



# ANNUAL REPORT

## OF THE SOUTHEAST AREA MONITORING AND ASSESSMENT PROGRAM (SEAMAP)

OCTOBER 1, 2019 - SEPTEMBER 30, 2020

SEAMAP - Gulf of Mexico  
Gulf States Marine Fisheries Commission

SEAMAP - South Atlantic  
Atlantic States Marine Fisheries Commission

SEAMAP - Caribbean  
Puerto Rico Sea Grant College Program

# **JOINT ANNUAL REPORT**

## **of the**

### **Southeast Area Monitoring and Assessment Program**

#### **October 1, 2019 - September 30, 2020**

#### **INTRODUCTION**

The Southeast Area Monitoring and Assessment Program (SEAMAP) is a State/Federal/university program for the collection, management, and dissemination of fishery-independent data and information in the southeastern United States. The program presently consists of three operational components: SEAMAP-Gulf of Mexico, which began in 1981; SEAMAP-South Atlantic, implemented in 1983; and SEAMAP-Caribbean, formed in 1988.

Each SEAMAP component operates independently, planning and conducting surveys and information dissemination in accordance with administrative policies and guidelines of the National Marine Fisheries Service's Southeast Regional Office (SERO). Agencies and organizations directly involved with SEAMAP are shown in Table 1.

Federal programmatic funding for SEAMAP activities and administration was appropriated in Federal Fiscal Years 1985-2020. Funding allocations to participants for FY1985-FY2020 were handled through State/Federal cooperative agreements, administered by SERO and the Southeast Fisheries Science Center (SEFSC), National Marine Fisheries Service (NMFS).

This report provides an overview of the SEAMAP Gulf, South Atlantic, and Caribbean programs. It outlines the program management, resource survey operations, information services activities, and publications for FY2020 and proposed activities for FY2021.

#### **PROGRAM MANAGEMENT**

Activities and operations of each SEAMAP component are wholly defined by the respective managing units: the SEAMAP-Gulf Subcommittee of the Gulf States Marine Fisheries Commission's (GSMFC) Technical Coordinating Committee, the SEAMAP-South Atlantic Committee of the Atlantic States Marine Fisheries Commission's South Atlantic State-Federal Fisheries Management Board, and the SEAMAP-Caribbean Committee of the University of Puerto Rico Sea Grant College Program. The Gulf and South Atlantic committees consist of designated representatives from each member state, NMFS, and the Gulf of Mexico and South Atlantic Fishery Management Councils. In addition, the SEAMAP-South Atlantic committee includes a representative from the Atlantic States Marine Fisheries Commission (ASMFC). The Caribbean component consists of members from the Puerto Rico Department of Natural and Environmental Resources, Virgin Islands Department of Planning and Natural Resources, Puerto Rico Sea Grant College Program, NMFS, U.S. Fish and Wildlife Service, and Caribbean Fishery Management Council. Each committee meets yearly to review operations, examine priorities, and plan future activities. Daily operations are carried out by the respective SEAMAP coordinators, assisted by staffs of the two Commissions and Puerto Rico Sea Grant College Program and personnel associated with the SEAMAP Information System, SEAMAP-South Atlantic Data Management System (DMS), SEAMAP Archiving Center, SEAMAP Invertebrate Plankton Archiving Center (SIPAC), and the Southeast Regional Taxonomic Center (SERTC).

## SEAMAP-Gulf of Mexico

Major SEAMAP-Gulf Subcommittee meetings were held in October 2019 and March 2020 in conjunction with the Annual Meeting of the GSMFC. All meetings included participation by various work group leaders, the Coordinator, the Program Monitor, and other GSMFC staff. Representatives from the Gulf program also met with the South Atlantic and Caribbean representatives in July 2020 to discuss respective program needs and priorities for FY2021.

**TABLE 1.**

<b>SEAMAP ORGANIZATION</b>		
<b>Program</b>	<b>Administering Organization</b>	<b>Participating Agencies</b>
SEAMAP-Gulf of Mexico	Gulf States Marine Fisheries Commission	Alabama Department of Conservation and Natural Resources Florida Fish and Wildlife Conservation Commission Louisiana Department of Wildlife and Fisheries Mississippi Department of Marine Resources/USM/Gulf Coast Research Laboratory Texas Parks and Wildlife Department National Marine Fisheries Service/Southeast Fisheries Science Center Gulf of Mexico Fishery Management Council
SEAMAP-South Atlantic	Atlantic States Marine Fisheries Commission	Florida Fish and Wildlife Conservation Commission Georgia Department of Natural Resources North Carolina Department of Environment and Natural Resources South Carolina Department of Natural Resources National Marine Fisheries Service/Southeast Fisheries Science Center South Atlantic Fishery Management Council U.S. Fish and Wildlife Service Atlantic States Marine Fisheries Commission
SEAMAP-Caribbean	Puerto Rico Sea Grant College Program	Puerto Rico Department of Natural and Environmental Resources Puerto Rico Sea Grant College Program Virgin Islands Division of Fish and Wildlife National Marine Fisheries Service/Southeast Fisheries Science Center U.S. Fish and Wildlife Service Caribbean Fishery Management Council

Coordination of program surveys and distribution of quick-report summaries of a Gulf-wide survey to management agencies and industry were major functions of SEAMAP management in 2020. Other important management activities included coordinating data provision and specimen loans, preparing publications and documents, and assisting in the preparation of State/Federal cooperative agreements, including amendments to permit extension of activities previously not detailed in the agreements.

## **SEAMAP-South Atlantic**

SEAMAP-South Atlantic (SEAMAP-SA) tasks included fulfilling data requests, preparation of annual program reports and State/Federal Cooperative Agreements, and distribution of publications. The SEAMAP-SA Data Management Work Group collaborated throughout the year on the SEAMAP-SA database migration to the Southeast Coastal Ocean Observing Regional Association (SECOORA) portal.

The SEAMAP-SA Committee held their annual meeting July 28<sup>th</sup>, 2020 via webinar, prior to the joint annual meeting. The Committee discussed the SEAMAP-SA budget and reviewed the impacts of the COVID-19 pandemic, progress by SEAMAP-SA work groups, the transition of the SEAMAP-SA online database to SECOORA and provided direction where necessary. The Committee also discussed the timing of the new 5-year SEAMAP grant scopes and budgets, the elimination of SERTC from the SEAMAP-SA scope due to funding constraints, and the 5-year management plan.

The COVID-19 pandemic has had significant implications for SEAMAP-SA field sampling operations. The North Carolina Division of Marine Fisheries (NCDMF) put in place safety procedures that included limiting surveys to day trips. For the Pamlico Sound Survey, this meant that only sites accessible from a nearby port could be sampled. The North Carolina Coastal Longline Survey was cancelled due to the restrictions. The Georgia Coastal Longline Survey was largely unaffected. South Carolina Department of Natural Resources (SCDNR) field sampling operations were significantly impacted.

On March 20, 2020 personnel at the SCDNR Marine Resources Division, including all staff associated with SEAMAP-SA surveys, were directed to start working from home. This severely affected laboratory and fieldwork operations. Since this directive occurred in the middle of the annual yard period for SCDNR's larger research vessels (R/Vs *Palmetto* and *Lady Lisa*), the immediate effect was a delay in completing the annual maintenance of the vessels. Laboratory operations resumed later in April 2020 on a very limited scale and under strict guidelines to avoid COVID-19 exposure to staff. In mid-May, some limited fieldwork operations involving day trips on smaller boats resumed, resulting in minimal COVID-19 impact on the Coastal Longline Surveys. However, in the remainder of the 2020 sampling season no overnight cruises were conducted for the Coastal Trawl Survey and Reef Fish Survey.

## **SEAMAP-Caribbean**

During FY2020, liaison activities included data collection, management, and dissemination of fishery-independent data. Four regular SEAMAP-Caribbean (SEAMAP-C) committee meetings were held in Puerto Rico, in the US Virgin Islands (USVI), and online due to earthquakes events in Puerto Rico which left the island without power energy and due to the global pandemic COVID-19.

The purpose of these meetings was to review programmatic surveys carried out in Puerto Rico and the USVI concerning conch, lobster, and reef fish. The four regular committee meetings were held during the following dates: November 15, 2019 in St. Thomas; February 21, 2020 in Puerto Rico; May 29, 2020 online; and July 24, 2020 online. In addition to these regular meetings, the following activities were also accomplished. The SEAMAP Joint Annual Meeting was held online on July 29, 2020. A reef fish working group meeting was held online on July 9, 2020.

All three, the reef fish, conch and lobster sampling protocols are being consistently and carefully revised to obtain a more useful data collection for fisheries management purposes. The SEAMAP-

C sampling protocol document was reviewed to include the new reef fish sampling design, which includes the use of handlines and longlines in combination with video recording, using cameras arrays, as recommended by NMFS/NOAA.

SEAMAP-C provided DSG-hydro acoustic dataloggers equipment to support the passive acoustic collection samplings on fish spawning aggregations in Puerto Rico and U.S. Virgin Islands during fish reproduction acoustic surveys. A Department of Marine Sciences student assistantship was granted to conduct the post-processing and preliminary data analysis of the DSG hydro-acoustic bottom data-logger's data collected at fish spawning aggregations during the last spawning season from December 2019 to March 2020.

All SEAMAP-C study reports, including the Caribbean sampling protocols and related information have been made available for public dissemination at the Puerto Rico Sea Grant College blog site <http://prsgfisheriesoutreach.wordpress.com>. The main goal was to have a clear and uniform sampling protocol and to make the information accessible for dissemination and outreach.

## **RESOURCE SURVEYS**

In FY2020, collection of resource survey information continued for the thirty-ninth consecutive year. Surveys by each program component reflect distinct regional needs and priorities; however, survey operations in one geographic area often provide information useful to researchers in all three regions. Because of the diverse scope and target species involved in the SEAMAP survey operations, activities are discussed here by geographic region.

### **SEAMAP-Gulf of Mexico**

#### **Fall Shrimp/Groundfish Survey**

The Fall Shrimp/Groundfish Survey was conducted from October 3 to November 22, 2019 from off southwest Florida to the U.S.-Mexican border. NOAA Fisheries, Florida, Alabama, Mississippi, and Louisiana sampled three hundred five trawl stations during the survey. Vessels sampled waters out to 60 fm with trawls in addition to environmental sampling. The objectives of the survey were to sample the northern Gulf of Mexico to determine abundance and distribution of demersal organisms from inshore waters to 60 fm; obtain length-frequency measurements for major finfish and shrimp species to determine population size structures; and collect environmental data to investigate potential relationships between abundance and distribution of organisms and environmental parameters.

#### **Bottom Longline Survey**

The SEAMAP Bottom Longline Survey is a nearshore survey that complements an existing long-term fisheries independent longline survey being conducted by NOAA Fisheries, by targeting shark and finfish species within the shallow waters of the Gulf of Mexico. The objectives of the survey are to collect information on shark and finfish abundances and distribution with a 1-mile longline and to collect environmental data.

The Bottom Longline Survey samples during three seasons Spring (April-May), Summer (June-July), and Fall (August-September). Sampling is conducted in waters defined by the 3-10m depth contour. NMFS Statistical Zones are used as guides to ensure effective distribution of sampling effort. Stations are proportionally allocated and randomly distributed within the 3-10m depth

contour in each statistical zone based on the proportion of those depths present. Since the 3-10m depth strata is smaller in some statistical zones relative to other statistical zones, each statistical zone is allocated at least two stations during each season in order to ensure adequate sampling coverage. COVID-19 impacted sampling for all partners. Alabama was able to sample during all three seasons and completed 11 stations this year. Mississippi was not able to sample during the Spring season, but did sample 25 stations during the Summer and Fall seasons. Louisiana was able to sample 2 stations during the Spring, 6 in the Summer, and 15 in the Fall. Texas was not able to sample any stations during 2020.

### **Vertical Line Survey**

In FY2020, Texas, Louisiana, and Alabama conducted vertical line sampling for reef fish, but at a reduced level due to COVID-19 impacts. Approximately 70 stations were sampled from April through October. The Vertical Line Survey uses three bandit reels that are outfitted with ten circle hooks (8/0, 11/0 or 15/0). Each has only one hook size. The bandit reels deploy the gear simultaneously on or near a reef structure and, once locked in at depth, are allowed to fish for 5 minutes. All bandit reels then retrieve the lines simultaneously. Catch data are collected once the lines are onboard. Environmental data is collected upon completion of fishing at each station.

The Vertical Line Survey design divides the Gulf offshore waters between 10 and 150m into 150x150m grid blocks. Unknown habitat, known natural reef (hard bottom), presumed reef either natural or artificial, oil/gas platforms, and artificial reefs were the five habitat classifications developed by the SEAMAP Subcommittee. Each 150x150m grid block is assigned a habitat classification based upon several different datasets used to develop the sampling universe. A grid block can be classified as more than one habitat type if it has more than one habitat located within it.

For the station selection process, the total amount of habitat within the three depth zones (10-20m, 20-40m, and 40-150m) is computed. The percentage of area covered by each depth zone determines the percentage of the total stations that will be sampled within each depth zone (i.e. if a depth zone contains 40% of the total area, 40% of the total stations will be assigned to that depth zone). The total area of each habitat classification is calculated within each depth stratum. The total of each habitat classification, excluding unknown habitat, is then used to calculate the percentage of habitats within the depth zone. This percentage is used to determine how many stations are assigned to each habitat type within the depth zone. Stations are randomly selected based upon the habitat classification percentages within each depth zone.

### **Reef Fish Survey**

The primary purpose of this survey was to assess relative abundance and compute population estimates of reef fish found on natural reef fish habitats in the Gulf of Mexico. Video stereo cameras were used during the survey since they enabled the measurement of length frequencies. Each stereo camera contained paired black-and-white Videre stereo cameras along with a color mpeg camera in a cylindrical pressure housing. Four of these were mounted in a camera array and were positioned orthogonally with the center of the camera mounted 51 cm above the bottom of the array. The camera array was baited with squid. The camera array was allowed to soak on the bottom for 30 minutes, and the fish trap soaked for one hour. NOAA Fisheries did not participate in the Reef Fish Survey this year due to impacts from COVID-19. Florida was able to participate and sampled approximately 1,000 stations in the eastern Gulf of Mexico.

## Cancelled SEAMAP Sampling Activities

The SEAMAP Spring Plankton Survey, the Summer Shrimp/Groundfish Survey, and the Fall Plankton Survey were all cancelled in 2020 due to COVID-19.

## SEAMAP-South Atlantic

### Coastal Trawl Survey

The overall goal of the Coastal Trawl Survey, conducted by SCDNR, is to continue to build a long-term database to provide data for stock assessments and to aid in management of stocks off the coast of the southeastern US. Initiated in 1986, this fishery-independent study was designed to monitor the distribution, abundance, and life history aspects of coastal species in the South Atlantic Bight and to measure associated environmental parameters in nearshore coastal waters. Sampling was standardized in 1990 and in January 2001, the sampling design was changed based on the results of an external program review. Offshore strata were discontinued, and additional stations were added to inshore strata for all three (spring, summer, and fall) cruises to reduce variability in the abundance estimates for priority species. From 2009 to 2012, the seasonal effort was increased by 10% to 112 stations per season. In spring 2013, seasonal effort was reduced to pre-2009 levels (102 stations per season) as a result of insufficient funding. As a result of cumulative cost savings, the seasonal effort was able to return to 112 stations per season for the calendar years of 2015 and 2016. However, seasonal effort has subsequently dropped back to 102 stations per season and has continued at this reduced level since 2017.

Discussions of the reduction of sampling efforts have continued. However, due to some sea-days savings because of inclement weather in the previous funding years, the Coastal Trawl Survey was able to conduct three sampling seasons in 2019.

In the fall of 2019, one multi-legged seasonal cruise was conducted between New River Inlet, North Carolina, and St Augustine, Florida, during this reporting period. This cruise constituted the completion of the 30<sup>th</sup> full year of standardized sampling under a stratified random survey design. Sampling was conducted from October 2 through November 22, 2019. In total, 68 of 102 stations were completed within five of the six sampling regions. Sampling was executed from New River Inlet, NC down to St. Augustine, FL. The ends of our range remained unsampled. Thirty-four planned stations could not be completed during the available cruise window due to weather conditions. A total of 131 taxa were identified and Atlantic Croaker (*Micropogonias undulatus*) was the most abundant species, representing 30.5% of the total catch based on numerical abundance. An estimated 208,303 individuals (9,542 kg) were taken in trawls with a catch per unit effort (CPUE) of 3,063 individuals per tow. These numbers do not include cannonball jellies (n=14,515 individuals) and non-enumerated species, such as other jellies, non-crustacean benthic invertebrates (stars, sand dollars, cucumbers, tunicates, and gastropods), and algae, which contributed an additional 5,969 kg to biomass. Otolith samples were collected from several species. The data from the fall 2019 cruise have been added to the SEAMAP-SA data management system. An annual summary report for calendar year 2019 has been provided to the ASMFC and is available at <http://www.seamap.org/CoastalSurvey.html>. During the reporting period, SEAMAP-SA Coastal Trawl Survey staff provided data for the Atlantic Croaker and Spot traffic light assessments. Trawl survey data were also provided for various compliance reports to the Commission, to academic institutions for research purposes, and to North Carolina, Georgia, Florida, and NMFS as part of permit compliance reporting.

### *2020 Fieldwork and Future Sampling*

The Coastal Trawl Survey sampling was suspended in March 2020 due to the COVID-19 pandemic. As a result, the 2020 spring, summer, and fall Coastal Trawl Survey cruises were canceled. The impact on data collection, future sampling, scopes, and budgets were discussed at the annual meeting, and follow-up conversations with the SEAMAP-SA committee and partners are ongoing. The full impact of COVID-19 for the Coastal Trawl Survey is yet unknown.

### **Pamlico Sound Survey**

The Pamlico Sound Survey provides a long-term fishery-independent database for the waters of the Pamlico Sound, and the lower Neuse, Pamlico, and Pungo rivers. Data collected from the survey provides juvenile abundance indices and long-term population parameters for interstate and statewide stock assessments of recreationally and commercially important fish stocks. Annually, 108 randomly selected stations from seven strata based on depth and geographic location are trawled for 20 minutes using double rigged demersal mongoose trawls. Traditionally, sampling occurs over a two-week period (54 tows) in June and September each year. However, new safety procedures in place by NCDMF for COVID-19 directly impacted traditional survey operations for the 2020 sampling year. Sampling was limited to day trips and only sites accessible from a nearby port could be sampled. This primarily included the river strata (Neuse River, Pamlico River, and Pungo River) and those sites close to the mouth of the rivers.

During 2020, NCDMF sampled 28 stations in June over six day-trips (June 8-9, 17-19, 23) and 35 stations in September over six day-trips (September 8-9, 14, 23-25). The 2020 data are currently being processed by NCDMF and will be made available to the SEAMAP-SA data management system when completed.

### **Bottom Mapping and Species Characterization**

In FY2020, the Florida Fish and Wildlife Research Institute (FWRI) provided technical support and infrastructure for updating and distributing GIS data products of fishery-independent surveys in the South Atlantic region. Online access of SEAMAP mapping products is available via the SA Fisheries Data Viewer ([https://ocean.floridamarine.org/SA\\_Fisheries](https://ocean.floridamarine.org/SA_Fisheries)).

FWRI created a story map to display the sampling stations of SEAMAP-SA surveys (<https://arcg.is/1W9D4e>). FWRI intends to update the story map annually to display the most recent survey data available and management uses.

In addition to the web applications above, FWRI created an operational dashboard to quickly evaluate the dominant species for the 2019 Coastal Trawl Survey (<https://arcg.is/1SGHO40>). The dashboard has a map interface and charts to view and interact with species or station data.

### **Fish Habitat Characterization and Assessment**

**Reef fish sampling** – In the summer of 2008, SEAMAP-SA received funding to complement and expand the Marine Resources Monitoring, Assessment, and Prediction (MARMAP) program's reef fish sampling at SCDNR to address high-priority needs for over-fished species in the snapper-grouper complex. The primary objective was to enhance the fishery-independent reef fish data collected by MARMAP by increasing sampling in underrepresented geographical regions of the sampled area. In addition, expanding the number of shallow (<20m) and deep (>90m) sampling sites through SEAMAP-SA would result in more complete coverage and address identified shortfalls of



the MARMAP sampling regime. Beginning in 2011, SEAMAP-SA Reef Fish Survey activities included regular monitoring of previously identified natural reef (live-bottom) habitat, in addition to surveying for new natural reef areas that had not been included in the survey before. In addition, the SEAMAP-SA Reef Fish Survey continued diet studies of selected snapper and grouper species. SEAMAP-SA Reef Fish Survey staff have been coordinating all efforts with MARMAP and the South East Fishery-Independent Survey (SEFIS) at SEFSC to accomplish a comprehensive fishery-independent sampling of reef fish in the southeast region. All sampling has been well coordinated among the three programs to ensure data quality standards and continuity. In addition, exploration of new areas of reef habitat to be included in the sampling stations universe was continued by both SEAMAP-SA and SEFIS. In 2013, the combined monitoring efforts were conducted under a new name: The Southeast Reef Fish Survey (SERFS).

In 2020, Reef Fish Survey priorities were to continue standardized sampling in coordination with SERFS partners MARMAP and SEFIS, continue monitoring sampling in underrepresented areas in very shallow or deep waters and in MPAs, and collect life history information (ageing, reproductive, etc.) to support stock assessments and managements of reef fishes in waters off the SE US. These objectives are met by supporting chevron video trap sampling and short and long bottom longline sampling. However, given the limited available funding, we anticipated that we would not be able to resume the long bottom long line (LBLL) survey using the R/V *Lady Lisa* in 2020. Note that the MARMAP program provided partial funding for the reef fish survey, and funding for supplemental short bottom longline sampling was provided by a Marine Fisheries Initiative (MARFIN) grant to SCDNR.

#### *2020 Fieldwork*

As a result of the COVID-19 pandemic, no overnight cruises (including MARMAP and SEFIS) were conducted in 2020. However, in August, staff developed sampling protocols for day trips with a smaller scientific and vessel crew that would allow for sampling while limiting risk of exposure to COVID-19 for everyone on board. Sampling protocol and strategy were discussed with and agreed upon by SERFS partners and SEFSC stock assessment staff during conference calls on June 6 and August 17, and approved by SEAMAP leadership on August 12, and SEFSC leadership on August 13. Note that SEFIS was not able to conduct any fieldwork in 2020.

The goal of the day trips was to collect data on variability of species composition and relative densities within several selected reef areas. This was accomplished by repeated deployment of chevron video on the same sampling stations with a reef patch for two to three days. To limit the amount of fish work-up, and thus the need for staff to work in close proximity, we collected data by video cameras only (no trap catches) by closing the trap opening so no fish could enter the traps and using a soak time of 60 minutes, compared the standard 90 minutes. Remaining sampling procedures were identical to normal sampling, including baiting the traps.

In addition, we were able to collect preliminary trap selectivity data with an underwater stereo camera (UWSC) system that was provided on-loan by SEFIS on September 1. This UWSC was attached to a trap with a normal opening which was deployed as an extra (7<sup>th</sup>) trap during each set of 6 traps. This 7<sup>th</sup> traps had a standard soak time of 90 minutes and the collected fish underwent the usual standard length-frequency and life history work-up on board.

During the nine sampling trips between August 17 and October 7, 156 chevron video traps were deployed along with 19 chevron stereo video traps and 20 CTDs. Fieldwork was conducted with 4 or 5, rather than 8 or 9 scientific crew on board. All Reef Fish Survey fieldwork was conducted in collaboration with MARMAP which funded 5 of the 9 sea days. Several sampling days were

canceled due to (named) storms in the region. Traps were deployed in three reef areas with one area being sampled twice (11 stations) and two areas sampled three times (41 stations). The video recordings of the 156 trap deployments as well as the 19 stereo camera trap deployments are currently being examined and analyzed.

### *Data*

The data implications of the COVID-19 pandemic are no or limited collection of standard monitoring data in 2020. This will affect data on relative abundance, length and age compositions, and reproductive information for many snapper grouper species. However, collected data can aid in estimating variability within reef patches and preliminary information on trap selectivity. Discussions were held regarding the data limitations for future stock assessments with SEFSC stock assessment scientists.

Additionally, data management staff have been able to dedicate more time to outstanding tasks with reduced fieldwork. These outstanding tasks include the expansion of hydrocast data in the online database, development of the in-house Coastal Trawl Survey archive database, and migration of the SEAMAP-SA online database to the SECOORA online data portal. Staff have been developing expanded and revised metadata and in-house databases to ease the workload for data management staff and survey partners in the future (see further details below).

### **Assessment of Adult Red Drum Populations on the Southeast Atlantic Coast**

In 2008, SEAMAP-South Atlantic initiated support for a project to sample the adult Red Drum (*Sciaenops ocellatus*) population from North Carolina to Florida to develop a better understanding of abundance, distribution and age composition of the stock. These surveys contribute to the understanding of adult Red Drum populations along the southeastern Atlantic coast by expanding the currently available data, thereby allowing for more effective and responsible management of the stock. Information derived from these surveys can also be used for coastal shark assessments in the South Atlantic.

The primary objectives of the survey are to conduct fishery-independent longline sampling on adult Red Drum to develop information on catch per unit effort (CPUE); collect biological information (size, sex, etc.) and samples (otoliths, gonads, muscle, fin clips, etc.) from random sub-samples of the Red Drum catch in order to determine size at age, recruitment to the spawning population, mercury contamination, and genetic composition of the stock; tag adult Red Drum for the collection of migratory and stock identification data; disseminate accomplishments and results to the ASMFC and NMFS for inclusion in stock assessments; and produce an annual summary report. Secondary objectives are to tag and measure small and large coastal sharks caught during longlining for inclusion in the Cooperative Atlantic States Shark Popping and Nursery Survey (COASTSPAN) database and to respond to external requests for samples and/or data.

**South Carolina** – During the 2019/2020 sampling season, 351 longline sets were made in four strata along the coast of South Carolina. The season was separated into three periods, designed to maximize catches of red drum and sharks (August 1 – September 15, September 16 - October 31, November 1 – December 15). In this report, for the 2019 sample season only, the later part of time period II and the whole of time period III are considered (October through December); in 2020 only the first time period (August through mid-September) is considered. Two sets were missed in Saint Helena Sound due to weather during the second time period of 2019. Three sets in Port Royal Sound and four sets in Saint Helena Sound were missed due to weather during the third time period of 2019. The first time period and strata were sampled with equal effort in 2020. During sampling, 614 Red Drum

were caught. Winyah Bay yielded the highest numbers of Red Drum (286) followed by Saint Helena Sound (135), Charleston Harbor (101) and Port Royal Sound (92). There were 507 Red Drum that were tagged and released, 15 were recaptured (8 project recaptures and 7 fish tagged by SCNDR Inshore Fisheries trammel net survey), 77 were sacrificed for age/growth and reproductive investigations, 6 were kept as broodstock for the SCDNR's mariculture program, 7 were released without tags (fish that were lost at the boat or too stressed are released without tags to reduce mortality), and 1 was predated upon. Fin clips were taken from 604 individuals for genetic investigations (e.g., determination of stocked fish, recaptured fish that have lost external and PIT tags). Most shark species were tagged and released, with the exception of Atlantic sharpnose (*Rhizoprionodon terraenovae*) and large nurse sharks (*Ginglymostoma cirratum*). During this reporting period, 1454 sharks were caught, of those, 527 were tagged and released. The four most abundant shark species were Atlantic sharpnose (850), sandbar (*Carcharhinus plumbeus*) (189), blacknose (*Carcharhinus acronotus*) (138) and finetooth (*Carcharhinus isodon*) (88). There were no COVID-19 pandemic impacts to 2020 sampling. All stations were completed as scheduled; however, costs were higher due to necessary modifications needed to allow sampling to occur (staff sleeping arrangements).

**North Carolina** – The longline survey is conducted on a relatively small vessel (<26 ft) with a crew of four participants, involves extensive travel, and requires overnight hotel stays. Therefore, due to COVID related regulations, no sampling occurred during the 2020 sampling season.

**Georgia** – For the current reporting period, sampling occurred off southeast Georgia during the fall months (October – December) of 2019 and the summer months (June – September) of 2020. A total of 62 longline sets were deployed over the two seasons, with 23 sets made during fall 2019 and 39 sets during the summer of 2020. A total of 40 adult Red Drum were captured; 40 during fall 2019 and 0 during the summer of 2020. Red Drum ranged in size from 813 to 968 mm FL. Prior to release, 40 Red Drum were tagged with both conventional dart tags and PIT tags.

## **SEAMAP-Caribbean**

### **Puerto Rico**

#### **Pilot Study Reef Fish Monitoring Survey**

The project collected information on reef fish abundance and distribution for the waters surrounding Puerto Rico. A long-term database has been established for various sites off the west coast of Puerto Rico. This database provides the type of information managers need. Nonetheless a modification on methodology was approved to fulfill identified needs for several species. Fishermen were hired to conduct the fishing with handline, so skill and experience is not an issue to consider in the data analysis. Increased budget allowed including the east coast of Puerto Rico as well.

There is a great need to have basic information, in specific reproduction information of the species harvested in our fisheries. The SEAMAP-Caribbean Committee recognized the importance of collecting this type of information. To that effect Puerto Rico DNER recommended combining resources from SEAMAP and the Reproduction Program of the Fisheries Research Laboratory to collect the data. Funding from SEAMAP and the U.S. Fish and Wildlife Service Sport Restoration Program provided funding to collect gonad samples from reef fish collected during the monitoring surveys on the west coast of Puerto Rico.

## Reef Fish Monitoring

During the sampling period of February 17, 2019 to October 13, 2020 a total of 53 stations were sampled off the west coast of Puerto Rico. Handline yielded 226 finfish representing 25 species from 14 families weighing over 74 kg. The groupers, followed by snappers, squirrelfishes and jacks numerically dominated the catches. Three species of groupers comprised 34.51% of the catch. The snappers were represented by five species making up 21.68% of the total catch, of which one species represented 18.58% in terms of number.

For the sampling period of December 23, 2019 to November 19, 2020 a total of 53 stations were sampled off the east coast. A total of 214 individuals representing 36 species from 19 families weighing over 89 kg were collected. Three groups of fish constituted most of the catch. The jacks (28.97%), the groupers (21.96%), and the snappers (21.03%) were the most abundant by number. In terms of weight the jacks dominated the catch with 41.22%, followed by the snappers with 18.10% and the groupers with 11.68%.

No statistically significant results were obtained for the comparison of the catch for the two fishing methods of handline vs. longline and the different hooks used in handline sampling, J hook vs a circle hook for the east and west coast. While there were observed differences in species composition by coast, no statistically significant results were found in terms of number and weight.

Catch per unit of effort (CPUE) recorded per stations at the west coast ranged from 0.0027 to 0.167 kg/hr. East coast stations CPUE ranged from 0.003 to 0.205 kg/hr. There were no statistically significant results for calculated CPUE by kg/hooks for handline and longline.

Habitat information collected with video cameras at the east coast resulted in at least 5 dominant habitats: sand mud, coral, macroalgae, sponge and seagrass. Macroalgae stations on the west coast were the most common, followed by coral, seagrass, sponge and sand. For the east coast, macroalgae was again dominant followed by coral reef, sand mud, seagrass and sponge.

Stations consisted of latitude and longitude coordinates at a specific habitat and depth. Stratification of stations was based on habitat and depth ranges randomly selected from NOAA benthic maps for the east and west coast of Puerto Rico. Habitats selected were coral reef, macroalgae, sand mud and seagrass distributed in depth ranges of 0-20, 21-40 and > 41m. Allocations by habitat and depths differed for the east and west coasts due to the high percentage of unknown habitat of both platforms and inherent differences in habitat distribution on both coasts. The east coast has the highest number of stations allocated to the macroalgae and the lowest to coral reef in stark contrast to the west coast. A bait less frame with two GoPro Hero 4 set each facing in opposite directions was deployed at the closest latitude and longitude possible of the selected habitat site. Wind and currents posed a difficulty in deploying the camera frame at the exact latitude and longitude. Longlines were deployed at least 50 meters from the camera deployment site. A third GoPro Hero 6 camera mounted on a pole was used within the handline fishing site where fishing was conducted anchored to identify the habitat.

Videos recorded with the third camera were used to identify habitat at the handline area and all were read. The videos were recorded for a 30 second bottom time, although some fish can be identified from those videos those were not included in the fish reading. The video fish reading was more complex than identifying the habitat and takes more time to process. The overall results from 159 videos processed show a total of fish counts as 568, representing 96 species in 39 families. A total of 32 species corresponds to species that have not been caught with either handline or longlines. The

Redband Parrotfish (*Sparisoma aurofrenatum*) was the most abundant species. The family with the higher number of species identified were the Labridae (11), followed by the Scaridae (10).

Videos are read for 20 minutes to count the fish species on the video. A total of 131 individuals were counted representing 51 species of 26 families. The mackerel scad (*Decapterus macarellus*) was the most abundant species, while the family with higher representation were the parrotfishes with 7 species.

A total of 53 stations were sampled on the east coast. Although there are similarities between the habitat from maps with those from the camera, the greater change was the sponge category identified from videos. Stratification amongst habitat with the higher amount of stations corresponded to the macroalgae, followed by sand mud and seagrass and the lower number corresponded to the coral reef category. In the habitat identified by cameras, the macroalgae recorded the highest number of stations with all cameras. Coral reefs reported the second most abundant habitat with all three cameras. The other habitats had a mixed representation, although the sponge seem to occupy the third position.

The Redband Parrotfish was the species with the highest number of individuals counted followed by the Bluehead (*Thalassoma bifasciatum*). The family with the highest number of counts were the labrids (88), followed by the scarids with 57. Species of commercial or recreational importance included the Yellowtail Snapper, Blue Runner, Red Goatfish, Porgy, Coney, and Queen Triggerfish. The Queen Conch were identified, but not the Spiny Lobster.

The additional species reading was done for the east coast for 10 minutes and the species identify totaled 290 individuals of 78 species and 31 families. The most counted species were the Redband Parrotfish and Bluehead followed by the Slippery Dick. The family that recorded the highest number of counts of individuals were the labrids (wrasses), as well as the number of species (11) followed by the scarids (parrotfishes).

## **INFORMATION SERVICES**

Information from the SEAMAP activities is provided to user groups through the program administration and complementary systems: the SEAMAP Information System, SEAMAP-South Atlantic Data Management System, SEAMAP Archiving Center, and SERTC. Products resulting from SEAMAP activities can be grouped into two major categories: data sets (including broadly, digital data and collected specimens) managed by the SEAMAP Information System, SEAMAP-South Atlantic Data Management System, SEAMAP Archiving Center, and SERTC; and program information. Program information is discussed in the PROGRAM MANAGEMENT Section of this report.

### **SEAMAP Information System**

Biological and environmental data from all SEAMAP-Gulf surveys are included in the SEAMAP Information System, managed by GSMFC and NMFS-SEFSC. Raw data are edited by the collecting agency and verified by the SEAMAP Data Manager prior to entry into the system. Data from all SEAMAP-Gulf surveys during 1982-2019 have been entered into the system and data from 2020 surveys are in the process of being verified, edited, and entered for storage and retrieval. Verified, non-confidential SEAMAP data are available conditionally to all requesters.

Requested SEAMAP data were used for a multitude of purposes in 2020:

- Evaluating the abundance and size distribution of penaeid shrimp in federal and state waters to assist in determining opening and closing dates for commercial fisheries;
- Assessing the impact of the Deepwater Horizon oil spill on the Gulf of Mexico ecosystem;
- Evaluating and plotting the size of the hypoxic (Dead Zone) area off of Louisiana;
- Assessing shrimp and groundfish abundance and distribution and their relationship to such environmental parameters as temperature, salinity, and dissolved oxygen;
- Identifying environmental parameters associated with concentrations of larval finfish;
- Assessing the potential impact of the Deepwater Horizon oil spill on marine fish stocks; and
- Compiling the 2020 SEAMAP Environmental and Biological Atlas.

## **SEAMAP-South Atlantic Data Management System**

The goal of the SEAMAP-SA data management system is to create and maintain a web-based information system that facilitates data capture, error checking, data extraction, and dissemination of fishery-independent data and information for all ongoing SEAMAP-SA surveys. The SEAMAP-SA Data Management work group has met its goal of providing online public access through the ASMFC maintained [www.seamap.org](http://www.seamap.org) site and the SCDNR maintained based Oracle relational database ([www.dnr.sc.gov/seamap](http://www.dnr.sc.gov/seamap)). The SEAMAP.org website is where general links, information, and documents (surveys, reports, metadata, special studies) for SEAMAP-SA are presented. The Oracle database is constructed to provide access to “normalized data” for a number of fishery-independent programs including, but not limited to, SEAMAP-South Atlantic Coastal Trawl Survey, the NCDMF Pamlico Sound Survey, the Coastal Longline Surveys, and the Reef Fish Survey. The SEAMAP-SA Data Manager worked with the SCDNR Information Technology Department to continue to maintain and troubleshoot the Oracle database and web interface system as needed. Spatial presentations of SEAMAP-SA and other South Atlantic fishery-independent data are available through a regional GIS service managed by the Florida Fish and Wildlife Research Institute for the South Atlantic Fishery Management Council (SAFMC Fisheries Viewer: [http://ocean.floridamarine.org/sa\\_fisheries/](http://ocean.floridamarine.org/sa_fisheries/)). This application was developed for the SAFMC with ArcGIS Viewer for Flex. The custom GIS Web mapping application supports data display, interactive querying, geocoding and printing. Users may download GIS shapefiles and associated metadata.

Since last year’s annual meeting, the Data Management Workgroup worked to refine data availability in the current Oracle system. An application for the download of hydrocast data was finalized in the SEAMAP-SA data interface and is currently available to users. Hydrocast data for the Coastal Trawl and Reef Fish Surveys were updated and corrected during 2019-2020. In addition, surveys have provided an additional year of field data, which has been imported (2019 for the Coastal Trawl Survey, the Pamlico Sound Survey, and the Coastal Longline Surveys and 2017 for the Reef Fish Survey). Additional ageing and reproductive data were updated for the Coastal Trawl Survey and the Reef Fish Survey.

In addition to maintenance of the current Oracle database and extractions, SEAMAP-SA data management staff at SCDNR developed a pilot project with SECOORA to test the appropriateness of migrating the SEAMAP-SA database to the SECOORA system from the SCDNR system to increase availability of visualization and summary tools. SCDNR staff provided full time series data and code tables to the SECOORA portal programmers at Axiom Data Science to finalize the database structure, conduct load testing, continue to develop data extraction and summarization tools, and convert metadata to DarwinCore standards. In addition, SECOORA provided funding to Axiom Data Science to develop administration tools to collect user information and allow SCDNR staff to

directly import and correct data in the SECOORA system. Following review of the new system at the annual meeting, SCDNR staff provided all SEAMAP-SA surveys data to Axiom to complete the migration for the event, abundance, length frequency, individual specimen, and hydrocast data tables. The tagging table migration remains an outstanding issue to be addressed in the next year.

### **Southeast Regional Taxonomic Center (SERTC)**

As a result of reduced funding compared to previous years, SERTC activities were restricted to mostly maintaining the collection and fulfilling data requests, providing image and specimen loans, distributing educational materials, and assisting with simple species identifications. SERTC taxonomic specimens continue to be stored in a collection room.

Following a report of an Indo-Pacific swimming crab, *Charybdis helleri*, from Capers Creek, SC, SERTC staff provided collection information for all *C. helleri* specimens in the SERTC Collection to be included in the Gulf and South Atlantic Regional Panel on Invasive Species South Carolina state report. The SERTC Collection houses a specimen collected off Folly River in October 1986, which is the earliest record of this species from the western Atlantic. To date, *C. helleri* has been observed along the southeastern coast of the United States from Florida to North Carolina. Staff also provided SERTC database records for *Caprella andreae* to Dr. Rodríguez at the CIBIO-InBIO Research Center in Biodiversity and Genetic Resources in Vairão, Portugal, following their interest in the distribution of this species.

Staff provided Dr. Norenburg, with the Smithsonian Museum of Natural History, collection information for a nemertean specimen that is pictured on the SERTC website. Staff pulled the specimen from the collection to be sent to Dr. Norenburg once they can receive it. Staff shipped Cumacea and Tanaidacea specimens from the SERTC Collection, as well as some additional reference materials, to Dr. Richard Heard with the Department of Coastal Sciences at the University of Southern Mississippi. These items will be used to complete several South Atlantic Bight taxonomic guides.

Staff provided digital copies of the SERTC educational poster series, as well as 47 image loans, to the SCDNR South Carolina Oyster Recycling and Enhancement (SCORE) Program to be used for an educational program designed to teach students about species that regularly rely on oyster reef habitats. Staff provided an additional two digital copies and 25 hard copies of the educational poster series, as well as 23 Beachcomber's Guides and 19 Salt Marsh Guides. Staff loaned one SERTC image of a skeleton shrimp, *Paracaprella tenuis*, for a marine education newsletter. Staff also provided a box of educational coloring books to West Marine to distribute among children who visit the store. There were fewer requests for educational materials during this reporting period, likely due to the restrictions arising from the ongoing COVID-19 pandemic. Staff confirmed species identifications made by Smithsonian biologist Robert Aguilar regarding potential first accounts of the invasive marine isopod *Paradella diana* and green porcelain crab, *Petrolisthes armatus*, in North Carolina.

### **Program Documents**

The following peer reviewed papers and significant reports produced by project staff and/or based, at least in part, on project data were submitted, accepted, and/or published in the reporting period:

Buble, W.J., B. Galuardi, A.W. Dukes, and W.E. Jenkins. 2020. Incorporating Depth into Habitat Use Descriptions for Sailfish (*Istiophorus platypterus*) and Habitat Overlap with other Billfishes

in the Western North Atlantic. Marine Ecology Progress Series. Vol. 638:137-148. <https://doi.org/10.3354/meps13239>.

- Gamboa-Salazar, K. R., D.M. Wyanski, W.J. Bubley, and N. Klibansky. 2019. Effects of age and size on spawning and egg production in gag and scamp grouper off the southeastern United States. ICES Journal of Marine Science. Vol.77:290-299. doi:10.1093/icesjms/fsz174.
- Glasgow, D.M., W.J. Bubley, T.I. Smart, and M.J.M. Reichert. 2020. Standardized CPUE Based on the Southeast Reef Fish Survey Chevron Trap (1990-2019) and the MARMAP/ SEAMAP-SA Short Bottom Longline (1996-2019) and Long Bottom Longline Surveys (1996-2011 and 2015-2016). SCDNR Reef Fish Survey Technical Report 2020-03. 128 pp.
- Glasgow, D.M., M.J. Reichert, and J. Quattro. 2020. Effects of environmental factors on reef fish assemblage structure in the southeastern U.S. Atlantic. Submitted to Marine Ecology Progress Series.
- Kolmos, K.J., D.M. Wyanski, D.B. White, and P. Mikell. 2019. Temporal changes in the life history of Snowy Grouper (*Hyporthodus niveatus*) off the Carolinas, and factors that influence spawning dynamics. Fishery Bulletin. Vol. 117(4): 308-321.
- Marks, A., D.W. Kerstetter, D.M. Wyanski, and T.T. Sutton. 2020. Reproductive ecology of dragonfishes (Stomiiformes: Stomiidae) in the Gulf of Mexico. Frontiers in Marine Science. Vol. 7:101. doi: 10.3389/fmars.2020.00101. Published online 3 March 2020.
- Passerotti, M.S., T.E. Helser, I.M. Benson, B.K. Barnett, J.C. Ballenger, W.J. Bubley, M.J.M. Reichert, and J.M. Quattro. 2020. Age estimation of red snapper (*Lutjanus campechanus*) using FT-NIR spectroscopy: feasibility of application to production ageing for management. ICES Journal of Marine Science. doi:10.1093/icesjms/fsaa131.
- Pickens, C., T. Smart, M.J. Reichert, G. Sedberry, and D. McGlenn. 2020. Evaluating the effectiveness of marine protected areas for reef fish species in the US Southeast Atlantic. Submitted to Regional Studies in Marine Science.
- Reichert, M.J., T.I. Smart, M. Willis, and D.B. White. 2020. MARMAP/SEAMAP-SA Reef Fish Monitoring Cruise Report for 2019. MARMAP/SEAMAP-SA Reef Fish Survey Technical Report 2020-001. 49 pp.
- Rester, J.K. 2020. SEAMAP Annual Report to the Technical Coordinating Committee. Gulf States Marine Fisheries Commission, No. 299, GSMFC, Ocean Springs, MS.
- Rester, J.K., S. Murray, and E. Ojeda Serrano. 2020. Annual Report of the Southeast Area Monitoring and Assessment Program (SEAMAP), October 1, 2018 to September 30, 2019. Gulf States Marine Fisheries Commission, Atlantic States Marine Fisheries Commission, Puerto Rico Sea Grant College Program. No. 297, GSMFC, Ocean Springs, MS. 21 pp.
- Sinkus, W., B. White, L. Reed, and V. Shervette. 2020. Mercury bioaccumulation in grouper species from Atlantic waters of the Southeastern United States. Environmental Pollution, 2020\_3137.
- Smart, T.I., W.J. Bubley, D.M. Glasgow, and M.J.M. Reichert. 2020. Spatial Distribution Changes and Habitat Use in Red Porgy *Pagrus pagrus* in waters off the Southeast U.S. Atlantic Coast.



Accepted in Marine and Coastal Fisheries.

Wickliffe, L.C., F.C. Rohde, K.L. Riley, and J.A. Morris, Jr. 2019. An Assessment of Fisheries Species to Inform Time-of-Year Restrictions for North Carolina and South Carolina. NOAA Technical Memorandum NOS NCCOS 263. Beaufort, NC. 268 pp. doi:10.25923/7xdd-nw91.

Wyanski D.M., K.J. Kolmos, and W.J. Bubley. 2019. Update of Red Porgy, *Pagrus pagrus*, Reproductive Life History from the MARMAP/SERFS program. SEDAR60-WP02. SEDAR, North Charleston, SC. 23 pp.

Wyanski, D.M., D.M. Glasgow, K.R. Gamboa-Salazar, and W.J. Bubley. 2020. Reproductive Parameters for South Atlantic Scamp and Yellowmouth Grouper in Support of the SEDAR 68 Research Track Assessment. SEDAR68-DW-05. SEDAR, North Charleston, SC. 15 pp.

### **PROPOSED SEAMAP ACTIVITIES, FY2021**

Last year, total program allocations for all three SEAMAP components, Gulf, South Atlantic and Caribbean, was approximately \$4.8 million. At the July meeting, the SEAMAP components based their allocations for 2021 on level funding. Proposed FY2021 activities for all SEAMAP participants are shown in Table 2.

**Table 2.**

<b>PROPOSED SEAMAP ACTIVITIES, FY2021</b>				
	Fall	Winter	Spring	Summer
<b>Gulf of Mexico Activities</b>				
Resource Surveys:				
Spring Plankton Survey			X	
Reef Fish Survey			X	X
Summer Shrimp/Groundfish Surveys				X
Fall Shrimp/Groundfish Surveys	X			
Fall Plankton Survey	X			
Environmental Data Surveys	X		X	X
Bottom Longline Survey	X		X	X
Vertical Line Survey			X	X
Information Operations:				
Biological and Environmental Atlas		X		
FY2020 Joint Annual Report		X		
Real-time Data Summaries				X
Data Input and Request Processing	X	X	X	X
Specimen Archiving and Loan	X	X	X	X
Program Administration	X	X	X	X
<b>South Atlantic Activities</b>				
Resource Surveys:				
Coastal Survey	X		X	X
Pamlico Sound Survey	X			X
Winter Trawling and Fish Tagging Cruise		X		
Bottom Mapping Project	X	X	X	X
Fish Habitat Characterization and Assessment	X	X	X	X
Adult Red Drum Longline Survey	X		X	X
Information Operations:				
Data Input and Request Processing	X	X	X	X
Data Analysis and Utilization	X	X	X	X
Program Administration	X	X	X	X
Joint Planning Activities	X	X	X	X
<b>Caribbean Activities</b>				
Resource Surveys:				
Conch Survey Pilot Project	X	X	X	X
Lobster Survey Pilot Project	X	X	X	X
Information Operations:				
Preliminary Data Analysis and Quality Control	X	X	X	X
Information Dissemination	X	X	X	X
Program Administration	X	X	X	X

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