ANNUAL REPORT

OF THE SOUTHEAST AREA MONITORING AND ASSESSMENT PROGRAM (SEAMAP)

OCTOBER 1, 2017 - SEPTEMBER 30, 2018

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

Number 283

February 2019

JOINT ANNUAL REPORT of the Southeast Area Monitoring and Assessment Program October 1, 2017 - September 30, 2018

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 1985-2018. Funding allocations to participants for FY1985-FY2018 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 FY2018 and proposed activities for FY2019.

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 2017 and March 2018 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 2018 to discuss respective program needs and priorities for FY2019.

TABLE 1.

SEAMAP ORGANIZATION

Program	Administering Organization	Participating Agencies
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 2018. 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

The SEAMAP-South Atlantic (SEAMAP-SA) Data Management Work Group collaborated throughout the year to resolve SEAMAP database extraction issues. Additional SEAMAP-SA tasks included fulfilling data requests, preparation of annual program reports and State/Federal Cooperative Agreements, and distribution of publications.

The SEAMAP-SA Committee held their annual meeting in July 2018. In addition to Committee members, participants included the ASMFC Science Director, the SEAMAP-SA coordinator, SEAMAP Program staff, and representatives from the Data Management Work Group. The Committee developed the SEAMAP-SA budget and research program priorities for FY2019. The Committee also reviewed progress by SEAMAP-SA work groups and provided direction where necessary. The major discussions centered on plans for SEAMAP-SA data management and on the implications of budget constraints moving forward.

SEAMAP-Caribbean

During FY2018, liaison activities included data collection, management, and dissemination of fishery-independent data. Five SEAMAP-Caribbean (SEAMAP-C) committee meetings were held in Puerto Rico and the US Virgin Islands (USVI). The purpose of these meetings was to review programmatic surveys carried out in Puerto Rico and the USVI concerning conch, lobster, reef fish, and deepwater snapper populations. The five committee meetings were held on the following dates: December 15, 2017 in Puerto Rico; February 23, 2018 in Puerto Rico; May 18, 2018 in St. Thomas; July 24, 2018 in St. Petersburg, FL; and on September 21, 2018 in Puerto Rico.

As part of the coordination section efforts, two SEAMAP-C posters and educational brochures on conch, whelk, lobster, and reef fish were distributed as outreach materials. The color posters entitled "SEAMAP-Caribbean in Puerto Rico" and "SEAMAP-Caribbean in the Virgin Islands", summarized the main studies of SEAMAP in each region. These posters have been used during several fisheries workshops for fishermen and other targeted groups in Puerto Rico. They also have been distributed to the general public during visits to coastal communities.

A graduate student was contracted to continue updating the Caribbean sampling protocols and to summarize the information from all projects conducted by the Caribbean program.

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 FY2018, collection of resource survey information continued for the thirty-seventh 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 10 to November 21, 2017 from off southwest Florida to the U.S.-Mexican border. Two hundred ninety-two trawl stations were sampled during the survey. Plankton samples are no longer being collected during this survey. Vessels sampled waters out to 60 fm with trawls in addition to environmental sampling. While not funded by SEAMAP, Florida did participate in the Fall Shrimp/Groundfish Survey and collected data at one hundred forty-two trawl stations. 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.

Spring Plankton Survey

The SEAMAP Spring Plankton Survey was conducted from April 27 – May 25, 2018. Ninety-nine stations were sampled during the survey. The objectives of the survey were to assess, using neuston and bongo nets, the occurrence, abundance and geographical distribution of the early life stages of spring spawning fish, especially Atlantic Bluefin Tuna, from mid-continental shelf to offshore Gulf of Mexico waters in support of annual stock assessments and collect environmental data at all ichthyoplankton stations.

Plankton samples were taken with standard SEAMAP bongo and neuston samplers. The bongo sampler consisted of two conical 61-cm nets with 333-micron mesh. Tows were oblique, surface to near bottom (or 200 m) and back to surface. A mechanical flowmeter is mounted off-center in the mouth of each bongo net to record the volume of water filtered. Volume filtered ranges from approximately 20 to 600 m^3 but is typically 30 to 40 m^3 at the shallowest stations and 300 to 400 m^3 at the deepest stations. A single or double 2x1 m pipe frame neuston net fitted with 0.947 mm mesh netting is towed at the surface with the frame half-submerged for 10 minutes. Samples are taken upon arrival on station, regardless of time of day. At each station, either a bongo and/or neuston tow are made depending on the specific survey. Preservation protocol called for the right bongo samples to be preserved in 10% formalin and then transferred to fresh 95% ethanol after 36 hours. The original standard SEAMAP method of initial preservation in 10% formalin for 48 hours was changed to 36 hours in order to improve long term storage for genetic analysis. The left bongo and neuston samples are initially preserved in 95% ethanol and then transferred to fresh 95% ethanol after 24 hours. In addition, hydrographic data (surface chlorophylls, salinity, temperature and dissolved oxygen from surface, midwater and near bottom, and Forel-ule color) were collected at all stations.

Right bongo and neuston samples collected from SEAMAP stations were transshipped to the Polish Sorting and Identification Center. Left bongo samples were archived at the SEAMAP Invertebrate Plankton Archiving Center (SIPAC).

Bottom Longline Survey

The SEAMAP Bottom Longline Survey is a nearshore survey that complements an existing long-term fisheries independent longline survey currently 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. Texas, Louisiana, Mississippi, and Alabama sampled 165 stations from April through September, 2018 in waters off their coasts in 3-10m.

Vertical Line Survey

In FY2018, Texas, Louisiana, and Alabama conducted vertical line sampling for reef fish. Over 200 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 was standardized in 2016. The SEAMAP Subcommittee decided to divide 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 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. Florida sampled 209 stations on the west Florida shelf from May 7 to August 29 while NOAA Fisheries sampled 481 stations around the Gulf of Mexico from March 1 through May 6, 2018.

Summer Shrimp/Groundfish Survey

The SEAMAP Summer Shrimp/Groundfish Survey was conducted from June 5 to July 19, 2018. Three hundred two trawl stations were completed in this year's survey. Due to funding constraints, plankton sampling was not conducted during this year's survey. This was the thirty-seventh year for the survey. Objectives of the survey were to monitor size and distribution of penaeid shrimp during or prior to migration of Brown Shrimp from bays to the open Gulf; aid in evaluating the "Texas Closure" management measure of the Gulf Council's Shrimp Fishery Management Plan; and provide information on shrimp and groundfish stocks across the northern Gulf of Mexico from inshore waters to 60 fm.

Fall Plankton Survey

The Fall Plankton cruise took place from September 6 to September 30, 2018 with NOAA Fisheries, Louisiana, Mississippi, and Alabama participating. One hundred thirty-one stations were sampled this year. The objective of this survey was to collect ichthyoplankton samples with bongo and neuston gear for the purpose of estimating abundance and defining the distribution of eggs, larvae, and small juveniles of Gulf of Mexico fish, particularly king and Spanish mackerel, lutjanids and sciaenids.

Gear and methods used during the Fall Plankton Survey are the same as those used in the Spring Plankton Survey.

SEAMAP-South Atlantic

The Coastal Trawl Survey, conducted by the South Carolina Department of Natural Resources (SCDNR), continued as the long-standing core component of SEAMAP-SA survey activity. The overall goal of this survey 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 U.S. Initiated as a pilot project 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. In 2009 through 2012 the seasonal effort was increased again by 10%. However, as of spring 2013, seasonal effort was reduced to pre-2009 levels as a result of funding. Note that as a result of cumulative cost savings the seasonal effort increased to 2009-2012 levels (112 stations per season) for the calendar years of 2015 and 2016. Seasonal effort continued at a reduced level (102 stations per season) in 2018.

Discussions continued on the reduction of sampling efforts. However, due to some sea days savings as a result of inclement weather in the previous and current funding years, plus another year of supplemental funding by the ASMFC, we were able to complete the three seasonal sampling season in 2018.

Three multi-legged seasonal cruises were conducted between Cape Hatteras, North Carolina, and Cape Canaveral, Florida, during this reporting period (fall 2017, spring 2018, and summer 2018). A total of 252 stations in nearshore latitudinal strata (4.6 to 9.2 m depths) were sampled (91 stations in fall, 59 stations in spring, and 102 stations in summer). All samples were collected during daylight hours, a decision made in 1989 to maximize the collection of juvenile mackerels.

The fall 2017 cruise constituted the completion of the 28th full year of standardized sampling under a stratified random survey design. Sampling was conducted from October 9 through November 10, 2017. Eleven planned stations could not be completed during the available cruise window due to weather conditions, avoidance of marine mammal interactions, and debris snags. A total of 154 taxa were identified in fall trawls. The White Shrimp, *Litopenaeus setiferus*, was the most abundant species, representing 13.1% of the total catch based on numerical abundance. Atlantic Croaker, *Micropogonias undulatus,* was the second most abundant species (12.6%), followed by Atlantic Moonfish, *Selene setapinnis* (12.1%), Star Drum, *Stellifer lanceolatus* (11.8%), and species in the genus *Anchoa* (10.5%). An estimated 218,577 individuals were taken in trawls with a catch per unit effort (CPUE) of 2,402. Otolith samples were collected from Atlantic Croaker (n=301), Southern Kingfish, *Menticirrhus americanus* (n=593), Weakfish, *Cynoscion regalis* (n=235), King Mackerel, *Scomberomorus cavalla* (n=110), Spanish Mackerel, *Scomberomorus maculatus* (n=106), and Bluefish, *Pomatomus saltatrix* (n=44) for ongoing life-history research. Gonad samples were collected from Spanish Mackerel (n=79) and Bluefish (n=33). Due to recent interest from ASMFC, otolith samples were also collected from Spot, *Leiostomus xanthurus* (n=268).

The 2018 spring cruise for the SEAMAP-South Atlantic Coastal Trawl Survey began on April 13 and was completed on May 15, 2018. In total, 59 of the 102 stations were completed within five of the six sampling regions. There was no sampling effort in Raleigh Bay. Most strata within regions were sampled. However a sampling gap exists from St Helena Sound, SC to Sapelo, GA. Forty-three planned stations could not be completed during the available cruise window due to weather conditions, low tide heights, staffing challenges, and damaged gear. A total of 126 taxa were identified in spring trawls. The Atlantic Croaker was the most abundant species, constituting 45.4% of the total catch based on numerical abundance. Spot, was the second most abundant species (13.8%), followed by species in the genus *Anchoa* (5.7%), Atlantic Bumper, *Chloroscombrus chrysurus* (4.5%), and Silver Seatrout, *Cynoscion nothus* (3.7%). An estimated 200,227 individuals were caught during the spring cruise with a CPUE of 3,393.7 individuals per tow. Otolith samples were collected from Atlantic Croaker (n=207), Southern Kingfish (n=439), Spot (n=273), Weakfish (n=109), King Mackerel (n=3), Spanish Mackerel (n=53), and Bluefish (n=42). Gonad samples were collected from Bluefish (n=40) and Spanish Mackerel (n=44).

The 2018 summer cruise season for the SEAMAP-South Atlantic Coastal Trawl Survey began on July 9 and was completed on August 16, 2018. A total of 126 taxa were identified in summer trawls. An estimated 297,544 individuals, excluding miscellaneous invertebrates, Cannonball Jellies, and algae, with a biomass of 15,608 kg were caught during the summer cruise. The Atlantic Croaker was the most abundant species, representing 32.0% of the total catch based on numerical abundance. Spot was the second most abundant species (20.8%), followed by Banded Drum, *Larimus fasciatus* (7.1%), Brown Shrimp, *Farfantepenaeus aztecus* (5.4%), and Atlantic Cutlassfish, *Trichiurus lepturus* (4.6%). An estimated 297,544 individuals were captured during the summer cruise with a CPUE of 2,917. Otolith samples were collected from Atlantic Croaker (n = 400), Bluefish (n = 17), Southern Kingfish (n = 492), Spot (n = 419), Weakfish (n = 131), King Mackerel (n = 39), and Spanish Mackerel (n = 145).

Data from the Fall 2017 cruises has been added to the SEAMAP-SA data management system. The Fall 2017 cruise report is available at http://www.seamap.org/CoastalSurvey.html. During the reporting period, SEAMAP-SA Coastal Trawl Survey staff provided data for the Menhaden and Bluefish Benchmark Stock Assessments conducted by the Atlantic States Marine Fisheries Commission (ASMFC). Trawls survey data were also provided for various compliance reports to the Commission, to academic institutions for research purposes, and to the South Atlantic Fisheries Management Council to aid in fisheries management.

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 are trawled for 20 minutes using double rigged demersal mongoose trawls. Sampling occurs over a two-week period in June and September each year. During 2018 the North Carolina Division of Marine Fisheries (NCDMF) continued the ongoing Pamlico Sound Survey. Each cruise season the survey samples 54 stations that are randomly selected from seven strata based on depth and geographic location.

The survey sampled 54 stations each in June (11-15 and 18-22) and October (8-9 and 15-19) of 2018. The September portion of the survey was delayed until October because of impacts from Hurricane Florence on the North Carolina coast. Sampling during the first week of the survey (October 8th) was delayed further by the effects of Tropical Storm Michael. The 2018 data are processed by NCDMF and will be made available to the SEAMAP-South Atlantic DMS by April 2019. On February 20, 2018 the aggregated 1987-2016 Pamlico Sound Survey data was re-submitted to SCDNR for upload to the SEAMAP-SA database and website. On April 30, 2018, the 2017 Pamlico Sound Survey data was submitted to SCDNR for upload to the SEAMAP-SA database and website.

Bottom Mapping and Species Characterization

In FY2018, the Florida Fish and Wildlife Research Institute (FWRI) provided technical support and infrastructure for updating and distributing GIS data products of habitat, species and fisheries including bottom habitats and fishery-independent surveys in the South Atlantic region. Online access of SEAMAP mapping products is available via the South Atlantic Habitat and Ecosystem Atlas (https://ocean.floridamarine.org/safmc_atlas/). The Atlas integrates multiple services including spatial presentation of SEAMAP and other fishery-independent data through https://ocean.floridamarine.org/SA_Fisheries/.

FWRI created a new story map (https://bit.ly/2qCuVpU) to display the sampling stations of SEAMAP-SA surveys. 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 each SEAMAP-SA survey (https://bit.ly/2DurdHo). 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 MARMAP reef fish sampling 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 the Marine Resources Monitoring, Assessment, and Prediction Program (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 the 2011 sampling season, the Reef Fish Survey activities through SEAMAP-SA included regular monitoring of natural reef (live bottom) habitat identified in prior years, in addition to surveying for new areas with this habitat that have not been included in the survey to date. In addition, the SEAMAP-SA Reef Fish Survey continued diet studies of selected snapper and grouper species. SEAMAP-SA Reef Fish Survey staff has 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 south east region. Prior to the 2011 sampling season, it was decided in consultation with staff from all three reef fish surveys, that each program would sample a specific geographical area. As a result, SEFIS was scheduled to sample all chevron trap stations south of roughly 32ºN latitude using the R/V *Savannah*, while MARMAP and SEAMAP-SA were scheduled to sample all chevron trap stations north of roughly 32ºN latitude and all short bottom long-line stations. All sampling has been well coordinated between programs to ensure data quality standards and continuity. In addition, exploration of new areas of reef habitat to be included in the sampling stations database was continued by both SEAMAP-SA and SEFIS. In 2013 the combined monitoring efforts were conducted under a new name: The South East Reef Fish Survey (or SERFS).

In 2018, priorities agreed upon by the various parties involved in the Reef Fish Survey were aimed at continuing the chevron trap survey and the short bottom long line (SBLL) survey, which was resumed in July of 2014, on the R/V *Palmetto.* Based on the results of a trial in 2017 to deploy the short bottom longline off the R/V Lady. The halting of the SBLL survey for 2012, 2013, and the first half of the 2014 sampling season mostly affected data collection for snowy grouper and several other deep-water species. In addition, it significantly restricted data collection in areas of high vertical relief and Marine Protected Areas. Note that the MARMAP program provided partial funding for the short bottom long line survey. Given the available funding, we were unable to resume the long bottom long line (LBLL) survey using the R/V *Lady Lisa*.

In the 2018 season, we conducted sampling for the Reef Fish Survey from April 29 to October 5. We sampled 42 days using the R/V *Palmetto*, 22.5 of which were supported by SEAMAP. In addition, we sampled 4.5 days on the R/V *Lady Lisa* deploying short bottom longlines. The remaining sea days were funded by MARMAP and SCDNR. The vast majority of these sea days were used for reef fish monitoring, capturing specimens for diet studies, and short bottom ling line efforts, with very limited effort towards investigating new reef habitat.

During the 2018 sampling season, SEAMAP-SA researchers collected data for the annual reef fish monitoring, identified a few additional areas with natural reef habitat, collected samples for diet analysis (see section below). Limited surveys for new reef habitat were conducted using fathometry, reconnaissance trap deployments (with cameras), and short bottom long-line deployments. Hook and line fishing efforts (73 deployments) were mostly conducted for diet studies and to collect supplemental life history samples. Hook and line and bathymetry efforts were conducted during both day and nighttime hours, while other sampling activities occurred during daytime hours only.

Preliminary summary of the 2018 MARMAP and SEAMAP-SA Reef Fish Survey data indicated that sampling included 680 chevron trap deployments. During each trap deployment, a 60-90 minute video was recorded by two under-water cameras detailing habitat and fish populations near each trap. The chevron traps were equipped with one to four Go-Pro video cameras and recordings were shipped to SEFIS staff for examination and analysis as per agreement with SEFIS.

As a result of additional SEAMAP-SA funding (starting in the July 2014), the Reef Fish Survey resumed SBLL sampling for species in deeper hard bottom habitat (>90m) with significant relief. In 2018, a total of 48 SBLL stations were sampled. Due to funding, we did not resume the Long Bottom Longline survey in 2018.

Following any collections, hydrographic data (water temperature, salinity, etc.) were recorded during 125 CTD deployments (MARMAP and SEAMAP-SA combined). Abundance, biomass, and length-frequency data of the collected fish were recorded on a computer utilizing electronic measuring boards, and specimens identified for life-history work up were kept on ice and processed later. Otoliths, gonad samples, stomach contents, and DNA samples were taken and stored for later processing. MARMAP and SEAMAP-SA Reef Fish Survey staff will process all life-history samples collected by all SERFS projects (MARMAP, SEAMAP-SA, and SEFIS). The cruise information and samples are currently being processed, analyzed, and entered into the Reef Fish Database system and will subsequently be available for entry in the SEAMAP-SA database.

Preliminary analysis of the 2018 sampling season data indicated that a total of 16,600 individual fish, representing 69 species, were captured by the MARMAP and SEAMAP-SA Reef Fish Survey (all gears combined). Just under 30% of the captured specimens (4,785, 49 species) were retained for life-history work-up. The most abundant species in the catches were Tomtate (*Haemulon aurolineatum*), Black Sea Bass (*Centropristis striata*), Vermilion Snapper (*Rhomboplites aurorubens*), Porgies (*Stenotomus* spp.), Red Porgy (*Pagrus pagrus*), Gray Triggerfish (*Balistes capriscus*), White Grunt (*Haemulon plumierii*), Sand Perch (*Diplectrum formosum*), Bank Sea Bass (*Centropristis ocyurus*), and Spottail Pinfish (*Diplodus holbrooki).* A detailed cruise report and a report are being prepared and will be available on January 1, 2019. The trends report will detail long-term, trends in relative abundance of trap and longline catches for species abundant in our gear or of interest for fisheries managers in the region.

SEAMAP-SA Reef Fish Survey staff provided data and analyses, and participated in conference calls, webinars, and workshops for (SEDAR) stock assessment and management actions for Red Snapper, Golden Tilefish, Red Grouper, Black Sea Bass, Vermillion Snapper, Blueline Tilefish, Red Porgy, and Great Amberjack. Staff has also participated and provided expertise during other workshops and meeting such as the South Atlantic Fisheries Management Council, the Council's Scientific and Statistical Committee and Advisory Panels, and the Atlantic States Marine Fisheries Committee bodies. In addition, samples and data to researchers from various academic Institutions, state and federal agencies, NGO's, SAFMC, ASMFC, and others.

Diet studies

During the reporting period, targeted species for diet studies were grouper/hind species (family Serranidae), and Red Snapper (*Lutjanus campechanus*). Although rarely encountered with standard survey gear, diet samples from Lionfish (*Pterois sp.*) were also collected opportunistically due to their growing ecological impact. Fish were primarily collected using hook and line fishing gear (Round Scad (*Decapterus punctatus*) and squid (*Illex sp.)* used as bait) and chevron traps (baited with Atlantic Menhaden (*Brevoortia tyrannus*)) aboard the R/V *Palmetto,* and R/V *Savannah*. In

total, 167 stomachs (29 Scamp (*Mycteroperca phenax*), 8 Gag (*Mycteroperca microlepis*), 6 Red Grouper (*Epinephelus morio*), 7 Snowy Grouper (*Hyporthodus niveatus*), 5 Graysby (*Cephalopholis cruentata*), 3 Coney (*Cephalopholis fulva*), 2 Rock Hind (*Epinephelus adscensionis*), 1 Red Hind (Epinephelus guttatus), 2 Speckled Hind (*Epinephelus drummondhayi*), 1 Warsaw Grouper (*Hyporthodus nigritus*), 103 Red Snapper, and 4 Lionfish) were collected.

Stomachs were excised from the posterior end of the esophagus (near the mouth) to the pyloric sphincter, and immediately frozen and stored at -20°F. All contents from each stomach were then sorted, counted, measured (if whole), and weighed. Prey items were identified to the lowest possible taxon. For each species, to quantify feeding habits, the relative contribution of food items to the total diet will be determined using % frequency of occurrence (F), % composition by number (N), and % composition by weight (W). These measures will be used to calculate an index of relative importance (IRI). Once all prey items are identified for a particular species, more analyses will be completed (i.e., examining prey composition by predator size class, depth zone, latitude, and between species).

During the reporting period, 187 diet samples were processed. This includes processing of backlogged stomach samples for Scamp, Gag, Red Grouper, and Snowy Grouper, which were frozen upon collection to facilitate genetic sequencing of prey items not identifiable by traditional visual methods. By using DNA barcoding, approximately 32 unique piscine prey species were able to be identified in the diets of these predators. This is a significant increase in diet composition resolution, since only 5 unique species were previously identified using visual methods alone. Scamp consumed the greatest diversity of fish including Tomtate (*Haemulon aurolineatum*), Round Scad, Vermilion Snapper (*Rhomboplites aurorubens*), Striped Grunt (*Haemulon striatum*), Bluespotted Sea Robin (*Prionotus roseus*), and Red Barbier (*Hemanthias vivanus*). Gag consumed primarily Tomtate and Round Scad. Red Grouper consumed Tomtate, Vermilion Snapper, Bank Sea Bass (*Centropristis ocyurus*), and Cubbyu (*Pareques umbrosus*), and also ate a variety of invertebrates and cephalopods. Snowy Grouper preyed on cusk eels (*Ophidion sp.*), offshore lizardfish (*Synodus poeyi*), and also box crabs (Calappidae). This research was supported by additional funding awarded through the Slocum-Lunz Foundation. Preliminary results for this project were presented at the College of Charleston's Student Research Colloquium in October 2018.

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 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 were 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 were to tag and measure small and large coastal sharks caught during longlining, for inclusion in the COASTSPAN (Cooperative Atlantic States Shark Pupping and Nursery Survey) database and to respond to external requests for samples and/or data.

South Carolina – During the 2017/2018 sampling season, 360 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 (August 1 – September 15, September 16 - October 31, November 1 – December 15). In this report, for the 2017 sample season only the later part of time period II and the whole of time period III are considered (October through December); in 2018 only the first time period (August through mid-September) is considered. Each time period and stratum were sampled with equal effort. During sampling, 469 Red Drum were caught. Winyah Bay yielded the highest numbers of Red Drum (182) followed by Charleston Harbor (100), Saint Helena Sound (94), and Port Royal Sound (93). Three hundred sixty-three Red Drum were tagged and released, 6 were recaptured (4 project recaptures and 2 fish tagged by SCNDR Inshore Fisheries trammel net survey), 83 were sacrificed for age/growth and reproductive investigations, 6 were kept as broodstock for the SCDNR's mariculture program, 8 Red Drum were released without tags (fish that were lost at the boat or too stressed are released without tags to reduce mortality) and 3 were predated upon. Fin clips were taken from 464 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 and large Nurse Sharks. During this reporting period, 405 sharks were tagged and released.

North Carolina – For 2018, North Carolina conducted sampling in Pamlico Sound from July through September. Sampling occurred as part of a standardized, stratified-random sample design that has occurred in North Carolina since 2007. This design divides a large portion of the Pamlico Sound estuary into 12 similarly sized regions. From July through September, samples were taken from randomly selected grids (1 square nautical mile) within each region during each of three four-week intervals. All samples were conducted with a 1,500 meter mainline, with gangions placed at 15 meter intervals (100 hooks/set) during nighttime hours starting at sunset. On average, four sets were made per night. Two samples were collected from each randomly chosen sample site. Sampling targets were met, however Hurricane Florence and associated damage prevented longline sampling for one week in September.

Georgia – For the current reporting period, sampling occurred off southeast Georgia and northeast Florida during the fall months (October – December) of 2017 and the spring and summer months (May – September) of 2018. A total of 164 longline sets were deployed over the two seasons with 62 sets made during fall 2017 and 102 sets during the spring and summer of 2018. A total of 97 adult Red Drum were captured; 91 during fall 2017, and 6 during the spring and summer of 2018. Red Drum ranged in size from 754 to 1,035 mm center length. Prior to release, 63 Red Drum were tagged with both conventional dart tags and PIT tags.

A total of 435 sharks, representing ten species were captured. The top four species being Atlantic Sharpnose shark, Blacknose shark, Bonnethead, and Sandbar shark. During fall 2017, 43 Atlantic Sharpnose shark, 20 Blacknose shark, 3 Bonnethead, and 1 Sandbar shark were captured. During the spring and summer of 2018, 185 Atlantic Sharpnose shark, 66 Blacknose shark, 46 Bonnethead, and 20 Sandbar sharks were captured. Atlantic sharpnose sharks ranged in size from 385 to 1036 mm total length and none were tagged prior to release. Blacknose sharks ranged in size from 513 to 1410 mm total length and 84 were tagged prior to release. Bonnethead ranged in size from 359 to 1185 mm total length and 45 were tagged prior to release. Sandbar sharks ranged in size from 640 to 1828 mm total length and 27 were tagged prior to release.

SEAMAP-Caribbean

Puerto Rico

The destruction from Hurricane Irma on September 6 and Hurricane Maria on September 20, 2017 left over 75% of the islands of Puerto Rico without energy power throughout the rest of the year. Due to that fact, SEAMAP-Caribbean was not able to sample during most of this reporting period. Energy power at DNER was re-established in late February 2018.

Reef Fish Survey

In 2014, the SEAMAP Program Manager discussed the need to increase the number of sampling station in the Caribbean. The Reef Fish Survey was revamped and expanded to include video and bottom longline sampling to complement the hook and line gear. To develop a correction factor for historic data samples collected while drifting, the current sampling period includes hook and line fishing anchored and drifting.

Site selection includes a two-factor random stratified sampling design based on depth and benthic habitat type within the 50 fm contour of Puerto Rico. Depth stratification is based on three zones (0-10, 11-20 and 21-50 fm). Habitat classification was grouped in five major types: coral reef, seagrass, macroalgae, sand/mud and unknown. The largest type by far is the unknown classification. A total of 200 stations will be conducted by Puerto Rico, 100 off the east and west coast. When possible, a drop-down camera will be deployed to ground truth the area.

Sample collection is conducted using three sample gear types at each station: video camera (a two camera array), a 300-ft bottom longline (100 #9 circle hooks) and a 4-hook handline (two #9 circle and two #6 circle hooks). Each sample gear is deployed at the same station area, but at least 50 m apart, so that there is no interaction with the different gear types. For all samples, all pertinent station data is collected. In addition, fish length, sex, and gonadal condition is collected.

In all the reef fish surveys, data on sexual maturation of all individuals is recorded, which is being used to determine spawning season and size of 50% population maturation. Samples are also provided for the reproduction program established at the Fisheries Research Laboratory for some of the species under study by this program. Data are also being used to determine the precision of sex determination between macroscopic or microscopic/histological sexing. All individuals are macroscopically sexed and gonads are photographed, removed, and preserved for histological sexual determination. Comparison between macroscopic and microscopic sex is performed. This information is used as a guide to determine the sexual maturation for different species to increase the precision on sexing the individuals.

During this reporting period, a single station was sampled off the east coast. This trip was done before implementing the new methodology for the reef fish survey. During this a trip total of 12 species representing 6 families weighing 14 kg were collected. Two groups of fish constituted most of the catch, the groupers with 74% and the snappers 10% of the total catch by number.

Virgin Islands

Two category 5 hurricanes devastated the Virgin Islands in September 2017 leading to widespread damage. The resulting destruction of equipment, property, and infrastructure limited the ability of USVI Department of Planning and Natural Resources-Division of Fish and Wildlife (DFW) staff to

complete all sampling objectives. Losses included freezers of bait, damage to boats, no power for months, and the inability to acquire essential items like fuel or ice.

Reef Fish Survey

A new 32-foot research vessel was purchased and delivered from Florida to St. Thomas. This vessel arrived in the U.S. Virgin Islands in September 2017 and was secured during the Hurricanes without damage.

Despite significant difficulties during this reporting period a total of 26 sites were surveyed using the new longline-camera-handline methodology. Survey work began on January 16, 2018. A total of 52 videos were processed and 90 fish were measured, weighed, gonads staged, and had otoliths removed for a concurrent study on fish aging. The majority of sampled fish were captured using the longline method (n=65). More than half of the total catch (n=90) was composed of Blue Runner (n=32) and Red Hind (n=18).

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 1982-2017 have been entered into the system and data from 2018 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 2018:

- 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 2018 SEAMAP Environmental and Biological Atlas.

Real-time Data

A major function of the SEAMAP Information System is the processing of catch data from the Summer Shrimp/Groundfish Survey as near-real-time data. Data were transmitted weekly to the GSMFC for inclusion. Plots of station locations and catch rates of shrimp, squid and dominant finfish species were prepared, edited, and processed by GSMFC for weekly distribution to management agencies, fishermen, processors and researchers. SEAMAP real-time data plots were produced during the 2017 Summer Shrimp/Groundfish Survey. Six weekly mailings were produced and distributed to approximately 125 interested individuals. These plots were also available through the SEAMAP web page.

SEAMAP-South Atlantic Data Management System

The SEAMAP-SA data management system goal is 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 and special studies. The SEAMAP-SA Data Management work group has met its goal of providing public access on the Web to the ASMFC maintained at the www.seamap.org site and the SCDNR maintained based Oracle relational database (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 trawl survey, the Coastal Longline Surveys, the Reef Fish Survey, and eventually the SEAMAP Cooperative Winter tagging cruises. Spatial presentations of SEAMAP 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/). 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 primarily to refine the web design and data extraction queries. An application for the download of Hydrocast data was added to the SEAMAP-SA data interface. This application will be made available to users as soon as all Hydrocast data have been uploaded and imported into the database. Errors in the report extraction process were identified and corrected. To assist in this effort the group worked with SCDNR Information Technology Department in Columbia, SC, to continue to develop, maintain, and troubleshoot the Oracle database and web interface system. All Pamlico Sound data were deleted from the database and aggregated data were provided by North Carolina for upload and importation to the database. Access to data downloads has been restricted for the Reef Fish Survey while solutions to issues with data errors continue to be implemented. The SEAMAP-SA database for other projects is available via the web interface.

Southeast Regional Taxonomic Center (SERTC)

As a result of reduced funding compared to previous years, SERTC activities were restricted to mostly maintaining the collection, distributing educational materials, and assisting with simple species identifications. All SERTC taxonomic specimens continue to be stored in a collection room. During the reporting period, a specimen of the invasive *Charybdis helleri*, collected by DNR's

Southeast Area Monitoring and Assessment Program in an abandoned crab pot offshore South Carolina, was added to the SERTC collection.

A summary of the SERTC collection was sent to Dr. Gustav Paulay of the Florida Museum of Natural History. Dr. Paulay is accumulating data on the U.S. marine invertebrate community, specifically on U.S. holdings of marine invertebrates, for a National Science Foundation Thematic Collections Networks proposal for collection digitization. SERTC also assisted Dr. Steven Pennings, professor at the University of Houston, with his request to sample the Ace Basin NERR in 2018. Dr. Pennings is interested in documenting latitudinal variation in nematode diversity and crab body size in salt marsh dominated by *Spartina alterniflora*. Additionally, SERTC provided general information to a researcher at James Madison University interested in how oyster reef growth is monitored.

Various educational materials continue to be distributed among educators and the general public. Within the reporting period, a total of 235 educational posters, 124 South Carolina Beachcomber's Guides, and three copies of the Guide to the Salt Marshes and Tidal Creeks of the Southeastern United States have been distributed. Additionally, SERTC provided 24 image loans to multiple institutions, including the Gray's Reef National Marine Sanctuary, the University of Georgia, the University of Guadalajara, and Huntington Beach State Park in Pawley's Island, SC.

SERTC also maintains microscope-mounted photography equipment in the collection room. It is currently being used by the Crustacean Research and Monitoring Section to photograph various species of coastal crayfish.

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:

Bacheler, N.M. and J.C. Ballenger. 2018. Decadal-scale decline of scamp (*Mycteroperca phenax*) abundance along the southeast United States Atlantic Coast. Fisheries Research 204: 74-87.

Batt, R. D., J. W. Morley, R. L. Selden, M. W. Tingley, and M. L. Pinsky. 2017. Gradual changes in range size accompany long-term trends in species richness. Ecology Letters 20(9): 1148-1157 doi: 10.1111/ele.12812.

Bubley, W.J. and T.I. Smart. Vermilion Snapper Fishery-Independent Index of Abundance in US South Atlantic Waters Based on a Chevron Trap Survey (1990-2016). SEDAR55 WP02.

Bubley, W. and D. Wyanski. Update of Vermilion Snapper, *Rhomboplites aurorubens*, Reproductive Life History from the MARMAP/SERFS programs. SEDAR55 WP03.

Bubley, W.J. (ed.) 2017. 2017 MARMAP Life History Data Report. (MARMAP Technical Report # 2017-004).

Bubley, W.J., J.C. Ballenger, T.I. Smart, and M.J.M. Reichert. 2017. Trends in relative abundance of reef fishes in fishery-independent surveys of waters off the SE US. Delta-GLM Standardized CPUE Based on the Southeast Reef Fish Survey Chevron Trap (1990-2016) and the MARMAP/ SEAMAP-SA Short-Bottom Longline (1996-2011 and 2013-2016) and Long

Bottom Longline Surveys (1996-2011 and 2016). MARMAP/SEAMAP-SA Reef Fish Technical Report 2017-003 (v.1). 98 pp.

Carlson, J.K., A.G. Pollack, W.B. Driggers, J.I. Castro, A.B Bramie, and J.L. Lee. 2017. Revised analyses suggest that the lesser electric ray *Narcine bancroftii* is not at risk of extinction. Endangered Species Research 32: 177-186.

Cleary, J., S. Roberts, C. Curtice, and P.N. Halpin (2017). Exploring Species Range Shifts in the U.S. Mid Atlantic: Existing Literature, Web Portals, and Data, report prepared for the Mid-Atlantic Council on the Ocean (MARCO), Marine Geospatial Ecology Lab at Duke University, Durham, North Carolina, 54 pp.

Ewers-Saucedo, C., B.K.K. Chan, J.D. Zardus, and J.P. Wares. 2017. Parallel Patterns of Host-Specific Morphology and Genetic Admixture in Sister Lineages of a Commensal Barnacle. The Biological Bulletin 232(3): 171-185.

Farmer N. Science Journal for Kids published a kid's version of the paper published in PLOS One (2017) paper: “Timing and locations of reef fish spawning off the southeastern United States.” This version “How can we protect fish better?” is available freely online (http://www.sciencejournalforkids.org/articles/how-can-we-protect-fish-better), along with student assessment questionnaire, a teacher's key, science curriculum alignment and some opening videos.

Morley, J. W., R. D. Batt, and M. L. Pinsky. 2017. Marine assemblages respond rapidly to winter climate variability. Global Change Biology 23(7): 2590-2601.

Peterson, C.D., C.N. Belcher, D.M. Bethea, W.B. Driggers III, B.S. Frazier, and R.J. Latour. 2017. Preliminary recovery of coastal sharks in the southeast U.S. Fish and Fisheries DOI:10.1111/faf.12210

Peterson C.D., K.T. Parsons, D.M. Bethea, W.B. Driggers III, and R.J. Latour. 2017. Community interactions and density dependence in the southeast United States coastal shark complex. Marine Ecology Progress Series 79:81-96.

Reichert, M., T. Smart, M. Willis, B. White. MARMAP/SEAMAP-SA Reef Fish Monitoring Cruise Report for 2017. MARMAP/SEAMAP-SA Reef Fish Survey Technical Report 2018-001. Submitted to NMFS on January 1, 2018. 75 pp.

Rester, J.K. 2018. SEAMAP Annual Report to the Technical Coordinating Committee. Gulf States Marine Fisheries Commission, No. 279, GSMFC, Ocean Springs, MS.

SEAMAP 2017 Annual Coastal Trawl Survey Report.

Siegel, S. V., A.V. Rivero, J. Oberstaller, B.L. Colon, I. de Buron, and D.E. Kyle. 2018. Blood flukes *Cardicola parvus* and *C. laruei* (Trematoda: Aporocotylidae): life cycles and cryptic infection in spotted seatrout, *Cynoscion nebulosus* (Teleost: Sciaenidae). Parasitology Intern. 67(2):150-158.

Smart, T.I., A. Lytton, and A. Kelly. Spatiotemporal trends in abundance and life history of Gray Triggerfish *Balistes capriscus* off the Southeast U.S. Atlantic coast. Submitted to Fishery Bulletin.

Smith, D.R., H.J. Brockmann, M.A. Beekey, T.L. King, M.J. Millard, and J. Zaldívar-Rae. 2017. Conservation status of the American horseshoe crab, (*Limulus polyphemus*): a regional assessment. Reviews in Fish Biology and Fisheries 27(1): 135-175.

White, A. 2017. Spatial and temporal heterogeneity in life history and productivity trends of Atlantic Weakfish (Cynoscion regalis) and implications for fisheries management. M.S. Thesis. Virginia Polytechnic Institute and State University, Blacksburg, Va. 6/26/2017.

PROPOSED SEAMAP ACTIVITIES, FY2019

Last year, total program allocations for all three SEAMAP components, Gulf, South Atlantic and Caribbean, was approximately $4.74 million. At the July meeting, the SEAMAP components based their allocations for 2019 on level funding. Proposed FY2019 activities for all SEAMAP participants are shown in Table 2.

Table 2.

PROPOSED SEAMAP ACTIVITIES, FY2019	Fall	Winter	Spring	Summer
Gulf of Mexico Activities				
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			
Winter Plankton Survey		X		
Plankton and Environmental Data Surveys			X	X
Bottom Longline Survey	X		X	X
Vertical Line Survey			X	X
Information Operations:				
Biological and Environmental Atlas		X		
FY2018 Joint Annual Report		X		
Real-time Data Summaries		X		X
Data Input and Request Processing	X	X	X	X
Specimen Archiving and Loan	X	X	X	X
Program Administration	X	X	X	X
South Atlantic Activities				
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
Caribbean Activities				
Resource Surveys:				
Reef Fish Botton Longline Survey (PR & VI)	X	X	X	X
Reef Fish Camera Monitoring (PR & VI)	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

SEAMAP-Gulf of Mexico Representatives

Ted Switzer, Chair
Florida Fish and Wildlife Conservation Commission

John Mareska
Alabama Department of Conservation
and Natural Resources

Brett Falterman
Louisiana Department of Wildlife and Fisheries

Read Hendon
Mississippi Department of Marine Resources
USM/Gulf Coast Research Laboratory

Fernando Martinez-Andrade
Texas Parks and Wildlife Department

Christian Jones
National Marine Fisheries Service
Pascagoula Laboratory

John Froeschke
Gulf of Mexico Fishery Management Council

SEAMAP-South Atlantic Representatives

Roger Pugliese, Chairperson
South Atlantic Fishery Management Council

Marcel Reichert
South Carolina Department of Natural Resources

Patrick Campfield
Atlantic States Marine Fisheries Commission

Wilson Laney
U.S. Fish and Wildlife Service

Carolyn Belcher
Georgia Department of Natural Resources

Tina Udouj
Florida Fish and Wildlife Research Institute

Todd Kellison
National Marine Fisheries Service
Beaufort Laboratory

Katy West
North Carolina Department of Environment and
Natural Resources

SEAMAP-Caribbean Representatives

Ricardo López, Chairperson
Marine Fisheries Laboratory, Director
Puerto Rico Department of Natural and
Environmental Resources

Ruth Gomez
US Virgin Island Division of Fish and Wildlife

Aida Rosario, DNER Contractor
Puerto Rico Department of Natural and
Environmental Resources

Verónica Seda
Puerto Rico Department of Natural and
Environmental Resources

Juan J. Cruz Motta/Ruperto Chaparro
Puerto Rico Sea Grant College Program

Richard Appeldoorn
University of Puerto Rico

Matthew Kammann//Eric Wooden
US Virgin Islands Division of Fish and Wildlife

Graciela Garcia-Moliner
Caribbean Fishery Management Council

Miguel Rolón
Caribbean Fishery Management Council

Walter Ingram/Eric Hoffmayer/Christian Jones
NOAA-National Marine Fisheries Service

Edwin Muñíz/Ana Román
Puerto Rico & Virgin Islands
US Fish and Wildlife Service

SEAMAP Personnel

Jeffrey Rester
SEAMAP-Gulf Coordinator
Gulf States Marine Fisheries Commission

Sarah Murray
SEAMAP-South Atlantic Coordinator
Atlantic States Marine Fisheries Commission

Edgardo Ojeda Serrano
SEAMAP-Caribbean Coordinator
Puerto Rico Sea Grant College Program

David Donaldson, Executive Director
Gulf States Marine Fisheries Commission

Robert Beal, Executive Director
Atlantic States Marine Fisheries Commission

Bret Allain, Chairman
Gulf States Marine Fisheries Commission

James Gilmore, Chairman
Atlantic States Marine Fisheries Commission

Lloyd Kirk
Gulf States Marine Fisheries Commission
SEAMAP Data Manager

Sara LeCroy, Curator
SEAMAP Invertebrate Plankton Archiving Center

Eric Hoffmayer
National Marine Fisheries Service
SEAMAP Program Manager

Kelly Donnelly
National Marine Fisheries Service
SEAMAP Program Office