

ANNUAL REPORT

OF THE SOUTHEAST AREA MONITORING AND ASSESSMENT PROGRAM (SEAMAP)

OCTOBER 1, 2004 - SEPTEMBER 30, 2005

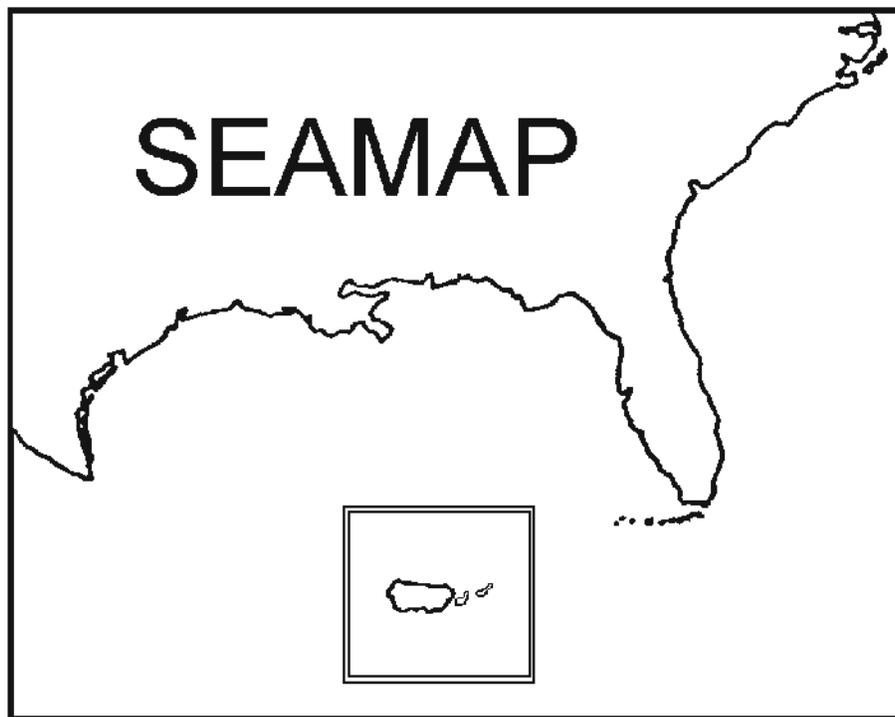
SEAMAP - Gulf of Mexico
Gulf States Marine Fisheries Commission

SEAMAP - South Atlantic
Atlantic States Marine Fisheries Commission

SEAMAP - Caribbean
Puerto Rico Sea Grant College Program

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

OCTOBER 1, 2004 - SEPTEMBER 30, 2005



Gulf States Marine Fisheries Commission

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



Annual Report Preparation By:

Jeffrey K. Rester
Coordinator, SEAMAP - Gulf of Mexico

Elizabeth Griffin
Coordinator, SEAMAP - South Atlantic

Edgardo Ojeda Serrano
Coordinator, SEAMAP - Caribbean

Design and Layout:

Cheryl Noble
Gulf States Marine Fisheries Commission

ANNUAL REPORT

of the

Southeast Area Monitoring and Assessment Program

October 1, 2004 - September 30, 2005

INTRODUCTION

The Southeast Area Monitoring and Assessment Program (SEAMAP) is a State/Federal/university program for the collection, management and dissemination of fishery-independent data and information in the southeastern United States. The program presently consists of three operational components: SEAMAP-Gulf of Mexico, which began in 1981; SEAMAP-South Atlantic, implemented in 1983; and SEAMAP-Caribbean, formed in 1988.

Each SEAMAP component operates independently, planning and conducting surveys and information dissemination in accordance with administrative policies and guidelines of the National Marine Fisheries Service's Southeast Regional Office (SERO). Agencies and organizations directly involved with the SEAMAP are shown in Table 1.

Federal programmatic funding for SEAMAP activities and administration was appropriated in Federal Fiscal Years 1985-2005. Funding allocations to participants for FY1985-FY2005 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 FY2005 and proposed activities for FY2006.

PROGRAM MANAGEMENT

Activities and operations of each SEAMAP component are wholly defined by the respective managing units: the SEAMAP-Gulf Subcommittee of the Gulf States Marine Fisheries Commission's (GSMFC) Technical Coordinating Committee, the SEAMAP-South Atlantic Committee of the Atlantic

States Marine Fisheries Commission's South Atlantic State-Federal Fisheries Management Board, and the SEAMAP-Caribbean Committee of the University of Puerto Rico Sea Grant College Program. The Gulf and South Atlantic committees consist of designated representatives from each member state and NMFS and the Gulf of Mexico and South Atlantic Fishery Management Councils. In addition, the SEAMAP-South Atlantic committee includes a representative from the Atlantic States Marine Fisheries Commission (ASMFC). The Caribbean component consists of members from the Puerto Rico Department of Natural and Environmental Resources, Virgin Islands Department of Planning and Natural Resources, Puerto Rico Sea Grant College Program, NMFS, U.S. Fish and Wildlife Service, and Caribbean Fishery Management Council. Each committee meets yearly to review operations, examine priorities, and plan future activities. Daily operations are carried out by the respective SEAMAP coordinators, assisted by staffs of the two Commissions and Puerto Rico Sea Grant College Program and personnel associated with the SEAMAP Information System, SEAMAP Archiving Center and SEAMAP Invertebrate Plankton Archiving Center (SIPAC).

SEAMAP - Gulf of Mexico

Major SEAMAP-Gulf Subcommittee meetings were held in October 2004 and March 2005, in conjunction with the Annual Fall and Spring Meetings of the GSMFC. All meetings included participation by various work group leaders, Coordinator, Data Manager, Program Manager, and the GSMFC Executive Director. Representatives from the Gulf program also met with the South Atlantic and Caribbean representatives in August 2005 to discuss respective program needs and priorities for FY2006.

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 FY2005. Other important management activities included coordinating data provision and specimen loans, preparing publications and documents and assisting in the preparation of State/Federal cooperative

TABLE 1.

SEAMAP ORGANIZATION

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

agreements, including amendments to permit extension of activities previously not detailed in the agreements.

SEAMAP - South Atlantic

One committee meeting, two work group meetings, and several conference calls, were coordinated and documented in FY2005. Additional tasks included fulfilling data requests, preparation of annual program reports and State/Federal Cooperative Agreements, and distribution of publications.

The SEAMAP-SA Committee held their annual meeting in conjunction with the joint annual meeting held August 2-4, 2004 in Biloxi, Mississippi. The meeting included participation by the work group leaders and coordinator. The Committee developed the 2006 SEAMAP-SA budget and Operations Plan. The Committee also reviewed progress by the Crustacean, Data Management, and Trawl work groups and provided direction where necessary. Topics discussed included fisheries independent data collection/storage standards, and NMFS data management activities. The committee also developed a recommendation to the South Atlantic Board for project funding in FY2006.

The South Atlantic Board met on August 17, 2005 to review recommendations from the SEAMAP-SA Committee. The Board approved the 2006 budget. The SEAMAP Data Management Work Group met on November 29-30, 2004 in Charleston, SC and March 8, 2005 in Tampa, Florida, as well as had a conference call on June 24, 2005 to work on the development of a draft SEAMAP.Org website, refine the SEAMAP Data Management System, and discuss metadata needs.

SEAMAP - Caribbean

The SEAMAP-Caribbean Administrative and Working Group components held five meetings during FY2005, on October 29, March 7, July 1, August 3-4, and September 23. During the meetings, the SEAMAP-Caribbean reviewed several main topics: the 2003-2004 no cost-extension for the Puerto Rico and Virgin Islands whelk surveys and its final reports, and the reef fish surveys for 2004-2005. The SEAMAP-Caribbean committee began discussions regarding reassessing long-term sampling protocols for conch and lobster surveys.

A fisheries specialist was hired under SEAMAP-Caribbean supplemental funds to enter and correct Virgin Islands trap and line missing data from the database. The University of Puerto Rico contracted the fisheries specialist to re-analyze the full data set of the SEAMAP-Caribbean USVI trap and line data. The proposed "St. Croix & St. Thomas/St. John Fisheries Independent Trap and Line Survey, 1992-2002," directed by the Caribbean coordinator, for the evaluation and quality control of the Virgin Island data was finished, and a final report including all findings and sampling recommendations to improve long-term records was submitted to the Pascagoula archive center, and to Puerto Rico and Virgin Island components. The SEAMAP-Caribbean components provided their review comments on the draft 2006-2010 SEAMAP management plan document. All projects and adjustments to the sampling protocols for the next five year cycle SEAMAP-Caribbean proposal were thoroughly discussed (Year 1 conch surveys, Year 2 lobster surveys and Year 3 to 5 reef fish surveys (trap and hook & line).

RESOURCE SURVEYS

In FY2005, collection of resource survey information continued for the twenty-fourth consecutive year. Surveys by each program component reflect distinct regional needs and priorities; however, survey

operations in one geographic area often provide information useful to researchers in all three regions. For instance, the South Atlantic program's Bottom Mapping will be useful in SEAMAP-Gulf gear calibration efforts, while plankton and environmental surveys in the Gulf program have set the standards for the entire region's much-needed long-term database. Because of the diverse scope and target species involved in the SEAMAP's survey operations, activities are discussed here by geographic region.

SEAMAP - Gulf of Mexico

Fall Shrimp/Groundfish Survey

The Fall Shrimp/Groundfish Survey was conducted from October 12 - December 12, 2004, from off Mobile, Alabama to the U.S.-Mexican border. Vessels sampled waters out to 60 fm, covering 314 trawl stations, in addition to plankton and environmental sampling.

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

- (1) sample the northern Gulf of Mexico to determine abundance and distribution of demersal organisms from inshore waters to 60 fm;
- (2) obtain length-frequency measurements for major finfish and shrimp species to determine population size structures;
- (3) collect environmental data to investigate potential relationships between abundance and distribution of organisms and environmental parameters; and
- (4) collect ichthyoplankton samples to determine relative abundance and distribution of eggs and larvae of commercially and recreationally important fish species.

NMFS, Mississippi, Alabama, and Louisiana vessels collected ichthyoplankton data at sample sites occurring nearest to half-degree intervals of latitude/longitude. A total of 48 stations was sampled with bongo and/or neuston nets, as encountered along cruise tracks. The Polish Sorting and Identification Center will sort the samples.

Once sorted, the specimens and data will be archived at the SEAMAP Archiving Center.

Spring Plankton Survey

The SEAMAP Spring Plankton Survey took place from April 20 - May 30, 2005. One hundred ninety-four stations were sampled from the west Florida shelf to the Louisiana/Texas border. This was the twenty-fourth year for the survey. The objectives of the survey were to collect ichthyoplankton samples for estimates of the abundance and distribution of Atlantic bluefin tuna larvae and collect environmental data at all ichthyoplankton stations.

Plankton samples were taken with standard SEAMAP bongo and neuston samplers. The bongo sampler consisted of two conical 61-cm nets with 333-micron mesh. Tows were oblique, surface to near bottom (or 200 m) and back to surface. Wire angle was maintained at 45 degrees. Neuston samples were taken with 947-micron mesh nets on 1 x 2-meter frames towed at the surface for ten minutes. Right bongo and neuston samples were initially preserved in 10% buffered formalin and after 48 hours were transferred to 95% ethyl alcohol for final preservation. Left bongo samples were preserved via an ethanol/ethanol transfer to aid in preservation of larval otoliths. In addition, hydrographic data (surface chlorophylls, salinity, temperature and dissolved oxygen from surface, midwater and near bottom, and Forel-ule color) were collected at all stations.

Right bongo and neuston samples collected from SEAMAP stations were transshipped to the Polish Sorting and Identification Center. Left bongo samples were archived at the SEAMAP Invertebrate Plankton Archiving Center (SIPAC).

Reeffish Survey

The primary purpose of this survey is to assess relative abundance and compute population estimates of reef fishes found on natural reef fish habitat in the Gulf of Mexico. Two types of gear are used to deploy video cameras: 1) a single-funnel fish trap (2.13 m long by 0.76 m square) with the camera mounted at a height of 25 cm above the bottom of the trap; or 2) a 4 camera array with 4 cameras mounted orthogonal to each other at a height of 25 cm above the bottom. Both gears are baited with squid before deployment. The resultant video recordings (typically of one hour duration) are processed back at the laboratory where fishes are

identified and counted independently by two tape readers. Final counts are entered into the SEAMAP reefish database along with additional observations on habitat and fish activity. NMFS conducted reefish sampling from April 12 through May 11, 2005. Video cameras were deployed at 142 sites and the chevron trap at 29 sites.

Summer Shrimp/Groundfish Survey

During the spring of 2005, 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 2005 SEAMAP summer survey was to work from the eastern Gulf to the Texas/Mexico border, in order to sample during or prior to migration of brown shrimp from bays to the open Gulf area. This was the twenty-fourth year for the survey. The entire survey occurred from June 1 through July 31, 2005 and 272 trawl stations were sampled during the survey. In addition, NMFS, Mississippi, Alabama, and Louisiana vessels collected ichthyoplankton data.

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

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 1986-2004 covered Gulf waters from Florida Bay to Brownsville, Texas. Due to impacts from Hurricane Katrina, the 2005 Fall Plankton Survey was cancelled.

Plankton and Environmental Data Surveys

As in previous years, plankton samples and environmental data were collected routinely during most SEAMAP trawling surveys. During the Summer Shrimp/Groundfish Survey, plankton tows were piggybacked on the NMFS and state vessels, sampling randomly generated trawl stations within the standard 30-minute SEAMAP grids.

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

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

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

SEAMAP - South Atlantic

Shallow Water Trawl Survey

The major SEAMAP-South Atlantic survey in FY2005 was the continuing Shallow Water Trawl Survey conducted by the South Carolina Department of Natural Resources (SCDNR). Initiated as a pilot

project in 1986, this is a fishery-independent study designed to monitor the distribution and abundance of coastal species in the South Atlantic Bight and to measure associated environmental parameters in nearshore coastal waters. Sampling was standardized in 1990, and a 10-year trawl report was completed in December 2000 summarizing species composition, regional species assemblages, and trends in distribution and abundance of 27 priority species. In January 2001, the sampling design was changed based on the results of an external program review. Offshore strata were discontinued, and additional stations were added to inshore strata for all three cruises to reduce variability in the abundance estimates for target species. The overall goal is to obtain a long-term database to facilitate management of stocks in the South Atlantic Bight.

The objectives of the survey are to:

- (1) collect data on size, abundance, distribution, and seasonality of target finfish and decapod crustaceans;
- (2) record species composition, biomass, and abundance in order to assess latitudinal and seasonal fluctuations; and
- (3) collect data on size, sex, and gonadal condition of white, pink, and brown shrimp and attempt to locate spawning grounds.

Three multi-legged seasonal cruises were conducted between Cape Hatteras, North Carolina, and Cape Canaveral, Florida, during FY2005: Fall 2004 (October 5 - October 30), Spring 2005 (April 4 - April 28), and Summer 2005 (July 10 - July 28). Inshore strata (4.6 to 9.2 m depths) were sampled during each cruise. All samples were collected during daylight hours to maximize the opportunities for collecting juvenile mackerels.

The fall 2004 cruise completed the fifteenth full year of standardized sampling under a stratified random survey design. Sampling was conducted between October 5 - October 30 and all of the 102 inshore stations allocated to 24 shallow coastal strata in the South Atlantic Bight were sampled. A total of 133 species or genera were identified in fall trawls. *Micropogonias undulatus*, the Atlantic croaker, was the most abundant species, constituting 15% of total abundance, followed by the white shrimp, *Litopenaeus setiferus* (14%), the striped anchovy, *Anchoa hepsetus* (8%), the banded drum, *Larimus fasciatus* (5%), and the pinfish, *Lagodon rhomboides* (5%). The abundance of individuals,

excluding cannonball jellies, in 2004 was greater than the level of abundance observed in fall 2003. Miscellaneous invertebrate biomass, including cannonball jellies, however, was smaller in 2004. Overall abundance was greatest in Raleigh Bay, whereas miscellaneous invertebrate biomass was greatest off South Carolina.

The spring cruise for the SEAMAP-South Atlantic Shallow Water Trawl Survey began on April 4 and was completed on April 28, 2005. A total of one hundred and two stations were sampled in the twenty-four shallow coastal strata in the South Atlantic Bight. A total of 124 species or genera were identified in spring trawls. *Opisthonema oglinum*, the Atlantic thread herring, was the most abundant species, constituting 17% of total abundance, followed by the Atlantic croaker, *Micropogonias undulatus* (14%); the weakfish, *Cynoscion regalis* (13%); the striped anchovy, *Anchoa hepsetus* (13%); the spot, *Leiostomus xanthurus* (9); and the southern kingfish, *Menticirrhus americanus* (4%). Abundance of individuals collected in spring 2005 decreased from the record level of spring abundance observed in 2004, whereas miscellaneous invertebrate biomass was very low, but exceeded 2004 abundance. The cannonball jelly, *Stomolophus meleagris*, constituted more than 35% of miscellaneous invertebrate biomass. An increase in the number of smooth dogfish, *Mustelus canis*, taken in trawls was noted. This trend has been noted each spring since 2001. Water temperatures were considerably colder in 2005 than those measured during other spring cruises, with the exception of 1989, 1993, 1996. As would be expected, the coldest water temperatures were encountered in Raleigh Bay. Mean water temperature increased southward.

The summer cruise for the SEAMAP-South Atlantic Shallow Water Trawl Survey began on July 10 and was completed on July 28, 2005. A total of one hundred and two stations were sampled in the twenty-four shallow coastal strata in the South Atlantic Bight. A total of 127 species or genera were identified in summer trawls. *Micropogonias undulatus* was the most abundant species, constituting 27% of total abundance, followed by *Leiostomus xanthurus* (10%), *Farfantepenaeus setiferus* (9%), and *Larimus fasciatus* (7%). Abundance of individuals collected decreased slightly from the level of abundance observed in summer 2004. The biomass of miscellaneous invertebrates continued to be low.

Data from the spring, summer, and fall 2004 cruises have been added to the SEAMAP Data Management

System (DMS). For additional cruise information, please see the individual cruise reports available at ASMFC.org under the Research & Statistics section of the website. The results of the entire 2004 cruise season (Spring 2004, Summer 2004, and Fall 2004 cruises) are documented in the final 2004 project report, "Results of Trawling Efforts in the Coastal Habitat of the South Atlantic Bight, FY2004" by South Carolina Marine Resources Division.

Pamlico Sound Survey

During FY2005, the North Carolina Division of Marine Fisheries (NCDMF) continued the ongoing Pamlico Sound Survey. Cruises sample approximately 52 stations each in June and September. This seasonal trawl survey is designed to provide a long-term fishery-independent database on the distribution, relative abundance, and size composition of target species of estuarine fish and decapod crustaceans for the waters of Pamlico Sound. The data are processed by NCDMF and are made available to the SEAMAP DMS.

Bottom Mapping Project

In 1992, the SEAMAP-South Atlantic Bottom Mapping 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 reefish resources and increased fishing pressure. In order to assess reefish populations and the effects of changes in fishing pressure, the amount of habitat available for priority species of fish must be quantified.

The primary objectives of the Work Group are to:

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

All accessible databases available from state and federal agencies and other sources that have sampled

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

By the end of FY1997, more than 65,700 records were compiled from databases obtained off North Carolina, South Carolina, Georgia, and Florida in three study phases. Reports summarizing the databases available for these areas were provided in three final reports submitted to the SEAMAP-SA Committee. From FY1998 through FY2001, the Florida Marine Research Institute (FMRI) reproduced and refined the three Bottom Mapping Reports into a single product on a CD-ROM readable on any desktop PC. The CD-ROM includes GIS software, data files, documentation, and maps covering the area from Florida to the North Carolina-Virginia border. Version 1.0 was completed in 1998, Version 1.1 was printed in 1999, and Version 1.2 was printed in 2001. The development of version 1.2 included a much-improved summary document, and several tools to help users view and analyze the data. All versions were distributed to libraries to maximize availability and utilization of the data. Copies of the Bottom Mapping CD version 1.2 and the summary document are available through the ASMFC.

During 2001, the work group began discussing the development of protocols to capture deepwater (200 - 2000 m) data on bottom type for funded action in 2002. The deepwater bottom type project will extend the depth range of the existing Bottom Mapping CD-ROM, and is progressing under a three-phase plan. Phase 1 and 2 occurred simultaneously in FY2002-2003. In phase 1, protocols were developed to recover existing data and convert it into a standard format. During phase 2, key information was gathered on existing data sources (availability, format, data contacts, number of records, geographical range, etc.) to help the Bottom Mapping Work group prioritize data sources to obtain for conversion. The Phase 2 report "Summary of Seafloor Mapping and Benthic Sampling Conducted in 200-2000 m, from North Carolina through Florida" was completed in April of 2003 and is available via www.asmfc.org. Phase 3,

which began in 2004, involves using the protocols developed in Phase 1 to obtain and standardize the data identified in Phase 2. The first project of Phase III was digitizing and translating existing bottom character maps published by Popenoe for deepwater marine habitat off the Southeastern U.S. margin. Future priorities also include working with the South Atlantic Fisheries Management Council to increase availability of summary data via the Internet in both static and interactive mapping formats and working to characterize habitat use by species of interest.

SEAMAP - Caribbean

In FY2005, SEAMAP-Caribbean supported a variety of activities in the U.S. Virgin Islands and Puerto Rico. In Puerto Rico, the first year of a whelk survey (FY2003) was undertaken for the next three-year cycle. Thirty-seven visual censuses around the coasts of Puerto Rico, including Mona Island, Desecheo Island, Culebra Island and Caja de Muertos were conducted. A final report with data analysis was finished in April 2005 and submitted to the Southeast Regional Office. The results of this survey were the following: a total of thirty-seven whelk surveys were conducted along the shoreline of Puerto Rico, ten on each coast except the north coast, in which only seven were conducted because of prevailing bad weather conditions. The maximum shell width found was 124 mm. The average size was 35.3 mm. The average number of individuals found per site was 260.

Fisheries reports show that the West Indian topshell, *Cittarium pica*, is fished all along the Puerto Rico coast. Although not much was known about the population status of this mollusk in the Island, fishermen complain that it was very abundant along the rocky shores, and that now it was not. Based on these statements and landing reports, it could be concluded that the resource was certainly diminishing.

It was found during the study that the West Indian topshell was not fished with equal intensity or sold at the same scale throughout the Island. At some areas, like Cabo Rojo on the southwest coast, it was part of the food menu of some restaurants, on other areas it was sold on a more local or informal scale. Sale prices ranged from \$8.00 to \$12.00 per pound. Variation on fishing pressure could affect resource availability.

There was great variety on the number of snails found during the surveys. The range was from 7 to

1,073 individuals. The average was 259. Several factors could be responsible for the variation found. Some areas might be overfished while others might be fished occasionally. Difference on recruitment rate was another factor to consider. A study suggested that low population densities at calm sites could be due to poor recruitment. But, on places of high wave action, recruitment might be difficult because low capability of small snails to confront the wave dragging force. The majority of the high wave action areas surveyed showed a small number of small snails (18-24%). On the contrary low wave action areas showed a greater number of small snails (65%). This suggests that the snail recruitment was better on quiet sites. The small amount of larger shell size snail on quiet sites could be due to overfishing, given that predation pressure was the same on both areas. It should be noted that in the Bahamas a greater predation pressure was found on high energy sites, which would mean larger snails on quiet areas, contrary of what was found in this study.

Considering the data gathered the following behavioral pattern is suggested for the West Indian topshell in Puerto Rico. As stated by other studies, it was found that *Cittarium pica* showed a size-specific zonation. Larger snails use the creeds on the submerged rocky shore, while smaller snails use the pseudo-exposed rocky shore (it gets wet with the wave movement). Recruitment is better on low-energy sites because of less stress due to wave dragging forces. The West Indian topshell has been overfished at these low-energy sites, which explains the lack of larger snails. High energy sites are probably not overfished because of the difficulties that weather imposes to the fishermen, but these sites are still fished during calm weather. Difficult access sites showed the same situation as the high energy sites.

In Puerto Rico, no study has been conducted to collect information on recruitment and reproduction of *Cittarium pica*. A study in the Bahamas found that snails on quiet areas had a maturation size and fecundity greater than the ones in wave-stress areas. If that holds true for Puerto Rico, as well as the suggested behavioral pattern, it would mean that larger snails are especially important in the quiet areas. Therefore, in order to recover the overfished sites, snails should be allowed to reach their sexual maturity size. If this hypothesis is true, the snails in the exposed areas might be the ones responsible for most of the recruitment.

This hypothesis may help explain the data gathered and what has been reported by fishermen. The fact

remains that too much is unknown. More studies of the reproduction and recruitment patterns of the species need to be done to determine accurately what will be the right management measurements to take.

Reef fish monitoring surveys started on April 2004 and will continue into FY2006. During April 2004, all gear, materials and equipment were bought and prepared to begin sampling in May 2004. Sampling was continuous from May to July 2004, and from November 2004 to July 2005. A total of 17 stations off the west coast of Puerto Rico were sampled yielding over 388 kg of finfish and shellfish. Of those sampled stations, four of them were from the Mona Island Natural Reserve, located forty-five miles off the west coast of Puerto Rico. The last fisheries independent data collection for reef fishes was done in 1989. Since a closure in February 2004 it has become increasingly important to document the status to the fisheries resources since the closing date.

Several species of groupers (Serranidae) constituted 47.5% of the hook and line catch in terms of weight. Red hinds, *Epinephelus guttatus*, and coney, *Cephalopholis fulva*, represented 29.0% and 17.5% by weight respectively, of the total hook and line catch. Other species that constituted more than one percent of the hook and line catches by weight were: sand tilefish, *Malacanthus plumieri*, 11.5%; the longjaw squirrelfish, *Holocentrus ascensionis*, 2.7%; the black jack, *Caranx lugubris*, 4.2%; the great barracuda, *Sphyrnaea barracuda*, 3.2%; the blue runner, *Caranx crysos*, 4.5%; and the black durgon, *Melichthys niger*, 4.3%. The results so far are compatible with those obtained during previous surveys in the area.

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 Cruise¹

The SEAMAP Cooperative Winter Offshore Tagging Cruise was conducted from January 23 - February 3, 2005 aboard the OREGON II. Atlantic States Marine Fisheries Commission personnel participated

¹ Data from the cruise is preliminary and therefore subject to revision.

as crew on the cruise. This was the eighteenth year of the cooperative project, initiated in 1988 at the request of SEAMAP-South Atlantic. Adult striped bass over-wintering in the area between False Cape, Virginia and Cape Lookout, North Carolina, were tagged for assessment of the population structure and exploitation rates. Other species tagged included horseshoe crab, spiny dogfish, and red drum. Numerous species including croaker, menhaden, herring and weakfish were retained for diet studies.

The Scientific Party and crew of the OREGON II, trawling night and day in the Atlantic Ocean off the North Carolina Outer Banks, processed (processing includes counting, measuring, sexing and additional weighing, tagging and/or sampling for some species) fish of 21 different species. This year's cruise capture and tagging of migratory Atlantic striped bass far exceeded the long-term average value for striped bass tagged (17-year average of 1,961). The new 18-year average striped bass number tagged is 2,437. The 2005 cruise ranks third overall in numbers of striped bass tagged and released. In addition to tagging 4,266 of the striped bass, random scale samples were taken for aging fish. Striped bass mortally injured during capture this year were sacrificed for aging, prey analysis and condition assessment (using livers). During its 18-year history, the Cooperative Winter Tagging Cruises have collectively tagged 43,869 striped bass.

Bluefish were collected for work to be done by North Carolina State University. Observations were taken also regarding weakfish abundance and distribution. Only a few catches of large fish were observed this year. Samples of large weakfish encountered were measured and otoliths removed and retained for analysis by the NC Division of Marine Fisheries, and for the CTILS diet studies. Only one Atlantic sturgeon was captured and measured and released this year. For the tenth consecutive year during this cruise, spiny dogfish were enumerated. Tagging has been conducted in eight of the ten years (no tags were available in 2000 and 2001). As observed in the previous years, the majority of the adult or immature fish encountered were females. No neonates were captured this year. Overall numbers of summer flounder encountered on the cruise this year were down relative to numbers observed in previous years; however, our effort was reduced during much of the cruise due to towing only one net. For the second time this year, skates in the catch were measured and their gender noted. At least three species were present in the catch: clearnose (*Raja eglanteria*); winter (*Leucoraja ocellata*) and little (*L. erinacea*). Only one

horseshoe crab was tagged this year, the third year in which such tagging has been conducted. Observations of humpback whales and fin whales occurred on several days during the cruise this year. Temperature, salinity and depth data were collected continuously by the ship's sensors and were recorded at each station where the nets were set.

Release data from the initial eighteen years (1988-2005) of the Cooperative Winter Tagging Cruise (Cruise) are annually maintained in databases by the U.S. Fish and Wildlife Service's Maryland Fisheries Resources Office, and by the Maryland Department of Natural Resources, Tidewater Administration, Fisheries Service, both located in Annapolis, MD. Recapture data are entered by the Maryland Fisheries Resources Office and are used annually by the ASMFC Striped Bass Tagging Subcommittee to derive estimates of mortality for various size classes of striped bass. The data from the first fifteen Cruise years were entered into a geographic information system (GIS) database at the U.S. Fish and Wildlife Service's Raleigh, NC, Ecological Services field office. Preliminary plots of cruise tows and striped bass recapture localities were made; however, additional cleaning of the database must take place before final analysis can be conducted. In association with the Atlantic States Marine Fisheries Commission's Habitat Program and the National Marine Fisheries Service, striped bass data from previous years of the cruise also have been entered into a GIS database at NMFS headquarters in Silver Spring, MD, and were analyzed to assess habitat use off North Carolina as well as patterns of travel and habitat use inferred from coast-wide tag returns. Preliminary GIS products were prepared for use by ASMFC. Summary reports for each annual cruise are available through the South Atlantic Fisheries Resources Office.

INFORMATION SERVICES

Information from the SEAMAP activities is provided to user groups through the program administration and three complementary systems: the SEAMAP Information System, SEAMAP Archiving Center and SIPAC. Products resulting from SEAMAP activities can be grouped into two major categories: data sets (including broadly, digital data and collected specimens) managed by the SEAMAP Information System, SEAMAP Archiving Center and SIPAC; and program information. Program information is discussed in the *PROGRAM MANAGEMENT* Section of this report.

SEAMAP Information System

Biological and environmental data from all SEAMAP-Gulf surveys are included in the SEAMAP Information System, managed in conjunction with NMFS-SEFSC. Raw data are edited by the collecting agency and verified by the SEAMAP Data Manager prior to entry into the system. Data from all SEAMAP-Gulf surveys during 1982-2004 have been entered into the system and data from 2005 surveys are in the process of being verified, edited, and entered for storage and retrieval. Verified, non-confidential SEAMAP data are available conditionally to all requesters, although the highest priority is assigned to SEAMAP participants. A total of 286 SEAMAP data requests have been received. In most instances, requests were filled promptly. To date, 283 requests have been completed. During this reporting period, 21 requests were received.

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

Work was completed during FY1990 on the new distributed SEAMAP DMS. New modules completed include those for data entry, edit, upload, data query and download. The system is decentralized, i.e., distributed. Thus, the SEAMAP users are able to locally, and directly, enter and retrieve data. Software for the system has been distributed to participants for trial runs of data input.

This system decreases the time necessary to enter and retrieve data and provides powerful and flexible local data analysis and display capabilities. Under the system, each SEAMAP site enters, verifies and edits their data, eliminating the mail-oriented loop

necessary to enter/edit/verify data. Secondly, each site has the capability of locally accessing SEAMAP data, utilizing a user-friendly system. Local data retrieval allows the data to be accessed in a timely manner with a minimum amount of effort and programming skills.

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

Requested SEAMAP data were used for a multitude of purposes in 2005:

- Evaluating the abundance and size distribution of penaeid shrimp in federal and state waters to assist in determining opening and closing dates for commercial fisheries;
- Evaluating and plotting the size of the hypoxic (Dead Zone) area off of Louisiana;
- Assessing shrimp and groundfish abundance and distribution and their relationship to such environmental parameters as temperature, salinity, and dissolved oxygen;
- Identifying environmental parameters associated with concentrations of larval finfish;
- Assessing the potential impact of liquefied natural gas facilities on marine fish stocks;
- Compiling the 2005 SEAMAP Environmental and Biological Atlas;
- Comparing catches of shrimp and groundfish captured by 40-ft versus 20-ft trawl nets;
- Using 1989-2003 data for development of a North Carolina fisheries management plan on kingfish;
- Using 1989-2003 data for determination of the distribution of bottlenose dolphins as a function of prey resource availability;

- Gathering marine turtle data for graduate student research on how trends in bycatch may be related to turtle catch;
- Collecting YOY bluefish specimens for analysis of PCB fingerprints;
- Using historical SEAMAP data for baseline survey of the species composition of major ports of the South Atlantic Bight Region (Wilmington, Charleston, Savannah, and Jacksonville) conducted by the Georgia Marine Extension Service;
- Helping the South Atlantic Fishery Management Council, in cooperation with the Florida Fish and Wildlife Research Institute, put SEAMAP data into an Internet Map Server (IMS) to provide access to GIS data, imagery, and documents related to EFH, EFH-HAPCs, and coral and benthic habitats across the South Atlantic Region; and
- Distributing South Atlantic Bottom mapping data to a variety of interested parties, including consulting and engineering firms, NOAA, and academic institutions.

Real-time Data

A major function of the SEAMAP Information System is the processing of catch data from the Summer Shrimp/Groundfish Survey as near-real-time data. Data were transmitted three times weekly via cellular phone to the NMFS Mississippi Laboratories from the NOAA vessel, while the states' data were entered into the system weekly. Plots of station locations and catch rates of shrimp, squid and dominant finfish species were prepared and edited at the NMFS Mississippi Laboratories, and processed by GSMFC for weekly distribution to management agencies, fishermen, processors and researchers. SEAMAP real-time data plots were produced during the 2005 Summer Shrimp/Groundfish Survey. Seven weekly mailings were produced and distributed to approximately 200 interested individuals. These plots were also available through the SEAMAP home page. Management agencies also received comprehensive data listings showing penaeid shrimp length frequencies, sampling parameters and environmental conditions.

SEAMAP Archiving Center

Larval fish and fish egg samples sorted to the lowest taxa level possible by the Polish Sorting and Identification Center are returned to the SEAMAP Archiving Center for archiving and loan to researchers. To date in 2005, 956 samples were returned from the Polish Sorting and Identification Center. Data entry for 839 of the sorted samples has been completed in the new SEAMAP Access data entry system. The 19,899 specimens cataloged this year represent 18 orders, 126 families, 235 genera and 245 species.

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

SEAMAP Invertebrate Plankton Archiving Center

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

The student assistant employed during the past year currently aids the curator with the cataloging of new samples, and the maintenance and curation of the collection. Activities during the year were limited to the maintenance and curation of the existing collection, as well as the cataloging of 121 additional bongo net samples from year 2004 plankton cruises. The number of samples currently cataloged in the SIPAC collections is 9,010, with 326 samples currently on loan.

In an effort to keep the space required to house the SIPAC collection of unsorted plankton samples to a minimum, samples that have been in the collection for over 10 years and duplicate samples sorted and received from the Polish Sorting and Identification Center, are aliquoted to ¼ their original volume and placed into 100 ml vials, as necessary. When

possible, the remaining 3/4 aliquots are donated to educational institutions for use as teaching materials. If the remaining sample must be discarded, sample jars are cleaned and returned to NMFS-Pascagoula for reuse. To date, approximately 2,264 samples collected from 1982-1988 have been aliquoted and prepared for long-term storage. Due in part to the removal of approximately 180 samples to the NMFS, Pascagoula, in 2002, there is presently sufficient space available for additional samples to be deposited into the SIPAC archives without continuing the aliquoting of 1988-1994 SEAMAP samples.

On August 29, 2005, Hurricane Katrina struck the Mississippi coast, severely damaging the building at the Gulf Coast Research Laboratory in which the SIPAC samples were housed. The room containing these samples was breached by the storm surge and many samples were washed out into the surrounding area. Although some samples were destroyed, many were not, and to date approximately 850 samples have been recovered. It is anticipated that many additional samples remain beneath the debris within the room that housed them; however, that room is currently inaccessible because of damage to the building above. Plans are currently underway to attempt the recovery of those samples as a part of the debris removal process prior to the demolition of the building.

During the next year, the SIPAC will continue to manage SEAMAP plankton collections, accession samples and provide available data from the collection to qualified researchers as requested. In addition, the recovered samples will be checked against the catalog, their recovery noted, and a listing of lost samples obtained. Preservative will be checked for the existing samples and replaced as needed. Space is currently available for SIPAC material in another location at the GCRL and the samples will be reorganized there.

Program Documents

The following documents were published and distributed by the SEAMAP program in FY2005:

Gulf States Marine Fisheries Commission. 2005. SEAMAP Marine Directory. Gulf States Marine Fisheries Commission, Ocean Springs. 1 p. + appendices.

Jiménez, N. 2004. Study on the juvenile recruitments of the spiny lobster (*Panulirus argus*). Completion report. NMFS/SEAMAP Program. 1 – 13.

Rester, J.K., E. Griffin, and E. Ojeda Serrano. 2004. Annual Report of the Southeast Area Monitoring and Assessment Program (SEAMAP), October 1, 2003 to September 30, 2004. Gulf States Marine Fisheries Commission, Atlantic States Marine Fisheries Commission, Puerto Rico Sea Grant College Program. 10 pp.

Rester, J.K. 2004. SEAMAP Annual Report to the Technical Coordinating Committee (October 1, 2003 to September 30, 2004). No. 125. Gulf States Marine Fisheries Commission, Ocean Springs. 16 pp. + appendices.

Rosario Jiménez, A. 2004. Shallow water reef fish monitoring SEAMAP-Caribbean fisheries independent monitoring. Comp. Rep. NMFS/SEAMAP-Caribbean Program. PRDNER. 1 – 78 pp.

Rosario Jiménez, A. and M. Figuerola Fernández. 2004. Recruitment of postlarval spiny lobster (*Panulirus argus*) in southwestern Puerto Rico. Completion report NMFS/SEAMAP Program. 1 – 9 pp

South Carolina Marine Resources Division. 2004. 2004 Fall SEAMAP Cruise Report. South Carolina Department of Natural Resources. Charleston, SC. 9 pp.

South Carolina Marine Resources Division. 2005. 2005 Spring SEAMAP Cruise Report. South Carolina Department of Natural Resources. Charleston, SC. 9 pp.

South Carolina Marine Resources Division. 2005. 2005 Summer SEAMAP Cruise Report. South

Carolina Department of Natural Resources. Charleston, SC.. 9 pp.

South Carolina Marine Resources Division. 2005. Results of Trawling Efforts in the Coastal Habitat of the South Atlantic Bight, FY2004. South Carolina Department of Natural Resources, Charleston, SC. 98 pp.

Toller, W., and S. Gordon. 2005. A population survey of the West Indian topshell or whelk (*Cittarium pica*) in the U.S. Virgin Islands. Bureau of Fisheries, Division of Fish and Wildlife, Department of Planning and Natural Resources, Government of the U.S. Virgin Islands. 55 pp.

Whiteman, E.A. 2005. SEAMAP-Caribbean USVI St. Croix & St. Thomas/St. John fisheries independent trap and line survey, 1992-2002 summary report: data analysis and conclusions. UPR Sea Grant College Program/NMFS Cooperative Southeast Area Monitoring and Assessment Program - Caribbean (SEAMAP-Caribbean), University of Puerto Rico, Sea Grant College Program, Mayaguez, Puerto Rico.

PROPOSED SEAMAP ACTIVITIES, FY2006

Annual program allocations for the SEAMAP programs, Gulf, South Atlantic and Caribbean total approximately \$1.385 million. Proposed FY2006 activities for all participants are shown in Table 2.

Table 2.

PROPOSED SEAMAP ACTIVITIES, FY2006

	Fall	Winter	Spring	Summer
Gulf of Mexico Activities				
Resource Surveys:				
Spring Plankton Survey			X	
Reeffish Survey			X	X
Summer Shrimp/Groundfish Surveys				X
Louisiana Seasonal Surveys	X			X
Fall Shrimp/Groundfish Surveys	X			
Fall Plankton Survey	X			
Plankton and Environmental Data Surveys			X	X
Information Operations:				
2002 Biological and Environmental Atlas		X		
2006 Marine Directory			X	
FY2005 Joint Annual Report		X		
Real-time Data Summaries		X		X
Data Input and Request Processing	X	X	X	X
Specimen Archiving and Loan	X	X	X	X
Program Administration	X	X	X	X
Joint Planning Activities	X	X	X	X
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
2004 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				
Conch Resource Surveys	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

SEAMAP-Gulf of Mexico Representatives

Jim Hanifen, Chairperson
Louisiana Department of Wildlife and Fisheries

Steve Heath, Vice Chairperson
Alabama Department of Conservation and Natural Resources

Paul Choucair
Texas Parks and Wildlife Department

Mark Leiby
Florida Fish and Wildlife Conservation Commission

Butch Pellegrin
National Marine Fisheries Service
Pascagoula Laboratory

Richard Leard
Gulf of Mexico Fishery Management Council

Richard Waller
Mississippi Department of Marine Resources
USM/COMS/Gulf Coast Research Laboratory

SEAMAP-South Atlantic Representatives

Roger Pugliese, Chairperson
South Atlantic Fishery Management Council

Dale Theiling
South Carolina Department of Natural Resources

Dr. Carmela Cuomo
Atlantic States Marine Fisheries Commission

Dr. Wilson Laney
U.S. Fish and Wildlife Service

Henry Ansley
Georgia Department of Natural Resources

Tina Udouj
Florida Fish and Wildlife Research Institute

John Merriner
National Marine Fisheries Service
Beaufort Laboratory

Katy West
North Carolina Department of Environment and Natural Resources

SEAMAP-Caribbean Representatives

K. Roger Uwate, Chairperson
U.S. Virgin Islands Division of Fish and Wildlife

Barbara Kojis
Virgin Island Division of Fish and Wildlife

Aida Rosario
Puerto Rico Department of Natural and Environmental Resources

Ruperto Chaparro
Puerto Rico Sea Grant College Program

Richard Appeldoorn
University of Puerto Rico

Graciela Garcia-Moliner
Caribbean Fishery Management Council

Miguel Rolón
Caribbean Fishery Management Council

Nancy Thompson/Peter Thompson/John Merriner
National Marine Fisheries Service

Edwin Muñiz/Ana Román

SEAMAP Personnel

Jeffrey Rester
SEAMAP-Gulf Coordinator
Gulf States Marine Fisheries Commission

Elizabeth Griffin
SEAMAP-South Atlantic Coordinator
Atlantic States Marine Fisheries Commission

Edgardo Ojeda Serrano
SEAMAP-Caribbean Coordinator
Puerto Rico Sea Grant College Program

Larry Simpson, Executive Director
Gulf States Marine Fisheries Commission

John O'Shea, Executive Director
Atlantic States Marine Fisheries Commission

John Roussel, Chairman
Gulf States Marine Fisheries Commission

Preston Pate, Chairman
Atlantic States Marine Fisheries Commission

Mark McDuff
National Marine Fisheries Service
SEAMAP Data Manager

Sara LeCroy, Curator
SEAMAP Invertebrate Plankton Archiving Center

Scott Nichols
National Marine Fisheries Service
SEAMAP Program Manager

Cynthia Pierce
National Marine Fisheries Service
SEAMAP Program Office

ANNUAL REPORT

of the

Southeast Area Monitoring and Assessment Program

October 1, 2004 - September 30, 2005

INTRODUCTION

The Southeast Area Monitoring and Assessment Program (SEAMAP) is a State/Federal/university program for the collection, management and dissemination of fishery-independent data and information in the southeastern United States. The program presently consists of three operational components: SEAMAP-Gulf of Mexico, which began in 1981; SEAMAP-South Atlantic, implemented in 1983; and SEAMAP-Caribbean, formed in 1988.

Each SEAMAP component operates independently, planning and conducting surveys and information dissemination in accordance with administrative policies and guidelines of the National Marine Fisheries Service's Southeast Regional Office (SERO). Agencies and organizations directly involved with the SEAMAP are shown in Table 1.

Federal programmatic funding for SEAMAP activities and administration was appropriated in Federal Fiscal Years 1985-2005. Funding allocations to participants for FY1985-FY2005 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 FY2005 and proposed activities for FY2006.

PROGRAM MANAGEMENT

Activities and operations of each SEAMAP component are wholly defined by the respective managing units: the SEAMAP-Gulf Subcommittee of the Gulf States Marine Fisheries Commission's (GSMFC) Technical Coordinating Committee, the SEAMAP-South Atlantic Committee of the Atlantic

States Marine Fisheries Commission's South Atlantic State-Federal Fisheries Management Board, and the SEAMAP-Caribbean Committee of the University of Puerto Rico Sea Grant College Program. The Gulf and South Atlantic committees consist of designated representatives from each member state and NMFS and the Gulf of Mexico and South Atlantic Fishery Management Councils. In addition, the SEAMAP-South Atlantic committee includes a representative from the Atlantic States Marine Fisheries Commission (ASMFC). The Caribbean component consists of members from the Puerto Rico Department of Natural and Environmental Resources, Virgin Islands Department of Planning and Natural Resources, Puerto Rico Sea Grant College Program, NMFS, U.S. Fish and Wildlife Service, and Caribbean Fishery Management Council. Each committee meets yearly to review operations, examine priorities, and plan future activities. Daily operations are carried out by the respective SEAMAP coordinators, assisted by staffs of the two Commissions and Puerto Rico Sea Grant College Program and personnel associated with the SEAMAP Information System, SEAMAP Archiving Center and SEAMAP Invertebrate Plankton Archiving Center (SIPAC).

SEAMAP - Gulf of Mexico

Major SEAMAP-Gulf Subcommittee meetings were held in October 2004 and March 2005, in conjunction with the Annual Fall and Spring Meetings of the GSMFC. All meetings included participation by various work group leaders, Coordinator, Data Manager, Program Manager, and the GSMFC Executive Director. Representatives from the Gulf program also met with the South Atlantic and Caribbean representatives in August 2005 to discuss respective program needs and priorities for FY2006.

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 FY2005. Other important management activities included coordinating data provision and specimen loans, preparing publications and documents and assisting

TABLE 1.

SEAMAP ORGANIZATION

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

in the preparation of State/Federal cooperative agreements, including amendments to permit extension of activities previously not detailed in the agreements.

SEAMAP - South Atlantic

One committee meeting, two work group meetings, and several conference calls, were coordinated and documented in FY2005. Additional tasks included fulfilling data requests, preparation of annual program reports and State/Federal Cooperative Agreements, and distribution of publications.

The SEAMAP-SA Committee held their annual meeting in conjunction with the joint annual meeting held August 2-4, 2004 in Biloxi, Mississippi. The meeting included participation by the work group leaders and coordinator. The Committee developed the 2006 SEAMAP-SA budget and Operations Plan. The Committee also reviewed progress by the Crustacean, Data Management, and Trawl work groups and provided direction where necessary. Topics discussed included fisheries independent data collection/storage standards, and NMFS data management activities. The committee also developed a recommendation to the South Atlantic Board for project funding in FY2006.

The South Atlantic Board met on August 17, 2005 to review recommendations from the SEAMAP-SA Committee. The Board approved the 2006 budget. The SEAMAP Data Management Work Group met on November 29-30, 2004 in Charleston, SC and March 8, 2005 in Tampa, Florida, as well as had a conference call on June 24, 2005 to work on the development of a draft SEAMAP.Org website, refine the SEAMAP Data Management System, and discuss metadata needs.

SEAMAP - Caribbean

The SEAMAP-Caribbean Administrative and Working Group components held five meetings during FY2005, on October 29, March 7, July 1, August 3-4, and September 23. During the meetings, the SEAMAP-Caribbean reviewed several main topics: the 2003-2004 no cost-extension for the Puerto Rico and Virgin Islands whelk surveys and its final reports, and the reef fish surveys for 2004-2005. The SEAMAP-Caribbean committee began discussions regarding reassessing long-term sampling protocols for conch and lobster surveys.

A fisheries specialist was hired under SEAMAP-Caribbean supplemental funds to enter and correct Virgin Islands trap and line missing data from the database. The University of Puerto Rico contracted the fisheries specialist to re-analyze the full data set of the SEAMAP-Caribbean USVI trap and line data. The proposed "St. Croix & St. Thomas/St. John Fisheries Independent Trap and Line Survey, 1992-2002," directed by the Caribbean coordinator, for the evaluation and quality control of the Virgin Island data was finished, and a final report including all findings and sampling recommendations to improve long-term records was submitted to the Pascagoula archive center, and to Puerto Rico and Virgin Island components. The SEAMAP-Caribbean components provided their review comments on the draft 2006-2010 SEAMAP management plan document. All projects and adjustments to the sampling protocols for the next five year cycle SEAMAP-Caribbean proposal were thoroughly discussed (Year 1 conch surveys, Year 2 lobster surveys and Year 3 to 5 reef fish surveys (trap and hook & line).

RESOURCE SURVEYS

In FY2005, collection of resource survey information continued for the twenty-fourth consecutive year. Surveys by each program component reflect distinct regional needs and priorities; however, survey operations in one geographic area often provide information useful to researchers in all three regions.

For instance, the South Atlantic program's Bottom Mapping will be useful in SEAMAP-Gulf gear calibration efforts, while plankton and environmental surveys in the Gulf program have set the standards for the entire region's much-needed long-term database. Because of the diverse scope and target species involved in the SEAMAP's survey operations, activities are discussed here by geographic region.

SEAMAP - Gulf of Mexico

Fall Shrimp/Groundfish Survey

The Fall Shrimp/Groundfish Survey was conducted from October 12 - December 12, 2004, from off Mobile, Alabama to the U.S.-Mexican border. Vessels sampled waters out to 60 fm, covering 314 trawl stations, in addition to plankton and environmental sampling.

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

- (1) sample the northern Gulf of Mexico to determine abundance and distribution of demersal organisms from inshore waters to 60 fm;
- (2) obtain length-frequency measurements for major finfish and shrimp species to determine population size structures;
- (3) collect environmental data to investigate potential relationships between abundance and distribution of organisms and environmental parameters; and
- (4) collect ichthyoplankton samples to determine relative abundance and distribution of eggs and larvae of commercially and recreationally important fish species.

NMFS, Mississippi, Alabama, and Louisiana vessels collected ichthyoplankton data at sample sites occurring nearest to half-degree intervals of latitude/longitude. A total of 48 stations was sampled with bongo and/or neuston nets, as encountered along cruise tracks. The Polish Sorting and Identification Center will sort the samples. Once sorted, the specimens and data will be archived at the SEAMAP Archiving Center.

Spring Plankton Survey

The SEAMAP Spring Plankton Survey took place from April 20 - May 30, 2005. One hundred ninety-four stations were sampled from the west Florida shelf to the Louisiana/Texas border. This was the twenty-fourth year for the survey. The objectives of the survey were to collect ichthyoplankton samples for estimates of the abundance and distribution of Atlantic bluefin tuna larvae and collect environmental data at all ichthyoplankton stations.

Plankton samples were taken with standard SEAMAP bongo and neuston samplers. The bongo sampler consisted of two conical 61-cm nets with 333-micron mesh. Tows were oblique, surface to near bottom (or 200 m) and back to surface. Wire angle was maintained at 45 degrees. Neuston samples were taken with 947-micron mesh nets on 1 x 2-meter frames towed at the surface for ten minutes. Right bongo and neuston samples were initially preserved in 10% buffered formalin and after 48 hours were transferred to 95% ethyl alcohol for final preservation. Left bongo samples were preserved via an ethanol/ethanol transfer to aid in preservation of larval otoliths. In addition, hydrographic data (surface chlorophylls, salinity, temperature and dissolved oxygen from surface, midwater and near bottom, and Forel-ule color) were collected at all stations.

Right bongo and neuston samples collected from SEAMAP stations were transshipped to the Polish Sorting and Identification Center. Left bongo samples were archived at the SEAMAP Invertebrate Plankton Archiving Center (SIPAC).

Reeffish Survey

The primary purpose of this survey is to assess relative abundance and compute population estimates of reef fishes found on natural reef fish habitat in the Gulf of Mexico. Two types of gear are used to deploy video cameras: 1) a single-funnel fish trap (2.13 m long by 0.76 m square) with the camera mounted at a height of 25 cm above the bottom of the trap; or 2) a 4 camera array with 4 cameras mounted orthogonal to each other at a height of 25 cm above the bottom. Both gears are baited with squid before deployment. The resultant video recordings (typically of one hour duration) are processed back at the laboratory where fishes are identified and counted independently by two tape readers. Final counts are entered into the SEAMAP reefish database along with additional observations

on habitat and fish activity. NMFS conducted reefish sampling from April 12 through May 11, 2005. Video cameras were deployed at 142 sites and the chevron trap at 29 sites.

Summer Shrimp/Groundfish Survey

During the spring of 2005, 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 2005 SEAMAP summer survey was to work from the eastern Gulf to the Texas/Mexico border, in order to sample during or prior to migration of brown shrimp from bays to the open Gulf area. This was the twenty-fourth year for the survey. The entire survey occurred from June 1 through July 31, 2005 and 272 trawl stations were sampled during the survey. In addition, NMFS, Mississippi, Alabama, and Louisiana vessels collected ichthyoplankton data.

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

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 1986-2004 covered Gulf waters from

Florida Bay to Brownsville, Texas. Due to impacts from Hurricane Katrina, the 2005 Fall Plankton Survey was cancelled.

Plankton and Environmental Data Surveys

As in previous years, plankton samples and environmental data were collected routinely during most SEAMAP trawling surveys. During the Summer Shrimp/Groundfish Survey, plankton tows were piggybacked on the NMFS and state vessels, sampling randomly generated trawl stations within the standard 30-minute SEAMAP grids.

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

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

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

SEAMAP - South Atlantic

Shallow Water Trawl Survey

The major SEAMAP-South Atlantic survey in FY2005 was the continuing Shallow Water Trawl Survey conducted by the South Carolina Department of Natural Resources (SCDNR). Initiated as a pilot project in 1986, this is a fishery-independent study designed to monitor the distribution and abundance of coastal species in the South Atlantic Bight and to measure associated environmental parameters in nearshore coastal waters. Sampling was

standardized in 1990, and a 10-year trawl report was completed in December 2000 summarizing species composition, regional species assemblages, and trends in distribution and abundance of 27 priority species. In January 2001, the sampling design was changed based on the results of an external program review. Offshore strata were discontinued, and additional stations were added to inshore strata for all three cruises to reduce variability in the abundance estimates for target species. The overall goal is to obtain a long-term database to facilitate management of stocks in the South Atlantic Bight.

The objectives of the survey are to:

- (1) collect data on size, abundance, distribution, and seasonality of target finfish and decapod crustaceans;
- (2) record species composition, biomass, and abundance in order to assess latitudinal and seasonal fluctuations; and
- (3) collect data on size, sex, and gonadal condition of white, pink, and brown shrimp and attempt to locate spawning grounds.

Three multi-legged seasonal cruises were conducted between Cape Hatteras, North Carolina, and Cape Canaveral, Florida, during FY2005: Fall 2004 (October 5 - October 30), Spring 2005 (April 4 - April 28), and Summer 2005 (July 10 - July 28). Inshore strata (4.6 to 9.2 m depths) were sampled during each cruise. All samples were collected during daylight hours to maximize the opportunities for collecting juvenile mackerels.

The fall 2004 cruise completed the fifteenth full year of standardized sampling under a stratified random survey design. Sampling was conducted between October 5 - October 30 and all of the 102 inshore stations allocated to 24 shallow coastal strata in the South Atlantic Bight were sampled. A total of 133 species or genera were identified in fall trawls. *Micropogonias undulatus*, the Atlantic croaker, was the most abundant species, constituting 15% of total abundance, followed by the white shrimp, *Litopenaeus setiferus* (14%), the striped anchovy, *Anchoa hepsetus* (8%), the banded drum, *Larimus fasciatus* (5%), and the pinfish, *Lagodon rhomboides* (5%). The abundance of individuals, excluding cannonball jellies, in 2004 was greater than the level of abundance observed in fall 2003. Miscellaneous invertebrate biomass, including cannonball jellies, however, was smaller in 2004. Overall abundance was greatest in Raleigh Bay,

whereas miscellaneous invertebrate biomass was greatest off South Carolina.

The spring cruise for the SEAMAP-South Atlantic Shallow Water Trawl Survey began on April 4 and was completed on April 28, 2005. A total of one hundred and two stations were sampled in the twenty-four shallow coastal strata in the South Atlantic Bight. A total of 124 species or genera were identified in spring trawls. *Opisthonema oglinum*, the Atlantic thread herring, was the most abundant species, constituting 17% of total abundance, followed by the Atlantic croaker, *Micropogonias undulatus* (14%); the weakfish, *Cynoscion regalis* (13%); the striped anchovy, *Anchoa hepsetus* (13%); the spot, *Leiostomus xanthurus* (9); and the southern kingfish, *Menticirrhus americanus* (4%). Abundance of individuals collected in spring 2005 decreased from the record level of spring abundance observed in 2004, whereas miscellaneous invertebrate biomass was very low, but exceeded 2004 abundance. The cannonball jelly, *Stomolophus meleagris*, constituted more than 35% of miscellaneous invertebrate biomass. An increase in the number of smooth dogfish, *Mustelus canis*, taken in trawls was noted. This trend has been noted each spring since 2001. Water temperatures were considerably colder in 2005 than those measured during other spring cruises, with the exception of 1989, 1993, 1996. As would be expected, the coldest water temperatures were encountered in Raleigh Bay. Mean water temperature increased southward.

The summer cruise for the SEAMAP-South Atlantic Shallow Water Trawl Survey began on July 10 and was completed on July 28, 2005. A total of one hundred and two stations were sampled in the twenty-four shallow coastal strata in the South Atlantic Bight. A total of 127 species or genera were identified in summer trawls. *Micropogonias undulatus* was the most abundant species, constituting 27% of total abundance, followed by *Leiostomus xanthurus* (10%), *Farfantepenaeus setiferus* (9%), and *Larimus fasciatus* (7%). Abundance of individuals collected decreased slightly from the level of abundance observed in summer 2004. The biomass of miscellaneous invertebrates continued to be low.

Data from the spring, summer, and fall 2004 cruises have been added to the SEAMAP Data Management System (DMS). For additional cruise information, please see the individual cruise reports available at ASMFC.org under the Research & Statistics section of the website. The results of the entire 2004 cruise season (Spring 2004, Summer 2004, and Fall 2004

cruises) are documented in the final 2004 project report, "Results of Trawling Efforts in the Coastal Habitat of the South Atlantic Bight, FY2004" by South Carolina Marine Resources Division.

Pamlico Sound Survey

During FY2005, the North Carolina Division of Marine Fisheries (NCDMF) continued the ongoing Pamlico Sound Survey. Cruises sample approximately 52 stations each in June and September. This seasonal trawl survey is designed to provide a long-term fishery-independent database on the distribution, relative abundance, and size composition of target species of estuarine fish and decapod crustaceans for the waters of Pamlico Sound. The data are processed by NCDMF and are made available to the SEAMAP DMS.

Bottom Mapping Project

In 1992, the SEAMAP-South Atlantic Bottom Mapping 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 reefish resources and increased fishing pressure. In order to assess reefish populations and the effects of changes in fishing pressure, the amount of habitat available for priority species of fish must be quantified.

The primary objectives of the Work Group are to:

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

All accessible databases available from state and federal agencies and other sources that have sampled or surveyed bottom habitats in the region were investigated to obtain files for processing. The data available from these sources varies in information content and accuracy in pinpointing reef habitat location. Treatment of each data type and gear is

standardized, and the most accurate data for each gear type for each location are being compiled according to procedures developed by the Bottom Mapping Work Group. The database is designed for easy incorporation into Geographic Information System (GIS) or other PC mapping software programs.

By the end of FY1997, more than 65,700 records were compiled from databases obtained off North Carolina, South Carolina, Georgia, and Florida in three study phases. Reports summarizing the databases available for these areas were provided in three final reports submitted to the SEAMAP-SA Committee. From FY1998 through FY2001, the Florida Marine Research Institute (FMRI) reproduced and refined the three Bottom Mapping Reports into a single product on a CD-ROM readable on any desktop PC. The CD-ROM includes GIS software, data files, documentation, and maps covering the area from Florida to the North Carolina-Virginia border. Version 1.0 was completed in 1998, Version 1.1 was printed in 1999, and Version 1.2 was printed in 2001. The development of version 1.2 included a much-improved summary document, and several tools to help users view and analyze the data. All versions were distributed to libraries to maximize availability and utilization of the data. Copies of the Bottom Mapping CD version 1.2 and the summary document are available through the ASMFC.

During 2001, the work group began discussing the development of protocols to capture deepwater (200 - 2000 m) data on bottom type for funded action in 2002. The deepwater bottom type project will extend the depth range of the existing Bottom Mapping CD-ROM, and is progressing under a three-phase plan. Phase 1 and 2 occurred simultaneously in FY2002-2003. In phase 1, protocols were developed to recover existing data and convert it into a standard format. During phase 2, key information was gathered on existing data sources (availability, format, data contacts, number of records, geographical range, etc.) to help the Bottom Mapping Work group prioritize data sources to obtain for conversion. The Phase 2 report "Summary of Seafloor Mapping and Benthic Sampling Conducted in 200-2000 m, from North Carolina through Florida" was completed in April of 2003 and is available via www.asmfc.org. Phase 3, which began in 2004, involves using the protocols developed in Phase 1 to obtain and standardize the data identified in Phase 2. The first project of Phase III was digitizing and translating existing bottom character maps published by Popenoe for deepwater

marine habitat off the Southeastern U.S. margin. Future priorities also include working with the South Atlantic Fisheries Management Council to increase availability of summary data via the Internet in both static and interactive mapping formats and working to characterize habitat use by species of interest.

SEAMAP - Caribbean

In FY2005, SEAMAP-Caribbean supported a variety of activities in the U.S. Virgin Islands and Puerto Rico. In Puerto Rico, the first year of a whelk survey (FY2003) was undertaken for the next three-year cycle. Thirty-seven visual censuses around the coasts of Puerto Rico, including Mona Island, Desecheo Island, Culebra Island and Caja de Muertos were conducted. A final report with data analysis was finished in April 2005 and submitted to the Southeast Regional Office. The results of this survey were the following: a total of thirty-seven whelk surveys were conducted along the shoreline of Puerto Rico, ten on each coast except the north coast, in which only seven were conducted because of prevailing bad weather conditions. The maximum shell width found was 124 mm. The average size was 35.3 mm. The average number of individuals found per site was 260.

Fisheries reports show that the West Indian topshell, *Cittarium pica*, is fished all along the Puerto Rico coast. Although not much was known about the population status of this mollusk in the Island, fishermen complain that it was very abundant along the rocky shores, and that now it was not. Based on these statements and landing reports, it could be concluded that the resource was certainly diminishing.

It was found during the study that the West Indian topshell was not fished with equal intensity or sold at the same scale throughout the Island. At some areas, like Cabo Rojo on the southwest coast, it was part of the food menu of some restaurants, on other areas it was sold on a more local or informal scale. Sale prices ranged from \$8.00 to \$12.00 per pound. Variation on fishing pressure could affect resource availability.

There was great variety on the number of snails found during the surveys. The range was from 7 to 1,073 individuals. The average was 259. Several factors could be responsible for the variation found. Some areas might be overfished while others might be fished occasionally. Difference on recruitment rate was another factor to consider. A study

suggested that low population densities at calm sites could be due to poor recruitment. But, on places of high wave action, recruitment might be difficult because low capability of small snails to confront the wave dragging force. The majority of the high wave action areas surveyed showed a small number of small snails (18-24%). On the contrary low wave action areas showed a greater number of small snails (65%). This suggests that the snail recruitment was better on quiet sites. The small amount of larger shell size snail on quiet sites could be due to overfishing, given that predation pressure was the same on both areas. It should be noted that in the Bahamas a greater predation pressure was found on high energy sites, which would mean larger snails on quiet areas, contrary of what was found in this study.

Considering the data gathered the following behavioral pattern is suggested for the West Indian topshell in Puerto Rico. As stated by other studies, it was found that *Cittarium pica* showed a size-specific zonation. Larger snails use the creeds on the submerged rocky shore, while smaller snails use the pseudo-exposed rocky shore (it gets wet with the wave movement). Recruitment is better on low-energy sites because of less stress due to wave dragging forces. The West Indian topshell has been overfished at these low-energy sites, which explains the lack of larger snails. High energy sites are probably not overfished because of the difficulties that weather imposes to the fishermen, but these sites are still fished during calm weather. Difficult access sites showed the same situation as the high energy sites.

In Puerto Rico, no study has been conducted to collect information on recruitment and reproduction of *Cittarium pica*. A study in the Bahamas found that snails on quiet areas had a maturation size and fecundity greater than the ones in wave-stress areas. If that holds true for Puerto Rico, as well as the suggested behavioral pattern, it would mean that larger snails are especially important in the quiet areas. Therefore, in order to recover the overfished sites, snails should be allowed to reach their sexual maturity size. If this hypothesis is true, the snails in the exposed areas might be the ones responsible for most of the recruitment.

This hypothesis may help explain the data gathered and what has been reported by fishermen. The fact remains that too much is unknown. More studies of the reproduction and recruitment patterns of the species need to be done to determine accurately what will be the right management measurements to take.

Reef fish monitoring surveys started on April 2004 and will continue into FY2006. During April 2004, all gear, materials and equipment were bought and prepared to begin sampling in May 2004. Sampling was continuous from May to July 2004, and from November 2004 to July 2005. A total of 17 stations off the west coast of Puerto Rico were sampled yielding over 388 kg of finfish and shellfish. Of those sampled stations, four of them were from the Mona Island Natural Reserve, located forty-five miles off the west coast of Puerto Rico. The last fisheries independent data collection for reef fishes was done in 1989. Since a closure in February 2004 it has become increasingly important to document the status to the fisheries resources since the closing date.

Several species of groupers (Serranidae) constituted 47.5% of the hook and line catch in terms of weight. Red hinds, *Epinephelus guttatus*, and coney, *Cephalopholis fulva*, represented 29.0% and 17.5% by weight respectively, of the total hook and line catch. Other species that constituted more than one percent of the hook and line catches by weight were: sand tilefish, *Malacanthus plumieri*, 11.5%; the longjaw squirrelfish, *Holocentrus ascensionis*, 2.7%; the black jack, *Caranx lugubris*, 4.2%; the great barracuda, *Sphyrnaena barracuda*, 3.2%; the blue runner, *Caranx crysos*, 4.5%; and the black durgon, *Melichthys niger*, 4.3%. The results so far are compatible with those obtained during previous surveys in the area.

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 Cruise¹

The SEAMAP Cooperative Winter Offshore Tagging Cruise was conducted from January 23 - February 3, 2005 aboard the OREGON II. Atlantic States Marine Fisheries Commission personnel participated as crew on the cruise. This was the eighteenth year of the cooperative project, initiated in 1988 at the request of SEAMAP-South Atlantic. Adult striped bass over-wintering in the area between False Cape, Virginia and Cape Lookout, North Carolina, were

¹ Data from the cruise is preliminary and therefore subject to revision.

tagged for assessment of the population structure and exploitation rates. Other species tagged included horseshoe crab, spiny dogfish, and red drum. Numerous species including croaker, menhaden, herring and weakfish were retained for diet studies.

The Scientific Party and crew of the OREGON II, trawling night and day in the Atlantic Ocean off the North Carolina Outer Banks, processed (processing includes counting, measuring, sexing and additional weighing, tagging and/or sampling for some species) fish of 21 different species. This year's cruise capture and tagging of migratory Atlantic striped bass far exceeded the long-term average value for striped bass tagged (17-year average of 1,961). The new 18-year average striped bass number tagged is 2,437. The 2005 cruise ranks third overall in numbers of striped bass tagged and released. In addition to tagging 4,266 of the striped bass, random scale samples were taken for aging fish. Striped bass mortally injured during capture this year were sacrificed for aging, prey analysis and condition assessment (using livers). During its 18-year history, the Cooperative Winter Tagging Cruises have collectively tagged 43,869 striped bass.

Bluefish were collected for work to be done by North Carolina State University. Observations were taken also regarding weakfish abundance and distribution. Only a few catches of large fish were observed this year. Samples of large weakfish encountered were measured and otoliths removed and retained for analysis by the NC Division of Marine Fisheries, and for the CTILS diet studies. Only one Atlantic sturgeon was captured and measured and released this year. For the tenth consecutive year during this cruise, spiny dogfish were enumerated. Tagging has been conducted in eight of the ten years (no tags were available in 2000 and 2001). As observed in the previous years, the majority of the adult or immature fish encountered were females. No neonates were captured this year. Overall numbers of summer flounder encountered on the cruise this year were down relative to numbers observed in previous years; however, our effort was reduced during much of the cruise due to towing only one net. For the second time this year, skates in the catch were measured and their gender noted. At least three species were present in the catch: clearnose (*Raja eglanteria*); winter (*Leucoraja ocellata*) and little (*L. erinacea*). Only one horseshoe crab was tagged this year, the third year in which such tagging has been conducted. Observations of humpback whales and fin whales occurred on several days during the cruise this year. Temperature, salinity and depth data were collected

continuously by the ship's sensors and were recorded at each station where the nets were set.

Release data from the initial eighteen years (1988-2005) of the Cooperative Winter Tagging Cruise (Cruise) are annually maintained in databases by the U.S. Fish and Wildlife Service's Maryland Fisheries Resources Office, and by the Maryland Department of Natural Resources, Tidewater Administration, Fisheries Service, both located in Annapolis, MD. Recapture data are entered by the Maryland Fisheries Resources Office and are used annually by the ASMFC Striped Bass Tagging Subcommittee to derive estimates of mortality for various size classes of striped bass. The data from the first fifteen Cruise years were entered into a geographic information system (GIS) database at the U.S. Fish and Wildlife Service's Raleigh, NC, Ecological Services field office. Preliminary plots of cruise tows and striped bass recapture localities were made; however, additional cleaning of the database must take place before final analysis can be conducted. In association with the Atlantic States Marine Fisheries Commission's Habitat Program and the National Marine Fisheries Service, striped bass data from previous years of the cruise also have been entered into a GIS database at NMFS headquarters in Silver Spring, MD, and were analyzed to assess habitat use off North Carolina as well as patterns of travel and habitat use inferred from coast-wide tag returns. Preliminary GIS products were prepared for use by ASMFC. Summary reports for each annual cruise are available through the South Atlantic Fisheries Resources Office.

INFORMATION SERVICES

Information from the SEAMAP activities is provided to user groups through the program administration and three complementary systems: the SEAMAP Information System, SEAMAP Archiving Center and SIPAC. Products resulting from SEAMAP activities can be grouped into two major categories: data sets (including broadly, digital data and collected specimens) managed by the SEAMAP Information System, SEAMAP Archiving Center and SIPAC; and program information. Program information is discussed in the *PROGRAM MANAGEMENT* Section of this report.

SEAMAP Information System

Biological and environmental data from all SEAMAP-Gulf surveys are included in the SEAMAP Information System, managed in

conjunction with NMFS-SEFSC. Raw data are edited by the collecting agency and verified by the SEAMAP Data Manager prior to entry into the system. Data from all SEAMAP-Gulf surveys during 1982-2004 have been entered into the system and data from 2005 surveys are in the process of being verified, edited, and entered for storage and retrieval. Verified, non-confidential SEAMAP data are available conditionally to all requesters, although the highest priority is assigned to SEAMAP participants. A total of 286 SEAMAP data requests have been received. In most instances, requests were filled promptly. To date, 283 requests have been completed. During this reporting period, 21 requests were received.

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

Work was completed during FY1990 on the new distributed SEAMAP DMS. New modules completed include those for data entry, edit, upload, data query and download. The system is decentralized, i.e., distributed. Thus, the SEAMAP users are able to locally, and directly, enter and retrieve data. Software for the system has been distributed to participants for trial runs of data input.

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

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

Requested SEAMAP data were used for a multitude of purposes in 2005:

- Evaluating the abundance and size distribution of penaeid shrimp in federal and state waters to assist in determining opening and closing dates for commercial fisheries;
- Evaluating and plotting the size of the hypoxic (Dead Zone) area off of Louisiana;
- Assessing shrimp and groundfish abundance and distribution and their relationship to such environmental parameters as temperature, salinity, and dissolved oxygen;
- Identifying environmental parameters associated with concentrations of larval finfish;
- Assessing the potential impact of liquefied natural gas facilities on marine fish stocks;
- Compiling the 2005 SEAMAP Environmental and Biological Atlas;
- Comparing catches of shrimp and groundfish captured by 40-ft versus 20-ft trawl nets;
- Using 1989-2003 data for development of a North Carolina fisheries management plan on kingfish;
- Using 1989-2003 data for determination of the distribution of bottlenose dolphins as a function of prey resource availability;
- Gathering marine turtle data for graduate student research on how trends in bycatch may be related to turtle catch;

- Collecting YOY bluefish specimens for analysis of PCB fingerprints;
- Using historical SEAMAP data for baseline survey of the species composition of major ports of the South Atlantic Bight Region (Wilmington, Charleston, Savannah, and Jacksonville) conducted by the Georgia Marine Extension Service;
- Helping the South Atlantic Fishery Management Council, in cooperation with the Florida Fish and Wildlife Research Institute, put SEAMAP data into an Internet Map Server (IMS) to provide access to GIS data, imagery, and documents related to EFH, EFH-HAPCs, and coral and benthic habitats across the South Atlantic Region; and
- Distributing South Atlantic Bottom mapping data to a variety of interested parties, including consulting and engineering firms, NOAA, and academic institutions.

Real-time Data

A major function of the SEAMAP Information System is the processing of catch data from the Summer Shrimp/Groundfish Survey as near-real-time data. Data were transmitted three times weekly via cellular phone to the NMFS Mississippi Laboratories from the NOAA vessel, while the states' data were entered into the system weekly. Plots of station locations and catch rates of shrimp, squid and dominant finfish species were prepared and edited at the NMFS Mississippi Laboratories, and processed by GSMFC for weekly distribution to management agencies, fishermen, processors and researchers. SEAMAP real-time data plots were produced during the 2005 Summer Shrimp/Groundfish Survey. Seven weekly mailings were produced and distributed to approximately 200 interested individuals. These plots were also available through the SEAMAP home page. Management agencies also received comprehensive data listings showing penaeid shrimp length frequencies, sampling parameters and environmental conditions.

SEAMAP Archiving Center

Larval fish and fish egg samples sorted to the lowest taxa level possible by the Polish Sorting and Identification Center are returned to the SEAMAP Archiving Center for archiving and loan to researchers. To date in 2005, 956 samples were

returned from the Polish Sorting and Identification Center. Data entry for 839 of the sorted samples has been completed in the new SEAMAP Access data entry system. The 19,899 specimens cataloged this year represent 18 orders, 126 families, 235 genera and 245 species.

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

SEAMAP Invertebrate Plankton Archiving Center

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

The student assistant employed during the past year currently aids the curator with the cataloging of new samples, and the maintenance and curation of the collection. Activities during the year were limited to the maintenance and curation of the existing collection, as well as the cataloging of 121 additional bongo net samples from year 2004 plankton cruises. The number of samples currently cataloged in the SIPAC collections is 9,010, with 326 samples currently on loan.

In an effort to keep the space required to house the SIPAC collection of unsorted plankton samples to a minimum, samples that have been in the collection for over 10 years and duplicate samples sorted and received from the Polish Sorting and Identification Center, are aliquoted to ¼ their original volume and placed into 100 ml vials, as necessary. When possible, the remaining ¾ aliquots are donated to educational institutions for use as teaching materials. If the remaining sample must be discarded, sample jars are cleaned and returned to NMFS-Pascagoula for reuse. To date, approximately 2,264 samples

collected from 1982-1988 have been aliquoted and prepared for long-term storage. Due in part to the removal of approximately 180 samples to the NMFS, Pascagoula, in 2002, there is presently sufficient space available for additional samples to be deposited into the SIPAC archives without continuing the aliquoting of 1988-1994 SEAMAP samples.

On August 29, 2005, Hurricane Katrina struck the Mississippi coast, severely damaging the building at the Gulf Coast Research Laboratory in which the SIPAC samples were housed. The room containing these samples was breached by the storm surge and many samples were washed out into the surrounding area. Although some samples were destroyed, many were not, and to date approximately 850 samples have been recovered. It is anticipated that many additional samples remain beneath the debris within the room that housed them; however, that room is currently inaccessible because of damage to the building above. Plans are currently underway to attempt the recovery of those samples as a part of the debris removal process prior to the demolition of the building.

During the next year, the SIPAC will continue to manage SEAMAP plankton collections, accession samples and provide available data from the collection to qualified researchers as requested. In addition, the recovered samples will be checked against the catalog, their recovery noted, and a listing of lost samples obtained. Preservative will be checked for the existing samples and replaced as needed. Space is currently available for SIPAC material in another location at the GCRL and the samples will be reorganized there.

Program Documents

The following documents were published and distributed by the SEAMAP program in FY2005:

Gulf States Marine Fisheries Commission. 2005. SEAMAP Marine Directory. Gulf States Marine Fisheries Commission, Ocean Springs. 1 p. + appendices.

Jiménez, N. 2004. Study on the juvenile recruitments of the spiny lobster (*Panulirus argus*). Completion report. NMFS/SEAMAP Program. 1 – 13.

Rester, J.K., E. Griffin, and E. Ojeda Serrano. 2004. Annual Report of the Southeast Area Monitoring and Assessment Program (SEAMAP), October 1, 2003 to September 30, 2004. Gulf States Marine Fisheries Commission, Atlantic States Marine Fisheries Commission, Puerto Rico Sea Grant College Program. 10 pp.

Rester, J.K. 2004. SEAMAP Annual Report to the Technical Coordinating Committee (October 1, 2003 to September 30, 2004). No. 125. Gulf States Marine Fisheries Commission, Ocean Springs. 16 pp. + appendices.

Rosario Jiménez, A. 2004. Shallow water reef fish monitoring SEAMAP-Caribbean fisheries independent monitoring. Comp. Rep. NMFS/SEAMAP-Caribbean Program. PRDNER. 1 – 78 pp.

Rosario Jiménez, A. and M. Figuerola Fernández. 2004. Recruitment of postlarval spiny lobster (*Panulirus argus*) in southwestern Puerto Rico. Completion report NMFS/SEAMAP Program. 1 – 9 pp

South Carolina Marine Resources Division. 2004. 2004 Fall SEAMAP Cruise Report. South Carolina Department of Natural Resources. Charleston, SC. 9 pp.

South Carolina Marine Resources Division. 2005. 2005 Spring SEAMAP Cruise Report. South Carolina Department of Natural Resources. Charleston, SC. 9 pp.

South Carolina Marine Resources Division. 2005. 2005 Summer SEAMAP Cruise Report. South

Carolina Department of Natural Resources. Charleston, SC.. 9 pp.

South Carolina Marine Resources Division. 2005. Results of Trawling Efforts in the Coastal Habitat of the South Atlantic Bight, FY2004. South Carolina Department of Natural Resources, Charleston, SC. 98 pp.

Toller, W., and S. Gordon. 2005. A population survey of the West Indian topshell or whelk (*Cittarium pica*) in the U.S. Virgin Islands. Bureau of Fisheries, Division of Fish and Wildlife, Department of Planning and Natural Resources, Government of the U.S. Virgin Islands. 55 pp.

Whiteman, E.A. 2005. SEAMAP-Caribbean USVI St. Croix & St. Thomas/St. John fisheries independent trap and line survey, 1992-2002 summary report: data analysis and conclusions. UPR Sea Grant College Program/NMFS Cooperative Southeast Area Monitoring and Assessment Program - Caribbean (SEAMAP-Caribbean), University of Puerto Rico, Sea Grant College Program, Mayaguez, Puerto Rico.

PROPOSED SEAMAP ACTIVITIES, FY2006

Annual program allocations for the SEAMAP programs, Gulf, South Atlantic and Caribbean total approximately \$1.385 million. Proposed FY2006 activities for all participants are shown in Table 2.

Table 2.**PROPOSED SEAMAP ACTIVITIES, FY2006**

	Fall	Winter	Spring	Summer
Gulf of Mexico Activities				
Resource Surveys:				
Spring Plankton Survey			X	
Reeffish Survey			X	X
Summer Shrimp/Groundfish Surveys				X
Louisiana Seasonal Surveys	X			X
Fall Shrimp/Groundfish Surveys	X			
Fall Plankton Survey	X			
Plankton and Environmental Data Surveys			X	X
Information Operations:				
2002 Biological and Environmental Atlas		X		
2006 Marine Directory			X	
FY2005 Joint Annual Report		X		
Real-time Data Summaries		X		X
Data Input and Request Processing	X	X	X	X
Specimen Archiving and Loan	X	X	X	X
Program Administration	X	X	X	X
Joint Planning Activities	X	X	X	X
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
2004 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				
Conch Resource Surveys	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

SEAMAP-Gulf of Mexico Representatives

Jim Hanifen, Chairperson
Louisiana Department of Wildlife and Fisheries

Steve Heath, Vice Chairperson
Alabama Department of Conservation and Natural Resources

Paul Choucair
Texas Parks and Wildlife Department

Mark Leiby
Florida Fish and Wildlife Conservation Commission

Butch Pellegrin
National Marine Fisheries Service
Pascagoula Laboratory

Richard Leard
Gulf of Mexico Fishery Management Council

Richard Waller
Mississippi Department of Marine Resources
USM/COMS/Gulf Coast Research Laboratory

SEAMAP-South Atlantic Representatives

Roger Pugliese, Chairperson
South Atlantic Fishery Management Council

Dale Theiling
South Carolina Department of Natural Resources

Dr. Carmela Cuomo
Atlantic States Marine Fisheries Commission

Dr. Wilson Laney
U.S. Fish and Wildlife Service

Henry Ansley
Georgia Department of Natural Resources

Tina Udouj
Florida Fish and Wildlife Research Institute

John Merriner
National Marine Fisheries Service
Beaufort Laboratory

Katy West
North Carolina Department of Environment and Natural Resources

SEAMAP-Caribbean Representatives

K. Roger Uwate, Chairperson
U.S. Virgin Islands Division of Fish and Wildlife

Barbara Kojis
Virgin Island Division of Fish and Wildlife

Aida Rosario
Puerto Rico Department of Natural and Environmental Resources

Ruperto Chaparro
Puerto Rico Sea Grant College Program

Richard Appeldoorn
University of Puerto Rico

Graciela Garcia-Moliner
Caribbean Fishery Management Council

Miguel Rolón
Caribbean Fishery Management Council

Nancy Thompson/Peter Thompson/John Merriner
National Marine Fisheries Service

Edwin Muñiz/Ana Román

SEAMAP Personnel

Jeffrey Rester
SEAMAP-Gulf Coordinator
Gulf States Marine Fisheries Commission

Elizabeth Griffin
SEAMAP-South Atlantic Coordinator
Atlantic States Marine Fisheries Commission

Edgardo Ojeda Serrano
SEAMAP-Caribbean Coordinator
Puerto Rico Sea Grant College Program

Larry Simpson, Executive Director
Gulf States Marine Fisheries Commission

John O'Shea, Executive Director
Atlantic States Marine Fisheries Commission

John Roussel, Chairman
Gulf States Marine Fisheries Commission

Preston Pate, Chairman
Atlantic States Marine Fisheries Commission

Mark McDuff
National Marine Fisheries Service
SEAMAP Data Manager

Sara LeCroy, Curator
SEAMAP Invertebrate Plankton Archiving Center

Scott Nichols
National Marine Fisheries Service
SEAMAP Program Manager

Cynthia Pierce
National Marine Fisheries Service
SEAMAP Program Office