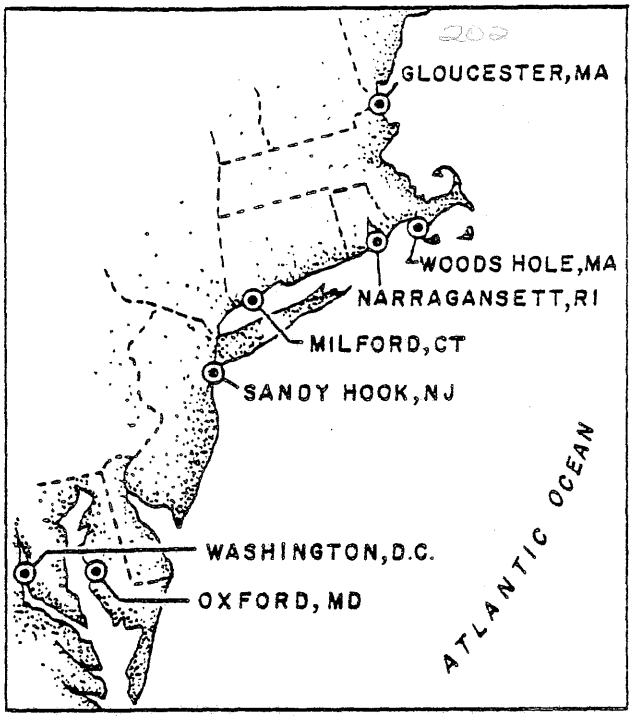
NEFC

Northeast Fisheries Center

NEWS



MONTHLY NARRATIVE REPORT
JANUARY 1978

Editor, Jon A. Gibson

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE

RESOURCE ASSESSMENT DIVISION

Resource Surveys Investigation

The first two parts of a four-part surf clam and ocean quahog survey were completed in January aboard the Delaware II (Henry Jensen, Chief Scientist). The primary cruise objectives were to determine the distribution and relative abundance of, and to collect biological data from, the two clam species. Extensive clam meat collections were made for Steve Murawski for a meat weight and shell length study. Additional collections were made for biochemical analysis studies by the Milford Laboratory staff.

The first part of a three-part cruise aboard the Soviet R/V Argus (Bill Overholtz, Chief Scientist) began on 28 January. The objectives of this cruise include studying the winter distribution and biology of Atlantic mackerel, Atlantic herring, and long-finned squid (Illex).

The Investigation inaugurated a new system for correcting cruise data tapes in January. Cruise data which were previously stored and corrected on cards, will be placed in disc storage and corrections to the data will be made directly at the terminal. Once data for a cruise have been corrected on the disc, a new tape will be generated. We plan to start using the new system routinely with the data from the 1978 spring bottom trawl survey.

Age and Growth Investigation

Fred Nichy and Judy Penttila met with Dr. Arnold Stalder from Texas Instruments, Inc., to discuss results of Texas Instrument Report for developing the auto-aging instrument. The report was reviewed and development of next phase was discussed. A first draft of a proposal to determine the cost of developing image-analyzer programs was prepared by F. Nichy and J. Penttila.

Judy Penttila and Vi Gifford examined a large number of haddock scale samples to develop quality aging categories for the auto-aging instrument proposal.

Age samples completed during January were pollock (aged 1977; quarters I, II,and III); redfish (audited Albatross IV Cruise No. 75-12); and Atlantic herring (aged Albatross IV Cruise No. 78-01).

Sandy Hook Investigation

Processing data for the New Jersey creel census continued. Estimation of the numbers and weights of the catch of all major species was completed. Analysis of length-weight and length frequency data was initiated.

Fishery Assessment Investigation

Steve Clark participated in an assessment workshop of the State-Federal Lobster Scientific Committee held in Warwick, RI, during 9-11 January. The purpose of the workshop was to assess the immediate and long-term effects of changes in the minimum size limit of lobsters. Steve also completed an assessment of the Georges Bank-Gulf of Maine haddock stock for submission to the New England Regional Fishery Management Council.

Emma Henderson prepared a proposal outlining means of providing stock assessment data and results for public use. She has also been reviewing the data base and methodology of the red hake assessments and has begun preparing the 1977 red hake and summer flounder data needed for the upcoming assessments.

Bill Overholtz is chief of the US party of four scientists aboard the USSR R/V Argus which is conducting the first part of a trawl and hydroacoustic survey for squid, mackerel, and associated species from Georges Bank to Cape Hatteras. The first part began on 27 January.

Frank Almeida and Thurston Burns completed an analysis and report of the 1977 herring tagging study. Frank also completed a definitive biological description of the silver hake stocks for use by the New England Regional Fishery Management Council in their Silver Hake Management Plan. He has continued work on calculating von Bertalanffy growth equations for the silver hake stocks and has begun assembling 1977 commercial catch and length frequency data for upcoming silver hake assessments.

Thurston Burns completed computer runs converting survey indices for pollock during 1963-1976 to metric units and also adjusting all of the spring survey indices from No. 36 Yankee trawl catches to equivalent No. 41 trawl catches. He has also been updating and preparing 1977 commercial pollock catch and length frequency data for assessment needs.

Frank Almeida attended the semiannual meeting of the Southern New England Chapter of the American Fisheries Society held on 30 January at Windsor Locks, CT

Brian Hayden has continued working on mackerel catch statistics.

Emory Anderson participated in a USA-USSR assessment meeting held at Woods Hole on 18 January to discuss assessments on Atlantic mackerel, silver hake, red hake, spiny dogfish, Atlantic saury, and Illex squid. Dr. V. A. Rikhter from AtlantNIRO, Kaliningrad, USSR was the Soviet scientific representative. He also participated in discussions on 17 January with USA, USSR, and Canadian scientists to finalize plans for the trawl and hydroacoustic survey for Atlantic mackerel to be conducted in January-February on the R/V Argus. Emory also finished drafting the red hake stock assessment reports.

Fishery Analysis Investigation

Fred Serchuk, Paul Wood, and Harold Foster completed an interim assessment on cod for the New England Council meeting on 18-19 January. Harold Foster finished auditing the 1977 length samples. Bill Callahan provided the Rhode Island Lt. Governor's office with statistics on Rhode Island for 1974-1977. Judy Brennan completed the report on overfishing for the "Annual Report to Congress." She also prepared two manuscripts for publication. Steve Murawski spent 2 wk on the Delaware II on the second leg of the surf clam and ocean quahog survey. Harold Foster, Steve Murawski, and Ralph Mayo attended the AFS meeting in Windsor Locks, CT. Fred Serchuk attended a public hearing on the 1978 Groundfish Management Plan in Centereach, Long Island.

In response to a request from the Regional Office for economic data on the New England cod fleet, Ralph Mayo and Bill Callahan produced an analysis of each vessel which caught cod in either 1976 or 1977. The average catch and rank of each of the 737 vessels involved in the fishery in both years were calculated from commercial fishery landings data contained on our New England weighout tapes. Bill and Ralph also prepared a separate summary of cod catches for the Massachusetts Inshore Draggerman's Association and the Cape Cod Commercial Fishermen's Coalition.

Fishery Systems Investigation

The primary activity was the preparation of an assessment document on four stocks of yellowtail flounder. This document will be the scientific basis for the management of the yellowtail flounder fishery as described in the Groundfish Fishery Management Plan (FMP). Michael Sissenwine attended the 19 January meeting of the New England Regional Fishery Management Council and public hearings on the Groundfish FMP in Centereach, Long Island, and Point Judith, RI, on 30 and 31 January. He also participated in a working group preparing further cross-examination of the electrical power generating utilities in the Hudson River adjudicatory hearing at Fort Monmouth, NJ, on 28-30 January.

Considerable time was also devoted to meetings in Woods Hole with scientists from the USSR. Upcoming research cruises, other joint future research, and fish stock assessments were discussed.

Anne M. T. Lange continued preparation for the ICNAF special meeting on squid in Cuba during 13-17 February.

Gordon Waring attended the Southern New England chapter meeting of the American Fisheries Society in Windsor Locks, CT.

Manuscripts

Almeida, F. P., and T. S. Burns. 1978. Preliminary results of the international herring tagging program conducted on the northeast coast of the United States in 1977. NEFC Woods Hole Lab. Ref. No. 78-07.

Anderson, E. D. 1978. An explanation of virtual population analysis. NEFC Woods Hole Lab. Ref. No. 78-09.

Anderson, E. D., and F. P. Almeida. 1978. Assessment of the Georges Bank red hake stock. NEFC Woods Hole Lab. Ref. No. 78-01.

Anderson, E. D., and F. P. Almeida. 1978. Assessment of the southern New England-Middle Atlantic red hake stock. NEFC Woods Hole Lab. Ref. No. 78-06.

Brennan, J. A., and J. E. Palmer. 1978. Estimates of variance of age composition of mackerel catches in ICNAF Subarea 5 and Statistical Area 6. ICNAF Sel. Pap. No. 3.

Brown, B. E., J. A. Brennan, and J. E. Palmer. In press. Linear programming simulations of the effects of by-catch on the management of mixed species fisheries off the northeast coast of the US. Fish. Bull. (A)

Clark, S. H., and J. E. Palmer. 1978. Assessment of the haddock stocks in the Gulf of Maine-Georges Bank area. NEFC Woods Hole Lab. Ref. No. 78-05.

Morse, W. W. In press. Biological and fisheries data on scup, Stenotomus chrysops (Linnaeus). NEFC Tech. Ser. Rep. No. 9.

Serchuk, F. M., P. Wood, and B. E. Brown. 1978. Atlantic cod (Gadus morhua): assessment and status of the Georges Bank and Gulf of Maine stocks, January 1978. NEFC Woods Hole Lab. Ref. No. 78-03.

Sissenwine, M., B. Brown, and M. McBride. 1978. Yellowtail flounder (Limanda ferruginea): status of the stocks, January 1978.

Sissenwine, M., and E. Bowman. 1978. An analysis of some factors affecting the catchability of fish by bottom trawls. ICNAF Res. Bull. (S)

Wilk, S. J., W. W. Morse, and D. E. Ralph. In press. Length-weight relationships of fishes collected in the New York Bight. Bull. NJ Acad. Sci. (A)

MARINE ECOSYSTEMS DIVISION

Ecosystem Dynamics Investigation

The ecosystem dynamics task group continued work on the productivity and energy flow studies on Georges Bank. Ed Cohen and Marv Grosslein revised the draft report on the Georges Bank energy budget for presentation at the ecosystem modeling workshop in February at the Northwest and Alaska Fisheries Center. They also participated in formal and informal talks with Soviet scientists regarding joint US-USSR productivity and modeling studies during the period 16-22 January. Mike Pennington and Dr. Grosslein continued work on analysis of sources and levels of variability in trawl survey abundance indices to be presented at the Northeast Fish and Wildlife Conference in February. Also, they conferred with Dr. Walters (University of Wisconsin) who is planning to spend next summer with us evaluating approaches to modeling food web interactions involving finfish.

Recruitment Processes

The fourth planning meeting for the proposed Georges Bank Larval Herring Patch Experiment was held in Woods Hole, 9 and 10 January 1978. Participants attended the meeting from six institutions (Northeast Fisheries Center Woods Hole and Narragansett Laboratories, MARMAP Field Group, Bedford Institute of Oceanography, Brookhaven National Laboratory, Woods Hole Oceanographic Institution, and US Coast Guard Oceanographic Unit). The primary objective of the proposed multidisciplinary study is to identify and follow a patch of recently hatched herring larvae for a better understanding of the physical and biological processes controlling dispersal and survival of larvae. The experiment has now been scheduled for the last half of October - first half of November 1978. Six vessels are involved working directly on the larval patch and three other vessels indirectly covering the broader area. Greg Lough served as chairman for the meeting and is responsible for overall planning and coordination of the experiment. Minutes of the meeting are being prepared and will be distributed in the next few weeks.

A number of new Co-op students and temporaries joined the task group in January (Elizabeth Stein, Dana Temple, Peter Hamer, Judy Lettes, Tim Cole), and were immediately trained and pressed into service for sorting herring larvae from the fall 1977 larval herring surveys. They have completed sorting and measuring herring larvae from two fall cruises, Wieczno No. 77-06 and Delaware II No. 77-13. In addition, some are being trained to sort and identify copepods from fine-mesh samples, and others to sort broad categories of ichthyo- and zooplankton from MOCNESS samples. Also, some are learning to dissect and identify larval herring gut contents, remove and read herring otoliths, and operate and maintain the MOCNESS sampler.

Andrew Rosenberg completed his final Co-op student session this month and returned to the University of Massachusetts. George Bolz and Greg Lough are processing larval herring data available since 1968 to provide an overall regional analysis of larval production and spawning stock biomass to help assess the recent changes in herring populations for the New England Regional Fishery Management Council. In this regard, Robert Livingstone, with the aid of Peter Hamer, is analyzing available data on herring maturation to see if a shift in maturity at length or age has occurred in recent years.

Fishery Oceanography Investigation

January was marked by changes and additions in personnel, a series of meetings, and the preparation of the Soviet R/V Argus for her winter-spring series of cruises. Bob Pawlowski, who has been with the group for 3 yr on loan from NOAA Corps, will return to sea duty on the Kelez in March. He has been cleaning up his work on the Gulf of Maine SOOP runs, the paper with Sam Nickerson on surface temperature and salinities from bottom trawl surveys and the Northeast Channel hydrography, but has also devoted some time to preparations for his change of assignment. A replacement has been requested but not assigned yet; we expect someone from NOAA Corps in the fall. Ron Kirschner will be taking over the SOOP run; he wrote the report on the December run and continues to keep up to date on weather maps. Tom Laughton completed his 6-mo Co-op duty and has returned to Northwestern University. Ray Cloutier has returned to take Tom's place, and has been busy plotting horizontal charts of temperature, salinity, and nutrients from the larval herring series in preparation for the ASLO meeting in June. Ann Dorkins, a University of Colorado graduate who worked with the group in 1975 and 1976, is back on a 130-day appointment. She has been plotting T/S diagrams for Bob Pawlowski. Bill Burns, a junior at Falmouth High School, has been employed after school and will be occupied for the immediate future in cleaning up our XBT backlog.

The month began with a 2-day meeting in Woods Hole to continue planning for the international patch study scheduled next fall on the northern edge of Georges Bank. Representatives from Bedford Institute, Brookhaven National Laboratory, WHOI, and USCG were present, with Ron Schlitz and Red Wright as principal spokesmen for physical oceanography at NEFC. Major outlines of the program, in terms of ship schedules and assignments, personnel, and field operations, were agreed upon. The next physical oceanography meeting will be in conjunction with the AGU meetings in April. On 11-13 January, Red Wright, Ron Schlitz, Bob Pawlowski, Steve Ramp, and Gil Dering participated in the Current Meter Workshop at the University of Delaware, where latest developments in current-meter technology and mooring techniques were discussed. The following week Red

Wright went to Brookhaven with others from NEFC and a contingent of Russians to participate in planning sessions for a comprehensive IDOA proposal to study secondary production on the continental shelf. On 25 January Red Wright and Dan Patanjo met with representatives of other tasks at Sandy Hook to consider ways to improve the data collection on the MARMAP cruises.

The Argus arrived at the Maritime Academy in Buzzards Bay on 17 January and sailed on the 28th. Several in the task were occupied during that period obtaining and installing equipment and supplies, instructing Russian operators in techniques, providing information on computerized handling of hydrographic data, etc. This was made vastly more difficult and time consuming because of the 22-mi distance and total lack of telephone communication between Woods Hole and the ship. Red Wright also participated in some long-range planning sessions with the Russians in Woods Hole. Steve Ramp has been organizing equipment and plans for the March current-meter cruise and Gil Dering has been assembling cost estimates for servicing our own instruments here in Woods Hole. We intend to begin that work, with some assistance from Nova University and the Buoy Group at WHOI, after the March cruise. Preliminary discussions have been held with Endeco, Inc., of Marion, MA, which has offered to lend us two current instruments--probably at 10 and 40-m depth operation.

Abstracts have been submitted for two papers to be given at the AGU meeting in April. One will describe the general hydrography of the Northeast Channel region and the other will describe results of the first setting of current meters.

Apex Predators Investigation

Tag returns this month included two from mako sharks, one from a smooth dogfish, and one (found in a net) that had been attached to a spinner shark.

One of the makos provided excellent migration information. It moved from Lydonia Canyon on Georges Bank to an area 500 mi west of the Azores, a distance of over 1,200 mi in 3.5 mo. This is the second farthest distance traveled by a tagged mako and is the first suggestion that the species may make trans-Atlantic migrations. The second mako was tagged on the R/V Wieczno in March of 1977 off Cape Hatteras, North Carolina. It was at liberty for 10 mo and was recaptured 15 mi northeast of the tag site by an American longlining vessel.

The smooth dogfish was at liberty for 22 days and traveled southward 57 mi between St. Augustine and New Smyrna Beach, Florida. This is the first recovery of this species from the Florida coast.

The spinner shark tag was returned by trawl seine fishermen working in the area of False Cape, Virginia. The shark was tagged with a roto fin tag 11 days before, 9 mi to the northeast.

Verification of tagging data for 1975 was completed and included in the historical tagging data base. In the next few months we expect to have all tagging data for the period 1965-1977 (over 20,000 entries) entered into the ADP system.

The biannual tagging newsletter has been delayed while awaiting the clearances required for printing. In the past we have photocopied the newsletter The number of cooperating anglers has increased to the point where this is no longer feasible. Hopefully the newsletter will be ready by the end of February.

Larval Physiology and Biochemistry Investigation

Studies of the influence of prey density on growth and survival, studies of digestion and assimilation rates, and embryological-developmental anatomy studies of larval cod are currently in progress. Also underway is a study of the DNA, RNA, and protein content of cod eggs and larvae. Preliminary results indicate that starved cod larvae have a significantly lower RNA-DNA ratio than fed larvae. The excretion rates of ammonia, primary amines, and total organic nitrogen are also being measured on a weekly basis.

Adult winter flounder are being prepared for hormonal induction with the resultant eggs and larvae to serve as test organisms in cooperative studies with EPA on the influence of petroleum hydrocarbons on growth and survival.

Dr. V. V. Konchin, Moscow State University, has joined the Investigation for 5 mo of study of the embryology, physiology, and biochemistry of early life stages of cod, haddock, yellowtail flounder, and scup.

Benthic Dynamics Investigation

Analysis and evaluation of the quantitative data pertaining to the New England macrobenthic invertebrate fauna were continued. A section on the distribution of Turbellaria was completed and good progress was made in preparing a section of Nemertina. A substantial amount of time this month was devoted to checking records, specimens, and identifications of specimens for geographic distribution plots.

A manuscript entitled, "Food Habits and Food Resource Partitioning by Northwest Atlantic Gadiform Fishes," by Richard Langton and Ray Bowman, was completed. Analysis of the food habits of juvenile haddock is in progress. Stomach samples collected between 1953 and 1976 have been processed and the results are being tabulated and studied. Another major food-habits data base that is currently being studied is that for the pleuronectiform fishes. Stomachs from these species were collected between 1969 and 1972. Preparations were made for a 3-day cruise on R/V Albatross IV to collect stomachs from demersal fishes in the vicinity of Georges Bank - Great South Channel in early February.

Ichthyoplankton Investigation

Members of the four investigations participating in MARMAP I surveys met at Sandy Hook on 25 January to discuss sampling design and techniques, divisions of labor at sea, and the overall status of shipboard sampling operations since combining forces at the outset of FY 78. Center personnel from the Oceanographic Investigation at Woods Hole, the Plankton Ecology Investigation at Narragansett, and the Biological Oceanography and Ichthyoplankton Investigations at Sandy Hook participated. Discussions dealt with field procedures and protocol problems in 1977 and actions to be implemented in 1978 to ensure the successful completion of the remaining four surveys scheduled in this fiscal year.

Two Monmouth College students have temporarily joined the staff to assist in sorting plankton samples collected in FY 77. We are finishing the two-part May cruise conducted in the Middle Atlantic Bight and have passed the halfway point in sorting and volumizing FY 77 samples. In addition, we are again actively working on neuston samples from the MARMAP surveys.

BLM contract activities this month centered around ADP. Myron Silverman spent 3 days at Narragansett entering data into the MIS, setting up a timetable for completing data entry, and establishing divisions of labor for getting all pertinent historical data information into machine-readable form. Pat Rosenberg has been reassigned to ADP-related work to assure its timely completion. Preliminary discussions were held on compilation of the final report and how we will format biological and ancillary hydrographic data.

Plankton Ecology Investigation

Efforts to improve the rough estimates of Atlantic herring and Atlantic mackerel food requirements are using the method described by Winberg in 1956. These estimates will be compared over the last 5 yr to examine the changes in the predation pressure on the zooplankton population from year to year. Visitors from the Soviet research ship Argus were briefed on the methodology for determining zooplankton length-dry weight relationships and some discussion of applicatio of these methods to the naupliar stages and the possibility of a joint project was considered. Length-wet weight relationships methodology employed by Dr. Grusov at AtlantNIRO, Kaliningrad, USSR was also discussed. The length-weight measurements of Centropages typicus from spring samples are continuing.

Biostatistics

The cruise data and associated ichthyoplankton data which had been processed previously by the Sandy Hook Laboratory personnel on the Fort Monmouth computer were successfully extracted, put on tape, and sent to Narragansett. The data were loaded into the University of Rhode Island computer for further processing by both Narragansett and Sandy Hook personnel as a part of the contractual obligations to BLM. During January, quality control programs and resulting updates were performed on the master files for several cruises in this set of data and other data files were prepared for conversion to master files. Work continued at Narragansett on the master station record data and sample log data from R/V Anton Dohrn Cruise No. 77-03 and R/V Wieczno Cruise No. 77-06. Similar data from the R/V Delaware II Cruise No. 77-13 were entered from a data terminal directly into the computer using the new log forms developed at Sandy Hook. The "Fager Statistics" program and other statistical analyses were performed on the oil and organism data from the USNS Potomac oil spill samples. These samples were collected by Peter Grose of EDS/CEDDA in Baffin Bay, Greenland, and the samples were sorted and analyzed by the Plankton Sorting Group, Narragansett.

Plankton Sorting

In response to a request from Dr. Lough of the Woods Hole Laboratory, Atlanti herring larvae were sorted from the R/V Anton Dohrn Cruise No. 77-03. Summaries of this data including densities and length frequencies will become part of a data base, used to calculate herring production as requested by the New England Council.

The 1971-1975 spring-fall zooplankton data base for Georges Bank neared completion. A manuscript summarizing this data is being reviewed.

Two students, Vivian Bothelo (Roger Williams College) and Jim Mignone (URI), have joined the sorting staff and are currently being trained.

The basic components of the newly acquired image-analysis system have arrived. Rennovation of a small room to house the system is nearing completion. An engineer from Bausch and Lomb will install and test the system. Initial experiments will include developing methods that produce an optimum image for counting and measuring. After the image is refined, a series of measuring

experiments are scheduled to test the statistical variability associated with this new technique.

Meetings, Talks, Visitors, Publicity

Kenneth Sherman and Carolyn Griswold attended a meeting on 5 and 6 January in Narragansett to discuss the Regional Response Plan for Oil Spills. A NMFS-NEFC Fisheries Plan for Oil Spill Ecological Damage Assessment was completed by Carolyn Griswold and was submitted to Mitre Corporation to be included in the Region I Workshop document.

On 6 January, Perry Lane from NEFC, Gloucester, met with Kenneth Sherman to plan a demonstration of underutilized species for the American Fisheries Society visit to Narragansett in August.

On 11 January, Drs. Pearce, Sindermann, and Edwards, and Kenneth Sherman met with Eric Schneider and Don Phelps to plan cooperative research projects with EPA.

The biological sessions of the Argo Merchant Symposium held 13-15 January at the URI Bay Campus were chaired by Kenneth Sherman. This symposium was attended by Richard Langton, Ray Bowman, and several members of the Biostatistics Unit. Ray Bowman presented a paper entitled, "Food Habits of Fish and Squid Found in the Vicinity of the Argo Merchant Oil Spill, August 1977."

On 16-18 January Kenneth Sherman participated in the US-USSR Scientific Bilateral Meetings in Woods Hole.

Kenneth Sherman and Geoffrey Laurence participated in a meeting held at the Brookhaven National Laboratory on 17-18 January to develop a plan for conducting coordinated and integrated research on secondary production on the continental shelf from the Scotian Shelf to Cape Hatteras. Dr. Laurence prescribed an overview of his models of larval fish growth and survival. Kenneth Sherman presented an overview of the Center's studies of marine ecosystems.

Dr. Grosslein attended an S&S committee meeting for the NERFMC on 17 January, and a workshop on 19 January at Brookhaven for developing a proposal for IDOE support of secondary production studies on the Northeast United States shelf.

On 19 January Carolyn Griswold attended a meeting of the BLM Biological Task Force in New York City. State representatives were in attendance for the first time. The meeting was designed to familiarize new members with the types of activities in which the Task Force is involved. Some time was spent discussing soft coral populations on Georges Bank.

Two scientists, Boris Bykov and Vyacheslav Sushin from the R/V Argus, visited the Narragansett Laboratory during the week of 23-27 January. Boris Bykov, a computer programmer (systems), spent the week with the Biostatistics Unit to learn about the MARMAP Information System as a data base management system.

Aaron Rosenfield and Robert Murchelano of the Oxford Laboratory visited the Narragansett Laboratory on 24 January to discuss aspects of the Ocean Pulse initiative.

Jerry Prezioso, Donna Busch, Lorrie Sullivan, Jack Green, Joe Kane, and Tom McKinney attended the "Ecosystem Survey Operations Workshop" at Sandy Hook, New Jersey, on 25 January.

On 27 January, Kilho Park, Chief of the NOAA Deepwater Dumpsite Program, visited the Narragansett Laboratory to discuss areas of possible cooperative research dealing with environmental impact assessment.

On 30 January Jerry Prezioso, Loretta Sullivan, and Carolyn Griswold attended a workshop on "The Biologist as an Expert Witness," which was sponsored by the Southern New England Chapter of the American Fisheries Society.

Robert Theroux attended a 3-day course on commercial-industrial photography given by Eastman Kodak in Waltham, Massachusetts.

Ray Maurer attended a meeting in Woods Hole, Massachusetts, dealing with sampling strategy for the multinational Larval Herring Patch Study to be conducted in fall 1978. Some six-to-eight vessels representing four countries (USA, Canada, USSR, and Poland) will participate in the 30-day experiment.

Manuscripts

Colton, J. B., Jr., and R. R. Byron. Gulf of Maine-Georges Bank ichthyoplankton collected on ICNAF larval herring surveys, September 1971-February 1975. NOAA Tech. Rep. NMFS SSRF 717. 35 pp. (P)

MANNED UNDERSEA RESEARCH AND TECHNOLOGY PROGRAM

The MURT group continued processing and analysis of data from 1977 summer and fall cruises concerned with surf clam biology, hydroacoustics, sand lance behavior, continental shelf canyon ecology, and Atlantic herring spawning ecology. Each of these studies had sampling objectives requiring diving or submersible technology. Cruise reports and manuscript reports of these activities are being developed along with manuscript reports of earlier studies.

Manuscripts

Uzmann, J. R., R. A. Cooper, R. B. Theroux, and R. L. Wigley. 1977. Synoptic comparison of three sampling techniques for estimating abundance and distribution of selected megafauna: submersible vs. camera sled vs. otter trawl. Mar. Fish. Rev. Pap. 1273. (P)

DIVISION OF ENVIRONMENTAL ASSESSMENT

Behavior of Marine Fishes and Invertebrates Investigation

We have been examining responses of adult bluefish, Pomatomus saltatrix, (800-1350 g) to changes in temperature which approximate those commonly associated with thermal edges the species would encounter in the sea. Our aim is to correlate the physiological capabilities of these animals with their behavioral responses. To do this we have begun to monitor body temperatures by using sonic transmitters, placed either in the stomach or dorsal musculature (transmitters on loan from Woods Hole Oceanographic Institution and Oak Ridge National Laboratory, respectively). This will enable us to compare body temperature with ambient water temperature to ascertain the length of time, as related to body size, a particular sized animal will remain at any given temperature.

Findings from these studies will be used in developing a model of the distribution of this species based on temperature and age.

Coastal Ecosystems Investigation

The benthos task of our continental shelf studies for the Bureau of Land Management project is nearing completion. We finished processing the 114 macrofauna samples taken from potential oil-producing areas of the Baltimore Canyon Trough. Most of our time was spent in data reduction and analysis, including cluster analysis of faunal and habitat groupings. Much effort was also spent in developing an overview of potential effects of oil-related activities on the Baltimore Canyon Trough. We began preparing the final report to BLM on this work.

We continued processing our New York Bight benthic data in order to provide macrofauna data reports for the MESA program and to develop an atlas of benthic faunal distributions and abundances for the Bight. A search of published information on the dominant benthic species of the Bight also continued. This will supplement the atlas information and will also help guide our Ocean Pulse studies. Sorters concentrated on completing a 1976 census of the fauna of Block Island Sound, as well as on sorting samples from the 1976 anoxia area off New Jersey in order to measure benthic impacts and recolonization. Tom Wilhelm began experiments to determine whether subsampling of our macrofauna collections will yield reliable data on dominant species.

Physiological Effects of Pollutant Stress Investigation

Physioecology

The study to assess the effect of 48-hr copper exposure on both embryos and 2-day-old larvae of the American oyster, Crassostrea virginica, held under 9-12 different temperature and salinity regimes is continuing (5th experiment). Oyster embryos were also exposed to silver in a similar experiment being run concurrently with the above. Samples now being examined for live vs. dead as well as to make normality-abnormality determinations.

A brief report on the results of a study to determine the effects of copper, mercury, and zinc, both as nitrates and chlorides, on oyster embryos is being prepared.

Considerable time was spent constructing and testing a mini-diluter to be used in intermittent flow-thru studies with larval mollusks.

Physiological Effects

A study of the effects of metals on growth and feeding of bivalve mollusks was initiated this month. We have constructed a precise, continuous, algal feeding system that will be monitored with fluorometric readings. The data obtained from this work will be similar to the "scope for growth" information generated by researchers at the Plymouth, England, IMER Laboratory. We will be introducing metals into the system to assess any effects of the pollutants on "scope for growth" and other metabolic parameters. Many of the ideas for this study were stimulated by discussions held in Plymouth at both the IMER and MBA Laboratories during a visit there by Fred Thurberg last summer. We also anticipate that cooperative work between this investigation and the EPA-Narragansett CEAS program will evolve from this study.

The balance of the month was spent working on the Argo Merchant paper and preparation (see Meetings, Talks, Visitors, Publicity) and assorted hematological studies for manuscripts in preparation.

Biochemical Effects

Several enzyme protocols were developed for winter flounder (Pseudopleuronect americanus) gonads, including a kinetic analysis for MDH. In vitro cadmium ion was found to enhance the activity of this enzyme. This preparative work was undertaken to make optimal use of tissues from the flounder-cadmium recovery experiments, the first of which is scheduled for takedown the last of January.

Analyses were completed for adductor muscles of oysters, Crassostrea virginica, from a metals-uptake experiment (Environmental Chemistry Task; June 1977) in which several bivalve species were exposed to the nitrate salts of three metals: Cd, Cu, and Ag. The results, incompletely analyzed as yet, suggest that the controls had slightly more active glycolysis than did the metal-exposed animals (wide individual variation), and that the animals had not been actively feeding.

Adductor muscles from scallops, Placopecten magellanicus, and horse mussel, Modiolus modiolus, were obtained for us by Resource Surveys personnel at Woods Hole (Henry Jensen, Tom Azarovitz, Don Flescher), and are currently frozen awaiting analysis.

Considerable time was spent in preparing material for a paper to be given at the AAAS annual meeting in Washington, DC, in February.

Anaerobic Bacteriology/Metabolism

Laboratory study was limited to work on the isolation and identification of several isolates from morbid eels obtained from the Institute of Anguilliform Research (University of Bridgeport) as a cooperative effort to help understand their problems with holding eels in culture. At least five distinct morphologic types were obtained, including a Pseudomonas species and a gram-positive rod (Clostridium). The latter organisms did not appear to be toxic to mice, but additional testing with mice is needed, as well as with eels, if available, to determine whether Clostridium is causing the problem. The organisms obtained from the eels were essentially the same as those found in the water of the holding systems.

Manuscript preparation is continuing.

Biological Oceanography of Stressed Environments Investigation

During the month of January, the Biological Oceanography Investigation continued to process the backlog of productivity, respiration, and hydrographic data collected during two cruises in 1976 and five cruises in 1977. The Phytoplankton Baseline Survey Subtask completed the processing of chlorophyll samples collected from the NOAA R/V Mt. Mitchell and R/V Kelez during the November and December 1977 MARMAP cruises.

Drs. Vinogradova and Senin (USSR) spent 1 day at Sandy Hook Laboratory viewing chlorophyll analyses and phytoplankton primary productivity equipment and discussing methods and techniques in phytoplankton research, including studies of phytoplankton nutrition, biomass, production, and identification. The graphing of chlorophyll data from the USSR R/V Argus cruise in October 1977 was initiated.

Nutrient analysis of the Woods Hole samples collected over Georges Bank and in the Gulf of Maine was begun. The first group processed showed high variability among replicates (up to 56%). The variability was demonstrated not to be due to the Technicon Autoanalyzer.

Calculation of the nutrient data from the Advance II and Albatross IV cruises continued.

Drs. Vinogradova and Senin also spent half a day observing the operation of the Technicon Autoanalyzer.

Seven titles were submitted by project personnel for the NEFC Symposium to be held at Woods Hole during April 1978.

Coastal Monitoring, Assessment, and Prediction Investigation (COMAP)

On 6 January George Kelly, Fred Lux, and Tom Azarovitz attended a meeting at the Sandwich office of the Massachusetts Division of Marine Fisheries to discuss the approval of funding and plans for implementation of the proposal "Coastwide Fishery Resource Assessment" with John Cookson of the Regional State-Federal Branch and Leigh Bridges, Arnold Howe, and Bruce Estrella of the Division of Marine Fisheries. Arnold Howe has been designated as Project Leader by Leigh Bridges and plans were formulated for Tom Azarovitz to serve as liaison with Arnold to achieve standardization of procedures and data processing between the state and federal surveys. The field program will start in March and cruise activities will be coordinated by Tom working with Arnold and H.C. Boyar.

George Kelly attended a meeting at the EPA Laboratory at Narragansett on 10 January with Jack Pearce and several others from the Division of Environmental Assessment to discuss cooperation in Ocean Pulse studies with Eric Schneider, Don Phelps, and a large segment of other EPA investigators from the Narragansett Laboratory. There was considerable exchange of information from both sides regarding the EPA "Musselwatch" program and "Scope for Growth" studies as well as the NMFS Ocean Pulse program and related studies.

The Argo Merchant symposium was held at University of Rhode Island on the following 3 days and a substantial delegation from the NEFC attended. Studies based on data from the cruises of Delaware II comprised a significant portion of the material presented. Ray Bowman gave a very good presentation on the occurrence of oil residues in invertebrates taken from fish stomachs. Bill MacLeod, from the NMFS analytical facility at Seattle, WA presented an analysis of the hydrocarbon residues found in fishes collected aboard Delaware II. Ken Sherman gave an excellent summation of the overall effect of the oil spill on the fisheries stocks and associated organisms.

Meetings, Talks, Visitors, Publicity

On 10 January, personnel from NEFC met with the staff of the EPA Environmental Research Laboratory (ERL-N), Narragansett, Rhode Island, to discuss cooperative research activities. Dr. Donald Phelps (EPA) and Dr. John Pearce co-hosted the meeting. Mr. Richard Greig represented Environmental Chemistry; Dr. James Thomas represented Biological Oceanography; Mr. Ken Sherman represented Ecosystems; Drs. Tony Calabrese and Fred Thurberg represented Physiology; Ms. Edith Gould represented Biochemistry; Mr. Robert Reid and Mr. Frank Steimle represented Benthic Communities; and Ms. Anne Studholme represented the Behavior Investigation. This important workshop was convened to make arrangements for cooperative research efforts in several disciplines. During the meeting, participants reviewed specific research activities that they were currently involved with and identified those areas where meaningful, cooperative research could be pursued. The meeting concluded with a resume of research activities that will be conducted jointly within the EPA/ERL-N major programs such as World Mussel Watch and CEAS, and within the Ocean Pulse program recently initiated by NEFC. It is proposed that additional meetings/workshops will be held in March and April in order to follow up on preliminary arrangements made during the January workshop.

Frank Steimle and James Thomas met with Wayne Davis (EPA/ERL-N) on 11 January to review his experimental open ecosystem aquaria used for benthic life history studies.

A symposium entitled, "In the Wake of the Argo Merchant" was held at the University of Rhode Island, 11-13 January, and was attended by John Pearce, James Thomas, Robert Reid, Frank Steimle, Frederick Thurberg, Margaret Dawson, Edith Gould, and Lynne Hanson. Dr. Thurberg presented a paper, "Some Physiological Effects of the Argo Merchant Oil Spill on Several Marine Teleosts and Bivalve Molluscs."

Dr. John Pearce gave a presentation to the Rumson (New Jersey) Community Education Program. This evening seminar was concerned with the importance of the estuaries and coastal zones of New Jersey to the general public as well as to the economy of the area.

During the period 22-27 January, Dr. Pearce met with Dr. Alistair McIntyre at the Aberdeen (Scotland) Fishery Research Laboratory, to plan an upcoming ICES workshop concerned with biological effects monitoring. Drs. Pearce and McIntyre selected names of possible participants; these scientists will represen several disciplines, most of which will be represented in the Ocean Pulse progra and similar activities in Great Britain and Europe. The Skidaway Laboratories, Savannah, Georgia, were selected as the site of the ICES workshop to be held in late February or early March 1979.

Bill Phoel and Bob Reid visited the Virginia Institute of Marine Sciences, 23-24 January, where they attended a review of VIMS' continental shelf benchmarch program, and discussed benthic studies, community analysis, and possible collaboration on nutrient regeneration work.

On 26 January Frank Steimle met with the New Jersey Department of Environmental Protection biologists to begin cooperative studies in an Ocean Pulse mode

Dr. Pearce presented a lecture to the Pathobiology and Ecology courses at the Marine Biological Laboratory, Woods Hole, on 18 January. His topic was the relationship between environmental contamination and disease and other factors affecting the biology of marine organisms.

On 31 January, Drs. Sindermann and Pearce met with representatives of EPA, Region III, to discuss the possible interrelationships between EPA research efforts in Chesapeake Bay and the Ocean Pulse initiative. Drs. Aaron Rosenfield and Robert Murchelano, Oxford Laboratory, also participated in this meeting. The EPA personnel furnished NEFC scientists with planning documents which have been developed for the extensive EPA effort in Chesapeake Bay.

Mr. Bori Olla delivered a series of lectures at Woods Hole as part of the Marine Biological Laboratory/Boston University Marine Program course on animal behavior.

Manuscripts

Fine, M. L., H. E. Winn, and B. L. Olla. 1977. Communication in fishes. Pages 472-518 in A. Sebeok, ed. How Animals Communicate. Indiana University Press, Bloomington, IN. (P)

Reid, R. N. 1977. A study of effects of dredging and spoil disposal at New London, CT. J. Am. Geophys. Union. (Abstr.) (P)

Phoel, W. C. A diving system for polluted waters. Proceedings Working Diver 1978 Symposium. Battelle Columbus Laboratories. (A)

Pearce, J., J. Caracciolo, M. Halsey, and L. Rogers. Distribution and abundance of benthic macrofauna at nested stations in the sewage sludge disposal area, New York Bight apex - February 1975. NOAA DR ERL MESA Data Report. (S)

Steimle, F. W. Hydrographic data collected during a series of cruises investigating the 1976 oxygen depletion phenomenon in the New York Bight by NEFC, NMFS, NOAA. NOAA DR ERL MESA Data Report. (S)

Steimle, F. W., and D. J. Radosh. Effects of the 1976 New York Bight oxygen depletion phenomenon on the benthic invertebrate community. NOAA Prof. Pap., Anoxia in the New York Bight. (S)

Thurberg, F. P., E. Gould, and M. A. Dawson. Some physiological effects of the Argo Merchant oil spill on several marine teleosts and bivalve molluscs. (S)

AQUACULTURE DIVISION

Aquacultural Genetics Investigation

Selective Breeding of the Commercial American Oyster

Additional data from a study examining the relationship between larval setting order and subsequent spat growth in the commercial American oyster, Crassostrea virginica, were analyzed. Four full-sib families were examined. In all cases spat that metamorphosed during the first 3 days of the setting period were significantly larger at 28 wk post setting than spat that metamorphosed later during the setting period. Data from one family, measured at

two different time intervals post setting, indicate that differences of size among the spat become more pronounced as the oysters get older. These data indicate that hatchery selection of larvae that set earliest will probably produce faster growing juvenile oysters as well.

Conditioning of oysters in the selection lines has begun. These hatchery-reared oysters from wild stock were reared under uniform conditions and divided into fast growth, slow growth, and random control lines. Eight hundred animals from these lines should be spawnable by the end of February. Studies will then be made to determine the degree to which growth rate is inherited in each of the three lines.

Preparations for the 1978 spawning season are underway. Repairs of spawning and rearing facilities and equipment are being made. Breeding plans are being updated and advanced. Routine care of the 1976 and 1977 year-class animals continues.

Hybridization and Inbreeding of Commercial Oysters

Full-sib juvenile oysters from 1976 lines for inbreeding are being counted and measured prior to conditioning for spawning. Larvae from new crosses initiated this month for inbreeding did not survive to metamorphosis. Oyster larvae from hybrid and nonhybrid control samples are continuing to be measured for comparing length, width, and area. Other studies relating to hybridization include mass spawning in EDTA for inhibiting initial within-group fertilization of stock intended for ultimate mass hybridization between groups.

Cytological and Cytogenetic Studies on Fish Eggs

It is estimated that in the past 12 mo over 10,000 fish eggs have been sorted out of plankton samples taken at sea and had their embryos dissected off and processed for microscopic study. Based on the cytological state of cleavage cells and regularity of chromosome divisions, viability ranged from 0 to 60% for early cleavage Atlantic mackerel (Scomber scombrus) eggs sampled at 15 different stations in the New York Bight over a 5-day period of May 1977. Station ranking on the basis of early cleavage data is being supported by similar data on later development stages. An effort is underway to measure correlations of these data with natural physical variables and with contaminant loads in plankton, surface water, and microlayer water collected on the same cruise as were the eggs. Synergisms are also to be explored.

Students employed as temporary help on this work have been assigned and are pursuing on their own time projects on aspects of this research that could not otherwise be conducted: characterization of the chromosomes of the Atlantic mackerel from planktonic eggs; photomicrography of typical abnormalities observed in mackerel embryos; appraisal of the effects, if any, of a colloidal silicate used in plankton sorting on fish eggs intended for cytological study.

Aspects of Nutritional Requirements of Mollusks Investigation

Experiments were conducted to determine the tolerance limits of four species of phytoplankters to essential trace metals that are also potentially toxic pollutants. Fourteen concentrations of $ZnCl_2$ ranging from 0.25 to 6.0% were examined. Tolerance to metals appears to be relatively high, e.g., a concentration of 3-5% once resulted in a growth inhibition of only about 43% for three species and only about 17% for another.

Ten concentrations of $CuCl_2$ ranging from 0.2 to 50% were tested. At 5.0% two species reacted with only about 11% inhibition and two species were not affected. At 50%, however, three species demonstrated 64% growth inhibition and one species 28%.

A manuscript is in preparation by J. Babinchak and R. Ukeles entitled, "Epifluorescence Microscopy, a New Technique for Assessing Feeding Behavior of Crassostrea virginica Larvae."

Algal mass cultures yielded a harvest of 1,286 liters of larval foods and 1,173 liters of juvenile foods during the past month. Algal foods were supplied to the following Investigations in liters as follows: Spawning and Rearing of Mollusks, 860; Genetics, 495; Physioecology, 420; and Pathobiology, 20. Stock cultures were subcultured on schedule. Samples of Chlorella autotrophica were sent to M. J. Brevier of Gourrin, France, and Dunaliella euchlora to D. Morgan of Marine Research, Inc., Niantic, Connecticut.

Spawning and Rearing of Mollusks Investigation

Groups of 1-cm surf clams, Spisula solidissima, have been maintained at 22°C in static culture. Three feeding regimes have been maintained to determine the most efficient schedule for introduction of algal food. One group receives food once daily. A second receives the same amount of food but is fed twice daily. The third group is pumped an equal amount of food; however, it is delivered continuously over a 24-hr period. Based on previous experiments, the test animals were fed optimal levels of either 400,000 or 600,000 cells/ml of medium. Preliminary results indicate that there is no apparent growth advantage to continuous feeding. This is corroborated by an earlier experiment that demonstrated that the clearing rate of continuously fed surf clam is much lower than for those animals fed periodically. This information also agrees with the results of work done in Great Britain. In terms of the cost/efficiency of hatchery operations, it appears that batch feeding may be more economical than continual feeding.

Bay scallops, Argopecten irradians, from both the 1976 and 1977 year classes have been collected for a comparison of the response of these two groups to conditioning for spawning in the winter and early spring. Experimentation will deal with the temperature and food requirements necessary for early reproduction and high fecundity.

Some work has been initiated with oyster (C. virginica) larvae to determine the effects of larval culture density and algal concentration on larval growth. In these tests algal concentration is held "constant" by periodically checking chlorophyll-a levels and adjusting back to the original level. Initial results with larvae 1-3 days old indicate most efficient growth (growth/food unit) at mid-range food concentrations (25,000-50,000 cells/m) at larval densities from 1 to 10/ml.

Meetings, Talks, Visitors, Publicity

Ms. Kathy Snyder, Hatchery Manager, Kahuku Seafood Plantation, Kahuku, Hawaii.

PATHOBIOLOGY DIVISION

Comparative Pathobiology Investigation

Paraffin-embedded tissues from squid (Loligo sp.) and Pacific oysters (Crassostrea gigas) were deparaffinized for examination with electron microscopy. With conventional light microscopy, lesions of uncertain etiology were observed in these animals. The squid had numerous basophilic inclusions in the tubules of the digestive gland. Electron microscopy revealed the presence of chlamidia-like organisms in these inclusions. Similar microorganisms have been reported in other species of mollusks; however, this is the first finding of chlamidia-like microorganisms in a squid. The deparaffinized oyster tissues had a disease known as "focal necrosis." The lesions in these animals contain gram-positive, acid-fast-like bacteria. Examination with electron microscopy revealed pleomorphic procaryotic cells, the largest of which measured 0.5 μ x 3.0 μ. Because these cells contained distinctive electron-dense bodies and sharply defined crystalline structures, they may be identifiable by morphologic criteria.

Mr. Austin Farley, of the Molluscan Pathology Subtask, spent the month of January at the Marine Biological Laboratory at Woods Hole. He assisted Dr. Frederick Bank, of the Johns Hopkins University School of Medicine, in conducting a course of Invertebrate Pathology. Typing continues on the first draft of the monograph on blue crab, Callinectes sapidus, histology. A preliminary outline for a chapter on viruses, bacteria, and fungi has been prepared for "Biology of the Crustacea." Amphipods taken from the stomach contents of a winter flounder, Pseudopleuronectes americanus, collected during the Argo Merchant cruise have been examined histologically. The amphipods were submitted because they contained some eroded and melanized areas on the cuticle. Although these parts of the cuticle were somewhat thickened, a tissue reaction in or near the epidermis was not noted. Internal tissues also were normal. No parasites or other microorganisms were observed. The cuticular damage may be due to bites inflicted by other amphipods. Histologic sections of summer flounder, Paralichthys dentatus, larvae from 2 days post-hatching to 3 wk post-hatching have been prepared. Serial sections have been examined to determine the presence or absence of "rodlet" cells in these pre-metamorphosed fish. In all sections examined to date, no "rodlet" cells have been found; however, adult summer flounder contain abundant "rodlet" cells. Because these summer flounder were laboratory reared, it could be argued that if "rodlet" cells are parasites the fish did not become infected. If possible, planktonic larvae of summer flounder will be examined to note whether "rodlet" cells are present. During the month, the histology laboratory sectioned 891 blocks and stained 530 slides from a large variety of marine fishes, crustaceans, and mollusks.

Disease and Environmental Stress Investigation

Weather conditions again imposed severe limitations on the ability to conduct fin rot surveillance cruises in the New York Bight. Only one cruise was made in Raritan/Sandy Hook Bay (5 January); no cruises were made in the

apex or in Great Bay, NJ. On the one cruise to Raritan/Sandy Hook Bay, 154 winter flounder were examined; none had fin rot disease. The examination of transmission and electron micrographs of winter flounder with laboratory-induced fin rot disease continues. Stereoscopic visualization of freeze-fractured virus particles from winter flounder with lymphocystis disease clearly reveals the icosahedral form of the virus. The external coat of the virus appears to be finely granular to somewhat pebbled in texture. In order to continue these studies, additional winter flounder with lymphocystis disease are required. The bacterium isolated from kidney tissues of moribund striped bass, Morone saxatilis, from Long Island Sound is being identified. A series of differential media have been prepared in order to identify the organism on the basis of its biochemical activity. In September 1977, a collection of 93 rock crabs, Cancer irroratus, was made from the sewage sludge dumping site near Ambrose Light. Histological studies were conducted on 15 females and 15 males, while visual examinations only were made on 37 females and 31 males (total examined = 47 females and 46 males). The September collection was made in order to sample post-molt females and pre-molt adult males. Assuming that the previous molt period for adult males ended during the preceding months of March-April, the crabs would have been in the intermolt period for approximately 6 mo. In contrast, females would have just entered a new intermolt period and most of them would have clean gills. Data derived from only visual examination showed that 45/47 (96%) of the females had clean gills. When the number of preadult males (carapace width of 5.5 cm or less) was subtracted from the total, the number of adult males with clean gills was 13/37 (35%). The collection demonstrated the importance of seasonality, molting cycle, and year class in estimating the numbers of clean, discolored, or black gills. When all crabs are included without regard to these three parameters, the data showed that only 30% of the animals had discolored or blackened gills. In contrast, when the three parameters were considered, the figure increases to 65% discolored or blackened gills. All of the data accumulated to date are being reexamined to assure that seasonal influences are considered before making conclusions on the extent of gill discoloration or blackening.

Aquaculture: Control of Larval Disease Investigation

In vitro survival of oyster, Crassostrea virginica, hemocytes in varying proportions of oyster hemolymph and seawater was measured over a 7-day period. Criteria for viability were rough cell boundaries and ability of cells to spread on glass. After 1 day, highest survival was seen in a hemolymph: seawater ratio of 1:1; lowest survival was at a ratio of 0:1 (100% seawater). After 4 days, survival was higher in proportions of hemolymph:seawater of either 1:0 (100% hemolymph) or 3:1 (75% hemolymph). Following the initial (1-day) reduction in viability shown by cells in 100% seawater, cell numbers stabilized so that by day 7 those in seawater and those in other preparations were approximately equal with 40% of their initial numbers remaining. Information on cell viability is essential in future in vitro experiments with oyster hemocytes. An earlier experiment showed that 2-day-old oyster larvae (Crassostrea virginica) have no cells that can be recognized as phagocytic. We have extended this work to find that within 6 days (and possibly earlier) easily recognized phagocytes are present in the animal. However, these cells are smaller and contain fewer enzymatic granules than adult oyster hemocytes. We are continuing our observations in order to determine whether (or at what stage) these immature phagocytes mature into adult hemocytes. Continuing disinfection experiment results indicate that

the red pseudomonad shellfish pathogen mutates to a yellow organism during UV irradiation of seawater seeded with the microorganism. As soon as eggs become available (in about 4-6 wk), the experimentally induced yellow mutant will be added to cultures of fertilized oyster eggs to determine pathogenicity. The yellow mutant appeared 24 hr after irradiation in the Aquafine system regardless of the flow rate tested. A red pigment, chemically extracted from the red pathogenic pseudomonad, was compared to prodigiosin, extracted from Serratia marcescens. Chromatographic, spectral, and solubility data suggest that the unknown pigment is similar to the prodigiosin pigment.

Meetings, Talks, Visitors, Publicity

Dr. Rosenfield and Dr. Blogoslawski attended the World Mariculture Meeting in Atlanta, GA, on 2-6 January. Dr. Blogoslawski presented a paper titled "Bacterial Disinfection in Shellfish Hatchery Disease Control." Dr. Rosenfield attended a meeting of the Society for Invertebrate Pathology Program Committee in Gainsville, FL, on 9-10 January and 15-17 January. He also attended a meeting of the Maryland Sea Grant Advisory Board, 19 January, in Annapolis, MD. On 24 January, Dr. Rosenfield and Dr. Murchelano traveled to Narragansett, RI, to discuss Ocean Pulse with EPA representatives. On 25 January, Dr. Rosenfield participated in the Oyster Hatchery Workshop, conducted by New York Sea Grant in Rivershead, NY. Dr. Rosenfield and Dr. Murchelano hosted a meeting at the Marine Science Consortium, Wallops Island, VA, on climatology and blue crab abundance. Attending the meeting were representatives of VIMS; University of Maryland, Horn Point, MD; Maryland Department of Natural Resources; and Dr. Ingh from the Atlantic Environmental Group, Narragansett, RI. On 31 January, Dr. Rosenfield, Dr. Murchelano, and Dr. Robert Lippson traveled to Philadelphia, PA, to discuss Ocean Pulse and other cooperative research with Mr. Leonard Mangiaracina, Director, Chesapeake Bay Program, EPA. Dr. Sindermann and Dr. Pearce of the Sandy Hook Laboratory also participated in the meeting.

Dr. Murchelano discussed activities and needs of the Registry of Marine Pathology (ROMP) with Dr. Richard Wolke at University of Rhode Island on 25 January.

Dr. Phyllis Johnson traveled to Marine Biological Laboratory, Woods Hole, on 23-25 January. She presented lectures on normal histology and diseases of crabs in the course on comparative pathology of invertebrates.

A. Morris Ellison and Nedra Confer, temporary appointments, joined the Oxford staff in January. They are working on the ROMP program. Ms. Shawn McLaughlin, a college student enrolled at the Baltimore campus of Notre Dame, worked as a volunteer on the ROMP program at Oxford Laboratory.

Mr. William Rose (6-mo nonrenewable appointment) and Mr. Dudley W. Alleman (work/study cooperative) started work for Milford Pathobiology in January.

Manuscripts

Brown, C., and E. Losee. 1978. Observations and induced epizootics of vibriosis in Crassostrea virginica larvae. J. Invert. Pathol. 31:41-47.

RESOURCE UTILIZATION DIVISION

Resource Development and Improvement Investigations

Fisheries Engineering

The beam for the prototype beam trawl has been designed and fabricated. Work is underway on designing and acquiring materials for the net. Layout and installation drawings have been completed for a small net reel as assistance to a local boat owner. Engineering personnel traveled to Sandy Hook to survey an NMFS small vessel. Engineering participated in the first leg of the Delaware II shellfish assessment cruise. The purpose was to instruct members of the scientific party, crew, and bridge on ways to control fishing methods and conditions to improve the reliability of data collected.

Considerable time continues to be spent in supervising the second floor addition to the building on the Gloucester State Fish Pier. The installation of the new rear entry for the Woods Hole Laboratory was halted until the contractor presented shop drawings showing evidence of preplanning. Resumption of work has now been authorized.

Squid-Skinning and Eviscerating Machine

In the past month, we have mocked up and tested methods of removing the head and tentacles of the squid with an air-operated guillotine. It makes a clean cut and leaves the viscera in the mantle, making it easy to insert a carrier bar with a spear tip which drives through the viscera and stops in the tail. The mantle is supported horizontally with the tail fins hanging down.

A pair of air cylinders -- one with a cutting knive and one with a cutting block -- on either side of the tail are each equipped with a resilient pad attached so that it will grip the two tail fins on either side and hold them together as they are cut off.

After removal of the tail fins, the carrier moves forward 2 inches, placing the squid between a carrier belt and a rubber stripping roll which pulls the squid off the carrier and places it on the carrier belt of the primary machine.

The eviscerating and skinning operations have been developed and tested to the point that we feel sure that they will work in production.

Shell-Content Determination in Crab Meat

As part of our investigation of shell content in crab meat and the acceptability of crab meat containing shell, six samples of crab meat were obtained for us by Arlene Joyce at the NMFS Marketing Branch in Baltimore, MD. Three, 1-lb containers of crab meat were purchased from six different packers in four states -- Virginia, North Carolina, Georgia, and Florida. Taste panel members were presented with a sample from each of the 18 containers. Two shell determinations were conducted on the remaining crab meat in each container by the AOAC method.

The results indicated that there was greater variation in shell content within each brand than among brands. The Florida samples had the least and greatest percent shell (0.16% and 0.61%). The North Carolina crab meat averaged 0.45% shell, while all the other samples were grouped at 0.2 - 0.3% shell content. The panelists used a five-point scale to rate their detectability of shell content.

Species Identification

Two brands of sterilized, canned snow crab meat and a frozen brand of snow crab meat were tested by isoelectric focusing (IEF). The two canned samples yielded identical focusing patterns. The frozen brand had the same focusing pattern plus one additional large band that was lacking in the canned crab meat. This is an unfortunate setback for species identification since every species will have to have its own library of fingerprints for different processing modes. This was just an initial attempt and subsequent tries may yield the desirable results.

Squid

A series of organoleptic tests was completed on raw and prefried frozen breaded squid strips which were commercially produced by H. B. Kennerly and Sons of Nanticoke, MD. These strips were very well accepted -- the only comment being that there was a bit too much breading on the strips which masked some of the squid flavor. Samples were placed in frozen storage at 0°F to determine quality changes through time. Results indicate no significant differences in overall quality through 9 mo of storage.

Guaranteed Quality

As a result of our program with the Stop & Shop supermarket chain, that chain was reluctant to drop the U.S. Grade A concept and is continuing a pilot program of one store in Gloucester. This store historically has been poor in its fresh fish offerings, but since the introduction of U.S. Grade A, business seems to have picked up because the area reserved for fresh fish display has been doubled. The final report on this project is being completed.

Product Quality, Safety, and Standards Investigations

Product Quality

In order to increase their output of fillet blocks, the producers would like to incorporate the mince normally made from trimmings and V-cuts of fillets into the original fillet block. Current standards do not permit this since the effect on quality of such a block is not known. Consequently, we have engaged in a cooperative study with one manufacturer to determine the frozen storage characteristics of cod fillet blocks containing 0, 10, 20, or 30% cod mince. The product is being evaluated in two different forms, as frozen precooked sticks and as blocks. Analysis of variance conducted on the results, to date, of organoleptic tests for appearance, flavor, and texture has indicated no consistent significant difference among any of the treatments in any of these parameters over storage periods of 8 mo at 20°F or 9 mo at 0°F. There also have been no real differences in moisture content, in TBA number (a measure of rancidity), percent (a measure of protein denaturation). There has been a

trend to indicate a higher rate of DMA formation with increased mince content. The study has been terminated at +20°F but will continue for several more months at 0°F, after which conclusions will be made.

Product Safety

Validation of the multidetection method at the 4, 2, and 1-ppb level in smoked salmon is continuing.

A Perkin Elmer Sigma 10 microprocessor has been interfaced to the Perkin Elmer 910 gas chromatograph. The unit is operational and is being utilized in the analysis of nitrosamines in smoked-fish extracts.

Product Standardization

A new approach in standards development is being tested in the preparation of new and revised USDC Standards. This new approach takes into account the following: (1) Product forms would be those included in the completed Codex (International) Standards; (2) The standards would follow Codex format as closely as possible with Grade C being Codex minimal quality; (3) The standard would include inspection by attributes with defects presented in a serious major/minor format. Varying AQL's for different defects may be included; and (4) The document would be developed with a view toward application during processing rather than static inspection of samples after manufacture. At the present time, the proposed unified shrimp standard which is based upon this new approach has been submitted to USDC inspectors for a thorough review and testing. So far, encouraging results have been obtained, but it is evident that a massive educational effort is needed to illustrate the advantages of this new approach.

Technical Assistance, Visitors, Meetings, and Training

Technical assistance went to: Mike DiLiberti, Gloucester -- Scottish Seining; Tom McArdle, Gloucester -- Offshore Lobstering and Ocean Quahoging; Bobby Hilbrunner, Beverly -- Scottish Seining; Tony Parisi, Gloucester -- Hydraulic Boom Slewing; and Union Carbide Co. -- Rapid Chilling of Whole Cooked Crab.

We also responded to inquiries concerning: Sea clams -- how they are caught and how to determine quality; photographs illustrating shrimp defects; about quality characteristics of monkfish and export to foreign countries; and comments on Federal Specification for Oysters to U.S. Army, Natick Laboratories.

Joe Licciardello and Louis Ronsivalli assisted Professor Herb Hultin of the University of Massachusetts Marine Station in the formulation of an experimental design which proposes to increase the yield and economics of fish meal manufacture while at the same time reduce the obnoxious odors usually associated with fish meal manufacture.

Bob Learson and Louis Ronsivalli assisted Professor Les Whitney of the University of Massachusetts at Amherst in the preparation of a proposal for the feasilibity of using hydraulic separation and classification in the fishing industry.

Louis Ronsivalli, who is a member of an institute advisory board, attended the spring-semester-curriculum evaluation of the Food Science and Technology Department of Essex Agricultural and Technical Institute.

Fred King participated in a workshop meeting with the tuna industry, U.S. Food & Drug Administration, and National Marine Fisheries Service representative at San Diego, CA, on 23-26 January 1978.

Bob Learson and Louis Ronsivalli attended an "Industry-Government Review" meeting in Boston. This meeting was chaired by Hugh O'Rourke and Regional Director Bill Gordon.

NATIONAL SYSTEMATICS LABORATORY

Pelagic Fishes

A working draft of a field guide to species taken by the Atlantic pelagic longline fishery was completed and submitted to the Southeast Fisheries Center. Work continued on the anatomy and systematics of the Spanish mackerels and on a review of the Indo-West Pacific marine halfbeaks.

Benthic Fishes

A collection of ophidioid fishes taken by Soviet trawlers off West Africa was studied.

Crustaceans

Work continued on preparation of a Guide to the Temperate Water Decapod Crustaceans of the U.S. East Coast. Postlarval Pacific American penaeid shrimps were studied. Progress was made on a revision of the shrimp genus Penaeopsis. A manuscript on anomalies or intersexes in shrimps of the genus Penaeopsis was revised. A draft chapter on brachyuran crabs for a book on the pollution ecology of estuarine invertebrates was revised.

Meetings, Talks, Visitors, Publicity

Visitors included Gary Herbst, Donald Stephens, and John Magnuson from the University of Wisconsin; Eric Anderson of the Virginia Institute of Marine Sciences who studied eelpouts, Labbish Chao of the National Museum of Canada who studied croakers; and Jay Quast, NMFS Scientific Editor, who talked over editorial matters with all the Systematics Laboratory professional staff.

B. B. Collette participated in a Publications Policy Board meeting in Washington, DC, to complete transition of certain editorial matters to the new Scientific Editor. D. M. Cohen and B. B. Collette attended a meeting of National Museum-based systematic zoologists with a representative of the National Research Council to explore ways to support systematic research collections.

A seminar was presented to the Natural History Museum's Senate of Scientists on the adaptations and systematics of tunas and mackerels by B. B. Collette.

Manuscripts

Perez Farfante, I. Introductory chapter for shrimps, F.A.O. Identification Sheets for Fishery Purposes, West Central Atlantic. (S)

ATLANTIC ENVIRONMENTAL GROUP

Ocean Monitoring and Climatology Task Group

A magnetic tape and microfilm record of monthly average sea surface temperature, wind velocity, and wind stress for 96 one-degree squares off the Atlantic Coast from 30° to 45°N for 1946-75, was received from the National Climatic Center in completion of a task supported by Atlantic Environmental Group and Northeast Fisheries Center funds. The basic data, from which the monthly averages were computed, are about 1.5 million observations of water temperature and wind velocity made on board cooperating merchant and military vessels operating in the area of interest. The tape will be transferred to the MARMAP Information System for archiving, and a sample graphical portrayal of the variables will be generated for distribution to scientists in the Northeast Fisheries Center.

During January the cooperative Ship of Opportunity Program obtained five transects, of which one was in the Gulf of Maine, one along the 71°W line across the southern New England shelf, two from New York Harbor to DWD 106, and one in the South Atlantic Bight.

A one-page article updating the location and configuration of Gulf Stream eddies adjacent to the continental shelf in the Middle Atlantic Bight was submitted for publication in the February Atlantic Notice to Fishermen. The article also was released to a mailing list of interested individuals at the same time.

Ocean Dumping Task Group

Final preparations were made for the 30 January - 5 February cruise to Deepwater Dumpsite 106 on the Albatross IV, and the oceanographic sampling equipment was transferred from the Atlantic Environmental Group to the ship.

Meetings, Talks, Visitors, Publicity

On 11 January Mert Ingham conferred with members of the Applied Climatology Division of the National Climatic Center in Asheville, NC, regarding tasks underway there for AEG and NEFC.

On 12 January Mert Ingham conferred with members of the Fisheries Assessment Division (F52) in NMFS Headquarters regarding fishery climatology and the NMFS role in the National Climate Program.

Mert Ingham attended a review held in Woods Hole on 26 January of some of the research efforts directed toward describing the trajectories and impacts of wastes discharged at Deepwater Dumpsite 106. The review was led by Dr. Kilho Park and Dr. Tom O'Connor of the National Ocean Survey Ocean Dumping Program Office.

On 30 January Mert Ingham attended a meeting at Wallops Island, VA, of the participants in a cooperative study of blue crab climatology.

Manuscripts

Cook, S. K. 1977. Gulf Stream interaction with shelf water in the Cape Hatteras Area. Gulfstream (NOAA) 3(6). (P)

Ingham, M. C., S. K. Cook, and K. A. Hausknecht. 1977. Oxycline characteristics and skipjack tuna distribution in the southeastern tropical Atlantic. Fish. Bull. 75(4). (P)