

**Optimizing Fishery-Independent Data  
Collection, Management and Dissemination  
Through the Experimental, Cooperative  
State-Federal SEAMAP Program**

NIKKI BANE<sup>1</sup> and PETER ELDRIDGE<sup>2</sup>

<sup>1</sup>Gulf States Marine Fisheries Commission  
Ocean Springs, Mississippi 39564 and Louisiana  
State University, Baton Rouge, Louisiana 70803

<sup>2</sup>NOAA/National Marine Fisheries Service  
Southeast Fisheries Center  
Charleston, South Carolina 29412

INTRODUCTION

The Southeast Area Monitoring and Assessment Program (SEAMAP) is a State/Federal/university program for collection, management and dissemination of fishery-independent data and information in the southeastern United States. The program presently consists of two operational components, SEAMAP-Gulf of Mexico, which began in 1981, and SEAMAP-South Atlantic, implemented in 1983. A third component, SEAMAP-Caribbean, is in the planning phase. The history, conceptual framework, program organization, goals and proposed activities of the Gulf and South Atlantic components are detailed in each program's five-year Operations Plan and Operations Plan Executive Summary.

The program's major objectives are (1) to coordinate regional fishery-independent monitoring and assessment efforts for both living marine resources and their environment; and (2) to provide for efficient management and timely dissemination of fishery-independent data. Data generated by SEAMAP activities are available to users in many formats, but are primarily accessible through the SEAMAP Information System. Primary users include:

- (1) The National Marine Fisheries Service (NMFS), Southeast Fisheries Center, which employs SEAMAP data to support its programs and respond to the needs of regional management agencies.
- (2) State fishery management agencies.
- (3) The Gulf and the South Atlantic Fishery Management Councils, and the Gulf and the Atlantic State Marine Fisheries Commissions.
- (4) Fishery developers.
- (5) Universities and other research organizations.

Federal programmatic funding for SEAMAP activities and

administration was appropriated for the first time in Fiscal Year 1985 (October 1, 1984 through September 30, 1985). State and commission funding allocations, determined by SEAMAP participants and emphasizing resource surveys (Figure 1), were handled through State-Federal cooperative agreements, administered by NMFS-Southeast Regional Office.

Activities and operations of each SEAMAP component are wholly defined by the respective managing units: the SEAMAP-Gulf Subcommittee of the Gulf States Marine Fisheries Commission's Technical Coordinating Committee, and the SEAMAP-South Atlantic Committee of the Atlantic States Marine Fisheries Commission's South Atlantic Board. These committees consist of designated representatives from each member state and the National Marine Fisheries Service (Mississippi Laboratories), and in the case of the South Atlantic program, the South Atlantic Fishery Management Council. They meet several times each year to review operations, examine priorities and plan future activities. Additionally, nine SEAMAP advisory work groups, charged specifically with providing recommendations for surveys and information services, each meet at least once a year. Daily operations are carried out by the respective SEAMAP Coordinators, assisted by staffs of the two commissions, and personnel associated with the SEAMAP Information System, SEAMAP Archiving Center, and SEAMAP Invertebrate Plankton Archiving Center.

## COOPERATIVE SURVEYS

### Resource Assessment and Monitoring

The scope and involvement of participants in specific SEAMAP activities vary from year to year. Figure 2 illustrates the extent of SEAMAP surveys and studies for the year 1985. Surveys by each program component reflect distinct regional needs and priorities, although survey operations in one region often provide information useful to researchers in both geographic regions. For instance, SEAMAP-Gulf plankton surveys produce a wealth of material useful to South Atlantic fishery scientists, and conversely, SEAMAP-South Atlantic's Trawl Calibration Study is expected to yield findings important to Gulf calibration efforts.

The keynotes of SEAMAP resource surveys, not coincidentally widely-held as explanations for the program's success, are its cost-effectiveness and cooperative planning. The program is committed, for example, to extensively collecting plankton and environmental data during bottom trawling surveys, which themselves provide data not only on shrimp, but on many species of important finfish and crustaceans. Thus, the major survey emphasis in the Gulf program has been on trawl studies, especially the Summer Shrimp/Groundfish surveys. Data are currently available for four consecutive years of these cruises, involving both state and Federal vessels concurrently sampling inshore and FCZ waters from the Florida panhandle to the Mexican border. This year, a pilot Fall Shrimp/Groundfish Survey was

### FY85 SEAMAP APPROPRIATED FUNDS

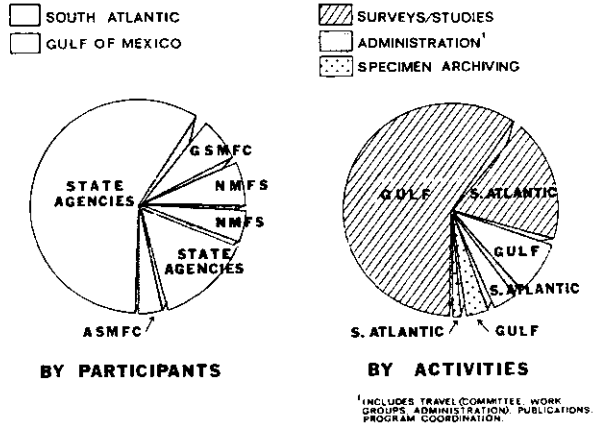


Figure 1. FY85 SEAMAP Appropriated Funds, by participants and activities.

### FY85 SEAMAP SURVEYS

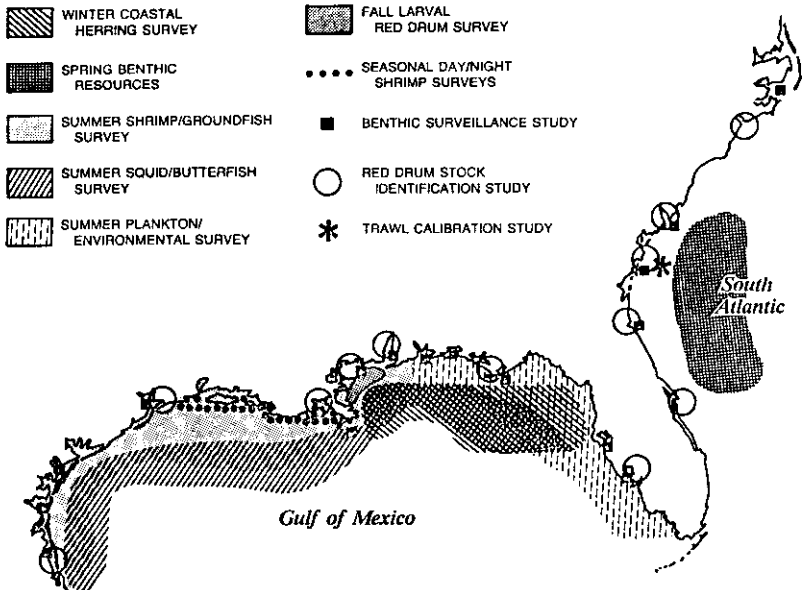


Figure 2. FY85 SEAMAP Surveys.

added to the Gulf program, as well as a Summer Squid/Butterfish Survey to assess northern Gulf stocks of these potentially valuable commercial resources. The rapid implementation of the squid/butterfish survey - less than eight weeks from the Subcommittee's approval of the concept to the first trawl station made - illustrates one of the major advantages of the SEAMAP program: the pre-existing mechanism for planning and coordinating a region-wide survey.

Other major SEAMAP survey activities in the Gulf in 1985 included: (1) the Winter Coastal Herring Midwater Trawling Survey, to locate trawlable concentrations of coastal herrings and evaluate fishing gear for this resource, including the use of acoustic recordings to assess behavior patterns of target species; and (2) the Larval Red Drum Study, to analyze patterns of distribution, abundance and species complexes associated with these larvae in the Mississippi Sound.

In the South Atlantic program, major activities in 1985 included: (1) a Spring Benthic Resource Survey to assess golden crab (Geryon fenneri) stocks off Florida and locate commercial concentrations of scallops off Georgia; and (2) an ongoing Bottom Mapping Survey. The objectives of this latter project are to: (1) define the needs of resource management agencies concerned with hard bottom resources, (2) identify types of physical and biological data that will be needed to satisfy these needs, and (3) conduct a case history study, on a selected North Carolina site, that can be used to evaluate existing and future data bases on this ecosystem.

An additional SEAMAP-South Atlantic study is the Shallow Trawling Calibration Project to calibrate this type of gear among users in the region. Whenever possible, shallow trawling procedures will be calibrated among the participants so that future survey data can be exchanged to develop regional or interstate fishery management plans, an objective shared by the SEAMAP-Gulf program.

- (a) Red Drum Stock Identification Study. Recommendations made by the SEAMAP-Gulf Red Drum Work Group in November 1984, and approved by the Subcommittee, directed participants to collect young red drum for analysis of possible inshore stock differences. Specimens of young-of-the-year estuarine red drum were collected in late spring from discrete estuarine systems by all Gulf states and South Carolina, and in eastern Florida; sampling is ongoing through fall in North Carolina and Georgia. The specimens were frozen whole and transported to the Coastal Fisheries Institute at Louisiana State University, for analysis of tissues by electrophoresis and high performance liquid chromatography. Results of the study will be presented in January 1986.
- (b) Status and Trends Benthic Surveillance Study. For the second year, the SEAMAP Program actively participated in the nationwide sampling for contaminants in coastal fishes and sediments, as part of the NOAA National Status and Trends Program. Both SEAMAP regions supplied personnel from state

management agencies to provide guidance in locating concentrations of the target species, Atlantic croaker and spot. Sampling occurred at 17 Gulf and South Atlantic sites from August-October 1985, with a NOAA vessel serving as the primary sampling platform; analyses of trace metals, organics, chlorinated hydrocarbons and other contaminants, as well as histological examinations, are being conducted by the NMFS-Beaufort and Charleston Laboratories. Results of the 1984 and 1985 cooperative sampling efforts will be made available to participants for use by State and Federal resource management agencies.

## INFORMATION SERVICES

### Data Management

Biological and environmental data from all SEAMAP surveys are included in the SEAMAP Information System, managed in conjunction with NMFS-SEFC. Raw data are edited by the collecting agency and verified by the SEAMAP Data Manager prior to entry into the system. Data from all SEAMAP surveys in 1982 through 1984, and some 1985 surveys, have been entered into the system and are available to users throughout the country.

Verified, non-confidential SEAMAP data are available conditionally to all requestors, although the highest priority is assigned to SEAMAP participants. Requested SEAMAP data are used for a multitude of purposes, including:

- (a) Evaluating abundance and size distribution of penaeid shrimp in Federal and state waters to assist in determining opening and closing dates for commercial fisheries.
- (b) Assessing shrimp and groundfish abundance and distribution and their relationship to such environmental parameters as temperature, salinity and oxygen.
- (c) Identifying environmental parameters associated with concentrations of larval finfish.
- (d) Compiling the yearly SEAMAP Biological and Environmental Atlas, and SEAMAP Ichthyoplankton Atlas.
- (e) Verifying values for remote-sensed imagery of chlorophyll concentrations in the Gulf.
- (f) Identifying primary mackerel, red drum and tuna spawning areas in the Gulf.
- (g) Identifying optimized survey designs for resource surveys.

Results of the first four years of the SEAMAP-Gulf program indicate significant annual increases in biological and environmental data compared to previous years' collections solely by the National Marine Fisheries Service (Figure 3). For

example, environmental and hydrographic data increased in 1983 by more than 600 percent, from a total of 908 entries in 1981 to 5,487 in 1983. During that period, trawl (catch) data increased by 300 percent, from 142 entries in 1981 to 422 in 1983. Although these increases have leveled off somewhat with the continuous refining of survey designs to improve sampling efficiency and data reliability, the program's growth to incorporate new surveys in 1986 will add significantly to the long-term, synoptic data base.

The data management system itself is designed to provide: (1) a smooth flow of standardized, uniform data from field collections to analysts; (2) individualized products to a large and diverse user community; and (3) data archival capabilities for future use. Six data subsystems have been developed to date: environmental, shrimp, finfish, plankton, satellite and near real-time. As regional fishery management agencies cooperatively determine additional priorities, the system can easily accommodate new subsystems.

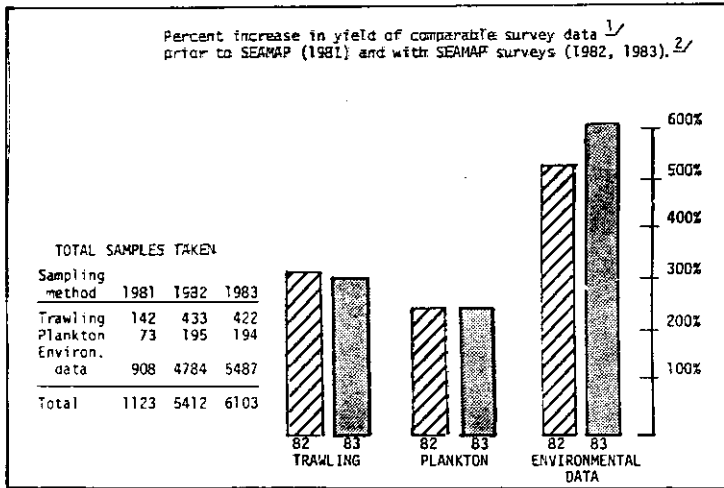
One unprecedented and vital function of the system takes advantage of the near real-time subsystem to furnish up-to-the-minute fish and shrimp stock information needed for sound, timely management of the region's billion-dollar fisheries. For four consecutive years, SEAMAP-Gulf has provided weekly data plots of summer survey shrimp and finfish catches to state and Federal agencies, universities, seafood processors and more than 200 Gulf shrimp fishermen (Figure 4). In 1985 similar plots of catch data were also distributed during the SEAMAP Squid/Butterfish Survey.

A major feature of these reports is information on current environmental conditions in the survey area, including water temperature, salinity and dissolved oxygen. In summer 1985, the largest area of low dissolved bottom oxygen yet encountered in the northern Gulf - more than 3,000 square miles of hypoxic offshore Louisiana waters - was described to the industry in an effort to warn commercial shrimpers of this unproductive region. This ability to respond rapidly to unanticipated data collection needs is an important function of the SEAMAP program.

#### Specimen Archiving

Two SEAMAP centers focus on maintenance of collected plankton samples for research use: the SEAMAP Archiving Center, for ichthyoplankton, and the newer SEAMAP Invertebrate Plankton Archiving Center. Larval fish and fish egg samples sorted to the family level by the Polish Sorting Center in Szczecin, Poland, are returned to the SEAMAP Archiving Center (SAC) for archiving and loan to researchers. More than 7,000 lots, containing 128,543 larvae, have been accessioned from the 1982 SEAMAP surveys and accessioning has begun on the approximately 7,000 lots from 1983 surveys. Additional materials maintained for research use include many fish eggs and unsorted fish larvae.

Managed in conjunction with Florida Department of Natural Resources in St. Petersburg, SAC in 1985 acquired a computer system and developed comprehensive data listings of specimens by



<sup>1/</sup> Surveys with essentially the same NMFS data requirements.

<sup>2/</sup> June-July survey.

Figure 3. Percent increase in yield of comparable survey data prior to SEAMAP (1981) and with SEAMAP June-July surveys for 1982, 1983.

### SEAMAP85 SAMPLING DATES FROM 6/15/85 TO 7/5/85 AVERAGE BROWN SHRIMP COUNT PER POUND

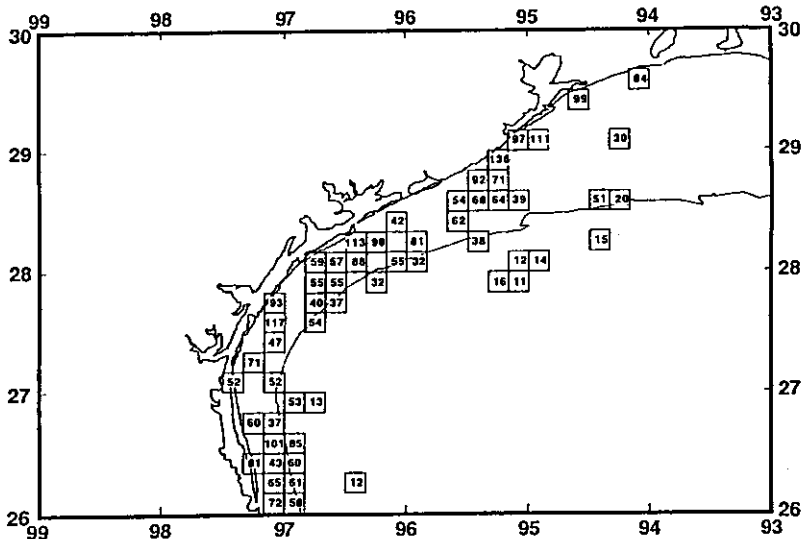


Figure 4. Representative Real-time Catch Data Plot, SEAMAP Summer Shrimp/Groundfish Survey.

family; as species identifications are supplied by researchers borrowing the specimens, this information is added to the data files, and made available to subsequent requestors.

Loan of SEAMAP specimens is supervised by SAC's Curator, following policies outlined in the SEAMAP-Gulf Operations Plan. In 1985, more than 1150 specimen lots of fish larvae were loaned, most of them species of commercial and recreational importance: mackerels, snappers, tunas, butterflyfish, bluefish, jacks, herrings, grunts and others.

With the determination of SEAMAP-Gulf that the retained "back-up" bongo collections also contain valuable research materials, the SEAMAP Invertebrate Plankton Archiving Center (SIPAC) was established, managed by the SIPAC Curator in conjunction with the Gulf Coast Research Laboratory in Biloxi, Mississippi. Approximately 270 unsorted station samples from 1982 SEAMAP surveys have been archived and 1983 samples are expected to be accessioned by fall 1985; some 1984 and 1985 state-collected samples are also archived at SIPAC.

As with the archiving center in Florida, SIPAC developed a computer system for data associated with the samples (collection date, station number, depth, location and environmental parameters). Although SIPAC was established in late spring 1985, requests have already been received to search samples for squid and lobster larvae. The recent decision by SEAMAP-Gulf to request Polish sorting of penaeid shrimp, blue crab, stone crab, lobsters and squid will lead to future archiving at SIPAC of these sorted specimens, as well as unsorted fractions of invertebrates remaining after the fish eggs and larvae have been removed.

#### Publications

In addition to the program planning documents and real-time reports described earlier, the SEAMAP Program publishes and distributes a variety of other needed information. An annual program report is issued jointly by the Gulf and South Atlantic components, describing achievement, funding distribution, program needs and proposed activities. Additionally, more detailed accounts of survey results and systems developments are detailed in individual Commission and committee reports.

Biological and environmental information from SEAMAP-Gulf surveys is provided in yearly atlases; the 1982 Atlas is now available, with the 1983 Atlas currently in preparation. A separate, detailed SEAMAP atlas of ichthyoplankton abundance and distribution, by key families, is published yearly as a NOAA Technical Memorandum; the 1982 Ichthyoplankton Atlas is currently available and the 1983 Atlas in press.

Other recent publications include: (1) the annual SEAMAP-Gulf Marine Directory, a compilation of state, Federal and university fishery-independent research efforts in the northern Gulf, and (2) the SEAMAP Shrimp and Bottomfish Sampling Gear Workshop Proceedings, a summary of seven technical papers on shrimp/groundfish sampling gear presented at the 1983 Spring Meeting of the Gulf States Marine Fisheries Commission.



## SUMMARY

There is a national interest in the increased survey data yield, available specimens, and ability of states and NMFS to direct jointly the focus of needed fishery-independent research. Initial results from SEAMAP demonstrate the usefulness of cooperative approaches in such planned and ongoing additional activities as reef fish and pelagic resource assessments, bottom mapping, trawl gear calibration, stock identification studies and environmental contaminant surveys. Additionally, transfer of information has been enhanced by the development of common data management systems.

As a direct consequence of the successes enjoyed by the Gulf and South Atlantic components, planning has begun for a SEAMAP-Caribbean program. Preliminary discussion of data collection needs and resource priorities have been initiated, with the first cooperative activity recently completed. A proposal to study deepwater habitats and associated species around Puerto Rico and the U.S. Virgin Islands was prepared jointly by NMFS, the University of Puerto Rico Department of Marine Science, and the U.S. Virgin Islands Department of Conservation and Cultural Affairs. Objectives of the study were to: (1) provide information on the effectiveness of deepwater fish and invertebrate traps; (2) provide a survey of precious corals; (3) evaluate previously deployed fish attraction devices; and (4) increase the knowledge of deepwater habitats and associated fauna in the region. Results of the study, completed in late October 1985 will be available to regional planners and participants in the study.