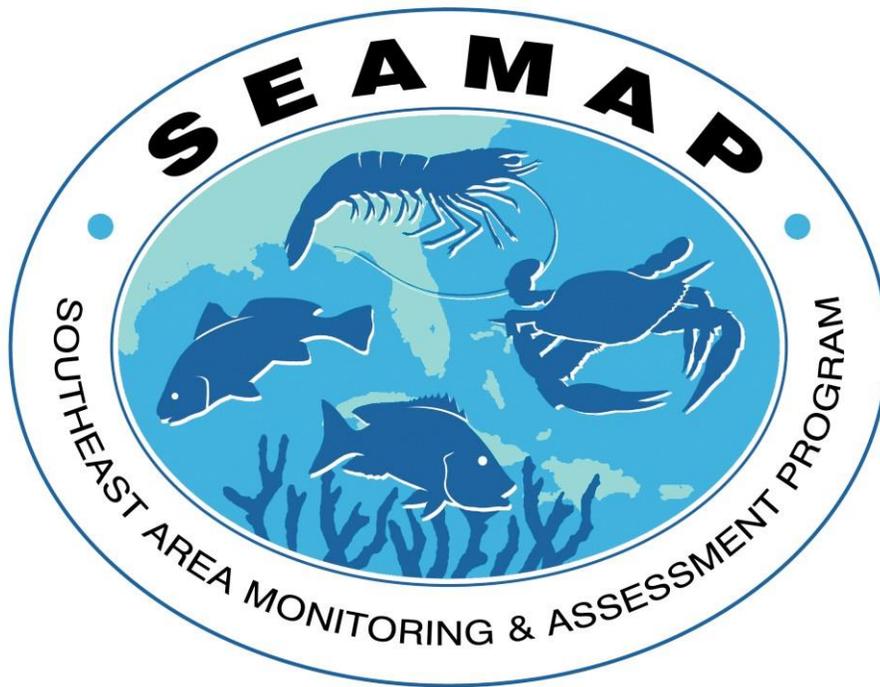


**ANNUAL REPORT**  
**OF THE**  
**SOUTHEAST AREA MONITORING**  
**AND ASSESSMENT PROGRAM**  
**(SEAMAP)**

**OCTOBER 1, 2012 - SEPTEMBER 30, 2013**



Gulf States Marine Fisheries Commission

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# **JOINT ANNUAL REPORT**

## **of the**

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

#### **October 1, 2012 - September 30, 2013**

#### **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 1985-2013. Funding allocations to participants for FY1985-FY2013 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 FY2013 and proposed activities for FY2014.

#### **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 2012 and March 2013 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 2013 to discuss respective program needs and priorities for FY2014.

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 2013. 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**

One committee meeting and several conference calls were held in FY2013. Additional tasks included fulfilling data requests, preparation of annual program reports and State/Federal Cooperative Agreements, and distribution of publications.

The SEAMAP-South Atlantic (SEAMAP-SA) Committee held their annual meeting via conference call on July 29, 2013, the day before the joint annual meeting. The meeting included participation by the work group leaders and coordinator. The Committee developed the SEAMAP-South Atlantic budget and research program priorities for FY2014. The Committee also reviewed progress by the Crustacean, Data Management, Bottom Mapping, Coastal Survey, and Fish Habitat Characterization and Assessment Work Groups and provided direction where necessary. The major

discussions centered on development of the SEAMAP-SA web-accessible database and preliminary presentations of the data output and maps via ArcGIS.

## **SEAMAP-Caribbean**

During FY2013, liaison activities included data collection during surveys and management and dissemination of fishery independent data. Five SEAMAP-Caribbean (SEAMAP-C) Committee meetings were held alternately in Puerto Rico and the U.S. Virgin Islands (USVI) between October 2012 and September 2013 to review programmatic surveys carried out in Puerto Rico and the USVI concerning conch, lobster, and reef fish populations. In addition, SEAMAP-C committee members participated in the SEAMAP joint annual meeting held online.

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 performed by the Caribbean program 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 given to the general public during visits to coastal communities.

During this reporting period, a PhD graduate student was contracted to continue updating the sampling protocols and to summarize the information from all projects conducted by the Caribbean program. All SEAMAP-C study reports and related information have been made available for public dissemination at <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. After the contract with the PhD graduate student expired, a Master’s student was hired to

**TABLE 1.**

**SEAMAP ORGANIZATION**

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

continue working on the sampling protocol and the SEAMAP-C web information maintenance.

In addition, three new bottom acoustic receiver data-loggers were acquired to continue the USVI's and Puerto Rico's reef fish spawning aggregation identification and dynamic population evaluation surveys. With the addition of these new data-loggers, the Caribbean program has a total of seven units to conduct surveys. Three data-loggers have been recording fish spawning aggregation information on the Virgin Islands, and four in Puerto Rican waters. The Virgin Islands' data-loggers have been deployed at "Grammanik Bank" and the historic "Nassau-Hind Bank" site. The four recording instruments deployed in Puerto Rico were located at two different

depths at the "Bajo de Cico" and "Abril la Sierra" spawning grounds. Some data have already been retrieved and analyzed. Two complete sets of diving equipment were acquired for conch and spawning aggregation surveys, while a new diving scooter was purchased for the Puerto Rico conch survey.

**RESOURCE SURVEYS**

In FY2013, collection of resource survey information continued for the thirty-second 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. For instance, the South Atlantic program's bottom

mapping will be useful in SEAMAP-Gulf gear calibration efforts, while plankton and environmental surveys in the Gulf program have set the standards for the entire region's much-needed long-term database. 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 October 3 to November 26, 2012 from off southwest Florida to the U.S.-Mexican border. Three hundred sixty-five trawl stations were sampled during the survey. Vessels sampled waters with trawls and plankton nets 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; collect environmental data to investigate potential relationships between abundance and distribution of organisms and environmental parameters; and collect ichthyoplankton samples to determine relative abundance and distribution of eggs and larvae of commercially and recreationally important fish species.

NMFS and Louisiana vessels collected ichthyoplankton data with bongo and/or neuston nets at sample sites occurring nearest to half-degree intervals of latitude/longitude. The Polish Sorting and Identification Center will sort the samples. Once sorted, the specimens and data will be archived at the SEAMAP Archiving Center.

### **Winter Plankton Survey**

The SEAMAP Winter Plankton Survey took place from February 1 - 28, 2013. NOAA Fisheries collected ichthyoplankton samples at

107 SEAMAP stations. The objectives of the survey were to assess the occurrence, abundance and geographical distribution of the early life stages of winter spawning fishes from mid continental shelf to deep Gulf waters; measure the vertical distribution of fish larvae by sampling at discrete depths in the water column using a 1-meter Multiple Opening and Closing Net Environmental Sensing System (MOCNESS); and sample the size fraction of fishes that are underrepresented in bongo and neuston samples using a juvenile (Methot) fish trawl.

### **Spring Plankton Survey**

The SEAMAP Spring Plankton Survey was conducted from May 1 - 29, 2013. One hundred thirty-seven stations were sampled during the survey. This was the thirty-second year for the survey. The objectives of the survey were to collect ichthyoplankton samples for estimates of the abundance and distribution of Atlantic bluefin tuna larvae 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<sup>3</sup> but is typically 30 to 40 m<sup>3</sup> at the shallowest stations and 300 to 400 m<sup>3</sup> 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. 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 Bottom Longline Survey complements an existing long-term fisheries independent survey currently being conducted by NOAA Fisheries, by targeting shark and finfish species within the shallow waters of the north central Gulf of Mexico. The objectives of the survey are to collect information on coastal shark and finfish abundances and distribution with a 1-mile longline and to collect environmental data. The Bottom Longline Survey samples the northern Gulf of Mexico from March through October each year. Mississippi, Alabama, Louisiana, and Texas participate in the Bottom Longline Survey.

### **Vertical Line Survey**

In FY2013, Louisiana and Alabama conducted vertical longline sampling for reef fish. In Alabama, a total of 12 grids are fished per survey. Vertical longline reels are baited with Atlantic mackerel and are fished for five minutes. Fish may be retained and processed for age and fecundity. All fish are sacrificed for otoliths at stations deeper than 60 m. In water depth less than 60 m, stations may be assigned as tag and release or collection sites.

In Louisiana, the sampling frame is subdivided into three sampling blocks based on depth between 89 degrees longitude and 91 degrees longitude, with the water depth ranging from 60 to 360 feet. Each block is sampled quarterly in a rotation. Within these sampling blocks, there is a possibility of randomly selecting 40 different corridors within the block. The actual sites are randomly selected within the corridor boundary and sampled at the chief scientist's discretion. The sites roughly consist of artificial reefs, natural bottom, and petroleum production platforms. Three hundred forty-one stations were sampled during FY2013 with sampling conducted from February to September.

### **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 habitat 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 video stereo still 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. A chevron fish trap, that measured 1.83 x 1.83 x 0.75 meters with 3.81-cm mesh, was used to capture fish for ageing and other life history studies. Both the fish trap and camera array were baited with squid. The camera array was allowed to soak on the bottom for 30 minutes, and the fish trap soaked for one hour. In August 2013, Florida sampled 71 stations on the west Florida shelf. NOAA Fisheries conducted reef fish sampling in April through June 2013 and completed 312 stations.

### **Summer Shrimp/Groundfish Survey**

The overall sampling strategy during the 2013 SEAMAP Summer Shrimp/Groundfish Survey was to work from the eastern Gulf to the Texas/Mexico border, in order to sample during or prior to migration of brown shrimp from bays to the open Gulf area. The Summer Shrimp/Groundfish Survey was conducted from June 3 to July 14, 2013. Florida, Alabama, Mississippi, Louisiana, Texas, and NOAA Fisheries sampled 392 trawl stations during the survey. In addition, NOAA Fisheries, Mississippi, and Louisiana vessels collected ichthyoplankton data. 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 in August through September 2013 with NOAA Fisheries, Alabama, Louisiana, and Mississippi all participating. One hundred eighty-one stations were sampled. 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 fishes, particularly king and Spanish mackerel, lutjanids and sciaenids.

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<sup>3</sup> but is typically 30 to 40 m<sup>3</sup> at the shallowest stations and 300 to 400 m<sup>3</sup> 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. Right bongo and neuston samples collected from SEAMAP stations will be transshipped to the Polish Sorting and Identification Center. Left bongo samples will be archived at the SEAMAP Invertebrate Plankton Archiving Center (SIPAC).

## **SEAMAP-South Atlantic**

### **Coastal Survey**

The Coastal Survey, conducted by the South Carolina Department of Natural Resources (SCDNR), continued as the long-standing core

component of SEAMAP-SA survey research through the period. The overall goal of this survey was to continue to build a long-term database to provide data for stock assessments and to aid in management of stocks of the coast of the southeastern US. Initiated as a pilot project in 1986, this is a fishery independent study designed to monitor the distribution and abundance of coastal species in the South Atlantic Bight and to measure associated environmental parameters in nearshore coastal waters. Sampling was standardized in 1990. 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. For 2009 through 2012 seasonal effort was increased again by 10%. However, as of spring 2013, seasonal effort was dropped back to pre-2009 levels as a result of funding decreases.

The objectives of the survey were to collect data on annual, seasonal, and latitudinal distribution, abundance, and biomass of most species encountered; collect additional size data on priority finfish, sharks, decapod crustaceans, xiphosurans, and sea turtles; collect additional data on sex and gonad development of white, pink, and brown shrimp and blue crabs; and collect otolith, gonad, and stomach samples from selected finfish species for additional life history and diet data.

Three multi-legged seasonal cruises were conducted between Cape Hatteras, North Carolina, and Cape Canaveral, Florida during FY2013: fall 2012; spring 2013; and summer 2013. A nearshore band (4.6 to 9.2m depths) of latitudinal strata was sampled during each cruise. All samples were collected during daylight hours for comparability with previous data. The decision to focus on daylight sampling was made in 1989 to maximize the opportunities for collecting juvenile mackerels, which had been shown to be captured more frequently during the day, based on 1987 and

1988 datasets. A total of 336 stations were sampled in calendar year 2012, with 112 stations sampled during each seasonal cruise. For 2013 the goal was to sample 102 stations per season. While this was accomplished during the summer cruise, only 91 stations were completed during spring 2013 as a result of inclement weather.

The fall 2012 cruise constituted the completion of the twenty-third full year of standardized sampling under a stratified random survey design. Sampling was conducted from October 1 to November 10, 2012. A total of 144 species or genera were identified in fall trawls.

The 2013 spring cruise for the SEAMAP-Coastal Survey began on April 15 and ended on May 14, 2013. Due to decreased funding, seasonal sample allocation was reduced to 102 stations. At the end of the sampling season, eleven stations were not sampled in the three northern-most strata (east and north of Beaufort, NC). This was a result of inclement weather and pre-determined vessel scheduling, making the research vessel unavailable for the Coastal Survey beyond May 14. A total of 163 species or genera were identified in spring trawls.

The summer cruise for the SEAMAP-SA Survey began on July 9 and was completed on August 1, 2013. A total of 123 species or genera were identified in summer trawls.

Data from the fall 2012 cruise were added to the SEAMAP-SA data management system. Additional cruise information can be found in the cruise reports that are available via links at <http://www.seamap.org/trawlSurveys.html>.

During the reporting period, SEAMAP-SA Coastal Survey staff provided data and participated in conference calls, webinars, and workshops for the SEDAR and ASMFC stock assessments for Spanish mackerel, king mackerel, menhaden, and small coastal sharks.

## **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, 54 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 FY2013, the North Carolina Division of Marine Fisheries (NCDMF) continued the ongoing Pamlico Sound Survey. The survey sampled 54 stations each in June (10<sup>th</sup>-14<sup>th</sup>, 17<sup>th</sup>-21<sup>st</sup>, and 24<sup>th</sup>) and September (9<sup>th</sup>-13<sup>th</sup> and 23<sup>rd</sup>-27<sup>th</sup>) of 2013. The 2013 data are currently being processed by NCDMF.

## **Bottom Mapping and Species Characterization**

In FY2013, the Florida Fish and Wildlife Research Institute (FWRI) provided technical support and infrastructure for maintaining and distributing GIS data products of 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 [http://ocean.floridamarine.org/safmc\\_atlas](http://ocean.floridamarine.org/safmc_atlas). The Atlas integrates multiple services including spatial presentation of SEAMAP and other fishery independent data through South Atlantic Fisheries [http://ocean.floridamarine.org/SA\\_Fisheries](http://ocean.floridamarine.org/SA_Fisheries) and SEAMAP bottom mapping information through SAFMC EFS service [http://ocean.floridamarine.org/sa\\_efh](http://ocean.floridamarine.org/sa_efh). The SEAMAP Bottom Mapping Workgroup met on March 4, 2013 to update and refine spatial presentations of bottom mapping and species information summarized from SEAMAP and other fishery independent data systems. The workgroup also reviewed, updated, and refined

the bottom mapping data to use the existing map grid information and updated the hard bottom habitat information with species occurrence and habitat mapping information collected by fishery independent programs.

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

**Reef fish sampling** - In 2008, SEAMAP-SA received funding to complement and expand the Marine Resources Monitoring, Assessment, and Prediction program (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 MARMAP by increasing sampling in underrepresented geographical regions of the sampled area. In addition, expanding the number of shallow (<20m) and deep (>90m) sampling sites through SEAMAP-SA would result in more complete coverage, and address identified shortfalls of the MARMAP sampling regime. Beginning in 2011, 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 have been coordinating all efforts with MARMAP and the South East Fishery Independent Survey (SEFIS) to accomplish a comprehensive fishery independent sampling of reef fish in the southeast region. Prior to 2011, it was decided that each program would sample a specific geographical area. As a result, SEFIS was scheduled to sample all chevron trap stations south of roughly 32°N latitude using the R/V *Savannah*, while MARMAP and SEAMAP-SA were scheduled to sample all chevron trap stations north of roughly 32°N latitude and all short bottom longline (SBLL) 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 the new name the South East Reef Fish Survey (SERFS).

Due to the continued MARMAP funding reduction, the priorities agreed upon by the various parties continued in 2013 to optimize the number of sea days for the chevron trap survey on the R/V *Palmetto* in lieu of other activities. The primary implication for SEAMAP-SA was that the SBLL gear deployments continued to be halted or severely reduced. Sea days scheduled for the longline gear was used for sampling reef fish with chevron traps instead. The halting of the SBLL survey for 2012 and 2013 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.

In this reporting period, SEAMAP-SA conducted sampling for the Reef Fish Survey from April 23 – October 5, 2013 using the R/V *Palmetto*. A total of 26.5 sea days were realized for the SEAMAP-SA Reef Fish Survey, with the vast majority of these sea days used for reef fish monitoring and capturing specimens for diet studies, with limited effort geared towards investigating new reef habitat. In addition, MARMAP funded 23.5 sea days, SEFIS realized 83 sea days on the R/V *Savannah* (51 days) and the NOAA Vessel *Pisces* (32 days). The age of the R/V *Palmetto* continues to be a cause of concern, in terms of sampling efforts and efficiency of the fishery independent monitoring of reef fish species in the region.

During the 2013 sampling season, SEAMAP-SA researchers collected data for the annual reef fish monitoring, identified a few additional areas with natural reef habitat (including areas with expected red snapper presence), and collected samples for diet analysis. Surveys for

new reef habitat were conducted using a fathometer, reconnaissance trap deployments with cameras on the traps (50 deployments), and short bottom longline deployments (42). Hook and line fishing efforts (155 deployments) were mostly conducted for diet studies. Hook and line and bathymetry efforts were conducted during both day- and night-time hours, while other sampling activities occurred during day-time hours only. Sampling efforts for monitoring purposes with chevron traps by the MARMAP and SEAMAP-SA programs totaled 493 deployments, a significant increase over the 376 deployments realized in 2012. During each trap deployment, a 60-90 minute video was recorded by two under water cameras detailing habitat and fish populations near each trap. As per agreement with SEFIS, examination and analysis of these videos are performed by SEFIS staff in Beaufort, NC, but MARMAP received funding to aid with the examination of about 1,000 video's annually. Note that starting with the 2013 sampling season, the still cameras on each trap was replaced by a (second) video camera (GoPro).

Environmental data were recorded during 103 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.

During the reporting period, SEAMAP-SA Reef Fish Survey staff provided data and participated in conference calls, webinars, and workshops for the SEDAR stock assessments for red porgy, vermilion snapper, and black sea bass (all update assessments), snowy grouper (standard assessment), and blueline tilefish and gray triggerfish (benchmark assessment). Staff has also been preparing for assessments of red

snapper and gag grouper which will start in 2014.

**Juvenile gag ingress** - Between March 12 and June 20, 2013, fifteen sites were sampled to monitor ingress of juveniles of winter spawning commercially and recreationally important fish species, in particular gag, from Swansboro, North Carolina to Brunswick, Georgia.

At each site, four Witham collectors were deployed approximately 30 meters apart and sampled two to three times a week from mid-March to mid-June (when winter spawned reef fish no longer recruit to this gear type). Air and water temperature, salinity, wind velocity and direction, and tide stage were measured and recorded in each creek. Salinity and water temperature were measured and bycatch species were identified to the lowest practical taxonomic level and recorded.

During 2013, 1,211 collections (examination and identification of collected organisms of one Witham collector on a given date) were made. Sixty-eight gag were collected: 35 from the Wilmington, NC sites, 3 from the Swansboro, NC sites, 1 from the Georgetown, SC sites, 6 from the Charleston, SC sites, 13 from Beaufort, SC sites, and 9 from the Brunswick, GA sites and 1 from the Savannah, GA sites.

**Diet studies** – During the reporting period, samples were taken for diet studies targeting grouper species (scamp, red, gag, rock hind, warsaw, snowy, and graysby); red snapper, black sea bass, and squirrelfish. Fish were collected using hook and line fishing gear and chevron traps aboard the RV *Palmetto*, RV *Savannah*, and RV *Pisces*. For species caught in large numbers (black sea bass) twenty specimens of each were targeted in each of 24 zones. Each zone consisted of one of three depth zones (0-20m, 21-50m, and >50m) and one of eight 1-degree latitudinal zones (from 27° N through 34° N). Stomachs were excised from the posterior end of the esophagus (near the mouth) to the pyloric sphincter, and the

contents of individual guts were sorted by taxa, counted, and weighed. Prey items were identified to the lowest possible taxon.

During the 2013 sampling season, 331 stomachs (66 groupers, 160 red snapper, 91 black sea bass, and 14 squirrelfish) were collected, 250 of which contained prey items. During the reporting period, prey from 366 guts were fully identified. Preliminary results reveal that groupers prey on mostly fishes and red snapper feed on swimming crabs and fishes.

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

In 2008, SEAMAP-SA began 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 are to conduct fishery independent longline sampling on adult red drum to develop information on catch per unit effort (CPUE); collect biological information (size, sex etc.) and samples (otoliths, gonads, muscle, fin clips, etc.) from sub-samples of the red drum catch in order to determine size at age, recruitment to the spawning population, mercury contamination, and genetic composition of the stock; tag adult red drum for the collection of migratory and stock identification data; disseminate accomplishments and results to the ASMFC and NMFS for inclusion in stock assessments; and produce an annual summary report. Secondary objectives are to tag and measure small coastal and large coastal sharks caught incidentally to red drum sampling, 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 FY2013 sampling season, 362 longline sets were made in four strata along the coast of South Carolina. The season was broken down into three periods, defined to maximize catches of Red Drum (August 1 – September 15, September 16 - October 31, November 1 – December 15). In this report, for the 2012 sample season only the later part of time period II and the whole of time period III are considered (October through December); in 2013 only the first time period (August through mid-September) and the first part of the second time period (mid-September through end of September) are included in this summary. Each time period and stratum were sampled equally. During sampling, 711 red drum were caught. Fin clips were taken from all individuals for genetic investigations (determination of stocked fish, recaptured fish that have lost external and PIT tags, telomere research). Stomach samples were also collected for diet determination. Some red drum were also surveyed for parasite fauna. During this reporting period, 291 sharks were tagged and released.

**North Carolina** – For sampling year 2013, 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. 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.

Random sampling occurred in July (n=12 sets), August (n=32 sets), and September (n=28 sets) and yielded 356 red drum (15, 203, and 138 respectively). Sixty-five red drum were sacrificed to determine age composition and for other biological investigations. Two-hundred seventy-five fish were tagged and released to track migration, stock ID and growth rates. Sampling during this period resulted in eight recaptures of red drum.

**Georgia** - For the current reporting period, sampling occurred off southeast Georgia and northeast Florida during the fall months (October - December) of 2012 and the spring and summer months (May - September) of 2013. A total of 208 longline sets were deployed over the two seasons with 83 sets made during fall 2012 and 125 sets during the spring and summer of 2013. A total of 14 adult red drum were captured.

#### **SEAMAP-Caribbean**

**Administrative** – Several new staff members have been hired in both districts. Two Fisheries Biologist II positions have been secured in St. Thomas. A Chief of Fisheries was hired in St. Croix. These new hires greatly alleviate staff shortages faced in both districts from previous years.

**Acoustic Hydrophones** – Data from two bottom acoustic receiver data-loggers from the historic Nassau grouper site and Grammanik Bank in St. Thomas have been downloaded. The original SIM cards were sent to Puerto Rico for analysis. The hydrophones are expected to be redeployed at the Grammanik and Hind Banks in December 2013. One additional hydrophone has been secured. Locations for deployment have yet to be determined.

#### **Conch and Lobster** – Virgin Islands

The conch, *Strombus gigas*, study was completed this year. All survey sites were conducted within the annual queen conch

closed season between June 1 and October 31, 2012.

Preliminary needs have begun for the spiny lobster, *Panulirus argus*, study. Previous artificial habitat sites have been located in both districts and assessed for determining necessary repair and/or replacement of building materials. St. Thomas district contains two artificial habitat sites, one deep (20 m) and one shallow (10 m), each containing ten artificial habitats. The St. Croix district contains one shallow artificial habitat site at less than 10 m. In addition to artificial habitats, upon recent discussion, collection of the puerulus stage of spiny lobster will be conducted in the St. Thomas district. The last monitoring and assessment of pueruli collection occurred in 2002 that included five sites.

#### **Parrotfish** – Virgin Islands

Several purchase orders for supplies are currently being processed. Once supplies are secured the study will commence. A vendor in Puerto Rico has been approved to provide professional services in the capacity of performing histological and gonadal stage analysis.

#### **Puerto Rico**

During this reporting period SEAMAP-C analysed data on several grouper species collected during FY2012 on the west coast of Puerto Rico using hydrophones. SEAMAP-C installed several hydrophones in seven areas (Abrir la Sierra, Mona Island Red Hind Site, Mona Island Black Grouper Site, Mona Island Yellowfin Grouper Site, Bajo de Sico, Buoy 4, and El Seco) identified as spawning sites for various species of groupers.

#### **Lane Snapper Survey** – Puerto Rico

The objective of this survey is to collect data on the lane snapper fishery around Puerto Rico. A fisher survey was conducted among identified fishers that target this species to collect

information on traditional fishing grounds and determine target areas for sampling.

From January 8 to September 17, 2013, a total of 31 stations were sampled at least twice off the west coast of Puerto Rico. Hook and line sampling yielded 64 species representing 18 families of finfish weighing over 721 kg. The categories of fish that dominate the catch in terms of number were the snappers, followed by porgies and groupers. Eight snapper species constituted 24.2% of the total catch, of which two species represented 22% in terms of number. The most abundant species was the pluma porgy (*Calamus pennatula*) with 21.2%, followed by the lane snapper (*Lutjanus synagris*, 16.1%) and the blue runner (*Caranx crysos*, 14.9%) in terms of number. In terms of weight, the blue runner constituted 23.6% of the total catch, followed by the pluma porgy (16.9%) and the lane snapper (6.7%).

From January 22 to August 15, 2013, a total of 30 stations were sampled twice off the east coast. A total of 19 species of finfish representing 11 families weighing 100 kg were collected. Groupers constituted 53.8% of total catch by number. Five species constituted the bulk of the east coast catch by number (86.5%) and weight (79.4%). The coney (*Cephalopholis fulva*, 38.35%) was the most caught species followed by the blue runner (16.5%), the red hind (*Epinephelus guttatus*, 15%), the vermilion snapper (*Rhomboplites aurorubens*, 10.9%) and the sand tilefish (*Malacanthus plumieri*, 5.6%) of total catch per number. Snappers, which are considered the most valuable commercial species group, were only represented by two species.

Species composition varied according to area and depth. Species composition collected at the west coast was comprised of snappers (24.2%), followed by porgies (21.4%), groupers (15.5%), jacks (15.4%), grunts (8.2%), sand tilefish (5.1%), squirrelfish (6.2%), triggerfish (1.6%) and eleven other families (2.3%) in terms of number of individuals caught. In terms of weight, the species composition was led by the

jacks (25.5%), followed by the groupers (16.9%), porgies (16.7%), sand tilefish (5.5%), triggerfish (5.3%), grunts (3.7%), squirrelfish (3.4%) and the other remaining species made up 8.0%.

The east coast species composition was comprised of groupers (53.8%), followed by jacks (16.9%), snappers (15.4%), sand tilefish (5.6%), squirrelfish (2.3%), porgies (1.9%), grunts (1.5%), triggerfish (0.4%) and others (2.3%) in terms of number. The three dominant groups in terms of weight were the same.

Observed differences in species composition by coast yielded statistically significant results in terms of number Mann Whitney Rank Sum ( $T = 124$ ;  $P = <0.001$ ). In terms of weight, species composition was again significantly different ( $T = 120$ ;  $P = 0.003$ ).

## **SPECIAL STUDIES**

In addition to the regularly scheduled surveys, SEAMAP participates in a variety of other projects. SEAMAP provides guidance, personnel, and other contributions to these studies for enhancement and protection of the marine resources.

### **Winter Trawling and Fish Tagging Cruise**

The long running Cooperative Winter Tagging Cruise (Cruise) conducted a full research vessel, trawl-based survey in 2013. Partners were also able to conduct hook-and-line striped bass tagging operations. Historically funded by NOAA Fisheries (through use of one of its survey vessels, or provision of charter funds) and supported with in-kind contributions from the U.S. Fish and Wildlife (USFWS), the ASMFC, Maryland DNR-Fisheries Service, North Carolina Division of Marine Fisheries and numerous additional state fishery agencies and universities, the Cruise provides important data for the striped bass stock assessment, as well as data on other ASMFC species. This marked the 24th year of the research vessel Cruise (since 1988; no vessel funding was

available in 2011 and 2012 and data were gathered on only striped bass during those two years), and the 26<sup>th</sup> consecutive year for striped bass tagging in the Atlantic Ocean off North Carolina and Virginia. Since 2010, the Cruise has employed charter sport fishing vessels and tagged striped bass caught on hook-and-line gear, using the protocol supplied by the Massachusetts Division of Marine Fisheries.

Tagging operations in 2013 resulted in a total of 2,030 striped bass tagged and released. All fish and invertebrates collected in the trawls were for the first time this year fully documented. Horseshoe crabs were also tagged as part of an ASMFC/USFWS program. Four Atlantic sturgeon were captured and documented, but none were tagged due to the lack of NMFS authorization.

## **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 1982-2012 have been entered

into the system and data from 2013 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 2013:

- 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 BP 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 liquefied natural gas facilities on marine fish stocks;
- Assessing the potential impact of the Deepwater Horizon oil spill on marine fish stocks;
- Compiling the 2013 SEAMAP Environmental and Biological Atlas; and
- Comparing catches of shrimp and groundfish captured by 40-ft versus 20-ft trawl nets.

### **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. Weekly plots of station locations and catch rates of shrimp and dominant finfish species were prepared, edited, and processed by GSMFC for distribution to

management agencies, fishermen, processors and researchers. SEAMAP real-time data plots were produced during the 2013 Summer Shrimp/Groundfish Survey. Seven 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 goal for FY2013 was providing public access on the web to the ASMFC maintained [www.seamap.org/](http://www.seamap.org/) site and the SCDNR maintained based Oracle relational database at [www.dnr.sc.gov/seamap](http://www.dnr.sc.gov/seamap). The [www.seamap.org](http://www.seamap.org) website is where general links, information, and documents (surveys, reports, metadata, and 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 Coastal Survey, the NCDMF Pamlico Sound trawl survey, the adult red drum longline survey, the augmented MARMAP survey, and eventually the SEAMAP Cooperative Winter tagging cruises. Spatial presentations of SEAMAP and other South Atlantic fishery independent data at [http://ocean.floridamarine.org/sa\\_fisheries](http://ocean.floridamarine.org/sa_fisheries) are available through a developing regional GIS service managed by FWRI for the South Atlantic Fishery Management Council (SAFMC Fisheries Viewer). This application was developed for the SAFMC with ArcGIS Viewer for Flex. The web mapping application supports data display, interactive querying, geocoding and printing. Users may download GIS shapefiles and associated metadata.

In FY2013, the Data Management Work Group worked primarily on data management tasks that relate to the web design, database maintenance, and data extraction queries. To assist in this effort the group worked to develop an Oracle database with a web accessible application. SCDNR contracted with an Oracle programmer in March 2013 to continue the development of the Oracle database and web interface system. The web interface structure is undergoing refinement so links to program documentation and metadata are available on the data extraction pages. A series of data request pages were created, including user registration and data report extraction pages with query filters for downloading selected data. The test site is now available to allow contributing partners to test/review query outputs. The SEAMAP-SA data base is expected to be available via the web interface early in 2014.

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

The SERTC laboratory facilities continued to serve as a sample processing facility for collections generated by SEAMAP components, and SERTC staff continued to provide support, training, and expertise to assist the SEAMAP-SA Coastal Survey and the Reef Fish Survey with the examination and analysis of fish stomach contents. To further assist diet study personnel with taxonomic identifications, SERTC staff began work on a comprehensive stomach content guide pertaining to the Coastal Survey portion of the diet study. When completed, the guide will include prey frequency of occurrence tables for six predator fish species; a prey identification section organized by taxa, with species lists for each prey category; and detailed species descriptions, as well as photos of partially digested voucher specimens and close-ups of diagnostic characters. As part of this effort, SERTC staff have verified and photographed approximately 90% of the voucher specimens collected by the Coastal Survey portion of the diet study. SERTC staff also provided

taxonomic expertise, image loans, photographic assistance, and general information to members of the public and researchers both within and outside of the SCDNR.

SERTC staff continued to add to the SEAMAP voucher and general specimen collections. In total, 236 lots of specimens (comprising 21 lots of fish and 215 lots of invertebrates) were added this year. These specimens included several invasive species, including six lots of the Asian tiger prawn, *Penaeus monodon*, one lot of *Megabalanus coccopoma*, and one lot of the green mussel, *Perna viridis*, as well as 88 lots of mollusks. All specimens collected during FY2013 were accessioned and formally catalogued into the Specify 6 database. Seventy-six lots of fin clips from representative fish specimens were also cataloged for future genetic analysis. SERTC's taxonomic library was expanded, with approximately 230 references either added to Endnote or updated with electronic versions.

Forty new fish and invertebrate images, including 28 images of SEAMAP fish specimens, were added to the photo gallery this year, and the SERTC web page was updated to include these images, as well as lesson plan resources for teachers. Staff are working with the SCDNR Education and Outreach Department, the South Carolina Aquarium, and other formal and informal educators in order to promote increased distribution of SERTC-produced educational materials to local and regional schools. During FY2013, approximately 500 posters and 400 copies of the Beachcomber's Guide to South Carolina were distributed, along with a new teacher's brochure and magnet designed to increase awareness about available educational resources.

### **Program Documents**

The following documents were published and distributed by the SEAMAP program in FY2013:

Gulf States Marine Fisheries Commission. 2013. SEAMAP Marine Directory. Gulf States Marine Fisheries Commission, Ocean Springs. 1 p. + appendices.

Rester, J.K., M. Paine, and E. Ojeda Serrano. 2013. Annual Report of the Southeast Area Monitoring and Assessment Program (SEAMAP), October 1, 2012 to September 30, 2013. Gulf States Marine Fisheries Commission, Atlantic States Marine Fisheries Commission, Puerto Rico Sea Grant College Program. No. 214, GSMFC, Ocean Springs, MS. 17pp.

Rester, J.K. 2013. SEAMAP Annual Report to the Technical Coordinating Committee. Gulf States Marine Fisheries Commission, No. 221, GSMFC, Ocean Springs, MS.

Richardson, J. and J. Boylan. 2013. SEAMAP-SA: Results of trawling efforts in the coastal habitat of the South Atlantic Bight, 2011. ASMFC, Washington, DC.

SEAMAP-SA Coastal Survey, Cruise Report, Fall 2012.

SEAMAP-SA Coastal Survey, Cruise Report, Spring 2013.

SEAMAP-SA Coastal Survey, Cruise Report, Summer 2013.

### **PROPOSED SEAMAP ACTIVITIES, FY2014**

Last year, total program allocations for all three SEAMAP components, Gulf, South Atlantic and Caribbean, was approximately \$4.42 million. At the July 2013 meeting, the SEAMAP components based their allocations for 2014 on level funding of \$4.42 million. Proposed FY2014 activities for all participants are shown in Table 2.

**Table 2.**

<b>PROPOSED SEAMAP ACTIVITIES, FY2014</b>				
	Fall	Winter	Spring	Summer
<b>Gulf of Mexico Activities</b>				
Resource Surveys:				
Spring Plankton Survey			X	
Reef Fish Survey			X	X
Summer Shrimp/Groundfish Surveys				X
Fall Shrimp/Groundfish Surveys	X			
Fall Plankton Survey	X			
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		
2014 Marine Directory			X	
FY2013 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
<b>South Atlantic Activities</b>				
Resource Surveys:				
Coastal Survey	X		X	X
Pamlico Sound Survey	X			X
Winter Trawling and Fish Tagging Cruise		X		
Bottom Mapping Project	X	X	X	X
Fish Habitat Characterization and Assessment	X	X	X	X
Adult Red Drum Longline Survey	X		X	X
Information Operations:				
Data Input and Request Processing	X	X	X	X
Data Analysis and Utilization	X	X	X	X
Program Administration	X	X	X	X
Joint Planning Activities	X	X	X	X
<b>Caribbean Activities</b>				
Resource Surveys:				
Conch Survey (Puerto Rico & Virgin Islands)	X	X	X	X
Spiny Lobster Survey (Puerto Rico)	X	X	X	X
Spiny Lobster Survey (Virgin Islands)	X	X	X	X
Reef Fish Survey (Puerto Rico)	X	X	X	X
Parrotfish Survey (Virgin Islands)	X	X	X	X
Information Operations:				
Preliminary Data Analysis and Quality Control	X	X	X	X
Research Programs	X	X	X	X
Information Dissemination	X	X	X	X
Program Administration				
Joint Planning Activities	X	X	X	X

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

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