

**ANNUAL REPORT**

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

**OCTOBER 1, 2005 - SEPTEMBER 30, 2006**

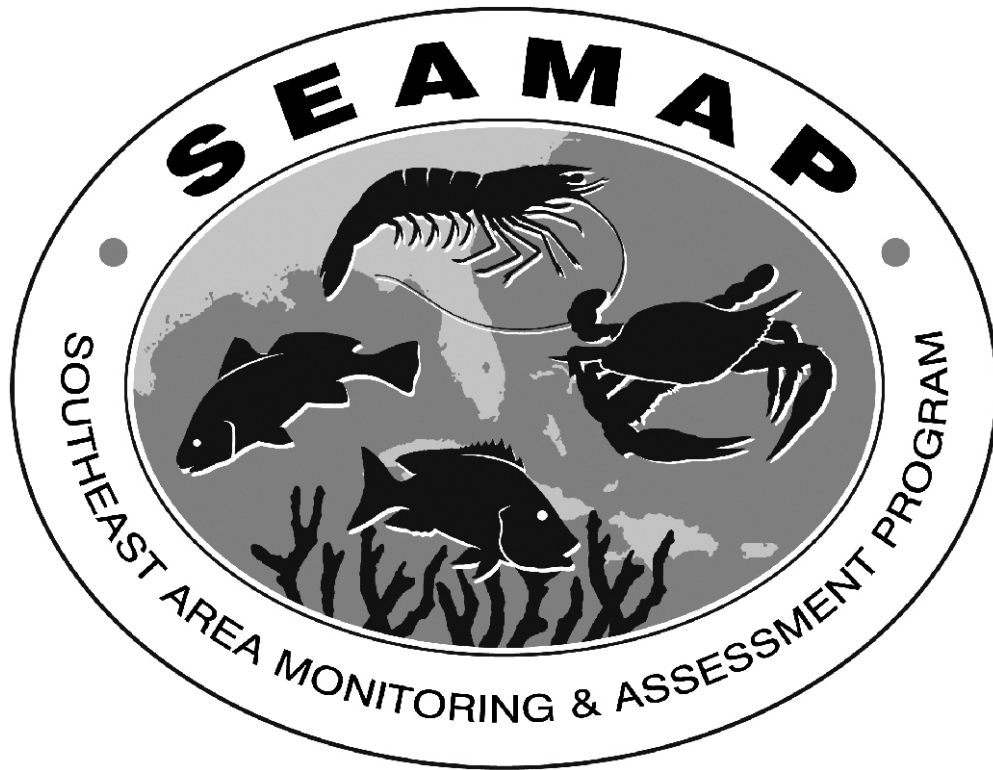
**SEAMAP - Gulf of Mexico**  
Gulf States Marine Fisheries Commission

**SEAMAP - South Atlantic**  
Atlantic States Marine Fisheries Commission

**SEAMAP - Caribbean**  
Puerto Rico Sea Grant College Program

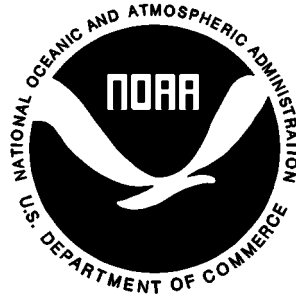
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Gulf States Marine Fisheries Commission

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# **ANNUAL REPORT**

## **of the**

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

#### **October 1, 2005 - September 30, 2006**

#### **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 1985-2006. Funding allocations to participants for FY1985-FY2006 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 FY2006 and proposed activities for FY2007.

#### **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 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 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 Archiving Center and SEAMAP Invertebrate Plankton Archiving Center (SIPAC).

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

Major SEAMAP-Gulf Subcommittee meetings were held in October 2005 and March 2006 in conjunction with the Annual Meeting of the GSMFC. All meetings included participation by various work group leaders, Coordinator, Data Manager, Program Monitor and other GSMFC staff. Representatives from the Gulf program also met with the South Atlantic and Caribbean representatives in August 2006 to discuss respective program needs and priorities for FY2007.

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 2006. 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

**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/COST/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

extension of activities previously not detailed in the agreements.

**SEAMAP-South Atlantic**

One committee meeting, two work group meetings, and several conference calls, were coordinated and documented in FY2006. Additional tasks included fulfilling data requests, preparation of annual program reports and State/Federal Cooperative Agreements, and distribution of publications.

The SEAMAP-South Atlantic Committee held their annual meeting in conjunction with the joint annual meeting held August 2-4, 2006 in Charleston, South Carolina. The meeting included participation by the work group leaders and coordinator. The Committee developed the SEAMAP-SA budget and research program priorities for the 2006-2010 SEAMAP Management Plan. The Committee also reviewed progress by the Crustacean, Data Management, and

Trawl work groups and provided direction where necessary. Topics discussed included fisheries independent data collection/storage standards, and NMFS data management activities. The committee also developed a recommendation to the South Atlantic Board for project funding for 2006-2010.

The South Atlantic Board met on August 16, 2006 to review recommendations from the SEAMAP-South Atlantic Committee. The Board approved the 2006-2010 SEAMAP Management Plan on October 24, 2006. The SEAMAP Crustacean Work Group and Shallow Water Trawl Work Group both met on June 14-15, 2006, and discussed topics including analyses of Shallow Water Trawl Survey sample allocation and recent trends in crustacean fisheries.

The SEAMAP Cooperative Winter Offshore Tagging Cruise was conducted from January 19-28, 2006 aboard the NOAA R/V Oregon II. Personnel from U.S. Fish and Wildlife Service, North Carolina

Division of Marine Fisheries, Atlantic States Marine Fisheries Commission, East Carolina University, and Maryland Department of Natural Resources participated in the cruise. This was the nineteenth 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 Cape Lookout, North Carolina, were tagged for assessment of the population structure and exploitation rates. Other species tagged included Atlantic sturgeon, horseshoe crab, and spiny dogfish. Numerous species including summer flounder, weakfish, bay anchovies, spotted hake, and Atlantic croaker were retained for diet studies.

### **SEAMAP-Caribbean**

The SEAMAP-Caribbean Administrative and Working Group components held four meetings during FY 2006: on January 20, April 24, July 20, and August 3-4. Timely distribution of meeting memos, minutes and agendas to all SEAMAP-Caribbean Committee members were provided to coordinate alternating meetings in Puerto Rico and the U.S. Virgin Islands (St. Thomas). During these meetings, the SEAMAP-Caribbean committee overviewed and followed up several main topics: the 2004-2005 Puerto Rico and Virgin Islands reef fish surveys and their final reports, the status of the current (2006) conch surveys, the revision of the SEAMAP-Caribbean priorities for 2006-2010, the budget analysis to restore current projects to full utilization, and the discussion of new fishery independent data collection projects needed by the Caribbean region. In addition, the SEAMAP-Caribbean committee continued their discussions regarding reassessing long-term sampling protocols to improve conch and lobster surveys.

### **RESOURCE SURVEYS**

In FY2006, collection of resource survey information continued for the twenty-fifth 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 Shrimp/Groundfish Survey**

The Fall Shrimp/Groundfish Survey was conducted from October 8 to November 16, 2005, from off Mobile, Alabama to the U.S.-Mexican border. Vessels sampled waters out to 60 fm, covering 344 trawl stations, in addition to plankton and environmental sampling. Due to impacts from Hurricane Katrina, Mississippi did not participate in the 2005 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 and Louisiana vessels collected ichthyoplankton data at sample sites occurring nearest to half-degree intervals of latitude/longitude. Fifty-eight stations were sampled with bongo and/or neuston nets, as encountered along cruise tracks. The Polish Sorting and Identification Center will sort the samples. 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 April 22 to May 29, 2006. One hundred sixty-four stations were sampled from the west Florida shelf to the Louisiana/Texas border. This was the twenty-fifth 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 were transshipped to the Polish Sorting and Identification Center. Left bongo samples were archived at the SEAMAP Invertebrate Plankton Archiving Center (SIPAC).

### **Reeffish Survey**

The primary purpose of this survey was to assess relative abundance and compute population estimates of reef fishes found on natural reef fish habitat in the Gulf of Mexico. Two types of gear were 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 were baited with squid before deployment. The resultant video recordings (typically of one hour duration) were processed back at the laboratory where fishes were identified and counted independently by two tape readers. Final counts were entered into the SEAMAP reef fish database along with additional observations on habitat and fish activity. NMFS conducted reeffish sampling from April 11 to May 10, 2006. Video cameras were deployed at 154 sites and the chevron trap at 28 sites.

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

During the spring of 2006, 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 2006 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-fifth year for the survey. The entire survey occurred from June 1 to July 16, 2006 and 332 trawl stations were sampled during the survey. In addition, NMFS and Louisiana vessels collected ichthyoplankton data. Fifty-five stations were 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, and oxygen at each station.

### **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 since then have covered Gulf waters from Florida Bay to Brownsville, Texas. The Fall Plankton cruise took place from August 28, 2006 through September 29, 2006. NMFS and Alabama sampled 127 stations on the west Florida shelf and northern Gulf of Mexico. 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. 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).

### **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) 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. Preservation of plankton samples was in buffered formalin prior to transfer to ethanol.

## **SEAMAP-South Atlantic**

### **Shallow Water Trawl Survey**

The largest component of SEAMAP-South Atlantic survey research in FY 2006 was the continuing Shallow Water Trawl Survey conducted by the South Carolina Department of Natural Resources (SCDNR). The overall goal of this survey is to obtain a long-term database to facilitate management of stocks in the South Atlantic Bight. 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 (spring, summer and fall) cruises to reduce variability in the abundance estimates for target species.

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 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 FY 2006: Fall 2005 (October 10-November 9); Spring 2006 (April 10-May 9); and Summer 2006 (July 10-July 28). 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, which are found more frequently during the day.

The fall 2005 cruise completed the sixteenth full year of standardized sampling under a stratified random survey design. Sampling was conducted between October 10 – November 9 and all of the 102 inshore stations allocated to 24 shallow coastal strata in the

South Atlantic Bight were sampled. A total of 133 species or genera were identified in fall trawls. Spot, *Leiostomus xanthurus*, was the most abundant species, constituting 19% of total abundance, followed by Atlantic croaker, *Micropogonias undulatus* (13%); white shrimp, *Litopenaeus setiferus* (10%); butterflyfish, *Peprilus triacanthus* (7%); and weakfish, *Cynoscion regalis* (6%). The abundance of individuals, excluding cannonball jellies, *Stomolophus meleagris*, (n= 330,876 individuals, mean per tow= 3244 individuals) in 2005 exceeded all previous estimates of abundance recorded during fall cruises. Miscellaneous invertebrate biomass, including cannonball jellies (n= 4,995 kg, mean per tow= 49.5 kg), also increased in 2005; however, miscellaneous invertebrate biomass did not approach record levels. Overall abundance was greatest in Raleigh Bay (n= 141,382 individuals, mean per tow= 14,138 individuals), whereas miscellaneous invertebrate biomass was greatest off Georgia (n= 3,457 kg, mean per tow= 133.0 kg).

The spring cruise for the SEAMAP-South Atlantic Shallow Water Trawl Survey began on April 10 and was completed on May 9, 2006. A total of 102 stations were sampled in the 24 shallow coastal strata in the South Atlantic Bight. A total of 124 species or genera were identified in spring trawls. Atlantic croaker was the most abundant species, constituting 26% of total abundance, followed by spot (21%); Atlantic bumper, *Chloroscombrus chrysurus* (10%); southern kingfish, *Menticirrhus americanus* (5%); and white shrimp (4%). Abundance of individuals collected (n= 196,555 individuals, mean per tow= 1,927 individuals) in Spring 2006 increased from the record level of spring abundance observed in 2005. Miscellaneous invertebrate biomass (n= 7,073 kg, mean per tow= 69.3 kg) also exceeded 2005 estimates, primarily due to an increase in the catch of cannonball jellies. The cannonball jelly constituted more than 88% of miscellaneous invertebrate biomass.

The summer cruise for the SEAMAP-South Atlantic Shallow Water Trawl Survey began on July 10 and was completed on July 28, 2006. A total of one hundred and two stations were sampled in the twenty-four shallow coastal strata in the South Atlantic Bight. A total of 120 species or genera were identified in summer trawls. Atlantic croaker was the most abundant species, constituting 21% of total abundance, followed by spot (16%), Atlantic bumper (15%), scup, *Stenotomus* sp. (6%), and brown shrimp, *Farfantepenaeus aztecus* (5%). Abundance of individuals collected (n= 214,168 individuals, mean per tow= 2,100 individuals) in summer 2006 was exceeded only by 1991, the year of peak

abundance. Abundance was greatest in the northern portion of the South Atlantic Bight. The lowest regional abundance was observed in South Carolina.

Data from the spring, summer, and fall FY2006 cruises have been added to the SEAMAP Data Management System (DMS). For additional cruise information, please see the individual cruise reports available at [www.asmfc.org](http://www.asmfc.org) under the Research & Statistics section of the website. Additionally, the results of the entire 2005 cruise season (Spring 2005, Summer 2005, and Fall 2005 cruises) are documented in the final 2005 project report, "Results of Trawling Efforts in the Coastal Habitat of the South Atlantic Bight, FY 2005" by South Carolina Marine Resources Division.

### **Pamlico Sound Survey**

During FY 2006, 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.

Sixty-three species of finfish, invertebrates, and submerged aquatic vegetation were captured during the June cruise. Several of the most abundant species are considered economically important and include: spot, Atlantic croaker, blue crab, *Callinectes sapidus*, weakfish, summer flounder, *Paralichthys dentatus*, southern flounder, *P. lethostigma*, bluefish, *Pomatomus saltatrix*, and brown shrimp which made up 93.4% of the catch. Seventy-five species of finfish, invertebrates, and SAV's were captured during the September cruise. Spot, Atlantic croaker, blue crab, weakfish, summer flounder, southern flounder, bluefish, white shrimp and brown shrimp made up 91.5% of the total catch and 76.6% of the total biomass. More information on the results of these surveys is available at [www.asmfc.org](http://www.asmfc.org) under the Research & Statistics section of the website.

### **Bottom Mapping Project**

In 1992, the SEAMAP-South Atlantic Bottom Mapping Work Group 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 reef fish resources and increased fishing pressure. To assess reef fish 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 Work Group 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 FY 2001, 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 work group 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 occurred simultaneously in FY 2002-2003. In phase 1, protocols were developed to recover existing data and convert it into a standard format. During phase 2, key information was gathered on existing data sources (availability, format, data contacts, number of records, geographical range, etc.) to help the Bottom Mapping Work group 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.asafc.org](http://www.asafc.org). Phase 3, which began in 2004, involves using the protocols developed in Phase 1 to obtain and standardize the data identified in Phase 2. The first project of Phase 3 was digitizing and translating existing bottom character maps published by Popenoe for deepwater marine habitat off the Southeastern U.S. margin. The Popenoe maps were digitized by the Skidaway Institute of Oceanography. The digital GIS maps include coral formations and base geology for a large area encompassing over 29,000 square miles off the coasts of Northern Florida, Georgia and South Carolina. These maps and associated metadata can be viewed at the SAFMC Ecosystem and Habitat IMS <[http://ocean.floridamarine.org/efh\\_coral/ims](http://ocean.floridamarine.org/efh_coral/ims)>.

Progress has been made during FY2006 on another project for Phase 3, which is the creation of a deepwater bottom type spatial database. The Florida Fish and Wildlife Research Institute (FWRI) is participating with the Bottom Mapping Workgroup to create a GIS of deepwater bottom habitats, from 200 to 2000 m depth for the area off the North Carolina, South Carolina, Georgia and east Florida coasts. The deepwater GIS will be created from the recovery, interpretation, and integration of existing data for this region. The methodology to develop the deepwater GIS has closely followed the guidelines established for GIS data originally built for the Distribution of Bottom Habitats on the Continental Shelf from North Carolina through the Florida Keys project. By maintaining design consistency between these two projects it will be possible to serve, view, and query, both databases within identical applications. The bottom classification scheme for the deepwater project will be slightly different;

however, this will not affect the consistency of GIS design between the two projects.

Within the last year, FWRI produced a template database for the collaborating partners at Harbor Branch Oceanographic Institute (HBOI), University of North Carolina, Wilmington (UNCW), and South Carolina Department of Natural Resources (SCDNR) to populate with data sets for their respective regions. The majority of the master database has been populated this year. FWRI compiled the regional data to create several different GIS layers for the deepwater project. These include: a one-minute latitude/longitude grid; a point layer holding bottom type information found at a single location, such as from a fish trap or lead line; and a line layer holding data types expressing information found along a transect. FWRI created the deepwater latitude/longitude grid to dovetail exactly with the earlier continental shelf grid for consistency. The individual grid cells will store the bottom-type information of all the individual data records found within each cell.

The resulting deepwater GIS database will be distributed via appropriate Web sites, including the South Atlantic Fishery Management Council, the Atlantic States Marine Fisheries Commission, and the Coastal Services Center. All data created or rescued by this project will be documented using current accepted standards. FGDC compliant metadata will be created and submitted to the appropriate agencies for inclusion in the NOAA Server, the Coastal Information Directory, the FGDC Clearinghouse and other metadata-based search and retrieval systems.

The deepwater GIS will prove to be critical for regional management decisions related to: identification, description, and conservation of unique habitats, including deep-water coral communities and Essential Fish Habitat; designation of Marine Protected Areas; recovery of over-exploited fisheries; locating appropriate cable routes; and exploration for mineral and hydrocarbon resources. As such, we anticipate a broad user group, including but not limited to state natural resource and commerce agencies, federal agencies, university scientists, and private industry.

### **SEAMAP-Caribbean**

In FY2006, SEAMAP-Caribbean supported a variety of activities in the U.S. Virgin Islands (USVI) and Puerto Rico. In FY2005, \$80,000 was made available from U.S. Fish and Wildlife Sport Fish Restoration Program funds to partially fund a new

fishing research vessel in addition to the \$41,000 provided by SEAMAP-Caribbean. The Division of Fish and Wildlife (DFW) requested bids for the research vessel on three occasions through the Department of Property and Procurement. No response was received within the bid time frame for the first bid request; one bid was received for over \$200,000 for an aluminum boat in response to the second bid request. The DFW staff felt the price was too high and that aluminum was too prone to electrolysis due to the equipment that would be installed on the vessel. The third bid period ended early July 2006 with no bids. After three unsuccessful bid advertisements, the Division, following Department of Property and Procurement procedures, obtained a quote for \$124,203.00 from RP Boats, Inc., in Steuben, Maine, for a 31 ft. diesel-powered fiberglass vessel. Purchase requisitions from two funding sources were prepared and funds for the vessel were secured. A contract was initiated and vessel construction has commenced.

A consultant was hired by SEAMAP-Caribbean to analyze the entire historic SEAMAP-Caribbean USVI trap and hook & line database. This analysis was forwarded to SEAMAP-Caribbean and NMFS. A review report of this analysis was completed. No further strides have been made in this project due to staff shortage.

Approximately 5 years ago, as part of a separate U.S. Fish and Wildlife Service habitat study, conch data was collected secondarily to fish census data, but was not analyzed. These data have been analyzed and a final report has been completed. Copies of the final report were provided to the SEAMAP-Caribbean Committee. A PowerPoint presentation was also presented to the Committee members on the abundance, density, size distribution and habitat of conch in six backreef embayments on the east end of St. Croix.

DFW has received approval for a conch survey grant from NMFS. DFW has also acquired two underwater scooters (as well as two battery chargers and four batteries) for field work through the administrative portion of the SEAMAP-Caribbean grant. A conch literature search and update was conducted using the Aquatic Sciences and Fisheries Abstract database. Conch papers of interest have been requested to update the DFW's conch library. Due to staff shortages in both the St. Thomas and St. Croix offices (only one biologist in each office), conch surveys have not been conducted. An extension of the conch survey grant will be requested.

Historically, St. Croix and Puerto Rico have done drift hook and line fishing during the reef fish monitoring project while St. Thomas/St. John have done anchor fishing. An index between drift and anchor hook and line fishing is needed so that results can be compared. This must be done concurrently with the St. Thomas/St. John trap and line fishing that is on hold pending the arrival of the new research vessel.

The reef fish monitoring surveys that were started on May 2004 continued until April 2006 in Puerto Rico. A total of 86 surveys were conducted, covering 17 stations. Total catch was 1,625 fish that weighted 551.34 kg and included 55 fish species. Three species represent 56% of the total catch, *Epinephelus guttatus*, *Cephalofolis fulva* and *Malacanthus plumieri*. Hook and line yielded 80% of the total catch by weight. The data collected and the analysis will be submitted as part of the final report no later than December 2006.

A six month non-cost extension was requested and approved to finish the proposed work on the research vessel used for the study. This job was contracted and started in August 2006.

The five year SEAMAP-Caribbean proposal for the period 2006-2011 was submitted and approved in April 2006. The Queen Conch, *Strombus gigas* surveys were first. Governmental shut down during May 2006 in addition to a closure of the Fisheries Research Laboratory facilities during April-May 2006 delayed the proposed tasks schedule. The contract for a diver was approved by the Department of Natural and Environmental Resources in July 2006. Most of the materials and equipment needed for the Queen Conch surveys have been acquired. Surveys were started on July 2006. Approximately 75% of the proposed surveys were completed by September 2006.

## **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<sup>1</sup>**

The SEAMAP Cooperative Winter Offshore Tagging Cruise was conducted from January 17-29, 2006

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<sup>1</sup> Data from the cruise is preliminary and therefore subject to revision.

aboard NOAA R/V OREGON II. Personnel from U.S. Fish and Wildlife Service, North Carolina Division of Marine Fisheries (NCDMF), Atlantic States Marine Fisheries Commission (ASMFC), East Carolina University, and Maryland Department of Natural Resources (MDDNR) participated in the cruise. This was the nineteenth year of the cooperative project, initiated in 1988 at the request of SEAMAP-South Atlantic. Adult striped bass, *Morone saxatilis*, over-wintering in the area between False Cape, Virginia and Cape Lookout, North Carolina, were tagged for assessment of the population structure and exploitation rates. Other species tagged included Atlantic sturgeon, *Acipenser oxyrinchus*, horseshoe crab, *Limulus polyphemus*, and spiny dogfish, *Squalus acanthias*. Numerous species including summer flounder, weakfish, bay anchovies, *Anchoa mitchilli*, spotted hake, *Urophycis regia* and Atlantic croaker were retained for diet studies.

The scientific party and crew of the R/V OREGON II, trawling night and day in the Atlantic Ocean off the North Carolina Outer Banks, processed (i.e., counting, measuring, sexing and additional weighing, tagging and/or sampling for some species) fish of 19 different species. In 2006, the number of migratory Atlantic striped bass captured and tagged far exceeded the long-term average value for striped bass tagged (18-year average of 2,437). The 2006 cruise ranks third overall in numbers of striped bass tagged and released. The new 19-year average striped bass number tagged is 2,213. In addition to tagging 4,445 striped bass, random scale samples were taken for ageing fish. Striped bass mortally injured during capture this year were sacrificed for aging, prey analysis and condition assessment (using livers). During its 19-year history, the Cooperative Winter Tagging Cruises have collectively tagged 43,869 striped bass. A majority of the fish tagged this year was in the 28-inch and up (711 mm+) size classes.

Only a few bluefish were collected for research to be conducted by North Carolina State University. Observations were taken also regarding weakfish abundance and distribution. Only a few catches of large fish were observed this year. Samples of large weakfish encountered were measured and otoliths removed and retained for analysis by the NCDMF, and for the Chesapeake Bay Trophic Interactions Studies Laboratory Services (CTILS) diet studies. Twenty-nine Atlantic sturgeon were captured, measured and released this year. For the eleventh consecutive year during this cruise, spiny dogfish were enumerated. Tagging has been conducted in nine of the eleven years (no tags were available in 2000 and 2001). As observed in the previous years,

the majority of the adult or immature fish encountered were females. No neonates were captured this year. Overall number of summer flounder encountered on the cruise this year was higher than last year. For the third time during the cruise, skates in the catch were measured and their gender noted. At least three species were present in the catch: clearnose, *Raja eglanteria*, winter, *Leucoraja ocellata*, and little, *L. erinacea*. The fourth year of horseshoe crab tagging resulted in a record twelve crabs tagged. Adult and juvenile alewives, *Alosa pseudoharengus*, blueback herring, *A. aestivalis*, and hickory shad, *A. mediocris* were collected by East Carolina University for a food habitats and ecological study. Observations of whales occurred during the cruise this year, with one confident identification of a northern right whale. Temperature, salinity, and depth data were recorded at each station where the nets were set.

Release data from the initial nineteen years (1988-2006) of the Cooperative Winter Tagging Cruise (Cruise) are annually maintained in databases by the U.S. Fish and Wildlife Service's Maryland Fisheries Resources Office, and by the MDDNR, Tidewater Administration, Fisheries Service, both located in Annapolis, MD. Recapture data are entered by the Maryland Fisheries Resources Office and are used annually by the ASMFC Striped Bass Tagging Subcommittee to derive estimates of mortality for various size classes of striped bass. The data from the first fifteen Cruise years were entered into a GIS database at the U.S. Fish and Wildlife Service's Raleigh, NC, Ecological Services field office. Preliminary plots of cruise tows and striped bass recapture localities were made; however, additional cleaning of the database must take place before final analysis can be conducted. In association with the ASMFC Habitat Program and the National Marine Fisheries Service, striped bass data from previous years of the cruise also have been entered into a GIS database at NMFS headquarters in Silver Spring, MD, and were analyzed to assess habitat use off North Carolina as well as patterns of travel and habitat use inferred from coast-wide tag returns. Preliminary GIS products were prepared for use by ASMFC. Summary reports for each annual cruise are available through the South Atlantic Fisheries Resources Office.

## INFORMATION SERVICES

Information from the SEAMAP activities is provided to user groups through the program administration and 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 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 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 1982-2005 have been entered into the system and data from 2006 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.

Requested SEAMAP data were used for a multitude of purposes in 2006:

- 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;
- Assessing the potential impact of liquefied natural gas facilities on marine fish stocks;
- Compiling the 2006 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. Data were transmitted 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, edited, and processed by GSMFC for weekly distribution to management agencies, fishermen, processors and researchers. SEAMAP real-time data plots were produced during the 2006 Summer Shrimp/Groundfish Survey. Seven weekly mailings were produced and distributed to approximately 200 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.

### **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 (SAC) for archiving and loan to researchers. To date in 2006, 17,820 lots of samples were returned from the Polish Sorting and Identification Center. Data entry for 3,069 of the specimens has been completed in the SEAMAP Access data entry system. Nine thousand nine hundred eighty-nine (9,989) lots of specimens have been cataloged, but not entered into the database. The Archiving Center is experiencing a back log of data entry as there have been delays in receiving the necessary data from the NMFS Pascagoula laboratory. The specimens cataloged this year represent 18 orders, 126 families, 235 genera and 245 species.

The SEAMAP Archiving Center is managed in conjunction with Florida Fish and Wildlife Conservation Commission's (FWC) Fish and Wildlife Research Institute (FWRI) in St. Petersburg, Florida. The SAC processes specimen loans, requests for associated plankton survey data, and requests for data clarification. Fifty-four requests have been accommodated this year to nineteen different researchers at both the state and federal level.

### **SEAMAP Invertebrate Plankton Archiving Center**

The SEAMAP Invertebrate Plankton Archiving Center (SIPAC) is in its twenty second year of operation. Sara LeCroy at the USM/CMS/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 the focus shifted from archiving new material to the recovery of material damaged by Hurricane Katrina. The SIPAC continues to provide unsorted plankton samples and data or specimens of larval invertebrates to qualified researchers upon request.

On August 29, 2005, Hurricane Katrina struck the Mississippi Gulf coast severely damaging the building at the Gulf Coast Research Laboratory in which the SIPAC samples were housed. The room containing these samples was breached by the storm surge and many samples were washed out into the surrounding area. Although some samples were destroyed, many were not, and to date approximately 1,263 samples have been recovered. Prior to re-archiving, each of these samples was carefully checked and the alcohol, internal and external labels replaced, if necessary. Available data from the labels was entered in an Excel spreadsheet as an ongoing record of sample recovery. The recovered samples are currently housed within the GCRL Museum's Research Building Collection Room. It is anticipated that many additional samples remain beneath the debris within the room that previously housed them; however, that room is currently inaccessible because of damage to the building above. Plans are currently underway to attempt the recovery of those samples as a part of the debris removal process prior to the demolition of the building. However, this recovery effort has been delayed by insurance issues regarding the partially destroyed building.

The student assistant employed during the past year to aid the curator with the cataloging of new samples, and the maintenance and curation of the collection, has graduated and the process of finding a replacement is currently underway. Activities during the year were limited to the recovery, maintenance and curation of the existing collection; no new material was cataloged. In addition, two samples were sent out on loan. The number of samples cataloged in the SIPAC collections prior to Katrina was 9,010, with 7,747 still missing post-Katrina and 328 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; of these, 116 were recovered post-Katrina. There is presently sufficient space available for additional samples to be deposited into the SIPAC archives without continuing the aliquoting of 1988-1994 SEAMAP samples.

During the next year, the SIPAC will continue to manage SEAMAP plankton collections, accession samples and provide available data from the collection to qualified researchers as requested. In addition, any recovered samples will be checked against the catalog, their recovery noted, and a listing of recovered samples will be maintained. Preservative will be checked for the existing samples and replaced as needed.

### **Program Documents**

The following documents were published and distributed by the SEAMAP program in FY2006:

Gulf States Marine Fisheries Commission. 2006. SEAMAP Marine Directory. Gulf States Marine Fisheries Commission, Ocean Springs. 1 p. + appendices.

Jiménez, N. 2005. Whelk Assessment Project. Final report. Caribbean/NMFS Cooperative SEAMAP Program. 14p.

Rester, J.K., E. Griffin, and E. Ojeda Serrano. 2005. Annual Report of the Southeast Area Monitoring and Assessment Program (SEAMAP), October 1, 2004 to September 30, 2005. Gulf States Marine Fisheries Commission, Atlantic States Marine Fisheries Commission, Puerto Rico Sea Grant College Program. 10 pp.

Rester, J.K. 2005. SEAMAP Annual Report to the Technical Coordinating Committee (October 1, 2004 to September 30, 2005). No. 132. Gulf States Marine Fisheries Commission, Ocean Springs. 16 pp. + appendices.

Tobias, William. 2002. Assessment of conch densities in backreef embayments on the northeast and southeast coast of St. Croix, U.S. Virgin Islands. Government of the Virgin Islands, Department of Planning and Natural Resources, Division of Fish and Wildlife, Bureau of Fisheries. 31pp.

### **PROPOSED SEAMAP ACTIVITIES, FY2007**

Annual program allocations for the SEAMAP programs, Gulf, South Atlantic and Caribbean total approximately \$1.385 million. Proposed FY2007 activities for all participants are shown in Table 2.



**Table 2.**

<b>PROPOSED SEAMAP ACTIVITIES, FY2007</b>				
	Fall	Winter	Spring	Summer
<b>Gulf of Mexico Activities</b>				
Resource Surveys:				
Spring Plankton Survey			X	
Reeffish Survey			X	X
Summer Shrimp/Groundfish Surveys				X
Fall Shrimp/Groundfish Surveys	X			
Fall Plankton Survey	X			
Plankton and Environmental Data Surveys			X	X
Information Operations:				
Biological and Environmental Atlas		X		
2007 Marine Directory			X	
FY2007 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
Joint Planning Activities	X	X	X	X
<b>South Atlantic Activities</b>				
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
2006 South Atlantic Annual Report		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>				
Conch Resource Surveys	X	X	X	X
Lobster Recruitment Surveys			X	X
Information Operations:				
Coordination with Caribbean Countries				
Research Programs		X	X	
Program Administration	X	X	X	X
Joint Planning Activities	X	X	X	X

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