ANNUAL REPORT

OF THE
SOUTHEAST AREA MONITORING
AND ASSESSMENT PROGRAM
(SEAMAP)

OCTOBER 1, 2020 - SEPTEMBER 30, 2021

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
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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 1985-2021. Funding allocations to participants for FY1985-FY2021 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 FY2021 and proposed activities for FY2022.

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 (ASMFC), 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 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 2020 and March 2021 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 2021 to discuss respective program needs and priorities for FY2022.

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 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 29th, 2021 via webinar. The Committee provided updates on program activities and discussed the SEAMAP-SA budget. The Committee also reviewed the continuing impacts of the COVID-19 pandemic on ongoing fieldwork, progress by SEAMAP-SA work groups, and the transition of the SEAMAP-SA online database to SECOORA and provided direction where necessary.

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 in 2020 due to the restrictions but resumed sampling in 2021. The Georgia Coastal Longline Survey was largely unaffected. South Carolina Department of Natural Resources (SCDNR) field sampling operations continued to be significantly impacted. The unavailability of vessel staff resulted in the reduction of sea days, in particular for the Coastal Trawl Survey. Reduced scientific field crews resulted in adjustments in field operations, in particular for the Reef Fish Survey. Fortunately, very limited COVID-19 impacts were seen in the Red Drum and Coastal Shark Longline Survey.

SEAMAP-Caribbean

On March 31, 2021, the previous Coordinator Edgardo Ojeda retired and in April 2021 the new Coordinator, Carlos Zayas Santiago, started. During FY2021, liaison activities included data collection and management, of fishery-independent data for dissemination among SEAMAP-Caribbean (SEAMAP-C) members and the public. Eight regular SEAMAP-C committee meetings were held online. The purpose of these meetings was to establish standardized methodologies for the surveys carried out in Puerto Rico and the USVI concerning conch, lobster, and reef fish. As well as transitioning and hiring the new SEAMAP-C coordinator.

The committee meetings were held online on the following dates: January 13, 2021, February 12, 2021, April 09, 2021, April 30, 2020, May 07, 2021, May 13, 2021, July 20, 2021, and October 8, 2021. In addition to these regular meetings, a reef fish video analysis workshop was held online on May 13, 2021 and a lobster preservation and ossicle extraction workshop on September 2, 2021. The reef fish, conch and lobster sampling protocols are being standardized and adjusted to meet the natural intricacies of the Caribbean and obtain a more useful data collection for fisheries management purposes.

The reef fish video sampling protocol document was reviewed to include the new reef fish sampling design, which includes dropping the use of longline and increase handline effort in combination with video recording, using cameras arrays, as recommended by NMFS/NOAA.

The next five-year proposal for coordination was submitted. The coordinator and a contractor continue to analyze and QA/QC the west coast of Puerto Rico video-recordings for bottom habitat

classification and reef fish species identification and abundance determination. This work is performed for all videos collected at the west coast of Puerto Rico.

Equipment was necessary to improve data analysis capabilities and improve data storage and archiving capabilities that could also be used in the next five-year cycle as stereo video technology and software requires grater computing power. Therefore, computers and hard drives were acquired during this fiscal year. All SEAMAP-C study reports and related information, including the SEAMAP-C sampling protocols and related information have been made available for public dissemination in the Puerto Rico Sea Grant fisheries coordinator's blog site at http://prsgfisheriesoutreach.wordpress.com. However, the information is being moved to increase exposure by posting the information on a new webpage under construction at https://seagrantpr.org/.

In the meantime, and to continue with the outreach component educational post have been made on the Sea Grant Facebook page. The main goal has been to make this information accessible for dissemination and outreach, and to have a clear and uniform sampling protocol.

RESOURCE SURVEYS

In FY2021, collection of resource survey information continued for the fortieth 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 1 to December 11, 2020 from off southwest Florida to the U.S.-Mexican border. NOAA Fisheries, Florida, Alabama, Mississippi, and Louisiana sampled two hundred fifty trawl stations during the survey. The Fall Shrimp/Groundfish Survey effort was impacted by numerous tropical systems last fall. 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.

Spring Plankton Survey

The SEAMAP Spring Plankton Survey was conducted by NOAA Fisheries from April 28 - May 26, 2021. Ninety-seven 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 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.

Vertical Line Survey

The SEAMAP Vertical Line Survey is currently being conducted off Alabama, Louisiana, and Texas. Two hundred twenty stations were sampled in 2021. 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 sampled 464 camera stations from March - June during the 2021 SEAMAP Reef Fish Survey, while Florida sampled 807 camera stations. In addition, the state of Florida conducted 69 habitat mapping surveys.

Summer Shrimp/Groundfish Survey

The SEAMAP Summer Shrimp/Groundfish Survey was conducted from June 1 to July 19, 2021. NOAA Fisheries, Florida, Alabama, Mississippi, and Louisiana sampled two hundred twenty-three trawl stations in this year's survey. Survey effort was impacted by vessel related COVID protocols. 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 9 through October 4, 2021. NOAA Fisheries completed ninety-seven stations during the survey. 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

Coastal Trawl Survey

The overall goal of the Coastal Trawl Survey, conducted by the South Carolina Department of Natural Resources (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 U.S. 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. Sampling effort currently consists of sampling 102 stations per season.

Sampling remained suspended entirely through the fall of 2020, due to the pandemic. Work primarily focused on data QA/QC. Three Simrad PX multisensors, a receiver, and a portable hydrophone were purchased in anticipation of beginning mensuration exercises during the final year of operations aboard the R/V *Lady Lisa*.

Due to COVID-19 impacts, it was decided that spring 2021 would be approached as day-trips to work out logistics of deploying the new Simrad mensuration gear. Three day-trips were executed. On the first tow of the first trip, the starboard main trawl cable parted during the tow. It took much of the rest of the day to retrieve the lost rig, and the rest of the week to arrange and accomplish cable replacement. Nine tows were completed over the remaining two days of sampling. Biomass from the two catches of each tow was recorded, but usual catch sorting and logging was not conducted. The exercises confirmed that the chosen mounting points for the sensors could work but were sub-optimal. Door spread sensors were mounted near the lower rear corner, on the outside of each trawl door of the port net. A third sensor, programmed to log height above bottom and to act as a trawl geometry master, was clipped into the ventral surface of the tongue of the net. The Simrad portable hydrophone was mounted in a Survey-designed towfish and deployed from a small tow block approximately 4m out the port outrigger and set to run approximately 2-3 m below the surface. Door spread and tongue height readings were consistently logged, however trawl geometry was only received intermittently.

In preparation for the start of the summer cruise season, a small opening (~ 10cm high x 15cm long) was cut in each port trawl door rigged with a spread sensor, positioned adjacent to, and slightly forward of, the lateral communications port of each sensor. Summer deployments of the PX Multisensors demonstrated that this resolved the issue of intermittent trawl geometry data.

The 2021 summer cruise began on July 12 and was terminated on August 10, 2021, after the crew received notice at sea that two of them had been exposed to someone who had tested positive for COVID-19. Those two crew members escaped infection. However, after docking and crew testing, it was discovered that a third member of the crew was positive for COVID-19, from a separate, unknown, contact. Of the 102 stations allocated for the summer season, 38 out of 39 stations between Winyah Bay, SC and the GA/FL border were completed in a total of 9.5 vessel days. No sampling was executed north of Winyah Bay, SC or off FL. Simrad PX Multisensor net mensuration gear, acquired late in 2020, was rigged on the port trawl rig, and only catch from this rig was processed. The tailbag of the starboard rig was left open. Door spread, tongue (head rope) height above bottom, and geometry (distance from port door to tongue, distance from starboard door to tongue, and difference between the two) were logged. Occasionally, there appeared to be orientation issues with the tongue sensor, resulting in questionable height data; these values will be removed from analysis.

Average door spread for 22 of the 38 tows was 14.2m. Average tongue height for those same tows was 4.6m.

Preliminary analysis of the 2021 summer data has been completed. A total of 82 taxa were identified in summer trawls. An estimated 40,220 individuals, excluding Cannonball Jellies, miscellaneous invertebrates, and algae, with a biomass of 1,758 kg were caught during the summer cruise. Cannonball Jellies (n = 2), miscellaneous (non-crustacean) invertebrates, and algae contributed an additional 109 kg of biomass. Life history research resumed this summer. Otolith samples were collected from Atlantic Croaker (n = 146), Bluefish (n = 8), Southern Kingfish (n = 121), Spot (n = 173), Weakfish (n = 92), King Mackerel (n = 8), and Spanish Mackerel (n = 62). Gonad samples were collected from Bluefish (n = 8) and Spanish Mackerel (n = 44).

An annual summary report for calendar year 2020 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. Spanish Mackerel life history data and age-0 and age-1 indices of abundance were provided to support SEDAR stock assessment 78. Bluefish life history and indices of abundance were provided to support the ASMFC update assessment.

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 2021 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. In addition to COVID restrictions, the completion of the September 2021 portion of the survey was interrupted by staffing issues related to the R/V *Carolina Coast*.

During 2021, NCDMF sampled 35 stations in June over six day-trips (June 7-9th, 16-18th) and 33 stations in September over five day-trips (September 7-9th, 14-15th). Stations were sampled from all seven strata for both months. The 2020 data were processed by NCDMF and made available to the SEAMAP-SA data management. Cruise reports for the 2020 sampling year were also completed and made available to SEAMAP-SA. The data for the 2021 sampling year will be processed and made available to SEAMAP-SA data management when complete.

Bottom Mapping and Species Characterization

In FY2021, 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).

FWRI updated the SEAMAP-SA surveys story map (https://arcg.is/1W9D4e) to display the SEAMAP-SA Data Management Work Group in the credits section. Each participating survey and state agency are now recognized in this new feature.

Fish Habitat Characterization and Assessment

Reef fish sampling

In February 2021, MARMAP, SEAMAP-SA Reef Fish Survey, SEFIS, and SEFSC stock assessment staff met to discuss the COVID-19 implications for the 2021 field season. Both SCDNR and SEFIS were planning to conduct overnight cruises, but with a limited survey staff on board (4-6 rather than 8-9). This was expected to reduce sampling efficiency in terms of number of gear deployments per day, the amount of life history work-up, or a combination thereof. An overall sampling strategy for 2021 was agreed upon and was communicated with SEFSC leadership and the MARMAP Technical Monitor and discussed with SERFS partners. In addition, NOAA allowed us to use some of the carry-over funds for sea days from the previous 5-year grant for the 2021 sampling season. The group considered various options for optimizing the data collection in terms of number of Chevron Video Traps (CVTs), including the number of videos and life history information. The consensus was to optimize the number of CVTs sampled as well as the number of age structures collected (the two highest stock assessment priorities) during the 2021 season. This means that SERFS collectively aimed to deploy 2,000 to 2,400 CVTs in 2021, averaging 15 to 18 CVTs (2.5 to 3 sets) per day. One of the primary advantages of this strategy was that it may allow us to analyze effective sample size for a larger number of species, which will likely aid in survey (and possibly funding) decisions in the future. Trying to optimize the number of deployed CVTs was done in lieu of collecting the normal full suite of life history samples. However, the normal length frequency work-up was completed for all CVTs. Given the priority data needs for stock assessments the order of priority for data and sample collection in 2021 was:

I. Collect underwater videos, as well as species composition, biomass, abundance, and length composition from each trap catch (normal SERFS protocol)
II. Collect stereo camera data from one stereo camera system on one trap in each deployed trap set.
III. Collect otoliths from priority species, some of which were subsampled. We collected otoliths from Black Sea Bass (random selection of 20% of all fish), Vermilion Snapper (random selection of 20% of all fish), White Grunt (random selection of 50% of all fish), Red Snapper, Red Porgy, and groupers. We also collected spines from Gray Triggerfish (random selection of 50% of all fish). We anticipated that no otoliths would be sampled from any other species unless time allowed.
IV. Time allowing, macro sex information from priority gonochoristic species (Red Snapper, Vermilion Snapper, White Grunt, and Gray Triggerfish) would be determined and recorded.
V. Time allowing, histological samples from Red Porgy, Red Snapper, and groupers would be collected only. Red Porgy was selected because we did not collect Red Porgy reproductive tissues in the previous 4 years, reproductive parameters of Red Porgy are very plastic, and the results of the Red Porgy stock assessment indicated recruitment issues. Red Snapper histology would be collected from female and fish with unknown sex only to reduce the number of samples.

VI. Time allowing, reproductive tissues, otoliths, and other samples such as DNA and stomachs would be collected from other species.

The 2021 Reef Fish Survey monitoring cruises took place between May 19 and October 15 with 40.5 realized sea days aboard the R/V *Palmetto*. Funding for 19.5 R/V *Palmetto* sea days was provided by the MARMAP program, whereas the SEAMAP-SA program provided funding for 21 sea days. Periods of consistent high seas due to strong winds, named storms, and vessel staffing issues resulted in shortening or cancelation of some cruises. The scientific crews consisted of 6 to 7 scientific staff, a reduction in staff due to COVID-19 protocols.

Regular sampling consisted of deployments of the Chevron Video Trap. Each chevron trap was equipped with two GoPro video cameras. During each trap deployment, 45-90 minute videos were recorded by two underwater cameras detailing habitat and fish populations near each trap. Recordings were shipped to SEFIS staff for examination and analysis as per agreement with SEFIS. Following each collection, hydrographic data (water temperature, salinity, etc.) were recorded during 140 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 and spines (from Gray Triggerfish), gonad samples, and when possible, stomach contents, and DNA samples were taken and stored for later processing. MARMAP and SEAMAP-SA Reef Fish Survey staff are processing all life-history samples collected by all SERFS partners (MARMAP, SEAMAP-SA, and SEFIS). The 2021 cruise information and samples currently are being processed, analyzed, and entered into the Reef Fish Survey Database, and subsequently will be available via the SEAMAP-SA database. Note that Long and Short Bottom Longline sampling in 2021 was not funded by SEAMAP-SA or MARMAP but were deployed as part of separately funded MARFIN and South Atlantic Deep Water Longline Survey (SADLS) projects.

During the 2021 MARMAP/SEAMAP-SA Reef Fish Survey season, a total of 1,311 gear deployments were conducted on the R/V *Palmetto,* the highest number of gear deployment in the program's history. Preliminary analysis indicates that close to 16,000 individual fish representing 73 species were caught by MARMAP/SEAMAP-SA. Ten species (Tomtate, Vermilion Snapper, Black Sea Bass, Red Porgy, White Grunt, Red Snapper, Gray Triggerfish, *Stenotomus* spp., Spottail Pinfish, and Sand Perch) made up 92% of the total catch of all gears in numbers. In recent years, the list of most abundant species in the trap catches has not changed much, but Red Snapper was the 6th most abundant species in the catches in 2021. Life history samples were removed from just over 2,500 specimens, representing 30 species. The data are undergoing QA/QC. MARMAP/SEAMAP-SA Reef Fish Survey staff will process all life history samples, including otoliths or spines, reproductive tissues, and fin clips, provided sufficient funding is available.

All field data are being entered into the standard MARMAP/SEAMAP-SA Reef Fish Survey Access database after quality control procedures are completed. Analyses of the data for the 2021 summary report and SEDAR stock assessments are ongoing.

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 and coastal sharks to generate information on CPUE for indices of abundance. The survey also collects biological information (size, sex, etc.) and samples (otoliths, gonads, muscle, fin clips, etc.) from random sub-samples of the Red Drum catch to determine size at age, recruitment to the spawning population, and genetic composition of the stock. Adult Red Drum and coastal sharks are tagged to collect migration and stock identification data. Results and accomplishments are disseminated to the ASMFC and NMFS for inclusion in stock assessments; and through an annual summary report.

South Carolina – During the 2020/2021 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 2020 the later part of time period II and the whole of time period III are considered (October through December); in 2021 only the first time period (August through mid-September) is considered. All time periods and strata were sampled with equal effort. During sampling, 723 Red Drum were caught. Winyah Bay yielded the highest numbers of Red Drum (310) followed by Charleston (178), Saint Helena Sound (154), and Port Royal Sound (81). There were 606 Red Drum that were tagged and released, 14 were recaptured (8 project recaptures and 6 fish tagged by SCNDR Inshore Fisheries trammel net survey), 80 were sacrificed for age/growth and reproductive investigations, 12 were kept as broodstock for the SCDNR's mariculture program, and 11 were released without tags (fish that were lost at the boat or too stressed are released without tags to reduce mortality). Fin clips were taken from 707 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, except for Atlantic Sharpnose (*Rhizoprionodon terraenovae*) and large Nurse Sharks (*Ginglymostoma cirratum*). During this reporting period, 2,244 sharks were caught. Of those, 767 were tagged and released. The four most abundant shark species were Atlantic Sharpnose (1365), Sandbar (*Carcharhinus plumbeus*) (245), Blacknose (*Carcharhinus acronotus*) (212) and Blacktip (*Carcharhinus limbatus*) (136). There were no COVID-19 pandemic impacts to 2020-2021 sampling.

North Carolina –In 2021, North Carolina conducted sampling for adult Red Drum in the Pamlico Sound from July through October. 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 October, samples were taken from randomly selected grids (1 square nautical mile) within each region during each of the 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. Two samples were collected from each randomly chosen sample grid.

In 2021, sampling consisted of 72 longline sets and yielded a total of 219 Red Drum. Red drum captured ranged in size from 584 to 1,295 mm fork length. The Red Drum index (# of fish per 100 hook set) in 2021 (3.04) was below the average index (4.7) across the entire time-series (2007-2019). Forty Red Drum were sacrificed to determine age composition and for other biological investigations. One-hundred and sixty-three red drum were tagged and released to track migration, stock ID, and growth rates. Sampling during this period resulted in eight tag recaptures of red drum. No sharks were captured during the 2021 longline sampling season.

Georgia – For the current reporting period, sampling occurred off southeast Georgia during the fall months (October – December) of 2020 and the summer months (June – September) of 2021. A total of 91 longline sets were deployed over the two seasons, with seven sets made during fall 2020 and 84 sets during the summer of 2021. No time was lost due to COVID-19 effects during the sampling period, but sampling during fall 2020 was negatively impacted by vessel mechanical problems. A total of six adult Red Drum were captured: two during fall 2020 and four during the summer of 2021. red drum ranged in size from 971 to 1,040 mm FL. Prior to release, four Red Drum were tagged with both conventional dart tags and PIT tags, one Red Drum received only a PIT tag, and one Red Drum was half eaten by a shark. Most shark species were tagged and released, with the exception of Atlantic sharpnose and large nurse sharks. A total of 476 sharks were captured: 23 during fall 2020 and 453 during summer of 2021. These sharks consisted of 188 Atlantic sharpnose, 164 blacknose shark, 67 blacktip, 21 sandbar, 16 bonnethead, nine finetooth. five spinner, four nurse, and two scalloped hammerhead.

SEAMAP-Caribbean

Puerto Rico

During the sampling period of February 17, 2020, 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 of finfish. The categories of fish that dominate the catch in terms of number were the groupers, followed by snappers, squirrelfishes, and jacks. Three species of groupers comprised 34.51%. The snappers were represented by five species making up 21.68% of total catch, of which one species represented 18.58% in terms of number. The coney (*Cephalopholis fulva*) was the most caught species making up 19.03% of the catch, followed by the yellowtail snapper (*Ocyurus chrysurus*, 18.58%), the white grunt (*Haemulon plumieri*, 9.73%), the longspine squirrelfish (*Holocentrus rufus*, 9.73%), the red hind (*Epinephelus guttatus*, 8.85%), the graysby (*C. cruentata*, 6.64%) and the blue runner (*Caranx crysos,* 5.75%) in terms of number. In terms of weight the yellowtail snapper was the most caught species with 17.76% followed by the coney (10.33%), red hind (9.78%), the blue runner (8.60%), and the white grunt (4.87%).

For the sampling period of December 23, 2019, to November 19, 2020, a total of 53 stations were sampled off the east coast. In addition, 26 stations were sampled from October 31, 2020, to November 19, 2020, as part of a master thesis work and were added to our sampling. A total of 214 individuals representing 36 species from 19 families weighing over 89 kg of finfish were collected. Three groups of fish constituted most of the catch, the jacks (28.97%), the groupers with 21.96% and the snappers with 21.03% of total catch 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%.

Video data sampling period in which this census took place a total of 120 stations were to be completed and the habitat allocation for those stations was coral reef (75) which is the higher number of stations allocation, followed by seagrass (31), macroalgae (5) and sand mud (9). Of those 120 a total of 53 stations were corresponded to the sampling period of December 2019 to November 2020 and the coral reef had 30 stations allocated, the seagrass 18, sand mud allocation was 3 and for algae 2 stations. Coral reef reported the highest number of individuals and of species, followed by the seagrass, sand mud and macroalgae.

Six dominant species were not represented in all the habitats recorded, with coral reefs recording the highest numbers of individuals and the six dominant species. The blue runner was caught in higher

numbers in sand mud, seagrass, macroalgae and finally in coral reef. Their distribution in the other habitats was very low or not represented at all. The six dominant recorded species were *Cephalopholis fulva* (41), *Ocyurus chrysurus* (35), *Holocentrus rufus* (22), *Haemulon plumieri* (21), *Epinephelus guttatus* (20), and *Cephalopholis cruentata* (14). Total number of species recorded was 143, of which fishes made the highest contribution. Nonetheless, crabs, conch, lobster, and sea urchins among other were identified.

Three species constituted the bulk of the east coast catch by number and weight 52.1% and 43.0%, respectively. The blue runner (26.64%), the yellowtail snapper (13.55%), coney's (12.15%), and the white grunt (7.94%), and the red hind (7.48%) were the most caught species. Snappers and groupers which are considered the most valuable commercial species group represented 42.99% of the total catch by number. 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, J hook vs circle hook for the east and west coast. Observed differences in species composition by coast yielded no statistically significant results in terms of number and weight.

Catch per unit of effort (CPUE) recorded per stations at the west coast ranged from 0.019 to 0.119 kg/hook, in terms of kg/hr ranged from 0.0027 to 0.167. East coast station CPUE ranged from 0.003 to 0.341 kg/hook, in terms of kg/hr ranged from 0.003 to 0.205. There are 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. West coast stations with macroalgae recorded the highest number, followed by coral, seagrass, sponge, and sand. For the east coast, habitat information resulted in the same dominant habitat with the macroalgae being the dominant one followed by the coral reef, sand mud, seagrass, and sponge.

Puerto Rico Video Cameras Results

For habitat identification in Puerto Rico, the frame is set at the latitude and longitude from which the habitat stratification was selected from the NOAA habitat map. Therefore, the comparison of habitat from the recorded videos and that from the NOAA map is appropriate and useful to build up a more precise habitat map. Videos recorded with the third camera are used to identify habitat at the handline fishing area and all are read. The videos are recorded for a 30 second bottom time, although some fish can be identified from those videos those are not included in the fish reading.

Fish reading is more complex than identifying the habitat and takes more time to process. Several west coast stations were completed for fish reading during 2021. Results from a total of 159 videos processed resulted in 568 total fish representing 96 species of 39 families. A total of 32 species that have not been caught with either handline or longlines were identified. Many of the major species that are not caught with lines were part of the fish traps catches, such as the doctor fishes, butterfly fishes, parrotfishes, small wrasses, and the yellow goatfish, among others. The redband parrotfish was the most abundant species. The family with the higher number of species identified were the Labridae (11), followed by the Scaridae (10).

Species of finfish of commercial or recreational importance included the yellowtail snapper, red goatfish, coney, porgies, white grunts, and queen triggerfish. The two most valuable commercial species, lobsters and conch, were also observed in the videos.

For the videos selected to be read, there is a 20-minute reading to identify the reef fish species and some additional species are read out of that time, which are also tabulated. A total of 131 individual

were counted representing 51 species of 26 families. The mackerel scad was the species with the highest number of individuals counted, while the family with higher representation was the parrotfishes with 7 species.

A total of 53 stations were sampled at the east coast of which all have been processed for habitat and fishes. The redband parrotfish was the species with the higher number of individuals counted followed by the bluehead. 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 and coney, and queen triggerfish. Queen conch were identified, but not spiny lobster.

The additional species reading was done for the east coast for 10 minutes and the total species identified was 290 individuals of 78 species and 31 families. The most counted species were the redband parrotfish, the bluehead, followed by the slippery dick. Labrids (wrasses) were the most numerous as well as the number of species (11) followed by the scarids (parrotfishes) in the number of individuals and species (9).

Virgin Islands
Pilot Conch, Lobster, and Finfish Surveys

To collect more accurate and spatially representative fishery independent data on conch, lobster, and finfish populations the project revised the methodologies for these surveys and are conducting pilot studies of these new sampling methodologies during this reporting period.

Due to COVID-19 pandemic impacts and the loss of key personnel conch and lobster surveys that were to be conducted during this reporting period were postponed until 2021, and it was decided to use the new methodologies for conducting those surveys. For the conch survey this includes a pilot study which compares conch abundance between a two diver SCUBA survey over a 500m long linear diver transect, that records number of conch, and the size and lip width of each conch surveyed within each diver's 2m transect; and 3-5 radial surveys of 7m and 15m diameter that records the same information. A total of 30 sites stratified by depth (10 shallow, mid-depth, & deep) have been selected based on sites with high abundance from previous surveys for the St. Thomas-St. John, and St. Croix districts and at present 5 surveys have been conducted within St. Thomas-St. John. No surveys have been conducted yet on St. Croix due to the need to train staff on protocols.

Finfish surveys were redesigned after research and discussions among the SEAMAP-C working group. The longline fishing method will be discontinued due to safety and representative sampling concerns. A handline survey consisting of eight deployments of 2-minute sampling intervals at 2 randomly selected substations within a 50 m radius at individual sites and a camera survey that uses a stereo setup of GoPro Hero 9 cameras that is deployed at the site for 30 mins. Abundance, benthic composition, length, weight, gender, and gonadal condition will be determined from each fish sample. Gonadal condition will be determined by gross visual examination. Sites were determined based on stratified random sampling design based on depth, habitat, and spatial coverage surrounding St. Thomas-St. John and St. Croix. A total of 72 sites were identified for each district. A total of 38 finfish sites were sampled between 2020 and 2021 using a combination of handline and longline gear to compare the two methods. Coney represented 50% of the overall catch, with sand tilefish as the second highest at 13% when combining longline and handline gears. Overall, 23 different species were caught with both gears. Handline yielded 12 different species and longline

yielded 19 different species, showing that the longline gear yielded more diversity.

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 1982-2020 have been entered into the system and data from 2021 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 2021:

- 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 2021 SEAMAP Environmental and Biological Atlas.

SEAMAP-South Atlantic Data Management System

The SEAMAP-SA data management system goal 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 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 Survey, the Coastal Longline Surveys, and the Reef Fish Survey. The SEAMAP-SA Data Manager worked with SCDNR Information Technology Department in 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/). 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. The Pamlico Sound Survey and the Georgia Coastal Longline Survey were able to conduct sampling in 2020. The Pamlico Sound Survey data are now available in the SEAMAP-SA online database. The SC Coastal Longline Survey was also able to conduct sampling in 2020, but have added a 2-year delay on data delivery to allow staff to analyze data and potentially publish results prior to addition to the public database. The Coastal Trawl Survey, NC Coastal Longline Survey, and the Reef Fish Survey were unable to conduct sampling in 2020. However, due to the data delay applied to the Reef Fish Survey, 2018 data are now available in the database. The Coastal Trawl Survey did conduct an extensive overhaul of their specimen data in the Oracle system due to a focused QA/QC effort during 2020. Coastal Trawl Survey data were scrutinized and corrected, resulting in a complete deletion and reupload of the Coastal Trawl Survey data to the Oracle database. Only life history specimen data have yet to receive final edits and those data will be uploaded and imported into the database as soon as they become available. Due to the volume of requests for 2020 data that are not available, we also added a COVID-19 impacts document to the Data Access tab on SEAMAP.org.

In addition to maintenance of the current Oracle database and extractions, SEAMAP-SA data management staff at SCDNR continue to work with Axiom Data Science to migrate the SEAMAP-SA database to the SECOORA system from the SCDNR system to increase availability of visualization and summary tools. SCDNR staff provided updated time series data and code tables to Axiom Data Science to continue development of database structure, conduct load testing, to continue development of data extraction and summarization tools, and convert metadata to DarwinCore standards. In addition, data management staff applied for funding through the IOOS 5-year plan to fund development of the new database and extractions through SECOORA. This funding was awarded and will cover continued additions of tables and tools to the database through 2026.

Southeast Regional Taxonomic Center (SERTC)

As a result of reduced funding compared to previous years, SERTC activities were restricted to mostly fulfilling data requests, providing specimen loans, and distributing educational materials. To this end, staff shipped 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 taxonomic guides for the South Atlantic Bight. Staff provided copies of 80 SERTC educational posters to various schools, teacher training programs, and outdoor recreation centers in the region. Eight copies of the *South Carolina Beachcomber Guide: A Guide to the Common Invertebrates, Plants and Natural Artifacts of the South Carolina Seashore* (2010) by DeVictor, Knott & Crowe were provided to Sapelo Island's National Estuarine Research Reserve (NERR). An additional copy was also sent to a teacher in Columbia, SC. Thirty-six copies of the *Guide to the Salt Marshes and Tidal Creeks of the Southeastern United States* (2016) by Sanger & Parker were provided to an educator in Hilton Head, SC, with 4 additional copies provided to other educators in the state.

Upon learning that no additional funding will be included for SERTC in the new funding cycle of SEAMAP, staff has dedicated resources to ensuring wide public availability of existing SERTC-

related resources independent of SEAMAP. Remaining educational resources, such as printed posters and guides associated with SERTC, for example, have been transferred to SCDNR's Coastal Reserves and Outreach (CRO) section.

Without adequate funding, SCDNR's Marine Resources Research Institute is no longer able to maintain the integrity of the SERTC Invertebrate collection. As such, staff have dedicated remaining resources in the SERTC portion of the SEAMAP budget to transfer the SERTC collection from SCDNR to the North Carolina Museum of Natural Sciences (NCMNS). The NCMNS has agreed to receive these specimens and incorporate them into their collection. The NCMNS maintains a searchable database of museum specimens that can be loaned to interested parties (https://collections.naturalsciences.org/).

Program Documents

Ashe, E. Age, growth, and reproduction of White Grunt off the U.S. southeast Atlantic coast. MS thesis, College of Charleston. July, 2021.

Barker, A.M., B.S. Frazier, D.H. Adams, C.N. Bedore, C.N. Belcher, W.B. Driggers III, A.S. Galloway, J. Gelsleichter, R.D. Grubbs, E.A. Reyier and D.S. Portnoy. 2021. Distribution and relative abundance of scalloped (*Sphyrna lewini*) and Carolina (*S. gilberti*) hammerheads in the western North Atlantic Ocean. Fisheries Research. 242

Brown, A.N., B.S. Frazier, and J. Gelsleichter. 2020. Re-evaluation of reproductive cycle and fecundity of finetooth sharks *Carcharhinus isodon* (Valenciennes 1839) from the Northwest Atlantic Ocean, with new observations on ovarian cycle and reproductive endocrinology of biennially reproducing sharks. Journal of Fish Biology. doi:10.1111/jfb.14542

Bubley, 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., M.J.M. Reichert, J. Quattro. Effects of environmental factors on reef fish assemblage structure in the southeastern U.S. Atlantic. Marine Ecology Progress Series.

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.

Nash, C.S., P. Darby, B.S. Frazier, J. Hendon, J. Higgs, E.H. Hoffmayer and T.S. Daly-Engel 2021. Multiple paternity in two populations of finetooth sharks *Carcharhinus isodon* with varying reproductive periodicity. Ecology and Evolution. 11: 799-807.

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.M. Reichert, G.R. Sedberry, and D. McGlinn. 2021. Evaluating the effectiveness of marine protected areas for reef fish species in the U.S. Southeast Atlantic. 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. 2021. SEAMAP Annual Report to the Technical Coordinating Committee. Gulf States Marine Fisheries Commission, No. 307, GSMFC, Ocean Springs, MS.

Rester, J.K., S. Murray, and C.M. Zayas Santiago. 2021. Annual Report of the Southeast Area Monitoring and Assessment Program (SEAMAP), October 1, 2019 to September 30, 2021. Gulf States Marine Fisheries Commission, Atlantic States Marine Fisheries Commission, Puerto Rico Sea Grant College Program. No. 305, GSMFC, Ocean Springs, MS. 19 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." Marine and Coastal Fisheries 12(6):381-394. https://doi.org/10.1002/mcf2.10135.

Smart, Tracey and Amy Zimney. 2021. Spanish Mackerel Indices of Abundance in U.S. South Atlantic Waters Based on the SEAMAP-SA Fishery-independent Coastal Trawl Survey. SEDAR78-WP02. SEDAR, North Charleston, SC. 22 pp.

Spanik, S, T. Smart, M.J.M. Reichert, and T. Darden. 2020. Reducing Diet Uncertainty of red snapper (*Lutjanus campechanus*) along the U.S. Southeast Atlantic Coast using DNA barcoding. Fishery Bulletin.

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.

Wyanski, D.M., K. Howington, K. Morgan, and R. Ravago. 2020. Updated Estimates of Batch Fecundity vs. Total Length, Total Weight, and Calendar Age for South Atlantic Red Snapper in Support of the SEDAR 73 Operational Assessment. SEDAR73-WP07. SEDAR, North Charleston, SC. 14 pp.

Zimney, Amy. 2021. SEAMAP-SA Coastal Trawl Survey Data and Sample Collection Methods.

In addition, staff gave over 20 presentations to various audiences at professional, fisheries management, and general meetings that included data and analyses (in part) funded by SEAMAP-SA.

Assistance to stock assessments and management
SEAMAP-SA staff assisted with various SEDAR stock assessments, including the completed SEDAR 60 Red Porgy Benchmark Assessment, SEDAR 66 Golden Tilefish Standard Assessment, SEDAR 68 Scamp Research Track, SEDAR 71, Gag Standard Assessment, and the SEDAR 73 Red Snapper Operational Assessment. Staff provided data and analyses and completed working papers detailing the submitted information. Almost all assessments were conducted via webinars and many Reef Fish Survey staff participated in the assessments as SAFMC appointed Panel Members, data providers and observers in these webinars.

In the fall of 2020, staff also participated in a series of SEDAR coordinated Selectivity Workshop webinars to address the selectivity of the chevron traps. The Workgroup concluded that research by FWRI and SEFSC indicated that the selectivity of chevron traps for Red Snapper is likely to be dome shaped, but that the degree of doming is uncertain at this time. The workgroup also concluded that the trap selectivity is likely to vary by species and provided a number of research recommendations to further address the selectivity issue.

Staff also participated in webinars for the SEDAR Procedural Workshop 8: Indices of Abundance in Spring and Summer 2021. In addition, David Wyanski and Kevin Kolmos participated in a series of five SEDAR Best Practices webinars in spring 2021 to update and improve the template for reproductive data submitted for stock assessments. Having all data providers use this updated template will shorten the time required for data compilation and analysis.

PROPOSED SEAMAP ACTIVITIES, FY2021

Last year, total program allocations for all three SEAMAP components, Gulf, South Atlantic and Caribbean, was approximately $4.73 million. At the July meeting, the SEAMAP components based their allocations for 2022 on level funding. Proposed FY2022 activities for all SEAMAP participants are shown in Table 2.

Table 2.

PROPOSED SEAMAP ACTIVITIES, FY2022	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			
Environmental Data Surveys	X		X	X
Bottom Longline Survey	X		X	X
Vertical Line Survey			X	X
Information Operations:				
Biological and Environmental Atlas		X		
FY2021 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
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:				
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

SEAMAP-Gulf of Mexico Representatives

Ted Switzer, Chair
Florida Fish and Wildlife Conservation Commission

John Mareska
Alabama Department of Conservation
 and Natural Resources

Erik Lang
Louisiana Department of Wildlife and Fisheries

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

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Texas Parks and Wildlife Department

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