

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

**OCTOBER 1, 1992 - SEPTEMBER 30, 1993**

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

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

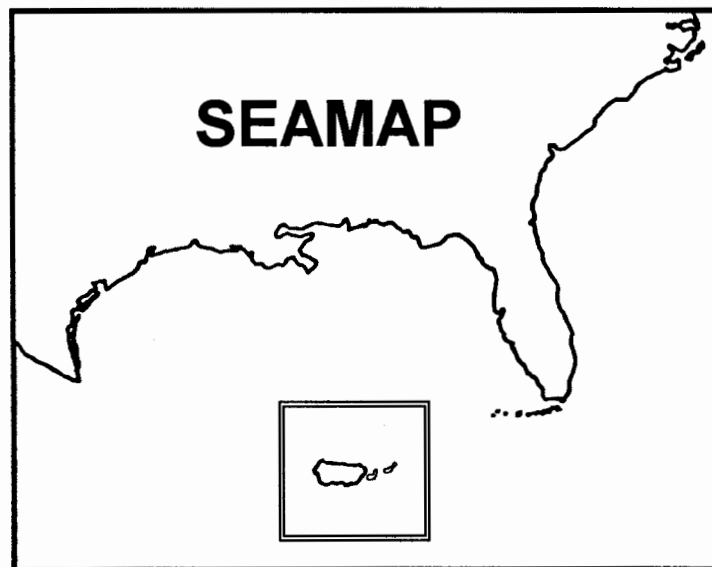
**SEAMAP - Caribbean**  
Puerto Rico Department of Natural Resources

**DECEMBER 1993**



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Gulf States Marine Fisheries Commission

**DECEMBER 1993**

**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 Wildlife, Fisheries and Parks/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 Wildlife and Marine Resources Department National Marine Fisheries Service/Southeast Fisheries Science Center South Atlantic Fishery Management Council
SEAMAP-Caribbean	Caribbean Fishery Management Council	Puerto Rico Department of Natural 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 real-time summaries of the Summer Shrimp/Groundfish survey to management agencies and industry were major functions of SEAMAP management in FY1993. 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 1993, in conjunction with the SEAMAP joint annual meeting in St. Petersburg, Florida. Topics for the meeting, held August 18 and 20, 1993, included: work group reports, reports of survey activities and special studies, utilization of SEAMAP - South Atlantic data, South Atlantic needs and funding priorities, funding for 1994,

1994 South Atlantic operations plan, and election of officers.

Work group reports were presented for the Crustacean, Bottom Mapping, Data Management and Shallow Water Trawl Work Groups. The Crustacean Work Group met March 8-9, 1993, to discuss regional shrimp trawl bycatch research and the regulatory environment, and report on the progress of individual crustacean related research projects. The Work Group also reviewed and ranked crustacean related research priorities, and discussed areas of common research interest among the states that could be developed into cooperative projects. The fourth annual Crustacean Newsletter was published during FY 1993.

The Bottom Mapping Work Group met November 12-13 to develop protocols for evaluating data and to design the final structure for the database. The Data Management Work Group met April 28-29, 1993 to review database access

procedures and participate in hands on training for accessing the database. The Shallow Trawl Work Group did not meet during FY1993, however the survey was performed as scheduled.

## **SEAMAP - Caribbean**

During FY1993, the SEAMAP-Caribbean Committee met twice to consider several issues concerning the status of ongoing projects in Puerto Rico and the U.S. Virgin Islands, and budget matters. Both areas had some vessel difficulties during their surveys. In effort to correct these problems, Puerto Rico Department of Natural Resources established a cooperative agreement with the University of Puerto Rico, in Mayaguez, to use one of their vessels as a backup, in case of future vessel problems. The U.S. Virgin Islands Division of Fish and Wildlife made a similar arrangement with the U.S. Virgin Islands University. The Committee agreed that the management body for the SEAMAP-Caribbean component would be the Caribbean Fishery Management Council.

The first year of the three-year reef resources sampling project was initiated in Puerto Rico (April 1992-March 1993) and the U.S. Virgin Islands (July 1992-March 1993). This project implements survey design and standardized sampling methodologies between the U.S. Virgin Islands and Puerto Rico. The Reef Resources Work Group evaluated recommendations from a group of statisticians for refining the sampling methodologies regarding the stratifying criteria. The work group also recommended to the SEAMAP-Caribbean Committee that results of the first year of sampling be analyzed in order to determine if other parameters would need to be implemented.

The SEAMAP-Caribbean Committee published the updated version of the Fishery Independent Data Base Directory. Also, the committee has approved the publication of the analysis of the reef fish data gathered by Puerto Rico and the U.S. Virgin Islands, as well as the sampling protocol manual for this survey.

## **RESOURCE SURVEYS**

In FY1993, collection of resource survey information continued for the twelfth 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 September 28 to November 23, 1992, from off Mobile, Alabama to the U.S.-Mexican border. Vessels sampled waters out to 60 fm, covering a total of 344 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 221 stations in offshore waters and territorial Louisiana and Texas waters. The R/V A.E. VERRILL sampled 8 stations in Alabama territorial waters. The R/V TOMMY MUNRO sampled 15 stations in Mississippi territorial and offshore waters. The R/V PELICAN sampled 20 stations in Louisiana territorial and offshore waters. And Texas vessels sampled 80 stations within their territorial waters.

Ichthyoplankton data were collected by the NMFS and Louisiana vessels, at sample sites occurring nearest to half-degree intervals of latitude/longitude. A total of 35 stations was sampled with bongo and/or neuston nets, as encountered along cruise tracks. The NMFS completed 30 ichthyoplankton stations and Louisiana completed 5 stations. The samples, except those taken by Louisiana, will be sorted by the Polish Sorting and Identification Center (PSIC). Once sorted, the specimens and data will be archived at the SEAMAP Archiving Center.

## Winter Ichthyoplankton Survey

The Plankton Work Group has expressed some interest in conducting a winter plankton survey since there is no SEAMAP plankton information available during this time period. In an effort to collect samples in the winter, a SEAMAP ichthyoplankton survey was piggybacked on a winter marine mammals cruise. The plankton survey was conducted from January 5, to February 13, 1993. The NOAA Ship OREGON II sampled offshore waters from Mobile Bay, Alabama to the Texas-Mexico border. A total of 222 bongo, 111 neuston, and 32 Tucker trawl samples were collected.

Plankton collections were generally taken only during night hours when marine mammal observations could not be made. Plankton samples were taken with standard SEAMAP bongo and neuston samplers. The bongo sampler consisted of two conical 60-cm nets with 335-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. The Tucker trawl used for discrete depth sampling has a 1 m<sup>2</sup> mouth opening and was fitted with three, 335-micron mesh nets. 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.

Hydrographic data at all stations included surface chlorophylls, salinity, temperature and dissolved oxygen from surface, midwater and near bottom and forel-ule color.

Right bongo and neuston samples collected by NMFS from SEAMAP stations will be transshipped to the PSIC. Left bongo samples will be archived at the SEAMAP Invertebrate Plankton Archiving Center which is located at the Gulf Coast Research Laboratory in Ocean Springs, Mississippi.

## Spring Plankton Survey

For the eleventh year, plankton samples were collected during the spring in the northern Gulf of Mexico. The NOAA Ship OREGON II and Florida's R/V HERNAN CORTEZ II sampled offshore waters from the western edge of the West Florida Shelf to the Texas-Louisiana border from April 24 to June 15, 1993. A total of 236 stations was sampled. The OREGON II sampled 217 stations and the R/V HERNAN CORTEZ II sampled 19 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.

Hydrographic data at all stations included surface chlorophylls, salinity, temperature and dissolved oxygen from surface, midwater and near bottom and Forel-ule color.

Right bongo and neuston samples collected by NMFS and Florida from SEAMAP stations will be transshipped to the PSIC. Left bongo samples will be archived at the SIPAC. Salinity data from the Florida vessel were sent to the NMFS Mississippi Laboratories for interpretation.

## Spring Reef Fish Survey

The second Spring Reef Fish Survey was started on May 17 and will continue into October 1993. Vessels from NMFS, Mississippi, Alabama and Florida sampled inshore and offshore waters, covering approximately 190 stations, in addition to plankton and environmental sampling. 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 m<sup>2</sup> 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 PSIC.

Final analyses of video tapes are accomplished at the Pascagoula Laboratory, 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

A planning meeting of the Shrimp/Groundfish Work Group was held in April 1993 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 bottomfish stocks across the northern Gulf of Mexico from inshore waters to 50 fm.

The overall sampling strategy during the 1993 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 survey occurred from June 1 to July 18, 1993.

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 336 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.

Catch rates of brown shrimp east of the River were very low, with a maximum catch of 8.8 lb/hr of 46-count shrimp. White shrimp catches east of the River were all less than 1 lb/hr. The largest pink shrimp catch rate east of the River was 7.5 lb/hr of 26-count shrimp taken in 12 fm of water off Mississippi. Finfish catch rates east of the River were low, with the largest catch of 708 lb/hr with Atlantic croaker predominating.

Low catches of brown shrimp were made off Texas from June 1 to July 4. The largest catch rate occurred June 22 in waters off Port Isabel in 18 fm (46.3 lb/hr of 84-count shrimp). White shrimp catches off Texas were very low with the largest catch, 19.3 lb/hr of 15-count shrimp, taken off of Corpus Christi in 9 fm. Catch rates for pink shrimp were very low off Texas, with the largest catch, 48.9 lb/hr of 40-count shrimp, taken off the lower Laguna Madre in 13 fm. Finfish catch rates were low in Texas inshore and offshore waters. The largest catch of finfish was 1,057 lb/hr in 9 fm off Galveston Bay with Atlantic croaker predominating.

In July's samples west of the river (Louisiana) brown shrimp catches were low with the largest catch rate of 50.1 lb/hr of 129-count shrimp occurring southwest of Sabine Lake in 3 fm. White shrimp catches were extremely low, with a maximum catch rate of 20.2 lb/hr of 18-count shrimp taken in 3 fm south of Vermilion Bay. Catches of pink shrimp were all less than 3 lb/hr off the Louisiana coast. Finfish catch rates were also low with the largest catch rate of 1,217 lb/hr taken on July 17 with Atlantic croaker predominating.

Several areas of low bottom dissolved oxygen (less than 2 ppt) occurred off Louisiana between off Sabine Lake and the Mississippi River in depths of 6 to 18 fms.

### 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 1986-1992 and in the current year covered Gulf waters from Florida Bay to Brownsville, Texas. Vessels from Florida, Alabama, Mississippi, Louisiana and NMFS surveyed from August 29 - October 9, 1993.

The NOAA Ship OREGON II sampled stations from Tampa Bay, Florida to Brownsville, Texas at depths from 5 to 100 fm. Chlorophyll samples were filtered at each station. Florida's R/V HERNAN CORTEZ sampled stations from off Tampa Bay south to the Florida Straits area. Stations were located along a 30-minute latitude/longitude grid from inshore waters to the shelf edge. The R/V A.E. VERRILL sampled stations at the mouth and outside Mobile Bay. The R/V TOMMY MUNRO sampled stations south of Mississippi Sound along a 30-minute grid. And the R/V PELICAN sampled stations in Louisiana territorial waters.

Stations were sampled with standard SEAMAP bongo nets with 333-micron mesh and/or 1x2-meter neuston nets fitted with 947-micron mesh. Hydrographic sampling included chlorophylls, salinity, temperature and dissolved oxygen from surface, mid-water, and bottom, water transparency and water color. Right bongo samples collected by NMFS and the Gulf States will be transshipped to the PSIC. Left bongo and neuston samples will be stored at the SIPAC for possible future sorting. Louisiana plankton samples will be sorted by Louisiana Department of Wildlife and Fisheries according to SEAMAP protocols and specimens and data provided to the SAC.

### **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 transshipment 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 FY1993, as detailed earlier.

## **SEAMAP - South Atlantic**

### **Shallow Water Trawl Survey**

The major SEAMAP - South Atlantic survey in FY1993 was the continuing Shallow Water Trawl Survey conducted by the South Carolina Marine Resources Division (SCMRD). 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 FY1993: Fall 1992 (October 12 - November 5), Spring 1993 (April 19 - May 21), and Summer 1993 (July 19 - August 13). 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 1992 cruise completed the fourth full year of standardized sampling under a stratified random survey design. Sampling was conducted during October 12 - November 5 at 85 stations and emphasized 24 target species for additional biological measurements. Both king mackerel and Spanish mackerel were most abundant off Florida. White shrimp, the most abundant penaeid, made up 92 % by number and were also most abundant off Florida.

The Spring 1993 cruise sampled 78 stations from April 19 through May 13. Significantly large catches of jellyfish impeded operations; however, all sampling was completed as scheduled. Spanish mackerel were taken mainly in the inner strata off South Carolina, Georgia and Florida. White shrimp was the most abundant penaeid collected, and the majority were captured off Georgia and Florida.

The Summer 1993 cruise sampled 78 stations and targeted 24 species. Sampling was conducted from July 19 through August 4, 1993. The greatest average number of Spanish mackerel were taken off Florida. The average number of Spanish mackerel taken outnumbered king mackerel at all stations. Brown shrimp was the most abundant penaeid shrimp taken during the cruise, and was captured in greatest numbers in Raleigh Bay.

Data from the spring and summer 1993 cruises are currently being added to the SEAMAP Data Management System. The results of the entire 1992 cruise season (Spring and Summer 1992 cruises in addition to the Fall 1992 cruise discussed above) are documented in the final 1992 project report, *Results of Trawling Efforts in the Coastal Habitat of the South Atlantic Bight* by Boylan, Webster, Beatty and Wenner (1993).

### **Pamlico Sound Survey**

During FY1993, the North Carolina Division of Marine Fisheries (NCDMF) continued the ongoing Pamlico Sound Survey with cruises that sampled 53 stations each in June and September 1993. 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 being processed by NCDMF and are made available to the SEAMAP Data Management System.

### **Benthic Characterization**

During FY1993, the Florida Department of Environmental Protection (FDEP) continued work to characterize the structure and general ecology of South Atlantic benthic communities. Invertebrates were collected on four SEAMAP survey cruises in the region during 1983-1987.

Selected invertebrate groups from northeast Florida are being identified to the lowest appropriate taxonomic level.

All echinoderms except the crinoids were identified and verified during FY1993. The crinoids should be identified and verified by the end of calendar year 1993. Species of mollusk (308), crustaceans (265), echinoderms (approximately 100) and brittle stars have been catalogued and recorded in a database of benthic shelf fauna from Georgia to Palm Beach, Florida. Upon study termination, identified organisms will be housed in a number of reference collections including Harbor Branch Foundation, Smithsonian Institution, and Florida Department of Natural Resources. A final year of funding for FY 1994 is planned for development of distributional maps and scientific papers.

### **Bottom Mapping Project**

In 1985, the SEAMAP-South Atlantic Bottom Mapping Work Group developed a plan for establishing a regional database which would include the location and characteristics of hard bottom resources in 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.

Funds for this project resumed in FY1992 after a seven year hiatus. This portion of the study, which is being conducted by SCMRD, represents the next step in developing the regional database for the portion of the South Atlantic Bight off South Carolina and Georgia, from the beach out to 200 m in depth.

The primary objectives of the study are to:

- (1) Conduct an extensive search of existing databases to identify all known critical hard bottom reef habitats on the continental shelf off South Carolina and Georgia;
- (2) Develop 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; and
- (3) Evaluate PC based software programs that will allow researchers to easily obtain graphic outputs of the database.

All reasonably 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 GIS or other PC mapping software programs.

The following accomplishments were made during FY 1993: (1) The database format and data evaluation procedures were finalized based on discussions with work group members and the SEAMAP Data Manager; (2) A 1 minute longitude by 1 minute latitude grid was prepared for the entire South Atlantic Bight using GIS software. Squares within the grid will be designated by bottom type based on available data; (3) Project staff (including a subcontractor working on Georgia data) initiated a search of existing data sources and began evaluating those records using the protocols recommended by the work group. More than 8,000 records have been entered into the database; and (4) Project staff began evaluating PC ArcView software for suitability in graphical output of database information.

It is anticipated that mapping for the South Carolina and Georgia regions will be complete by the end of calendar year 1993. Data compilation for North Carolina will begin in calendar year 1994.

## **SEAMAP - Caribbean**

### **Reef Resources Survey**

#### **Puerto Rico**

During the survey, a total of 45 stations were sampled west of Parallel 67 of Puerto Rico from April 1992 to March 1993. Fifty eight species representing 25 families yielded over 796 kg of fish. The two most important commercial groups, snappers and groupers, constituted 69% by weight of total catch. Two species of groupers constituted 59% of the hook and line catch in terms of weight.

Red hinds and coney represented, by weight 33% and 26.0%, respectively of the total hook and line catch. Other species which were caught by hook and line include: silk snapper; black snapper; vermillion snapper; queen triggerfish; ocean tully; African pompano; blackjack; sand tilefish; great barracuda; and longjaw squirrelfish. The later four species are consider to be bycatch, due to their low or non commercial value.

Trap catches were dominated by the same two species as for hook and line catches. Red hinds constituted 41.3% of total trap catches by weight, while coney made up 21.1%. Other species that represented part of trap catches were: queen triggerfish; silk snapper; yellowtail snapper; nassau grouper; longjaw squirrelfish; longspine squirrelfish; white grunt; porgy; whitespotted filefish; scrawled cowfish; and banded butterflyfish.

Species composition by sampled stations varied according to three factors: area, fishing gear and depth. Nevertheless, observed species composition is believed to reflect actual composition of commercial landings in Puerto Rico for the gear used in this study, since data collected by port agents represents certain fish groups which are discarded by fishermen due to low economic value (e.g. butterflyfish). Differences in species composition between those reported in commercial landings and those obtained in this survey may be reflection of differences in soak times of fish traps and in times of the day fished with hooks.

Catch per unit effort (CPUE) by stations varied from 0.17g/trap hours to 423 g/trap hours and from 0 g/hook hours to 1,372 g/hook hours. Fishermen experience influenced CPUE, most experienced fishermen had a greater CPUE than those with less experience. Also, most experienced fishermen landed a higher number of fish with less effort than least experienced fishermen.

#### **U.S. Virgin Islands**

The survey was conducted from July 1992 to March 1993. A total of 140 fish, consisting of 28 different species and weighing approximately 64 kilograms were capture during hook and line and fish trap sampling. During the survey, the R/V SEAHORSE sampled U.S. Virgin Islands waters.

Hook and line yielded a total of 62 fish weighing approximately 36 kilograms and consisted of 12 different species. Members of the family Serranidae represented 71% of the total catch. The red hind was the dominant species, representing 43.5% of the total catch. Other families caught were: triggerfish and snappers. Catch per unit effort as described as gram/trip fluctuated from a maximum of 3,342g/trip to a minimum of 435 g/trip. In terms of g/hook hours, it varied from a maximum of 581g/hook hours to a minimum of 83 g/hook hours. The only factor that had a large effect on the hook and line catch was the area sampled. Areas fished where the substrate type was coral reef produced a higher yield of fish per trip than sand or grass bottom.

Fish traps yielded a total of 87 fish weighing approximately 28 kilograms and consisted of 14 different species captured in 60 trap hauls during the sampling period. Members of the family Serranidae dominated fish traps catches, comprising 58.4% of the total catch. The coney was the

dominant serranid captured with fish traps, totaling 36.7% of the total catch. The red hind represented 18.3% of the total catch. Others captured were triggerfish, butterfly fish, snappers and angelfish. Empty traps represented 47% of total number of traps hauled. Zero catches were represented in all quadrants sampled and all depth strata.

Completion of all project objectives for this year was severely hindered by several problems. The U.S. Virgin Islands Division of Fisheries and Wildlife research vessel, R/V SEAHORSE, experienced major mechanical and electrical problems and was inoperable for long periods. Resignation of key personnel during the year complicated sampling schedules. The sole Global Positioning System (GPS) unit which is needed to locate the sample site, required repairs at the factory, which made it unavailable for several months. All boat repairs were completed and equipment acquired to conduct monitoring. The GPS unit is required for the project and a back-up unit has been ordered.

## 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 in the Gulf of Mexico.

### Status and Trends Benthic Surveillance Project

This was the tenth year of SEAMAP's participation in sampling for contaminants in coastal fishes and sediments under the Benthic Surveillance Project of the NOAA National Status and Trends Program. Both SEAMAP-South Atlantic and SEAMAP-Gulf supplied personnel from State fishery management agencies to provide guidance in locating concentrations of the target species, Atlantic croaker and spot.

Managed regionally through the SEFSC's Beaufort, North Carolina Laboratory, the survey team sampled thirteen sites in the Gulf and South Atlantic from August 4 - September 30, 1993. The South Atlantic sites included: Cape Fear River, NC (August 4-6), Charleston Harbor, SC (August 7-13), the Savannah River, GA (August 16-18), Sapelo Sound, GA (August 19-20), the St. Johns River, FL (August 23-26), the Indian River, FL (August 28 - September 1) and Biscayne Bay, FL (September 2-3). The Gulf of Mexico sites included: Charlotte Harbor, FL (September 8-9), Tampa Bay, FL (September 10-11), Apalachicola Bay, FL (September 14-15), St. Andrews

Bay, FL (September 17-18), Choctawhatchee Bay, FL (September 21-24) and Pensacola Bay, FL (September 27-30).

The NOAA Ship FERREL was the primary platform. The sampling methodologies in 1993 were identical to those of previous years. Analyses of trace metals, aromatic and chlorinated hydrocarbons, and other contaminants and indicators in the samples were coordinated by the Beaufort Laboratory.

A list of publications produced by the program is available from NOAA, National Status and Trends Program, N/OMA32, 11400 Rockville Pike, Rockville, MD 20852. A report on the findings of the project's first four years is available as: NOAA Technical Memorandum NMFS-SEFSC-284, *Metal Contaminant Assessment for the Southeast Atlantic and Gulf of Mexico Coasts: Results of the National Status and Trends Benthic Surveillance Project over the First Four Years, 1984-1987* by P.J. Hanson and D.W. Evans.

### Winter Trawling and Fish Tagging Cruise

During February 1 - 9, 1993, personnel from the states of North Carolina and Maryland, the U.S. Fish and Wildlife Service (FWS), the NMFS/SEFSC and Atlantic States Marine Fisheries Commission participated in a striped bass tagging cruise. This was the fifth 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 581 striped bass was captured. Of these, 530 healthy fish were measured, tagged with FWS internal anchor tags and released. Six summer flounder were also tagged. Scales were collected from tagged fish for age and growth determinations. Captured tagged fish were tested for coded wire tags (CWTs) which indicate hatchery origin; 36 CWT positive fish were identified. A database for striped bass tag returns is managed by FWS in Leetown, WV.

## INFORMATION SERVICES

Information from the SEAMAP activities is provided to user groups through three complementary systems: the SIS, SAC and SIPAC. Products resulting from SEAMAP activities can be grouped into two major categories: data sets managed by SIS, SAC and SIPAC and program documents.

## SEAMAP Information System

Biological and environmental data from all SEAMAP 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 surveys during 1982-1991 have been entered into the system and data from 1992 and 1993 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 130 SEAMAP data requests has 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, 127 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 Data Management System. New modules completed include those for data entry, edit, upload, data query and download has been completed. Delivery of the remaining PS/2's has been completed and all of the Gulf and South Atlantic States are now equipped with the necessary computer hardware and software.

The new 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 new system overcomes the deficiencies of the old system (i.e., the time necessary to enter and retrieve data) and provides powerful and flexible local data analysis and

display capabilities. Under the new system, each SEAMAP site enters, verifies and edits their data, eliminating the mail-oriented loop necessary to enter/edit/verify data under the old system. 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 new system, outside users (e.g., Minerals Management Service, U.S. Army Corps of Engineers, etc.) may continue to request special data sets for research or study. The outside users submit the request to the SEAMAP committees through the SEAMAP Coordinators 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 FY1993:

- 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 1990 and 1991 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 Atlantic States Marine Fisheries Commission;
- Species differentiation of Brevoortia smithi and B. tyrannus and age and growth of cobia by the National Marine Fisheries Service;

- Development of the striped bass fishery management plan by North Carolina Division of Marine Fisheries
- Age/growth analysis of Spanish mackerel, king mackerel, black sea bass, and gray triggerfish; age, growth, and fecundity analysis of croaker and kingfishes; age, growth, fecundity and diet analysis of weakfish; estimation of abundance of coastal sharks and educational shark project by South Carolina Wildlife and Marine Resources Department;
- Protein analysis of the mucilaginous stingray spine sheath by Medical University of South Carolina
- Analysis of data collected during the Caribbean Reef Resources Survey to determine if other parameters are needed by the SEAMAP-Caribbean Committee.

#### Real-time Data

A major function of the SEAMAP Information System in FY1993 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 Mississippi Laboratories 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 Mississippi Laboratories, 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 family level by the PSIC are returned to the SAC for archiving and loan to researchers. Data entry for most of the returned sorted samples is completed in an improved and simplified information management system. All data are now managed by a dual microcomputer/mainframe program which eliminates coding errors and facilitates faster data entry. Samples cataloged to date represent 18 orders, 125 families, 234 genera and 244 species.

The SAC is managed in conjunction with FDEP in St. Petersburg, Florida and processes both specimen loans and requests for associated plankton survey environmental data. Currently, the SAC is being reorganized and lines of supervisory responsibilities are being changed due, in part, to the departure of Dr. John V. Gartner, Jr. He has done an exemplary job in organizing and running the SAC from its inception. A new collection manager and half-time

assistant for the collection manager have been hired. The backlog of uncatalogued samples has been eliminated, and all new samples are being processed as they arrive.

The SAC personnel and other staff from FDEP will be participating in the fall ichthyoplankton cruise starting the week of October 11, 1993.

#### SEAMAP Invertebrate Plankton Archiving Center

With the determination in 1985 by the SEAMAP-Gulf Subcommittee that the retained "back-up" bongo collections also contain valuable research materials, the SIPAC was established and is managed in conjunction with Gulf Coast Research Laboratory in Ocean Springs, Mississippi.

Curation and management of SEAMAP zooplankton samples and sorting for selected invertebrates continues at the SIPAC for the seventh consecutive year. The SIPAC continues to provide both sorted and unsorted SEAMAP zooplankton samples and data on those samples to researchers and other user groups as requested.

During FY1993, 92 unsorted SEAMAP samples were received and catalogued at SIPAC. As of September 30, 1993, a total of 4,978 unsorted fish larvae samples is held at SIPAC. In an effort to limit the space and costs of curating the growing SIPAC collection of unsorted samples, a protocol was adopted to retain only a 1/4 aliquot of samples that are more than 7 years old. To date, 1,500 samples were aliquoted including all of the 1982-1984 samples and retained in the collection. The remaining volumes of the samples have been donated to several educational organizations for use as instructional materials. Data on SEAMAP samples added to the SIPAC collection and samples aliquoted for long-term storage has been entered into the SIPAC data base. Updated computer files on the SIPAC holdings have been requested by and provided to NMFS-Pascagoula personnel.

During FY1993 a total of 160 SEAMAP samples has been sorted for selected invertebrate taxa by the SIPAC and the PSIC following established protocol. A total of 607 lots was obtained from these samples. As of September 30, 1993, a total of 5,415 lots of invertebrates has been sorted from 1,278 samples. All portunid crab megalopae from the sorted samples have been further identified to the lowest possible taxonomic level. A substantial data base has been established on the occurrence and distribution of blue crab and other portunid megalopae from the northern Gulf of Mexico. These data are available to researchers upon request.

During the next fiscal year, the SIPAC collection will continue to be maintained and additional samples will be

sorted for invertebrates, contingent on funding. Activities will include: aliquoting of low priority samples for long-term archiving; recycling old sample jars; and maintaining data on unsorted and sorted samples. Emphasis will be placed on building a substantial data base on the occurrence and distribution of megalopae blue crabs and postlarval penaeid shrimp.

## Program Documents

The following documents were published and distributed by the SEAMAP program in FY1993, or were published earlier and not yet reported:

- Beatty, H.R. 1992. 1992 Fall SEAMAP Cruise Report. South Carolina Wildlife and Marine Resources Department. 6 p.
- Beatty, H.R. and E.L. Wenner. 1993. 1993 Spring SEAMAP Cruise Report. South Carolina Wildlife and Marine Resources Department. 6 p.
- Beatty, H.R. and E.L. Wenner. 1993. 1993 Summer SEAMAP Cruise Report. South Carolina Wildlife and Marine Resources Department. 6 p.
- Boylan, J.M., R.P. Webster, H.R. Beatty and E.L. Wenner. 1993. Results of trawling efforts in the coastal habitat of the south Atlantic bight. SEAMAP-SA Final Report FY 1992. South Carolina Wildlife and Marine Resources Department, Marine Resources Research Institute, Charleston, SC. 54 p.
- Donaldson, D.M. 1993. SEAMAP Annual Report to the Technical Coordinating Committee (October 1, 1992 to September 30, 1993). Gulf States Marine Fisheries Commission, Ocean Springs, 42 p.
- Donaldson, D.M., N. Sanders and P.A. Thompson. 1993. SEAMAP Environmental and Biological Atlas of the Gulf of Mexico, 1991. No. 29. Gulf States Marine Fisheries Commission. Ocean Springs, 321 p.
- Donaldson, D.M., C.D. Stephan and A. Rosario. 1992. Annual Report of the Southeast Area Monitoring and Assessment Program (SEAMAP), October 1, 1991 to September 30, 1992. Gulf States Marine Fisheries Commission, Atlantic States Marine Fisheries Commission, Puerto Rico Department of Natural Resources. 10 p.
- Gulf States Marine Fisheries Commission. 1993. SEAMAP Marine Directory. Gulf States Marine Fisheries Commission, Ocean Springs, 10 p. + appendices
- Pawson, D.L. and J.E. Miller. 1992. *Phyllophorus (Urodemella) arenicola*, a new sublittoral sea cucumber from the southeastern United States (Echinodermata: Holothuroidea). Proc. Biol. Soc. Wash. 105(3): 483-489.
- Pulley, M.G. 1990. Pamlico Sound Survey June 1990 Cruise Report. North Carolina Department of Environment, Health and Natural Resources, Division of Marine Fisheries, Morehead City, NC. 27 p.
- Pulley, M.G. 1991. Pamlico Sound Survey September 1990 Cruise Report. North Carolina Department of Environment, Health and Natural Resources, Division of Marine Fisheries, Morehead City, NC. 33 p.
- Pulley, M.G. 1991. Pamlico Sound Survey June 1991 Cruise Report. North Carolina Department of Environment, Health and Natural Resources, Division of Marine Fisheries, Morehead City, NC. 29 p.
- Pulley, M.G. 1992. Pamlico Sound Survey September 1991 Cruise Report. North Carolina Department of Environment, Health and Natural Resources, Division of Marine Fisheries, Morehead City, NC. 27 p.
- Sanders, N., D.M. Donaldson and P.A. Thompson. 1992. SEAMAP Environmental and Biological Atlas of the Gulf of Mexico, 1990. No. 27. Gulf States Marine Fisheries Commission. Ocean Springs, 311 p.
- Stephan, C.D. 1992. SEAMAP - South Atlantic Annual Report, 1 October 1991-30 September 1992. Submitted to the South Atlantic Board of the Atlantic States Marine Fisheries Commission, Washington, D.C. 109 p.

## PROPOSED SEAMAP ACTIVITIES, FY1994

Annual program allocations for the SEAMAP programs, Gulf, South Atlantic and Caribbean total approximately \$1.32 million. Proposed FY1994 activities for all participants are shown in Table 2.

**TABLE 2.**

**PROPOSED SEAMAP ACTIVITIES, FY1994**

	Fall	Winter	Spring	Summer
<b>Gulf of Mexico Activities</b>				
Resource Surveys:				
Spring Plankton Survey			X	
Spring 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:				
1992 Biological and Environmental Atlas				X
1994 Marine Directory			X	
FY1993 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
<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		
Benthic Characterization - Northeast Florida	X	X	X	X
Bottom Mapping Project	X	X	X	X
Information Operations:				
Data Input and Request Processing	X	X	X	X
1993 South Atlantic Annual Report	X			
Data Analysis and Utilization	X	X	X	X
Program Administration	X	X	X	X
<b>Caribbean Activities</b>				
Resource Surveys:				
Reef Resources Survey			X	X
Information Operations:				
Updated Fishery Independent Database Directory		X		
Coordination with Caribbean Countries	X	X	X	X
Research Programs				
Program Administration	X	X	X	X

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