Representative Biological Sampling of Recreational Harvest on the East Coast of Florida to Improve Stock Assessments in the South Atlantic

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II. Executive Summary

For many economically important stocks in the South Atlantic, recreational landings and discards are a significant component of fishery removals. Among the most important data needs to improve stock assessments in the region are size, age and length compositions that are representative of recreational removals. The primary source of recreational fishery statistics for private and for-hire charter boat-based segments in the South Atlantic region is the Marine Recreational Information Program (MRIP). However, for fisheries with short seasons, strict harvest limits, or that are not frequently targeted, the survey suffers from low sample sizes to characterize the size composition for landed catch. Furthermore, age structures and sex ratios are not collected through the MRIP survey. In the Gulf of Mexico, separate data collection programs for the biological composition of recreational catch that supplement MRIP have contributed to improved stock assessments for Red Snapper and other managed species.

This study developed a specialized survey to collect biological samples, including length, weight, age structures and sex ratios, from reef fishes and other managed species that are representative of current recreational landings along the east coast of Florida. The survey design employed dockside sampling at known landing sites for private and charter boat-based recreational fishing trips that take place in the Atlantic Ocean, and incorporated random site selection that was distributed geographically and throughout the year. Interviews were conducted with vessel operators to collect trip-level data on area fished, depths fished, fishing methods, hook gears, and characteristics of discards. Roughly half of the approximately 1,200 miles of coastline in the South Atlantic region from North Carolina through Florida were included in the study area, and a majority of recreational landings for many managed stocks are from the Atlantic coast of Florida.

A total of 1,427 assignments were completed over the course of this study, which resulted in 3,737 interviews with angler parties from private and chartered boats that targeted species that are federally managed in the South Atlantic. Assignments were distributed throughout the year across three large geographic areas along the Atlantic coast of Florida. Priority was given to collecting biological data from important managed species that are assessed through SEDAR, and the most frequently sampled species included Red Snapper (*Lutjanus campechanus*), Gray Snapper (*L. griseus*), Vermilion Snapper (*Rhomboplites aurorubens*), Yellowtail Snapper (*Ocyurus chrysurus*), and King Mackerel (*Scomberomorus cavalla*). Species that are rare in dockside sampling efforts and

generally considered data poor for stock assessments were also encountered, including Cobia (*Rachycentron canadum*), Greater Amberjack (*Serioloa dumerili*), Gag (*Mycteroperca microlepis*), Scamp (*M. phenax*), and Blueline Tilefish (*Caulatilus microps*).

Data collected through this work have already contributed to multiple SEDARs either through direct data inputs (length, weight, and age composition) or contributions to studies that informed the assessment. Length and age data were shared with analysts for direct inclusion in assessments for Red Porgy (*Pagrus pagrus*, SEDAR 60), Yellowtail Snapper (SEDAR 64), Scamp (SEDAR 68), Gag (SEDAR 71), and Red Snapper (SEDAR 73). Other biological samples, including fin clips and gonads, have been shared with principal investigators of ongoing, coast wide studies that are helping to inform stock assessments. For example, fin clips collected from harvested Cobia intercepted along the Atlantic coast of Florida over the course of this study were shared with researchers for inclusion in an ongoing coast wide genetics study to identify the stock boundary for the South Atlantic stock for SEDAR 58. The majority of Cobia samples came from northeast Florida, including Jacksonville, St Augustine, Ponce Inlet and Cape Canaveral, and helped to identify this area as an important "mixing zone" between the Gulf and South Atlantic stocks (Perkinson et al. 2018, Darden et al. 2018).

III. Purpose

A. Detailed description of problem or impediment of fishing industry that was addressed.

Managed species in the South Atlantic Snapper-Grouper Complex fall under the purview of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (MSRA), which mandated an end to overfishing by 2010 (Tromble et al., 2009). Stock assessments for Red Snapper (*Lutjanus campechanus*) in the South Atlantic indicate that the stock was undergoing overfishing through the late 1980's and the 2000's until the fishery was closed in 2010 (SEDAR15, 2008; SEDAR24, 2010; SEDAR41, 2016). During recent years when small quotas have been allowed, the high harvest capacity of the recreational fishery has limited the season to just 3–9 days. The most recent assessments for Red Grouper (*Epinephelus morio*) and Blueline Tilefish (*Caulolatilus microps*) in the South Atlantic revealed similar patterns of stock declines through the 1980's with recovery after management in the 1990's; however, Red Grouper continues to be classified as overfished and experiencing overfishing (SEDAR50, 2017; SEDAR53, 2017). Gag (*Mycteroperca microlepis*) is not overfished but was experiencing overfishing at the time of the last benchmark assessment (SEDAR10, 2006). Snowy Grouper (*Epinephelus niveatus*) is in a 34 year rebuilding plan, and although the stock is not currently experiencing overfishing, recreational landings exceeded established annual catch limits in 2012 and 2013 (SEDAR36, 2013). These examples underscore the importance of robust models in the South Atlantic region for assessing the current fishing status and monitoring recovery of overfished stocks.

Representative data on the size and age distribution and sex composition of recreational catch have become increasingly important for fully-integrated stock assessment models (NMFS, 2001). Integrated stock assessments account for variable mortality rates across all age classes and fishing sectors to yield more precise model outputs, including reference points used to determine whether

a stock is overfished or experiencing overfishing (Quinn and Deriso, 1999). A significant source of error in age-based models is uncertainty around assumptions of the relative impacts from exploitation across different fishing sectors (Punt et al., 2014). Fishery dependent data, including gear-specific size and age composition of fish removed and the spatial and temporal distribution of effort, can be used to better inform stock assessment models on variable selectivity among fishing fleets (Methot and Wetzel, 2013). A simulation using available data from eight assessed stocks in the South Atlantic demonstrated that increased sample sizes for age composition of both commercial and recreational catch had the greatest impact on improving accuracy of stock assessments when compared with increased fishery independent survey data and improved precision around estimates for landings and discards (Siegfried et al., 2016).

Stock assessments in the South Atlantic region have historically relied on small sample sizes for aged fish from the recreational sector, and samples are often collected using ad-hoc methods and may not be representative of the overall fishery (SEDAR, 2012; Sustainable Fisheries Branch, 2013). Table 1 shows the number of fisheries-dependent age samples from the recreational sector available for recent stock assessments of four managed species. The majority of aged fish were sampled through the NMFS Southeast Region Headboat Survey (SRHS), which is the only long-term fisheries-dependent monitoring program for recreational fisheries in the region that collects otoliths for ageing. However, private boats represent the majority of recreational landings and are not sampled through the SRHS. The paucity of data available is symptomatic of the low level of funding for necessary monitoring and research in the South Atlantic compared to other regions. A review of peer-reviewed literature for Red Snapper published between 1982 and 2013 found that out of 110 available studies, only seven pertained to the stock in the South Atlantic, and of those only three pertained to stock assessment, management and fishery interactions (Rindone et al. 2015). Since that review, one new analysis of gear-specific age and size-selectivity using available data from the commercial hook and line fishery has become available (Mitchell et al. 2014). Fisheries selectivity is a particularly contentious issue surrounding assessments for Red Snapper in the southeast U.S. (Cowan 2011), and at the root of this controversy is the lack of available size and age composition data to support necessary assumptions. More analyses of size and age composition data, coupled with spatial distribution of fishing effort (across distances from shore and depths fished) relative to a species' ontogeny, are needed to make well-informed decisions surrounding selectivity for fishery sectors targeting not just Red Snapper, but the full suite of managed species in the South Atlantic (Mitchell et al. 2014).

Fishery-dependent monitoring programs in the South Atlantic region that collect vital statistics on catch and effort from the recreational fishery do not provide some of the critical data inputs needed for contemporary age-based stock assessments (NMFS, 2001). The Marine Recreational Information Program (MRIP, previously the Marine Recreational Fisheries Statistics Survey or MRFSS; Essig and Holliday, 1991) is the only dedicated large-scale fishery dependent program that monitors private and for-hire charter boat-based segments of the recreational fishery in the South Atlantic region. The MRIP strives to provide a statistically valid sample of the size composition and biomass of harvested finfish that is representative of the spatial and temporal distribution of the recreational fishery. However, for many important managed species in the South Atlantic, the MRIP survey intercepts low numbers of landed fish, particularly for species with strict harvest limits, such as red snapper, or that are targeted by a small subset of participants in the overall recreational fishery, such as tilefishes and deep water grouper species. Furthermore, time constraints and strict interview procedures do not allow field interviewers to collect age

structures or record sex from fish sampled in the access-point intercept portion of the survey. The MRIP survey collects coarse trip-level data on the primary area fished (inland, state territorial seas up to 3 miles from shore, or EEZ greater than 3 miles from shore), but does not provide data on the distribution of catch across latitudinal gradients, distance from shore, and depths fished that are needed to make inferences about fisheries selectivity and depth-dependent discard mortality for released portions of recreational catch.

For the for-hire headboat segment of the recreational boat-based fishery, the Southeast Region Headboat Survey (SRHS) utilizes self-reported logbook data to estimate total catch and effort by area fished and a dockside survey component collects biological samples (including length, weight, and age structures) from harvested catch. A separate headboat observer program also provides representative samples for the size-composition of discards. Similarly in the Gulf of Mexico, separate data collection programs that are independent of the MRIP have provided representative samples of the size, age, and sex of recreational catches and the mortality rate of discards from private and charter boat-based recreational fisheries (FIN, 2014; Sauls et al., 2014). These supplemental data sources have contributed to improved stock assessments for red snapper and other priority species in the Gulf region. Likewise, separate survey designs are needed in the South Atlantic to fulfill the current data needs for resource management and assessment in this data-poor region.

B. Objectives of the project.

The goal of this project was to design and test a randomized sampling program to collect biological data from harvested fish that are representative of recreational fishery operating off the Atlantic coast of Florida. The purpose of this sampling program is to enhance data available to assess managed stocks in the South Atlantic.

Primary objectives of this research were to:

1. Design and implement a three-year study of the private boat and charter boat segments of the recreational fishery on the Atlantic coast of Florida to collect biological samples, including length, weight, age structures and sex ratios from reef fishes and other managed species, and also collect trip-level data on area fished, depths fished, fishing methods, gear types, and characteristics of discards.
2. Work cooperatively with a representative panel of charter vessel operators throughout the region to sample trips that target Blueline Tilefish (*Caulolatilus microps*), Tilefish (*Lopholatilus chamaeleonticeps*) and snowy grouper (*Epinephelus niveatus*); compare size and age compositions to evaluate whether rare event trips are adequately sampled in a random biological sampling design; and recommend alternative sampling methods if necessary.
3. Process age structures from sampled fish in accordance with accepted standardized methods used throughout the region, provide sample weights, and calculate weighted length and age compositions that are representative of removals in the private boat and charter boat segments of the recreational fishery.

4. Contribute to ongoing research in the Gulf of Mexico and South Atlantic by collecting gonadal tissue samples from Gag (*Mycteroperca microlepis*) encountered during this study for histological classification of reproductive phase and oocyte developmental stage.
5. Evaluate results and provide recommendations for a biological sampling program that may be implemented on a region-wide scale to supplement existing fishery dependent monitoring of recreational effort and catch in the South Atlantic.
6. Share all resulting data and analyses during upcoming SEDAR data workshops and assessments.

IV. Approach

A. Detailed description of the work that was performed.

Study Area

The study area was the east coast of Florida from the border with Georgia south through the Florida Keys (Figure 1). Distributed throughout the mainland coastline are eighteen navigable egress points, including inlets, river mouths and the northern section of Biscayne Bay[1] that allow boating access to the Atlantic Ocean. Landing sites for offshore fishing trips are concentrated around these geographically separated egress points. A survey during 2012–2014 that took advantage of clustered landing sites around the nine northern-most egress points during short (3–8 day) recreational season openings for red snapper found latitudinal differences in depths fished, distances traveled offshore, CPUE, and size of landed fish (Sauls et al., 2017). Thus, it was important for this study to distribute sampling effort across the study area in order to characterize regional differences in offshore fishing effort and describe catch compositions that are representative for a suite of managed species.

The survey design employed year-round, stratified random sampling of offshore landing sites clustered around a total of eighteen egress points along the east coast of the Florida peninsula (Figure 1). The study area was stratified into three regions. The north region includes seven egress points from Cumberland Sound to Sebastian Inlet, the south region includes eleven egress points from Jupiter Inlet to Biscayne Bay, and the Keys region was split into northern, middle and lower Keys sub-regions.

Site Register

The Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute (FWRI) is responsible for state conduct of the MRIP access-point intercept survey and MRIP for-hire telephone survey for charter fishing effort. As part of these tasks, FWRI maintains complete sample frames for public access point sites and active charter vessels throughout Florida. For this study, MRIP sites with private or charter boat offshore fishing pressure clustered near Atlantic Ocean egress points along the east coast of Florida were identified.

[1] In Biscayne Bay, access to the Atlantic Ocean is restricted to the northern section due to extensive shallow sand flats (called the Safety Valve) in the central section of the lagoon, and a series of barrier islands in the southern section with few tidal inlets and shallow limestone ridges that extend three to four miles seaward from the barrier shoreline.

Variables maintained in the site selection sample frame for this study included:

- Region (NE, SE, Keys)
- County
- Cluster the site is associated with (egress point for NE and SE regions; upper/middle/lower for Keys)
- MRIP site number
- MRIP site name
- Primary mode (PR or CH)
- Number of wet slips (updated each wave in MRIP site register)
- Number of dry slips (updated each wave in MRIP site register)
- Number of trailer parking spaces (updated each wave in MRIP site register)
- Number of boat ramps (updated each wave in MRIP site register)
- Number of charter boats that use the site (updated each wave in MRIP site register)
- Navigable miles to nearest egress point (calculated in Arc GIS)

FWC staff identified public boat ramps, marinas, and dry storage facilities along the Atlantic coast of Florida where private boats and charter boats returning from recreational fishing trips in the Atlantic Ocean may be intercepted to sample landed catch. A total of 174 sites were included in the site register, including 49 in the northeast region, 73 in the southeast, and 52 in the Florida Keys.

Each site included in the sample frame for this study was assigned a new offshore fishing pressure rating, and sites where a combination of private and charter boats return from offshore trips were assigned separate pressures for each mode. For private boat mode, the pressure rating incorporated two factors: a) the maximum capacity of the site, based on the number of wet and dry slips occupied by private recreational boats and/or available parking spaces for trailers, and b) the navigable distance (in miles) from the site to the mouth of the egress point. Private boat mode pressure was calculated for each site by division (offshore pressure = a/b). This ensured that sites with high capacity and/or located close to an egress point had higher pressures relative to those located farther away and/or with fewer slips and parking spaces. For charter boat mode, the offshore fishing pressure was simply the total number of charter fishing vessels known to use each site, which was kept up to date in the MRIP site register each wave. Updates to the site register and offshore fishing pressures were made prior to each new monthly sample draw.

Sample Selection

Each week, sites were selected from the sample frame in two-stages. In the first stage, 5-6 site clusters were randomly selected in each of the three regions (cluster = egress point in NE and SE regions, upper/mid/lower islands in Keys). This ensured geographic distribution of assignments throughout the study area. In the second stage, one private boat mode site was randomly selected proportional to size from the first three clusters selected in stage 1, and one charter mode site was randomly selected in the remaining clusters. The stage two site selection incorporated probability

proportional to size sampling (pps sampling), with the pressure rating for each site serving as the size measure. Sites in a cluster with high pressure had a higher selection probability than medium and low pressure sites, which ensured that productive sites were visited more frequently and less productive sites were also represented in the sample.

During the recreational Red Snapper season in the South Atlantic, the sample selection methods were modified to randomly select a supplemental draw of charter vessel landing sites from each inlet cluster during each weekend the Red Snapper season was open. In years prior to this project, field staff were given latitude when the season was open to go to locations where charter boats were known to land catch and opportunistically sample all Red Snapper that came in, regardless of size. This supplemental random draw that was provided to staff during the years of this study ensured that sites across the region were representatively sampled during the short time period when the Red Snapper season was open. Other managed species were also sampled during supplemental Red Snapper assignments.

Field Sampling Methods

A procedures manual and field data sheets that were developed for this project are provided in Appendix D. For private mode assignments, biologists arrived on site before 11:00 am and remained on site until sunset or all boats out and potentially fishing in the Atlantic returned to the site (whichever occurred first). For charter mode assignments, biologists arrived on site before the first scheduled charter trip returned to the site. Once a charter assignment started, the biologist remained on site until all vessels known to be out charter fishing returned (unless they were overnight trips).

As boats returned from trips, biologists introduced themselves and quickly determined whether the party was saltwater recreational fishing, whether fishing took place in the Atlantic Ocean, and whether managed species were caught over the course of the trip. For positive responses, the biologist asked permission from the vessel operator to conduct a short interview and sample their catch. The offshore trip interview collected the following information:

- Trip type (charter or private);
- Trip duration, including departure and return time;
- Number of people in the party and number that fished;
- Primary and secondary target species;
- Fishing methods (trolling, bottom fishing, spear, etc.) and proportions of fishing time each method was employed;
- Statistical grid area fished
- The minimum, maximum, and average distance from shore fished;
- The minimum, maximum, and average depths fished;
- Numbers of fish harvested by species for all anglers in the party;
- Approximate numbers of fish released by species for all anglers in the party.

For parties that reported discards for managed species, the interviewer asked if they could estimate the proportion that were:

- Below the legal size limit (including fish released due to season closures and bag limits)
- Released alive
- Released floating at the surface
- Released dead

For parties with harvested catch, field staff attempted to collect biological samples from snappers, groupers, and other managed species. Whenever possible, the biologist collected length and weight measurements from whole specimens before fish were cleaned. If only a carcass length could be obtained, this was noted on field data sheets. Sagittal otoliths were removed from either whole fish or carcasses. Fish that were cleaned on site were also examined for sex determination. For groupers encountered during biological sampling, a gonadal tissue sample was also collected. Fin clips were also collected for a select group of species based on the specific requests from researchers conducting genetic analyses.

Pilot Program to Evaluate Biological Sampling Design for Rare Target Species

Blueline Tilefish, Tilefish and Snowy Grouper are targeted during recreational fishing trips in deep water and, due to the rarity of these trips in the general recreational fishery, sample sizes for these species are particularly low in the MRIP intercept survey. To evaluate the effectiveness of random biological sampling for producing representative age and length compositions for these three species, cooperative charter vessel operators throughout the study area that participate in fisheries for Blueline Tilefish, Tilefish and Snowy Grouper were recruited for a panel study. Participants were contacted to determine when deep water recreational fishing trips were planned, and biologists arranged to meet vessels dockside to sample available catch when it is landed. Sample sizes and weighted size and age compositions of Blueline Tilefish, Tilefish and Snowy Grouper generated from the random sampling design for charter mode were compared with samples collected through the panel study to evaluate whether compositions are representative of the overall fishery and whether rare event trips are potentially under sampled in a randomized design. Results from this pilot program will be used to recommend alternative methods to increase sample sizes for rare trip types.

Ageing and Histology Methods

Otoliths were provided to the National Marine Fisheries Service Southeast Fisheries Science Center (NMFS SEFSC) or processed in-house at FWRI's age and growth lab using standardized procedures. FWRI routinely provides age data to the NMFS SEFSC for regional stock assessments. For otoliths processed in-house, we will use a Buhler Isomet low speed saw equipped with four equally-spaced diamond wafering blades. With this multi-blade technique, one transverse cut yields three ~400 μm thick sections that encompass both the core and the entire region surrounding the core (Vanderkooy, 2009). Sections will be mounted on glass slides and examined under a stereo microscope. Each otolith will be examined by at least two blind reads. When age estimates do not agree between reads, a third read will be conducted to resolve the discrepancy. Annual ages will be calculated based on a calendar year using annulus count (number of opaque zones), degree of

marginal completion, average date of otolith increment deposition, and date of capture (VanderKooy, 2009). Prior to ageing samples for a given species, individual readers will read through an in-house reference set of otoliths representing a range of age classes, seasons, sexes and collection locations (Campaña, 2001) to calibrate ageing technique, particularly identification and interpretation of the first annulus and margin type. The Institute along with other state and federal partners is a participant and host in an annual workshop on ageing methods sponsored by the GSMFC. The workshop helps ensure consistency in ageing methods among participants.

For histological analysis, gonadal tissue from both males and females were fixed in 10% neutrally buffered formalin in the field and then rinsed in the lab and stored in 70% ethanol. Samples were embedded in glycol methacrylate, sectioned to 3-5 μm thickness, stained with periodic acid-Schiff's hematoxylin, and then counterstained with metanil yellow (Quintero-Hunter et al. 1991). Gonadal classification into reproductive phases followed that of Brown-Peterson et al. (2011). Based on preliminary histological analysis, and criterion from Sadovy de Mitcheson and Liu (2008), and Trip et al. (2011), sex in gag was assigned based on the following histological characteristics: males will have spermatazoa or spermatogenic tissue throughout the section; females will have vitellogenic oocytes or oogenic tissue throughout the section. Fish undergoing sex change (transition) were characterized as in early transition if they had spermatocytes and did not have vitellogenic oocytes. Late transition individuals were characterized based on the presence of spermatids and the majority of the tissue in the section being spermatogenic.

B. Project management: List individuals and/or organizations actually performing the work and how it was done.

Beverly Sauls, principal investigator, developed the sample design and field procedures, supervised staff, conducted training workshops and on-site visits, monitored progress, and oversaw data management for the project. Co-principal investigator Dr. Richard Cody accepted a new position with NOAA Fisheries and was not involved with management of the project. Beverly Sauls, Bridget Cerrmak, Jessica Carrol, and Dr. Dominique Lazarre participated in workshops and provided data and analyses for the Southeast Data, Assessment and Review (SEDAR). Bridget Cermak developed the data entry program, maintained the database, developed the error checking program, and oversaw all aspects of database management. Zoe Goozner developed QA/QC procedures, tracked assignments and progress in the field, routinely ran error checks on electronic data, and provided feedback to staff responsible for collecting data in the field.

Regional staff that provided oversight and contributed to work in the field include Nicole Alvarado, Ashley Beasley, Meredith Beverly, Jen Bogdan, Trevor Brown, Robert Darcy, John Fisher, Anna Floyd, Mark Koryak, Nikki Goebel, Zoe Goozner, Madeline Musante, Adam Purdy, Michael Ruccolo, Eric Sander, Toby Silverman, Savannah Summers, and Royce Zehr.

Julia Reeves (FWRI) was responsible for receiving and cataloging biological samples and distributing to appropriate labs for processing. Jessica Carroll (FWRI) oversaw all aspects of otolith processing and ageing for species that were processed at FWRI. Otoliths not processed in-house were shared with Jennifer Potts, NOAA Fisheries Southeast Fisheries Science Center for

processing. Dr. Sue Barbieri (FWRI) was responsible for analyzing histological data, and Laura Crabtree (FWRI) provided training in sex identification and gonadal tissue collection to field staff and processed samples. Elizabeth Wallace was responsible for samples, data and analyses from genetic samples, with the exception of cobia that were shared with South Carolina DNR for a coast wide analysis.

V. Findings

A. Actual accomplishments and findings.

A total of 1,427 assignments were completed over the course of this study, which resulted in 3,737 interviews with angler parties from private and chartered boats that targeted species that are federally managed in the South Atlantic (Table 2). Assignments were distributed throughout the year across three large geographic areas along the Atlantic coast of Florida, and fluctuations in interview numbers reflect temporal and spatial variations in fishing pressure within the study area (Figure 2). February 2017 was the first month that assignments were initiated in the NE and SE regions, and field work was expanded to the Keys the following month.

Anglers in the NE region reported fishing farther from shore and in shallower depths compared to the other two regions (Figure 3). Charter boats in the NE fished in shallower depths (93.6 feet) than private boats (131.7 feet). In the SE region, charter and private boat parties reported fishing closer to shore (4.1 miles for private boats, 2.7 miles for charter), but average depths fished were greater than 200 feet, which reflects the different bathymetry in this region (Figure 3). In the Keys, private boat fishing took place closer to shore compared to charter trips (Figure 3). For snapper and grouper species that were frequently discarded, more than 95% that were reported were released alive without floating at the surface (Figure 4). The majority of discards were reported to be under the legal size limit to retain (irrespective of whether the season was open), with the exception of Red Snapper which was closed to harvest most of the year (Figure 5).

For harvested fish, priority was given to collecting biological data from important managed species that are assessed through SEDAR. Frequently sampled species listed in Table 3 include some species that are rare in dockside sampling efforts and generally considered data poor for stock assessments, such as Cobia (*Rachycentron canadum*), Greater Amberjack (*Serioloa dumerili*), Gag (*Mycteroperca microlepis*), Scamp (*M. phenax*), and Blueline Tilefish (*Caulatilus microps*). There were noticeable differences in the frequencies of species sampled across the three regions (Appendix A). In the northeast region, Red Snapper (*Lutjanus campechanus*) was the most frequently encountered species, due to enhanced sampling efforts during the federal recreational season, in addition to Vermilion Snapper (*Rhomboplites aurorubens*) and King Mackerel (*Scomberomorus cavalla*). The northeast region is in the center of abundance for Red Snapper in the South Atlantic, and while harvest is permitted year-round from state waters on the Atlantic coast of Florida, legal sized Red Snapper (20 inches total length) are generally not encountered in state waters. Thus recreational harvest occurs primarily during the federal season, which in the years of this study was only open a maximum of 9 days. In the southeast region, the continental shelf is tapered closer to shore and legal sized Red Snapper may be encountered in state waters; however, the species is not abundant south of Fort Pierce inlet and historically has not been a frequent target of the recreational fishery in this region (Moe 1963). Over the three

years of this study, three Red Snapper were intercepted outside of the federal season from charter fishing trips in the southeast region, including one in Palm Beach County and two in Miami-Dade County. Species that were more frequently encountered in the southeast region include pelagic species (Dolphin, *Coryphaena hippurus*, and King Mackerel) and other snapper species, including Yellowtail Snapper (*Ocyurus chrysurus*; Appendix A). In the Keys, sampled catch was dominated by Yellowtail Snapper, Gray Snapper (*Lutjanus griseus*), and other snappers (Appendix A).

The spatial and temporal distribution of sampling effort allowed for important migratory pelagic species to be sampled representatively across the seasonal and geographic ranges that they are targeted within the recreational fishery. For example, in the northeast region King Mackerel and Cobia were most frequently intercepted in the landed catch or reported as regulatory discards during summer months when recreational fishing effort is at its peak (May-August), and continued to be intercepted or reported south of Mayport throughout winter and spring months, even though fishing effort is comparatively low during this time (Tables 4 and 5). The Atlantic coast of Florida north of Cape Canaveral was identified during SEDAR 58 as an important mixing zone for Gulf of Mexico and South Atlantic Cobia stocks (Darden et al. 2018). In the Keys, Cobia were only intercepted during winter and spring, whereas King Mackerel continued to be encountered in low numbers throughout the summer (Tables 4 and 5). The Atlantic coast of the Florida Keys is a mixing zone for King Mackerel stocks in the Gulf of Mexico and South Atlantic (SEDAR 38, 2014). Thus, recreational catch data for seasonal fisheries may not be representative if sampling efforts are not adequate throughout the year and appropriately distributed throughout the geographic range of the fishery.

Data collected through this work have already contributed to multiple SEDARs either through direct data inputs (length, weight, and age composition) or contributions to studies that informed the assessment. Age and length compositions from Yellowtail Snapper collected during the first year of this study were shared with FWRI's Stock Assessment Program, which led the assessment with a terminal year of 2017 for SEDAR 64. Assessments for Scamp (SEDAR 68) and Gag (SEDAR 71) are currently in progress, and otoliths collected during this study were shared with NOAA Fisheries Southeast Fisheries Science Center for processing. More than 2,200 otoliths collected from Red Snapper harvested during recreational seasons in the South Atlantic over the course of this study were processed in-house at FWRI's Age and Growth Lab, and data were provided to NOAA Fisheries for use in the current stock assessment (SEDAR 73). During the first year of this study, the federal season for Red Snapper had been closed 37 consecutive months before re-opening in 2017, and the accumulation of young fish aged 4 and younger are reflected in the age composition of fish that were sampled from charter trips. Those younger year classes can be tracked as they moved through the fishery in the age composition of fish sampled in the two subsequent years (Figure 6). These three years of age compositions, which run through the terminal year of 2019, will be contributing as direct inputs into the assessment model for SEDAR 73.

Genetic samples collected during this project (Table 6) were shared with principal investigators of ongoing, coast wide studies to help inform stock assessments. Fin clips collected from harvested Cobia intercepted along the Atlantic coast of Florida were included in an ongoing coast wide genetics study to identify the stock boundary between Gulf of Mexico and South

Atlantic stocks (Perkinson et al. 2018, Darden et al. 2018). The majority of Cobia sampled during this project came from northeast Florida (Table 6), including Jacksonville, St Augustine, Ponce Inlet and Cape Canaveral, and helped to identify this area as an important "mixing zone" between the Gulf and South Atlantic stocks during SEDAR 58 (Darden et al. 2018). Fin clips collected from Scamp (*Mycteroperca phenax*) in the Keys also contributed to an analyses of the stock along the coast of Florida for SEDAR 68, which found no clear genetic boundary between the northeastern Gulf of Mexico and the Keys (Wallace 2019). Additional genetic samples collected from Scamp along the eastern peninsula, as well as Gag and Gray Triggerfish samples collected throughout the study area will also contribute to ongoing research to evaluate stock boundaries in Florida (Liz Wallace, personal communication).

A total of 101 gonad samples were collected from 9 grouper species for histological analyses. The most frequently sampled species were Red Grouper (KY=56, NE=6) and Gag (NE=17) and Black Grouper (KY=9). The majority of grouper that were sexed through histology were female (Figure 7); and the percentage that were male was 22.6% for Red Grouper, 11.8% for Gag, and 11.1% for Black Grouper. Only one fish was in the process of transitioning to male, and it was a Red Grouper. Gonad samples collected through this work were shared with FWRI's Movement Ecology and Reproductive Resilience (MERR) lab to contribute to larger ongoing investigations into grouper reproduction in Florida (for a list of published work from this lab, see https://myfwc.com/research/saltwater/fish/other/reproductive-publications/).

In the first year of this study, five charter boat captains (SE=3, KY=2) and 3 private boat owners (SE=2, KY=1) that target Blueline Tilefish, Tilefish, and Snowy Grouper were recruited to the panel study. Panel boats were met at the dock 12 times during 2017 and a total of 16 Blueline Tilefish were sampled in the SE region, in addition to one in the Keys. In contrast, trips intercepted at randomly selected sites during the same year only yielded one Blueline Tilefish in the SE region, while 41 were sampled in the Keys. A higher proportion of fish sampled from randomly intercepted trips were from larger size classes (Figure 8).While neither method intercepted this species in adequate numbers across both regions, the two methods combined improved the overall sample distributions for a species that is not frequently encountered. However, panel participants only contributed four Snowy Grouper (SE=1, KY=3) and two Tilefish (SE=2). Overall, actively intercepting anglers at random sites was more productive than the targeted panel survey, and it also proved difficult to recruit and retain volunteers who were willing to be regularly contacted by biologists long-term. All of the panel participants that were recruited dropped out during the first year.

B. If significant problems developed which resulted in less than satisfactory or negative results, they should be discussed.

Sampling was suspended for a portion of September 2017 due to Hurricane Irma, which had widespread impacts throughout the state of Florida. The region most impacted was the Keys, and the middle Keys site cluster had to be excluded from the sample draw through mid-2018 until a majority of damaged sites could re-open.

C. Description of need, if any, for additional work.

The intent of this project was to demonstrate the feasibility of a supplemental dockside intercept survey to fill important data gaps for the biological composition of recreational catch and enhance regional stock assessments. The data collected through this project will continue to be made available for upcoming SEDARs. However, there is a need for long-term, continuous biological data collection throughout the South Atlantic region. These data will continue to be shared in future stock assessments as they are scheduled. Florida is incorporating biological sampling techniques developed through this study into the statewide expansion of the State Reef Fish Survey (MyFWC/SRFS).

VI. Evaluation

A. Describe the extent to which the project goals and objectives were attained.

The goals and objectives did not change through the course of this work. A three-year study of the private boat and charter boat segments of the recreational fishery was successfully implemented to collect biological samples, trip-level data, and characteristics of discards across three regions along the Atlantic coast of Florida. Field procedures manual and data sheets developed for this projects are attached in Appendix D. Samples were representative of the coast wide recreational fishery, and age and growth data from sampled fish were made available in time for inclusion in multiple regional stock assessments. Other biological samples were also shared with researchers throughout the region and are contributing to analyses that are better informing stock assessments. We also conducted a one-year panel study with charter vessel and private boat operators that volunteered to contact biologists when they targeted Blueline Tilefish, Tilefish and Snowy Grouper and allow for fish to be sampled at the dock. These data were compared with randomly sampled fish to evaluate the best methods for improving sample sizes for fish that historically have not been frequently encountered in dockside surveys.

Results of this work have been disseminated in reports and publications, including:

- SEDAR 73 - WP13: Size and age composition of Red Snapper, Lutjanus campechanus, collected in association with fishery-independent and fishery-dependent projects along Florida's Atlantic coast, 2012 to 2019

- SEDAR 73 - RD05: Recreational Effort, Catch and Biological Sampling in Florida During the 2018 South Atlantic Red Snapper Season

- SEDAR 73 - RD06: Biological Sampling and Recreational Catch and Effort Estimation during the November 2017 South Atlantic Red Snapper Re-opening

- SEDAR 73 - RD07: Recreational Effort, Catch and Biological Sampling in Florida During the 2019 South Atlantic Red Snapper Season

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Table 1. Numbers of fishery dependent age samples from the recreational sector available for recent stock assessments in the South Atlantic. The majority of samples reported in SEDAR assessment reports are attributed to the Southeast Region Headboat Survey.

Harvest Year	Gag SEDAR10, 2014 update	Red Grouper SEDAR53, 2017	Snowy Grouper SEDAR36, 2013	Gr. Amberjack SEDAR59, 2017
1980	80	150	22	
1981	179	161	45	
1982	70	69	1	
1983	283	35	18	
1984	336	42	11	
1985	178	24	6	
1986	140	14	18	
1987	0	0	1	
1988	0	20	0	
1989	0	0	15	
1990	0	0	4	
1991	0	14	2	
1992	0	0	1	
1993	0	0	4	
1994	0	0	3	6
1995	0	0	1	1
1996	0	0	7	2
1997	0	0	2	0
1998	0	0	0	2
1999	0	0	0	0
2000	0	0	0	9
2001	0	10	0	18
2002	69	26	4	221
2003	102	23	185	587
2004	90	49	62	380
2005	80	79	5	362
2006	84	59	19	189
2007	81	47	7	29
2008	26	18	13	17
2009	80	0	8	28
2010	93	21	8	13
2011	0	54	2	12
2012	62	126	2	29
2013		99		33
2014		121		25
2015		40		45

Table 2. Numbers of assignments completed and angler party level interviews collected by region and year.

	Northeast (NE)		Southeast (SE)		Keys (KY)	
Year	Assignments	Interviews	Assignments	Interviews	Assignments	Interviews
2017	147	393	130	284	111	259
2018	137	544	173	484	149	428
2019	123	474	220	417	146	305
2020	24	82	42	32	25	35

Table 3. Sample sizes for important managed species targeted for biological sampling.

	Lengths	Weights	Age Structures	Sex
Snappers				
Red Snapper, *Lutjanus campechanus*	2,374	2,010	2,272	1,753
Lane Snapper, *L. synagris*	595	230	541	432
Mutton Snapper, *L. analis*	403	199	368	314
Gray Snapper, *L. griseus*	1,838	615	1,706	1,432
Cubera Snapper, *L. cyanopterus*	4	3	4	1
Silk Snapper, *L. vivanus*	101	39	86	67
Schoolmaster, *L. apodus*	29	11	27	19
Vermilion Snapper, *Rhomboplites aurorubens*	1,122	646	892	813
Yellowtail Snapper, *Ocyurus chrysurus*	2,523	598	2,356	2,091
Porgies				
Red Porgy, *Pagrus pagrus*	102	50	87	55
Jolthead Porgy, *Calamus bajonado*	22	19	8	8
Jacks				
Greater Amberjack, *Seriola dumerili*	202	147	123	117
Almaco Jack, *S. rivoliana*	68	58	12	10
Tilefishes				
Tilefish, *Lopholatilus chamaeleonticeps*	31	27	30	10
Blueline Tilefish, *Caulatilus microps*	77	22	73	65
Tuna, Mackerel, Dolphin, Wahoo				
Blackfin Tuna, *Thunnus atlanticus*	250	213	65	60
King Mackerel, Scomberomorus *cavalla*	1,507	1,182	1,041	1,021
Spanish Mackerel, *S. maculatus*	141	74	110	108
Dolphin, *Coryphaena hippurus*	878	822	3	289
Wahoo, *Acanthocybium solandri*	53	46	34	29
Seabass and Groupers				
Black Sea Bass, *Centropristis striata*	199	131	183	38
Gag, *M. microlepis*	45	39	38	6
Black Grouper, *M. bonaci*	41	18	31	27
Scamp, *M. phenax*	21	16	19	12
Yellowmouth Grouper, *M. interstitialis*	2	0	1	1
Red Grouper, *Epinephelus morio*	144	42	134	115
Snowy Grouper, *E. niveatus*	24	17	24	15
Rock Hind, *E. adscensionis*	13	5	12	10
Graysby, *E. cruentatus*	12	11	9	1
Coney, *E. fulvus*	2	1	2	2
Red Hind, *E. guttatus*	11	2	11	9
Triggerfish				
Gray Triggerfish, *Balistes capriscus*	400	276	310	134
Other				
Cobia, *Rachycentron canadum*	137	110	92	83
Hogfish, *Lachnolaimus maximus*	32	12	20	23
Tripletail, *Lobotes surinamensis*	55	49	26	31
African Pompano, *Alectis ciliaris*	12	10	4	5

Table 4. Spatial and temporal distribution of observed and reported (harvested and released) King Mackerel (all years combined).

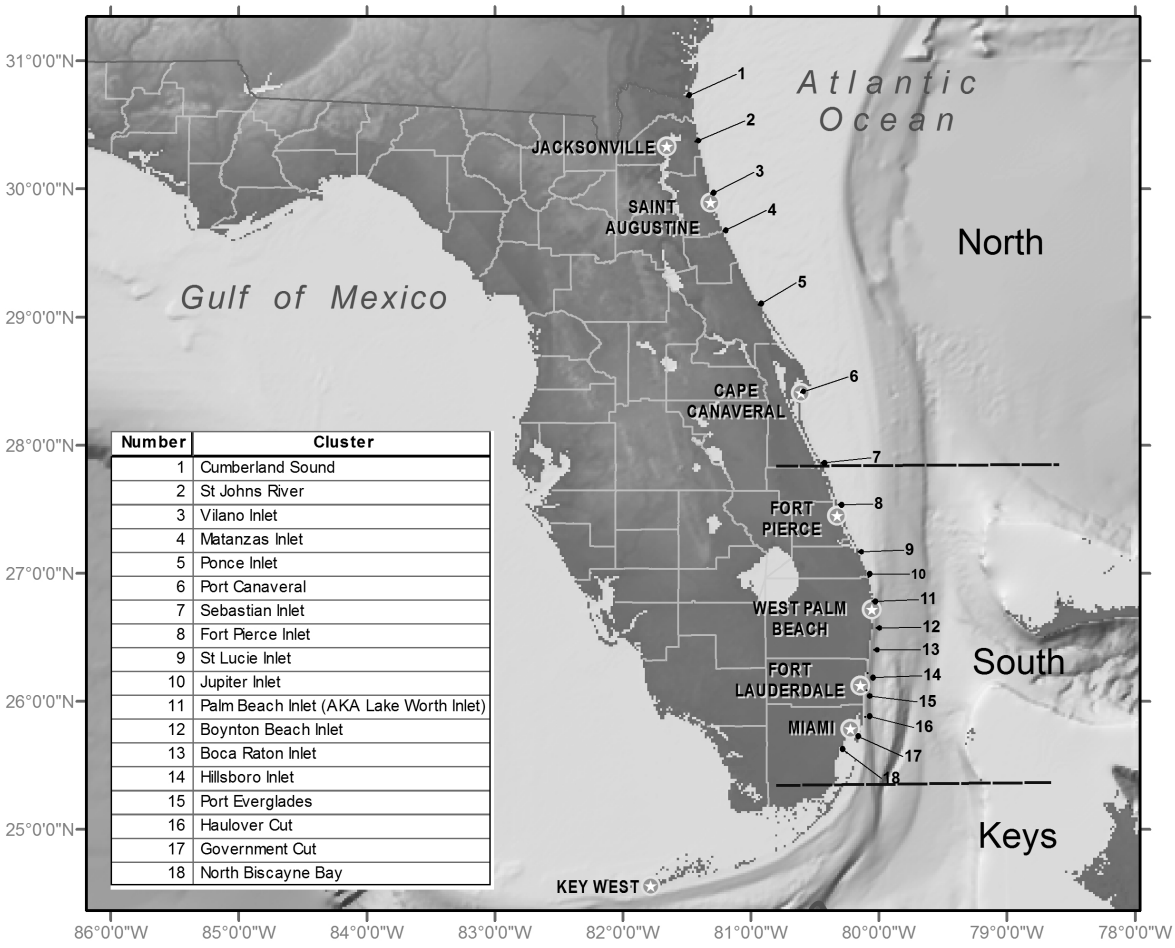
Region	Inlet	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NE	Cumberland Sound					12	30	63	7				
	Mayport					9	105	4	19				
	Vilano Inlet			9			38	68	16			6	
	Ponce Inlet					3	6	16	5	2		3	
	Port Canaveral	18		1	12	14	54	72	69	5	2	8	2
	Sebastian Inlet	1	1	16	1	8	2	22	12	6			1
SE	Fort Pierce Inlet		1					2	1			1	1
	Saint Lucie Inlet			2	2	1	5	2	5			1	1
	Jupiter Inlet	6			4		1	3	4			2	1
	Palm Bch. Inlet		4	9	3	1	6	11	3	3		2	
	Boynton Bch. Inlet		1	3		5	4	9	5	2	2	16	4
	Boca Raton Inlet								2				
	Hillsboro Inlet	2		3	13	24	12	6	3	1	2	5	6
	Port Everglades		5	4	9	10	12	31		5	7		1
	Haulover Cut	6	6	17	4	14	12	34	21	7	1	21	17
	Govt. Cut	6		5	6	3	3		7	1	3	4	10
	North Biscayne Bay	1		5	4	3	3			4	1	8	
Keys	Upper Keys	57	27	108	2	2	1	1	1		13	8	22
	Middle Keys	13	11	1	1			1	1			1	
	Lower Keys	3			8	1		2		5			1

Table 5. Spatial and temporal distribution of observed and reported (harvested and released) Cobia (all years combined).

Region	Inlet	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NE	Cumberland Sound					1	1	15	3				
	Mayport				2	4	7		13			1	
	Vilano Inlet	9		12		3	2	16	8			11	
	Ponce Inlet		2			2	2	5		2			1
	Port Canaveral	7		11		1	8	15	5	1	3	17	
	Sebastian Inlet			24		7	3	18	20	2			
SE	Fort Pierce Inlet				1								2
	St Lucie Inlet		6		2								
	Jupiter Inlet				1								
	Palm Beach Inlet			8		1		3				1	
	Boynton Beach Inlet					1						1	
	Hillsboro Inlet	2											
	Port Everglades										1		
	Haulover Cut											1	1
	Government Cut		1	2									
Keys	Upper Keys		6	1	2							16	5
	Middle Keys		2	1									5
	Lower Keys												1

Table 6. Numbers of fin clips collected for genetics, by region.

Common Name	Northeast	Southeast	Keys
AFRICAN POMPANO	1	1	
BLACK GROUPER	3	2	20
BLUELINE TILEFISH		1	
COBIA	70	17	5
CONEY		1	1
GAG	25	1	
GRAY SNAPPER	1	2	
GRAY TRIGGERFISH	67	25	
GRAYSBY	1		
HOGFISH		1	
MISTY GROUPER			1
MUTTON SNAPPER	1	2	
QUEEN TRIGGERFISH		1	
RED GROUPER	15	2	111
RED HIND			10
RED SNAPPER	192		
ROCK HIND			12
SCAMP	6		7
SNOWY GROUPER	2	3	9
TILEFISH	2	13	
TRIPLETAIL		1	
YELLOWEDGE GROUPER	1		5
YELLOWFIN GROUPER		1	
YELLOWMOUTH GROUPER			2



Number	Cluster
1	Cumberland Sound
2	St Johns River
3	Vilano Inlet
4	Matanzas Inlet
5	Ponce Inlet
6	Port Canaveral
7	Sebastian Inlet
8	Fort Pierce Inlet
9	St Lucie Inlet
10	Jupiter Inlet
11	Palm Beach Inlet (AKA Lake Worth Inlet)
12	Boynton Beach Inlet
13	Boca Raton Inlet
14	Hillsboro Inlet
15	Port Everglades
16	Haulover Cut
17	Government Cut
18	North Biscayne Bay

Figure 1. Three regions included within the study area. In north and south regions, each egress point is considered a site cluster. In the Keys region, which runs from Key Largo south to Key West, islands were grouped into three sub-regions (northern, middle, and southern) that served as site clusters.

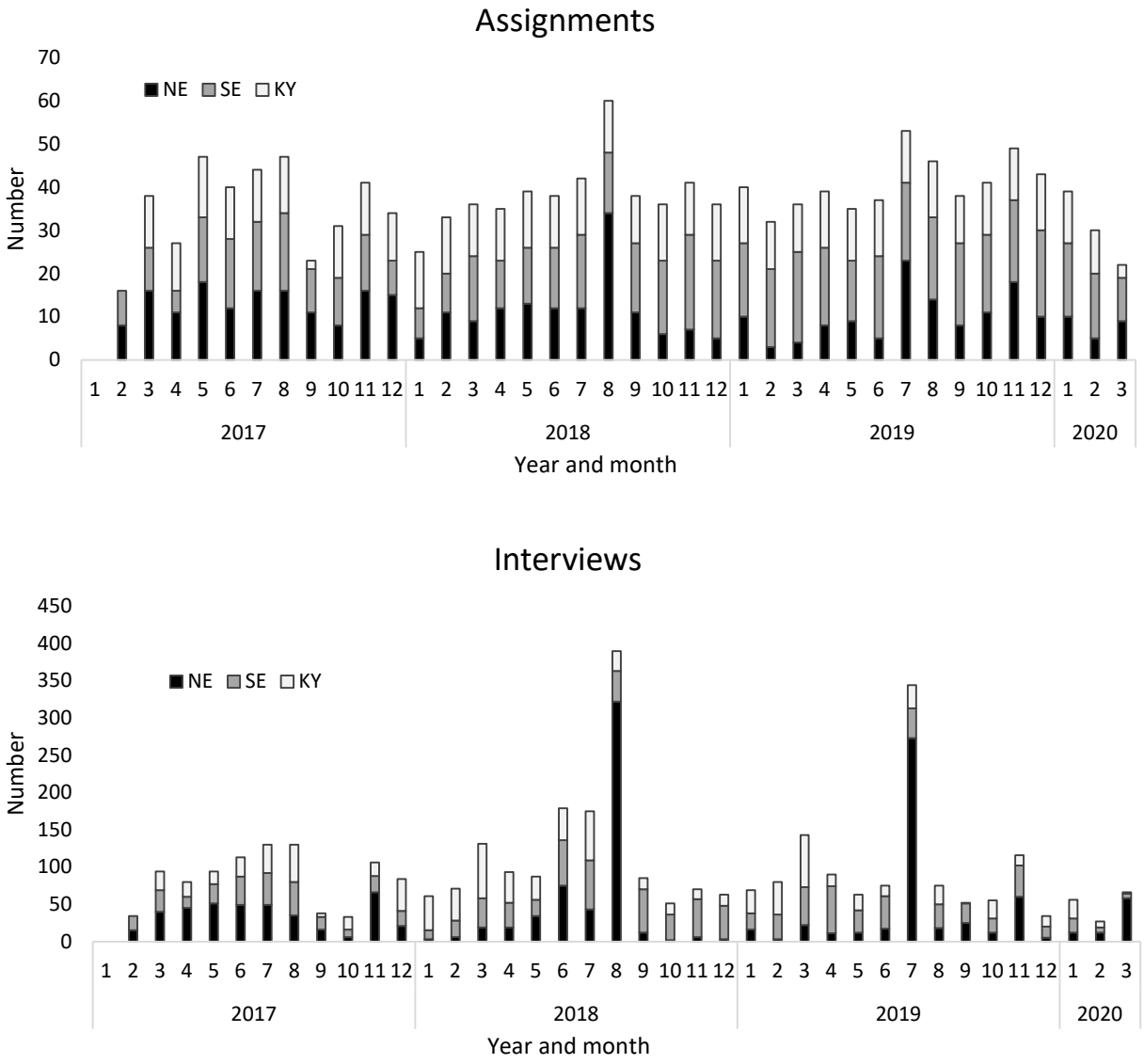


Figure 2. By region, numbers of assignments completed (top panel) and recreational fishing parties interviewed (bottom panel) each month over the course of the study. Sampling levels in the NE region during November 2017, August 2018 and July 2019 include supplemental assignments conducted during recreational season openings for Red Snapper in the South Atlantic. Sampling in 2017 was impacted by Hurricane Irma that made landfall in September.

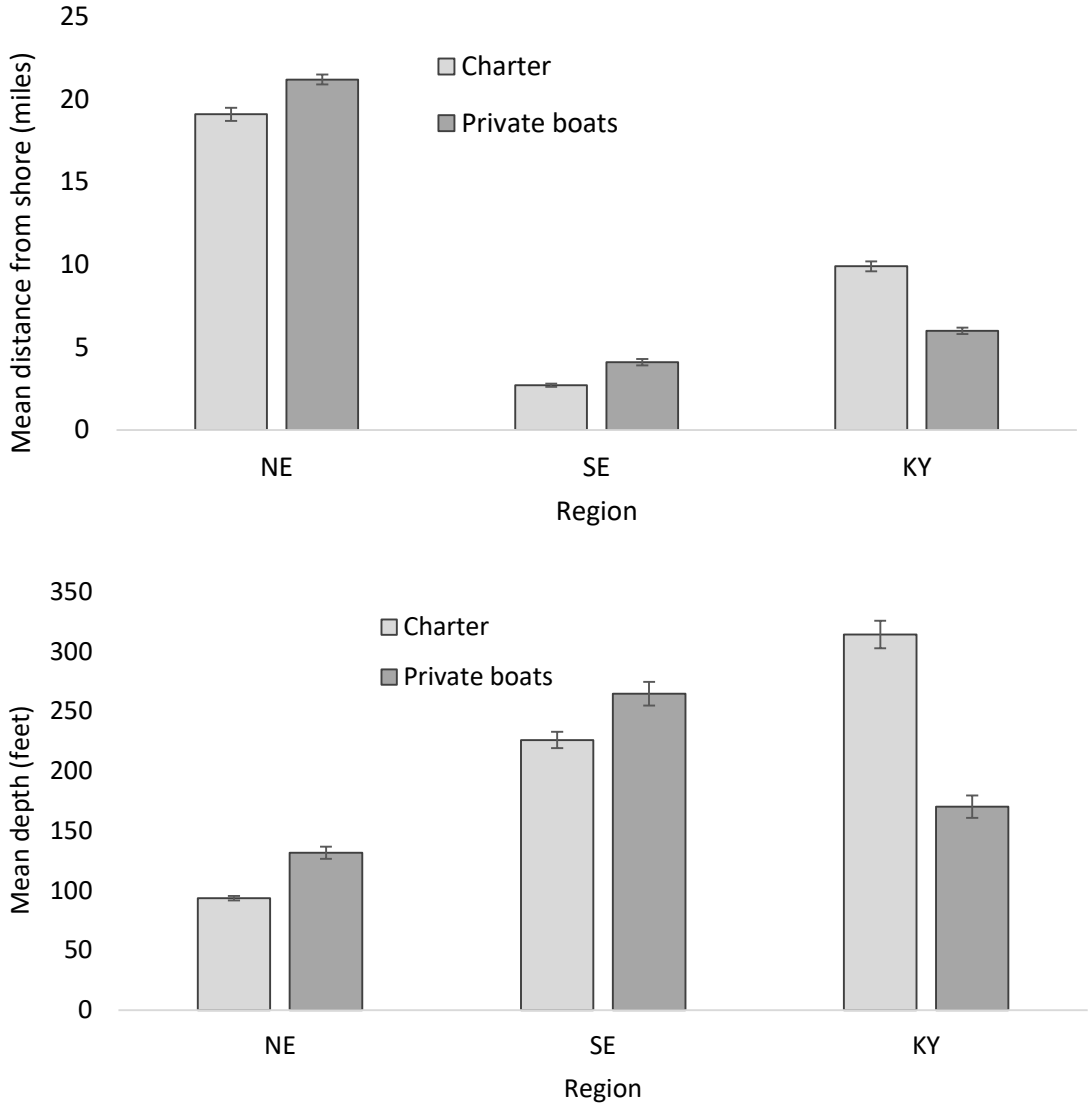


Figure 3. Mean distance (in miles) from shore (top panel) and mean depth (in feet, bottom panel) where charter boat and private boat parties reported spending the majority of time fishing.

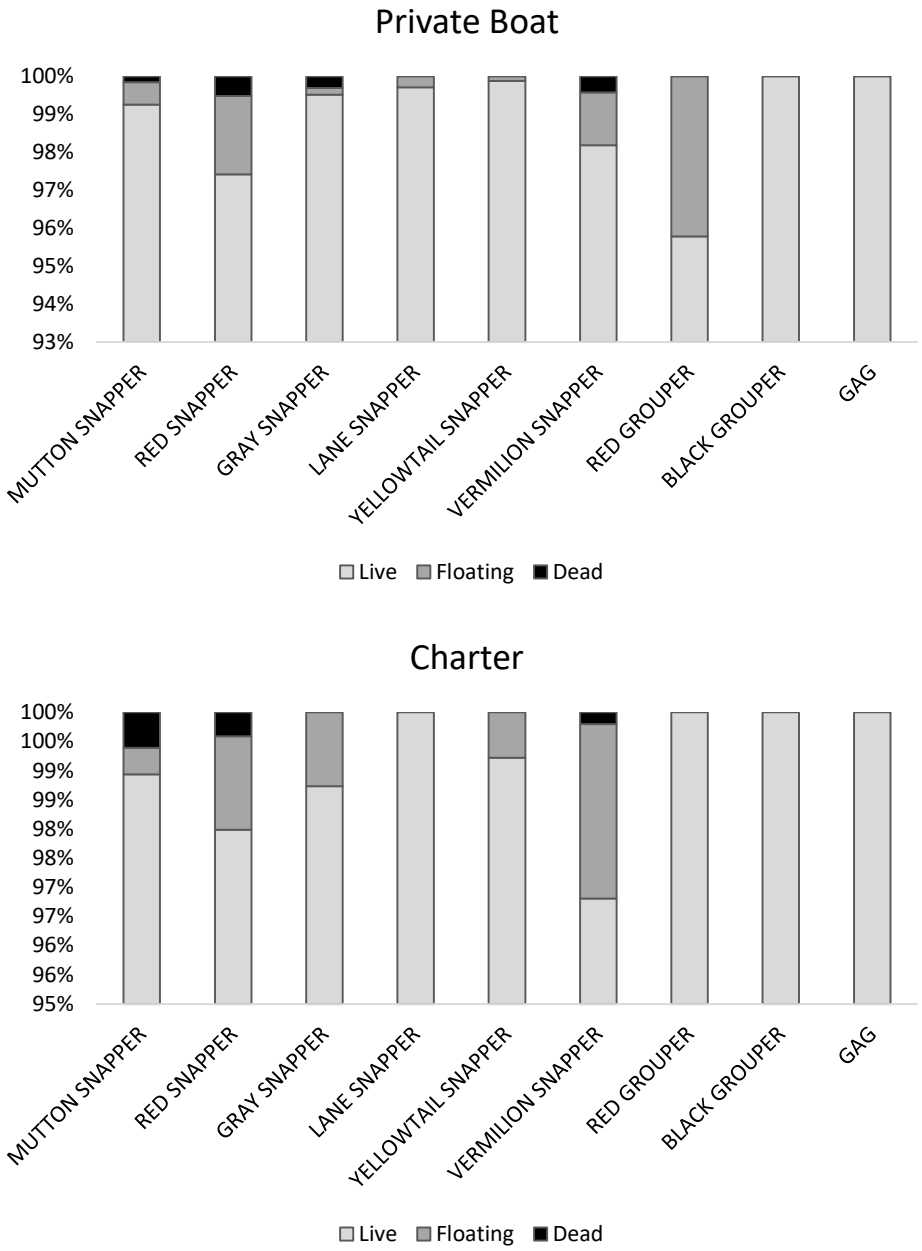


Figure 4. Percentage of discards reported alive, floating or dead from private boats (top panel) and charter trips (bottom panel). Numbers are provided in Appendices B and C.

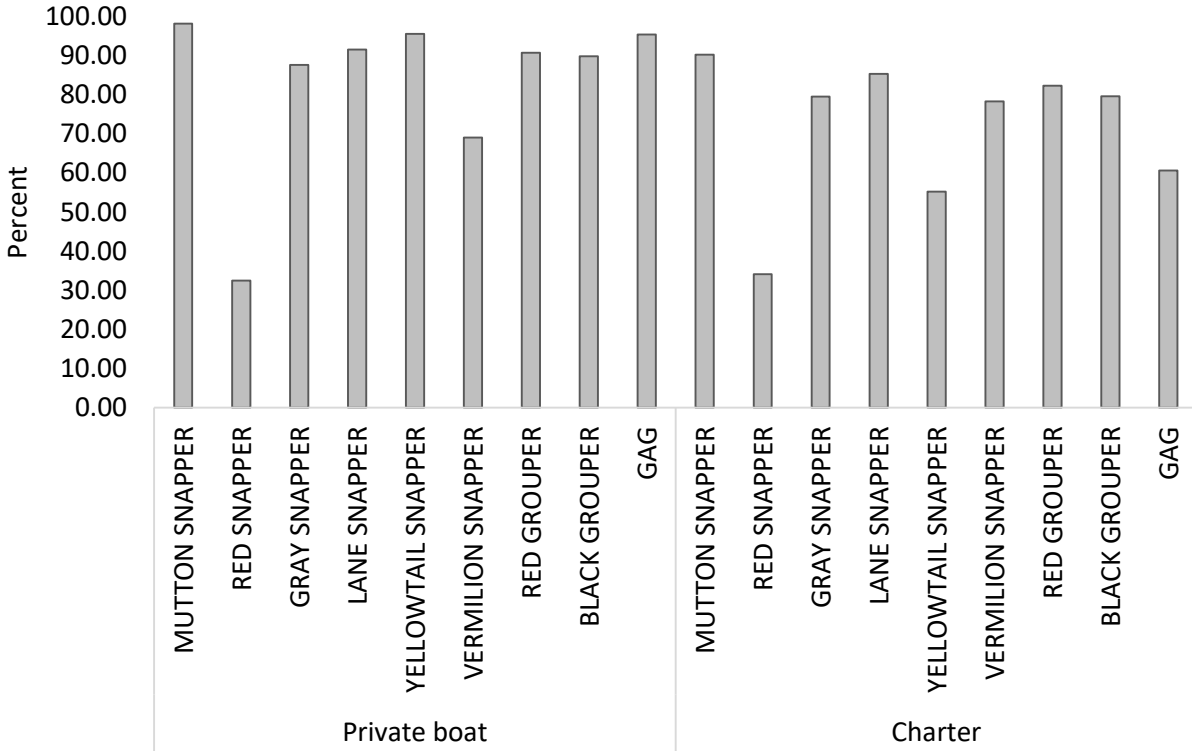


Figure 5. Percentage of reported discards that were under the legal size limit to retain, regardless of whether the harvest season was open.

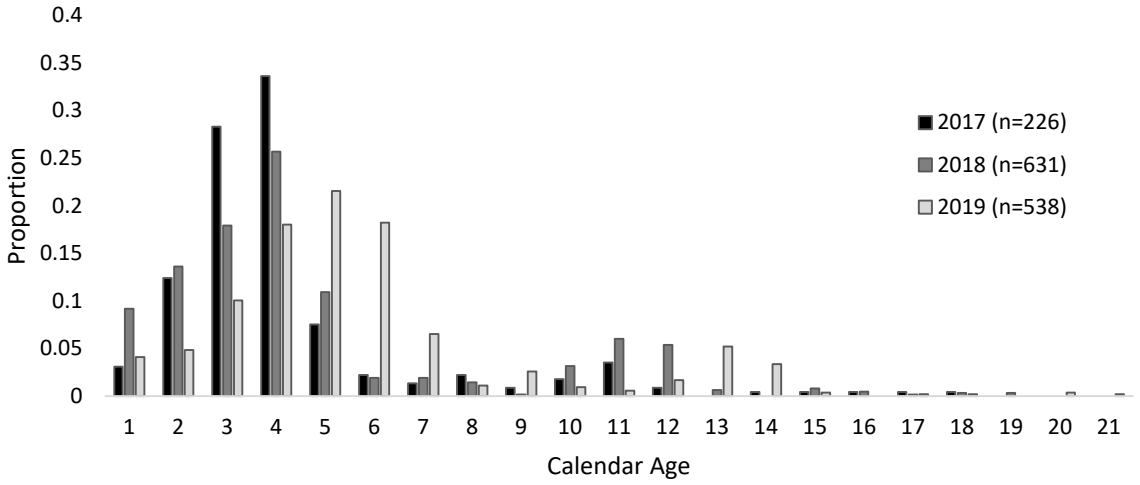


Figure 6. Age distribution of Red Snapper sampled during the South Atlantic recreational season as a result of supplemental charter mode assignments. Data were shared with NOAA Fisheries for use in SEDAR73.

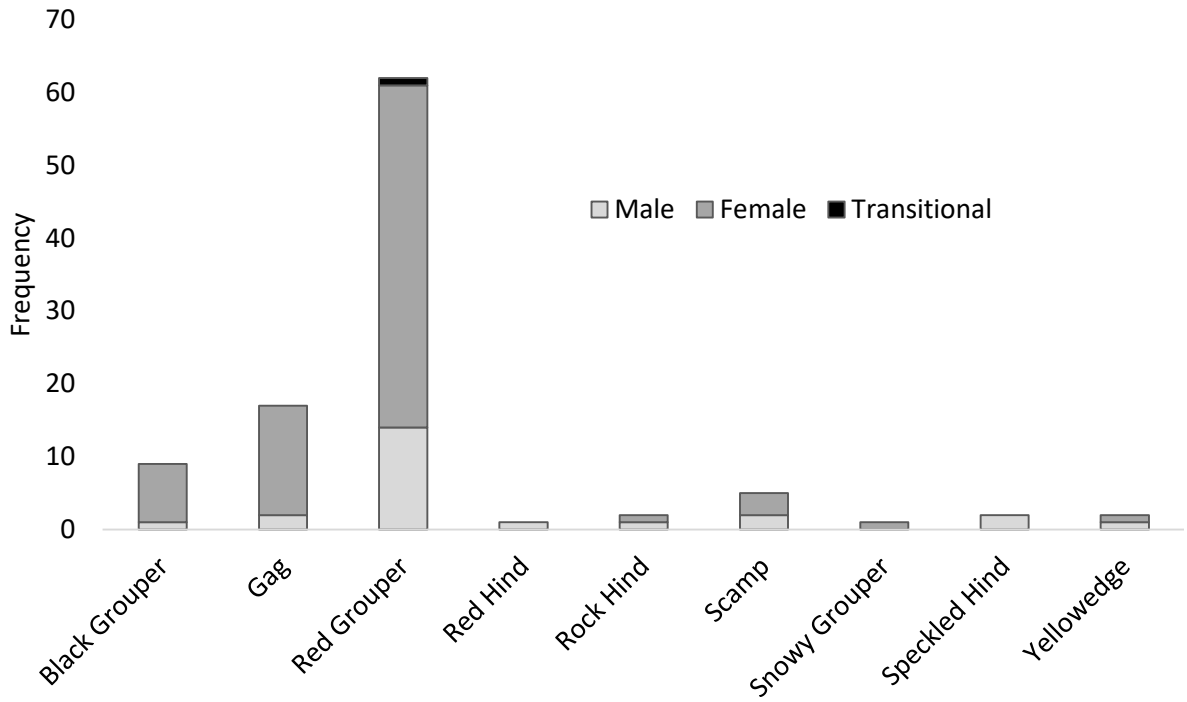


Figure 7. Numbers of groupers identified through histology as male, female, or transitioning to male.

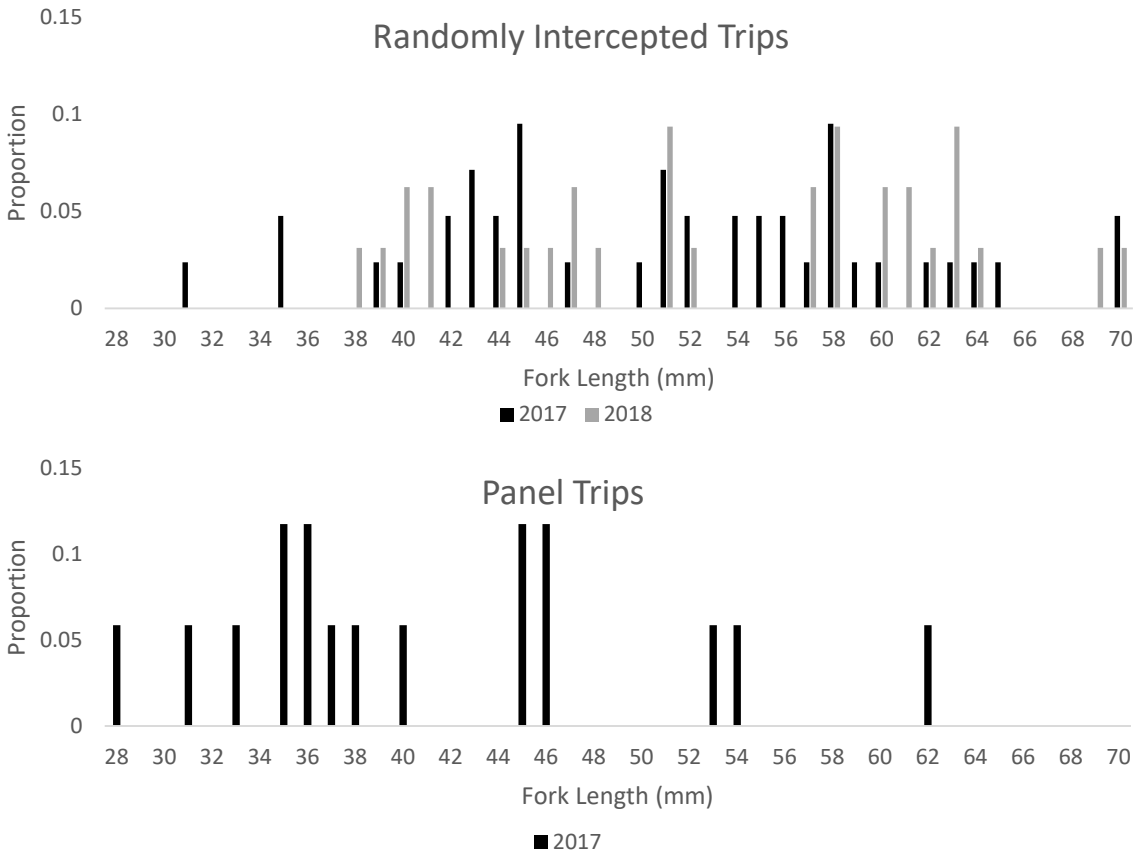


Figure 8. Size distribution of Blueline Tilefish sampled from panel trips in 2017 (top panel) and randomly intercepted trips in 2017 and 2018 (bottom panel). Note, only three fish were sampled from randomly intercepted trips in 2019.

Appendix A. Frequency of landed fish sampled by region.

Northeast (NE)		Southeast (SE)		Keys (KY)	
RED SNAPPER	2,371	KING MACKEREL	680	YELLOWTAIL SNAPPER	2,041
VERMILION SNAPPER	721	DOLPHIN	546	GRAY SNAPPER	1,288
KING MACKEREL	698	YELLOWTAIL SNAPPER	473	LANE SNAPPER	357
GRAY SNAPPER	328	GRAY SNAPPER	222	MUTTON SNAPPER	242
GRAY TRIGGERFISH	311	BLACKFIN TUNA	192	VERMILION SNAPPER	233
BLACK SEA BASS	195	VERMILION SNAPPER	168	DOLPHIN	135
DOLPHIN	195	LITTLE TUNNY	123	KING MACKEREL	129
LANE SNAPPER	194	MUTTON SNAPPER	105	RED GROUPER	114
GREATER AMBERJACK	146	SPANISH MACKEREL	58	SPOTTED SEATROUT	113
COBIA	108	GRAY TRIGGERFISH	56	BLUELINE TILEFISH	72
RED PORGY	71	GREATER AMBERJACK	44	SILK SNAPPER	68
MUTTON SNAPPER	56	LANE SNAPPER	44	SPANISH MACKEREL	54
BLACKFIN TUNA	44	GREAT BARRACUDA	32	GRAY TRIGGERFISH	33
GAG	44	SILK SNAPPER	32	BLACK GROUPER	31
ALMACO JACK	43	WAHOO	30	SCHOOLMASTER SNAPPER	24
TRIPLETAIL	37	WHITE GRUNT	29	RED PORGY	23
SPANISH MACKEREL	29	RAINBOW RUNNER	26	HOGFISH	22
RED GROUPER	25	ALMACO JACK	25	BLACKBELLY ROSEFISH	18
LITTLE TUNNY	15	CERO	22	TRIPLETAIL	15
WAHOO	15	JOLTHEAD PORGY	21	BLACKFIN TUNA	14
TILEFISH	14	COBIA	20	CERO	13
SCAMP	13	SKIPJACK TUNA	19	SNOWY GROUPER	13
AFRICAN POMPANO	9	SAND TILEFISH	18	GREATER AMBERJACK	12
GREAT BARRACUDA	9	TILEFISH	17	ROCK HIND	12
YELLOWTAIL SNAPPER	9	BLACKBELLY ROSEFISH	16	RED HIND	10
SHEEPSHEAD	7	LITTLEHEAD PORGY	13	COBIA	9
YELLOWEDGE GROUPER	7	BLUE RUNNER	11	OCEAN TRIGGERFISH	8
SOUTHERN FLOUNDER	6	GRAYSBY	9	SCAMP	8
BLACK DRUM	5	HOGFISH	9	WAHOO	8
ATLANTIC SHARPNOSE SHARK	4	WHITEBONE PORGY	9	MARGATE	7
BLACK GROUPER	4	LESSER AMBERJACK	8	RED DRUM	7
GULF FLOUNDER	4	RED PORGY	8	BLACK DRUM	6
RAINBOW RUNNER	4	SNOWY GROUPER	8	BLACKFIN SNAPPER	6
BLUEFISH	3	ATLANTIC CROAKER	6	GOLDFACE TILEFISH	6
BLUELINE TILEFISH	3	BLACK GROUPER	6	SHEEPSHEAD	6
GOLDFACE TILEFISH	3	YELLOW JACK	6	BARRELFISH	5
RED DRUM	3	BANDED RUDDERFISH	5	BIGEYE	5
SNOWY GROUPER	3	RED GROUPER	5	YELLOWEDGE GROUPER	5
CUBERA SNAPPER	2	ROUGH TRIGGERFISH	5	CUBERA SNAPPER	2
FLORIDA POMPANO	2	SCHOOLMASTER SNAPPER	5	GREAT BARRACUDA	2
GRAYSBY	2	UNICORN FILEFISH	5	SAND TILEFISH	2
GULF KINGFISH	2	BLACK SEA BASS	4	SHEEPSHEAD PORGY	2
QUEEN TRIGGERFISH	2	BLACKFIN SNAPPER	4	YELLOWMOUTH GROUPER	2
WHITE GRUNT	2	QUEEN TRIGGERFISH	4	AFRICAN POMPANO	1
WHITEBONE PORGY	2	SAILORS CHOICE	4	BLACK MARGATE	1
BLUE RUNNER	1	SNOOK	4	CONEY	1
GRUNTS	1	RED DRUM	3	DOG SNAPPER	1

Northeast (NE)		Southeast (SE)		Keys (KY)	
GUAGUANCHE	1	RED SNAPPER	3	FLORIDA POMPANO	1
HOGFISH	1	TRIPLETAIL	3	GRAYSBY	1
JOLTHEAD PORGY	1	AFRICAN POMPANO	2	MAHOGANY SNAPPER	1
LESSER AMBERJACK	1	BIGEYE	2	MISTY GROUPER	1
RED HIND	1	BLUELINE TILEFISH	2	POMFRETS	1
ROCK HIND	1	CREVALLE JACK	2	QUEEN SNAPPER	1
SILK SNAPPER	1	DOLPHIN	2	SNOOK	1
SNOOK	1	SHEEPSHEAD	2	SPADEFISH	1
SPADEFISH	1	SPOTTED SEATROUT	2	SQUIRRELFISHES	1
		BLACKTIP SHARK	1	WRECKFISH	1
		BLUEFISH	1	YELLOWFIN GROUPER	1
		CONEY	1		
		DOG SNAPPER	1		
		GAG	1		
		GULF FLOUNDER	1		
		OCEAN TRIGGERFISH	1		
		SAND DRUM	1		
		SOUTHERN FLOUNDER	1		
		WEAKFISH	1		
		YELLOWFIN GROUPER	1		

Appendix B. Reported condition of discards from charter trips.

Common Name	Species	Live Discards	Live Floaters	Dead Discards	Percent Undersized
ALMACO JACK	SERIOLA RIVOLIANA	173	2	2	1.12
ATLANTIC SHARPNOSE SHARK	RHIZOPRIONODON TERRAENOVAE	186	0	0	0.00
ATLANTIC TARPON	MEGALOPS ATLANTICUS	56	0	0	26.79
BLACK GROUPER	MYCTEROPERCA BONACI	113	0	0	79.65
BLACK SEA BASS	CENTROPRISTIS STRIATA	1,507	8	2	97.11
BLACKFIN TUNA	THUNNUS ATLANTICUS	50	0	0	24.00
BLACKTIP SHARK	CARCHARHINUS LIMBATUS	31	0	0	6.45
BLUE RUNNER	CARANX CRYSOS	170	0	0	0.00
BONNETHEAD	SPHYRNA TIBURO	52	0	0	0.00
COBIA	RACHYCENTRON CANADUM	101	1	2	100.00
CREVALLE JACK	CARANX HIPPOS	336	0	0	0.00
DOLPHIN	CORYPHAENA HIPPURUS	1,539	11	1	91.29
GAG	MYCTEROPERCA MICROLEPIS	61	0	0	60.66
GRAY SNAPPER	LUTJANUS GRISEUS	1,954	25	0	79.59
GRAY TRIGGERFISH	BALISTES CAPRISCUS	421	0	1	94.08
GREAT BARRACUDA	SPHYRAENA BARRACUDA	212	0	14	16.37
GREATER AMBERJACK	SERIOLA DUMERILI	172	0	0	59.30
KING MACKEREL	SCOMBEROMORUS CAVALLA	302	2	16	63.04
LANE SNAPPER	LUTJANUS SYNAGRIS	253	0	0	85.38
LITTLE TUNNY	EUTHYNNUS ALLETTERATUS	199	0	0	1.01
MUTTON SNAPPER	LUTJANUS ANALIS	651	3	4	90.32
QUEEN TRIGGERFISH	BALISTES VETULA	31	0	0	90.32
RED DRUM	SCIAENOPS OCELLATUS	425	0	0	27.76
RED GROUPER	EPINEPHELUS MORIO	430	0	0	82.33
RED SNAPPER	LUTJANUS CAMPECHANUS	3,608	59	15	34.11
SAILFISH	ISTIOPHORUS PLATYPTERUS	253	0	0	10.28
SNOOK	CENTROPOMUS UNDECIMALIS	367	0	0	61.04
SPANISH MACKEREL	SCOMBEROMORUS MACULATUS	354	0	0	40.11
SPOTTED SEATROUT	CYNOSCION NEBULOSUS	705	0	0	60.99
VERMILION SNAPPER	RHOMBOPLITES AURORUBENS	971	30	2	78.32
WHITE GRUNT	HAEMULON PLUMIERII	75	0	0	4.00
YELLOWTAIL SNAPPER	OCYURUS CHRYSURUS	2,556	20	0	55.28

Appendix C. Reported condition of discards from private boat trips.

Common Name	Species	Live Discards	Live Floaters	Dead Discards	Percent Undersized
ALMACO JACK	SERIOLA RIVOLIANA	258	0	0	3.10
ATLANTIC SHARPNOSE SHARK	RHIZOPRIONODON TERRAENOVAE	43	0	0	0.00
BLACK GROUPER	MYCTEROPERCA BONACI	99	0	0	89.90
BLACK SEA BASS	CENTROPRISTIS STRIATA	2,063	8	7	93.14
BLUE RUNNER	CARANX CRYSOS	169	0	0	0.59
BLUEFISH	POMATOMUS SALTATRIX	33	7	0	0.00
BONNETHEAD	SPHYRNA TIBURO	35	0	0	0.00
COBIA	RACHYCENTRON CANADUM	76	1	4	87.80
CREVALLE JACK	CARANX HIPPOS	51	5	0	3.28
DOLPHIN	CORYPHAENA HIPPURUS	577	9	1	92.11
GAG	MYCTEROPERCA MICROLEPIS	44	0	0	95.45
GRAY SNAPPER	LUTJANUS GRISEUS	1,656	3	5	87.64
GRAY TRIGGERFISH	BALISTES CAPRISCUS	341	0	0	79.47
GRAYSBY	CEPHALOPHOLIS CRUENTATA	60	2	0	12.50
GREAT BARRACUDA	SPHYRAENA BARRACUDA	178	0	0	6.74
GREATER AMBERJACK	SERIOLA DUMERILI	115	0	1	60.34
HOGFISH	LACHNOLAIMUS MAXIMUS	89	0	1	73.33
KING MACKEREL	SCOMBEROMORUS CAVALLA	160	0	5	45.45
LANE SNAPPER	LUTJANUS SYNAGRIS	696	2	0	91.57
LITTLE TUNNY	EUTHYNNUS ALLETTERATUS	260	0	0	0.38
MUTTON SNAPPER	LUTJANUS ANALIS	668	4	1	98.23
RED DRUM	SCIAENOPS OCELLATUS	76	0	0	18.42
RED GROUPER	EPINEPHELUS MORIO	159	7	0	90.75
RED PORGY	PAGRUS PAGRUS	130	0	0	36.15
RED SNAPPER	LUTJANUS CAMPECHANUS	4,196	89	22	32.48
ROCK HIND	EPINEPHELUS ADSCENSIONIS	27	3	0	24.24
SAILFISH	ISTIOPHORUS PLATYPTERUS	83	0	0	20.48
SCHOOLMASTER SNAPPER	LUTJANUS APODUS	32	0	0	90.63
SPANISH MACKEREL	SCOMBEROMORUS MACULATUS	149	1	4	27.10
SPOTTED SEATROUT	CYNOSCION NEBULOSUS	40	0	0	67.50
TRIPLETAIL	LOBOTES SURINAMENSIS	49	0	0	87.76
VERMILION SNAPPER	RHOMBOPLITES AURORUBENS	705	10	3	69.09
WHITE GRUNT	HAEMULON PLUMIERII	74	0	0	0.00
YELLOWTAIL SNAPPER	OCYURUS CHRYSURUS	1,738	2	0	95.64

Appendix D: Procedures Manual and Field Data Sheets

Atlantic Coast Biological Survey

Site Register

The sample frame lists a sub-set of MRIP sites where landed reef fishes caught from recreational private boat (PR) and/or charter (CH) trips may be intercepted for biological sampling. Variables in the sample frame include:

- Region (NE, SE, KY)
- Numeric identifier for Inlet the site is associated with (Figure 1)
- Inlet name
- MRIP site number
- MRIP site name
- MRIP primary mode (PR or CH)
- Pressure rating

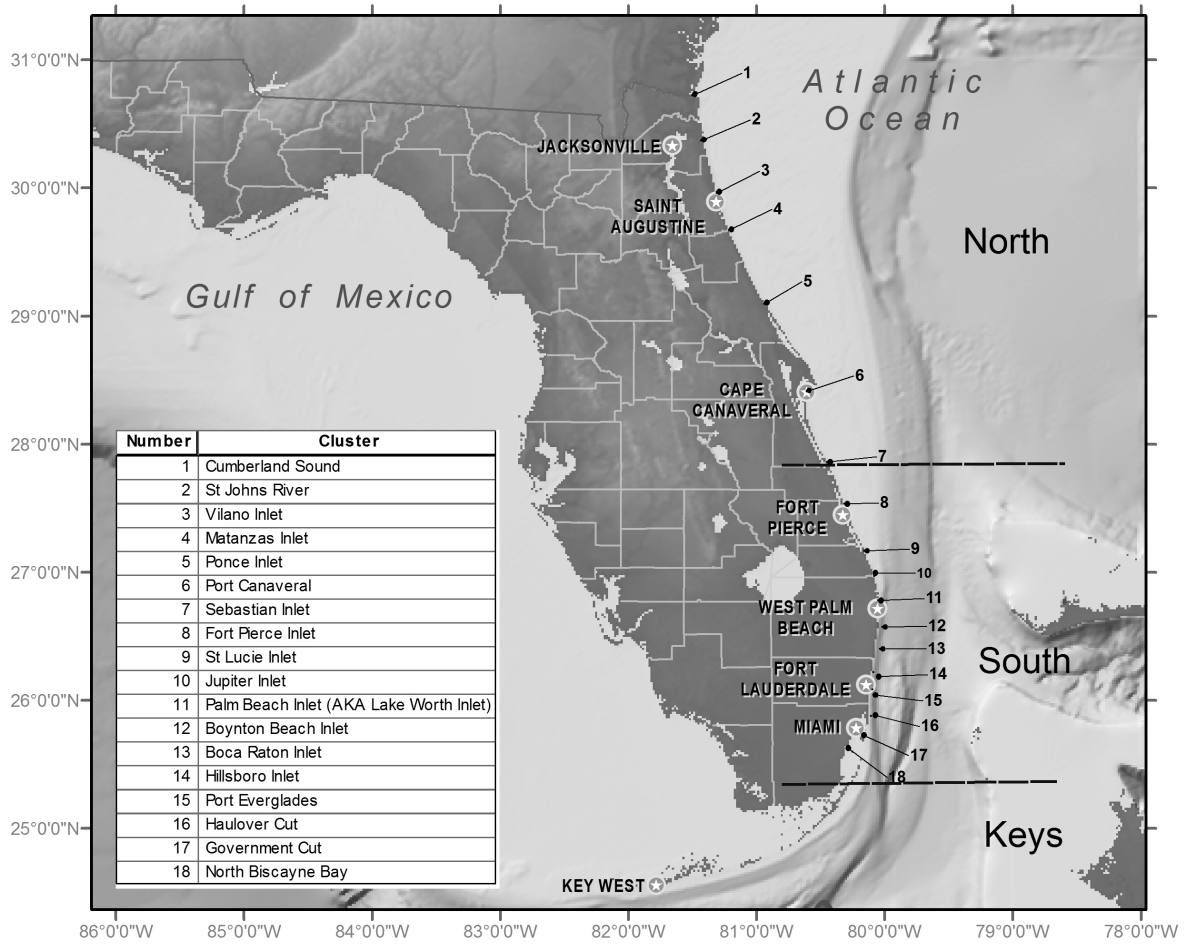
Sites for biological assignments are selected from this list in two-stages: 1) site clusters (group of sites associated with a given inlet) are randomly selected, and 2) within each sampled cluster one site is randomly selected. This design ensures geographic distribution of assignments throughout the study area. Sites in a cluster with high pressure have a higher selection probability than medium and low pressure sites (probability proportional to size, or pps sampling). This ensures that more productive sites are visited more frequently, and also ensures less productive sites are represented in the sample.

Sample selections are stratified by region (NE and SE) and mode (PR and CH). To ensure an equal distribution of assignments throughout the month, a total of 3 PR and 3 CH sites are selected each week in each region. Below is an outline of how samples are drawn:

- PR assignments for a given week:
  - First stage, randomly select 3 site clusters (inlets) from each region (NE, SE, KY) without replacement.
  - Second-stage, randomly select 1 PR site from each cluster sampled, proportional to pressure.
  - The first site drawn may be conducted on one week day (Mon-Thur) during the selected week.
  - Each of the remaining two sites may be conducted on one weekend day (Fri-Sun) during the selected week.

- CH assignments for a given week:
  - First stage, randomly select 2 site clusters (inlets) from each region (NE, SE, KY) without replacement.
  - Second stage, randomly select 1 CH site from each cluster sampled, proportional to pressure.
  - Each assignment may be conducted one day during the selected week (Mon-Sun).

- This yields a total of 3 PR and 2 CH assignments per region, per week.



Number	Cluster
1	Cumberland Sound
2	St Johns River
3	Vilano Inlet
4	Matanzas Inlet
5	Ponce Inlet
6	Port Canaveral
7	Sebastian Inlet
8	Fort Pierce Inlet
9	St Lucie Inlet
10	Jupiter Inlet
11	Palm Beach Inlet (AKA Lake Worth Inlet)
12	Boynton Beach Inlet
13	Boca Raton Inlet
14	Hillsboro Inlet
15	Port Everglades
16	Haulover Cut
17	Government Cut
18	North Biscayne Bay

Figure 1. Regions included within the study area. Each egress point is considered a site cluster. Sites in the Keys are grouped into upper, middle, and lower sub-regions.

Assignment Protocols

Each assignment must be completed during the week drawn and may only be cancelled if the assignment cannot be completed when weather conditions are favorable for offshore fishing activity. The first PR assignment drawn must be scheduled on a week day (Mon-Thurs during the scheduled week). Samplers should watch weather forecasts prior to the start of each week and plan accordingly to conduct assignments on days when boating conditions are favorable for offshore fishing. If offshore conditions are poor throughout the week, the week day assignment may be cancelled. The remaining two PR mode assignments must be conducted on a weekend (Fri-Sun). Weekend assignments should be scheduled on days when offshore conditions are favorable, and may be cancelled if offshore conditions are poor throughout the weekend. A CH mode assignment may be completed any day Mon-Sun during the selected week. Thus, for these

assignments, samplers should stay aware of the forecast throughout the week and plan ahead to conduct assignments during days when charter trips are expected to go out. For example, if the offshore forecast is expected to be poor later in the week, assignments should be scheduled early in the week to prevent cancellations. If charter fishing activity is sporadic (i.e. sites with a low number of boats, or during winter months when fishing may be slow), it may also be helpful to contact vessel operators in advance to determine what days are best to conduct assignments. If no vessels are expected to go out during a selected week, either due to offshore conditions or a lack of customers, the assignment may be cancelled.

For a scheduled private boat mode assignment, the sampler should arrive on site before 10:00 a.m. and remain on site until sunset, unless the site closes or all vessels return to the site first. If the assignment ends before sunset, the reason must be noted on the Assignment Summary Form. Upon arrival at the site, visit with site operators to let them know you will be at the site all day to sample catch from anglers. Ask where they recommend you set up equipment, etc. and follow any instructions they give about working the site (such as where and when not to approach anglers, particularly around haul-out areas where fork lifts operate, etc.). If for some reason a private property owner or manager requests that we not work the site, you may cancel the assignment and we will de-activate the site so it is no longer selected. Or, if they wish to speak to a supervisor for the project, give them the name and phone number of your immediate supervisor or Beverly Sauls.

For a scheduled charter boat mode assignment, the sampler does not need to arrive at 10:00 am, but should arrive on site before the first boat is scheduled to return to the site. You may determine when boats are returning by checking websites to see what trip types are advertised for the site, by calling ahead if there is a knowledgeable representative working at the site, or by visiting the site early to check on which boats are out fishing. The assignment is complete when all charter boats have returned to the site, or sunset, whichever occurs first. Before sampling catch from charter trips, approach the mate or captain to explain the project and ask for permission to collect samples from harvested fish and conduct a trip interview with them. If they refuse, mark this on the trip interview form (see below) and move on to the next boat.

The following equipment will be needed during each assignment:

- Assignment Summary Form
- Trip Data Sheets printed on waterproof paper
- Catch Data Sheets printed on waterproof paper
- Tagged Fish Data Sheets
- Pencils
- Measuring board
- Tape measure
- Electronic scales with spare batteries
- Otolith envelopes
- Properly sharpened knives (including a clean, smooth knife for cutting gonad tissue)
- Chisels
- Tweezers (bring back-ups, these tend to get lost in the field)
- Small scissors (for cobia fin clips)

- Large zip lock bags (for keeping otolith envelopes together)
- Small zip lock bags (for temporary storage of gonads and/or genetic samples)
- A small cooler with ice (for keeping gonad/genetic samples cool until they are placed in vials)
- A camera (for unusual species or determining sex and/or hydration of gonads later if needed)
- Clean rags
- Ample supply of drinking water
- State identification

Also recommended:

- Lunch, snacks
- Hat, sunscreen, bug spray
- Supply of fishing regulations
- Vials for gonad and genetic samples (useful when you have time to transfer samples to jars while in the field)

The Assignment Summary Form (ASF)

At the beginning of the assignment, fill out the following portions of the ASF:

- Date of the assignment
- Control Number
- Site Name
- Site Number (Site ID)
- Sampler ID number(s)
- Arrival Time (military hours)

During the assignment, also record on the ASF the start and stop time(s) for any breaks when no sampler is on site.

At the end of the assignment, record the time that you completed the assignment. If the assignment was ended before sunset, record the reason. If there were special circumstances (such as lightning, hostile site, etc.), record additional information in the comments section. When editing for the assignment is complete, record the totals for numbers of catch interviews, otolith/gonad/fin clip samples, and tagged fish in the table at the bottom of the ASF.

The Trip Interview Form (TIF)

At the beginning of the assignment, fill out the top portion of a blank TIF as follows:

- Date of the assignment
- Sampler Number:
    - Circle 1 if you are the primary sampler for the assignment. This is the sampler ID number that all biological samples will be associated with.
    - Circle 2 if you are a second sampler assisting with the assignment
- Your Sampler ID Number
- For “Page ___ of ___”, record the number 1 in the first blank space provided to indicate it is the first TIF for the assignment. The second space should be filled in at the end of the assignment to indicate the total number of forms used for the assignment.

To save time, you may also pre-fill the interview number column. Starting at the top of the data table, record the number 1 in the first row, 2 in the second row, etcetera, until you reach the last row. The sequential number will be used to identify the first angler party interviewed during the assignment, the second angler party interviewed, etc.
During the assignment, approach each boat party as they return to the site from a recreational boat trip. Approach all boats on a first-come basis, do not try to profile offshore boats. To determine if a boat party is eligible to be interviewed, ask someone in the party if anyone during the trip recreationally fished in saltwater. If they respond that they were not fishing, or were only fishing for invertebrate species, or were only fishing commercially, thank them for their time and move on to the next boat. You do not need to record anything on the TIF.

If the party was saltwater recreational fishing for finfish, proceed to the SCREENER QUESTIONS:

- Record the time (military hours) in column 2;
- Circle C in column 3 to indicate they were confirmed to be saltwater fishing;
- Ask the party if they spent any time fishing in the Atlantic Ocean and/or the inlet;
    - if they did not go outside the inlet, circle N for "no" in column 4, thank the anglers for their time, and proceed to next vessel
    - if they did fish in the ocean and/or inlet, circle Y for "yes" in column 4:
        - Ask the anglers whether any managed species were harvested and/or released during the trip. If anglers are not sure which species are federally managed, ask them what types of fish they caught or released.
        - If no managed fish were caught or released, record N for "no" in column 5 (labeled "Any Catch?") and proceed to the next vessel.
        - If any federally managed species were harvested or released, ask the angler party if they are willing to answer some more detailed questions about their fishing trip.
            - If they refuse, record an "R" in column 5 (labeled Any Catch?), thank them for their time, and move on to the next boat.
            - If the anglers are willing to proceed with the interview, record Y for "yes" in column 5 and

If you do not proceed to the next portion of the trip interview, thank the anglers for their time and move on to the next boat party. If the party agrees to continue with the TRIP interview:

- Record whether the fishing mode was a paid charter or a private recreational trip by circling "CH" or "PR" in column 6 (labeled Mode)
- Record the number of people that fished during the trip in column 7 (labeled Anglers).
- Record the time that the trip departed from the dock (military time) in column 8 (labeled Start).
- If the trip departed from the dock one or more days prior to the interview date, record the numeric month/day in column 9 (labeled Start Day). If the trip departed on the same day as the interview, leave this column blank.

- Record the percent of the time that they spent fishing in the EEZ (>3 miles from shore) in column 10 (labeled % time EEZ).
- In columns 11-16, record the number of hours (to the nearest hour or half hour) spent fishing during the trip fishing for each of the following methods:
  - Bott = Bottom fishing (time spent with weighted rigs, lures, or jigs fished at the bottom or in the lower half of the water column)
  - Troll = Trolling (time spent running with lines towed in the water)
  - Drft = Drift fishing (time spent with flat lines drifting at or near the surface)
  - Sght = Sight casting (time spent actively searching for and casting at fish at or near the surface)
  - Kite = time spent with kite gear in the water
  - Spr = Spear fishing (time spent with one or more divers underwater actively searching and pursuing fish)
- Once the trip interview is complete, proceed to the catch interview.

The Catch Interview Form (CIF)

- Begin a new CIF for each boat party with a catch interview
- Record date of interview on top of CIF
- Record the Interview Number for the boat party (must match sequential number for the boat party recorded in the first column of the Trip Interview Form)
- Record your sampler ID number
- For Sampler Number, circle 1 if you are the primary sampler for the assignment. Else, circle 2 if you are assisting the primary sampler.
- Determine which person in the party was the primary operator of the vessel and ask them to provide the following information for the upper data table on the front page of the CIF:
  - Primary depth (in feet) where the majority of time was spent fishing, and the range of depths fished for the entire time spent fishing (min and max). If only one depth was fished, record the same value in all three columns for depth.
  - The approximate straight-line distance (miles) from shore where the majority of time was spent fishing, and the range for the entire time spent fishing (min and max). If fishing was only conducted at one distance, record the same value in all three columns.
- In the lower data table on the front page of the CIF:
  - List any managed species that were released during the trip. It is not necessary to record bycatch or species that are not regulated in this section.
  - Do not split released catch for individual anglers, simply record totals for the whole boat party.
  - For each species listed, record:
    - estimated total number that were alive when they were released
      - Of those released alive,
        - Record the estimated number that were under the legal size limit (regardless of whether season is open)
        - OR record 0 if none were undersized. Do not leave the column blank.

        - OR record “DN” for don’t know if the anglers cannot recall.
    - Of those released alive,
        - Record the estimated number that were unable to re-submerge (floated off),
        - OR record 0 if none floated off. Do not leave column blank.
        - OR record “DN” for don’t know if the anglers cannot recall.
- Estimated total number that were dead before they were returned to the water.
    - For example, fish that were bitten in half by a predator, fish that may have been high-graded, fish that were mistakenly harvested (speared or gaffed) and then discarded because they were undersized, etc.
    - Do not include fish in this count if the angler was not sure the fish was dead before it was released, these fish should be included in released alive counts.
    - Record 0 if no fish were discarded dead, do not leave blank.
- Estimated total number that were used for bait
    - This column may be left blank if none were used for bait.

- On the back page of the CIF, record the following information for each managed species that was harvested during the trip. You do not have to record species that are not managed (such as baitfish or unregulated species) in this section. It is not necessary to identify which fish were caught by each angler, simply record totals for the whole boat party.
    - For the first fish sampled from the trip:
        - In column 2 (labeled FISH #), record 1 to indicate the first fish sampled from the trip.
        - In column 3 (labeled SPECIES) record the species name.
        - In column 4 (labeled # Obs), record the total number for that species that you were able to physically observe and count.
        - In column 5 (labeled # Unob), record the additional estimated number for that species if the angler does not allow you to observe and count all of the fish for that species.
        - In column 6 (labeled ML/FL), record the midline or fork length in mm for the fish.
        - In column 7 (labeled max TL), record the maximum pinched total length in mm for the fish. If the anglers are in a hurry, this measurement may be skipped to speed up fish processing.
        - In column 8 (labeled WGT):
            - Record the whole weight (in kg),

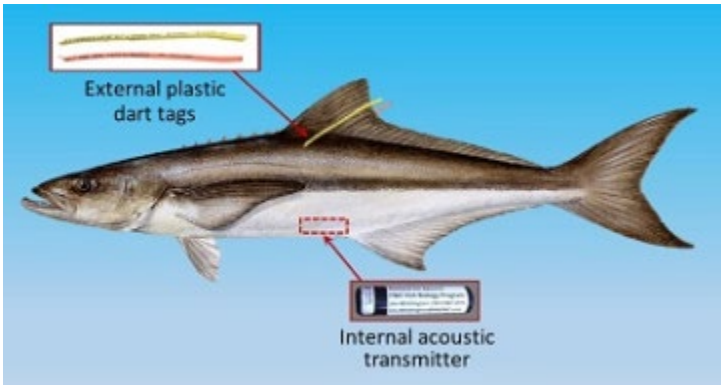
        - OR record “F” if the fish was filleted before it was measured and weighed,
        - OR record “G” if the fish was gutted. You may also record the gutted weight (in kg) after the “G”. For example, if a gutted fish weighs 3.5 kg, record “G - 3.5” on the data sheet.
        - If no weight was obtained, leave the column blank and make a comment to explain why (e.g. scale not working, fish bled, etc.)
    - In column 9 (labeled AGE), first make sure you have permission from angler or mate to cut fish before collecting age structures. For fish that people take home whole, you should use gill method whenever possible.
        - Record “O” if an otolith was extracted
        - Record “S” if a spine was collected
        - Record “R” if anglers refused
    - In column 10 (labeled SEX):
        - For gonochoristic species:
            - Record “M” for male or “F” for female
            - OR record “H” for hydrated with eggs
            - OR record “U” if gonads were observed and sex could not be determined (for gonochoristic species)
            - OR leave blank if gonads could not be examined or
        - For hermaphroditic species:
            - Record “H” for hydrated with eggs
            - OR record “U” if gonads were not hydrated
            - OR leave blank if gonads could not be examined
    - In column 11 (labeled OTHER BIO):
        - Record “G” if a gonad sample was collected
        - Record “F” if a fin clip was collected
    - In column 12 (labeled Note), record:
        - tag number for tagged fish (also fill out a tagged fish form, described below)
        - gonads that are clearly transitioning in red porgy
        - any visible external sexual dimorphism, such as copperbelly gag, black sea bass with bump on head, etc.
        - other notes
- For each subsequent fish sampled from the same boat party:
    - In column 2 (labeled Fish #), continue numbering new rows sequentially to indicate the second fish sampled for the trip, the third fish, etc.
    - Do not start over with number 1 when you begin to sample a new species, continue numbering each fish sequentially.
    - Sample fish of the same species (up to 15 individuals per species) before moving on to the next species.
    - For each new row, record the species if it is different from the previous fish sampled.

Tagged Fish

If a tagged fish is encountered during biological sampling, record the tag number on the Catch Interview Form and Fill out a Tagged Fish Form (including name and contact information for the angler). Include both forms with your monthly shipment of biological samples to St. Pete. Kelley Kowal will make sure the tagged fish form is given to the appropriate person.

Tagged cobia should be reported as soon as possible to Jim Whittington (Jim.Whittington@MyFWC.com, 561-882-5975) based at the Tequesta Field Lab 19100 SE Federal Highway, Tequesta, FL 3346. Whenever a tagged cobia is encountered, record both external tag numbers on the Tagged Fish Form if the fish is double-tagged. Cobia tagged with one yellow and one red external tag should also have an internal acoustic transmitter inside the abdominal cavity (Figure x), and it is important to try to retrieve the internal transmitter so that they may be reused by researchers. If the angler is cleaning their fish on site, ask them if you may first look inside the abdominal cavity (see figure below for approximate area where the acoustic tag is implanted). Or, if they are already cleaning the fish, ask them to look for the internal acoustic transmitter embedded in the abdominal cavity and if the transmitter is not found ask them to allow you access to the carcass after it has been fileted. If the fish is not being cleaned on site, ask for permission to open the abdominal cavity to retrieve the internal tag before they take the fish home. Also, attempt to sex the fish. If the angler does not allow you to look for the transmitter on site, at least attempt to obtain their contact information and record it on the Tagged Fish Form so that researchers may follow up with them later.

To learn more about FWC's work with cobia, visit:
http://www.myfwc.com/research/saltwater/telemetry/projects/cobia-telemetry/



Priority Species for Biological Sampling

Table 1 lists species that should be prioritized for biological sampling during assignments. Other managed species that are not listed (such as Dolphin fish, billfishes, and tunas) may be recorded on the catch data sheet and also measured and weighed; however, age structures or tissue samples are not needed.

If illegal fish are encountered during an interview, inform the angler of the illegality and quickly record length/weight, but do not proceed to work up fish for biological samples. If the anglers

choose to leave a site without taking illegally harvested fish home, you may collect biological sample out of plain sight of the public.

Table 1. Managed species for which age structures (otoliths, spines) should be collected. Asterisks denote species for which gonad samples should be collected.

Gonochoristic Species	Hermaphroditic Species
Snappers (Lutjanidae)	**Sea Basses (Serranidae)**
(Red Snapper, *Lutjanus campechanus*)	Gag*, *M. microlepis*
Lane Snapper, *L. synagris*	Black Grouper, *M. bonaci*
Mutton Snapper, *L. analis*	Scamp, *M. phenax*
Gray Snapper, *L. griseus*	Yellowmouth Grouper, *M. interstitialis*
Cubera Snapper, *L. cyanopterus*	Red Grouper, *Epinephelus morio*
Vermilion Snapper, *Rhomboplites aurorubens*	Snowy Grouper*, *E. niveatus*
Yellowtail Snapper, *Ocyurus chrysurus*	Rock Hind, *E. adscensionis*
Triggerfish	Graysby, *E. cruentatus*
Gray Triggerfish, *Balistes capriscus*	Coney, *E. fulvus*
Jacks (Carangidae)	Red Hind, *E. guttatus*
Greater Amberjack, *Seriola dumerili*	Warsaw*, *E. nigritus*
Tilefishes (Malicanthidae)	Black Sea Bass, *Centropristis striata*
Tilefish, *Lopholatilus chamaeleonticeps*	**Wrasses (Labridae)**
Blueline Tilefish, *Caulatilus microps*	Hogfish, *Lachnolaimus maximus*
Mackerels (Scombridae)	**Porgies (Sparidae)**
King Mackerel, Scomberomorus *cavalla*	Red Porgy, *Pagrus pagrus*
Spanish Mackerel, *Scomerberomorus maculatus*	
Wahoo, *Acanthocybium solanderi*	
Cobia (Rachycentridae)	
Cobia, *Rachycentron canadum*	

Table 2. Priority species for genetic (fin clip) samples

Cobia (Rachycentridae)	**Groupers (continued)**
Cobia, *Rachycentron canadum*	Red Grouper, *Epinephelus morio*
Snappers (Lutjanidae)	Graysby, *E. cruentatus*
(Red Snapper, *Lutjanus campechanus*)	Coney, *E. fulvus*
Triggerfish	Rock Hind, *E. adscensionis*
Gray Triggerfish, *Balistes capriscus*	Speckled Hind, E. drummondhayi
Groupers	Red Hind, *E. guttatus*
Gag, *M. microlepis*	Misty Grouper, *E. mystacinus*
Black Grouper, *M. bonaci*	(Nassau Grouper, *E. striatus*)
Scamp, *M. phenax*	Yellowedge Grouper, *E. flavolimbatus*
Yellowmouth Grouper, *M. interstitialis*	Warsaw, *E. nigritus*
Comb Grouper, *M. rubra (acutirostrus)*	Snowy Grouper, *E. niveatus*
Tiger Grouper, *M. tigris*	Marbled grouper, *Dermatolepis inermis*

Biological Sampling Procedures

Assigning Sex in the Field

Hermaphroditic and gonochoristic species are listed in Table 1. Whenever possible for gonochoristic species, attempt to identify the sex of mature fish in the field. If female gonads are hydrated with eggs, record an "H" instead of an "F" on the Catch Interview Form. Always obtain permission from anglers first before opening abdominal cavities if fish are not being cleaned on site. If unable to visually inspect gonads, leave the field blank on the data sheet. If gonads are inspected and sex cannot be assigned with certainty, record "U" on the data sheet to indicate sex was unidentifiable. When gonads are inspected for hermaphroditic species, only record whether gonads were hydrated with eggs or "U" for sex unidentifiable.

Age Samples

For each fish with an otolith or spine collected in the field, place the age structure in a coin envelope. Each envelope should be clearly labeled with the following information:

Date sample was collected
Sampler ID number
Interview Number recorded on the Catch Interview Form
Fish Number recorded on the Catch Interview Form
Species
Midline or Fork Length (mm)
Weight (kg)
Sex (optional)
Tag number (for tagged fish)

Gonad Samples

Gonad samples collected in the field may be temporarily stored in individual zip lock bags and kept cold in a cooler with ice. Zip lock bags should be clearly labeled with both the Interview Number and Fish Number from the Catch Interview Form. At the end of the assignment, gonad samples must be transferred to jars with formalin solution and labeled with the same information listed above for age structures. Labels may be placed inside the jar (a small square of waterproof paper), painters/masking tape affixed to the outside of the jar, or both.

Genetic Samples

Fin clips from cobia may also be stored in individual labeled zip lock bags and stored in a cooler in the field until they can be transferred to labeled vials at the end of the day.

Shipping Biological Samples

At the end of every month, ship age structures and gonad samples from all completed assignments to Kelley Kowal. For each assignment, make a copy of the ASF and Catch Interview Forms, place all otoliths/spines from the assignment in a zip lock bag, and place copies of forms in the same bag. Gonad jars should be tightly sealed, placed in individual zip lock bags, and wrapped in bubble wrap or other packing material to ensure jars are not broken during shipment.

Ship age structures and gonad samples to:

Kelley Kowal
Fish and Wildlife Research Institute
Florida Fish and Wildlife Conservation Commission
100 Eighth Avenue SE
Saint Petersburg, FL 33701
Kelly.Kowal@MyFWC.com
(727) 896-8626

Ship labeled vials with fin clips for cobia and copies of Catch Interview Forms directly to:

Jim Whittington
Fish and Wildlife Research Institute
Florida Fish and Wildlife Conservation Commission
19100 SE Federal Hwy
Tequesta, FL 33469
Phone: (561) 882-5975 or Dr. Joy Young (561) 882-5973

Field Data Sheets

F4292-16-F

Atlantic Coast Biological Survey, Assignment Summary Form

Today's Date: _____

Control Number: _____ (record "P" if panel boat)

Name of Site: _____

Site ID: ___ ___ ___ ___

Panel Boat: _____

Sampler number: 1 **Sampler ID:** __ __ __ __
Sampler number: 2 **Sampler ID:** __ __ __ __

Arrival Time: _____ **Departure Time:** _____

Reason if departed before sunset (circle one, provide details in comments/notes below):
Site closed All boats returned Other: _____

Break Times: (time away from site when no alternate sampler is on site)
Start _____ Stop _____
Start _____ Stop _____

Comments/Notes:

Final Tally:

Total Catch Interviews	Number of Otolith Samples	Number of Gonad Samples	Number of Genetic Samples	Number of Tagged Fish Intercepted

Atlantic Coast Biological, Trip Interview Data Sheet (front page)

Date: __ __ / __ __ / _____ **Sampler number:** 1 2 **Sampler ID:** __ __ __ __ **Page:** ____ of ____

Month Day Year

		SCREENERS: Did you fish recreationally (in saltwater) for finfish?			**May I ask for some more details about your trip and collect samples from any fish that you harvested today?**					**How many hours of the trip were spent fishing with each method?**					
Int #	**Time**	**Confirm**	**Ocean and/or inlet?**	**Any catch? Y/N/R**	**Mode**	**Anglers**	**Start time**	**Start day (if diff)**	**% of time fished EEZ**	**Bott**	**Troll**	**Drft**	**Sght**	**Kite**	**Spr**
		C U	Y N		CH PR										
		C U	Y N		CH PR										
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Site: Mode: Gear:

(back page)

		SCREENERS: Did you fish recreationally (in saltwater) for finfish?			May I ask for some more details about your trip and collect samples from any fish that you harvested today?					How many hours of the trip were spent fishing with each method?					
Int #	**Time**	**Confirm**	**Ocean and/or inlet?**	**Any catch? Y/N/R**	**Mode**	**Anglers**	**Start time**	**Start day (if diff)**	**% of time fished EEZ**	**Bott**	**Troll**	**Drft**	**Sght**	**Kite**	**Spr**
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Site: Mode: Gear:

Atlantic Coast Biological Survey, Catch Interview (front page)
Date: _____ Interview: _____ Sampler ID _____ Sampler number: 1 2 **Page:** __of __

	Majority of time	Minimum	Maximum
Depths fished (feet)			
Distance from shore (miles)			

Charter only:

Name or FL number _____

On For-Hire Survey? _____ For-Hire Survey vessel ID _____

Discards and bait (boat level totals):

Species (list all managed species, including reef fishes, pelagics, HMS and prohibited species released during trip)	**Total # alive when released**	**Of total # alive, how many were undersized ?**	**Of total # alive, how many never submerged (floated off)?**	**Total # dead before release**	**Total # used for bait**

Notes/Comments:

Site: Mode: Gear:

Atlantic Coast Biological Survey, Catch Interview (back page)
<u>Retained Catch (boat level totals)</u>.

FISH#	**SPECIES**	**# Obs**	**# Unob**	**S P E A R**	**ML/F L** (mm)	**Max TL** (mm)	**WGT (kg)** F=fillete d G=gut	**AGE** Y/N R=ref	**SEX** M/F H=hydr U=unk	**Other BIO** G=gonad F=fin clip	**Note tag number, copper belly, transitional porgy, fin clip #**