



ANNUAL REPORT

OF THE SOUTHEAST AREA MONITORING AND ASSESSMENT PROGRAM (SEAMAP)

OCTOBER 1, 2002 - SEPTEMBER 30, 2003

SEAMAP - Gulf of Mexico

Gulf States Marine Fisheries Commission

SEAMAP - South Atlantic

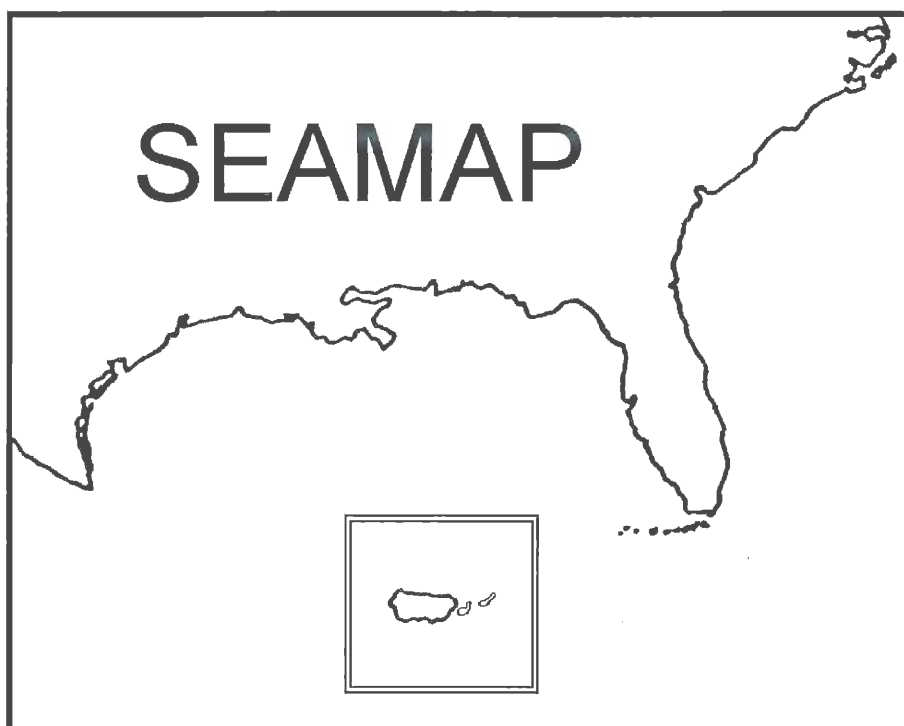
Atlantic States Marine Fisheries Commission

SEAMAP - Caribbean

Puerto Rico Sea Grant College Program

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SEAMAP is a State/Federal program administered by the Southeast Regional Office, National Marine Fisheries Service. This project was supported in part by the National Oceanic and Atmospheric Administration, National Marine Fisheries Service, under State/Federal Project Number NA47FS0038.



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ANNUAL REPORT

of the

Southeast Area Monitoring and Assessment Program

October 1, 2002 - September 30, 2003

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 the SEAMAP are shown in Table 1.

Federal programmatic funding for SEAMAP activities and administration was appropriated in Federal Fiscal Years 1985-2003. Funding allocations to participants for FY1985-FY2003 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 FY2003 and proposed activities for FY2004.

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 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 and 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 Division of Fish and Wildlife, 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 Archiving Center and SEAMAP Invertebrate Plankton Archiving Center (SIPAC).

SEAMAP - Gulf of Mexico

Major SEAMAP-Gulf Subcommittee meetings were held in October 2002 and March 2003, in conjunction with the Annual Fall and Spring Meetings of the GSMFC. All meetings included participation by various work group leaders, Coordinator, Data Manager, Program Manager, and the GSMFC Executive Director. Representatives from the Gulf program also met with the South Atlantic and Caribbean representatives in August 2003 to discuss respective program needs and priorities for FY2004.

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 FY2003. 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 three workgroup meetings were coordinated and documented in FY2003. Additional tasks included fulfilling data requests, preparation of annual program reports and State/Federal Cooperative Agreements, and distribution of publications.

The SEAMAP-SA Committee held their annual meeting in conjunction with the joint annual meeting held August 5-6, 2003. The meeting included participation by the work group leaders and coordinator. The Committee developed the 2004 SEAMAP-SA budget and Operations Plan. The Committee also reviewed progress by the Crustacean, Data Management, and Trawl workgroups and provided direction where necessary. Topics discussed included fisheries independent data collection/storage standards, and NMFS data management activities. The committee also

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/CMS/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 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

developed a recommendation to the South Atlantic Board for project funding in FY2004.

The South Atlantic Board met on August 26, 2003 to review recommendations from the SEAMAP-SA Committee. The Board approved the 2004 budget and 2004 Operations Plan and a revision to the SEAMAP Goals and Objectives to include coordination of a broad range of fisheries independent surveys, including those not conducted by SEAMAP personnel. The Board also provided direction on committee and workgroup actions.

The SEAMAP Data Management Workgroup met on November 9-10, 2002. The workgroup discussed current data structures in both South Carolina and the central NMFS system (Pascagoula) and developed a plan to update the NMFS data structures to contain the full extent of data collected by the trawl survey. The second day of the meeting included a joint session with the Northeast Area Monitoring and Assessment Data Management Workgroup. The joint session shared information on data structures and various methods to build a fisheries independent data warehouse.

The SEAMAP Cooperative Winter Offshore Tagging Cruise was conducted from January 15-22, 2003 aboard the NOAA Ship OREGON II. Atlantic States Marine Fisheries Commission personnel participated as crew on

the cruise. This was the sixteenth year of the cooperative project, initiated in 1988 at the request of SEAMAP-South Atlantic. Adult striped bass over-wintering in the area between False Cape, Virginia and Wimble Shoals, North Carolina, were tagged for assessment of the population structure and exploitation rates. Other species tagged include Atlantic sturgeon, spiny dogfish, and red drum.

The Crustacean Workgroup met on June 2, 2003 to discuss state harvest information on blue crabs and shrimp. The Committee also planned for fall 2003 activities to summarize blue crab research activities and population status for the ASMFC. The Crustacean Workgroup sponsored a shrimp symposium at the Crustacean Society meeting (June 2-5, 2003). Presentations and discussion focused on disease, transport, genetic variability, and population status.

The Bottom Mapping Workgroup finalized a three-phase approach to compile existing deepwater (200-2000m depth) bottom characterization data from existing data sets, and appointed a subcommittee to develop the protocols for data transformation. The Bottom Mapping Workgroup and Deepwater Subcommittee held a joint meeting on December 11-12, 2002 and a conference call on April 4, 2003. They worked on defining the deepwater habitat characterization, and the types of data for which

transformation protocols would need to be developed (Phase I). The subcommittee also approved the completion of a data source compilation document titled "Summary of Seafloor Mapping and Benthic Sampling Conducted in 200-2000m, from North Carolina through Florida" (Phase II).

The Bottom Mapping Deepwater Subcommittee held a conference call on August 8, 2003 to continue development of the Phase I protocols. Based on that call, the coordinator drafted a report for review and approval of the subcommittee by December 31, 2003. The subcommittee also approved funding of a pilot test for the video capture protocols. A contract has been awarded by the ASMFC and a report is due December 12, 2003.

SEAMAP - Caribbean

The SEAMAP-Caribbean Administrative and Working Group components held three meetings during FY2003, on February 13, June 12 and September 25. The committee discussed and reviewed the results of the FY2002 (pueruli and juveniles) no cost extension spiny lobster projects. In addition, the working group reviewed the status and coordinated their efforts on current whelk surveys for St. John, St. Croix, St. Thomas and Puerto Rico islands.

After an extensive process of quality control and consistency verification of all reef fish data collected for the Virgin Islands and Puerto Rico during the SEAMAP-Caribbean program, a long-term evaluation will be performed to verify and improve the adequacy of the current sampling methodology for the Virgin Islands. To follow this task and evaluate several other aspects on trend analysis for all Virgin Islands SEAMAP reef fish data, the coordination section has contracted a fisheries specialist, assisted by two graduate students. All evaluation results and/or recommendations will be reported, including some preliminary fish-habitat associations that were requested by the working group.

The Committee discussed and planned the next cycle of studies, and also evaluated and critically discussed other necessary studies and funding priorities. Delegates from the SEAMAP-Caribbean Committee participated in the Annual Joint Meeting held August 6-7, 2003.

RESOURCE SURVEYS

In FY2003, collection of resource survey information continued for the twenty-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's survey operations, activities are discussed here by geographic region.

SEAMAP - Gulf of Mexico

Fall Plankton Survey

The first fall ichthyoplankton survey to assess abundance and distribution of king mackerel eggs and larvae occurred in August 1984. No sampling survey was conducted in 1985; however, expanded surveys in 1986-2002 covered Gulf waters from Florida Bay to Brownsville, Texas. The Fall Plankton cruise took place from August 28, 2002 through September 21, 2002. Alabama, NMFS, Mississippi, and Louisiana sampled 109 stations on the west Florida shelf and northern Gulf of Mexico. The objective of this survey is 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. Wire angle was maintained at 45 degrees. Neuston samples were taken with .947-micron mesh nets on 1 x 2-meter frames towed at the surface for ten minutes. Right bongo and neuston samples were initially preserved in 10% buffered formalin and after 48 hours were transferred to 95% ethyl alcohol for final preservation. Left bongo samples were preserved via an ethanol/ethanol transfer to aid in preservation of larval otoliths. 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 will be transshipped to the Polish Sorting and Identification Center. Left bongo samples will be archived at the SEAMAP Invertebrate Plankton Archiving Center (SIPAC).

Fall Shrimp/Groundfish Survey

The Fall Shrimp/Groundfish Survey was conducted from October 12 - December 5, 2002, from off Mobile, Alabama to the U.S.-Mexican border. Vessels sampled waters out to 60 fm, covering 367 trawl stations, in addition to plankton and environmental sampling.

Sampling design was similar to the Summer Shrimp/Groundfish Survey. The objectives of the survey were to:

- (1) sample the northern Gulf of Mexico to determine abundance and distribution of demersal organisms from inshore waters to 60 fm;
- (2) obtain length-frequency measurements for major finfish and shrimp species to determine population size structures;

- (3) collect environmental data to investigate potential relationships between abundance and distribution of organisms and environmental parameters; and
- (4) collect ichthyoplankton samples to determine relative abundance and distribution of eggs and larvae of commercially and recreationally important fish species.

NMFS, Mississippi, Alabama, and Louisiana vessels collected ichthyoplankton data at sample sites occurring nearest to half-degree intervals of latitude/longitude. A total of 59 stations was sampled with bongo and/or neuston nets, as encountered along cruise tracks. NMFS completed 54 ichthyoplankton stations, Mississippi completed 2 stations, and Louisiana completed 3 stations. The Polish Sorting and Identification Center will sort the samples, except those taken by Louisiana. Once sorted, the specimens and data will be archived at the SEAMAP Archiving Center.

Spring Plankton Survey

The SEAMAP Spring Plankton Survey took place from May 12 through May 31, 2003. One hundred seventeen stations were sampled from the west Florida shelf to the Louisiana/Texas border. This was the twenty-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. Wire angle was maintained at 45 degrees. Neuston samples were taken with .947-micron mesh nets on 1 x 2-meter frames towed at the surface for ten minutes. Right bongo and neuston samples were initially preserved in 10% buffered formalin and after 48 hours were transferred to 95% ethyl alcohol for final preservation. Left bongo samples were preserved via an ethanol/ethanol transfer to aid in preservation of larval otoliths. 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 will be transshipped to the Polish Sorting and Identification Center. Left bongo samples will be archived at the SEAMAP Invertebrate Plankton Archiving Center (SIPAC).

Reeffish Survey

The primary purpose of this survey is to assess relative abundance and compute population estimates of reefish found on natural reefish habitat in the Gulf of Mexico. Two types of gear are used to deploy video cameras: 1) a single-funnel fish trap (2.13 m long by 0.76 m square) with the camera mounted at a height of 25 cm above the

bottom of the trap; or 2) a 4 camera array with 4 cameras mounted orthogonal to each other at a height of 25 cm above the bottom. Both gears are baited with squid before deployment. The resultant video recordings (typically of one hour duration) are processed back at the laboratory where fishes are identified and counted independently by two tape readers. Final counts are entered into the SEAMAP reefish database along with additional observations on habitat and fish activity. Alabama conducted sampling on August 11, 2003 and September 19, 2003. Three sites were sampled using trap videos and fish traps.

Summer Shrimp/Groundfish Survey

During the spring of 2003, there was communication between the Shrimp/Groundfish Work Group members to examine the design for the Summer Shrimp/Groundfish Survey and determine the random station locations for each participant.

Objectives of the survey were to:

- (1) monitor size and distribution of penaeid shrimp during or prior to migration of brown shrimp from bays to the open Gulf;
- (2) aid in evaluating the "Texas Closure" management measure of the Gulf Council's Shrimp Fishery Management Plan; and
- (3) provide information on shrimp and groundfish stocks across the northern Gulf of Mexico from inshore waters to 50 fm.

The overall sampling strategy during the 2003 SEAMAP summer 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. This was the twenty-second year for the survey. The entire survey occurred from June 2 through July 27, 2003 and 313 trawl stations were sampled during the survey. In addition, NMFS and Louisiana vessels collected ichthyoplankton data. A total of 42 stations was sampled with bongo and/or neuston nets, as encountered along cruise tracks.

During the survey, the NOAA Ship OREGON II and R/V TOMMY MUNRO sampled offshore and inshore Gulf waters with 40-ft trawls. Alabama's R/V VERRILL sampled offshore Alabama waters with 40-ft trawls, the R/V PELICAN sampled both Louisiana state waters and offshore waters with 40-ft trawls, and Texas vessels sampled Texas state waters and offshore waters with 20-ft trawls. All vessels took environmental data, including temperature, salinity, oxygen, and chlorophyll at each station.

Plankton and Environmental Data Surveys

As in previous years, plankton samples and environmental data were collected routinely during most SEAMAP trawling surveys. During the Summer Shrimp/Groundfish Survey, plankton tows were piggybacked on the NMFS and state vessels, sampling randomly generated trawl stations within the standard

30-minute SEAMAP grids.

Objectives of these piggybacked surveys were: 1) to collect plankton samples throughout the survey area; and 2) to collect associated hydrographic and environmental data at each plankton station. Additionally, environmental data (salinity, temperature, and oxygen from surface, mid-depth and bottom waters, and chlorophyll from surface and bottom waters) were collected during the shrimp/groundfish surveys. Wind direction, wind speed and wave height were taken at all trawl stations.

Samples from the right side of the bongo nets and neuston samples were shipped to the NMFS-Pascagoula Laboratory for shipment to the Polish Sorting and Identification Center, where they will be sorted to the family level (both ichthyoplankton and selected crustacean and molluscan species). The left bongo sample from each station is retained as a back up in the event of damage or loss of the specimens and maintained at the SIPAC.

Chlorophyll samples were filtered at each station using GF/C filters. All filters were put in petri disks and wrapped in foil for onboard storage in the freezer. Chlorophyll analysis will be completed ashore. Preservation of plankton samples was in buffered formalin prior to transfer to ethanol.

SEAMAP - South Atlantic

Shallow Water Trawl Survey

The major SEAMAP - South Atlantic survey in FY2003 was the continuing Shallow Water Trawl Survey conducted by the South Carolina Department of Natural Resources (SCDNR). 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, and a 10-year trawl report was completed in December 2000 summarizing species composition, regional species assemblages, and trends in distribution and abundance of 27 priority species. 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 cruises to reduce variability in the abundance estimates for target species. The overall goal is to obtain a long-term database to facilitate management of stocks in the South Atlantic Bight.

The objectives of the survey are to:

- (1) collect data on size, abundance, distribution, and seasonality of target finfish and decapod crustaceans;
- (2) record species composition, biomass, and abundance in order to assess latitudinal and seasonal fluctuations; and
- (3) collect data on size, sex, and gonadal condition of

white, pink, and brown shrimp and attempt to locate spawning grounds.

Three multi-legged seasonal cruises were conducted between Cape Hatteras, North Carolina, and Cape Canaveral, Florida, during FY2003: Fall 2002 (October 7 - November 8), Spring 2003 (April 8 - May 1), and Summer 2003 (July 14 - July 31). Inshore strata (4.6 to 9.2m depths) were sampled during each cruise. All samples were collected during daylight hours to maximize the opportunities for collecting juvenile mackerels.

The fall 2002 cruise completed the thirteenth full year of standardized sampling under a stratified random survey design. Sampling was conducted between October 7 - November 8 and all of the 102 inshore stations allocated to 24 shallow coastal strata in the South Atlantic Bight were sampled. A total of 136 species or genera were identified in fall trawls. *Micropogonias undulatus*, the Atlantic croaker, was the most abundant species, constituting 13% of total abundance, followed by the striped anchovy, *Anchoa hepsetus* (10%), the pinfish, *Lagodon rhomboides*, (7%), and the white shrimp, *Litopenaeus setiferus* (7%). Both abundance of individuals, excluding cannonball jellies, (n=99,414 individuals, x/tow=975 individuals) and the miscellaneous invertebrate biomass, including cannonball jellies, (n=3,513 kg, x/tow= 34.4 kg) in 2002 were lower than the levels of abundance and biomass observed in Fall 2001. Abundances of *Micropogonias undulatus*, *Leiostomus xanthurus*, *Cynoscion regalis*, *Menticirrhus americanus* were greatest in Raleigh Bay, as was overall abundance (n=25,771 individuals, x/tow=476.5 individuals). Miscellaneous invertebrate abundance was greatest off Georgia (n=3,086 kg, x/tow= 106.4 kg), where overall abundance was lowest. Only 7% of the miscellaneous invertebrate biomass was composed of the cannonball jelly compared to 94% in spring 2002 and 11% in summer 2002. The abundance of Spanish mackerel, *S. maculatus*, (n=351, x/tow=3.4) increased in fall trawls in 2002 from levels observed in 2001, although a general decline in overall fall abundance is apparent. Spanish mackerel were taken from all regions. White shrimp, *Litopenaeus setiferus*, were the most abundant commercially important shrimp species (n=6,745, x/tow=66.1), ranking first in abundance among decapod crustaceans and fourth among all species collected during the fall cruise. Regional concerns about the status of blue crabs in the South Atlantic Bight resulted in heightened interest in SEAMAP-SA blue crab data. *Callinectes sapidus* (n=7, x/tow=0.07 individuals) was taken only in Raleigh and Onslow Bays in Fall 2002. Fall abundance of blue crabs in SEAMAP collections is not generally high. In 2002, fall abundance was the same as that recorded in spring, both of which were well below summer levels (n=63, x/tow=0.6 individuals), the season in which blue crabs are most abundant in SEAMAP trawls.

The spring 2003 (April 8 - May 1) cruise sampled 102 inshore stations allocated to 24 shallow coastal strata in the South Atlantic Bight. A total of 137 species or genera were identified in spring trawls. *Leiostomus xanthurus* was the most abundant species, constituting

30% of total abundance, followed by *Peprilus triacanthus* (12%), *Micropogonias undulatus* (10%), and *Menticirrhus americanus* (6%). Abundance of individuals collected (n=141,195 individuals, x/tow=1384 individuals) and the miscellaneous invertebrate biomass (n=12,400 kg, x/tow= 121.6 kg) in 2003 changed only slightly from the level of abundance observed in Spring 2002. Miscellaneous invertebrate biomass was composed primarily (65%) of the cannonball jelly, *Stomolophus meleagris*, which was most abundant off South Carolina, Georgia, and Florida. An increase in the number of sharks taken in trawls was noted. Near record numbers of smooth dogfish, *Mustelus canis*, were taken in spring collections. The abundance of Spanish mackerel, *S. maculatus*, (n=288, x/tow=2.8) was very low in spring trawls. White shrimp, *Litopenaeus setiferus*, were the most abundant commercially important shrimp species (n=2394, x/tow=23.5) collected during the spring cruise.

The summer 2003 cruise sampled 102 inshore stations allocated to 24 shallow coastal strata in the South Atlantic Bight. Sampling was conducted from July 14 through July 31, 2003. A total of 132 species or genera were identified in summer trawls. *Leiostomus xanthurus* was the most abundant species, constituting 25% of total abundance, followed by *Micropogonias undulatus* (17%), *Cynoscion nothus* (11%) and *Stenotomus* sp. (6%). Abundance of individuals collected (n=204,848 individuals, x/tow=2008 individuals) increased considerably from the level of abundance observed in Summer 2002, whereas the miscellaneous invertebrate biomass (n=1,907 kg, x/tow= 18.7 kg) in 2003 decreased. Atlantic croaker and spot were the numerically dominant target species and together constituted approximately 40% of all abundance. The abundance of Spanish mackerel, *S. maculatus*, (n=535, x/tow=5.2) decreased in Summer 2003 trawls from levels observed in 2002. The brown shrimp, *Farfantepenaeus aztecus*, was taken in record numbers (n=9911, x/tow=97.2) during the summer cruise. Water temperatures (x=22.9°C, range=16.1-27.1°C) were considerably colder in Summer 2003 than in previous summer cruises. These cold-water temperatures were most notable in Florida waters and may be associated with an upwelling event caused by unusually high freshwater runoff due to unusually high precipitation. Runoff was accompanied by compensatory onshore intrusion of the cold and dense upwelled waters near the bottom, and southerly, upwelling-favorable winds facilitated the offshore spreading of the low-salinity water near surface, and thus increased shoreward advection of the cold upwelled water (pers. comm., O. Pashuk, MRRI/SCDNR).

Data from the fall 2002 and spring 2003 cruises have been added to the SEAMAP Data Management System (DMS). Data from the summer 2003 cruise are currently being added to the SEAMAP DMS. The results of the entire 2002 cruise season (Spring 2002, Summer 2002, and Fall 2002 cruises) are documented in the final 2002 project report, "Results of Trawling Efforts in the Coastal Habitat of the South Atlantic Bight, FY2002" by South Carolina Marine Resources

Division.

Pamlico Sound Survey

During FY2003, the North Carolina Division of Marine Fisheries (NCDMF) continued the ongoing Pamlico Sound Survey. Cruises sample approximately 52 stations each in June and September. This seasonal trawl survey is designed to provide a long-term fishery-independent database on the distribution, relative abundance, and size composition of target species of estuarine fish and decapod crustaceans for the waters of Pamlico Sound. The data are processed by NCDMF and are made available to the SEAMAP DMS.

Bottom Mapping Project

In 1992, the SEAMAP-South Atlantic Bottom Mapping Workgroup began an intensive effort to establish a regional database that includes the location and characteristics of hard bottom resources throughout the South Atlantic Bight. The importance of defining these areas has increased in the face of declining reefish resources and increased fishing pressure. In order to assess reefish populations and the effects of changes in fishing pressure, the amount of habitat available for priority species of fish must be quantified.

The primary objectives of the Workgroup are to:

- (1) conduct an extensive search of existing databases to identify all known critical hard bottom reef habitats on the continental shelf of the South Atlantic Bight from Florida through North Carolina from the beach out to 200 m in depth; and
- (2) summarize the bottom type information into a flexible, easy to use database which will provide researchers and managers with pertinent information concerning the location and extent of these areas, types of data used in determining bottom type, and source of the data for the development of future habitat mapping systems on available PC hardware.

All accessible databases available from state and federal agencies and other sources that have sampled or surveyed bottom habitats in the region were investigated to obtain files for processing. The data available from these sources varies in information content and accuracy in pinpointing reef habitat location. Treatment of each data type and gear is standardized, and the most accurate data for each gear type for each location are being compiled according to procedures developed by the Bottom Mapping Work Group. The database is designed for easy incorporation into Geographic Information System (GIS) or other PC mapping software programs.

By the end of FY1997, more than 65,700 records were compiled from databases obtained off North Carolina, South Carolina, Georgia, and Florida in three study phases. Reports summarizing the databases available for these areas were provided in three final reports

submitted to the SEAMAP-SA Committee. From FY1998 through FY2001, the Florida Marine Research Institute (FMRI) reproduced and refined the three Bottom Mapping Reports into a single product on a CD-ROM readable on any desktop PC. The CD-ROM includes GIS software, data files, documentation, and maps covering the area from Florida to the North Carolina-Virginia border. Version 1.0 was completed in 1998, Version 1.1 was printed in 1999, and Version 1.2 was printed in 2001. The development of version 1.2 included a much-improved summary document, and several tools to help users view and analyze the data. All versions were distributed to libraries to maximize availability and utilization of the data. Copies of the Bottom Mapping CD version 1.2 and the summary document are available through the ASMFC.

During 2001, the workgroup began discussing the development of protocols to capture deepwater (200 - 2000m) data on bottom type for funded action in 2002. The deepwater bottom type project will extend the depth range of the existing Bottom Mapping CD-ROM, and is progressing under a three-phase plan. Phase 1 and 2 are occurring simultaneously in FY2002-2003. Phase 1 (to be completed in December 2003) is developing protocols to recover existing data and convert it into a standard format. Phase 2 gathered key information on existing data sources (availability, format, data contacts, number of records, geographical range, etc.) to help the Bottom Mapping Workgroup prioritize data sources to obtain for conversion. The Phase 2 report "Summary of Seafloor Mapping and Benthic Sampling Conducted in 200-2000m, from North Carolina through Florida" was completed in April of 2003 and is available via www.asmf.org. Phase 3 will begin when funding is available to use the protocols developed in Phase 1 to obtain and standardize the data identified in Phase 2. Future priorities also include increased availability of summary data via the Internet in both a static and interactive mapping formats.

SEAMAP - Caribbean

In FY2003, SEAMAP-Caribbean supported a variety of activities in the U.S. Virgin Islands and Puerto Rico.

In the Virgin Islands, SEAMAP-Caribbean provided funds (in FY2002) to convert 8 square miles of side scan sonar data collected by the Environmental Protection Agency's OSV ANDERSON to a format compatible with U.S. Virgin Islands Division of Fish and Wildlife software. In early FY2003, the contractor finished data conversion and creation of 8 square miles of mosaics. U.S. Virgin Islands Division of Fish & Wildlife is now working with these converted data files. The St. Croix, U.S. Virgin Islands reefish trap and line survey (FY1999-2000) was delayed because of major repairs to the Division of Fish and Wildlife's R/V SARIMA. Fielding was completed in FY2002. In FY2003 the final report for this project was finalized and submitted to NOAA Fisheries. Fielding for the U.S. Virgin Islands - wide conch survey (FY2001) was completed that same year. Data analysis was completed and a draft report was written the following year (FY2002). In FY2003, this report was finalized and

submitted to NOAA-Fisheries. Field work for the St. Thomas (USVI) 12-month lobster pueruli collector and juvenile lobster attractor project (FY2002) was initiated in June 2002. Field surveys were completed in June 2003 (FY2003). By the end of FY2003, a draft report had been written and was under review. The U.S. Virgin Islands - wide whelk survey (FY2003) was initiated in 2003. Since little research had ever been completed on this species, a variety of methodologies had to be reviewed and assessed prior to initiation of the actual field surveys. Fielding of this survey was started in late FY2003 and will continue into FY2004. The SEAMAP-Caribbean Committee contracted with the University of Puerto Rico to review and cleanup SEAMAP-Caribbean reefish trap and line survey data (in FY2002). This included USVI traps and line data. In FY2003, data outliers were identified and the data files were cleaned up. Clean copy of data files were distributed to NOAA Fisheries and other relevant agencies.

In Puerto Rico, field work for the Puerto Rico 12-month lobster pueruli collector and juvenile lobster attractor project (FY2002) was initiated in October 2002. Field surveys will be completed in January 2004. By March 2004, a completion report will be written and sent to SERO. This completion report will include one year of reefish sampling (00-01), queen conch and lobster survey results. A whelk survey (FY2003) was undertaken for the first year of the next three-year cycle in Puerto Rico. There was a delay in the approval of the proposal, the grant approval arrived in June instead of April. Since little research had ever been completed on this species, a variety of methodologies had to be reviewed and assessed prior to initiation of the actual field surveys. Fielding of this survey was started in July and will continue into FY2004. It is expected to make over 40 visual censuses around the coasts of Puerto Rico, including Mona Island, Desecheo Island, and Caja de Muertos. The SEAMAP-Caribbean Committee contracted with the University of Puerto Rico to review and cleanup SEAMAP-Caribbean reefish trap and line survey data (in FY2002). This included Puerto Rico trap and line data. In FY2003, data outliers were identified and the data files were cleaned up. Clean copy of data files were distributed to NOAA Fisheries and other relevant agencies.

SPECIAL STUDIES

In addition to the regularly scheduled surveys, SEAMAP participates in a variety of other projects. The 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 SEAMAP Cooperative Winter Offshore Tagging Cruise was conducted from January 15-22, 2003 aboard the NOAA Ship OREGON II. The cruise included personnel from the Atlantic States Marine Fisheries Commission, Maryland Department of Natural Resources, North Carolina Division of Marine

Fisheries, U.S. Fish and Wildlife Service (FWS), the National Marine Fisheries Service, and East Carolina University. This was the 16th year of the cooperative project, initiated in 1988 at the request of SEAMAP-South Atlantic. Adult striped bass overwintering in the area between False Cape, Virginia and Wimble Shoals, North Carolina, were tagged for assessment of the population structure and estimation of exploitation rates of the migratory Atlantic Coast stock. Several other species have been tagged over the years of the cooperative tagging cruise, including Atlantic sturgeon, horseshoe crabs, red drum, and spiny dogfish.

The cruise resulted in the tagging of 1,908 striped bass, 8 Atlantic sturgeon, 2,986 spiny dogfish, 4 red drum, and 6 horseshoe crabs. An additional 20 striped bass were sacrificed for bacterial sampling and for length, weight, age, and sex. This year's cruise capture and tagging of migratory Atlantic striped bass exceeded the long-term average value for striped bass caught (14-year average of 1,959) and tagged (14-year average of 1,759). The Scientific Party and crew of the OREGON II, trawling night and day in the Atlantic Ocean off the North Carolina Outer Banks, processed 12,462 fish. In addition to tagging 1,908 of the striped bass, scale samples were taken for aging fish. All healthy fish were measured, tagged with FWS internal anchor tags, and released. Fish that were mortally injured during capture were sacrificed for aging, prey analysis and genetic sampling.

At the onset of the cruise, near Wimble Shoals north of Cape Hatteras, large numbers of juvenile sciaenids were caught. Upon moving north, several schools of Atlantic herring, Atlantic menhaden, very large Atlantic croakers and weakfish were captured along with lots of squid and a few spotted hake. Eight Atlantic sturgeon were captured, tagged and released this year. Tissue samples for genetic analysis were also taken from those tagged.

For the seventh consecutive year during this cruise, spiny dogfish were enumerated. In contrast to previous observations of spiny dogfish sex ratio being skewed with more females, this year's sex ratio was close to 1:1, females to males.

Data from the initial fifteen years of the cruise were entered into a geographic information system (GIS) database at the U.S. Fish and Wildlife Service's Raleigh, NC, Ecological Services field office. Preliminary plots of cruise tows and recapture localities have been made; however, additional cleaning of the database must take place before final analysis can be conducted. Also this year, in association with the Atlantic States Marine Fisheries Commission's Habitat Program and the National Marine Fisheries Service, data from previous years of the cruise have been entered into a GIS database at NMFS headquarters in Silver Spring, MD, and are undergoing analysis by intern Jodi Marcus, and GIS Specialist Keith Bickers, to assess habitat use off North Carolina as well as patterns of travel and habitat use inferred from coastwide tag returns. Preliminary GIS products have been prepared and additional work is underway. Summary reports are available through the South

Atlantic Fisheries Resources Office.

INFORMATION SERVICES

Information from the SEAMAP activities is provided to user groups through three complementary systems: the SEAMAP Information System, SEAMAP Archiving Center and SIPAC. 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 Archiving Center and SIPAC and program documents.

SEAMAP Information System

Biological and environmental data from all SEAMAP-Gulf surveys are included in the SEAMAP Information System, managed in conjunction with 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 1982-2002 have been entered into the system and data from 2003 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, although the highest priority is assigned to SEAMAP participants. A total of 265 SEAMAP data requests have been received. In most instances, requests were filled promptly. To date, 263 requests have been completed. During this reporting period, 13 requests were received.

The requirements report for an integrated data system, *Data Management System Design Study for Gulf and South Atlantic, 1987*, was completed in March 1987. The document identifies the high-level design specifications and recommended implementation plan for a module-based SEAMAP Data Management System (DMS). The design is based on information contained in the SEAMAP Gulf and South Atlantic DMS Requirements Document developed through a cooperative effort between NMFS and other SEAMAP participants. The document has five sections: 1) background and brief descriptions of current centralized and proposed distributed systems; 2) summary of the Requirements Survey; 3) overview of the system's architecture; 4) description of developmental modules constituting the DMS design; and 5) a modular implementation plan which includes costs and schedule.

Work was completed during FY1990 on the new distributed SEAMAP DMS. New modules completed include those for data entry, edit, upload, data query and download. All of the Gulf States are now equipped with the necessary computer hardware and software.

The system is decentralized, i.e., distributed. Thus, the SEAMAP users are able to locally, and directly, enter and retrieve data. Software for the system has been distributed to participants for trial runs of data input.

This system decreases the time necessary to enter and retrieve data and provides powerful and flexible local

data analysis and display capabilities. Under the system, each SEAMAP site enters, verifies and edits their data, eliminating the mail-oriented loop necessary to enter/edit/verify data. Secondly, each site has the capability of locally accessing SEAMAP data, utilizing a user-friendly system. Local data retrieval allows the data to be accessed in a timely manner with a minimum amount of effort and programming skills.

Under the system, outside users (e.g., Minerals Management Service, U.S. Army Corps of Engineers, etc.) may request special data sets for research or study. The outside users submit the request to the SEAMAP Subcommittee through the SEAMAP-Gulf Coordinator for approval to proceed. Once the request is approved, the information is provided by the Data Manager and staff members through a priority-based, mail-oriented system. Also, SEAMAP participants may use the Special Request mechanism for data sets too large for economical downloading by telephone. These requests will be handled by a Central Operations staff in the same priority-based, mail-oriented manner as noted above.

Requested SEAMAP data were used for a multitude of purposes in FY2003:

- 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;
- 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;
- Compiling the 2003 SEAMAP Environmental and Biological Atlas;
- Comparing catches of shrimp and groundfish captured by 40-ft versus 20-ft trawl nets;
- Stock assessment of Atlantic croaker, Atlantic Menhaden, black sea bass, bluefish, king mackerel, Spanish mackerel, and weakfish by ASMFC;
- Bottom mapping data used for Essential Fish Habitat definition for the South Atlantic by the South Atlantic Fishery Management Council;
- Historical and current shark abundance in the South Atlantic Bight for SCDNR, NMFS Highly Migratory Species;
- Genetic stock identification studies on Atlantic croaker, gulf kingfish, northern kingfish, and southern kingfish;

- Life history studies (age/growth, reproduction) on weakfish, gulf kingfish, northern kingfish, southern kingfish, sand perch, tomtate, and Atlantic croaker;
- Specimens of fish and invertebrate species for catalogue of voucher specimens for Southeastern Regional Taxonomic Center at MRRI and the College of Charleston;
- Data collected off Canaveral National Seashore (2002-2003) provided to the National Park Service;
- Historical and current shark abundance in the South Atlantic Bight for SCDNR, NMFS Highly Migratory Species (Silver Spring), and NMFS Narragansett Laboratory;
- Marine turtle capture data for the NMFS Cooperative Marine Turtle Tagging database, NOAA SEFSC, Florida FWC Endangered Species Division, Georgia DNR, and the South Carolina DNR sea turtle project;
- Cannonball jelly abundance data for correlation with Leatherback sea turtle sightings for the SCDNR- Endangered Species Office;
- Weekly penaeid shrimp abundance information from the Spring South Atlantic Trawl survey to evaluate season opening dates in Georgia and South Carolina;
- Penaeid shrimp specimens exhibiting signs of black gill disease for verification of the presence of the disease in shrimp stocks;
- Weekly blue crab/sponge crab abundance information in response to concern about status of blue crab in South Carolina waters; and
- South Atlantic Bottom mapping data was distributed to educators as teaching tools and individuals working on environmental impact statements for US Navy projects, an ecoregional conservation plan for the Nature Conservancy, and NMFS scientists working on drifting data buoys to correlate larval fish abundance to bottom habitat.

Real-time Data

A major function of the SEAMAP Information System is the processing of catch data from the Summer Shrimp/Groundfish Survey as near-real-time data. Data were transmitted three times weekly via cellular phone to the NMFS Mississippi Laboratories from the NOAA vessel, while the states' data were entered into the system weekly. Plots of station locations and catch rates of shrimp, squid and dominant finfish species were prepared and edited at the NMFS Mississippi Laboratories, and processed by GSMFC for weekly distribution to management agencies, fishermen, processors and researchers. SEAMAP real-time data plots were produced during the 2003 Summer

Shrimp/Groundfish Survey. Seven weekly mailings were produced and distributed to approximately 220 interested individuals. These plots were also available through the SEAMAP home page. Management agencies also received comprehensive data listings showing penaeid shrimp length frequencies, sampling parameters and environmental conditions.

Data from the 2002 Fall Shrimp/Groundfish Survey were used to produce red snapper real-time plots in January 2003. These plots described research trawl effort and catch rates for juvenile red snapper during the Survey. This was the fifth year the plots were produced and distributed to interested individuals.

SEAMAP Archiving Center

Larval fish and fish egg samples sorted to the lowest taxa level possible by the Polish Sorting and Identification Center are returned to the SEAMAP Archiving Center for archiving and loan to researchers. To date in 2003, 22,374 samples were returned from the Polish Sorting and Identification Center. Data entry for sorted samples is being completed in the new SEAMAP Access data entry system. The 27,602 samples cataloged this year represent 18 orders, 126 families, 235 genera and 245 species.

The SEAMAP Archiving Center, which is managed in conjunction with Florida Fish and Wildlife Conservation Commission (FWC) in St. Petersburg, Florida, processes specimen loans, requests for associated plankton survey data, and requests for data clarification. Seventy-eight requests have been accommodated this year to twenty different researchers at both the state and federal level.

SEAMAP Invertebrate Plankton Archiving Center

The SIPAC is in its nineteenth year of operation. Sara LeCroy at the USM/COST/GCRL currently serves as the SIPAC curator. The overall mission of the SIPAC, to archive and manage the large collection of plankton samples acquired during SEAMAP cruises and to obtain specimens and/or data on selected invertebrate larval stages from those samples, continued during the year, but at a reduced level of activity. The SIPAC continues to provide unsorted plankton samples and data or specimens of larval invertebrates to qualified researchers upon request.

The student assistant employed during the past year currently aids the curator with the cataloging of new samples, and the maintenance and curation of the collection. Activities during the year were limited to the maintenance and curation of the existing collection, as well as the cataloging of 400 additional bongo net samples (48 from year 1998 plankton cruises; 38 from year 1999 plankton cruises; 20 from year 2001 plankton cruises; 247 from year 2002 plankton cruises; 47 from year 2003 plankton cruises). In addition, 35 neuston samples were received and cataloged (21 from year 1998 plankton cruises; 14 from year 1999 plankton cruises). The number of samples currently cataloged in the SIPAC collections is 8,586, with 326 samples

currently on loan.

In an effort to keep the space required to house the SIPAC collection of unsorted plankton samples to a minimum, samples that have been in the collection for over 10 years and duplicate samples sorted and received from the Polish Sorting and Identification Center, are aliquoted to 1/4 their original volume and placed into 100 ml vials, as necessary. When possible, the remaining 3/4 aliquots are donated to educational institutions for use as teaching materials. If the remaining sample must be discarded, sample jars are cleaned and returned to NMFS-Pascagoula for reuse. To date, approximately 2,264 samples collected from 1982 - 1988 have been aliquoted and prepared for long-term storage. Due in part to the removal of approximately 180 samples to the NMFS-Pascagoula during the previous year (2002), there is presently sufficient space available for additional samples to be deposited into the SIPAC archives without continuing the aliquoting of 1988-1992 SEAMAP samples.

During the next year, the SIPAC will continue to manage SEAMAP plankton collections, accession samples, and provide unsorted samples, sorted specimens and data from the collection to qualified researchers as requested. Efforts with sorted materials will concentrate on curation and analysis of current holdings and publication of distribution patterns of selected taxa by cruise.

Program Documents

The following documents were published and distributed by the SEAMAP program in FY2003:

- Gulf States Marine Fisheries Commission. 2003. SEAMAP Marine Directory. Gulf States Marine Fisheries Commission, Ocean Springs. 1 p. + appendices.
- Rester, J.K., G.G. White, and E. Ojeda Serrano. 2002. Annual Report of the Southeast Area Monitoring and Assessment Program (SEAMAP), October 1, 2001 to September 30, 2002. Gulf States Marine Fisheries Commission, Atlantic States Marine Fisheries Commission, Puerto Rico Sea Grant College Program. 10 pp.
- Rester, J.K. 2002. SEAMAP Annual Report to the Technical Coordinating Committee (October 1, 2002 to September 30, 2003). No. 117. Gulf States Marine Fisheries Commission, Ocean Springs. 16 pp. + appendices.
- South Carolina Marine Resources Division. 2002. 2002 Fall SEAMAP Cruise Report. South Carolina Department of Natural Resources. Charleston, SC. 11 pp.
- South Carolina Marine Resources Division. 2003. 2003 Spring SEAMAP Cruise Report. South Carolina Department of Natural Resources. Charleston, SC. 9 pp.
- South Carolina Marine Resources Division. 2003.

2003 Summer SEAMAP Cruise Report. South Carolina Department of Natural Resources. Charleston, SC., 10 pp.

South Carolina Marine Resources Division. 2003. Results of Trawling Efforts in the Coastal Habitat of the South Atlantic Bight, FY2002. South Carolina Department of Natural Resources, Charleston, SC. 85 pp.

Southeast Area Monitoring and Assessment Program-South Atlantic. 2003. Summary of Seafloor Mapping and Benthic Sampling Conducted in 200-2000m, from North Carolina

through Florida. Final report to the NOAA Coastal Services Center Deep Water Habitat Mapping Project, Phase II. April 2003. 156 pp. Available through the Atlantic States Marine Fisheries Commission, Washington, DC. 166 pp.

PROPOSED SEAMAP ACTIVITIES, FY2004

Annual program allocations for the SEAMAP programs, Gulf, South Atlantic and Caribbean total approximately \$1.4 million. Proposed FY2004 activities for all participants are shown in Table 2.

Table 2.

PROPOSED SEAMAP ACTIVITIES, FY2004				
	Fall	Winter	Spring	Summer
Gulf of Mexico Activities				
Resource Surveys:				
Spring Plankton Survey			X	
Reef Fish Survey			X	
Summer Shrimp/Groundfish Surveys				X
Fall Shrimp/Groundfish Surveys	X			X
Fall Plankton Survey	X			
Plankton and Environmental Data Surveys	X	X	X	X
Information Operations:				
2001 and 2002 Biological and Environmental Atlas		X		
2004 Marine Directory			X	
FY2004 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				
Joint Planning Activities	X	X	X	X
South Atlantic Activities				
Resource Surveys:				
Shallow Water Trawl Survey	X		X	X
Pamlico Sound Survey	X			X
Winter Trawling and Fish Tagging Cruise		X		
Bottom Mapping Project	X	X	X	X
Information Operations:				
Data Input and Request Processing	X	X	X	X
2003 South Atlantic Annual Report	X			
Data Analysis and Utilization	X	X	X	X
Program Administration				
Joint Planning Activities	X	X	X	X
Caribbean Activities				
Resource Surveys				
	X	X	X	X
Information Operations:				
Coordination with Caribbean Countries				
Research Programs		X	X	
Program Administration				
Joint Planning Activities	X	X	X	X

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