observe these animals entangled in the net. However, video monitoring has not been tested under commercial fishing conditions, and attempts to do so with the cooperation of the industry have not been successful.

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Table 1. Compliance of Alabama, Louisiana, and Mississippi state boats, by selection period.

	Did not contact observer program	Not fishing/ sold boat	May fish later/ no safety sticker	Fishing Actively/ could not coordinate with observer	Covered by Observer	Letter Returned	Other	Total Selected Vessels
Alabama								
Aug - Dec 2012	2	1	4	2	1	0	0	10
Jan-Mar 2013	12	7	8	2	1	12	0	42
Apr-Jun 2013	9	6	7	5	8	8	0	43
Jul-Sept 2013	14	0	2	9	6	7	0	38
Oct-Dec 2013	12	3	4	5	2	3	1	30
Sept 2014	8	5	1	1	0	10	0	25
Oct-Dec 2014	9	7	0	2	4	4	0	26
Apr-Jun 2015	8	4	0	1	2	10	0	25
Jul-Sept 2015	9	1	0	2	2	6	0	20
Total	**83**	**34**	**26**	**29**	**26**	**60**	**1**	**259**
Louisiana								
Aug - Dec 2012	2	3	2	0	0	2	1	10
Jan-Mar 2013	5	4	0	0	0	0	0	9
Apr-Jun 2013	4	2	0	0	0	2	1	9
Jul-Sept 2013	4	3	0	0	3	1	0	11
Oct-Dec 2013	7	2	3	1	2	6	0	21
Aug-Oct 2014	0	0	1	0	2	0	0	3
Aug-Oct 2015	1	2	0	1	1	0	0	5
Total	**23**	**16**	**6**	**2**	**8**	**11**	**2**	**68**

Mississippi								
Jul-Sept 2013	2	0	0	0	0	0	0	2
Oct-Dec 2013	1	1	0	0	0	0	0	2
Total	**3**	**1**	**0**	**0**	**0**	**0**	**0**	**4**
Total	**109**	**51**	**32**	**31**	**34**	**71**	**3**	**331**

Table 2. Summary of observed net characteristics and soak time by target and gear type.

Target Species	Gear Type	Mean Soak Time (hr)	Gillnet Length (ft)	Gillnet Depth (ft)	Gillnet Mesh Size (in)	Trammel Mesh Size (in)
Spanish mackerel	Strike	0.90	200-2400	5-25	3-3.25	-
Striped mullet	Strike	0.76	100-2400	4-32	3.0-4.0	-
Mixed teleosts	Strike	0.92	300-2100	10-27	2.5-5	-
Spanish mackerel	Sink	2.06	100-2400	15-25	3-3.25	-
Striped mullet	Sink	0.60	100-1800	10-12	3-3.25	-
Florida pompano	Trammel	0.46	300-2400	15-24	5-5.25	8-12

Table 3. Total strike gillnet catch from Spanish mackerel targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2012-2015. 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. (%)
Scomberomorus maculatus	Spanish mackerel	11364	99.7	0.0	0.3
Elops saurus	Ladyfish	4533	99.8	0.1	0.1
Pomatomus saltatrix	Bluefish	1673	100.0	0.0	0.0
Caranx crysos	Bluerunner jack	1631	100.0	0.0	0.0
Chloroscombrus chrysurus	Atlantic bumper	1572	96.6	0.8	2.6
Brevoortia patronus	Gulf menhaden	866	1.9	81.6	16.5
Scyphozoa	Jellyfish	421	0.0	59.4	40.6
Arius felis	Hardhead catfish	339	0.0	93.8	6.2
Bagre marinus	Gafftopsail catfish	123	90.2	9.8	0.0
Rhizoprionodon terraenovae	Atlantic sharpnose shark	116	49.1	47.4	3.5
Hemicaranx amblyrhynchus	Bluntnose jack	69	100.0	0.0	0.0
Caranx hippos	Crevalle jack	36	88.9	11.1	0.0
Menticirrhus americanus	Southern kingfish	31	100.0	0.0	0.0
Brevoortia smithi	Yellowfin menhaden	28	100.0	0.0	0.0
Carcharhinus brevipinna	Spinner shark	24	33.3	62.5	4.2
Carcharhinus isodon	Finetooth shark	24	62.5	37.5	0.0
Carangidae	Jack family	16	93.8	6.3	0.0
Carcharhinus limbatus	Blacktip shark	16	62.5	37.5	0.0
Cynoscion nebulosus	Spotted seatrout	14	0.0	100.0	0.0
Carcharhinidae	Requiem shark family	13	0.0	100.0	0.0
Peprilus alepidotus	Harvestfish	13	84.6	15.4	0.0
Lagodon rhomboides	Pinfish	10	0.0	30.0	70.0
Brevoortia tyranus	Atlantic menhaden	9	0.0	100.0	0.0
Scianops ocellatus	Red drum	9	0.0	100.0	0.0
Mugil cephalus	Striped mullet	7	100.0	0.0	0.0
Leiostomus xanthurus	Spot	6	100.0	0.0	0.0
Menticirrhus littoralis	Gulf kingfish	6	100.0	0.0	0.0
Trachinotus carolinus	Florida pompano	6	66.7	33.3	0.0
Carcharhinus acronotus	Blacknose shark	5	100.0	0.0	0.0
Cynoscion arenarius	Sand seatrout	4	50.0	50.0	0.0
Cynoscion sp.	Seatrouts	4	100.0	0.0	0.0
Paralichthys albigutta	Gulf flounder	3	0.0	100.0	0.0
Asteroidea	Sea stars	2	0.0	100.0	0.0
Echeneis naucrates	Sharksucker	2	0.0	100.0	0.0
Mustelus canis	Smooth dogfish	2	0.0	100.0	0.0
Narcine brasiliensis	Lesser electric ray	2	0.0	100.0	0.0
Paralichthys lethostigma	Southern flounder	2	100.0	0.0	0.0
Penaeidae	Shrimp Penaeid	2	100.0	0.0	0.0
Remora remora	Remora	2	0.0	100.0	0.0

Callinectes sapidus	Blue crab	1	0.0	100.0	0.0
Diodontidae	Spiny puffer family	1	0.0	100.0	0.0
Echeneidae	Remora family	1	0.0	100.0	0.0
Lutjanus griseus	Gray snapper	1	0.0	100.0	0.0
Menticirrhus saxatilis	Northern kingfish	1	100.0	0.0	0.0
Micropogonias undulatus	Atlantic croaker	1	100.0	0.0	0.0
Mugil curema	Silver mullet	1	100.0	0.0	0.0
Peprilus burti	Gulf butterfish	1	100.0	0.0	0.0
Prionotus sp.	Searobins	1	0.0	100.0	0.0
Rachycentron canadum	Cobia	1	0.0	100.0	0.0
Rhinobatos lentiginosus	Atlantic guitarfish	1	0.0	100.0	0.0
Selene vomer	Lookdown	1	100.0	0.0	0.0
Sphyrna tiburo	Bonnethead shark	1	100.0	0.0	0.0

Table 4. Total strike gillnet catch from striped mullet targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2012-2015. 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. (%)
Mugil cephalus	Striped mullet	2260	90.0	8.6	1.5
Arius felis	Hardhead catfish	259	0.0	80.7	19.3
Brevoortia patronus	Gulf menhaden	189	0.0	65.1	34.9
Cynoscion nebulosus	Spotted seatrout	106	0.0	73.6	26.4
Scianops ocellatus	Red drum	93	0.0	91.4	8.6
Lagodon rhomboides	Pinfish	78	10.3	68.0	21.8
Micropogonias undulatus	Atlantic croaker	70	74.3	17.1	8.6
Alosa sp.	Shads	61	16.4	37.7	45.9
Bagre marinus	Gafftopsail catfish	52	96.2	3.9	0.0
Leiostomus xanthurus	Spot	50	96.0	4.0	0.0
Pogonias cromis	Black drum	48	93.8	6.3	0.0
Callinectes sapidus	Blue crab	22	0.0	45.5	54.6
Cynoscion arenarius	Sand seatrout	21	100.0	0.0	0.0
Archosargus probatocephalus	Sheepshead	20	35.0	40.0	25.0
Elops saurus	Ladyfish	20	70.0	15.0	15.0
Rajiformes	Skates and rays	20	100.0	0.0	0.0
Carcharhinus limbatus	Blacktip shark	17	100.0	0.0	0.0
Dorosoma cepedianum	Gizzard shad	12	0.0	58.3	41.7
Menticirrhus americanus	Southern kingfish	11	100.0	0.0	0.0
Paralichthys sp.	Flounders	10	100.0	0.0	0.0
Penaeidae	Shrimp Penaeid	10	100.0	0.0	0.0
Caranx hippos	Crevalle jack	5	20.0	80.0	0.0
Scyphozoa	Jellyfish	5	0.0	100.0	0.0
Paralichthys lethostigma	Southern flounder	4	50.0	50.0	0.0
Peprilus triacanthus	Atlantic butterfish	4	100.0	0.0	0.0
Scomberomorus maculatus	Spanish mackerel	4	50.0	0.0	50.0
Chaetodipterus faber	Spadefish	2	0.0	100.0	0.0
Dasyatis sabina	Atlantic stingray	2	0.0	100.0	0.0
Decapoda	Crab	2	0.0	100.0	0.0
Mugil curema	Silver mullet	2	100.0	0.0	0.0
Paralichthys albigutta	Gulf flounder	2	50.0	50.0	0.0
Atractosteus spatula	Alligator gar	1	0.0	100.0	0.0
Cyprinus carpio	Common carp	1	0.0	0.0	100.0
Dasyatis sp.	Stingrays	1	0.0	100.0	0.0
Orthopristis chrysoptera	Pigfish	1	0.0	100.0	0.0
Peprilus alepidotus	Harvestfish	1	0.0	100.0	0.0
Pomatomus saltatrix	Bluefish	1	0.0	100.0	0.0

Table 5. Total strike gillnet catch from mixed teleosts targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2012-2015. 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. (%)
Brevoortia patronus	Gulf menhaden	92191	100.0	0.0	0.0
Elops saurus	Ladyfish	4255	99.1	0.0	0.9
Mugil curema	Silver mullet	1484	99.4	0.4	0.2
Trachinotus carolinus	Florida pompano	956	99.6	0.4	0.0
Scomberomorus maculatus	Spanish mackerel	225	98.7	0.0	1.3
Arius felis	Hardhead catfish	221	57.0	42.5	0.5
Scyphozoa	Jellyfish	86	0.0	0.0	100.0
Bagre marinus	Gafftopsail catfish	60	56.7	43.3	0.0
Chloroscombrus chrysurus	Atlantic bumper	57	42.1	24.6	33.3
Pomacanthidae	Angelfish family	53	0.0	0.0	100.0
Rhizoprionodon terraenovae	Atlantic sharpnose shark	45	2.2	75.6	22.2
Callinectes sapidus	Blue crab	33	0.0	87.9	12.1
Pomatomus saltatrix	Bluefish	29	62.1	3.5	34.5
Carcharhinus isodon	Finetooth shark	25	4.0	96.0	0.0
Euthynnus alletteratus	Little tunny	24	100.0	0.0	0.0
Carcharhinus limbatus	Blacktip shark	19	5.3	89.5	5.3
Brevoortia tyranus	Atlantic menhaden	10	100.0	0.0	0.0
Cynoscion arenarius	Sand seatrout	7	100.0	0.0	0.0
Menticirrhus americanus	Southern kingfish	6	100.0	0.0	0.0
Caranx crysos	Bluerunner jack	5	80.0	0.0	20.0
Asteroidea	Sea stars	4	0.0	100.0	0.0
Carcharhinus brevipinna	Spinner shark	4	25.0	75.0	0.0
Cynoscion nebulosus	Spotted seatrout	4	0.0	50.0	50.0
Cynoscion sp.	Seatrouts	4	0.0	100.0	0.0
Rhinoptera bonasus	Cownose ray	4	0.0	100.0	0.0
Dasyatis sp.	Stingrays	3	0.0	33.3	66.7
Echeneis neucratoides	Whitefin sharksucker	3	0.0	100.0	0.0
Scianops ocellatus	Red drum	3	0.0	100.0	0.0
Selene vomer	Lookdown	3	0.0	33.3	66.7
Carangidae	Jack family	2	0.0	0.0	100.0
Caranx hippos	Crevalle jack	2	50.0	0.0	50.0
Carcharhinus leucas	Bull shark	2	50.0	50.0	0.0
Chaetodipterus faber	Spadefish	2	100.0	0.0	0.0
Pogonias cromis	Black drum	2	100.0	0.0	0.0
Cynoscion regalis	Weakfish seatrout	1	0.0	100.0	0.0
Dasyatis americana	Southern stingray	1	100.0	0.0	0.0
Echeneis naucrates	Sharksucker	1	0.0	100.0	0.0
Lepidocchelys kempi	Kemp's ridley sea turtle	1	0.0	100.0	0.0
Peprilus burti	Gulf butterfish	1	0.0	100.0	0.0
Rachycentron canadum	Cobia	1	0.0	100.0	0.0

Table 6. Total sink gillnet catch from Spanish mackerel targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2012-2015. 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. (%)
Scomberomorus maculatus	Spanish mackerel	4066	100.0	0.0	0.0
Pomatomus saltatrix	Bluefish	2261	99.7	0.0	0.4
Elops saurus	Ladyfish	1365	99.9	0.1	0.0
Chloroscombrus chrysurus	Atlantic bumper	991	98.4	1.6	0.0
Brevoortia tyranus	Atlantic menhaden	990	0.0	80.9	19.1
Caranx crysos	Bluerunner jack	821	100.0	0.0	0.0
Arius felis	Hardhead catfish	435	5.1	79.5	15.4
Brevoortia patronus	Gulf menhaden	286	0.0	11.5	88.5
Sardinella aurita	Spanish sardine	153	98.7	0.0	1.3
Brevoortia smithi	Yellowfin menhaden	111	100.0	0.0	0.0
Carangidae	Jack family	88	48.9	51.1	0.0
Caranx hippos	Crevalle jack	83	97.6	2.4	0.0
Rhizoprionodon terraenovae	Atlantic sharpnose shark	79	60.8	36.7	2.5
Hemicaranx amblyrhynchus	Bluntnose jack	52	100.0	0.0	0.0
Menticirrhus americanus	Southern kingfish	50	96.0	0.0	4.0
Mugil cephalus	Striped mullet	50	100.0	0.0	0.0
Menticirrhus littoralis	Gulf kingfish	30	96.7	3.3	0.0
Bagre marinus	Gafftopsail catfish	15	60.0	40.0	0.0
Carcharhinus limbatus	Blacktip shark	15	86.7	13.3	0.0
Rachycentron canadum	Cobia	13	7.7	69.2	23.1
Mugil curema	Silver mullet	11	100.0	0.0	0.0
Leiostomus xanthurus	Spot	9	88.9	11.1	0.0
Peprilus alepidotus	Harvestfish	8	100.0	0.0	0.0
Cynoscion sp.	Seatrouts	6	0.0	16.7	83.3
Callinectes sapidus	Blue crab	5	0.0	100.0	0.0
Penaeidae	Shrimp Penaeid	5	100.0	0.0	0.0
Trachinotus carolinus	Florida pompano	5	100.0	0.0	0.0
Carcharhinus acronotus	Blacknose shark	3	100.0	0.0	0.0
Pogonias cromis	Black drum	3	100.0	0.0	0.0
Asteroidea	Sea stars	2	0.0	100.0	0.0
Carcharhinus isodon	Finetooth shark	2	100.0	0.0	0.0
Cynoscion nebulosus	Spotted seatrout	2	0.0	100.0	0.0
Oligoplites saurus	Leather jack	2	0.0	100.0	0.0
Sarda sarda	Bonito	2	100.0	0.0	0.0
Carcharhinus brevipinna	Spinner shark	1	100.0	0.0	0.0
Chaetodipterus faber	Spadefish	1	0.0	100.0	0.0
Cynoscion arenarius	Sand seatrout	1	0.0	0.0	100.0
Decapoda	Crab	1	0.0	100.0	0.0
Echeneidae	Remora family	1	0.0	100.0	0.0
Majidae	Spider crabs	1	0.0	100.0	0.0

Peprilus triacanthus	Atlantic butterfish	1	100.0	0.0	0.0
Prionotus sp.	Searobins	1	0.0	100.0	0.0
Remora remora	Remora	1	0.0	100.0	0.0

Table 7. Total sink gillnet catch from striped mullet targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2012-2015. 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. (%)
Mugil Cephalus	Striped mullet	5826	99.98	0	0.02
Arius Felis	Hardhead catfish	138	0	12.32	87.68
Brevoortia Patronus	Gulf menhaden	78	0	53.85	46.15
Dorosoma Cepedianum	Gizzard shad	78	0	100	0
Scianops Ocellatus	Red drum	75	0	100	0
Leiostomus Xanthurus	Spot	45	100	0	0
Callinectes Sapidus	Blue crab	34	0	100	0
Bagre Marinus	Gafftopsail catfish	17	0	0	100
Alosa Alabamae	Alabama shad	15	0	100	0
Micropogonias Undulatus	Atlantic croaker	13	7.69	92.31	0
Cynoscion Nebulosus	Spotted seatrout	8	0	75	25
Ictalurus Furcatus	Blue catfish	7	14.29	85.71	0
Elops Saurus	Ladyfish	6	0	16.67	83.33
Stellifer Lanceolatus	Star drum	6	0	100	0
Lepisosteidae	Gar family	5	0	100	0
Penaeidae	Shrimp Penaeid	5	100	0	0
Cyprinus Carpio	Common carp	4	0	100	0
Lepomis Microlophus	Red ear sunfish	4	0	100	0
Dasyatis Sp.	Stingrays	2	0	100	0
Atractosteus Spatula	Alligator gar	1	0	100	0
Carcharhinus Leucas	Bull shark	1	0	100	0
Cynoscion Nothus	Silver seatrout	1	100	0	0
Decapoda	Crab	1	0	100	0
Gastropoda	Gastropods	1	0	100	0
Lagodon Rhomboides	Pinfish	1	0	0	100
Mugil Curema	Silver mullet	1	100	0	0

Table 8. Total trammel gillnet catch from Florida pompano targeted sets by species and species disposition in order of decreasing abundance for all observed trips, 2012-2015. 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. (%)
Trachinotus carolinus	Florida pompano	7202	100.0	0.0	0.0
Elops saurus	Ladyfish	476	0.0	1.3	98.7
Callinectes sapidus	Blue crab	279	0.0	11.5	88.5
Chaetodipterus faber	Spadefish	140	0.0	0.0	100.0
Asteroidea	Sea stars	96	0.0	53.1	46.9
Dasyatis americana	Southern stingray	96	0.0	1.0	99.0
Scyphozoa	Jellyfish	75	0.0	0.0	100.0
Rhinoptera bonasus	Cownose ray	46	0.0	2.2	97.8
Selene vomer	Lookdown	43	0.0	0.0	100.0
Arius felis	Hardhead catfish	35	0.0	0.0	100.0
Mugil cephalus	Striped mullet	22	0.0	0.0	100.0
Decapoda	Crab	13	0.0	61.5	38.5
Carcharhinus limbatus	Blacktip shark	12	0.0	58.3	41.7
Pomatomus saltatrix	Bluefish	12	0.0	0.0	100.0
Chloroscombrus chrysurus	Atlantic bumper	10	0.0	0.0	100.0
Scomberomorus maculatus	Spanish mackerel	8	0.0	0.0	100.0
Sphyrna tiburo	Bonnethead shark	8	0.0	0.0	100.0
Caranx crysos	Bluerunner jack	4	0.0	0.0	100.0
Cynoscion nothus	Silver seatrout	4	0.0	0.0	100.0
Majidae	Spider crabs	3	0.0	66.7	33.3
Scianops ocellatus	Red drum	3	0.0	0.0	100.0
Aetobatis narinari	Spotted eagle ray	2	0.0	100.0	0.0
Batrachoididae	Toadfish family	2	0.0	0.0	100.0
Narcine brasiliensis	Lesser electric ray	2	0.0	0.0	100.0
Negaprion brevirostris	Lemon shark	2	0.0	100.0	0.0
Rhizoprionodon terraenovae	Atlantic sharpnose shark	2	0.0	0.0	100.0
Carcharhias taurus	Sand tiger shark	1	0.0	100.0	0.0
Dasyatis sp.	Stingrays	1	0.0	0.0	100.0
Elasmobranchii	Sharks	1	0.0	100.0	0.0
Menticirrhus littoralis	Gulf kingfish	1	0.0	0.0	100.0
Menticirrhus sp.	Kingfish	1	0.0	100.0	0.0
Rachycentron canadum	Cobia	1	0.0	0.0	100.0
Trachinotus falcatus	Permit	1	100.0	0.0	0.0

Figure 1. Distribution of observed strike gillnet sets targeting Spanish mackerel, *Scomberomorus maculatus*, 2012-2015 (n=75 sets).

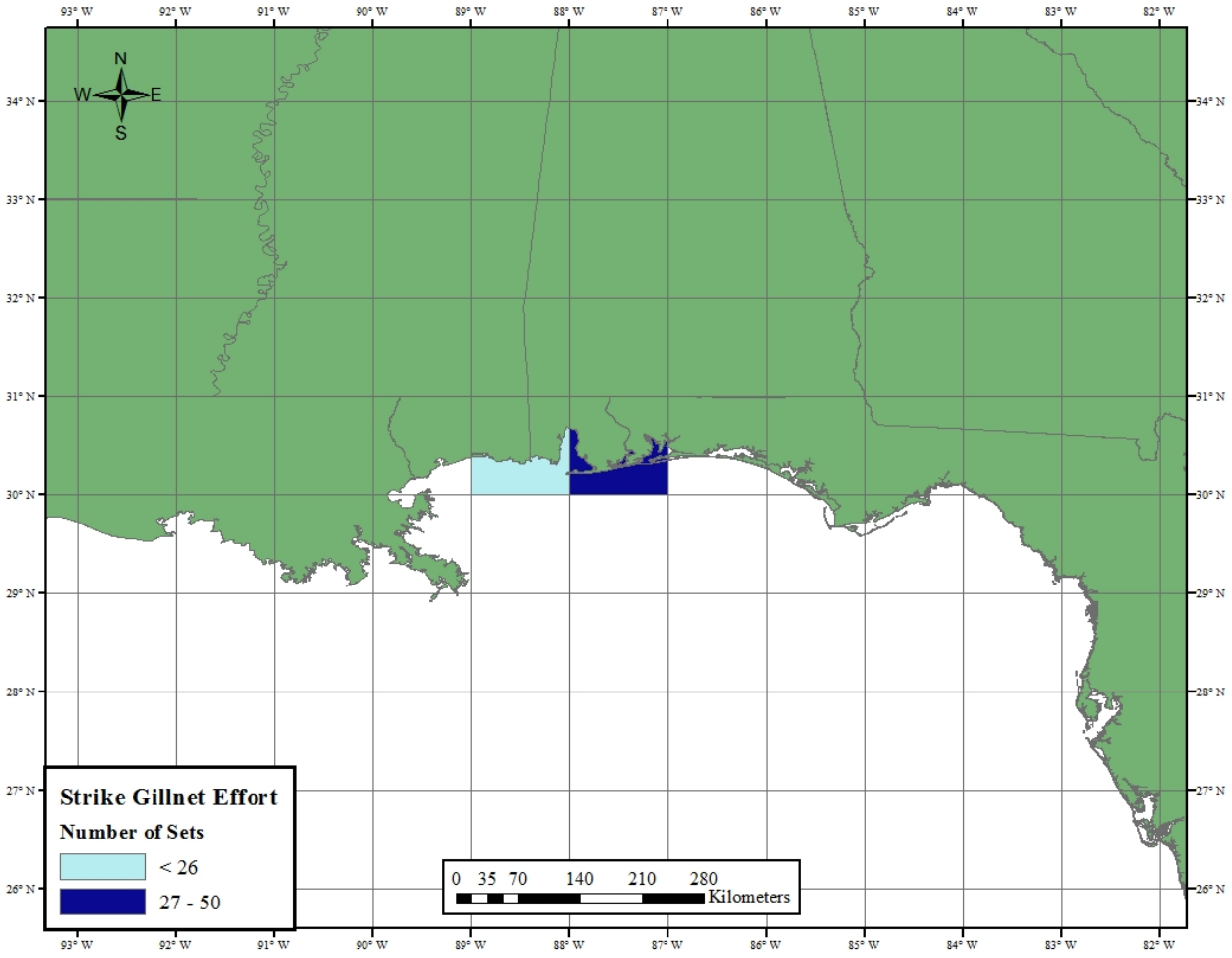


Figure 2. Distribution of observed strike gillnet sets targeting striped mullet, *Mugil cephalus*, 2012-2015 (n=56 sets).

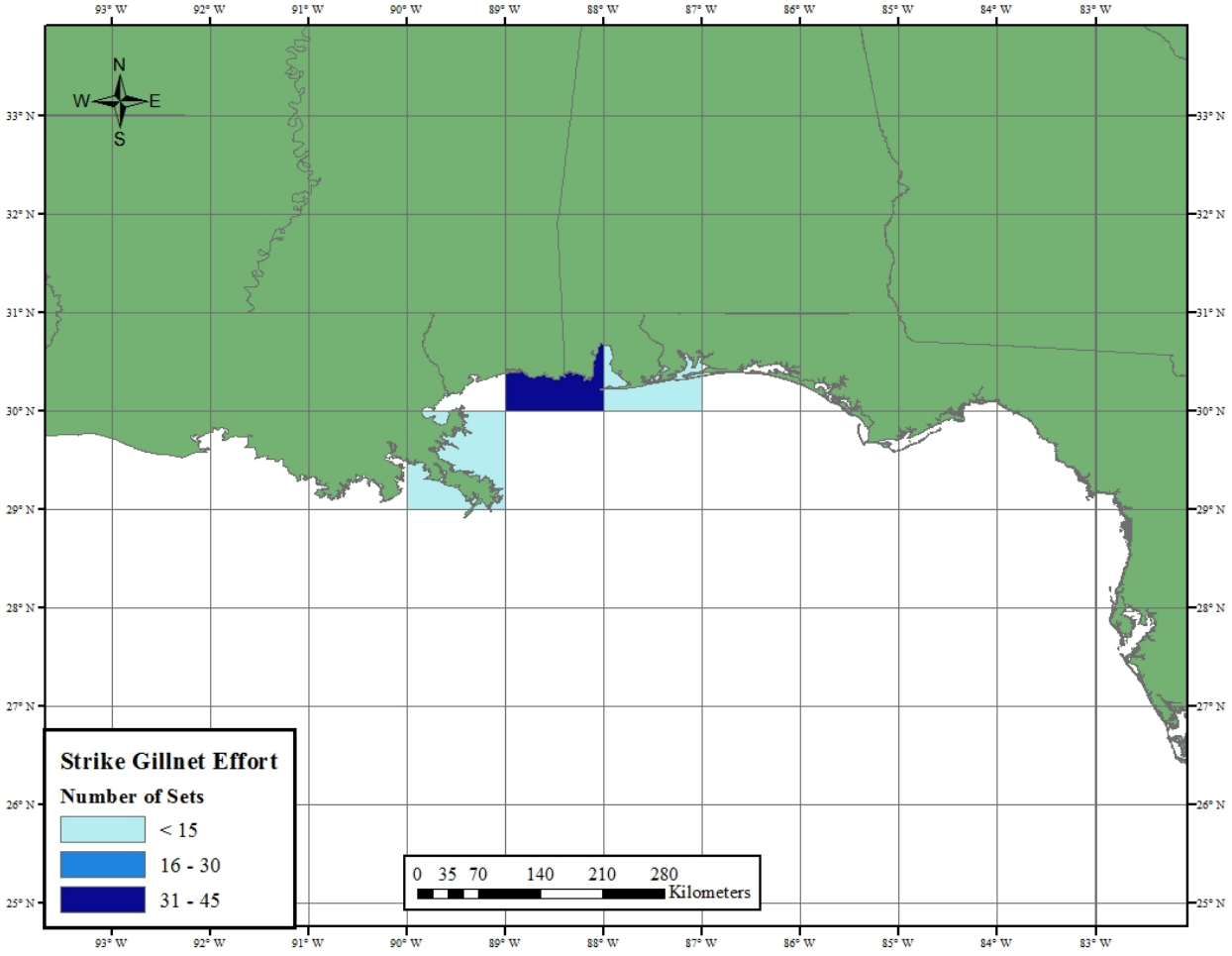


Figure 3. Distribution of observed strike gillnet sets targeting mixed teleosts 2012-2015 (n=23 sets).

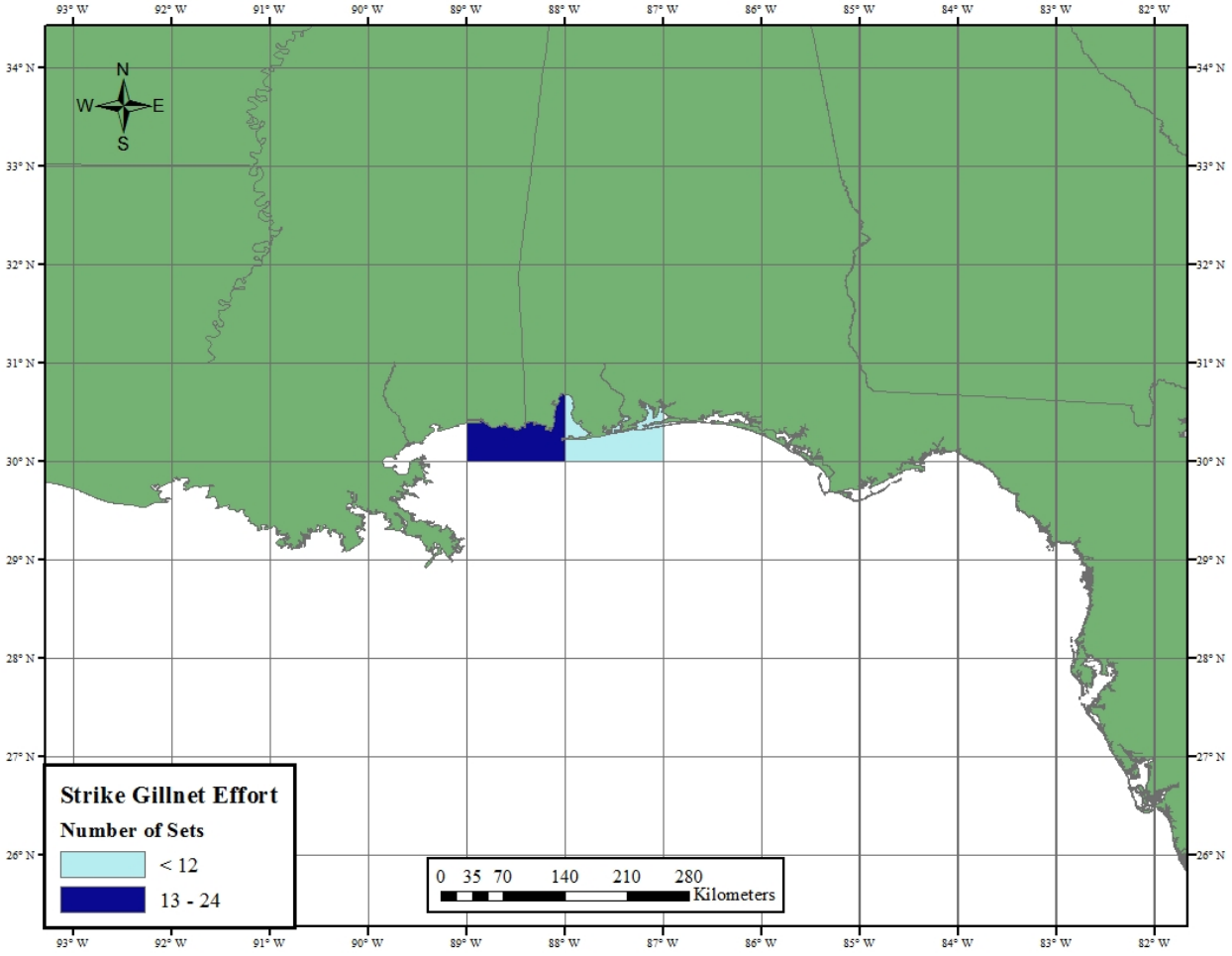


Figure 4. Distribution of observed sink gillnet sets targeting Spanish mackerel, *Scomberomorus maculatus*, 2012-2015 (n=40 sets).

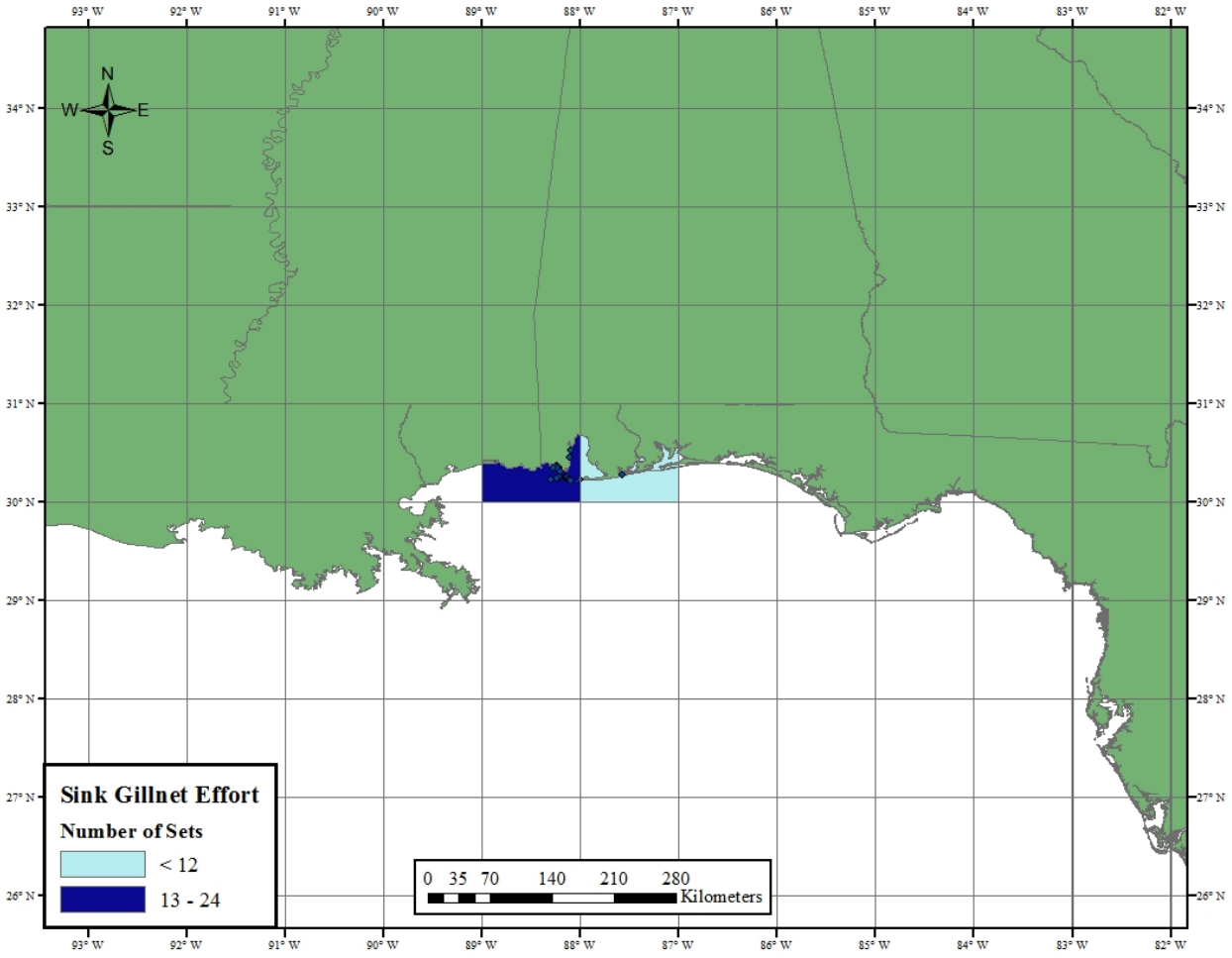


Figure 5. Distribution of observed sink gillnet sets targeting striped mullet, *Mugil cephalus*, 2012-2015 (n=30 sets).

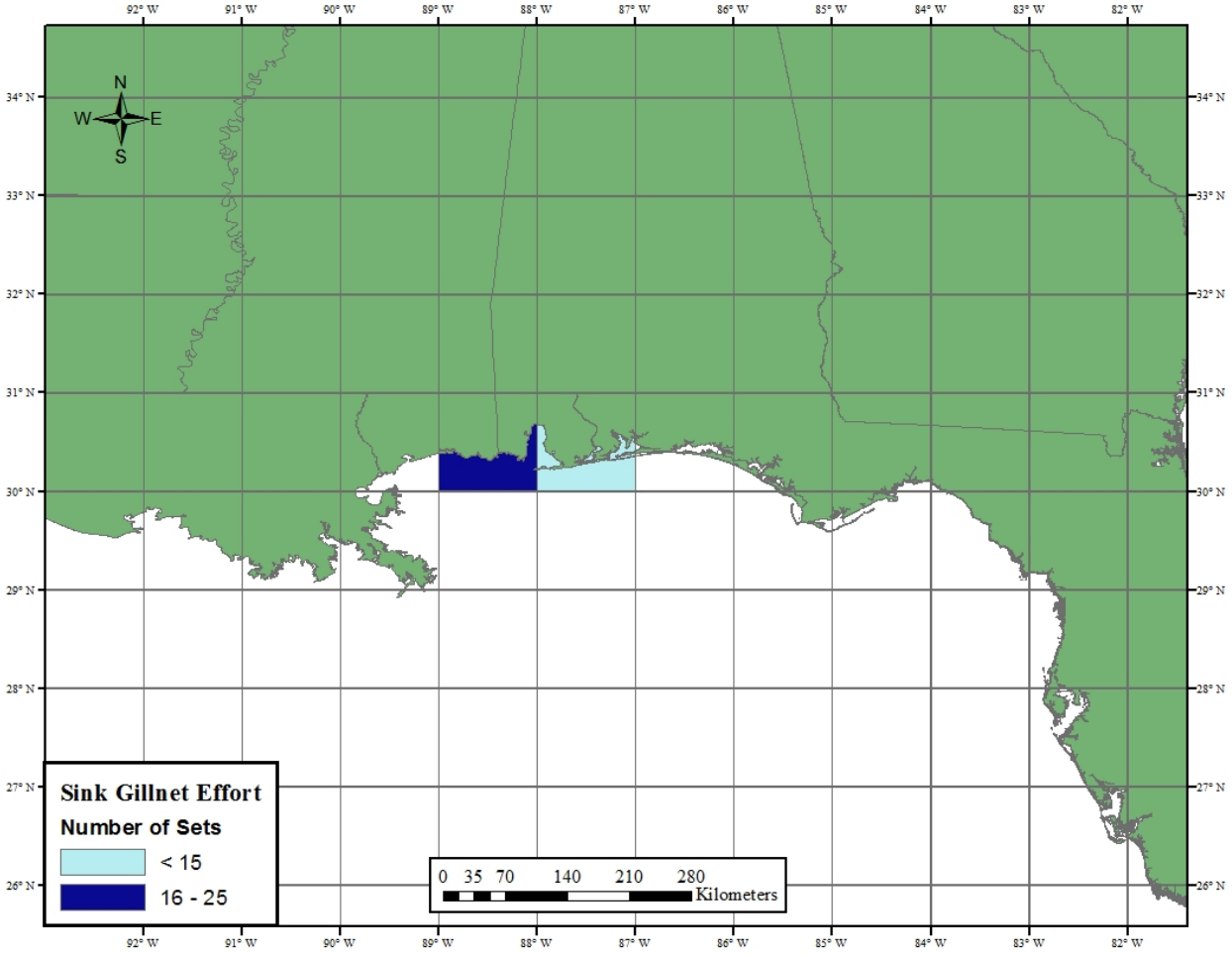


Figure 6. Distribution of observed trammel gillnet sets targeting Florida pompano, *Trachinotus carolinus*, 2012-2015 (n=39 sets).

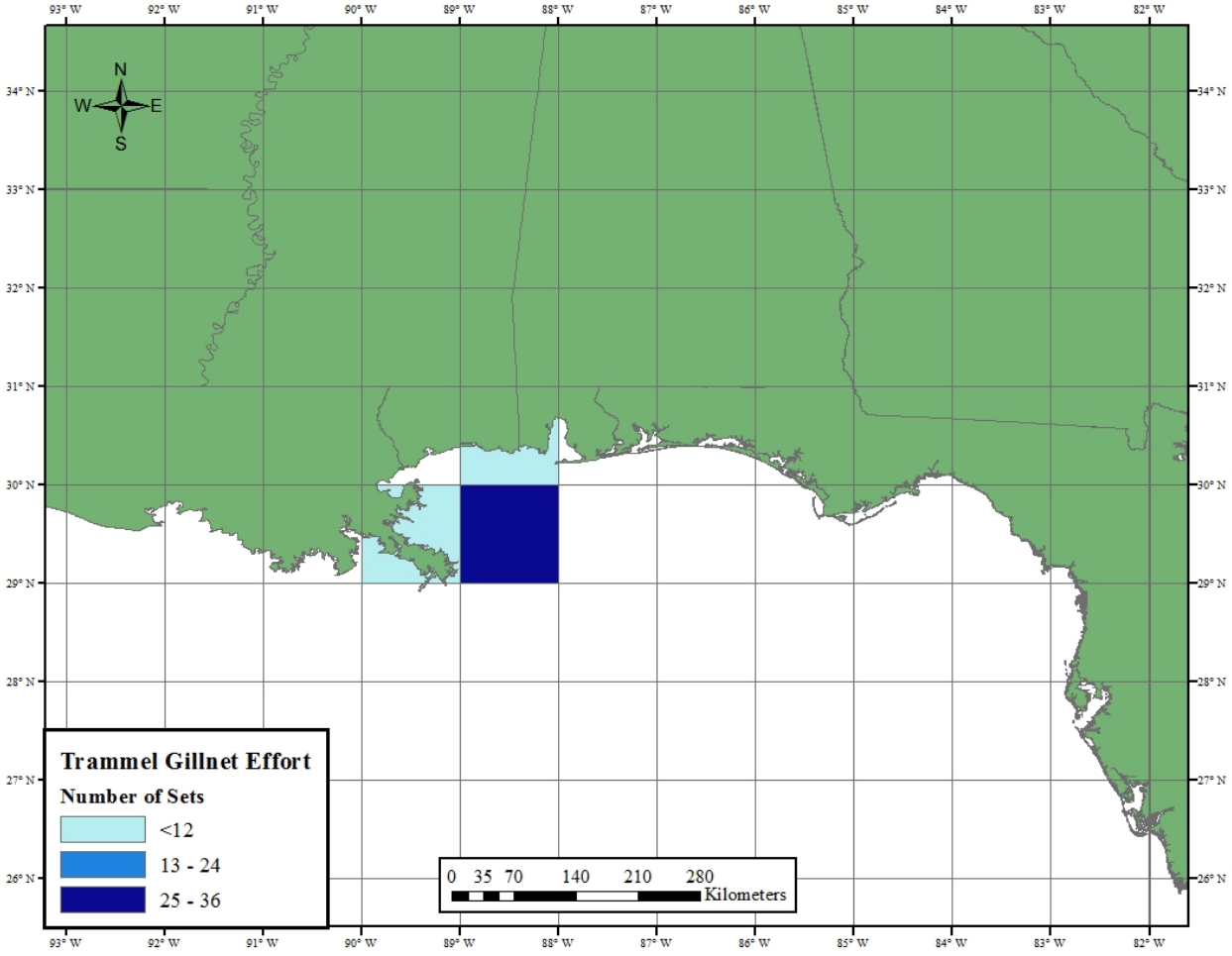


Figure 7. Monthly mean sightings of marine mammals per hour versus the total number of vessels observed fishing. Vessel fishing was defined as a vessel setting, hauling or soaking their gillnet.

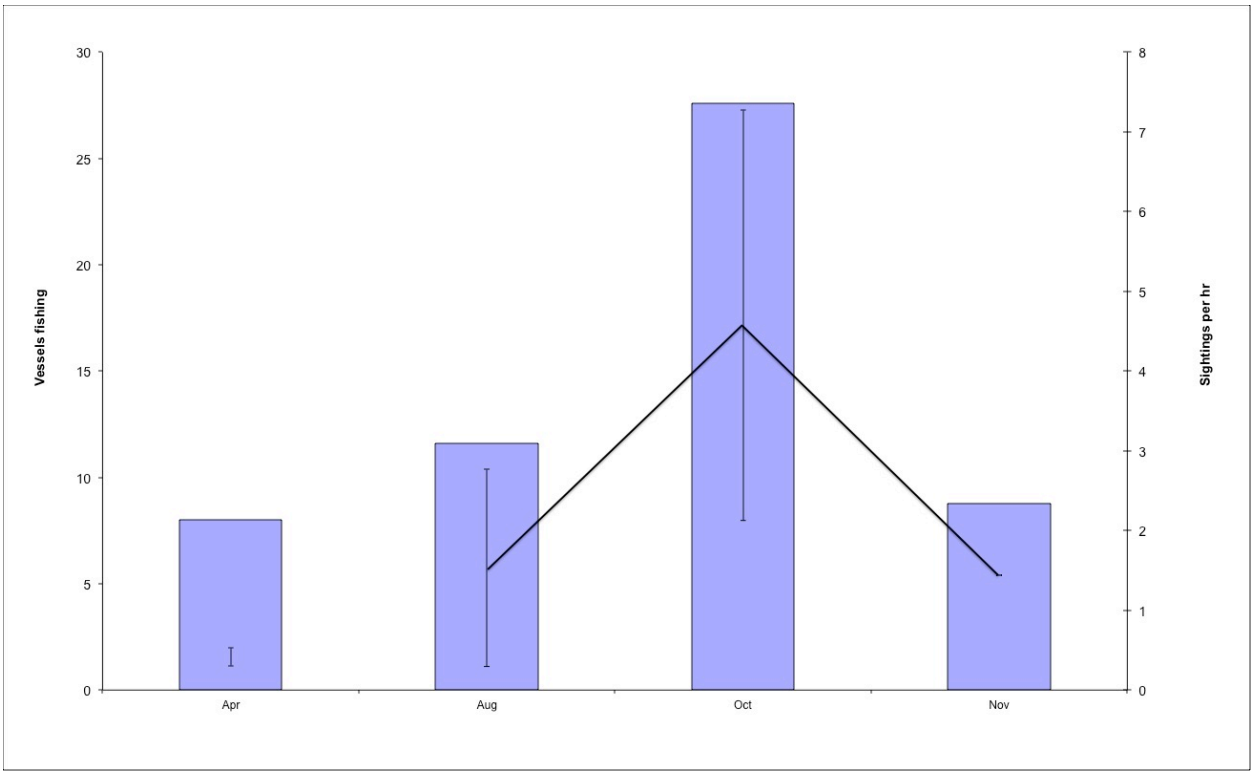


Figure 8. Length frequency of sea turtles sighted by scientific observers

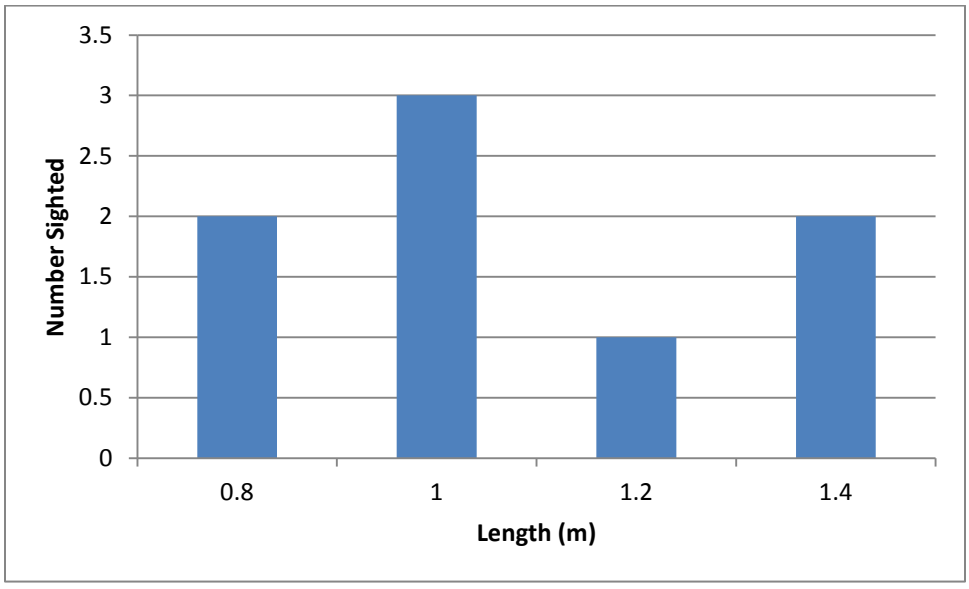
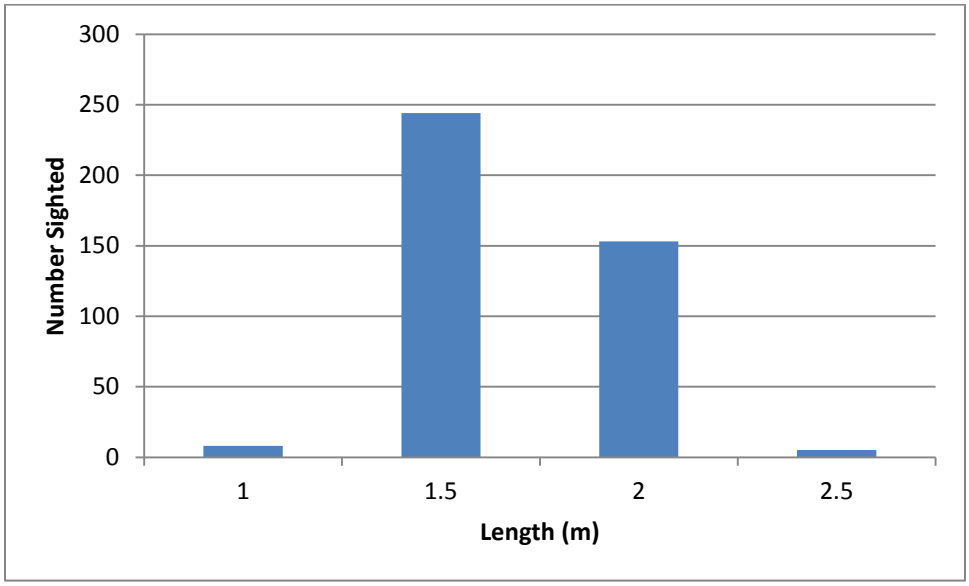
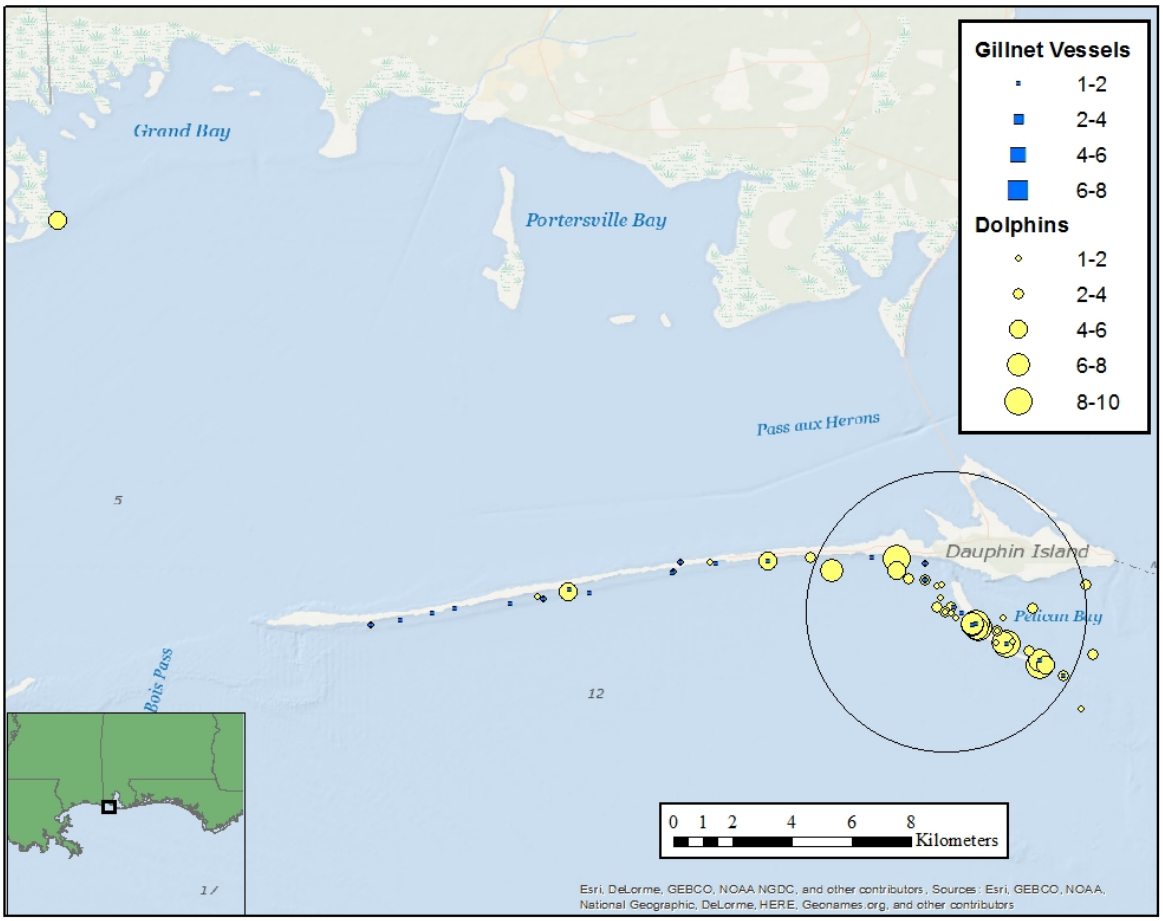
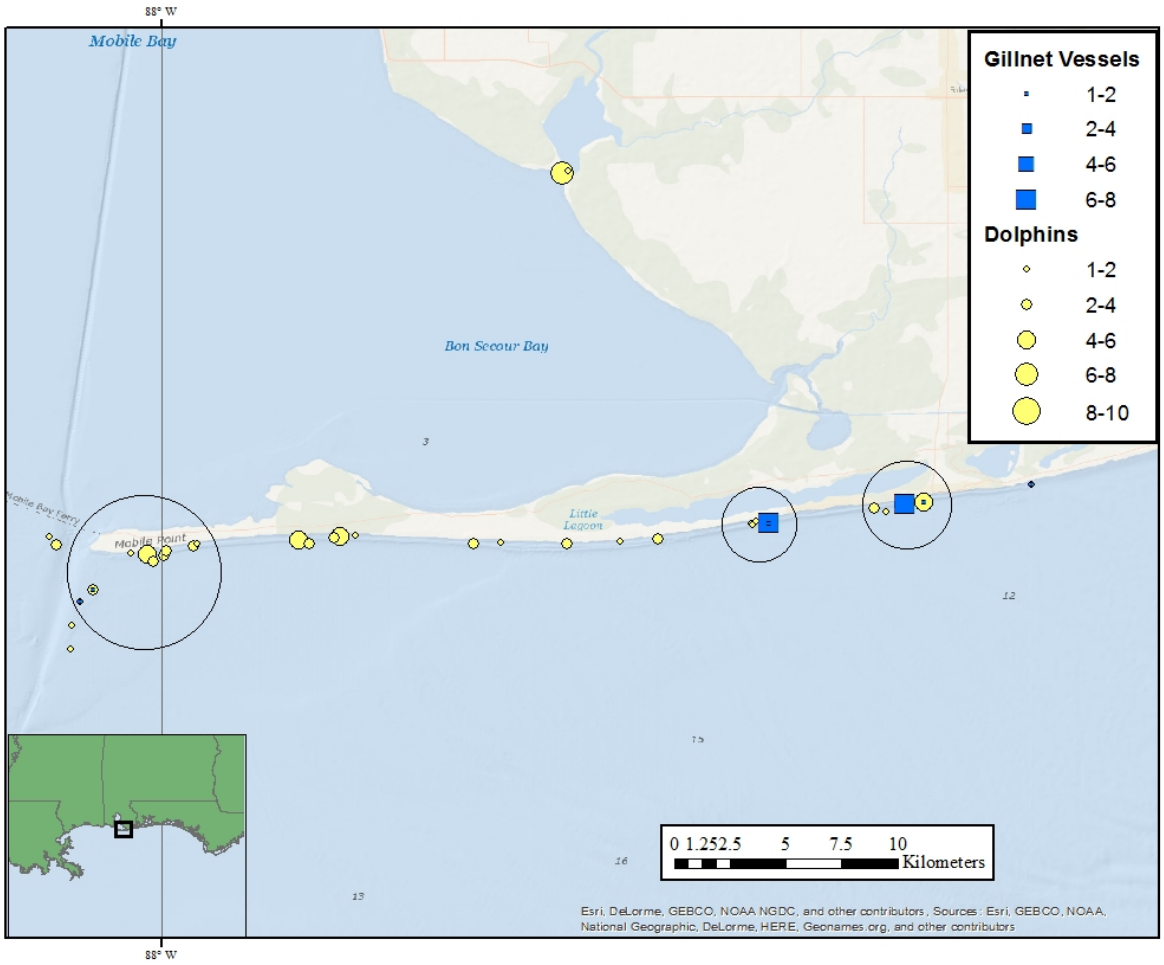


Figure 9. Length frequency of marine mammals sighted by scientific observers



Figures 10-12. Observations of dolphins and gillnet vessels actively fishing in Alabama. Areas of overlap between active fishing and dolphins are circled.




88° W
Mobile Bay
Bon Secour Bay
Little Lagoon
Mobile Point
Gillnet Vessels
1-2
2-4
4-6
6-8
Dolphins
1-2
2-4
4-6
6-8
8-10
0 1.252.5 5 7.5 10
Kilometers
Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors , Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, HERE, Geonames.org, and other contributors
88° W

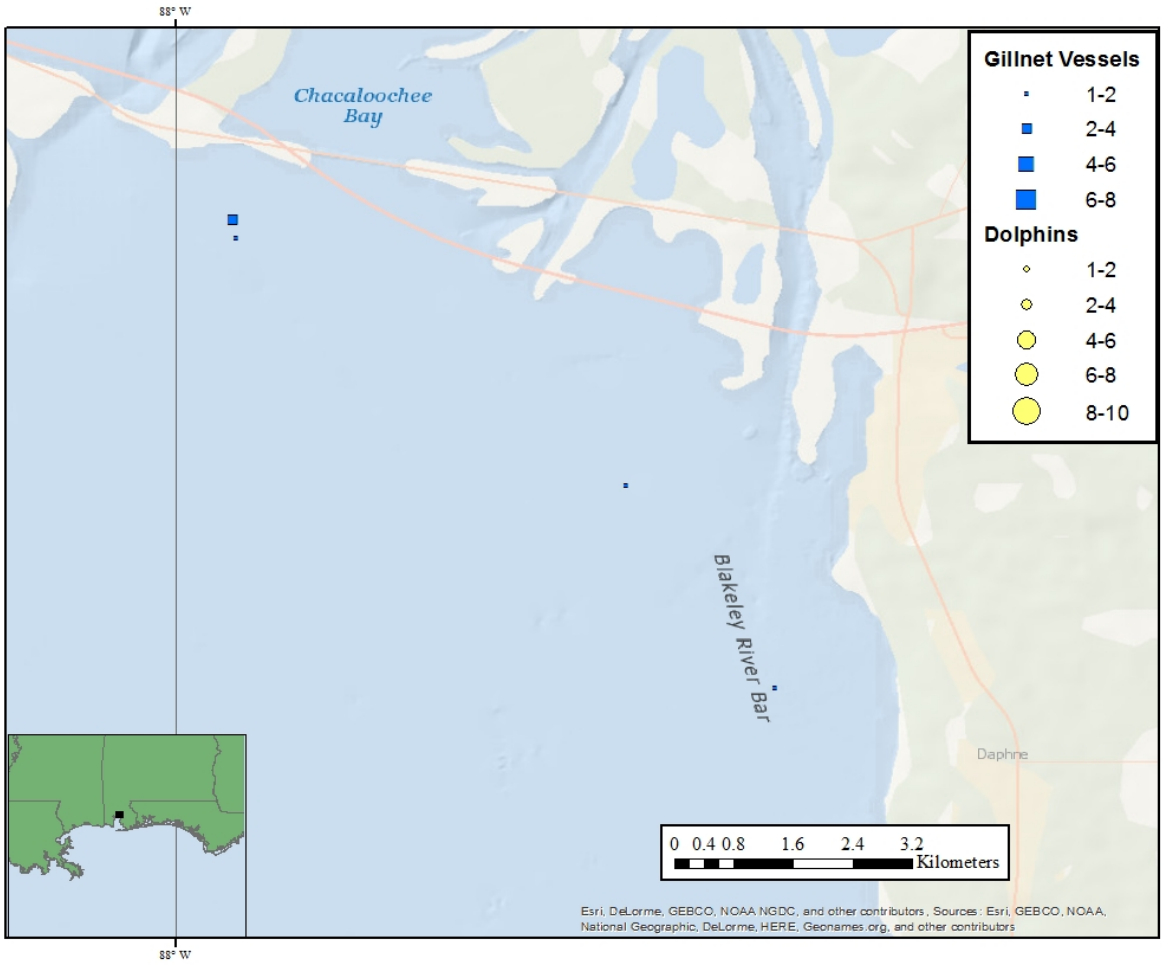

88° W
Chacaloochee Bay
Blakeley River Bar
Daphne
Gillnet Vessels
1-2
2-4
4-6
6-8
Dolphins
1-2
2-4
4-6
6-8
8-10
0 0.4 0.8 1.6 2.4 3.2
Kilometers
Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors, Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, HERE, Geonames.org, and other contributors
88° W

Figure 13. Observations of dolphins and gillnet vessels actively searching for fish, and shrimp vessels in Louisiana.

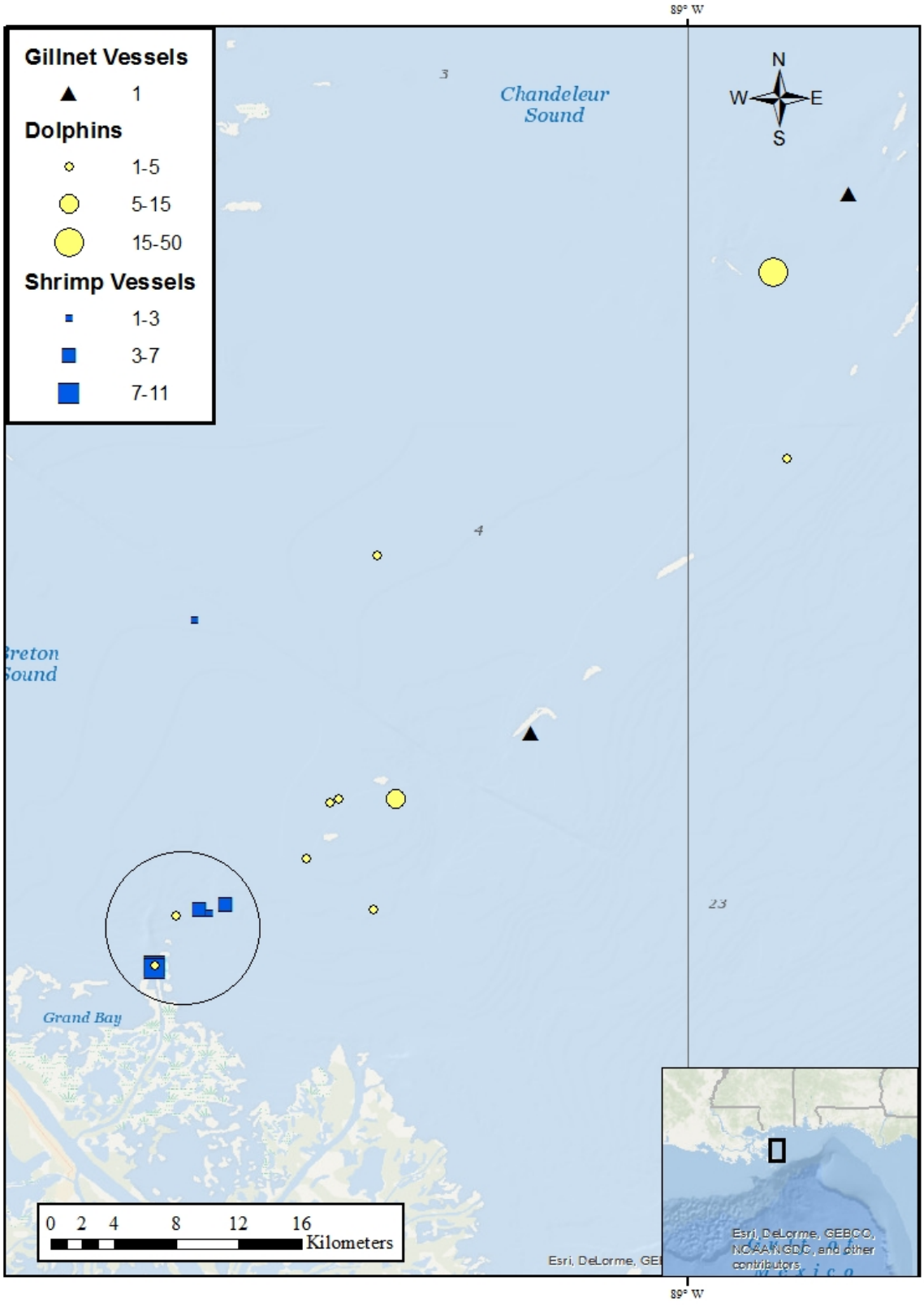


Figure 14. Observations of sea turtles and gillnet vessels actively searching for fish, and shrimp vessels in Louisiana.