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

OCTOBER 1, 1995 - SEPTEMBER 30, 1996

SEAMAP - Gulf of Mexico
Gulf States Marine Fisheries Commission

SEAMAP - South Atlantic
Atlantic States Marine Fisheries Commission

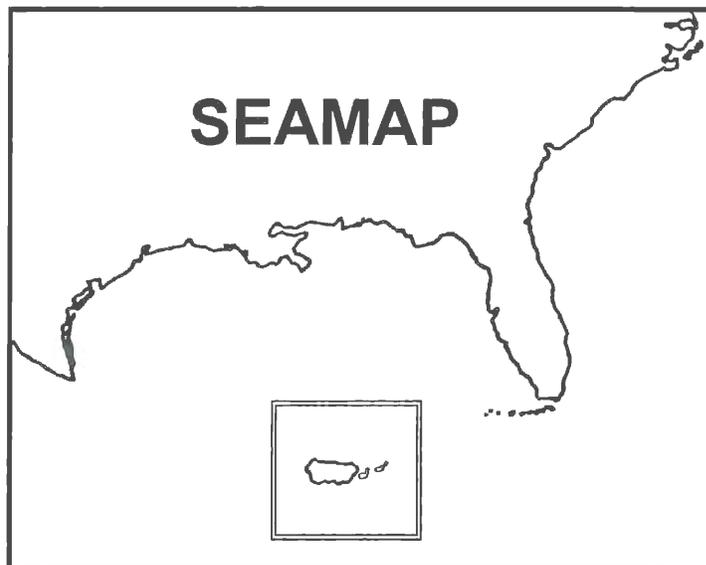
SEAMAP - Caribbean
Puerto Rico Department of Natural and Environmental Resources

Number 37

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ANNUAL REPORT of the Southeast Area Monitoring and Assessment Program October 1, 1995 - September 30, 1996

INTRODUCTION

The Southeast Area Monitoring and Assessment Program (SEAMAP) is a State/Federal/university program for 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 1985-1996. Funding allocations to participants for FY1985-FY1996 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 FY1996 and proposed activities for FY1997.

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 Puerto Rico Department of Natural and Environmental Resources. 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 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 Department of Natural and Environmental Resources 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 1995 and March 1996, in conjunction with the Annual Fall and Spring Meetings of the GSMFC. All meetings included participation by various work group leaders, Coordinator, Data Manager, and the GSMFC Executive Director. In conjunction with the Fall GSMFC meeting, the SEAMAP Subcommittee sponsored a general session concerning the uses of fishery-independent data for fisheries management. The session was conducted on October 17, 1995. Participants from both state and federal agencies presented information regarding the use of fishery-independent data. The presentations provided very useful information regarding the different methods for utilizing this type of data as well as demonstrating the importance of fishery independent data for management of a variety of major recreational and commercial species. Representatives from the Gulf program also met with the South Atlantic and Caribbean representatives in August 1996 to discuss respective program needs and priorities for FY1997.

SEAMAP-Gulf work groups met this past year to provide recommendations to the Subcommittee for survey and data management needs. The Red Drum Work Group met on June 28, 1996 (via conference call) to discuss the potential for being unable to conduct the second year of the red drum tag/recapture project and discuss possible alternatives for collecting the necessary data. Where additional discussion was needed, the Subcommittee also deliberated plans and needs via conference calls.

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 Department of Environmental Protection Louisiana Department of Wildlife and Fisheries Mississippi Department of Marine Resources/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 Department of Environmental Protection Georgia Department of Natural Resources North Carolina Department of Environment, Health 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 Department of Natural and Environmental Resources	Puerto Rico Department of Natural and Environmental Resources Puerto Rico Sea Grant College Program Virgin Islands Division of Fish and Wildlife National Marine Fisheries Service/Southeast Fisheries Science Center U.S. Fish and Wildlife Service Caribbean Fishery Management Council

Coordination of program surveys and distribution of quick-report summaries of a Gulf-wide survey to management agencies and industry were major functions of SEAMAP management in FY1996. Other important management activities included coordinating data provision and specimen loans, preparing publications and documents and assisting in the preparation of State/Federal cooperative agreements, including amendments to permit extension of activities previously not detailed in the agreements.

SEAMAP - South Atlantic

The SEAMAP - South Atlantic Committee met once during FY 1996, in conjunction with the SEAMAP joint meeting in Gulf Shores, Alabama. Topics for the meeting, held August 4 and 5, 1996 included: report of SEAMAP - South Atlantic activities in FY 1996 (including work group reports, reports of survey activities and special studies, data management report, and utilization of SEAMAP - South Atlantic data), South Atlantic needs and funding priorities, funding for FY

1997, election of vice-chairman, state contributions to SEAMAP, and discussion of strategic planning follow-on.

Work group summary reports were presented for the Crustacean, Bottom-mapping, Shallow Water Trawl, and Shrimp Bycatch Work Groups. No Work Groups met during FY 1996 (September 1995 - October 1996).

In place of a meeting in Spring 1995, the Shallow Water Trawl Work Group prepared a report to the Crustacean and Trawl Work Group members, including a summary of the 1995 trawl survey, results of a study of the effects of wind forcing on transport of shrimp and crab larvae, and crustacean reports from South Carolina, Georgia, Florida, and North Carolina.

The Shrimp Bycatch Work Group, established in FY 1995 by the Committee at the request of NMFS, completed their final report in FY 1996, *Estimates of Finfish Bycatch in the South Atlantic Shrimp Fishery*.

SEAMAP - Caribbean

During FY1996, the SEAMAP-Caribbean Committee met several times to consider various issues concerning the status of ongoing projects in Puerto Rico and the U.S. Virgin Islands, and budget matters. The Reef Resources Work Group also met to evaluate the status of ongoing projects. Among the issues considered were the validity of the data gathered in the shallow water reef resources surveys by both the U.S. Virgin Islands and Puerto Rico. The Reef Resources Work Group and the SEAMAP-Caribbean Committee discussed, evaluated and approved the sampling strategies for the underwater queen conch survey and queen conch stratification survey which are to be started in the U.S. Virgin Islands and Puerto Rico.

RESOURCE SURVEYS

In FY1996, collection of resource survey information continued for the fourteenth 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 data base. 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 12, 1995 to January 12, 1996, from off Mobile, Alabama to the U.S.-Mexican border. Vessels sampled waters out to 60 fm, covering a total of 338 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:

- (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.

During the survey the NOAA Ship OREGON II sampled 195 stations in offshore waters and territorial Louisiana and Texas waters. The R/V VERRILL sampled 6 stations in Alabama territorial waters. The R/V TOMMY MUNRO sampled 26 stations in Mississippi territorial and offshore waters. The R/V PELICAN sampled 31 stations in Louisiana territorial and offshore waters. And Texas vessels sampled 80 stations within their territorial waters.

In addition, ichthyoplankton data were collected by NMFS and Louisiana vessels, at sample sites occurring nearest to half-degree intervals of latitude/longitude. A total of 28 stations was sampled with bongo and/or neuston nets, as encountered along cruise tracks. NMFS completed 23 ichthyoplankton stations and Louisiana completed 5 stations. The samples, except those taken by Louisiana, will be sorted by the Polish Sorting and Identification Center. Once sorted, the specimens and data will be archived at the SEAMAP Archiving Center.

Louisiana Seasonal Day/Night Surveys

The Louisiana Department of Wildlife and Fisheries (LDWF) conducts seasonal day and night surveys as part of its continuing effort to provide comparative information on the abundance and distribution of critical life stages of major Gulf species, especially shrimp and associated environmental parameters. The sampling design for these surveys has changed little from similar day/night surveys in past years.

Sampling was conducted aboard the R/V PELICAN during four segments: September 1995 and January, March and July 1996. A stratified random station selection design was maintained, varying from the transects previously surveyed. During each segment, 24 stations were sampled during day and night at depths from 5 to 20 fm. The June sampling was completed as part of the SEAMAP Summer Shrimp/Groundfish Survey.

All seasonal trawls were completed with the standard SEAMAP net and doors. All organisms captured were identified, counted, measured and weighed. Environmental data and plankton/neuston sampling were conducted at trawl stations as well. Plankton samples were archived and sorted at the LDWF Plankton Laboratory. Specimens and data will be shipped to the SEAMAP Archiving Center in St. Petersburg, Florida. The area sampled covered Louisiana territorial and EEZ waters.

Spring Plankton Survey

For the fourteenth year, plankton samples were collected during the spring in the northern Gulf of Mexico. The

NOAA Ship CHAPMAN and Florida's R/V SUNCOASTER sampled offshore waters from the western edge of the West Florida Shelf to the Texas-Louisiana border from April 16 to May 26, 1996. A total of 189 stations was sampled. The CHAPMAN sampled 171 throughout the Gulf of Mexico stations and the R/V SUNCOASTER sampled 18 stations along the west Florida shelf.

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) was 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. Salinity data from the Florida vessel were sent to the NMFS Mississippi Laboratories for interpretation.

Reef Fish Survey

The fifth Reef Fish Survey began on June 25 and will continue into late fall 1996. Vessels from NMFS, Texas, and Alabama sample inshore and offshore waters, in addition to plankton and environmental sampling. To date, approximately 255 stations have been sampled throughout the Gulf of Mexico. Randomly selected sites from Brownsville, Texas to Key West, Florida are chosen from known hard bottom locations. The objectives of the survey are:

- (1) assess relative abundance and compute population estimates of reef fish using a video/trap technique;
- (2) determine habitat using an echo sounder and video camera;
- (3) determine if bioacoustics assessment methodology can be applied to reef fish communities;
- (4) collect environmental data at each station; and
- (5) collect ichthyoplankton samples at selected reef sites.

The primary purpose of this survey is to assess the relative abundance and compute population estimates of reef fish. Stations are randomly-selected 100 m² sites which are designated as "reef areas". There are several aspects of the

reef fish survey: 1) locating and compiling known hard bottom reef habitat locations; 2) survey site selection; 3) sampling protocol using a fish trap and video camera and 4) analyses of video records. Data is collected using the trap/video methodology where a fish trap containing a video camera is deployed onto the selected reef site. Trap soak time is one hour. After trap deployment, hydrographic data including a STD/light meter, transmissometer drop, secchi disk reading and surface chlorophyll samples will be collected. Also, after the last trap/camera set, one ichthyoplankton station will be completed each day with a surface neuston net and Tucker trawl. Environmental and plankton samples collected will use established SEAMAP protocols and plankton samples will be transshipped to the Polish Sorting and Identification Center. Final analyses of video tapes are accomplished at the Pascagoula Lab, where data is recorded onto standard SEAMAP forms. Tapes are analyzed either in their entirety or by randomly-selected one minute intervals. The determinant factors for sampling are based on whether the reader can identify and count fish entering the camera field of view and record the data.

Summer Shrimp/Groundfish Survey

During the spring 1996, 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 1996 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. The entire survey occurred from June 1 to July 19, 1995. For comparative purposes, we have enclosed separate plots of station locations, brown, white, and pink shrimp catches and counts, and finfish catches in each of the three areas: east of the river (June 6 to June 19), waters off Louisiana west of the River (June 26 to July 19), and Gulf waters off Texas (June 1 to July 9).

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.

A total of 323 trawl samples was taken from coastal and offshore waters out to 50 fm from Mobile Bay, Alabama, to Brownsville, Texas. All vessels took environmental data, including temperature, salinity, oxygen, and chlorophyll at each station.

In June, catch rates of brown shrimp east of the River were very low, with a maximum catch of 12.1 lb/hr of 70-count shrimp. White shrimp catches east of the River were all less than 4.0 lb/hr. The largest pink shrimp catch rate east of the River was 27.0 lb/hr of 39-count shrimp taken in 15 fm of water off the Mobile Bay. Finfish catch rates east of the River were low, with the largest catch of 668 lb/hr with longspine porgy predominating.

In July's samples west of the river (Louisiana) brown shrimp catches were moderate with the largest catch rate of 36.1 lb/hr of 12-count shrimp occurring off Vermilion Bay in 14 fm. White shrimp catches were low, with a maximum catch rate of 19.0 lb/hr of 18-count shrimp taken in 15 fm east of Vermilion Bay. Catches of pink shrimp were very low off the Louisiana coast with a maximum catch rate of 6.6 lb/hr of 24-count shrimp. Finfish catch rates were also low with the largest catch rate of 1,116 lb/hr taken on July 18 with catfish predominating.

High catches of brown shrimp were made off Texas from June 1 to July 9. The largest catch rate occurred June 24 in waters off Brownsville, Texas in 18 fm (142.2 lb/hr of 68-count shrimp). White shrimp catches off Texas were low with the largest catch, 27.4 lb/hr of 18-count shrimp, taken off Sabine in 5 fm. Catch rates for pink shrimp were also low off Texas, though the largest catch was 42.6 lb/hr of 47-count shrimp off the lower Laguna Madre in 8 fm. Finfish catch rates were moderate in Texas inshore and offshore waters. The largest catch of finfish was 802 lb/hr in 5 fm off Sabine with croaker predominating.

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 1986-1995 and in the current year covered Gulf waters from Florida Bay to Brownsville, Texas. Vessels from Florida, Alabama, Mississippi, Louisiana and NMFS began surveying Gulf waters on September 3 and will continue into the first week of October. Stations are located along a 30-minute latitude/longitude grid from inshore waters to the shelf edge.

The NOAA Ship CHAPMAN is sampling stations from Tampa Bay, Florida to Brownsville, Texas at depths from 5 to 100 fm. The R/V VERRILL is sampling stations at the mouth and outside Mobile Bay. The R/V TOMMY MUNRO is sampling stations south of Mississippi Sound along a 30-minute grid. The R/V PELICAN is sampling stations in

Louisiana territorial waters. And Florida's R/V SUNCOASTER is sampling stations off Tampa Bay south to the Florida Straits area.

Stations will be sampled with standard SEAMAP bongo nets with 333-micron mesh and/or 1 x 2-meter neuston nets fitted with 947-micron mesh. In addition, hydrographic sampling including chlorophylls, salinity, temperature and dissolved oxygen from surface, mid-water, and bottom, water transparency and water color will be conducted at each station. Right bongo samples collected by NMFS and the Gulf States will be transshipped to the Polish Sorting and Identification Center. Left bongo and neuston samples will be stored at the SIPAC at the Gulf Coast Research Laboratory for possible future sorting. Louisiana plankton samples will be sorted by LDWF according to SEAMAP protocols and specimens and data provided to the SEAMAP Archiving Center.

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. Plankton and environmental data were also taken by Louisiana at all of its seasonal day/night survey stations. Samples were taken by participants with a 60-cm bongo net and a standard SEAMAP neuston net.

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 Poland, 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.

In addition to these piggybacked surveys, two major SEAMAP plankton surveys were conducted in FY1996, as detailed earlier.

SEAMAP - South Atlantic

Shallow Water Trawl Survey

The major SEAMAP - South Atlantic survey in FY 1996 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. 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 FY 1996: Fall 1995 (October 2 - November 7), Spring 1996 (April 17 - May 9), and Summer 1996 (July 15 - August 2). Inshore strata (4.6 to 9.2m depths) were sampled during each cruise. Offshore strata (9.2 to 19m depths) were sampled only during fall and spring when penaeid shrimp spawning is thought to occur. All samples were collected during daylight hours to maximize the opportunities for collecting juvenile mackerels.

The Fall 1995 cruise completed the seventh full year of standardized sampling under a stratified random survey design. Sampling was conducted during October 2 - November 7 at 94 stations and emphasized 24 target species for additional biological measurements. The overall abundance and mean catch per tow of king mackerel was greater than that of Spanish mackerel in inner strata. The overall abundance and mean catch per tow of king mackerel for fall 1995 was only exceeded in fall 1992. Spanish mackerel were most abundant in waters off Florida while king mackerel were most abundant in Georgia waters. White shrimp, the most abundant penaeid, made up 96.5% by number and were most abundant off Florida.

The Spring 1996 cruise sampled 105 stations from April 17 through May 9. The spring tows yielded the lowest abundance of individuals observed in SEAMAP-South Atlantic samples due mostly to a large jellyfish biomass clogging nets. Catches of Atlantic croaker were exceptionally low. Spanish mackerel were most abundant in tows made in waters off Georgia, as were king mackerel. Abundances of penaeid shrimp were at the lowest level observed in

SEAMAP-South Atlantic samples. White shrimp was the most abundant penaeid collected, with the majority collected from strata off Georgia.

The Summer 1996 cruise sampled 78 stations and targeted 24 species. Sampling was conducted from July 15 through August 2, 1996. Spanish mackerel were most abundant in waters off South Carolina, but the area of greatest abundance extended north to Onslow Bay. King mackerel were most abundant in tows made off Florida, where 96% of the king mackerel were collected. Brown shrimp, the most abundant penaeid taken during the cruise, made up 92% of the total number of shrimp collected. The highest mean catch per tow of brown shrimp was taken in Onslow Bay.

Data from the Fall 1995 and Spring 1996 cruises have been added to the SEAMAP Data Management System (DMS). Data from the Summer 1996 cruise are currently being added to the SEAMAP DMS. The results of the entire 1995 cruise season (Fall 1994, Spring 1995, and Summer 1995 cruises) are documented in the final 1995 project report, *Results of Trawling Efforts in the Coastal Habitat of the South Atlantic Bight, FY 1995* by South Carolina Marine Resources Division.

Pamlico Sound Survey

During FY 1996, 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.

Benthic Characterization

The Florida Department of Environmental Protection (FDEP) completed identifying and cataloging benthic invertebrates collected on four SEAMAP survey cruises in the south Atlantic region during 1983-1987. Selected invertebrate groups from northeast Florida were identified to the lowest appropriate taxonomic level.

Species of mollusk, crustaceans, and echinoderms have been cataloged and recorded in a database of benthic shelf fauna from Georgia to Palm Beach, Florida. All data are made available to the SEAMAP DMS. During FY 1996, the final data on echinoderms were transmitted to the SEAMAP DMS. Identified organisms are housed in a number of reference collections, including Harbor Branch Foundation, Smithsonian Institution, and FDEP.

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. In order to assess reef fish populations and the effects of changes in fishing pressure, the amount of habitat available for priority species of fishes 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 are being 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.

Prior to FY 95-96, more than 23,900 records were compiled from databases obtained off North Carolina, South Carolina and Georgia. Final reports summarizing the databases available for these areas were provided in two final reports submitted to the SEAMAP-SA Committee. Beginning in FY 95-96, mapping efforts were focussed on the waters off Florida. This effort is being conducted by the Florida Marine Research Institute (FMRI). To date, these efforts have resulted in the compilation of an additional 7,767 point or line records and 462 1' X 1' block area records from more than 20 data sources. Florida has recently received four additional databases that will provide at least 2,661 more data records from Harbor Branch Oceanographic Institution, Inc. (HBOI). Two other data sets representing about 1,800 nm of side scan sonar tracks from HBOI and the Florida Institute of Technology will be available for FMRI staff in January, 1997. Finally, the FMRI will review a series of maps and data for an area database received from the U.S. Army Corps of Engineers covering nearshore (to about 100 ft.) areas from Cape Florida to just north of the Palm Beach-Martin county line. Results from Florida will be completed, and data will be submitted to the Data Base Manager prior to April 30, 1997.

For FY 97-98, Florida will reproduce all of the Bottom Mapping Final Reports on a CDROM readable on any desk top operating system. On the CDROM, Florida will also

include data and maps for coverage now becoming available for the near shore area south and west from Key Biscayne (Cape Florida) to Key West, Florida. All databases and map coverage available from Florida to the North Carolina-Virginia border will be plotted on a series of electronic maps.

SEAMAP - Caribbean

Queen Conch Stratification Survey

A survey was undertaken to determine the best stratification for a queen conch abundance survey to be carried out by SEAMAP-Caribbean in Puerto Rico and the U.S. Virgin Islands. Port Agents from the USVI Division of Fish and Wildlife and from the Puerto Rico Department of Natural and Environmental Resources were contracted to interview conch fishermen in the Caribbean. A total of 212 interviews, 46 from the US Virgin Islands and 166 from Puerto Rico, were conducted. Data regarding present and historical areas where the conch are found as well as effort data were collected during these interviews. Fishermen were asked to identify adult and juvenile queen conch habitats as well as their present and historical fishing areas for conch. All of the interviewed fishermen provided the requested information, mainly on the areas where they are presently fishing for conch. The results show that none of the interviewed fishermen from the US Virgin Islands fish for conch exclusively. In Puerto Rico, 11% of those interviewed fished for conch exclusively, and 88% targeted other reef resources (lobster, octopus, reef fishes) as well as queen conch.

Queen Conch Survey

A fishery-independent survey of the queen conch resource was conducted off the west and east coasts of Puerto Rico. Areas were stratified into "conch" and "no-conch" zones. Paired transects were conducted at each station, with data collected by divers using a visual census methodology. Data were collected on conch abundance, length and age, and on habitat type and distribution. On the west coast of Puerto Rico, no conch were found in the no-conch stratum, and mean density in the conch stratum was 5.58 conch/ha. On the east coast, average densities were 7.28 conch/ha in the conch stratum and 6.68 conch/ha in the no-conch stratum. The overall estimate of abundance was 697,000 individuals and the majority of conch were juveniles. Density was highest in seagrass (13-15 conch/ha). On the west coast, density in seagrass was significantly higher than in coral or mud, and density in rubble was higher than in mud. On the east coast, density in seagrass was significantly higher than in coral or algae. Abundance of juveniles declined rapidly with depth. Abundance of adults was highest in the 61-80 ft. and 51-70 ft. depth zones for the west and east coasts, respectively.

There has been a long-term monitoring project using visual transects to estimate the Queen Conch population of the Virgin Islands. Surveys have been done in 1981, 1985, 1990 and 1996.

A buoy was dropped at the starting point of each transect using the bearings from the transects done in previous years. GPS coordinates were taken at the same point. A diver on a scooter followed a fixed compass heading for a set period, between 20 minutes and 45 minutes. The diver towed a buoy on the scooter to enable the surface support vessel to track the movement of the diver. Transects were < 1 km to 2 km in length and the width was four meters. The scooter and diver were approximately one meter above the substrate. At the completion of the transects the diver pulled in the buoy and gave several sharp tugs on the buoy to signal the completion of the transect. The support vessel dropped a marker buoy to identify the end of the transect. Compass bearings and GPS coordinates were taken at the end marker buoy.

Scooters were equipped with a handle mounted compass and a clipboard with a watch and depth gauge attached. Start and end times were noted along with habitat type and time of habitat or depth change. When conch were sighted, the time, age class, depth, size estimates (in cm), and habitat type was noted. Conch were aged according to the categories described by Dr. Richard Appledorn of the University of Puerto Rico. The age categories range from juvenile which are without a flared lip, to Stage 4 that have a very thick and square lip, heavy erosion, short total length and the spires eroded.

Most of the conch seen were juveniles to stage 2 and were found on seagrass beds and coral rubble.

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

During January 23-25, and February 6-12, 1996, personnel from the states of North Carolina, Massachusetts, and Maryland, the U.S. Fish and Wildlife Service (FWS), and the NMFS, participated in a striped bass tagging cruise. This was the eighth 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.

A color video sounder was used to locate targets and reduce bycatch. A total of 779 striped bass were captured. All healthy fish were measured, tagged with FWS internal anchor tags and released. A total of 696 striped bass were tagged. Fifteen Atlantic sturgeon were also tagged and released. For the first time, spiny dogfish were counted. A total of 8,219 spiny dogfish were captured, and of these 198, consisting mostly of large females, were tagged. Captured tagged striped bass were tested for coded wire tags (CWTs) which indicate hatchery origin; 8 CWT positive fish were identified.

A database for striped bass tag returns is managed by FWS in Annapolis, MD.

Bycatch Estimates

In November 1994, the NMFS asked the South Atlantic SEAMAP Committee to undertake a coordination role for developing finfish bycatch estimates in the South Atlantic shrimp fishery. In response, the SEAMAP-SA Committee formed the Shrimp Bycatch Working Group, consisting of sixteen members with expertise in shrimp bycatch research and management from appropriate state and federal agencies. The working group's charge was to guide data identification and summarization, evaluate estimation methods, and review final estimates of bycatch removals by the South Atlantic shrimp fisheries. Data used in the analyses were obtained from the NMFS, the Florida Department of Environmental Protection, the Gulf & South Atlantic Fisheries Development Foundation, the North Carolina Sea Grant, and the North Carolina State University.

The working group completed their final report, *Estimates of Finfish Bycatch in the South Atlantic Shrimp Fishery*. The report provides estimates of finfish bycatch associated with the South Atlantic shrimp fisheries for specific geographic regions during specific periods of time based on available data--catch and effort data for seasons during 1992 and 1993, and characterization and Bycatch Reduction Device (BRD) data from 1992-1994.

Bycatch of finfish associated with the shrimp trawl fishery in the South Atlantic region is a critical issue for fisheries managers. Bycatch of weakfish is especially of interest because of regulations adopted by the South Atlantic Fishery Management Council (SAFMC) to reduce the bycatch component of weakfish and Spanish mackerel fishing mortality by 50 percent or numbers by 40%. The Atlantic States Marine Fisheries Commission's (ASMFC) Weakfish Fishery Management Plan (Amendment 3) requires the same reduction in weakfish fishing mortality or numbers, and also requires the use of approved BRDs. Protocols for approving future BRDs are being developed cooperatively by the SAFMC and the ASMFC.

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 managed by 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 SIS, 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 1982-1995 have been entered into the system and data from 1996 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 requestors, although the highest priority is assigned to SEAMAP participants. A total of 175 SEAMAP data requests have been received and processed. In some instances, requests were filled promptly; in many cases, however, a substantial lag occurred because of the extremely large amount of data being collected on an increased number of surveys over those of past years. To date, 173 requests have been completed and work is being performed on those remaining.

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) modular implementation plan which includes costs and schedule.

Work was completed during FY1990 on the new distributed SEAMAP DMS. The modules for the system include those for data entry, edit, upload, data query and download. All of the Gulf, South Atlantic, and Caribbean participants 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 appropriate 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.

SEAMAP data collected during surveys were used for a multitude of purposes in FY1996:

- Evaluation of the abundance and size distribution of penaeid shrimp in Federal and state waters to assist in determining opening and closing dates for commercial fisheries by NMFS;
- Evaluation of shrimp fishery bycatch and weakfish stock assessment by NMFS;
- Assessment of shrimp and groundfish abundance and distribution and their relationship to such environmental parameters as temperature, salinity, and dissolved oxygen by NMFS;
- Identification of environmental parameters associated with concentrations of larval finfish by NMFS;
- Compilation of the 1994 SEAMAP Biological and Environmental Atlas by NMFS and GSMFC;
- Comparison of catches of shrimp and groundfish captured by 40-ft versus 20-ft trawl nets by NMFS;
- Stock assessment of weakfish, striped bass, bluefish, spot and croaker by the ASMFC;
- Stock assessment of Spanish mackerel by South Atlantic Fishery Management Council and NMFS;
- Species differentiation of Brevoortia smithi and B. tyrannus and age and growth of cobia by NMFS;
- Development of an amendment to the Coral and Coral Reef Fishery Management Plan by South Atlantic Fishery Management Council;
- Development of the striped bass fishery management plan by NCDMF;
- Comparison of South Atlantic portunid crabs with Brazilian assemblages;
- Shrimp viral analysis, life history work on Centropristis striata, and DNA research in Paralichthys dentatus and Cynoscion regalis by SCDNR;
- Age/growth and fecundity of Cynoscion regalis by University of Charleston;
- Analysis of data collected during the Caribbean Reef Resources Survey to determine if other parameters are needed by the SEAMAP-Caribbean Committee;

- Differentiation of shark DNA by NMFS;
- Turtle research by Georgia Department of Natural Resources.

Real-time Data

A major function of the SEAMAP Information System in FY1996 was 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 Pascagoula Laboratory from the NOAA vessel OREGON II, while the states' data were entered into the system weekly. Plots of station locations and catch rates of shrimp and dominant finfish species were prepared and edited at the NMFS Pascagoula Laboratory, and processed by GSMFC for weekly distribution to management agencies, fishermen, processors and researchers. 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 for archiving and loan to researchers. For FY1996, approximately 12,870 vials have been returned from the Polish Sorting and Identification Center. Data entry for 6,407 of the returned sorted samples has been completed in an improved and simplified SEAMAP DMS. Samples cataloged to date represent 18 orders, 126 families, 235 genera and 245 species.

The SEAMAP Archiving Center, which is managed in conjunction with Florida Department of Environmental Protection (FDEP) in St. Petersburg, Florida, processes both specimen loans and requests for associated plankton survey environmental data. Five such requests have been accommodated in the present fiscal year. The FDEP is in the process of completing renovations on the existing building which houses the SEAMAP Archiving Center, allowing for expansion of the climate-controlled storage area and upgrading to current fire codes. The SEAMAP Archiving Center personnel, in cooperation with other staff from FDEP, have completed the spring ichthyoplankton survey, May 19 - 26, 1996 and will be participating in the fall ichthyoplankton cruise. The fall cruise is scheduled to depart on September 11, 1996.

SEAMAP Invertebrate Plankton Archiving Center

The SIPAC is in its twelfth year of operation. Ken Stuck of GCRL serves as SIPAC curator, and was assisted during FY1996 by a part-time technician and a temporary summer student. Replacement of the permanent full-time SIPAC

technician who resigned in July 1995 was delayed due to the interruption of SEAMAP funding in FY1996 resulting from the federal budget debate. 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 FY1996 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.

During FY1996, a total of 411 SEAMAP plankton samples were received and logged into the SIPAC database. The samples were obtained from the OREGON II, CHAPMAN, SUNCOASTER, TOMMY MUNRO during SEAMAP cruises. In addition, the entire collection of SEAMAP samples was inventoried, curated and computer files updated. The number of samples currently catalogued in the SIPAC collections is 5,613. Samples currently on loan include: 146 samples from various OREGON II, CHAPMAN, HERNAN CORTEZ II and SUNCOASTER cruises to S. Turner; and 7 samples from TOMMY MUNRO cruise to B. Commyns.

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 7 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 100ml vials. 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. During FY1996 approximately 250 samples from 1985 SEAMAP cruises were aliquoted. To date, approximately 1,450 samples collected from 1982 - 1985 have been aliquoted and prepared for long-term storage. Due to the recent addition of samples to the collection during FY1996, there is currently no space available for additional samples to be deposited into the SIPAC archives.

Due to the loss of the permanent full-time SIPAC technician, no additional SEAMAP samples were sorted for invertebrates during FY1996. Activities in this area will resume when the technical position is filled.

During the next fiscal year, the SIPAC will continue to manage SEAMAP plankton collections and generate specimens and data on selected invertebrate species. Beginning in September 1996, and continuing through August 1997, a full-time postgraduate student will be assigned to work with the SIPAC plankton collection. It is anticipated that during FY1996, samples from the 1986 collections will be aliquoted for long-term storage, sorted invertebrate collections will be inventoried, curated and a summary report prepared on the holdings.

Program Documents

The following documents were published and distributed by the SEAMAP program in FY1996:

Donaldson, D.M. 1995. SEAMAP Annual Report to the Technical Coordinating Committee (October 1, 1995 to September 30, 1996). Gulf States Marine Fisheries Commission, Ocean Springs, 28 pp. + appendices.

Donaldson, D.M., R. Peuser and A. Rosario 1995. Annual Report of the Southeast Area Monitoring and Assessment Program (SEAMAP), October 1, 1994 to September 30, 1995. Gulf States Marine Fisheries Commission, Atlantic States Marine Fisheries Commission, Puerto Rico Department of Natural Resources. 12 pp.

Gulf States Marine Fisheries Commission. 1995. Proceedings of the Reef Fish Workshop for SEAMAP. Gulf States Marine Fisheries Commission, Ocean Springs, 76 pp.

Gulf States Marine Fisheries Commission. 1996. SEAMAP Marine Directory. Gulf States Marine Fisheries Commission, Ocean Springs, 1 p. + appendices.

Peuser, R.L. 1996. SEAMAP - South Atlantic Annual Report, 1 October 1994 - 30 September 1995. Submitted to the South Atlantic Board of the Atlantic States Marine Fisheries Commission, Washington, DC. 121 pp.

Peuser, R.L. 1996. Southeast Area Monitoring and Assessment Program (SEAMAP) Management Plan: 1996-2000. Atlantic States Marine Fisheries Commission, Washington, DC. 86 pp.

Peuser, R.L. 1996. Southeast Area Monitoring and Assessment Program (SEAMAP) Management Plan: 1996-2000 [summary]. Atlantic States Marine Fisheries Commission, Washington, DC. 8 pp.

Pulley, M.G. 1996. Pamlico Sound Survey, June 1994 Cruise Report. North Carolina Department of Environment, Health, Natural Resources, Division of Marine Fisheries. 26 pp.

Pulley, M.G. 1996. Pamlico Sound Survey, September 1994 Cruise Report. North Carolina Department of Environment, Health, Natural Resources, Division of Marine Fisheries. 34 pp.

Shallow Water Trawl Work Group, SEAMAP-SA. 1996. SEAMAP-SA Shallow Water Trawl Survey Report to the Crustacean and Trawl Work Group Members. Atlantic States Marine Fisheries Commission, Washington, DC. 11 pp.

Shrimp Bycatch Work Group, SEAMAP-SA. 1996. Estimates of Finfish Bycatch in the South Atlantic Shrimp Fishery. Atlantic States Marine Fisheries Commission, Washington, DC. 64 pp.

South Carolina Marine Resources Division. 1995. 1995 Fall SEAMAP Cruise Report. South Carolina Department of Natural Resources. Charleston, SC. 5 pp.

South Carolina Marine Resources Division. 1996. 1996 Spring SEAMAP Cruise Report. South Carolina Department of Natural Resources. Charleston, SC. 7 pp.

South Carolina Marine Resources Division. 1996. 1996 Summer SEAMAP Cruise Report. South Carolina Department of Natural Resources. Charleston, SC. 6 pp.

South Carolina Marine Resources Division. 1996. Results of Trawling Efforts in the Coastal Habitat of the South Atlantic Bight, FY 1995. South Carolina Department of Natural Resources, Charleston, SC. 64 pp.

PROPOSED SEAMAP ACTIVITIES, FY1997

Annual program allocations for the SEAMAP programs, Gulf, South Atlantic and Caribbean total approximately \$1.2 million. Proposed FY1997 activities for all participants are shown in Table 2.

TABLE 2.

PROPOSED SEAMAP ACTIVITIES, FY1997

	Fall	Winter	Spring	Summer
Gulf of Mexico Activities				
Resource Surveys:				
Spring Plankton Survey			X	
Reef Fish Survey			X	X
Summer Shrimp/Groundfish Surveys				X
Louisiana Seasonal Surveys	X	X	X	X
Fall Shrimp/Groundfish Surveys	X			
Fall Plankton Survey	X			
Plankton and Environmental Data Surveys	X	X	X	X
Information Operations:				
1994 Biological and Environmental Atlas			X	
1995 Biological and Environmental Atlas				X
1997 Marine Directory			X	
FY1996 Joint Annual Report		X		
Real-time Data Summaries				X
Data Input and Request Processing	X	X	X	X
Specimen Archiving and Loan	X	X	X	X
Program Administration	X	X	X	X
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
1995 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
Caribbean Activities				
Resource Surveys:				
Reef Resources Survey	X	X	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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