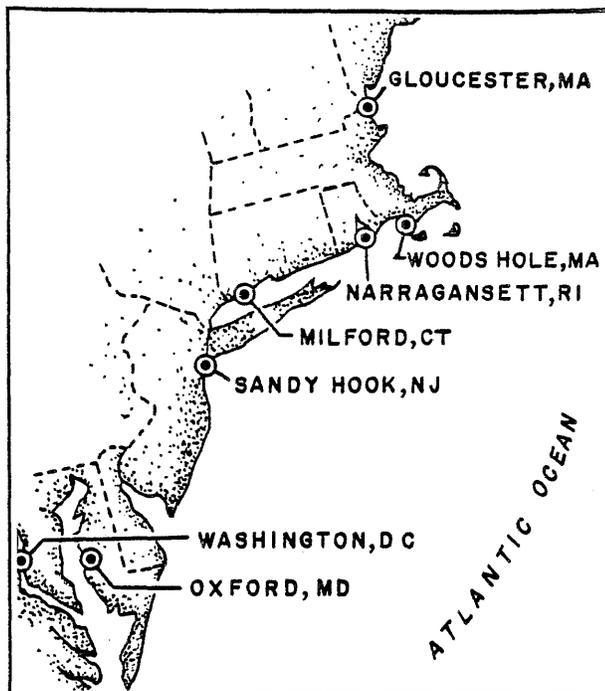


NEFC

Northeast Fisheries Center

NEWS

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DECEMBER 1978

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US DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL MARINE FISHERIES SERVICE



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SUBMISSIONS TO THE "NEFC NEWS" ARE PREPARED BY THE AFOREMENTIONED RESEARCH ADMINISTRATORS, AND COMPILED AND EDITED BY JON A. GIBSON, TECHNICAL WRITER-EDITOR, NEFC.

CENTER DIRECTORATE

Environmental Management Office

Dr. Sindermann participated with other members of a drafting committee in the preparation of a definitive paper on the NMFS position on pollution research. The meeting was held in LaJolla, CA, on 4 December. Dr. Sindermann also served as cochairman of an international Atlantic herring workshop in Quebec City, PQ, during 11-14 December. Several other members of the NEFC scientific staff also participated. As Chairman of the Advisory Committee on Marine Research for the University of Maryland Eastern Shore, Dr. Sindermann participated in a program review at Princess Ann, MD, on 1 December.

Fisheries Utilization Office

In recent meetings that included the 2nd International Meeting on Radiation Processing (more than two dozen countries represented), Annual Meeting of the DOD Research and Development Associates, and Annual Interagency Meeting on Radiation Processing of Foods (including representation from NMFS, FDA, USDA, EPA, EDA, NBS, DOD, etc.), there was evidence for support of radiation processing of foods that had not existed earlier. The reasons for this rebirth of interest in the process are: (1) the continuing demonstration of safety of the process through animal feeding studies; and (2) the continuing demonstration of public health risks associated with the use of chemical additives to prevent the development of botulism or to prevent the growth of insects, pathogenic microorganisms, and parasites. Chemical additives currently used (e.g., nitrite and ethylene oxide) are toxic and may not provide 100% protection anyway.

The NEFC's Gloucester Laboratory is the only US facility designed specifically to preserve seafoods, and its capacity is high enough to produce commercial size lots; therefore, the NEFC's participation is bound to be expected by the other agencies (under a reimbursable contract, of course).

Special Scientific Investigations Office

Art Merrill is preparing a manuscript with Dr. K. O. Emery of the Woods Hole Oceanographic Institution (WHOI) on Holocene molluscan fossils in the Middle Atlantic Bight with emphasis on key species as indicators of post-Wisconsin glacial period climates and sea levels.

Special Technical Projects Office

Ronald Smolowitz and Cathy Rearden completed the fourth mesh experiment data report and continued work on the final mesh report. Work commenced on outfitting the R/V Delaware II with the new clam dredge system in preparation for the January cruise. Seven requests for technical information were processed.

Operations Office

Data Management

On-site systems design and programming support through GSA/Input-Output Computer Services has been extended to include the Narragansett Laboratory. Three

full-time positions have been established with a fourth scheduled soon. Dr. John Flowers has been assigned as the contract leader with Oke Lundin and Dan Geary serving as scientific programmers. The major responsibility of the group will be the analysis and assembly of detailed input pertaining to the future modifications of the MARMAP Information System (MIS), as required for implementation within the NMFS Northeast Regional Fisheries Information System, as well as some scientific application programming.

The first phase of the documentation/standardization task has been completed. Formats are now being designed to allow for the storage and retrieval of the available NEFC software information from a central time-sharing system. Also included in the second phase task is the rewriting of selected program manuals in the new program standards.

The data management staff at Woods Hole also has two new faces. Barbara North (programmer) comes to us from the US Geological Survey in Virginia and Rose Concha (trainee computer aid) has transferred over from the Woods Hole Laboratory administrative staff.

Herb Stern, Eugene Heyerdahl, Kay Paine, and Mary Laird attended a concurrent National Data Management Committee and Financial Management Meeting in Alexandria, VA, during 12-14 September. One outcome was the approval for implementation of a regional automated financial reporting system. A model developed by the SWFC was selected, modified, and implemented, and data are beginning to be entered. Other modifications are being planned to aid in the budget preparation and current fiscal year control of NEFC funds.

Kay Paine attended the Second Working Conference on Oceanographic Data Systems hosted by WHOI during 26-28 September. As a spinoff, arrangements were made for Ralph Mintel, computer specialist at the NWAFC, to give a demonstration of shipboard computer processing for biological surveys in the Northeast Pacific. The NEFC has also been charged with developing an interagency agreement with OFO/NOS for any implementation of shipboard data acquisition and processing.

Eugene Heyerdahl gave a presentation on the development of a Northeast Regional Fisheries Information System to the Northern Section meeting of the Atlantic States Marine Fisheries Commission. As a consequence of the meeting discussions, a NMFS team has been established, chaired by Sal Testeverde (State/Federal Branch of the Northeast Regional Office) to reinstate State/Federal and Regional Fishery Management Council interactions and coordination vis-a-vis statistical data collection and required ADP system processing and access. In a related manner, the NEFC has begun a joint research survey program whereby common survey formats and coding schemes are being used to collect the data which are then processed through the NEFC ADP survey program procedures, with Massachusetts having access to the final survey data series. These State/Federal interactions will begin with two general discussion meetings--30 January for the New England meeting at Peabody, MA, and 1 February for the Mid-Atlantic meeting at Philadelphia PA.

Aquarium Operations

Attendance at the NMFS Woods Hole Aquarium for June-September 1978, the period it is open to the general public, was approximately 182,000 persons. This is a decline in the number visiting the aquarium. The number of persons visiting the aquarium from 1961 through 1978 totals slightly over 4,000,000.

The aquarium is expanding its activities as a marine extension service for regional educational institutions during the period it is closed to the general public from October through May. Tables and chairs have been procured and an informal classroom is being established for lectures by laboratory personnel. Biological specimens are also being collected on the bottom trawl surveys to incorporate into workshop sessions for biology classes. These activities are presently being developed and are planned to be ongoing in the fall of 1979.

Manuscripts

Smolowitz, R. J., L. Sovik, and P. Jacobsen. 1978. New England mesh selectivity studies. Experiment four, offshore groundfish. NMFS, NEFC Woods Hole Lab. Ref. No. 78-54. 31 p.

RESOURCE ASSESSMENT DIVISION

Resource Surveys Investigation

On 2 December 1978, the Delaware II (Steve Murawski, Chief Scientist) departed from Woods Hole to conduct a shellfish resource assessment survey. Surf clams and ocean quahogs were the target species. Stations were occupied between Cape Charles, VA, and Montauk Point, NY, in depths ranging from 10 to 72 m. This survey was the last cruise on which the old 48-inch dredge will be used. The new 60-inch dredge will now be the standard sampling gear for all future shellfish resource assessment survey cruises.

Heavy involvement by all personnel in the Electronics Section and Survey Unit was required for preparation of the electrical components of the 60-inch dredge. During the last week of December all of the components of the 60-inch dredge were installed aboard Delaware II for the first time. Preparations will be completed on time and the planned 3 January 1979 test of this gear should be conducted as scheduled.

The processing of survey data continues. The processing of the summer bottom trawl survey has been completed. The offshore fall bottom trawl survey has been nearly completed and should be put onto tape by mid January 1979. The summer scallop surveys (both R/V Albatross IV and Delaware II cruises) have been completed and are now on tape.

Fishery Biology Investigation

Gary Shepherd worked on impressing and aging commercial summer flounder samples for 1978. He finished impressing all of the 1978 commercial samples and completed aging the first quarter 1978 commercial summer flounder samples. He also continued work on preparing summer flounder fin ray data for a paper. He helped Vi Gifford with the aging of 1976 commercial redfish samples.

Vi Gifford worked on aging the second quarter 1976 commercial redfish data. She sectioned and aged 280 samples and then started re-aging the samples for the second reading.

Kris Kantola finished aging second quarter 1978 commercial haddock samples and began putting the data on age sheets.

Judy Penttila worked on preparing the haddock scale samples to be used in developing the Auto Age Reading System. She also worked on evaluating proposals for the development of a software program to be employed in conjunction with an image analysis system to automatically examine scales from haddock.

Before entering the hospital and during recovery at home, Louise Dery completed over one-third of the Albatross IV Cruise No. AL 78-04 silver hake samples, began training Laurie Savelkoul in aging red hake; they made good progress -- aging more than one-half of the Albatross IV Cruise No. AL 78-04 samples and submitting a 1978 US-USSR comparative aging of red hake report. Louise and Cathy Rearden began a comparative aging study of butterfish to resolve aging problems of that fish, and examined otolith growth patterns for a silver hake meristic study.

Cathy Rearden worked on assemblage of length frequencies for butterfish from cruises in 1977 and 1978 to aid in resolution of aging problems of the species. Cathy also finished her work with Ron Smolowitz concerning mesh selectivity.

Laurie Savelkoul continued sectioning silver hake otoliths from the 1978 summer survey cruises and assisted Ambrose Jearld in a literature search for material on ocean quahog for a proposed density-dependence experiment.

Mike Campbell worked on impressing and aging 141 scup samples from Delaware II Cruise No. DE 78-06. He completed assembling mean length-at-age data for a growth paper on scup and worked on aging ocean pout samples collected on Delaware II Cruise No. DE 78-06.

John Ropes participated in a Delaware II cruise designed as a shellfish resource assessment survey.

Loretta O'Brien worked on sectioning sea scallop commercial samples and surf clams. She also began working with Art Merrill (interested in problems centered around aging juvenile sea scallops).

Ambrose Jearld worked with the Shellfish Biology Task headed by John Ropes and the Finfish Biological Studies Group in establishing priorities for aging different species. Ambrose also evaluated proposals for the development of a software program to be employed in conjunction with an image analysis system to automatically age fish scales from haddock. In addition to these activities, Ambrose reviewed papers by John Ropes, Wallace Morse, and Stewart Grant et al., submitted or to be submitted for publication.

Sandy Hook Investigation

Darryl Christensen revised the estimate of the 1978 Atlantic mackerel recreational catch which included confidence intervals about the New York-through-Delaware catch. He also began analysis of the summer 1978 bluefish catch data which had been corrected and summarized. John Clifford continued correcting and summarizing bluefish data collected late in the season. He also worked with the Sandy Hook Laboratory ADP Unit to make additional revisions in computer programs for analysis of the 1975-77 party-boat and charter-boat survey data.

Wally Morse reports that cataloguing and automatic data processing of historical maturity observations collected between 1971 and 1975 continued. Approximately 12,000 observations have been recorded, reformatted, put on computer tape, and corrected for keypunch errors. All of the fall 1978 bottom trawl survey maturity data have also been keypunched, listed, corrected, and put on tape.

Erin Feeney finished laboratory processing of silver hake ovary samples and began counting and measuring eggs. She also worked on summarization of historical data for 23 species found in surveys of Sandy Hook Bay as part of a BLM report.

Stuart Wilk completed a final report titled "Biological and Fisheries Data on Weakfish, Cynoscion regalis (Bloch and Schneider)" which will be included in the Sandy Hook Laboratory Technical Report Series.

Fishery Analysis Investigation

Steve Murawski continued work on an ocean quahog assessment and initiated analysis of surf clam survey and logbook data for an updated surf clam assessment. Steve also served as Chief Scientist on the 1-21 December Delaware II surf clam/ocean quahog resource research survey covering from Montauk, NY, to Cape Charles, VA.

Ralph Mayo continued efforts on a redfish assessment paper, and worked with Maureen Griffin in updating the foreign fishery observer 1977 inventory log file and completing the 1978 log file. Ralph and Otis Jackson completed rewriting and restructuring the Division's biostatistical computer program.

Bill Callahan continued updating the commercial fishing vessel history record file and also provided data for the following requests: (1) groundfish landings summary for October 1978; and (2) a vessel-landings analysis for 1978. Both requests were performed for the Statistics Branch of the Northeast Regional Office.

Joan Palmer continued work on developing a Georges Bank multispecies fisheries model.

Paul Wood participated in the surf clam/ocean quahog Delaware II survey cruise during 1-21 December, and also began analysis of sea scallop height frequencies and relative abundance derived from bottom trawl survey cruises.

Fred Serchuk continued sea scallop assessment analyses and initiated analysis of the autumn 1978 bottom trawl survey results for Atlantic cod.

Brenda Fields left the Investigation to return to school.

Fishery Assessment Investigation

Emory Anderson continued to work on some silver hake yield-per-recruit analyses, assisted Frank Almeida in completing updated assessment reports for silver hake and red hake, and drafted a report of joint US-USSR life history studies in 1978 in which the Resource Assessment Division was involved for use at the US-USSR scientific discussions to be held in Moscow in February 1979.

Frank Almeida began the preliminary analysis of silver hake morphometric data obtained from samples collected during the bottom trawl survey for a stock delineation study. Joe Wade continued work on measuring morphometric characters on the silver hake and also participated in the shellfish resource assessment survey (Delaware II Cruise No. DE 78-07) from 1 to 21 December.

Steve Clark completed the initial draft of a manuscript on the review and assessment of the Georges Bank - Gulf of Maine haddock stocks.

Emma Henderson continued work on developing groundfish models for the New England Fishery Management Council and participated at a multispecies fishery management workshop held at Harvard University in Cambridge, MA, during 18-19 December.

Bill Overholtz completed work with Steve Clark on a haddock review and assessment paper and also worked on computer calculation of abundance indices for Atlantic mackerel. Bill resigned from his position and left at the end of December to begin work on a Ph.D. in fisheries biology at Oregon State University in Corvallis, OR.

Thurston Burns completed a manuscript with Steve Clark dealing with the assessment of offshore lobsters based on bottom trawl survey data which had been presented at a US-Canadian lobster workshop held in October. He also completed a

summary of autumn bottom trawl survey data for lobster for 1964-77 in the Gulf of Maine and on the Scotian Shelf.

Hillary Herring completed the final processing and auditing of July-September 1978 US commercial length-frequency data, finished the initial coding of the November data, and completed the conversion of commercial length data from card to computer tape storage.

Pat Carter worked with Bill Overholtz to learn computer procedures for retrieving survey data and running various analyses.

Fishery Systems Investigation

During December, some data from the autumn bottom trawl survey became available. A preliminary review of this data indicates a modest improvement in yellowtail flounder recruitment prospects and a substantial decline in Loligo squid recruitment relative to recent years. Status reports on squid and yellowtail flounder resources were presented to New England Marine Advisory Service personnel at a meeting in Woods Hole on 7 December by Margaret McBride and Anne Lange.

Anne Lange also reviewed and commented on a proposal to change the start of the "fishing year" for squid from 1 January to 1 April. She also participated in a meeting of the team negotiating the US-Canadian boundary on Georges Bank. This meeting was held in Boston on 6 December. Anne completed a paper (with Karen Johnson) on length-weight relationships of squid along the US East Coast.

Otis Jackson continued to work on the development of computer programs to plot coastal maps, contours, and statistical areas. Otis is part of a Resource Assessment Division team working to develop software for more efficient handling of bottom trawl survey data. This software development is being funded by BLM in order to facilitate the preparation of the reports necessary to evaluate the environmental impact of offshore drilling.

Mike Sissenwine reviewed a proposal for research on winter flounder submitted by the State of Rhode Island.

Meetings, Talks, Visitors, Publicity

Stuart Wilk attended a State-Federal Striped Bass Management Program Scientific and Statistical Committee meeting in Norfolk, VA, on 30 November and 1 December 1978.

Fred Serchuk attended the New England Marine Advisory Service (NEMAS) Stock Assessment Workshop on 7 December in Woods Hole and presented a review of the assessment of the Georges Bank and Gulf of Maine Atlantic cod stocks.

Ralph Mayo and Fred Serchuk attended the Southern New England Chapter Meeting of the American Fisheries Society on 11 December in Northampton, MA. Ralph presented a paper titled "A Review of NMFS Northwest Atlantic Commercial Fishery Data Bases: A Pre- and Post FCMA Perspective."

Emory Anderson attended a meeting in Philadelphia, PA, on 11 December with representatives from the Mid-Atlantic, South Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils, the NMFS Northeast Regional Office, and the Miami Laboratory of the SEFC. Jack Casey of the Narragansett Laboratory also attended. The purpose of the meeting was to review the present status of shark management plans being prepared by the Mid-Atlantic and Gulf Councils and particularly to examine the data base available for determining maximum sustainable yield (MSY) and optimum yield (OY).

Michael Sissenwine and Gordon Waring attended a meeting of a US-Canadian herring working group in Quebec City, PQ, during 11-15 December.

During 11-15 December, Ambrose Jearld participated in and completed a training course (Effective Supervision) offered in St. Petersburg, FL.

Steve Clark attended a meeting of the Northern Shrimp Section of the Atlantic States Marine Fisheries Commission (ASMFC) held in Portsmouth, NH, on 13 December at which time, as Chairman of the Northern Shrimp Scientific Committee, he reviewed biological information and presented management recommendations for the 1979 open season for shrimp.

Michael Sissenwine and Joan Palmer attended the Multi-Species Fisheries Management Workshop sponsored by the New England Fishery Management Council on 18 and 19 December in Cambridge, MA.

Fred Serchuk presented a talk on the current status of Northwest Atlantic sea scallop populations to the Dartmouth (MA) Rotary Club in Dartmouth on 19 December.

Manuscripts

Almeida, F. P., and E. D. Anderson. 1978. Status of the Georges Bank silver hake stock - 1978. NMFS, NEFC Woods Hole Lab. Ref. No. 78-57. 19 p.

Almeida, F. P., and E. D. Anderson. 1978. Status of the Gulf of Maine silver hake stock - 1978. NMFS, NEFC Woods Hole Lab. Ref. No. 78-56. 19 p.

Almeida, F. P., and E. D. Anderson. 1978. Status of the Southern New England - Middle Atlantic silver hake stock - 1978. NMFS, NEFC Woods Hole Lab. Ref. No. 78-55. 19 p.

Almeida, F. P., E. D. Anderson, and H. A. Herring. 1978. Status of the Southern New England - Middle Atlantic red hake stock - 1978. NMFS, NEFC Woods Hole Lab. Ref. No. 78-59. 18 p.

Anderson, E. D., and W. J. Overholtz. 1978. Summary of mackerel catch data from the USSR R/V Argus 1978 winter mackerel survey and the USA R/V Albatross IV 1978 spring bottom trawl survey. NMFS, NEFC Woods Hole Lab. Ref. No. 78-58. 8 p.

Burns, T. S., and S. H. Clark. Application of bottom trawl survey data to offshore lobster assessments. Fish. Res. Bd. Canada Tech. Rept. (S)

Clark, S. H. Application of bottom trawl survey data to fish stock assessments. Fisheries. (A)

Lange, A., and K. Johnson. 1978. Dorsal mantle length - total weight relationship of squid (Loligo pealei and Illex illecebrosus) from the Northwest Atlantic off the coast of the United States. NMFS, NEFC Woods Hole Lab. Ref. No. 78-51.

MARINE ECOSYSTEMS DIVISION

Ecosystem Dynamics Investigation

During December, Marv Grosslein, Wendell Hahm, and Ed Cohen attended a workshop at Harvard University on multispecies modeling. The workshop was jointly

sponsored by the New England Regional Fishery Management Council, NMFS, and Harvard University. The meeting was held to explore the possibilities of using ecosystem models in fisheries management. The models of Andersen-Ursin and Laevastu-Favorite were discussed with a view towards their potential as management tools. In addition, a plethora of questions concerning ecosystem models, and their applicability to management, were discussed. The workshop concluded with a consensus that multispecies models had a place in fisheries management, but that neither of the models discussed were fully satisfactory in their present form. A decision was made that the NEFC modeling group and Dr. Bossert's group at Harvard should continue to work on their respective modeling efforts while keeping channels of communication open between the two groups. The desirability of further workshops was espoused. Marv Grosslein participated in an S&S Committee meeting for the New England Regional Fishery Management Council on 13 December and helped prepare a critique of a discussion paper on management of the New England commercial groundfish fishery (by L. Vidaeus and J. Mueller). The critique was based on reviews by committee members and four outside professionals. Marv Grosslein completed the FY 1981 task development plan for the Ecosystem Dynamics Task. In addition, Marv Grosslein worked on the final editing of paper No. 25 of the ICES Symposium on Pelagic Fish Stocks, "Recent Fluctuations in Pelagic Fish Stocks of the Northwest Atlantic, Georges Bank Region, in Relation to Species Interactions," by Grosslein, Langton, and Sissenwine. This paper will be published by ICES in a special symposium volume.

Mike Pennington started work on a technical report on the estimates of fecundity of haddock for 1970-74. He also revised his paper on fitting a growth curve to field data for larval fish. Cindy Obenchain and Peter Berrien (Sandy Hook Laboratory) came to Woods Hole for consultation with Mike Pennington on the statistical analysis of their respective plankton and fish egg data.

Wendell Hahm worked on developing more efficient algorithms to ameliorate storage and run-time problems in the ecosystem model of Georges Bank. He concentrated on algorithms to deal with the economical storage of sparse matrices, by storing only non-zero matrix elements, along with additional functions to access and manipulate these condensed matrices quickly. On 4 December, Wendell Hahm presented a seminar at the University of Rhode Island Graduate School of Oceanography on modeling the Georges Bank ecosystem.

Ed Cohen returned to Woods Hole after attending classes in the University of Washington College of Fisheries.

Recruitment Processes

George Bolz, Bill Michaels, Bob Halpin, and Mary Nolf sailed on Albatross IV Cruise No. AL 78-15, during 29 November-15 December 1978, to conduct the standard larval Atlantic herring survey in the Georges Bank - Nantucket Shoals area. They also tried to conduct some limited fine-scale sampling on the larval herring patch previously studied during the multiship patch experiment just east of Cape Cod. The standard survey was successfully completed. Herring larvae were found only at 9 of the 81 standard stations sampled; most of the larvae observed were located in the Nantucket Shoals area. Larval herring production for the 1978 season was as low as the 1976 season's estimate which was the lowest production in the 8-yr time series. High densities of newly hatched sand lance (Ammodytes spp.) were observed on Nantucket Shoals, especially in the area of the larval herring patch study. After completion of the standard survey, a fine-scale grid of bongo stations

was sampled east of Cape Cod to identify the larval herring patch studied in early November. Although the densities of larvae in the area were considerably lower, the patch center could still be identified and was located in approximately the same area as on previous surveys. Several MOCNESS hauls were made on the patch site.

Greg Lough submitted a press release to NOAA News on the patch study, and presented a seminar on the study at the Marine Biological Laboratory. Roz Cohen has finished the larval herring - condition factor computer analysis of the December 1974 survey so that we now have two complete winters. Janet Murphy continued larval herring gut analysis of the October 1974 Wieczno samples. Both Roz Cohen and Janet Murphy are now working full time on the quality control of plankton logs from the ICNAF time-series in hopes of having the data outputs available by the end of January. Coop students Bob Halpin and Pete Hamer completed their appointments at the Woods Hole Laboratory and returned to school to finish their degrees. Temporaries Judy Lettes, Mary Nolf, and Virginia Wixson (CETA) also discontinued their appointments to return to school.

Ichthyoplankton Investigation

The second year of MARMAP plankton surveys on the continental shelf from the Gulf of Maine to Cape Hatteras was completed. In 1978, five of the seven surveys were conducted jointly by American and Soviet scientists, working from Soviet research vessels. Results of our February-March 1978 survey indicate that sand lance (Ammodytes spp.) larvae continue to dominate the winter ichthyoplankton, a situation that began in the early 1970's. In 1976 and again in 1977, sand lance larvae accounted for more than 90% of the young fishes collected in February and March in the Middle Atlantic, Southern New England, and Georges Bank subareas. In 1978, they accounted for 94% of the larval fish. They were the only species represented in the catch at 62% of the stations where larvae occurred. Sand lance larvae were most abundant in 1978 in the Southern New England subarea, where concentrations greater than 100 individuals per square meter of surface area blanketed a large part of the continental shelf from Long Island to Nantucket Shoals. Equally abundant concentrations occurred off Delaware and Maryland, and the outer banks of North Carolina.

Plankton Ecology Investigation

Bob Marak was at the Plankton Sorting Center in Szczecin, Poland, for 5 wk. During his stay he worked closely with Dr. Ejsymont and his staff in coordinating their efforts in meeting our sorting and identification priorities. A cooperative food habits study of larval Atlantic cod, haddock, and pollock was initiated with three of the senior scientific staff of the sorting center. Predator-prey relationships will be looked at between years (1976-77 and 1953-56) and geographical areas (Georges Bank, Southern New England, and Mid-Atlantic Bight). Over 200 stomachs of 5-25 mm long larvae have been examined so far. The cooperating scientists doing these analyses are still able to maintain their high level of routine sorting and identification. As of 1 January, all MARMAP I ichthyoplankton sorting and identification priorities for 1978 samples were completed with the exception of the November Belogorsk cruise. It is anticipated that the zooplankton analysis for the Mid-Atlantic Bight (1977) will be completed by 15 January. The analysis of the Southern New England, Georges Bank, and the Gulf of Maine samples has been completed at the Narragansett Laboratory.

Bob Marak participated in an official "krill tasting" experiment; 13 dishes of Antarctic krill were presented to the 21 invited guests. On a scale of 2-5, most recipes ranked in the 4-5 category, a fairly high rating considering that the krill were frozen for over 4 mo.

Plankton-Hydrography

A detailed analysis is being made of Argus Cruise No. 78-04 (13 April-24 May 1978) oceanographic and ichthyoplankton data in the context of a marked offshore displacement of the slope-shelf water front off the Middle Atlantic Coast during the spring of 1978 as evidenced by infrared satellite imagery. The possible impact of this offshore displacement of coastal water on the distribution and survival of boreal species of larval and juvenile fishes is being investigated. The processing of the 1978 monitoring series is completed for February through July. The samples collected in August and September have been processed for the Southern New England area.

Biostatistics

Work continued on updating the master files in the ICNAF larval Atlantic herring data base to accept 0.333-mm mesh bongo net data. Janet Murphy worked with us for a week in December helping with this task. The first listings of zooplankton data were sent to the Woods Hole Laboratory for quality control. These cruises included: Belogorsk Cruise No. 75-02, Belogorsk Cruise No. 75-03, Albatross IV Cruise No. AL 75-14, and Albatross IV Cruise No. AL 74-13. Op-scanning of ichthyoplankton data is nearly complete. The files from cruises during 1971-77 are being prepared for merging, the most recent cruises being handled first. Tom Plichta is continuing to process ichthyoplankton data obtained under the BLM contract.

Image Analysis

Danny O'Neil (University of Rhode Island Department of Oceanography) began making a series of measurements on images of preserved plankton specimens. These measurements will be used in further efforts to separate taxa using shape factors.

Preliminary evaluation of shipboard photos of zooplankton samples (taken by Dave Potter) using the Edgerton silhouette technique indicates that with minor modifications, these will be adequate for image analysis. Counts and measurements were easily made from discrete images on the 8x11-inch negative format.

Close cooperation continues with Tom Halavik of the Larval Physiology and Biochemistry Investigation, who is trying to develop the silhouette technique to photograph microzooplankton (rotifers and copepod nauplii) being used in feeding experiments. Once perfected, counts and size histograms will be made of live food organisms.

Larval Physiology and Biochemistry Investigation

Feeding experiments with larval Atlantic herring at a fixed prey density of 0.5 plankters per milliliter showed growth rates to be negative at this density. Experiments were conducted for the first 2 wk following feeding initiation and for 1 wk with larvae 4-5 wk old. Starvation experiments with herring showed they could remain viable as long as 10-14 days without food.

Drs. Beyer and Laurence visited the University of Miami (Florida) where they discussed the results of their larval survival model and potential cooperation with Dr. E. D. Houde and his graduate students. Geoffrey Laurence attended a 1-wk supervisory training course in St. Petersburg, FL.

Work with laboratory-reared herring larvae was completed. Changes in RNA, DNA, protein, and dry weight were observed for the first 5 wk after hatching. Nitrogen utilization studies were completed on 3, 20, and 33-day-old larvae. Preliminary estimates of the coefficient of nitrogen utilization for 20 and 33-day-old larvae were 33% and 35%, respectively.

Preliminary results from work on summer flounder indicate that measurements of serum alkali-labile phosphorous may be useful for monitoring the progress of hormonally induced spawning in this species.

Fishery Oceanography Investigation

December was devoted principally to cleaning up after the patch study and preparations for the Nantucket Shoals flux experiment, our two major field exercises since the Northeast Channel measurements. Meanwhile, both Steve Ramp and Derek Sutton have continued to input data from the latter exercise into the computer. Gil Dering and Tom Laughton repaired and refurbished the battered current meters and releases that were recovered from the patch study area by Canadian fishermen. Fortunately, none leaked, but there was both internal and external damage to several. Necessary replacement parts have been ordered and repairs continue.

The heavy load of salinity samples left from the patch study and fall MARMAP cruises was tackled on a rotation basis by Dan Patanjo, Sam Nickerson, Tim Cain, Tom Laughton, and Jim King, who returned to duty briefly during the holidays. When he wasn't running the salinometer, Jim plotted temperatures and drogue tracks from the patch study. By the end of the year the salinity backlog was completed.

Tim Cain has been assembling data from the larval Atlantic herring cruises in preparation for a series of data reports; most of the plots have already been prepared by Sam Nickerson. Dan Patanjo has nearly completed his summary of cruises on which hydrographic data were taken; it is already proving useful. Tim has also been deeply involved in organizing a Center-wide EEO workshop to be held in Milford in January.

Ron Kirschner checked out the oxygen titration apparatus returned from Belogorsk and has ordered the necessary equipment to build two duplicates, one to be permanently assigned to MARMAP and one as a spare. Ron also completed the November report on Ship of Opportunity runs across the Gulf of Maine.

Looking ahead, Red Wright and Ron Schlitz continued discussions on the Nantucket operation with WHOI and USGS. New current meters and releases were ordered to replace those lost in the patch study. Steve Ramp worked with John Vermersch of WHOI on the mooring design, and Derek Sutton, with Steve's help, drew up plans for improved marker floats with bigger radar reflectors and more reliable lights.

Ron Schlitz and Tom Laughton completed the charts and figures for a report on the volumetric study of the Gulf of Maine, and Bob Pawlowski returned briefly to rewrite and update his paper on bottom trawl survey surface temperatures and salinities for submission for publication.

At the end of the month, Tom Laughton left to return to Northeastern University and Steve Fogg arrived to take his place.

Benthic Dynamics Investigation

Good progress was made in writing up the main parts of the biological and life history aspects of the fishery management plan for the deepsea red crab. Inasmuch as this plan is being prepared in collaboration with other NMFS personnel and the New England Regional Fishery Management Council, the biological section constitutes only part of the comprehensive management plan. Shortcomings in our knowledge about various life history aspects of this species have become apparent during the preparation of this report. Some effort was devoted this month to work on two major groups of benthic invertebrates. Bivalve mollusks, which constitute the dominant portion of the benthic biomass, were studied with special emphasis on species distribution and relationships with bottom sediments. The second invertebrate group studied was the benthic amphipod crustaceans, which is the most numerous component of the macrobenthos and a major fish food. Geographic and bathymetric relationships of the various species were analyzed.

Fish food habits studies this month consisted largely of laboratory analyses. Gut weights and gut content weights have been obtained from all the frozen fish which had been collected in the Georges Bank - Gulf of Maine region on Belogorsk Cruise No. 78-02 during September - October 1978. Ray Bowman is continuing with the analysis of juvenile haddock food habits data. This study represents collections made during 1953-76. Rich Langton has made good progress in the analysis of the 1969-72 flatfish data base. The necessary computer programs have been modified to output the results in the desired format. Also, some headway has been made in establishing the KWIC (keyword in context) reference file for Rich Langton's and Ray Bowman's reference collections. Discussions with Bori Olla of the Sandy Hook Laboratory centered on the feasibility of developing a joint research effort addressing the problem of digestion rates in fish.

Apex Predators Investigation

Tag returns from six sharks, including two blues, two silkies, a sand tiger, and a smooth hammerhead, were received during the month. The smooth hammerhead was recaptured almost 200 mi south of the tag site off Ocean City, NJ, following 16 mo at liberty. The remaining five sharks had moved less than 100 mi after periods of freedom of 1-12 mo.

Tagging efforts by cooperating sportsmen were considerably reduced during December. Records received accounted for only 46 sharks being tagged, all of them south of Cape Hatteras, NC.

The semiannual newsletter, "The Shark Tagger," is in the first stages of preparation and is expected to be distributed to sportsmen volunteers and other contacts by February.

Longline catch data were provided to Dr. Virginia O'Leary of Booz, Allen, and Hamilton, Inc., for use by the South Atlantic Fishery Management Council.

Meetings, Talks, Visitors, Publicity

Carolyn Griswold, Chris Powell, Wes Pratt, Chuck Stillwell, and Lorrie Sullivan attended a workshop of the Southern New England Chapter of the American Fisheries Society in Northampton, MA, on 11 December 1978.

Carolyn Griswold has been working on revisions of the Draft Plan for Assessing the Impacts of Acute Spills of Oil and Other Toxic Substances on Fishery Resources.

On 8 December, Kenneth Sherman attended a meeting with NASA Langley staff held at Woods Hole to plan the upcoming large area marine productivity experiments (LAMPEX).

Kenneth Sherman and Rich Langton participated in a 2-day modeling workshop held at Harvard University, convened by Bill Bossert, to discuss the status of fishery ecosystem modeling. The principal models discussed were the Laevastu-Favorite and Ursin-Andersen models that would be most appropriate for analyzing the Georges Bank ecosystem.

Bob Edwards, Ken Sherman, and NOAA Office of Ocean Engineering staff met with Ferris Webster, Assistant Administrator of NOAA for Research and Development, to consider funding a comprehensive image analysis proposal. This initiative will address scale reading and high-speed zooplankton processing.

Manuscripts

Beyer, J. E., and G. C. Laurence. A stochastic model of larval growth. Ecol. Model. (A)

Buckley, L. J. Changes in RNA, DNA, and protein content of the winter flounder (Pseudopleuronectes americanus) and the effect of starvation. Fish. Bull., U.S. (A)

Laurence, G. C. 1978. Comparative growth, respiration and delayed feeding abilities of larval cod (Gadus morhua) and haddock (Melanogrammus aeglefinus) as influenced by temperature during laboratory studies. Mar. Biol. 50:1-7. (P)

MANNED UNDERSEA RESEARCH AND TECHNOLOGY PROGRAM

Personnel from the Manned Undersea Research and Technology Program spent the month analyzing data and preparing manuscripts on: (1) ecology and geology of Georges Bank submarine canyons; (2) ecological factors affecting survival of North Atlantic herring during spawning; (3) ecology and population structure of the surf clam populations off southwest Long Island, NY; and (4) synoptic comparison of surf clam density using a clam dredge, air lift, and diver sampling. Diver-collected samples and photographs of attached benthic organisms at the Jeffreys Ledge, Gulf of Maine, Ocean Pulse station were analyzed.

Uzmann and Cooper briefed personnel from BLM on the distribution and relative abundance of soft corals in the heads of Wilmington, Baltimore, and Oceanographer Canyons. These are proposed drilling sites for gas and oil. Information on the soft coral populations of these canyons is being gathered by BLM as part of an overall data base from which leasing decisions will be made.

DIVISION OF ENVIRONMENTAL ASSESSMENT

Behavior of Marine Fishes and Invertebrates Investigation

Experiments are continuing into the study of the behavior of bluefish in the presence of thermal edges. To examine the role that body size plays in the capability of fish to enter and remain in cold water, different size groups are being compared. Preliminary results from experiments with large, free-swimming adults weighing about 3.9 kg, acclimated to 15°C and then introduced to cold water,

showed no overt impairment of coordinated swimming activity down to 8°C. Below 8°C, motor coordination was significantly affected, manifested in the fish colliding with the aquarium walls and losing equilibrium. However, it took some time for the effect to occur, i.e., 35 min at 7°C and 25 min at 5°C. This time lag observed in the adults may reflect their capability for entering water that is potentially lethal and utilizing food resources contained therein. Although we have demonstrated the physiological capability of the fish to do this, it remains to be tested whether this will in fact occur for fish in a choice situation. We are currently preparing our experimental facilities to answer this question.

In contrast to the adults, when young bluefish weighing about 80 g were introduced to 5°C water, the loss of motor coordination was apparent after only 1.4 min. Their capability to remain at cold temperatures, as would be predicted, is extremely limited. We are currently examining predator avoidance strategies in regard to thermal barriers in these fish.

Biological Oceanography of Stressed Ecosystems Investigation

December was begun with participation by Drs. Pearce and Thomas at an NRT Oil Spill Response Training Workshop at Santa Barbara, CA. At this workshop the initial response of a scientific team to an oil spill was further discussed and field tested using the NOAA/EPA Philadelphia workshop and scenario as a starting point. It was determined that sampling from a helicopter was feasible not only for bucket samples, but also for plankton tows and bottom grab sampling.

From 11 to 14 December, Dr. Thomas participated as Section Co-Chairman of the US EPA/NOAA Interagency Workshop on Oil Spill Response held at Kiawah Island, SC. At this workshop, discussions were held building upon the Santa Barbara and Philadelphia workshops, and contingency plans were developed for initial response and assessment to offshore, estuarine, and inland spills. Dr. Thomas and CDR Wilkins (USCG) developed the response to an offshore spill scenario in the Straights of Florida which within 48 hr had impacted on coral reefs, grass beds, beach, bay, and mangrove communities. The scenario was developed on a nearly real-time basis and experts at the local, state, and national level were consulted. As with previous workshops, a document is to be prepared and distributed.

On 8 December, Dr. Thomas participated in a NOAA-NEFC/NASA workshop concerning joint interactions for remote sensing and ground truth. Subsequent to that meeting, additional conversations were held with Dr. Johnson (NASA) to discuss detailed planning for joint operations in March-April 1979 regarding the M2 Multispectral Scanner Zoom studies.

Graphic illustration for the MESA/SINC studies was completed and figures are now being photographed in readiness for inclusion in a final report due in January. Phytoplankton samples collected on the November USSR R/V Belogorsk cruises were sent to Dr. Marshall (Old Dominion University). A proposal for phytoplankton species analysis as part of the Ocean Pulse Program was received from Dr. Marshall.

The oxygen consumption data obtained from two in situ Ocean Pulse metabolism investigations involving surf clams from the New York Bight collected in August 1978 and two species of starfish (Porania insignis and Asterias vulgaris) from Pigeon Hill on Jeffreys Ledge collected in October 1978, have been reduced. These data will be integrated with ammonia excretion rates obtained during the same experiments to aid in distinguishing between the animal's metabolism in stressed and unstressed conditions. The in situ seabed oxygen consumption data obtained in August 1978

from the collaborative investigation (Intensive York River Study) between Mr. William C. Phoel and Dr. L. Haas of the Virginia Institute of Marine Science (VIMS), have also been reduced and will be integrated with the physical and chemical data collected by VIMS and the other collaborating universities.

This experiment was done to determine the consumption of oxygen and nutrient flux by the estuarine sediments prior to, during, and after severe hypoxia of the bottom waters and subsequent phytoplankton blooms. It is anticipated that these data will be applicable in aiding in the understanding of the condition encountered at the seabed off the New Jersey coast during the anoxic event of 1976.

Coastal Ecosystems Investigation

Dave Radosh began cluster analysis of all of our 1976 New Jersey Coast benthic data to determine the extent and severity of benthic impacts from that summer's hypoxia. The 1976 information will now be compared to data from a time series of 1977-78 samples, to examine the sequence and progress of recolonization following anoxia. Ann Frame and Bob Reid continued analysis of long-term (1972-78) trends in the macrobenthos of Long Island Sound. This research is considered important in establishing long-term trends and variations for Ocean Pulse monitoring and assessment. Ms. Frame also worked on descriptions of new species of amphipods from the Sound, while Mr. Reid was involved with problems related to reformatting data and producing final reports for the three tasks (finfish, ichthyoplankton, and pathobiology) still active. We assisted Northeast Regional Office Environmental Assessment Branch personnel in assessing benthic impacts of dredging an intertidal area to create a marina at Stone Harbor, NJ. Frank Steimle and Jan Caracciolo continued to work on the New York Bight apex benthic atlas. A draft of the text concerning life histories of common apex species has been completed, and distributional maps are being prepared. Mr. Steimle also completed the first issue of the Ocean Pulse Newsletter, and worked on revising the Ocean Pulse Program development plan. Tom Wilhelm completed measuring caloric contents of selected invertebrate species collected on the April 1978 Ocean Pulse cruise, and began analysis of materials from the September cruise. Sorting Center work concentrated on New Jersey post-hypoxia samples. We are planning for the bulk of future sorting (primarily benthic samples from Ocean Pulse strata) to be conducted through contractual arrangements as part of the Ocean Pulse Program. Standard methods and protocols are being developed as part of Ocean Pulse.

Environmental Chemistry Investigation

This group finished computerizing 16,000 chlorophyll measurements made during nine cruises (MARMAP and Ocean Pulse) between Cape Hatteras and Nova Scotia. Additionally, with considerable assistance from Donna Busch (Narragansett Laboratory), the group completed computerization of primary productivity measurements made on Belogorsk Cruises No. 78-01, 78-03, 78-04, and Albatross IV Cruise No. AL 78-12.

Physiological Effects of Pollutant Stress Investigation

Physioecology

A third long-term exposure (45 days of exposure and a subsequent 30 days of depuration) of copper as the chloride to the deposit-feeding clam Macoma balthica was initiated. A second experiment initiated in November was terminated early because of mechanical failure in the diluter system.

Microrespirometers ordered several months ago recently arrived. Experiments to determine the effect of mercury on oxygen consumption in oyster larvae will be resumed.

Considerable effort was spent in collecting M. balthica and winter flounder for exposure studies and preparing the proportional diluters for such.

Physiological Effects

With the repair of our flame photometer at the beginning of this reporting period, we were able to complete hundreds of backlogged serum samples collected during the spring Researcher and the fall Albatross IV Ocean Pulse cruises. We have added hundreds of serum sodium, potassium, calcium, and osmolality values from finfish, crustaceans, and mollusks to the baseline data file for Ocean Pulse. This data file is essential if we are to detect pollution-related perturbations during future Ocean Pulse activities.

We have also been working with a new method for measuring heart rate and gill-bailer activity in lobsters and crabs. This method employs electrodes glued to the outer carapace surface and results in an excellent recorder tracing. We have been using this technique to study arsenic effects. It is particularly useful since the added stress of drilling a hole in the carapace for electrode implanting is eliminated.

Work is also continuing on the effects of silver on feeding in bivalves. Because we now know that silver greatly reduces feeding rates while simultaneously increasing oxygen consumption rates, we are making growth and weight measurements.

Biochemical Effects

November and December have been spent working on tissue samples from three sources: the recent Ocean Pulse cruise (Albatross IV Cruise No. AL 78-12); several sea scallop survey cruises; and four experimental exposures of rock crabs and American lobsters to sodium arsenite (100 ppb of As for 2 mo). Data analyses thus far show very little disturbance of tissue biochemistry in the arsenic-exposed animals. A data base is beginning to emerge for metabolic patterns in scallop adductor muscle, taken from animals at stations with differing hydrographic parameters. Consistency of technical help is a real problem here. About 10 stations in four general areas were selected with the help of Henry Jensen and Don Flescher of the Woods Hole Laboratory for seasonal sampling of scallops for biochemistry, one of the areas to have a depth transect. The Woods Hole Unit of the Resource Surveys Investigation continues to give invaluable help in this respect; their sampling and packaging techniques are excellent. Scallops taken from the Baltimore Canyon oil-drilling site during the Ocean Pulse cruise had significantly elevated enzyme activity (three of five enzymes tested) compared to animals taken from a nearby control station of similar depth and temperature. The same was not true for scallops taken from the same stations during the spring Researcher Ocean Pulse cruise. It appears that these two stations should be carefully monitored.

Considerable time was also spent in preparing a program for laboratory-oriented Ocean Pulse research.

Anaerobic Bacteriology/Metabolism

Laboratory studies during this period have been directed to the biochemical

characterization of bacterial isolates obtained from waters and sediments collected during the Ocean Pulse cruise (Albatross IV Cruise No. AL 78-12). Some 50 isolates have now been examined. In addition to Clostridium perfringens, other clostridial types are being encountered. Most of the facultative anaerobic gram-negative rods are not in the Vibrio genus but appear to belong in the Aeromonas or Pseudomonas genus.

A second cooperative experiment with the Charleston Laboratory of the SEFC on the potential outgrowth of C. botulinum type E in heated oysters was completed during this period.

Meetings, Talks, Visitors, Publicity

On 7 December, Frank Steimle, Jay O'Reilly, and Andy Draxler met with New Jersey Division of Fish and Shellfish representatives to discuss historic water chemistry data bases and mutual cooperation under Ocean Pulse.

Jan Caracciolo, Tom Wilhelm, and Dave Radosh attended a nonparametric statistics course given by Dr. Laurel Smith at the Sandy Hook Laboratory on 14 December.

Bob Reid attended a review of studies monitoring impacts of dredging and spoil disposal (Thames River project) at Avery Point, CT, on 20 December.

On Wednesday, 6 December, Drs. Pearce and Sindermann met with Drs. Robert Ellis, Alex Malahoff, Edward Feinberg, and Tom Malone, as well as with Ms. Elaine Souchow to discuss further the Ocean Pulse Program, as well as the NOS Environmental Monitoring Program so as to better relate these to ongoing activities within the New Jersey Department of Environmental Protection (NJDEP) and the New Jersey Marine Sciences Consortium. Special topics included the efficacy of remote sensing as conducted by NASA for environmental purposes and the scheduling of research vessels to be used in cooperative environmental monitoring and assessment programs.

Drs. Pearce and Thomas, as well as other personnel from NEFC, attended a NEFC/NASA remote sensing workshop at Woods Hole, MA, on 8 December.

On 11 December, Dr. Pearce participated in an environmental law course offered by the Paralegal Institute in Philadelphia. This program stressed the importance of our laws in litigation concerned with environmental problems. Representatives from other federal agencies, as well as from the NJDEP participated in the law course.

During 11-14 December, Dr. Thomas attended, and participated in as a Section Co-Chairman, the US EPA/NOAA Interagency Workshop on Oil Spill Response held at Kiawah Island, SC.

On 20 December, Dr. Lowell Sick, University of Delaware, visited Sandy Hook Laboratory to discuss further Ocean Pulse support of his research concerned with the development of frontal systems over Georges Bank, as well as those located off major estuaries. These frontal systems provide a mechanism for the accumulation of contaminants in discrete boundaries, as well as for providing a conduit for carrying contaminants from surficial waters to benthic systems.

Manuscripts

Dawson, M. A. Effects of long-term mercury exposure on hematology of bass, Morone saxatilis. Mar. Biol. (S)

MacInnes, J. R., and A. Calabrese. Combined effects of salinity, temperature, and copper on embryos and early larvae of the American oyster, Crassostrea virginica. Arch. Environ. Contam. Toxicol. (S)

Mahoney, J. B. The role of environmental and physiological factors in growth maxima of the dinoflagellate, Ceratium tripos. Bull. NJ Acad. Sci. (A)

Olson, P., and M. Cohn. Phytoplankton in Lower New York Bay and adjacent New Jersey estuarine and coastal areas. Bull. NJ Acad. Sci. (S)

AQUACULTURE DIVISION

Spawning and Rearing of Mollusks Investigation

Fluorometric analysis of phytoplankton levels of seawater has been used in determining the flow patterns and clearing rates of surf clams maintained in a multifactorial feeding experiment. Three biomasses of surf clams were maintained at four flow rates. A known amount of cultured algae was added to the flowing system and fluorescence was monitored over time as it entered and exited the 12 trays containing the experimental animals. When graphed, the resulting data reveal the length of time and at what level algae were available. The amount of food utilized by each tray is also shown. This method provides a detailed analysis of what happens to the algal food as it is introduced into a flowing system. Results are obtained rapidly and can be used in making judgments about the quantity of algae necessary to meet the nutritional needs of filter feeders.

We are continuing our efforts to ripen bay scallops in the winter using various temperature and nutritional strategies. These conditioning studies have been underway for 6 wk and the first scallops appear sexually mature. The best conditioning system at this point in our analysis is a constantly flowing system at 15°C. Increasing the temperature to 20°C, adding cultured algae, or artificially chilling scallops to winter temperatures before attempting to ripen them did not decrease the ripening period significantly.

We have begun some experimentation to find a method to mark large numbers of juvenile bay scallops for use in field identification. A test underway will evaluate one of the red vital stains for this purpose.

Aspects of Nutritional Requirements of Mollusks Investigation

A series of experiments was conducted to investigate the utilization of lyophilized food by oyster larvae. Sample measurements have been completed and data from these studies evaluated. Development of larvae was followed over a period of 10 days by taking periodic samples from cultures for determination of growth changes and for observing fluorescence of the gut contents (a method of evaluating food uptake) before and after feeding. Eight experimental variables were included in each experiment: unfed larvae, living Isochrysis galbana-fed larvae, lyophilized seawater-fed larvae, and lyophilized I. galbana-fed larvae. Each of these variables was in duplicate cultures, one aerated and one not aerated. A fine stream of air bubbles was introduced into each culture to keep the dry particles in suspension. Larvae fed the living I. galbana cultures continued to

increase in size over 10 days. Observations of stomach contents 2 hr after feeding for the first 8 days of incubation showed that 60-100% of the larvae had food cells in the stomach. Larvae fed dried and pulverized I. galbana cells displayed little or no growth, although mortality was not excessive. In contrast to the microscopic appearance of the stomach contents of larvae fed live food, only 24% of the larvae fed dried food showed an uptake of the dried particle in the first feeding which decreased to 4% in subsequent days and to 0% by the 8th day. Aeration of the cultures had a generally adverse effect on all larvae. Algal foods and seawater are being lyophilized almost daily so that a stock of dried material can be accumulated with which to carry out further experiments when larvae are again available.

The last study in the series of experiments on cryopreservation of unicellular algae with liquid nitrogen is in progress. We are attempting to determine the relationship between the number of cells in a suspension and the time it takes for the onset of cell division. Details will be described in the next report.

Harvests of algae for larval foods from the mass culture apparatus yielded 2,616 and 965 liters in November and December, respectively. Juvenile food cultures yielded 1,838 and 868 liters in November and December. Cultures were utilized as foods by various investigations as follows: Aquacultural Genetics, 1,082 liters; Spawning and Rearing of Mollusks, 2,556 liters; and Physiological Effects of Pollutant Stress, 2,440 liters.

Axenic stock cultures were sent to the following investigators upon their request: J. Reidy, City College of New York; G. Bousquette, Pacific Mariculture, CA; D. Morgan, Marine Research, CT; C. Strong, Bluepoints Co., Long Island, NY.

Aquacultural Genetics Investigation

Cytology and Cytogenetics of Developing Fish Eggs

Using eggs of the mummichog, no response, cytologic or cytogenetic, was provoked in embryo cells by dilutions of Dupont Grasselli waste in seawater. The same waste in fresh water had high toxicity for embryo cells but only at extreme concentrations compared to those that would occur in nature. This waste forms a precipitate in seawater which probably reduces toxicity or availability of toxic waste components to the fish embryo.

Fourbeard rockling and yellowtail flounder eggs from the site of the 1978 Rhode Island gasoline spill have been studied for embryo damage at the level of the cell and chromosome division apparatus. Flounder eggs were too infrequent in samples to contribute much to the study. There was evidence, though, based on small sample size, that rockling eggs taken 2 days after the spill were fleetingly affected by exposure to the gasoline. The 25-day post-spill samples of rockling oddly showed a lower mitotic index than did the earlier ones taken shortly after the spill. These results are to be used by the Narragansett Laboratory staff in compiling a complete report involving different aspects of the ecological study conducted in response to the spill.

A report has been prepared on both the Dupont waste and on the eggs from the gasoline spill.

A. Longwell prepared for NOAA a response to Congressional inquiry regarding a Science article on fish breeding.

Meetings, Talks, Visitors, Publicity

Ed Rhodes gave a talk on careers in marine-related fields to 8th and 9th graders at the Gianotti Junior High School in West Haven, CT.

Manuscripts

Stiles, S. S. 1978. Approaches to inbreeding in the commercial American oyster, Crassostrea virginica. Abst. Can. J. Genet. Cytol. 20(3): 455. (P)

Losee, E. Relationship between size of young adult Crassostrea virginica and larval growth rate in their offspring. World Mariculture Society Meeting. (S)

PATHOBIOLOGY DIVISION

Comparative Shellfish Pathobiology Investigation

Ocean Pulse activities at Deepwater Dumpsite (DWD) 106 continued during the month. Euphausiids collected from dump and control stations during the November cruise were examined for gross abnormalities, apostome ciliate infestations, and gill melanization. Of the 450 adult euphausiids examined, 39% had melanized gills; 76% were infested with apostomes; and 5% were infested with a larger sessile ciliate. The relative abundance of this latter ciliate prompted reexamination of all euphausiids collected from previous DWD 106 Ocean Pulse cruises. It appears these sessile ciliates are suctorians. As yet, our data do not indicate an apparent relationship between apostome and suctorian infestations and/or gill melanization. During the November cruise, the NOAA Atlantic Oceanographic and Meteorological Laboratory (AOML) chemists also took water samples for analyses while plankton tows were being made. This is the first DWD 106 cruise in which chemists and biologists coordinated their field sampling in efforts to correlate chemical findings and biological observations. Continued coordinated field studies with AOML are planned for the future as are model experimental laboratory studies using DWD 106 dump wastes and simulant species of Crustacea. A parasitic ellobiopsid was also found in this November collection. This is the first ellobiopsid observed in over 750 euphausiids examined from Ocean Pulse cruises.

A draft of a manuscript on viral, bacterial, and fungal diseases of crustaceans was prepared. This paper is to be included in "The Biology of the Crustacea," a multivolume work to be published by Academic Press.

The histological services unit sectioned 206 specimen blocks and stained 1,028 slides. Specimens included oysters and clams received for our disease diagnosis service as well as clams, oysters, surf clams, crabs, fish, and blood smears collected for Ocean Pulse cruises and from sources related to other ongoing research.

Fish Pathology Investigation

From 6 to 22 November, Mr. John Ziskowski participated in a bottom trawl survey cruise on the Delaware II. The specific reason for his participation on this cruise was to assess the feasibility of making observations of the health status of western North Atlantic groundfishes. Four commercially important fishes were examined for

external and visceral lesions and parasites: Atlantic cod (29), haddock (33), winter flounder (21), and yellowtail flounder (36). The prevalence of lymphocystis disease, parasites, pigmentation anomalies (albinism, ambicoloration, reversal), skeletal anomalies (bent fins, fin rot, lordosis, scoliosis), and tumors was noted. Altogether, 119 fish were examined from 30 sampling strata; however, the data yet have not been collated. Although a small number of fish have been examined (119), diseases will be plotted by strata to determine their prevalence in coastal and offshore areas. These initial observations will be useful in the design of protocols for assessing the health of ocean fish in the Ocean Pulse Program.

Microbial Ecology Investigation

Twenty-five rock crabs were collected from Ocean Pulse strata along a transect approximately 4 mi west of Ambrose Light in the New York Bight apex. One gill lamella from each crab was fixed for histological study and the remaining lamellae and hepatopancreas were frozen for heavy metal analyses by Richard Greig of the Milford Laboratory. Ongoing histological studies on rock crab gills have shown that certain tissue anomalies which possibly are related to heavy metal burdens are not uncommon in animals collected from the New York and Philadelphia-Camden sewage dumpsites. Cooperative Ocean Pulse studies with Richard Greig are expected to provide our first opportunity to have comparative data on heavy metals and tissue pathology as found in the same test animal. Success in these studies will provide a sound basis for future research with animals exposed experimentally to known concentrations of target metals.

Diseases of Larval Mollusks Investigation

Cell cultures of adult oyster hemocytes have been kept alive for 40 days. There is some suggestion of cell division, but quantitative evidence is lacking due to high cell density in the starting culture. Mechanically detached cells, diluted and placed in additional culture wells, are now being observed for evidence of division and formation of monolayers.

Fish are being investigated as substitutes for rabbits as source animals for antibody in immundiagnostic tests. Striped bass have been injected with a formalin-killed Vibrio species. The resulting antibody will be purified and injected into rabbits to produce a rabbit antifish globulin (RAFG). With sufficient RAFG on hand, it should be possible to use fish antibody in a fluorescent antibody sandwich technique with commercially prepared fluorescing antiglobulins to assay for pathogenic bacteria.

The study on the pigment of the red pseudomonad is continuing. The five spots visible on thin-layer chromatography plates spotted with the purified pigment were identical to the spots on plates with the crude extract. The spots were more distinct on plates with the purified pigment due to the elimination of lipids associated with the crude extract.

Tests to identify the formation rates of hypobromous acid in ozonized and chlorinated seawater are in progress. A dissolved oxidant concentration of 0 to 0.5 mg/l appears to be the cutoff point in preventing development of this toxic, long-lived compound.

Meetings, Talks, Visitors, Publicity

Dr. Anwyl Cooper-Willis who is pursuing a postdoctoral assignment at Johns

Hopkins University with Dr. F. B. Bang was a visitor at the Oxford Laboratory for part of the month. Drs. Cooper-Willis and Phyllis Johnson spent considerable time discussing her proposed research which will involve studies of the fixed phagocytic systems and viral clearance mechanisms of crustaceans.

Dr. Rosenfield attended the NEFC's Promotion Review Board meeting and a remote sensing discussion group meeting in Woods Hole on 7 and 8 December, respectively; Dr. Rosenfield also participated in the State of Maryland's Department of Economic and Community Development task force meeting on improving the Maryland oyster industry on 13 December in Annapolis; and on 21 December, participated in a University of Maryland Sea Grant Citizens Advisory Group meeting in Annapolis.

Dr. Sawyer participated in a 1-day cruise on 5 December aboard the R/V Kelez to collect bottom sediments in sewage dumpsites near Ambrose Light. Sediments are to be cultured for fecal coliforms by CDR Jack Gaines of the US Public Health Service, and for sewage-associated amoebae by Dr. Sawyer. On 11 December, Dr. Sawyer and Mr. Jay Lewis collected rock crabs at Sandy Hook for metal analyses in cooperation with the Milford Laboratory. Dr. Sawyer attended a meeting at the National Ocean Survey headquarters on 19 December in regard to participation in the Environmental Protection Agency cruise to the Philadelphia-Camden dumpsites in April 1979. Dr. Sawyer and Mr. Lewis attended the centennial meeting of the American Microscopical Society in Richmond, VA, during 26-29 December. Dr. Sawyer, Vice President of the Society, served as program chairman for the centennial celebration. He presented papers on marine amoebae in bottom sediments of the Gulf of Mexico and on the histological findings in diseased juvenile lobsters. Mr. Lewis presented a paper on the distribution of Acanthamoeba in the St. Martin River, MD. The three papers will be published as abstracts in the January issue of the Transactions of the American Microscopical Society.

Dr. Blogoslawski attended the International Ozone Institute's Board of Directors meeting in New York City on 18 and 19 December.

Ms. Cassanelli delivered cruise data and equipment and discussed the feasibility of future coordinate zooplankton studies with appropriate personnel at the Narragansett Laboratory during 23-27 November.

In participation of the poster and essay contest sponsored by the Governor's Committee to Promote Employment of the Handicapped, Mr. O'Connell and Mrs. Ortt spoke to the English class at Kent County High School on 12 December. Mr. O'Connell and Mrs. Ortt presented their own perspectives of employment of the handicapped-- Mr. O'Connell that of the employer and Mrs. Ortt that of the employee. The purpose of their talks was to provide content material for posters and essays.

Mr. Mark Galasso, a senior student at the University of Maryland, reported for duty over the holidays on a WAE appointment; he will finish all ADP worksheets needed to complete a computer printout on data pertaining to "black gill disease" in the MESA-funded study of rock crabs.

Mrs. Mary Ann Smith, Administrative Clerk, was reemployed on a WAE appointment not to exceed 30 September 1979.

Mr. Peter Pendoley, a CCSC work-study cooperative student, left the Division's employ at the Milford Laboratory after a 6-mo tour of duty.

Visitors to the Oxford Laboratory during December were Drs. Frank Hetrick, R. Roberson, L. Howard, and A. Zachary of the Department of Microbiology at the University of Maryland (College Park); Mr. Chuck Bostater of the Maryland Water Resources Administration in Annapolis; Mr. Jim Chambers of the NMFS Office of Habitat Protection in Washington, DC; Mr. Marvin Moriarty and Mr. Dale Arhart of the US Fish and Wildlife Service in Washington, DC; Mr. Jim Butch of the Environmental Protection Agency in Washington, DC; Mr. and Mrs. Ron Nolf of Ojai, CA; and Ms. Patricia Rogers of the National University of Mexico in Mexico City.

Manuscripts

- Johnson, P. T., and C. A. Farley. A new enveloped helical virus from the blue crab, Callinectes sapidus. J. Invertebr. Pathol. (S)
- Rosenfield, A., and F. G. Kern. Mollucan imports and the potential for introduction of disease organisms. Proc. Sea Grant Symp. (S)
- Rosenfield, A., S. A. MacLean, M. W. Newman, and C. A. Farley. Gross and historical observations of some biota from "deepwater dumpsite 106." Proc. Int. Ocean Dump. Symp. (S)
- Sawyer, T. K. 1978. Microscopic observations on vertebrates and invertebrates collected near the Argo Merchant oil spill. Pages 93-95 in In the wake of the Argo Merchant. University of Rhode Island Center for Ocean Management Studies. Kingston, RI. (P)

RESOURCE UTILIZATION DIVISION

Fisheries Engineering Investigation

Sampling and Harvesting Gear Development

Activity this month centered on preparing for the changeover of the Delaware II dredging system during the last week of December. The Delaware II was initially rigged for the December cruise, with the old 48-inch blade dredge and a conventional deck-mounted water pumping system. Between Christmas and New Year's, the new system will be installed. This consists of a more modern and efficient 60-inch dredge equipped with a dredge-mounted electric pump. The winch to handle the electrical cable was completed this month and shipped to Woods Hole. Design and construction of dredge instrumentation were completed. They consist of a first generation of direct readout odometer and pressure gauge.

This final week we are also modifying the work table under the stern ramp, modifying the top of the stern ramp, repairing the docking gate, and installing the electric cable winch.

Resource Development and Improvement Engineering

Freezer No. 5 of the Gloucester Laboratory's experimental freezer system has been completed and is currently undergoing testing and calibration. The insulation and cooling tower have also been surveyed for possible repair or replacement.

Resource Development and Improvement Investigation

Storage of Blue Mussels

With the help of John Davies, we are routinely gathering data on the computer. Steve Bingham of the SEFC's new Charleston Laboratory is very interested in our mussel data for inclusion into his nutrition file.

Blue Crabs

A second batch of cleaned body cores and legs of retorted blue crabs was passed separately through the Baader meat/bone separator. Meat recovery from the body cores was 58.2% (15.0% of the weight of live crab).

A taste test was conducted on the Baader-extracted core meats. The scores were 6.1 for appearance, 6.8 for odor, 6.8 for flavor, and 5.5 for texture. Shell detectability was low--4.08 on a five-point scale where 5.0 = nil, 4.0 = barely detectable, 3.0 = slightly detectable, 2.0 = moderately detectable, and 1.0 = excessive.

Reformed Blue Crab Lumpmeats

Baader-extracted core meats were mixed 1:1 with roller-extracted meats and reformed into lumpmeats on the Boch extruder. Some of these lumpmeats were steamed for 3 min and some were microwaved for 2 min. They were then packaged in plastic pouches, frozen at -20°F overnight, and then stored at -5°F for future organoleptic evaluation.

Crab Species Identification

The manuscript titled "Identification of Species in Cooked Crabmeat by Thin Layer Isoelectric Focusing" was returned to the editor after minor revisions.

New Product Development

The first draft of the paper (part one) on the evaluation of the prototype heading and cleaning machine in a commercial plant has been completed and is being reviewed by Gloucester Laboratory personnel. In preparation also is the first draft of a paper (part two) on the building of a second generation heading and cleaning machine. The new machine will have all the necessary modifications to increase its cleaning efficiency and throughput, and reduce the downtime in the prototype model.

The results of a taste test of the silver hake (whiting) sticks made from frozen minced blocks show that the sticks made from day-boat whiting were rated as good to very good. Sticks made from penned whiting were rated as fair to good, the overall difference being significant. The largest differences were recorded in the appearance and taste of the sticks. An evaluation of the sticks made from day-boat whiting was made by two commercial fish processors. Both agreed that they were highly acceptable.

The manuscript reporting the results of the US Grade A guaranteed quality fresh fish study was reviewed and corrected. The manuscripts on "Pair Trawling for Squid" and "The Effect on Quality of Holding Squid in Chilled Seawater" were also reviewed and changes were suggested.

Surf Clams

Surf clams have been given to Ipswich Shellfish to be distributed as "clams on the half-shell" for customer reaction.

Cholesterol

The literature survey continues. We have been visiting various facilities to determine which instrumentation would suit our needs.

Antarctic Krill

The first draft of a paper on krill and its utilization has been completed.

Industry Demonstrations and Product Evaluation

The Baader 696 meat/bone separator was taken from the Stonington (ME) Coop and brought to the Gloucester Laboratory. On the way back, the machine was demonstrated to several crab and lobster processors and to personnel of Snow's Canning Co. at Pine Point, ME.

A commercial crab plant sent about 61 lb of picked crab waste from its plant to determine meat recovery when it was passed through the Baader meat/bone separator. Meat recovered was 36 lb, 12 oz--a 60% recovery. Samples of the meat were returned to the plant for its evaluation. Total aerobic plate counts of the meat were 1.3×10^6 organisms per gram at 35°C and 2.0×10^6 organisms per gram at 20°C .

Product Quality, Safety, and Standards Development Investigation

Product Quality

The texture of red hake fillet blocks stored at 20°F was borderline after 2 wk and unacceptable after 3 wk due to toughness. Certain treatments such as saberizing, vacuum packing, and antioxidant dip, aimed at minimizing oxidative rancidity, did not protect the texture; however, reference controls stored at -22°F were still highly acceptable after 4 wk. Even after 2 wk, the dimethylamine content was very high in all samples except the reference controls (-22°F). Rancidity had not developed in any of the treated blocks after 4 wk.

A study was undertaken to determine the effects of freezing and thawing on Torrymeter readings of whole whiting. With very fresh fish (1-day old), the Torrymeter reading after freezing and thawing was very low, indicative of spoiled fish. This low reading still prevailed with fish that were held on ice up to 14 days and frozen and thawed at various times. Thus, a low Torrymeter reading on whiting that appeared to be of good quality would indicate that the fish had been previously frozen.

The Torrymeter measures the loss in dielectric properties of cells that occurs during storage of muscle tissue at temperatures above freezing. To determine the role of autolytic processes on dielectric loss (and Torrymeter reading), readings were periodically made on iced Atlantic cod which had been irradiated with 200 Krad gamma rays to reduce the bacterial content. Spoilage of irradiated cod occurred after 30 days compared to 15 days for nonirradiated fish. At spoilage (as determined organoleptically), the bacterial count (APC) was 100 million per gram for irradiated fish and about 25 million per gram for nonirradiated fish. The Torrymeter reading was approximately the same at spoilage for irradiated and nonirradiated fish. There was a strong correlation between bacterial count and Torrymeter reading for the irradiated fish. It would appear that autolysis does not play a significant role in loss in dielectric properties of cod tissue cells, and the Torrymeter could be useful in measuring quality of iced, irradiated fish.

As part of a cooperative study, frozen whiting blocks were prepared from fillets which had been dipped in sodium erythorbate solution for various times. These were delivered to the analytical chemistry laboratory of the Pfizer Company (manufacturers of erythorbate), and they will determine the uptake of erythorbate as a function of dip time and also the fate of residual erythorbate in whiting blocks during storage at 0°F.

A rapid sampling cuvette and data lister were installed on one of our Gilford 240 spectrophotometers. Several days were spent preparing new standard curves for several assays. The rapid sampler allows us to triple the number of absorbance readings we can make in an hour. A new sample transport system will be installed as soon as the manufacturer resolves some problems with a time-delay unit.

Ron Lundstrom spent a week teaching Brad Marques (Fishery Inspector) the "art" of fish species identification by disc electrophoresis. In the process, two unknown frozen fillets were identified as Greenland turbot for the DOC Inspection Service, and another unknown fillet was confirmed as being winter flounder by John Kaylor.

We have received about 90 whiting samples from the Woods Hole Laboratory. Isoelectric focusing (IEF) analysis of sarcoplasmic proteins and specific enzymes will begin as soon as we receive some PAG plate IEF gels which have been back-ordered from LKB Instruments.

Ron Lundstrom met with Dr. George Ridgway to discuss potential problems with the IEF analysis of the whiting samples.

Ron Lundstrom also spent 2 days checking Mike Allsup out on IEF techniques and methodology for possible use during Mike's upcoming trip to Antarctica.

Product Safety

Workup and analysis of smoked sablefish purchased from Select Foods in Chelsea MA; Beach Bluff in Marblehead, MA; Godfried's in Saugus, MA; and Kay's in Lynn, MA, have been completed.

A great deal of time has been involved in an effort to develop a rapid accurate method for determining N-nitrosamines at the parts-per-billion level by utilizing the alkali flame ionization detector (AFID). These detectors are known to be capable of extreme sensitivity, but have erratic reproducibility characteristics and are very sensitive to operating conditions, the most critical of which is hydrogen flow. It was found that during the course of the day, the sensitivity of the detector can change as much as 50%. Halogenated hydrocarbons are not recommended as solvents because of excessive detector recovery time. However, methylene chloride is still being used in the assay by incorporating a valve in the GC system to vent the solvent from the column so that it does not pass through the detector. To overcome the problems associated with the variability in sensitivity, an internal/external standard ratio procedure was utilized, permitting indirect comparisons of the standard and fish samples. Tetramethylpyrazine (TMP) or any of one of the N-nitrosamines not found in the fish sample can be used as the internal standard. The same amount of TMP or N-nitrosamine is used in both the standard and fish solution in order to normalize the N-nitrosamine peak area in the fish sample. The detector was found to give a linear response over a range of 1.5 - 15 ng of N-dimethylnitrosamine.

Considerable time was spent in reading reprints on polychlorinated biphenyls, N-nitrosamines, and the report of the task force committee on contaminants.

Product Standardization

Many useful comments are being received from USDA inspectors and plant quality control supervisors on the proposed shrimp standard. One USDC inspector on his own time and using his wife as a secretary completely rewrote the proposed draft on the basis of his many years of grading all types of shrimp. A recommendation will be made to the area supervisory inspector that some type of award be made to the inspector.

The proposed revision of the fried scallop standard has been prepared and forwarded to the Central Office. A recommendation was made that action on publication in the Federal Register be deferred until the workshop on standardization reviews alternative actions. The workshop on standardization is scheduled to be held 27 February to 1 March at Washington, DC.

An interim specification for 3-oz battered fish portions utilizing latent species was developed for review and comment by the National Fisheries Institute and American Frozen Food Institute. It will be used for military purchases of this product until a federal specification can be developed. The military has tried this product at selected locations and is interested in using it for regular procurement.

Species of fish for use by the US Army Research and Development Command at Natick, MA, as a part of their study of comparative edibility of fresh fish, have been secured from local dealers and supplied to Army representatives.

Technical Assistance

Division personnel provided information and assistance in the following areas: composition of several fish species used in fish meal; Scottish seining; location of backup holding systems for live fish; sharks; isinglass; source of photographs of foreign vessels; sources of NMFS statistical publications; speakers on seafood seminar; shellfish aquaculture; cooking northern shrimp; use of ADP in nutritional studies; incidence of bones in fish portions and sticks of English-style battered products; investigated use of word-processing facility; vessel hydraulics; fish processing; processing of ocean quahogs; Jonah crabs; hake and red crabs; and identification of frozen cuttlefish caught off Kuwait as Sepia officinallis.

Meetings, Talks, Visitors, Publicity

Louis Ronsivalli attended a meeting at the SEFC's Charleston Laboratory to participate in the planning of the programs to be conducted by the National Center for Fisheries Contaminants.

Louis Ronsivalli participated in the annual meeting of the Interagency Committee on the Radiation Processing of Foods held at the Department of Commerce building in Washington, DC.

Bob Learson attended a joint NASA/NMFS meeting at Woods Hole on 8 December. The purpose of the meeting was to discuss the planning for an upcoming remote sensing study using low and high level aircraft.

Dr. Fred King participated in a workshop meeting with 10 scientists of the Natick Research and Development Command (Natick, MA) regarding their study of comparative edibility of fresh fish.

Fred King escorted Dr. Sudip Jhaveri (University of Rhode Island) to the Natick Research and Development Command in Natick, MA, to discuss sensory comparison testing of canned mackerel and canned tuna with Dr. Robert Kluter.

John Ryan met with William Rawls of Creative Properties of Beverly, MA, to explore marketing prospects for underutilized species of fish.

Dr. Perry Lane attended a stock assessment workshop presented by personnel from the Woods Hole Laboratory for members of the New England Marine Advisory Service (NEMAS). He also attended a meeting of the NEMAS Planning Committee and a meeting of the New England Fisheries Steering Committee.

The Gloucester Laboratory hosted a group of Sea Grant investigators from the University of Rhode Island who spent several hours reviewing our respective programs to integrate activities where possible. This university has been among the most relevant of the Sea Grant colleges insofar as our activities are concerned.

Dennis Mulane of Long Island, NY, visited the Gloucester Laboratory for information on fish meal production.

Donald Gadbois attended a course on the Sigma 10 at the Perkin-Elmer Corporation in Wellesley, MA.

Manuscripts

Lundstrom, R. C., and S. Roderick. Fish species identification by thin layer isoelectric focusing of sarcoplasmic protein. Sci. Tools. (S)

Lundstrom, R. C. AOAC annual associate reference report on fish species identification: thin layer isoelectric focusing. Jour. Assoc. Off. Analyt. Chem. (S)

NATIONAL SYSTEMATICS LABORATORY

Shrimps Investigation

We worked on intraspecific variation and distribution of Solenocera melantho, a wide-ranging Indo-West Pacific species which, for the first time, was found to be present on the waters of Australia.

Other Crustaceans Investigation

Preparation continued on a guide to marine decapod crustaceans of the temperate eastern United States. Also studied was the taxonomy of the primitive crab genus Latreillia.

Pelagic Fishes Investigation

A draft was completed of a manuscript describing a new species of Spanish mackerel from Australia and New Guinea.

Benthic Fishes Investigation

Writing began on a manuscript revising the American toadfishes of the genus Batrachoides.

Curatorial and Information Services

We rearranged the scombrid material in the fish collection of the National Museum of Natural History. Identified were xanthid crabs for M. J. Dadswell of the St. Andrews Biological Station in Halifax, NS, and pinnotherid crabs for F. Maturio of the University of Florida in Gainesville, FL.

Meetings, Talks, Visitors, Publicity

Daniel Cohen visited ichthyological and fishery institutions in the Peoples Republic of China as part of the National Academy of Science Ocean Sciences Delegation. Bruce B. Collette and Austin Williams attended the annual meetings of the Society of Systematic Zoologists and American Society of Zoologists in Richmond, VA.

Visitors included Mr. Terry Leitzell, Director of NMFS; John Lundburg of Duke University (Orinoco Belonidae and Hemiramphidae); and Marta Torres, a biologist of Colombia Central Bank (penaeid shrimps).

Manuscripts Reviewed

Los tunidos y demás escombridus mundiales, by Carlos Darila Fernandez.

Notes on two decapod Crustacea new to Pakistan waters, by Dr. Nasima M. Tirmizi, University of Katashi, Pakistan.

Manuscripts

Cohen, D. M., and J. G. Nielsen. 1978. Guide to the identification of genera of the fish order Ophidiiformes with a tentative classification of the order. NOAA Tech. Rep. NMFS CIRC-417. 71 p. (P)

Collette, B. B., and N. V. Parin. 1978. Five new species of halfbeaks (Hemiramphidae) from the Indo-West Pacific. Proc. Biol. Soc. Wash. 91(3):731-747. (P)

Pérez Farfante, I. Penaeopsis jerryi, new species from the Indian Ocean (Crustacea: Penaeidae). Proc. Biol. Soc. Wash. (A)

Pérez Farfante, I., and B. G. Ivanov. Range extensions of Penaeopsis serrata (Crustacea: Penaeidae) to off New Jersey and Rio Grande do Sul. Proc. Biol. Soc. Wash. (A)

ATLANTIC ENVIRONMENTAL GROUP

Ocean Monitoring and Climatology Investigation

During December the cooperative Ship of Opportunity Program (SOOP) obtained six expendable bathythermograph (XBT) transects, one in the Gulf of Maine, one across the Southern New England shelf along the 71°W meridian, one across the shelf and slope off New York, one off Norfolk (VA), and two in the Gulf of Mexico. The Edgar M. Queeny, a fast tanker operating between New Haven, CT, and Lake Charles, LA, has been added to the SOOP ships making transects for us in the Gulf of Mexico. Continuous plankton and temperature records at a 10-m depth were obtained along the New York Bight transect from Ambrose Light to Deepwater Dumpsite (DWD) 106.

A one-page report updating the location and configuration of warm-core Gulf Stream eddies adjacent to the continental shelf in the Middle Atlantic Bight was submitted for publication in the January Atlantic Notice to Fishermen, and also

was released to a mailing list of interested individuals at the same time. The report describes the movement of two eddies SW along the edge of the shelf, in the period between mid-November and mid-December. Eddy U, which was located off Hudson Canyon in mid-November moved SW about 160 nautical miles (nm) to 37°15'N, 73°45'W, east of Washington Canyon off Chesapeake Bay entrance. Eddy A, which has been obscure in satellite imagery since the third week of November, became less distinct in December. Weak indications of its existence were observed in mid-December at about 39°20'N, 69°40'W, south of Veatch Canyon.

A Data Analysis Product (No. 11), consisting of a 30-yr (1946-75) portrayal of monthly average values of wind stress, wind speed, and cube of the wind speed for Georges Bank (40-42°N, 66-69°W) was released to NEFC scientists. Data were graphically displayed by the MARMAP Information System from a base of meteorological and oceanographic data for 95 one-degree squares along the Atlantic Coast from 30° to 45°N. The cube of the wind speed was chosen as a potentially significant parameter, because it is proportional to the average time rate of change of mixing energy in the upper water column. Very possibly, higher rates of primary productivity on Georges Bank can be associated with periods of greater wind mixing of the water column.

Ocean Dumping Investigation

A second radio directional finding buoy study at DWD 106 is being planned for late February or early March 1979. As in the first experiment, this second more extensive effort will utilize tracking stations at Sandy Hook, NJ, and Cape Henlopen, DE. The original experimental design called for the release of six buoys at DWD 106 using the Mt. Mitchell as the release platform. Due to a cruise cancellation, however, another release platform is being sought. Data analysis from the first experiment will begin shortly and will use both observed and inferred wind data.

Meetings, Talks, Visitors, Publicity

Steve Cook and Grayson Wood traveled to New Haven, CT, to install an XBT system on board the Edgar M. Queeny and to train a cadet on 4 December.

On 8 December, Woody Chamberlin went to Woods Hole, MA, to discuss oceanography at the Woods Hole Oceanographic Institution and to attend a meeting at the Woods Hole Laboratory on the cooperative program between NEFC and NASA/Langley.

Dr. Herbert Austin, Assistant Director of the Virginia Institute of Marine Sciences, visited AEG on 12 and 13 December to discuss possibilities of cooperative projects in fishery climatology and monitoring of zooplankton and environmental variables in shelf waters off the Virginia Capes.

Reed Armstrong traveled to Houston, TX, during 12-15 December to review and advise personnel of the SEFC's Galveston Laboratory on progress in environmental assessment studies of the Buccaneer Oil Field (an EPA-sponsored study of an active oil field in the Gulf of Mexico).

On 19 December, Jim Bisagni went to Rockville, MD, to confer with EPA and NOS personnel about the Philadelphia Sewage Sludge Dumpsite.

Manuscripts

- Armstrong, R. S. Environmental assessment of an active oil field in the northwestern Gulf of Mexico. Current patterns and hydrography. Final report. (S)
- Bisagni, J. J. July 1977 physical oceanographic studies at Deepwater Dumpsite 106. Deepwater Dumpsite 106 Assess. Rep. (S)
- Cook, S. K. Expendable bathythermograph observations from the NMFS/MARAD Ship of Opportunity Program for 1975. NOAA Tech. Rep. NMFS SSRF. (A)
- Cook, S. K. Water column thermal structure across the shelf and slope southeast of Sandy Hook, NJ, in 1977. Annales Biologiques. (S)
- Crist, R. W., and J. L. Chamberlin. Bottom temperatures on the continental shelf and slope south of New England during 1977. Annales Biologiques. (S)
- Gunn, J. T. Variation in the shelf water front position in 1977 from Georges Bank to Cape Romain. Annales Biologiques. (S)
- Jossi, J. W., and R. R. Marak. MARMAP survey manual. Contribution to NOAA Fisheries Technology Shipboard Manual. 43 p. (S)
- Mizenko, D., and J. L. Chamberlin. Gulf Stream anticyclonic eddies (warm-core rings) off the northeastern United States during 1977. Annales Biologiques. (S)
- Mizenko, D., and J. L. Chamberlin. Gulf Stream anticyclonic eddies and shelf water at Deepwater Dumpsite 106 during 1977. Deepwater Dumpsite 106 Assess. Rep. (S)
- Murray, T. E. A summary of waste inputs to Deepwater Dumpsite 106 during 1976 and 1977. Deepwater Dumpsite 106 Assess. Rep. (S)