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CHARACTERIZATION OF THE SOUTHEASTERN U.S. ATLANTIC MID-SHELF AND DEEPWATER REEF FISH FISHERIES

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Introduction

Observations of the southeastern U.S. Atlantic mid-shelf and deepwater reef fish fisheries (NC through Florida) began in 2007 (Helies and Jamison, 2013). This work was done through the Gulf & South Atlantic Fisheries Foundation soliciting fishing vessels and captains to participate in voluntary observer coverage. The objective was to characterize catch and discards within the snapper-grouper vertical hook-and-line fishery. This approach, while cooperative and inclusive, introduced spatial and temporal sampling biases and did not collect biological samples which are essential to determine life history parameters of exploited reef associated and coastal pelagic fishes. In 2013, a Marine Fisheries Initiative (MARFIN) grant, initiated mandatory placement of fisheries observers in the southeastern U.S. Atlantic mid-shelf and deepwater reef fish fisheries with an overall target of 62 sea days. Currently about 544 fishers possess the South Atlantic unlimited snapper/grouper permit, and an additional 110 fishers are permitted to land up to 225 lbs. incidentally.

Herein, we report on fishing activities collected by on-board observers from south Atlantic mid-shelf and deepwater reef fish fisheries from February 2014 through January 2015.

Methods

The US southeast coast was divided into three fishing regions for the purposes of vessel selection: The Carolinas, Georgia/ Florida (Cape Canaveral) and southern Florida (Cape Canaveral to Key West). Vessels were randomly selected from all three fishing regions and observer coverage was divided accordingly based on the fishing effort and landings report from the previous year. Selection letters requiring observer coverage were issued to the permit holder via U.S. Certified mail approximately one month prior to the upcoming fishing season. Once the

permit holder receives the selection letter, he or she is required to make contact with the observer coordinator and indicate intent to fish during the upcoming fishing season. If the permit holder intended to fish, the observer coordinator deployed an observer to the port of departure. Vessels were required to possess a valid Coast Guard Commercial Fishing Vessel Safety Examination decal and complete a safety evaluation by the observer prior to departure. A "Trip" was defined as from the time a vessel leaves the port until the vessel returns to port and lands catch, including multiple hauls therein.

While onboard the vessel, the observer completes three data forms: Vertical Gear Log, Vertical Haul Log, and Animal Log. The Vertical Gear Log is used to record gear characteristics. The Vertical Haul Log is used to record the information on fishing effort and environmental parameters. Hauls were defined as the time the first line was dropped into the water to the time the last line left the water at every location fished. In some instances, breaks in fishing or repositioning of the boat over the fishing location occurred. To account for this, if the break or repositioning lasted less than 20 minutes, a continuation of the previous haul was assumed and the time with no lines in the water recorded. If the break or repositioning lasted greater than 20 min, then the previous haul ended at the time the last line left the water and a new haul started when the lines were dropped again. Regardless of time, if the boat moved to a new location, a new haul began with the first line dropped. A new haul could also occur if the target species or reel type (e.g. electric, hydraulic, hand, etc) changed. The Animal Log records all species caught, condition of the catch (e.g. alive, dead, damaged, or unknown), and the final disposition of the catch (e.g. kept, released alive, discarded dead, etc.).

Biological samples (e.g. otoliths and gonads) were collected from randomly sampled select reef fish species based on pending Southeast Data, Assessment, and Review (SEDAR)

stock assessments. The biological samples were logged in the Panama City Observer database but samples were sent to the National Marine Fisheries Service laboratory in Beaufort, NC for processing. Biological samples will ultimately be used to estimate age structure, longevity, maturity schedules and fecundity.

Results

From February 2014 through January 2015, a total of 27 trips on 15 vessels with a total of 408 vertical line and trolling hauls were observed (Table 1). The average number of sea days per trip was 2.1. Trips were observed in all three selected fishing regions. Data from the three regions were combined instead of separation by gear and target because the universe of observed vessels was insufficient to separate the data without compromising vessel confidentiality. Gear characteristics of hauls varied by target species (reef fish or coastal pelagic) and gear type (powered versus unpowered gear, vertical versus horizontal/trolling). The data were grouped by targets and gear type into five groups: a) trolling (powered and unpowered combined[1]) hauls targeting mixed species, b) unpowered hauls targeting coastal pelagic, c) unpowered hauls targeting reef fish, d) powered hauls targeting coastal pelagic and e) powered hauls targeting reef fish. There was a total of six (6) hauls not included with these groups, three hauls targeted bait fish, two were mixed between powered and unpowered gear and one was a pole spear haul. These data were not included due to confidentiality concerns. A total of 226 biological samples (otolith and gonad) were collected from various species with an average of 4.0 samples taken per sea day.

[1] "powered or unpowered" is referring to the type of reel used, not the vessel. All vessels were powered.

a) Trolling gear targeting mixed species

i) Gear and haul characteristics

There were 16 hauls on 7 trips observed targeting coastal pelagic and reef fish using trolling gear. The average fishing depth was 1.2 m (Standard Deviation (SD) 3.1) and an average bottom depth of 59.3 m (SD 28.5). The number of hook hours ranged from 0.1 to 21.3 with a mean of 5.1 hook hours (SD 7.3). The most commonly used hook was the 10.0 J hook (62.5%). There were two hauls (12.5%) that employed a 2.0 treble hook and a 3.0 circle hook. Of the 16 hauls, 85.8% of the time fished, a gear configuration consisting of 1 hook was used, while 14.2% of the time fished used a gear configuration of 2 hooks. Distributions of sets are presented in figure 1.

ii) Catch and bycatch

There were 126 individual animals caught on observed trolling hauls in the southeastern U.S. Atlantic (Table 2). Teleosts comprised 96.0% of the catch and sharks 4.0%. King mackerel, *Scomberomorus cavalla*, comprised 76.9 % of the teleost catch followed by 15.7% little tunny, *Euthynnus alletteratus*. Atlantic sharpnose, *Rhizoprionodon terraenovae*, were the only species of shark caught (4.0%).

iii) Protected species interactions

No protected species were observed caught in trolling hauls in the southeastern U.S. Atlantic.

b) Unpowered gear targeting coastal pelagic

i) Gear and haul characteristics

There were 36 hauls on 6 trips observed targeting coastal pelagics. The average fishing depth was 19.2 m (SD 16.6) and an average bottom depth of 36.5 m (SD 14.2). The number of hook hours ranged from 0.02 to 9.3 with a mean of 2.1 hook hours (SD 2.4). The most

commonly used hook was the 6.0 J hook (40.5%). There were seven hauls (18.9%) that employed a 15.0 circle hook and an unidentified J hook. Of the 36 hauls, 98.9% of the time fished, a gear configuration consisting of 1 hook was used, while 1.1% of the time fished used a gear configuration of 2 hooks. Distributions of sets are presented in figure 1.

ii) Catch and bycatch

There were 190 individual animals caught on observed unpowered hauls targeting coastal pelagic in the southeastern U.S. Atlantic (Table 3). Teleosts comprised 85.8% of the catch and sharks 14.2%. Little tunny comprised 28.8 % of the teleost catch followed by 28.2% Greater amberjack, *Seriola dumerili*. Atlantic sharpnose, was the most common species of shark caught (81.5%).

iii) Protected species interactions

No protected species were observed caught in unpowered hauls targeting coastal pelagic in the southeastern U.S. Atlantic.

c) Unpowered gear targeting reef fish

i) Gear and haul characteristics

There were 53 hauls on 10 trips observed targeting reef fish. The average fishing depth was 38.6 m (SD 16.5) and an average bottom depth of 40.4 m (SD 13.6). The number of hook hours ranged from 0.1 to 19.5 with a mean of 3.2 hook hours (SD 4.1). The most commonly used hook was the 4.0 C hook (48.1%). There were seven hauls (14.8%) that employed a 2.0 circle hook and a 1.0 J hook. Of the 53 hauls, gear configurations ranged from 1 to 4 hooks, the most common configurations being used were 1 hook (46.5% of the time fished) and 3 hooks (28.3% of the time fished.) Distributions of sets are presented in figure 1.

ii) Catch and bycatch

There were 852 individual animals caught on observed unpowered hauls targeting reef fish in the southern Atlantic (Table 4). Teleosts comprised 99.5% of the catch and sharks 0.5%. yellowtail snapper, *Ocyurus chrysurus*, comprised 43.2 % of the teleost catch followed by 26.5% vermilion snapper, *Rhomboplites aurorubens*. Sandbar shark, *Carcharhinus plumbeus*, was the most common species of shark caught (50.0%).

iii) Protected species interactions

No protected species were observed caught in unpowered gear targeting reef fish in the southeastern U.S. Atlantic.

d) Powered gear targeting coastal pelagic

i) Gear and haul characteristics

There were 54 hauls on 10 trips observed targeting coastal pelagic. The average fishing depth was 51.8 m (SD 22.0) and an average bottom depth of 61.0 m (SD 20.0). The number of hook hours ranged from 0.08 to 6.0 with a mean of 1.2 hook hours (SD 1.3). The most commonly used hook was the 12.0 C hook (72.2%). There were four hauls (7.4%) that employed a 6.0 J hook and a 15.0 circle hook. Of the 54 hauls, 99.2% of the time fished, a gear configuration of 1 hook was used while 0.8% of the time fished used a gear configuration of 2 hooks. Distributions of sets are presented in figure 1.

ii) Catch and bycatch

There were 316 individual animals caught on observed powered hauls targeting coastal pelagic in the southeastern U.S. Atlantic (Table 5). Teleosts comprised 99.1% of the catch and sharks 0.9%. Greater amberjack comprised 64.9 % of the teleost catch followed by 21.7% almaco jack, *Seriola rivoliana*. Unidentified shark, was the most common species of shark caught (66.7%).

iii) Protected species interactions

No protected species were observed caught in powered gear targeting coastal pelagic in the southeastern U.S. Atlantic.

e) Powered gear targeting reefish

i) Gear and haul characteristics

There were 249 hauls on 11 trips observed targeting reef fishes. The average fishing depth was 51.6 m (SD 38.4) and an average bottom depth of 53.7 m (SD 37.7). The number of hook hours ranged from 0.05 to 29.1 with a mean of 2.5 hook hours (SD 3.4). The most commonly used hook was the 13.0 C hook (26.8%) and the second most commonly used hook was the 6.0 J hook (18.4%). There were fifty hauls (20.0%) that employed a 13.0 circle hook and a 3.0 circle hook. There were 29 hauls (11.6%) that employed a 15.0 circle hook, a 1.0 J hook and a 12.0 circle hook. Of the 249 hauls, gear configurations used ranged from 1 to 6 hooks, with the most common configurations used being 2 hooks (67.2% of the time fished) and 3 hooks (23.5% of the time fished). Distributions of sets are presented in figure 1.

ii) Catch and bycatch

There were 2889 individual animals caught on observed powered hauls targeting coastal pelagic teleosts in the southeastern U.S. Atlantic (Table 6). Teleosts comprised 97.4% of the catch and sharks 2.6%. Vermilion snapper comprised 46.7 % of the teleost catch followed by 18.3% red porgy, *Pagrus pagrus*. Atlantic sharpnose was the most common species of shark caught (73.0%).

iii) Protected species interactions

No protected species were observed caught in powered gear targeting reef fish in the southeastern U.S. Atlantic.

Discussion

This project represents the first observations of the southeastern U.S. Atlantic vertical line reef fishery using the Southeast Fisheries Science Center's (SEFSC) standardized vessel selection methodology. Previous observations (Helies and Jamison, 2013) have been conducted on a voluntary basis which may have introduced spatial and temporal biases. Use of experienced observers (from the SEFSC Shark Bottom Longline Observer Program and Southeast Gillnet Observer Program) resulted in few unidentified discards and produced biological samples that will provide life history information for stock assessment. All hooks were sampled and no catch extrapolation procedures were required as sometimes occurs in the Gulf of Mexico (Scott-Denton et al., 2011),

No interactions with protected resources were observed for vertical line or trolling gear during the study period. This absence of interactions is consistent with previous vertical line observations in the southestern U.S. Atlantic (Helies and Jamison, 2013) and the Gulf of Mexico (Scott-Denton et al. 2011).

This project provided vital data on temporal and spatial catch, release mortality, bycatch species, and biological samples for determination of critical life history matrices. Funding was requested through the MARFIN program in 2014 and 2015 but was not granted. Continued funding would allow the observer program to maintain this important time series.

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Table 1. Number of vessels, trips, hauls, and hook hours observed in southeastern U.S. Atlantic Ocean (SA) for all target species. The total number of unique vessels and trips is reported in brackets. Gear types include Trolling (TRO), unpowered (UNP) and powered (POW). Target species include coastal pelagic (CP) and reef fish (RF).

Gear and Target	Vessels Observed	Trips Observed	Hauls Observed	Hook Hours
TRO MIXED	3	7	16	82.3
UNP CP	4	6	36	74.5
UNP RF	6	10	53	170.9
POW CP	6	10	54	63.3
POW RF	9	11	249	613.3
Total	22 (15)	44 (27)	408	1004.3

Table 2. Number caught (n) and disposition of catch in percentage for all observed hauls with trolling gear targeting mixed species in the southeastern U.S. Atlantic. Disposition of catch is divided into kept (K), discard dead (DD), discard alive (DA), and unknown (U).

Scientific Name	**Common Name**	**n**	**% K**	**% DD**	**% DA**	**% U**
Scomberomorus cavalla	King mackerel	93	100.0	0.0	0.0	0.0
Euthynnus alletteratus	Little tunny	19	94.7	0.0	0.0	5.3
Rhizoprionodon terraenovae	Atlantic sharpnose shark	5	0.0	0.0	100.0	0.0
Sphyraena barracuda	Great barracuda	5	80.0	0.0	0.0	20.0
Thunnus atlanticus	Blackfin tuna	3	66.7	33.3	0.0	0.0
Coryphaena hippurus	Dolphinfish	1	0.0	0.0	100.0	0.0

Table 3. Number caught (n) and disposition of catch in percentage for all observed hauls with unpowered gear targeting coastal pelagic in the southeastern U.S. Atlantic. Disposition of catch is divided into kept (K), discard dead (DD), discard alive (DA), and unknown (U).

Scientific Name	Common Name	n	% K	% DD	% DA	% U
Euthynnus alletteratus	Little tunny	47	100.0	0.0	0.0	0.0
Seriola dumerili	Greater amberjack	46	73.9	0.0	26.1	0.0
Scomberomorus cavalla	King mackerel	33	93.9	0.0	6.1	0.0
Rhizoprionodon terraenovae	Atlantic sharpnose shark	22	9.1	0.0	90.9	0.0
Coryphaena hippurus	Dolphinfish	9	88.9	0.0	0.0	11.1
Caranx crysos	Bluerunner jack	5	100.0	0.0	0.0	0.0
Pomatomus saltatrix	Bluefish	5	100.0	0.0	0.0	0.0
Rachycentron canadum	Cobia	5	60.0	0.0	0.0	40.0
Seriola rivoliana	Almaco jack	4	100.0	0.0	0.0	0.0
Carcharhinus acronotus	Blacknose shark	3	0.0	0.0	100.0	0.0
Lutjanus analis	Mutton snapper	3	100.0	0.0	0.0	0.0
Sphyraena barracuda	Great barracuda	2	50.0	0.0	50.0	0.0
Balistes capriscus	Gray triggerfish	1	100.0	0.0	0.0	0.0
Caranx hippos	Crevalle jack	1	0.0	0.0	100.0	0.0
Carcharhinus plumbeus	Sandbar shark	1	0.0	0.0	100.0	0.0
Elasmobranchii	Sharks	1	0.0	0.0	0.0	100.0
Istiophorus platypterus	Sailfish	1	0.0	0.0	0.0	100.0
Osteichthyes	Unknown teleost	1	0.0	0.0	100.0	0.0

Table 4. Number caught (n) and disposition of catch in percentage for all observed hauls with unpowered gear targeting reef fish in the southeastern U.S. Atlantic. Disposition of catch is divided into kept (K), discard dead (DD), discard alive (DA), and unknown (U).

Scientific Name	Common Name	n	% K	% DD	% DA	% U
Ocyurus chrysurus	Yellowtail snapper	366	98.4	1.4	0.0	0.3
Rhomboplites aurorubens	Vermilion snapper	225	97.8	0.0	2.2	0.0
Pagrus pagrus	Red porgy	64	68.8	12.5	18.8	0.0
Balistes capriscus	Gray triggerfish	61	100.0	0.0	0.0	0.0
Haemulon aurolineatum	Tomtate	27	7.4	51.9	40.7	0.0
Holocentrus sp.	Squirrelfishes	25	88.0	0.0	12.0	0.0
Lutjanus griseus	Gray snapper	16	100.0	0.0	0.0	0.0
Caranx crysos	Bluerunner jack	13	100.0	0.0	0.0	0.0
Haemulon plumieri	White grunt	13	100.0	0.0	0.0	0.0
Centropristis striata	Black seabass	5	80.0	0.0	20.0	0.0
Seriola rivoliana	Almaco jack	4	100.0	0.0	0.0	0.0
Tylosurus crocodilus	Houndfish	4	100.0	0.0	0.0	0.0
Echeneis naucrates	Sharksucker	3	0.0	0.0	100.0	0.0
Lutjanus campechanus	Red snapper	3	0.0	66.7	33.3	0.0
Malacanthus plumieri	Sand tilefish	3	100.0	0.0	0.0	0.0
Seriola zonata	Banded rudderfish	3	0.0	66.7	33.3	0.0
Calamus leucosteus	Whitebone porgy	2	100.0	0.0	0.0	0.0
Carcharhinus plumbeus	Sandbar shark	2	0.0	0.0	100.0	0.0
Lutjanus analis	Mutton snapper	2	100.0	0.0	0.0	0.0
Lutjanus synagris	Lane snapper	2	100.0	0.0	0.0	0.0
Carcharhinus falciformis	Silky shark	1	0.0	0.0	100.0	0.0
Elagatis bipinnulata	Rainbow runner	1	100.0	0.0	0.0	0.0
Mycteroperca bonaci	Black grouper	1	0.0	0.0	100.0	0.0
Mycteroperca microlepis	Gag grouper	1	100.0	0.0	0.0	0.0
Mycteroperca phenax	Scamp grouper	1	100.0	0.0	0.0	0.0
Pomacanthidae	Angelfish family	1	0.0	100.0	0.0	0.0
Rhizoprionodon terraenovae	Atlantic sharpnose shark	1	0.0	0.0	100.0	0.0
Scaridae	Parrotfishes	1	0.0	0.0	100.0	0.0
Seriola dumerili	Greater amberjack	1	100.0	0.0	0.0	0.0

Table 5. Number caught (n) and disposition of catch in percentage for all observed hauls with powered gear targeting coastal pelagic in the southeastern U.S. Atlantic. Disposition of catch is divided into kept (K), discard dead (DD), discard alive (DA), and unknown (U).

Scientific Name	Common Name	n	% K	% DD	% DA	% U
Seriola dumerili	Greater amberjack	203	67.5	5.4	25.1	2.0
Seriola rivoliana	Almaco jack	68	89.7	1.5	8.8	0.0
Mycteroperca microlepis	Gag grouper	12	83.3	8.3	8.3	0.0
Lutjanus campechanus	Red snapper	10	0.0	0.0	100.0	0.0
Balistes capriscus	Gray triggerfish	3	66.7	0.0	33.3	0.0
Euthynnus alletteratus	Little tunny	3	33.3	0.0	33.3	33.3
Lutjanus analis	Mutton snapper	3	100.0	0.0	0.0	0.0
Caranx hippos	Crevalle jack	2	0.0	0.0	100.0	0.0
Elasmobranchii	Sharks	2	0.0	0.0	0.0	100.0
Rhomboplites aurorubens	Vermilion snapper	2	100.0	0.0	0.0	0.0
Sphyraena barracuda	Great barracuda	2	100.0	0.0	0.0	0.0
Alectis ciliaris	African pompano	1	100.0	0.0	0.0	0.0
Carcharhinus plumbeus	Sandbar shark	1	0.0	0.0	100.0	0.0
Epinephelus drummondhayi	Speckled hind	1	0.0	0.0	100.0	0.0
Lutjanus griseus	Gray snapper	1	100.0	0.0	0.0	0.0
Rachycentron canadum	Cobia	1	100.0	0.0	0.0	0.0
Seriola zonata	Banded rudderfish	1	100.0	0.0	0.0	0.0

Table 6. Number caught (n) and disposition of catch in percentage for all observed hauls with powered gear targeting reef fish in the southeastern U.S. Atlantic. Disposition of catch is divided into kept (K), discard dead (DD), discard alive (DA), and unknown (U).

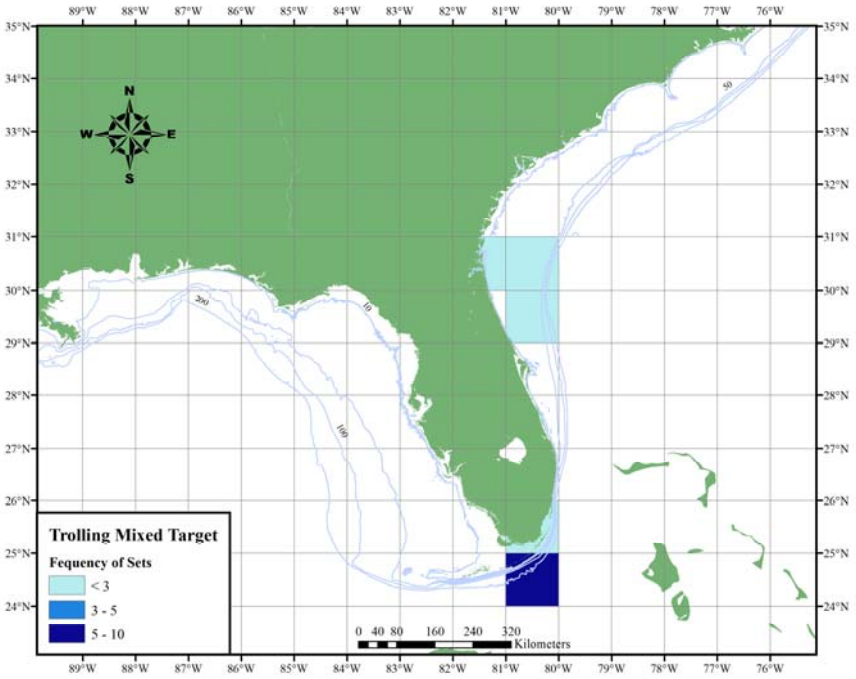
Scientific Name	Common Name	n	% K	% DD	% DA	% U
Rhomboplites aurorubens	Vermilion snapper	1316	91.0	3.8	4.9	0.4
Pagrus pagrus	Red porgy	515	52.2	17.1	30.7	0.0
Balistes capriscus	Gray triggerfish	361	97.0	0.3	2.5	0.3
Centropristis striata	Black seabass	111	70.3	1.8	27.9	0.0
Haemulon plumieri	White grunt	100	90.0	7.0	2.0	1.0
Haemulon aurolineatum	Tomtate	89	0.0	7.9	91.0	1.1
Seriola rivoliana	Almaco jack	70	90.0	1.4	7.1	1.4
Rhizoprionodon terraenovae	Atlantic sharpnose shark	54	0.0	0.0	100.0	0.0
Mycteroperca phenax	Scamp grouper	52	94.2	1.9	3.8	0.0
Lutjanus campechanus	Red snapper	34	14.7	8.8	73.5	2.9
Mycteroperca microlepis	Gag grouper	31	87.1	0.0	12.9	0.0
Seriola dumerili	Greater amberjack	23	47.8	8.7	43.5	0.0
Echeneis naucrates	Sharksucker	16	6.3	6.3	87.5	0.0
Diplodus holbrookii	Spottail Pinfish	11	100.0	0.0	0.0	0.0
Coryphaena hippurus	Dolphinfish	10	70.0	10.0	10.0	10.0
Calamus nodosus	Knobbed porgy	8	62.5	37.5	0.0	0.0
Lopholatilus chamaeleonticeps	Tilefish	8	100.0	0.0	0.0	0.0
Seriola zonata	Banded rudderfish	8	0.0	100.0	0.0	0.0
Carcharhinus plumbeus	Sandbar shark	6	0.0	0.0	100.0	0.0
Epinephelus adscensionis	Rock hind	6	100.0	0.0	0.0	0.0
Diplectrum formosum	Sand perch	5	0.0	40.0	60.0	0.0
Elasmobranchii	Sharks	5	0.0	0.0	80.0	20.0
Carcharhinus falciformis	Silky shark	4	0.0	0.0	100.0	0.0
Malacanthus plumieri	Sand tilefish	4	25.0	50.0	25.0	0.0
Carcharhinidae	Requiem shark family	3	0.0	0.0	33.3	66.7
Centropristis ocyurus	Bank seabass	3	0.0	0.0	100.0	0.0
Epinephelus drummondhayi	Speckled hind	3	33.3	0.0	33.3	33.3
Acanthurus chirurgus	Doctorfish	2	0.0	50.0	50.0	0.0
Bodianus pulchellus	Spotfin hogfish	2	50.0	50.0	0.0	0.0
Calamus leucosteus	Whitebone porgy	2	100.0	0.0	0.0	0.0
Epinephelus niveatus	Snowy grouper	2	100.0	0.0	0.0	0.0
Galeocerdo cuvier	Tiger shark	2	0.0	0.0	100.0	0.0
Holocentrus sp.	Squirrelfishes	2	50.0	0.0	50.0	0.0
Opsanus pardus	Leopard toadfish	2	50.0	0.0	50.0	0.0
Osteichthyes	Unknown teleost	2	50.0	0.0	50.0	0.0
Sparidae	Porgy family	2	50.0	50.0	0.0	0.0
Calamus calamus	Saucereye porgy	1	100.0	0.0	0.0	0.0

Table 6. cont'd

Scientific Name	Common Name	n	% K	% DD	% DA	% U
Epinephelus guttatus	Red hind	1	100.0	0.0	0.0	0.0
Epinephelus itajara	Goliath grouper	1	0.0	0.0	100.0	0.0
Epinephelus morio	Red grouper	1	100.0	0.0	0.0	0.0
Euthynnus alletteratus	Little tunny	1	100.0	0.0	0.0	0.0
Gonioplectrus hispanus	Spanish flag	1	100.0	0.0	0.0	0.0
Lachnolaimus maximus	Hogfish	1	100.0	0.0	0.0	0.0
Lutjanus griseus	Gray snapper	1	100.0	0.0	0.0	0.0
Lutjanus vivanus	Silk snapper	1	100.0	0.0	0.0	0.0
Muraena retifera	Reticulate moray eel	1	0.0	100.0	0.0	0.0
Paranthias furcifer	Creolefish	1	100.0	0.0	0.0	0.0
Pterois sp.	Lionfish	1	0.0	100.0	0.0	0.0
Serranidae	Seabass family	1	0.0	100.0	0.0	0.0
Sphyraena barracuda	Great barracuda	1	100.0	0.0	0.0	0.0
Thunnus atlanticus	Blackfin tuna	1	0.0	100.0	0.0	0.0

Figure 1. Distribution of all observed hauls by gear or target 2014. (a) Distribution of trolling effort targeting mixed species in the southeastern U.S. Atlantic, (b) distribution of unpowered effort targeting coastal pelagic in the southeastern U.S. Atlantic.

(a)



(b)

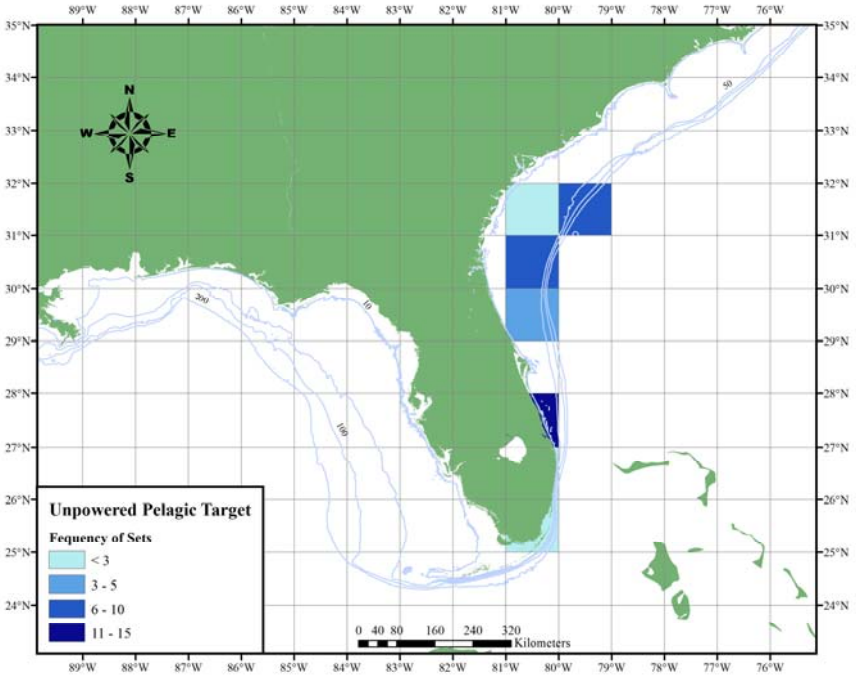
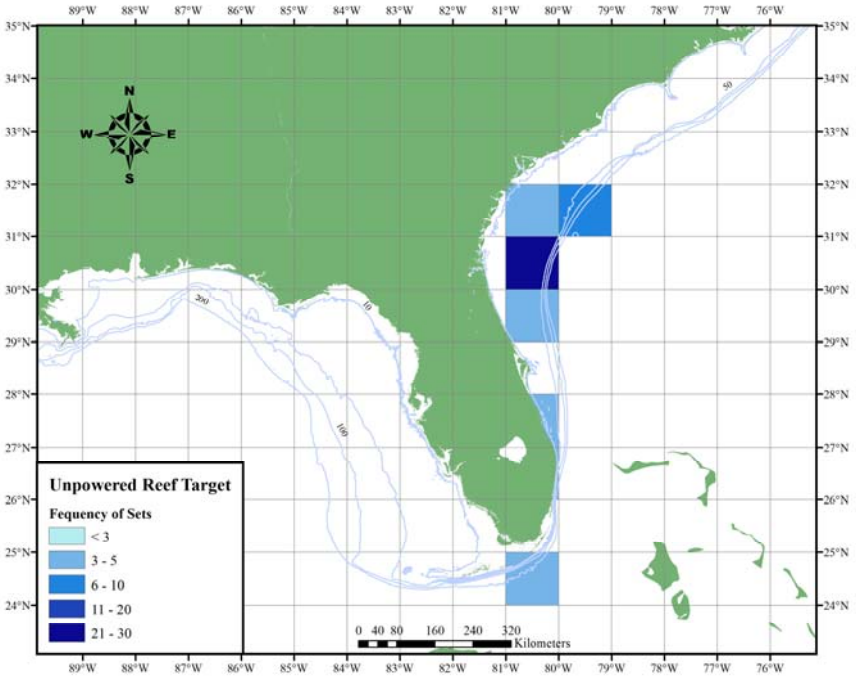


Figure 1 cont'd. Distribution of all observed hauls by gear or target 2014. (c) Distribution of unpowered effort targeting reef fish in the southeastern U.S. Atlantic, (d) distribution of powered effort targeting coastal pelagic in the southeastern U.S. Atlantic.

(c)



(d)

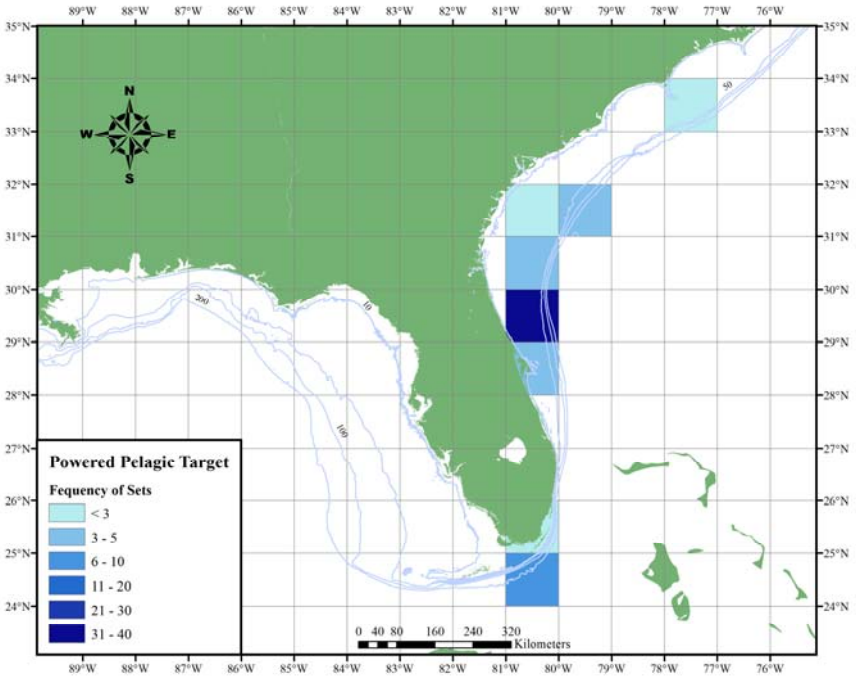


Figure 1 cont'd. Distribution of all observed hauls by gear and target 2014. (e) Distribution of powered effort targeting reef fish in the southeastern U.S. Atlantic.

(e)