

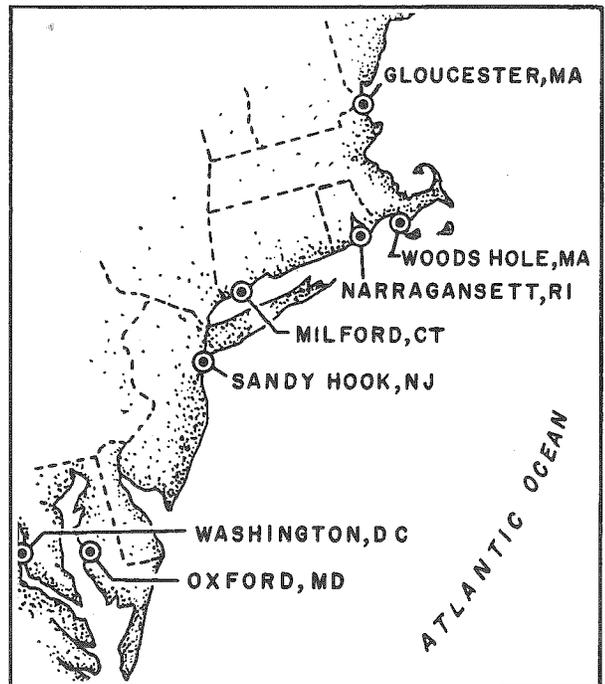
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NEWS

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FEBRUARY 1979

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US DEPARTMENT OF COMMERCE
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NORTHEAST FISHERIES CENTER
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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 and a number of NEFC staff members participated in the International Council for the Exploration of the Sea (ICES) Effects Monitoring Workshop held at the Duke University Marine Laboratory during 26 February-2 March. Dr. Sindermann chaired the Pathology Panel, Dr. Pearce was cochairman of the entire workshop, Mr. Olla chaired the Behavior Panel, Dr. Calabrese was a member of the Bioassay Panel, Dr. Longwell and Dr. Rosenfield were members of the Genetics Panel, and Dr. Thurberg was a member of the Physiology Panel. The week-long discussions reinforced the validity of pollution effects monitoring, and substantiated the conceptual base of the Ocean Pulse Program.

Dr. Sindermann was also a member of the group of NEFC staff members that participated in a 2-wk US-Poland and US-USSR joint fisheries planning meeting.

Fisheries Utilization Office

John Ryan of the Resource Utilization Division has played a major role in the introduction of new seafood products to the military and in the transfer of Department of Defense (DOD) inspection responsibility to the Department of Commerce for seafoods procured by the military. In a recent report by DOD, it was revealed that this transfer has saved the taxpayers about \$5 million.

Louis Ronsivalli was a member of a team which also included Paul Jacobs, former President of The Gorton Group of Gloucester, MA; Professor R. Gray from the University of Delaware; and Professors S. Gillespie and N. Nickelson from Texas A&M University, that presented a series of talks on handling and packaging of seafoods at a seminar held in Tuxedo Park, NY, and sponsored by the International Paper Company. Louis' talk was titled "Packaging of Seafoods in the Past, Present, and Future and Its Impact on Seafood Quality."

Bob Learson gave a presentation on squid preservation and processing at the New York Sea Grant Squid Symposium at Riverhead (Long Island), NY, on 23 February 1979.

Special Scientific Investigations Office

Arthur Posgay continued to work on assembling data on shell readings for a paper on the growth rate of the sea scallop from the Strait of Belle Isle to the Virginia Capes, and started to prepare a document for a meeting of the ICES Working Group on Atlantic Salmon.

Special Technical Projects Office

Ronald Smolowitz presented the results of the groundfish mesh study to the New England Fishery Management Council on 8 February. Plans are to have the final report finished by April.

Andrew Thoms continued the literature search on scallop gear. A review memorandum on past scallop gear research and on possible future work was submitted to the New England Fishery Management Council staff. A meeting is planned for March with the Council staff, Council Scallop Oversight Committee, scallop

industry advisors, and NEFC technical staff to discuss and decide upon the gear research approach.

Work is also in progress on specifying a new electric cable for the clam dredge, updating the R/V Albatross IV data logger, and on the trawl mensuration system. Six requests for technical information were answered.

Operations Office

Vessel Operations

H. C. Boyar met with officials of the USSR fisheries claims board, GDR embassy, and Department of State in Washington, DC, on matters pertaining to joint research aboard vessels from the USSR and GDR.

Manuscripts

Sindermann, C. J. 1979. Use of pathological effects of pollutants in marine environmental monitoring programs. ICES Workshop on the Problems of Monitoring Biological Effects of Pollution in the Sea, Paper No. 15. 17 p.

RESOURCE ASSESSMENT DIVISION

Resource Surveys Investigation

The first leg of a cooperative bottom trawl survey with an emphasis on Atlantic herring in the Georges Bank area was conducted aboard the FRG R/V Anton Dohrn from 8 to 23 February. John Nicolas was the US chief of party. The second leg of the survey commenced on 24 February and is scheduled to end on or about 10 March. Gordon Waring is the US chief of party. The primary survey areas are planned to be on Jeffreys Ledge, Stellwagen Bank, in Southern New England, and parts of the New York Bight. A portion of Georges Bank, especially the southern areas, was revisited during the first few days of the second leg.

Malcolm Silverman has been informing other members of the Investigation of on-line editing and auditing procedures for survey data. These procedures are now in general use and the amount of time required to complete the auditing process is expected to decrease as Investigation members become more experienced.

Tom Azarovitz completed and forwarded the final draft of the outline for the Bureau of Land Management (BLM) Final Report. Because of difficulties in program development of a graphics package, we have requested an extension of time (to November 1979) for submission of the final report. Chuck Byrne completed the reports for subtasks 2AB, 2AC, and 2AD; these are basically listings of catches in a BLM-requested format. These will be forwarded to BLM early in March and complete our obligations under the BLM contract except for the final report.

Investigation personnel assisted State of Massachusetts biologists in auditing and preparing a final computer tape of their fall 1978 coastal waters trawl survey.

Don Flescher has been working on a final draft manuscript of a field identification guide for finfish and shellfish species frequently encountered on our surveys. It has been accepted for publication in the NOAA Technical Report series.

Fishery Biology Investigation

Shellfish

John Ropes microscopically examined slide preparations of Raritan Bay hard clam tissues for presence of copper, lead, iron, and arsenic. All tests proved negative. A request has been made for further tests of the same tissues by modification of the histochemical processes that may intensify the reaction for some of the metals.

The field representative from Buehler, Ltd., visited with John on 28 February to discuss possible alterations to machinery and blades used for sectioning shellfish hard parts. Of particular interest was how to solve problems related to thin sections of the chondrophore of surf clams and to polishing the sections. In general, progress on sectioning clam shells has been at a minimum due to the lack of equipment capable of producing thin sections.

John is also working with Dr. Hopkins of the University of Maryland Eastern Shore on techniques and equipment design for aging surf clams. Dr. Hopkins' last progress report indicated that surf clam ages for that report ranged from 11 to 28-yr old. Those older than 20 yr were most difficult to age.

Loretta O'Brien continued to spend mornings cleaning scallop shells to unload the freezers, and sectioning surf clam shells. She spent the afternoons working with Dr. Merrill on a juvenile scallop research project.

Age and Growth

Vi Gifford sectioned and initially aged 261 commercial redfish samples from the fourth quarter of 1976.

Kris Kantola completed aging haddock samples from the 1978 fall bottom trawl survey.

Gary Shepherd finished work on his summer flounder paper by compiling commercial data and then writing a first draft of a paper on the age and growth of summer flounder which includes a comparison of three age structures: scales, fin rays, and otoliths.

Judy Penttila checked the ages of Atlantic mackerel from New Jersey party-boat samples for 1978 which were done for Darryl Christensen of the Sandy Hook Laboratory. She also finished annotating the haddock scale samples to be used by Cambridge Instrument Co. in the development of software for automatically aging fish scales.

Finfish

Laurie Savelkoul completed sectioning all red hake samples from the 1978 summer bottom trawl survey and is currently sectioning both red and silver hake from the 1978 fall survey. She is also in the process of aging red hake from the 1978 summer survey.

Cathy Rearden has now completed aging and summarizing all butterfish samples from the 1977 spring (206 ages) and 1977 fall (338 ages) surveys. She is now spending part of each week working on a project with Ambrose Jearld and Joan Palmer concerning density-dependent growth for a number of important fish species.

Michael Campbell is continuing his work on a paper concerning the age and growth of scup. He is also on temporary assignment with Fred Nichy in the aquarium.

Louise Dery has nearly completed the aging of silver hake from the 1978 summer survey. She is summarizing the results of a study of silver hake otolith growth patterns for stock separation based upon samples of the 1978 spring survey. Atlantic mackerel aging is now up-to-date with the completion of samples from Albatross IV Cruise No. AL 78-04 (56 ages), Albatross IV Cruise No. AL 78-09 (15 ages), R/V Delaware II Cruise No. DE 78-06 (118 ages), and Anton Dohrn Cruise No. 78-02 (118 ages). Summer commercial Atlantic mackerel samples from Thrumcap Island were also aged (62 ages). Concerning Atlantic herring, 245 age samples were received from Jean Chenoweth to be checked. Samples from Delaware II Cruise No. DE 78-06 (252 ages) and a fall 1978 Atlantic herring tagging sample (30 ages) were also processed.

Finfish biologists spent several weeks this month processing samples of pelagic species including butterfish stored in the freezer, and Ambrose Jearld spent several days reviewing red hake aging with Louise Dery.

Sandy Hook Investigation

Darryl Christensen completed a first draft of a report to the Mid-Atlantic Fishery Management Council concerning age composition of the recreational Atlantic mackerel catch. He also completed a first draft of a manuscript on composition of the catches made by party-boat anglers fishing for summer flounder.

John Clifford worked with the Sandy Hook Automatic Data Processing (ADP) Unit to revise programs for analysis of data collected in recent surveys.

Fishery Analysis Investigation

Investigation personnel devoted much of their time during February to completion of assessment analyses for inclusion in updated assessment reports to the Regional Fishery Management Councils.

Fred Serchuk, Paul Wood, and Rhett Lewis completed commercial and research survey analyses of the Georges Bank and Gulf of Maine Atlantic cod stocks for 1978 and prepared a document summarizing these results.

Ralph Mayo, Maureen Griffin, and Liz Bevacqua completed an initial draft of an assessment of the Gulf of Maine redfish stock.

Paul Wood participated in a 1-day sea sampling trip on 19 February aboard the F/V Friesland out of Pt. Judith, RI, for yellowtail flounder. Paul also continued analyses of commercial sea scallop length-frequency data, and scallop catch results from the spring and autumn bottom trawl surveys.

Joan Palmer continued analysis of multispecies data for a multispecies fisheries model. Joan also worked on an analysis of the Atlantic cod catch-per-tow data from bottom trawl surveys on Georges Bank and in the Gulf of Maine.

Harold Foster completed his efforts on analysis of recreational Atlantic cod landings and their incorporation into a revised virtual population analysis for the Georges Bank Atlantic cod stock.

Steve Murawski completed initial analyses of the December 1978 surf clam and ocean quahog survey data, and began preparation of current assessment reports on surf clams and ocean quahogs.

Fishery Assessment Investigation

Steve Clark completed a summary report of US shellfish research and related activities during 1978 for inclusion in the annual ICES Shellfish Committee administrative report. Steve also completed the NEFC contribution to a revised version of the Northern Shrimp Fishery Management Plan.

Emory Anderson began writing a document dealing with the by-catch of pelagic sharks and swordfish in the 1978 foreign trawl fishery in International Commission for the Northwest Atlantic Fisheries (ICNAF) Subarea 5 and Statistical Area 6.

Thurston Burns prepared commercial American lobster length frequencies for 1976 and 1977 for assessment use, and updated the trawl survey data base for pollock in preparation for the 1979 assessment.

Thurston Burns and Hillary Herring updated 1978 commercial length-frequency data for January-November (1978). Hillary also completed coding the December 1978 length-frequency data, audited the total 1978 file, made further progress in preparing data and loading it into computer files for 1963-67 red hake biostatistical analysis, and processed silver hake industrial length-frequency data for 1969-76 for computer analysis.

Emma Henderson completed a draft copy of biological and assessment information on summer flounder. She also continued work on the groundfish model for the New England Fishery Management Council including developing methods for interfacing biological and economic models and preparing current input data.

Frank Almeida continued preliminary analysis of morphometric characters for the silver hake stock delineation study. Jeffrey Floyd has been doing the laboratory measurements of fish for the study; approximately one-half of the samples collected (1978 summer and autumn bottom trawl surveys) have been processed to date. Frank also prepared silver hake industrial length-frequency data for 1969-78 for use by Sal Testaverde of the Northeast Regional Office.

Pat Carter worked further on haddock young-of-the-year indices for Browns Bank and Georges Bank, completed survey length-frequency computer analyses for Browns Bank haddock for 1963-78, and updated 1977 research vessel survey and commercial catch and sampling data for shellfish species.

Fishery Systems Investigation

Updated assessments for Atlantic herring and yellowtail flounder were prepared during February 1979. The yellowtail flounder assessment indicates some modest improvement in recruitment prospects, but stock abundance remains at a relatively low level. For the Atlantic herring, available data indicate a strong 1976 year class, which will result in a significant increase in surplus production during 1979.

Mike Sissenwine began reviewing "Influence of the Proposed Cornwall Pump Storage Project and Steam Electric Generating Plants on the Hudson River Estuary with Emphasis on Striped Bass and Other Fish Populations." This is a report prepared by the Consolidated Edison Company in support of their application for permits to the Federal Energy Regulatory Commission. Mike will be serving as

a consultant and expert witness for the Federal Energy Regulatory Commission during the next year.

Meetings, Talks, Visitors, Publicity

Mike Sissenwine and several others in the NEFC met with John Steele, George Grice, and Walcott Smith of the Woods Hole Oceanographic Institution on 5 February to discuss cooperative ecosystems research.

Stuart Wilk attended the Scientific and Statistical Committee meeting of the State-Federal Striped Bass Management Project in Alexandria, VA, during 5-7 February.

Jim Crossen participated in an underwater cable and connector workshop in San Diego, CA, sponsored by the Marine Technology Society, from 5 to 8 February. The purpose of the meeting was to exchange technical information on improving the durability of cables and connectors under various applications.

Mike Sissenwine and Gordon Waring met at the offices of the New England Fishery Management Council on 8 and 9 February with Vaughn Anthony and Council staff to discuss the current assessment for Atlantic herring.

Emory Anderson participated with an NEFC delegation in scientific discussions held in Poland and USSR during 11-25 February. The first week was spent in Poland at the Sea Fisheries Institute in Gdynia, at the Plankton Sorting Center in Szczecin, and in Warsaw. Emory reviewed stock assessments of mutual interest (Atlantic mackerel, Atlantic herring, and short-finned and long-finned squid) with Polish colleagues and also assisted in a review of the US bottom trawl survey program. The second week was spent in Moscow in formal discussions with Soviet scientists and administrators reviewing 1978 cooperative work and formulating plans for future research. Discussions included activities related to life history, stock assessments, hydroacoustics, Marine Resources Monitoring, Assessment, and Prediction Program (MARMAP) surveys, larval Atlantic herring studies, and ecosystem modeling.

Steve Clark attended the First International Pandalid Shrimp Workshop held in Kodiak, AK, during 13-15 February and presented a paper (coauthored by Vaughn Anthony of the Maine Department of Marine Resources in West Boothbay Harbor, ME) titled "An Assessment of the Gulf of Maine Northern Shrimp Resource."

Mike Sissenwine presented a noontime seminar at the Marine Biological Laboratory on 14 February titled "An Introduction to Stock Assessment with Examples from New England Fisheries."

Mike Sissenwine and Stuart Wilk attended the NMFS Recreational Fisheries Workshop held in Washington, DC, during 27 February-1 March 1979.

Mike Sissenwine and others from the NEFC met with lawyers and scientists of the Federal Energy Regulatory Commission to discuss the NMFS testimony at the upcoming hearings for licensing of the Cornwall pump storage plant on the Hudson River.

Brad Brown, Mike Sissenwine, Fred Serchuk, and Margaret McBride met with the Groundfish Oversight Committee of the New England Fishery Management Council to discuss current stock assessments for yellowtail flounder, haddock, and Atlantic cod.

Judy Penttila attended an image analysis meeting at the Narragansett Laboratory and gave a presentation on possible approaches to the problems of automatically aging haddock scales.

Manuscripts

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- McBride, M. M., and M. P. Sissenwine. 1979. Yellowtail flounder (Limanda ferruginea): status of the stocks, February 1979. NMFS, NEFC, Woods Hole Lab. Ref. No. 79-06.
- Murawski, S. A., and G. T. Waring. A population assessment of butterfish, Peprilus triacanthus, in the northwestern Atlantic Ocean. Trans. Am. Fish. Soc. (A).
- Ropes, J. The Atlantic surf clam fishery 1965-74. Mar. Fish. Rev. (A)
- Serchuk, F. M., S. A. Murawski, and J. W. Ropes. Ocean quahog, Arctica islandica (Linnaeus). MESA NY Bight Atlas Ser. (S)
- Serchuk, F. M., and R. L. Wigley. Deep-sea red crab, Geryon quinquegens Smith 1879. MESA NY Bight Atlas Ser. (S)
- Serchuk, F. M., P. W. Wood, R. Lewis, J. A. Penttila, and B. E. Brown. 1979. Status of the Georges Bank and Gulf of Maine cod stocks, February 1979. NMFS, NEFC, Woods Hole Lab. Ref. No. 79-10. 32 p.
- Sissenwine, M. P. 1978. Is MSY an adequate foundation for optimum yield? Fisheries 3(6):22-42. (P)
- Wood, P., and M. P. Sissenwine. 1979. Results of 19 February 1979 sea sampling trip aboard F/V Friesland. NMFS, NEFC, Woods Hole Lab. Ref. No. 79-11.

MARINE ECOSYSTEMS DIVISION

Ecosystem Dynamics Investigation

Marv Grosslein attended a meeting of the Scientific and Statistical (S&S) Committee for the New England Fishery Management Council where the Council's 1979 research program was reviewed as well as the draft fishery management plan for American lobster. Dr. Grosslein and others in the NEFC modeling group also updated the report on the status of ecosystem modeling within the NEFC, which is included in the "Fisheries Ecosystem Study News" (NMFS, NEFC, Narragansett Lab. Ref. No. 79-12). Final editing of the paper on marine ecosystem management (Item 6 of Narragansett Lab. Ref. No. 79-12) was completed.

During February, Ed Cohen reviewed the literature on fish feeding, digestion, and stomach contents as background for developing fish feeding functions for the model GEORGE II. Using the food habits data of Ray Bowman, Ray Maurer, and Janet Murphy, and the theoretical description of daily rations devised by Mike Pennington, the stomach content of an average sized fish was apportioned among the various food types. Adjustments to the feeding period based on the relation of active

metabolism to stomach content were investigated, and a preliminary feeding function based on proportion of food types in the stomach was devised for GEORGE. This function is based on the amount of food needed for von Bertalanffy-described growth with the rate of consumption following a Holling diet equation. Wendell Hahm, together with Brian Hayden, continued work on the fish food-habit files in preparation for statistical analyses of sources and magnitude of variability. Wendell also continued work on developing the structure of GEORGE II, particularly the inclusion of sparse matrix storage algorithms and rewriting subroutines for easier program alterations. Considerable effort is being expended to make GEORGE amenable to analytical procedures (e.g., sensitivity analysis, phase-plane plots, etc.).

Marv Grosslein spent 1 wk in Poland and 1 wk in the USSR with the delegation from the NEFC for talks on joint fishery research problems. While in Poland, Dr. Grosslein and Wally Smith presented general descriptions of the MARMAP program for staff members at the Sea Fisheries Institute (MIR) in Gdynia; MIR is planning to establish a MARMAP-type program in the Baltic Sea. Also, 1 day was spent at the plankton sorting center in Szczecin reviewing status of work on MARMAP samples. During the week in Moscow, the extensive 1978 joint US-USSR fishery research in the Northwest Atlantic was reviewed with AtlantNIRO scientists and a joint program for 1979 was established. Three USSR vessels are scheduled to conduct joint research with us this year. From June to mid-September an SRTM will conduct larval hake and concurrent environmental studies on Georges Bank, and also fish-feeding and bird census studies. From August to December, the R/V Belogorsk is scheduled to do a MARMAP cruise, bottom trawl surveys for fish and squid including food habits studies, and an expanded program of sampling phytoplankton and microzooplankton communities in the Georges Bank region. From September to December, another SRTM will carry out Atlantic saury surveys and concurrent hydrological studies.

The expanded plankton program proposed by the USSR scientists represents an extension of the work done in 1978 by Vinogradova and Sushin on species and size composition of phytoplankton communities and associated microzooplankton, in relation to primary production rates and hydrological factors. Their proposal also includes a plan to study the feasibility of linking the USSR primary-secondary production model to the NEFC multispecies fish production model.

The modeling workshop at the Woods Hole Oceanographic Institution (WHOI) with John Steele was completed in February, although there will be further meetings at 3-4 wk intervals. Wendell Hahm, Mike Sissenwine, and Ed Cohen also had a separate meeting with John Steele to discuss GEORGE and various theoretical and practical aspects of ecosystem modeling, as part of a more general effort by the NEFC to improve liaison and cooperative ventures with WHOI.

Mike Pennington finished a paper with Ann Naplin and Pete Berrien on estimating egg production from survey cruises. It will be presented at the April larval fish symposium in Woods Hole. The first draft of a paper with Bob Livingstone on the changes in fecundity of haddock from 1970 to 1973 has been completed.

Recruitment Processes

The final ICNAF larval Atlantic herring survey of the Georges Bank - Nantucket Shoals area was conducted this month, bringing to a close a time series of some 60+ cruises since fall 1971. The R/V Mt. Mitchell conducted the survey during 15-24 February 1979, departing and returning to Boston. Chief Scientist was Dave Potter; other participants from the group included Dana Temple and Cabell Davis. Fifty-three bongo net stations were completed on the survey, covering the prime target

areas. Larval Atlantic herring were found only in low densities and around the Nantucket Shoals area where there was evidence of some spawning activity last fall. American sand lance were the dominant larvae collected on all the Nantucket Shoals stations.

Greg Lough has spent most of his time this month preparing the larval Atlantic herring paper for the ICES Larval Fish Symposium in April with the help of George Bolz, Dave Potter, Roz Cohen, and Cabell Davis working on various parts of the data base. We received ichthyoplankton data outputs from the Narragansett Laboratory this month for the ICNAF time series of 1971-77 (30 cruises) and George Bolz is summarizing the data for Georges Bank and Nantucket Shoals. So far he has worked up 11 cruises for the 1974 and 1975 seasons. Dave Potter has completed a preliminary manuscript of neustonic ichthyoplankton for 1974-75 and will compare the catches with bongo net data. Roz Cohen has completed editing zooplankton data of seven cruises, and three cruises are partially done from the same time series. She also finished a preliminary draft of the larval Atlantic herring gut content data for the 1974 and 1975 winters that we plan to show at the Larval Fish Symposium.

Greg Lough, George Bolz, Dave Potter, and Roz Cohen attended a plankton review meeting with members of the Narragansett Laboratory staff on 13 February. Roz Cohen also attended an Image Analysis Project meeting at the Narragansett Laboratory on 7 February and an Input-Output Computer Services meeting to review data-processing problems. George Bolz attended two EEO meetings in Woods Hole this month, and in a recent NEFC election, he was elected to serve on the EEO Committee for 1 yr. Also, Roz Cohen was elected to the EEO Committee for a 2-yr period. Greg Lough met with two fishery graduate students from the University of Massachusetts to review the application of larval fish otolith aging techniques.

Fishery Oceanography Investigation

Preparation for cruises and scientific meetings has occupied most of our time in February. Derek Sutton, Gil Dering, Steve Ramp, and Red Wright have been getting ready for the R/V Oceanus cruise in March when the current meter array for the Nantucket Shoals flux experiment will be deployed. Derek has completed plans for construction of marker buoys, prepared a notice for fishermen and other mariners which is being widely distributed, and has begun fabrication of the flashing light assemblies for the buoys. Gil has prepared 11 current meters and five releases for the first deployment. Steve has assembled the necessary mooring supplies and equipment and Red managed our end of the process of awarding a contract for construction and painting of buoys.

Tim Cain, Dan Patanjo, and Steve Fogg have prepared equipment for other cruises: the MARMAP cruise on Delaware II, on which Steve is participating as hydrographer; the larval Atlantic herring cruise on Mt. Mitchell; and the MARMAP cruise on Albatross IV which was substituted for a planned MOCNESS - larval Atlantic herring cruise. Dan was to have sailed on Albatross IV on 26 February, but at this writing (5 March) the ship is still not ready for sea. We have had to stretch our equipment resources to the limit to supply all vessels.

Ron Schlitz and Ron Trites of the Bedford Institute of Oceanography have submitted an abstract for the annual meeting of the American Geophysical Union (AGU) in May, describing the current measurements made during the larval Atlantic herring patch study last fall. Steve Ramp and Red Wright have also submitted an AGU abstract on the first full year of measurements in the Northeast Channel.

Tim Cain and Red Wright helped to conduct the election of a new Woods Hole Laboratory EEO Committee - a good voter turnout of 90 chose 10 members from a list of 17 candidates. Tim and Cindy Chappell have been organizing the Soviet MARMAP data from last fall in preparation for submission to NODC.

Ron Schlitz has overseen the installation of our Tektronix graphics terminal on line with the Sigma 7 computer at WHOI. It appears to be functioning smoothly.

Ichthyoplankton Investigation

The winter ichthyoplankton survey on Delaware II was completed. John Sibunka was Field Party Chief. Bill Brennen, Alyce Wells, and Cindy Obenchain were on board to carry out ichthyoplankton and zooplankton work. The survey began off Cape Hatteras. Except for larval American sand lance, fish eggs and larvae are reportedly in short supply.

Wally Smith joined a group of NEFC scientists on a 2-wk trip to Poland and the USSR to discuss current and future cooperative research in the western North Atlantic. At the Sea Fisheries Institute in Gdynia, he and Marv Grosslein gave a detailed presentation on MARMAP to a group of Polish scientists. At the plankton sorting center in Szczecin, they met with Dr. L. Ejsymont to review the current status of sorting and the projected timetable for completing samples on hand. The MARMAP 6B5 samples have been sorted and enumerated for those surveys completed in FY78. They will begin processing FY79 samples within the next month. Plans were initiated to utilize diplomatic pouches to expedite the return of log sheets to the US. In Moscow, Wally Smith and Marv Grosslein represented the US in a working group that reviewed US-USSR plankton research in 1978 and planned continuing activities for 1979. A detailed report reviewing the impressive amount of work completed last year and outlining plans for the remainder of this year will be forthcoming.

Mike Fahay spent 1 wk with Drs. A. H. Ahlstrom and Jeff Moser at the SWFC compiling morphometric and meristic information on larval myctophiforms for his laboratory guide. When completed, the guide will include information and illustrations on larvae of 254 species.

The BLM report summarizing ichthyoplankton collections taken in the Middle Atlantic Bight between 1965 and 1976 was forwarded to BLM for review. We are awaiting their comments before preparing the final draft of the report.

Benthic Dynamics Investigation

A substantial proportion of the effort in the benthic invertebrates task was devoted to the analysis and evaluation of quantitative macrobenthic samples from the continental shelf region south of Martha's Vineyard and Nantucket. This portion of the shelf supports a very rich benthic fauna, and good progress was made in analyzing the biomass and density distributions of the major components. Another interesting aspect of these fauna that we are presently examining is the mode of feeding by major invertebrates inhabiting this region. Another subject that received attention during the month was the distribution of bivalve mollusks, based on both qualitative and quantitative samples in our collections.

Studies of the food habits of fishes continued with emphasis on the 1969-72 flatfish samples. Minor coding and computer listing problems have been corrected and the data are undergoing a final audit before summary listings are prepared. Ray Bowman is making satisfactory progress on the juvenile haddock data base; a report on that subject is in preparation. Computer programs to facilitate the

auditing procedure and the summarization of data are being prepared by Wendell Hahm and Brian Hayden. Analyses of the stomach contents of fish collected as part of Atlantic herring and Ocean Pulse studies, conducted by the Manned Undersea Research and Technology Program diving team, are underway. These analyses, together with other biological aspects of Atlantic herring spawning, will be incorporated in a report on this subject. Preparations were made for collecting stomach contents from Atlantic herring and Atlantic mackerel on the Anton Dohrn, which is presently operating in the Gulf of Maine - Georges Bank region.

Plankton Ecology Investigation

The processing of invertebrate samples from Belogorsk Cruises No. 78-01 and 78-03 was completed during January and February. This provides invertebrate information on 11 data sets for the monitoring series of 1977 and 1978, and consists of approximately 1,040 processed 0.333-mm mesh samples completed since March 1978. The sorting of samples taken on Belogorsk Cruise No. 78-04 is underway and upon its completion, two full years of monitoring data will be available for a baseline analysis.

Biostatistics

Lorrie Sullivan continued work on the ICNAF data base with help from Chris Lindgren and Gary Johnson. All ichthyoplankton summaries for 1974-77 have been sent to Greg Lough. Progress for 1971-73 collections has been slow due to inconsistencies in the master files and ichthyoplankton files. Copies of all completed larval file summaries (23 cruises) were made for Marv Grosslein to take to the USSR. Nine files of zooplankton data (three cruises) were remade for Roz Cohen to correct for missing stage information, which was due to an error in the card conversion program not previously picked up.

Tom Plichta and Patty Rosenberg are continuing work on plots for the BLM data. Jerry Prezioso completed a shipment of samples to Poland. Included were selected 0.333-mm bongo net samples from the larval Atlantic herring cruises (Albatross IV Cruises No. AL 78-07, AL 78-13, and AL 78-15; and Anton Dohrn Cruise No. 78-03) and from MARMAP cruises (Belogorsk Cruises No. 78-01 and 78-03), as well as for the plankton sorting center in Szczecin, Poland. Jerry also completed a computer archive file of small mesh bongo net samples, and converted wet displacement volume data from 1978 cruises to cubic centimeters per 100 cubic meters to run statistical analyses and plots.

Cynthia Jones has completed the three-dimensional plots for 1977 zooplankton volume data. She is currently finishing the elementary descriptive statistics and nonparametric analysis of variance for the 1978 zooplankton data. Three-dimensional plots of 1974-78 American sand lance data are being developed.

Julien Goulet joined the group at the end of the month. He will be responsible for coordinating all of the ADP needs of the Narragansett Laboratory and will provide support in plans and operations of electronic processing of data for the Marine Ecosystems Division.

Zooplankton Biomass

Joe Kane has completed the series of wet volume/dry weight regressions for 1977 MARMAP surveys and is currently involved in statistical comparisons of

regression equations. Joe has also begun a second series of dry weight determinations to examine the magnitude and significance of yearly variations in wet volume/dry weight relationships.

Jerry Prezioso has completed a preliminary inventory of "fine mesh" samples from ICNAF and MARMAP surveys and will be working on further refinements to streamline the inventory. The inventory is fundamental to determining a strategy for the sorting of fine-mesh samples. The optimal use of this data base for the purposes of 2-degree production estimates and estimates of food availability to larval Atlantic herring is being discussed by Greg Lough, Jack Green, and Cabell Davis.

Jack Green has been in contact with people from CEPEX concerning plankton sample aliquoting, sorting, and biomass determination programs.

Joe Kane and Jack Green participated in a larval Atlantic herring cruise aboard the Mt. Mitchell and a MARMAP cruise aboard the Delaware II (Cruise No. DE 79-03).

Donna Busch and Chris Powell participated in Part I of a MARMAP survey conducted from Cape Hatteras to Long Island aboard Delaware II. Primary productivity measurements were made at 16 of the 71 stations occupied during Part I of the cruise (23 February-5 March). At several stations (<10 fathoms) a net phytoplankton bloom consisting of chain diatoms extended from Maryland north to Barnegat Light.

At the same stations, high numbers of American sand lance larvae were noted in the bongo samples. Surface water temperatures of $\leq 2^{\circ}\text{C}$ near shore reflected freshwater runoff due to above-freezing air temperature. Chris Powell will continue primary production measurements on Part II of the cruise from 7 to 17 March, which will cover Georges Bank, Southern New England, and the Gulf of Maine.

Larval Physiology and Biochemistry Investigation

Studies of the intensity and variability of winter flounder larval respiration were continued. Physiological aspects include comparisons between fed and starved larvae of basal metabolism estimated from anesthetized larvae, and routine metabolism. Biochemical aspects include the effects of temperature and substrate concentration on the tetrazolium-reduction method for measurement of respiratory electron transport (RETS) activity. The energetic requirements for winter flounder larvae were 15.00 Kcal. The correlation between RETS activity and in vivo respiration for starved and fed larvae is also being studied.

Daily mortality rates and size at death for starved populations of larvae of increasing sequential ages are being investigated. Preliminary results indicate death from starvation usually is greatest in 7-10 days regardless of size or age.

A great deal of time has been spent completing manuscripts for presentation at the Early Life History Symposium on competitive growth and survival of Atlantic cod and haddock larvae, biochemical aspects during ontogenesis of Atlantic cod and winter flounder, and the convenor's speech for the modeling session of the symposium.

Apex Predator Investigation

A summary of the 1978 shark tagging activities was completed and mailed to 2,000 cooperators. In 1978, 4,504 sharks representing 30 species were tagged and released under the NMFS cooperative shark tagging program. Volunteer taggers accounted for about 90% of all releases which also included 53 swordfish and 51

miscellaneous teleosts. During the same period, 216 fish were recaptured from 14 species of sharks and a crevalle jack. No swordfish tags were returned. Last year was indeed a record year in that the number of sharks released, the number recaptured, and the recapture rate of 4.7% were all higher than in any year since the program began in 1963. Of the 216 tags returned last year, 161 (75%) came from blue, 11 (5%) from mako, 11 (5%) from sandbar, and 32 (15%) from other shark species. Rod and reel fishermen returned 152 (70%) of the tags, longliners accounted for 45 (21%), and 19 (9%) were recaptured by other methods. Foreign fishermen returned 17 tags, of which 14 were taken by longline fishermen from Japan (6), Republic of Korea (2), Spain (2), Canada (2), Cuba (1), and Mexico (1). An unprecedented aspect of 1978 tag returns was that 77 came from fishermen participating in the tagging program. Moreover, 22 of these sharks (primarily blue sharks) were retagged after the original tag had been retrieved. The maximum time at liberty for a tagged shark in 1978 came from a sandbar shark recaptured after 6 yr. The shark was released off Montauk, NY, and recovered off Jesus Maria, Mexico, a distance of 2,000 mi. This is 1,000 mi further than any previous recovery from a sandbar shark and it is the second recovery to show movements of the species from the Atlantic into the Gulf of Mexico. The longest distance recorded for any species in 1978 was 3,000 mi by a blue shark that was tagged off Southern New England and recaptured 1 yr later off Portugal. We have had blue sharks recaptured over broad areas of the Atlantic including the offings of South America and Africa, but this is the first recovery to show west-to-east transAtlantic movements to the coast of Europe. Additional information on last year's results is included in the newsletter.

Meetings, Talks, Visitors, Publicity

Considerable time was spent by the Narragansett Laboratory secretarial staff in preparing for the upcoming ICES Symposium on the Early Life History of Fish.

Ken Sherman and Bob Marak met in Washington, DC, with scientists from the South Carolina Department of Marine Resources to discuss East Coast MARMAP present and future work.

Bob Marak attended a Department of Commerce advanced management seminar in Washington, DC.

A meeting to discuss progress on the use of pattern recognition in plankton and fishery assessment studies was held on 5 February at the Narragansett Laboratory. In attendance were representatives from the NOAA Office of Engineering, University of Rhode Island, and the NEFC. The current proposal for automated plankton analysis was reviewed and funding discussed. The scale-reading problem was reviewed in detail and alternative approaches presented.

Ray Maurer presented a seminar at the Narragansett Laboratory on "RUFAS" (Remote Underwater Fisheries Assessment System) and its application to population assessment studies of the calico scallop.

Manuscripts

Berrien, P. L., A. Naplin, and M. R. Pennington. 1979. Atlantic mackerel, Scomber scombrus, egg production and spawning population estimates for 1977 in the Gulf of Maine, Georges Bank, and Middle Atlantic Bight. ICES/ELH Symp./DS:9.

- Buckley, L. J. 1979. Biochemical changes during ontogenesis of cod (Gadus morhua L.) and winter flounder (Pseudopleuronectes americanus) larvae. ICES/ELH Symp./SD:10.
- Buckley, L. J. Relationship between RNA-DNA ratios, prey density and growth rate in cod (Gadus morhua L.). J. Fish. Res. Bd. Can. (A)
- Laurence, G. C., B. R. Burns, T. A. Halavik, and A. S. Smigielski. 1979. Implications of direct competition between larval cod (Gadus morhua) and haddock (Melanogrammus aeglefinus) in laboratory growth and survival studies at different food densities. ICES/ELH Symp./FM:3.
- Marak, R. 1979. Annual report, MARMAP fisheries ecosystem studies. NMFS, NEFC, Narragansett Lab. Ref. No. 79-14.
- Sherman, K. 1979. MARMAP fishery ecosystem study news. NMFS, NEFC, Narragansett Lab. Ref. No. 79-12.
- Sherman, K., R. Maurer, R. Byron, and J. Green. 1979. Relationship between larval fish communities and zooplankton prey species in an offshore spawning ground. ICES/ELH Symp./DA:Poster 26.

MANNED UNDERSEA RESEARCH AND TECHNOLOGY PROGRAM

Activity during the reporting period was centered on sample workups, data analysis, and preparation of manuscripts from previous field seasons. Samples from the Ocean Pulse stations in the Gulf of Maine in 1978 and data from DSRV Alvin Dives No.'s 835-840 during 1978 received major attention. Two manuscripts were revised and accepted for publication, and a third is nearing completion.

Manuscripts

- Meyer, T. L., R. A. Cooper, and R. W. Langton. Relative abundance, behavior, and food habits of the American sand lance, Ammodytes americanus, from the Gulf of Maine. Fish. Bull., US. (A).
- Cooper, R. A., and J. R. Uzmann. Ecology of juvenile and adult lobsters: Homarus americanus and Homarus gammarus. In S. Cobb and B. Phillips, eds. Biology and management of lobsters. Academic Press, NY. (A)

DIVISION OF ENVIRONMENTAL ASSESSMENT

Behavior of Marine Fishes and Invertebrates Investigation

In addition to our work on blue crabs, studies of the response of Dungeness crabs to oiled sediments are also being conducted in conjunction with Battelle Pacific Northwest Laboratories with funding from the US Environmental Protection Agency (USEPA). Field observations have shown that both current and substrate are important ecological parameters which influence the activity and movements in Dungeness crabs. Typically, on the ebb tide, crabs are inactive and buried

together in pods of 10 - 12, while on the flood tide, they emerge and move inshore into the intertidal areas to feed. Therefore, our experiments with Dungeness crabs were designed to take into account the influence of both current and substrate on their avoidance capability.

In two tests, water flowed the length of each experimental tank (incoming half designated as upstream; remainder of tank as downstream). In the first test in which clean sediment was placed upstream, and oiled sediment (2,000 ppm Prudhoe Bay crude) covered the downstream end, the crabs showed no avoidance while inactive, remaining downstream and, in fact, burying into the oiled sediment. In the second test, a partition, running 3/4 the length of the tank, divided the tank in half lengthwise with clean sediment covering one half and oiled sediment the other. As in the first test, the crabs were also downstream when inactive, however, with both clean and oiled sediment present downstream, the animals chose to bury in the clean sediment, i.e., exhibiting avoidance. While these experiments are preliminary, they do indicate the importance of taking into account the various ecological factors which are critical to the animal's life habits when designing and analyzing experiments.

Biological Oceanography of Stressed Environments Investigation

A basic design for a 1-yr-long algal bioassay study was prepared for the Chief of the Division of Environmental Assessment.

Workup of winter flounder blood characteristics, including red blood cell numbers, packed red blood cell volume, hemoglobin, and serum protein was continued. This is a clearing of data collected between 1969 and 1972, partly during the "fin rot" epizootic. The blood characteristics of healthy and diseased fish are being compared.

Final editorial changes on a paper, "Possible Association of a Diatom Bloom with Fishing Gear Clogging in the Middle Atlantic Bight" by J. Mahoney and F. Steimle, were completed.

Continuous underway fluorometry data from joint NEFC/NASA operations in the New York Bight were digitized and converted to chlorophyll a concentrations. These data, along with data on suspended solids, have been sent to Dr. R. W. Johnson (NASA, Langley Research Center) so that he can convert his multispectral scanning data to chlorophyll concentrations to produce a detailed and accurate map of the chlorophyll distributions in the New York Bight apex for 23 June 1977. Such mapping will be much more detailed and more synoptic than a single research vessel could produce via continuous underway fluorometry. We are continuing to work with NASA to provide them with additional information.

Jim Thomas, Craig Robertson, and Jay O'Reilly reviewed and assisted in the revision of the Marine Ecosystems Analysis Program (MESA) Synoptic Investigations of Nutrient Cycling (SINC) compendium report.

Seabed oxygen consumption data for six cruises in the New York Bight and two over Georges Bank have been plotted onto Ocean Pulse charts and photographed. These data will be considered as part of our historical baseline for Ocean Pulse monitoring efforts.

Data induction and computer analysis have been initiated to partition total seabed oxygen consumption (SOC) into its biological and chemical components. The ratios of biological SOC/chemical SOC will be used in correlation and regression analyses to delineate areas of special interest.

Coastal Ecosystems Investigation

We prepared for and attempted to implement the winter Ocean Pulse environmental monitoring cruise. Problems with Delaware II equipment caused the cruise to be aborted with only 3 of 32 stations sampled. Frank Steimle was Chief Scientist and Dave Radosh led the benthic sampling effort. We also assisted Don Boesch of Virginia Institute of Marine Science (VIMS) in his examination of the MESA New York Bight apex benthic data set, and completed 76 caloric determinations on 16 additional species of benthic invertebrates this month. Caloric data for most of these species, which are food items for principal North Atlantic fishes, are nonexistent. Jan Caracciolo and Frank Steimle completed all sections of the atlas of New York Bight apex benthic invertebrates. The manuscript is now being typed. Frank Steimle is assisting the American Littoral Society (ALS) in writing a report on the results of last year's ALS-NOAA/MESA cooperative diving program.

Bob Reid spent considerable time in management of the NEFC's projects concerning biological baselines in the Middle Atlantic Bight for the Bureau of Land Management (BLM). Two draft final reports (on ichthyoplankton and finfish spawning seasons) were reviewed and forwarded to BLM. A listing of the 2,500 marine diseases citations gathered by Pathobiology Division personnel was also sent to BLM as a prelude to final report preparation. We arranged with the National Oceanographic Data Center (NODC) to submit the BLM data base without reformatting, which would have involved considerable time and expense in the case of MARMAP ichthyoplankton data. Those working with finfish data requested an extension of time until November 1979 for final report submission. The remaining tasks (ichthyoplankton and pathobiology) should be finished by early spring; benthos was completed earlier. Bob Reid and Ann Frame also continued work on benthic macrofauna baselines in Long Island Sound, and Mr. Reid and Greig Parker began preparations to assist the Atlantic Environmental Group in tracking radiosonde buoys to be deployed at Deepwater Dumpsite (DWD) 106 in March. Dave Radosh worked with our ADP unit on developing a benthic macrofauna data matrix and using clustering techniques to aid in analyzing impacts of and recovery from the 1976 anoxic episode. We completed processing of anoxia-related samples and prioritized and began work on Ocean Pulse benthic samples. Sukwoo Chang aided the Physiological Effects of Pollutant Stress and Aquacultural Genetics Investigations in statistical analysis of data, especially sample size determination. He also worked with Jack Pearce on data analysis involving a multiple disc sampling study, and with Tony Pacheco on Ocean Pulse data inputs, statistical treatments, and coordination.

Environmental Chemistry Investigation

Primary productivity, chlorophyll a biomass, and nutrients (nitrate, nitrite, phosphate, and silicate) were collected on the February Ocean Pulse cruise by Steven Ward, Susan Barker, and Andrew Draxler. Chlorophyll samples were processed in the field, while productivity and nutrient samples were returned to the laboratory for counting and analysis.

Susan Barker and William Hogelin participated in Part I of the February-March MARMAP cruise. Chlorophyll a biomass was sampled at 35 stations.

Percent of total chlorophyll a (mg/m^3) due to nanoplankton was plotted and contoured for all MARMAP cruises from October 1977 to October 1978. Chlorophyll a

and primary productivity measurements from the January surf clam cruise were plotted.

Vincent Zdanowicz spent much of February collecting biological hydrocarbon samples for MESA. Mussels were collected from Jones Inlet and surf clams from Atlantic Beach, Long Island. Mr. Zdanowicz participated in a 3-day cruise aboard the R/V Kelez where he collected striped bass and surf clams. All these samples were shipped to the NWAFC's Seattle Laboratory for hydrocarbon analysis. Attempts to collect striped bass samples from South Carolina and southern New Jersey were unsuccessful due to weather.

Planning continued for the new initiative in heavy metal analysis at the Sandy Hook Laboratory.

Albert Matte attended a 5-day course in applied oceanography sponsored by George Washington University. The course was held in Washington, DC.

Physiological Effects of Pollutant Stress Investigation

Physioecology

Chronic exposure of adult slipper limpets (Crepidula fornicata) to silver continued this month. A mated pair of F₁ limpets raised from parents held at 10 ppb silver for 1 mo and which were subsequently maintained at the same silver concentration for an additional 5.5 mo produced two egg masses this month, for a total of three egg masses produced. The larvae from these egg masses have not fared well.

A long-term exposure (45 days) and subsequent depuration (30 days) study of the deposit-feeding clam Macoma balthica is to be completed at the end of this month.

Two experiments to determine the effect of silver on embryos and larvae of the American oyster under various salinity-temperature regimes were performed this month, with inconclusive results. There was a high level of abnormal development and mortality of embryos in control cultures in both experiments.

Physiological Effects

Much of this reporting period was spent on testing the effects of silver and arsenic on heart and gill-bailer activity in American lobsters and rock crabs. New recording techniques have been developed and various reversible effects of short-term metal exposure have been detected.

Measurements of Na, K, Ca, and osmolality on the plasma of winter flounder and windowpane collected during June and July as part of the Long Island Sound Ocean Pulse project were completed. Similar measurements were completed on sea scallops collected on two Ocean Pulse cruises.

A considerable portion of this month was spent preparing for and participating in the February Ocean Pulse cruise.

Anaerobic Bacteriology/Metabolism

Analyses of the biochemical data of the many bacterial isolates from samples from recent Ocean Pulse monitoring activities are continuing. The objective, in part, is the evaluation during the operational test phase of bacteriological methodology and procedures for future baseline studies. Other Ocean Pulse activities included preparation for the February cruise.

A preliminary study of the anaerobic flora of American oysters was initiated.

Meetings, Talks, Visitors, Publicity

Dr. Sukwoo Chang traveled to the Milford Laboratory early in February to assist Drs. A. Calabrese and A. Longwell, Ms. E. Gould, and others with statistical analysis and sample size determination.

Bill Phoel, Diving Officer at the Sandy Hook Laboratory, gave a presentation concerning the various aspects of scientific diving at a night lecture series titled "Topics in Marine Science" hosted by the American Littoral Society.

Dr. James Thomas talked to the Boy Scouts of America Troop 24 of Fair Haven, NJ, about research at the Sandy Hook Laboratory and opportunities for careers.

Drs. A. Calabrese and F. Thurberg, and Ms. E. Gould, met with Dr. Donald Phelps and Mr. Walter Galloway of the EPA's Narragansett Laboratory, concerning our cooperative research effort in the EPA Coastal Ecosystem Analysis Survey.

Dr. J. Graikoski attended the Conference on Aquatic Microbial Ecology held during 7-10 February in Clearwater, FL.

On Tuesday, 13 February, Dr. John Pearce met with personnel from the NOAA Marine Minerals Division. Plans were made for Dr. Pearce to attend an ICES working group meeting on the effects of marine mining on fisheries resources to be held in The Hague during 21-23 March. Notes were exchanged so that the working group report on activities in the US could be prepared for submission to ICES.

Also on 13 February, Dr. Pearce met with MESA personnel in regard to preparation of proposals which might be supported by funds under Section 202. Dr. Pearce and Dr. Arlene Longwell discussed the proposal for experimental genetics studies to be done at the Milford Laboratory.

Dr. J. Graikoski acted as host (in part) to Dr. B. Lubieniecki and Mr. M. Lawadzki of the Sea Fisheries Institute in Gdynia, Poland, during 16-20 February.

On 22 February, Dr. Pearce met with Capt. Larry Swanson and Drs. Kilho Park and Alex Malahoff in regard to planning for a NOAA core-monitoring program in the Middle Atlantic Bight.

During 26 February-3 March, Dr. Pearce presided as co-convenor of the ICES Biological Effects Monitoring Workshop held at the Duke University Marine Laboratory in Beaufort, NC. Mr. Bori L. Olla was an invited plenary speaker and delivered a paper titled "Applicability of Behavioral Measures in Environmental Stress Assessment." Mr. Olla was also Chairman of the Behavior Panel. Drs. A. Calabrese and F. Thurberg also attended the Workshop. Some 60 scientists from 14 nations gathered for the 1-wk workshop during which panel sessions were conducted by different disciplines such as behavior, genetics, physiology/biochemistry, and ecology. Plenary sessions and individual discussion periods allowed scientists working in specific disciplines to have dialogues with scientists from other disciplines. The workshop was supported jointly by NMFS and EPA. The proceedings of the meeting, including reports from the various panel sessions, as well as over 30 submitted research papers, will be published by ICES.

Manuscripts

- MacInnes, J., 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. (A)
- Mahoney, J., and F. Steimle. Possible association of a fishing gear clogging with a diatom bloom in the Middle Atlantic Bight. Estuaries. (S)
- Olla, B. L., W. H. Pearson, and A. L. Studholme. Applicability of behavioral measures in environmental stress assessment. Proceedings of ICES Workshop on Monitoring Biological Effects of Pollution in the Sea. Duke University. 28 February-3 March. (S)
- Pearce, J. B. 1979. Marine sand and gravel production in areas off the the Northeast Coast of the United States. Mar. Poll. Bull. 10(1): 14-18. (P)
- Sherman, K., and J. Pearce. 1978. Oil, fisheries, and the health of the ecosystem: A review. Pages 240-258 in D. S. Soule and M. Oguri, eds. Marine studies of San Pedro Bay, California. Part 15. The impact of the Sansinena explosion and the Bunker C spill on the marine ecosystem of outer Los Angeles Harbor. Allan Hancock Foundation, Sea Grant Program, University of Southern California. (P)
- Steimle, F., and D. Radosh. Impacts to the benthic macrofauna. Chapter 12 in Oxygen depletion and associated mass mortalities in New York Bight. NOAA Prof. Pap. (S)

AQUACULTURE DIVISION

Spawning and Rearing of Mollusks Investigation

In an attempt to raise juvenile surf clams entirely on cultured algae, it has been demonstrated that growth in a static environment, both with and without sand substrate, is inferior to that of flowing cultures. The growth rates of 1-cm clams in flowing culture are unaffected by the presence or lack of sand substrate. The clams without substrate have some epizootic fouling, whereas clams in sand are clean.

Plans are being made for experimentation this summer to evaluate growth of young surf clams in the natural environment. We hope to identify which size ranges of clams are most heavily preyed upon. Several methods of predator control will be attempted. Long-range plans are to compare growth in nature with growth in a pumped raceway system.

Some tests of the short-term effects of low salinity water on the survival of bay scallops are in progress. These results will help us to identify some of the estuarine conditions likely to cause problems with our planned field planting. Results to date at 25°C show a marked intolerance to salinity below 10 ‰ for periods of time as short as 2 hr.

We have spawned and reared bay scallop larvae three times this year. Larval growth rates were slow and the production of juvenile scallops was low from the first two groups. Our third spawning resulted in more normal larval growth rates and reasonable juvenile production. These juveniles are now in a flowing water system and growing well.

Aspects of Nutritional Requirements of Mollusks Investigation

Experiments were initiated to investigate the effects of various environmental factors on the growth and stability of open-vessel algal cultures. The first two experiments were conducted in small basins with the aim of exploring the effect of varying salt concentrations on Dunaliella euchlora utilizing an artificial seawater culture medium. The progress of the culture was monitored for 2 wk by taking cell counts and pH readings. The conclusion drawn from these experiments was that with this flagellate, the life of an open-tank culture can be extended and vastly improved by increasing the salt concentration of the medium to at least twice that which at present is routinely used.

Algae in the stock culture collection were subcultured on schedule. In addition to the routine subculturing, four bacterized strains were treated with antibiotics for purposes of purification. Of these, one strain, Isochrysis sp., obtained from Tahiti, survived the antibiotic treatment and now appears to be purified. A number of strains cultured using the "paper technique" (Ukeles and Bishop 1976) between December 1977 and February 1978, and stored in the refrigerator at 5°C, were subjected to a viability test. Of the 54 paper cultures that had been stored for about 1 yr, all but nine of them were still viable. The usefulness of this technique for the preservation of small amounts of algae over a long period of time has been confirmed.

Experiments were conducted with six algal species to determine how the concentration of the culture inoculum will affect the progress of future growth in the culture. Growth curves were plotted from daily density readings taken over a period of 45 days for each species at six different initial cell concentrations. The results are being analyzed and integrated with our liquid nitrogen studies.

Experimental work with oyster veliger larvae is now directed at studies on the utilization of dried algal material by the larvae as a source of nutrition. In the first three experiments, utilization of freeze-dried Isochrysis was compared to that of the living alga. Other experiments attempted to feed veligers that were a few days old with living Chlorella from our laboratory and a sample of dried Chlorella received from Japan. These experiments varied from earlier studies in that the experimental feeding regime was not started with an initial feeding at 48 hr, but only after the larvae had been fed on an acceptable food for several days and had grown to a larger size than 48-hr veligers. The larvae fed dry Isochrysis increased in size by 14 μ in 7 days as compared to an increase of 40 μ for larvae fed living algae. Mortality was 14% and 6%, respectively. The experiments conducted with live Chlorella and dried Chlorella showed that the dried Chlorella resulted in a high mortality and there was little growth; 11.6 μ in 6 days as compared to 26 μ on live Chlorella and 47 μ on live Isochrysis. These results do suggest that larvae are receiving some minimal nutrition from the dried material.

Harvests from the mass culture system yielded 1,952 liters of larval foods and 2,135 liters of juvenile foods during the period of this report. These cultures were distributed to the various investigations as follows: Aquacultural Genetics, 833 liters; Spawning and Rearing of Mollusks, 1,946 liters; and Physiological Effects of Pollutant Stress, 1,118 liters.

Aquacultural Genetics Investigation

Oyster Breeding

As part of a comprehensive examination of the ultimate utility of interspecies hybrids in oyster breeding programs, a series of controlled hybrid crosses of these shellfish is underway. This month some crosses were made of the commercial local American oyster (Crassostrea virginica) with the Japanese oyster (C. gigas) and with the mangrove oyster (C. rhizophorae). Mangrove oysters were acquired through the cooperation of Columbia, South America, scientists. Insofar as possible, reciprocal hybrid crosses, and local and nonlocal hybrid control crosses are being made and evaluated simultaneously. Effluent water from exotic species is dumped into a dry well, and all other necessary precautionary measures are taken to avoid any dispersion of gametes, macro- or microorganisms, or hybrid larvae.

Oysters in the two-way mass selection experiment are nearly ready for spawning, and this year's selection and experimental program is being planned.

Cytology and Cytogenetics of Planktonic Fish Eggs

Atlantic mackerel eggs collected over the New York Bight on a May 1978 cruise are currently under study. Several species of planktonic fish eggs have been collected on several different Ocean Pulse cruises. These have been identified and sorted, and are now being processed for microscopic study. These collections, with their specific, spatial, and temporal differences, enable an estimation of the baselines of chromosome mutation rates in fish zygotes, as well as more general estimates of gametic and zygotic wastage. This would ultimately provide a better means of sorting natural from unnatural environmental damage to early life stages of fish.

Statistical study of the 1977 data on Atlantic mackerel eggs collected from surface waters of the New York Bight showed in several related statistical tests significant associations between heavy metal content of microlayer (surface) water and toxic hydrocarbon content of plankton. The study is especially limited by the low number of sites with chemical data, and new data from a 1978 cruise are to be combined with the 1977 results. Associations extended from a range of nonspecific zygote death, cell-level differentiation difficulties, gross malformations of early-stage larvae, and cytotoxic effects on mitoses, to increased chromosome errors (breakage and irregular distribution at zygote mitosis). New studies on the chorion structure of plankton-collected eggs now also hint that chorion damage may be a significant factor in egg health. Some pollutants have an affinity for membranes and can theoretically be a significant factor in altering uptake of chemicals with other more embryo- or chromosome-specific effects. Regarding the influence of natural physical variables, data appear best interpreted for now on the basis of synergisms between natural and unnatural environmental factors.

A detailed report on the Atlantic mackerel studies in the New York Bight was prepared as a written contribution to the recent ICES Workshop on Monitoring Biological Effects of Pollution in the Sea. A. Longwell served on the Genetics Committee of the Workshop. Several genetic approaches are being recommended as reliable means of monitoring sublethal effects of ocean pollution. These include: use of bacteria to ascertain and measure any mutagenic potential of the water or tissue extracts; study of population shifts in isoenzyme frequency associated with pollution stress; and estimation of chromatid and chromosome breakage. While all proposed means are overall pertinent, the latter ones have the more predictable and more immediate outcome on fish.

Meetings, Talks, Visitors, Publicity

A small group of bay scallops was sent to Prince Edward Island (PEI), Canada, as part of the PEI Fisheries Department program to attempt to establish a bay scallop population there.

Several thousand juvenile surf clams were provided to Blue Gold, Inc., a mussel aquaculture operation on Narragansett Bay in Newport, RI.

Ron Goldberg accompanied Dr. Lubieniecki and Mr. Lawadzki of the Sea Fisheries Institute in Gdynia, Poland, on a tour of the State of Massachusetts Lobster Hatchery on Martha's Vineyard and the Woods Hole Oceanographic Institution's Environmental Systems Laboratory.

Manuscripts

Longwell, A. Crosby, and J. B. Hughes. Cytologic, cytogenetic, and embryologic conditions of early-stage Atlantic mackerel eggs in sea surface waters, natural and unnatural stress factors, researching and monitoring biological effects of ocean pollution. Proceedings of the ICES Workshop on Monitoring Biological Effects of Pollution in the Sea. Duke University. 28 February-3 March. (A)

Losee, E. A. 1978. Influence of heredity on larval and spat growth in Crassostrea virginica. Pages 101-107 in Proceedings of the Ninth Annual Meeting of the World Mariculture Society. (P)

Stiles, S. 1978. Conventional and experimental approaches to hybridization and inbreeding research in the oyster. Pages 577-586 in Proceedings of the Ninth Annual Meeting of the World Mariculture Society. (P)

PATHOBIOLOGY DIVISION

Comparative Shellfish Pathology Investigation

During this reporting period, Mr. Austin Farley, representing the Comparative Shellfish Pathology Investigation, began a 3-wk cruise to the Middle and North Atlantic aboard the Anton Dohrn. Mr. Farley's responsibilities are to devise shipboard strategies and tests to detect biological effects of pollution on ocean mollusks for the Ocean Pulse Program. Preliminary work along these lines indicates

that as little as a single drop of invertebrate blood can be used to detect deficiencies in cell adhesion, and in some cases clotting or aggregation. Further, these blood tests appear to be useful in detecting other abnormal cell conditions in the presence of stress and pollution. Discussions were held with biologists and officials of the New Jersey Department of Environmental Protection regarding sampling design and processing procedures in order to begin cooperative work with the State of New Jersey and the US Food and Drug Administration and EPA. These studies involve mutagenesis testing and the presence of molluscan abnormalities in New Jersey and adjacent waters and are being conducted in the Ocean Pulse mode.

The revised rough draft of "Histology of the Blue Crab" has been completed. A copy has been given to a vertebrate histopathologist for review, and an invertebrate physiologist is being contacted concerning review of the manuscript. A second manuscript on viral, rickettsial, bacterial, and fungal diseases of crustaceans (for "Biology of the Crustacea") is almost completed in first rough draft and will shortly be ready for laboratory review.

Examinations of planktonic crustacea collected during the Ocean Pulse cruise of May 1978 have been completed. Various copepods and shrimp, euphausiids (Nyctiphanies), cumacea, cymothoidean and chirodotean isopods, and amphipods (Parathemisto) collected from Norfolk, VA, to the Gulf of Maine were catalogued and examined for gross abnormalities and ectoparasites. Fifty-three of 58 euphausiids from the Gulf of Maine were infested with apostome ciliates and 38 were infested with suctorian ciliates. No gill melanization was evident in any of the specimens. This examination provides useful data for comparison with data on euphausiids examined from DWD 106 and MARMAP cruises. Aggregates of hemocytes were evident in 32 of 67 Parathemisto as white, opaque areas located subcuticularly in the coxal plates, eyes, and dorsal carapace. No etiological agent has been found causing this cellular activity. All other organisms examined were unremarkable. Copepods were the only organisms taken in high numbers and at nearly all stations of the cruise. Representative samples of copepods were processed for histology as were the euphausiids. Histologically, these specimens were unremarkable. Future involvement in the Ocean Pulse project should provide additional data useful in establishing a baseline for pathology of planktonic crustacea.

Within the Histological Services Unit, over 550 sections were cut and over 170 slides stained of various tissues of fish and shellfish. An additional 800-plus slides were cleaned, labeled, and filed, thus making them available to pathologists for microscopic examination. The Unit has begun to revise its earlier paper on histological procedures in efforts to update the protocols and instructions we provide to other investigators interested in applying uniform procedures for studies of comparative pathology.

Fish Pathology Investigation

Knowledge of the effect of hemoparasites on fish health is fragmentary. Piscene erythrocytic necrosis (PEN) virus and Trypanosoma are known to cause anemia, and Cryptobia and one species of hemogregarine have been associated with clinically apparent disease. Many of these organisms appear to become more abundant in peripheral blood under conditions of stress.

As part of Ocean Pulse fish disease studies, blood smears were prepared from fishes collected during two 1978 Ocean Pulse cruises. Table 1 lists the preparations made during the April Norfolk-to-Gulf-of-Maine leg of the Researcher cruise.

Targeted species were haddock, Atlantic cod, winter flounder, and yellowtail flounder; however, these were not always abundantly available. Other species also were sampled. During the fall Delaware II bottom trawl survey (Table 2), no difficulty was encountered in obtaining the targeted species.

The paucity of fishes exhibiting hematozoan infections is quite surprising. Table 3 shows the results of examination of some of the same species sampled on cruises conducted in 1971. The erythrocyte lesions in yellowtail flounder and fourspot flounder resemble the nuclear lesions seen in fishes infected with the virus of PEN; but to date, the viral cytoplasmic inclusions have not been found in these species.

There are three possible explanations for this apparent difference in prevalence: (1) inadequate sample size, (2) seasonal differences in perhiperal hemoparasites--most of the 1971 samples were obtained during late-winter early-spring, and (3) decreased population density of the species sampled leading to a decreased probability of disease transmission.

At present, many additional blood smears are being prepared from the targeted species. When the slides are examined, we will have a better estimate of the current prevalence of hemoparasites during the late-winter period.

Table 1. Blood smears collected on Researcher cruise in April 1978.

Species	No. of smears	No. infected
Haddock	5	-
Atlantic cod	14	-
Winter flounder	26	-
Yellowtail flounder	15	-
Fourspot flounder	13	-
Red hake	20	-
Silver hake	15	-

Table 2. Blood smears collected on fall 1978 bottom trawl survey - Delaware II.

Species	No. of smears	No. infected			
		Trypanosoma	Cryptobia	Hemogregarines	PEN
Haddock	33	-	-	-	0
Atlantic cod	30	-	-	-	1
Winter flounder	21	-	-	-	0
Yellowtail flounder	36	-	-	-	11*

*Lesions of erythrocyte nuclei resembling PEN. No viral cytoplasmic inclusions

Table 3. Blood smears collected from selected groundfish species in 1971. Data pooled from several cruises.

	No. of smears	No. infected			
		Trypanosoma	Cryptobia	Hemogregarines	PEN
Haddock	33	1	-	2	-
Atlantic cod	9	-	-	-	-
Winter flounder	34	-	-	-	-
Yellowtail flounder	31	-	-	-	7*
Fourspot flounder	25	1	-	12	1*
Red hake	26	1	-	3	1
Silver hake	27	1	-	2	1

*Lesions of erythrocyte nuclei resembling PEN. No viral cytoplasmic inclusions.

Larval Diseases of Mollusks Investigation

In high pressure liquid chromatography studies with the Fairfield University Chemistry Department, four fractions have been demonstrated in acidified solutions of paralytic-shellfish-poison-(PSP)-contaminated surf clams. Three separate mouse assays revealed that one of these fractions was toxic, indicating that this procedure may be used to concentrate and, hopefully, separate toxic compounds from clams containing Gonyaulax tamarensis. When sufficient quantities of these toxic materials are obtained, they will be chemically oxidized by ozone in order to identify and trace the fate of PSP decomposition products.

Five suspect pathogens were tested in five separate oyster larval challenge tests. The results were inconclusive as poor embryo development in controls made interpretation impossible. This work is continuing, along with biochemical and physiological characterization of the challenge bacteria.

During this reporting period, the ozone-ultraviolet light (UV) quarantine system was used in nine cross-breeding experiments. Effluents containing larvae from Crassostrea gigas, C. virginica, and C. rhizophorae were disinfected after an 80-min treatment cycle.

The virulence of a red Pseudomonas sp. has been increased and experiments have again verified the toxicity of its pigment in the purified form. Experiments are now in progress to test the toxicity of the various fractions of this pigment which develop on chromatoplates. Another study is underway to isolate and identify the toxic metabolite produced by a Vibrio sp.

Work is continuing on two model systems for examining immune responses in larval oysters. Initially, to refine the systems, adult cells are being used because they are more readily available. One developing system measures the damage caused to oyster phagocytic cells which have ingested pathogenic microorganisms. Criteria for cell damage are impaired phagocytic attachment to plastic surfaces and reduced uptake of added fluorescent latex spheres. A second system attempts to provide a better quantitative measurement of particle uptake in phagocytic cells. It involves the use of atomic absorption spectrometry to measure the iron in horse ferritin particles which have been taken up by the cells. This work is being done in cooperation with Dick Greig of the Milford Laboratory. Two experiments on each system have been run to perfect the techniques.

Microbial Ecology Investigation

Observations on gill condition in 2,920 rock crabs throughout all seasons of the year were summarized to compare data from three different collecting sites: (1) New York Bight apex - 1,447 crabs; (2) Philadelphia-Camden dumpsites - 585 crabs; and (3) Sandy Hook Bay - 888 crabs. Data from the first two sites showed that 58% of the crabs had clean gills and data from the third site showed that 72% had clean gills. The Sandy Hook site differed from the other two sites in that adult crabs were scarce except during the winter-spring season when males migrate shoreward to molt. Black gills were found in 7% of the New York crabs, 4% of the Sandy Hook crabs, and 2% of the Philadelphia-Camden crabs. The respective percentages are conservative estimates since they represent only those gills which were black for 50% or more of their mass. Histological sections of black gills showed that they had necrotic melanized filaments and that black sediment often filled the interlamellar spaces. Extensive growths of bacteria and naviculoid diatoms also were present on the gill epicuticle. Data analyses showed that some of the severely diseased crabs were caught in Sandy Hook Bay during the summer months. They represented a segment of the population which probably did not molt and was too severely diseased to make a successful migration out of the Bay subsequent to the molting season. Results from the black gill survey have provided very useful information for planning further studies on the impact of specific pollutants on crustacean health.

Meetings, Talks, Visitors, Publicity

Dr. Rosenfield attended the ICES meeting at Beaufort, NC, from 26 February to 2 March. Dr. Rosenfield and Mr. Farley met with officials from the New Jersey Department of Environmental Protection on 14 February at the Sandy Hook Laboratory to discuss pollution monitoring projects of mutual concern to both agencies.

Dr. Blogoslawski attended the 3rd Annual Meeting of the Shellfish Health Section of the Long Island Shellfish Farmers Association in Riverhead, NY, on 31 January. Mr. Roger Townshend of the Prince Edward Island Department of Fisheries, Canada, visited Dr. Blogoslawski at the Milford Laboratory on 19 February; Mr. Townshend has constructed and is testing an ozone quarantine system which will treat effluent from nonindigenous bay scallops.

Dr. K. Kanungo of Western Connecticut State College visited Dr. Robohm at the Milford Laboratory on 15 February to confer on cooperative cell culture work.

On 23 February, Dr. G. Balouet of Brest, France, visited Dr. Johnson at the Oxford Laboratory to discuss areas of mutual research interests, particularly histopathology of mollusks and crustaceans, identification of types of hemocytes, and the possibilities of establishing certain types of crustacean cells in tissue culture.

Mr. George Olds, III, of Old Salt Seafood in Easton, MD, presented a seminar at the Oxford Laboratory on 9 February titled "Recent Industry Observations Regarding the Coastal Clam Fishery."

Other visitors to the Oxford Laboratory during February were Dr. Robert Hillman of the Battelle Institute in Duxbury, MA, and Mr. Danny Lomax of the University of Maryland Horn Point Environmental Laboratories in Cambridge, MD.

Manuscripts

- Blogoslawski, W. J. Water quality in shellfish culture. Proc. Natl. Shellfish Assoc. (A)
- Brown, C., and D. J. Russo. Ultraviolet light disinfection of shellfish hatchery seawater. I. Elimination of five pathogenic bacteria. Aquaculture. (A)
- Farley, C. A. 1978. Viruses and viruslike lesions in marine mollusks. Mar. Fish. Rev. 40(10):18-20. (P)
- Johnson, P. T. 1978. Viral diseases of the blue crab, Callinectes sapidus. Mar. Fish. Rev. 40(10):13-15. (P)
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RESOURCE UTILIZATION DIVISION

Fisheries Engineering Investigation

Sampling and Harvesting Gear Development

The surf clam and ocean quahog resource assessment cruise was successfully completed using the new inhouse-designed, 60-inch blade dredge with a submersible pumping system. As a followup, Mike Corbett met with the cruise chief, Henry Jensen, and discussed dredge and system performance. Information from this meeting will be used in the planning of this summer's dredge testing and comparison cruise.

The feasibility of installing a levelwind on the electric cable winch has been under investigation. However, Mr. Jensen now feels that the crew and scientific party are familiar with the gear operation, and it really may not be necessary.

Design work on a new dredge-handling system and on dredge instrumentation has been minimal this month as efforts have been centered on the inhouse rebuilding of the Rorqual engine and refurbishment of the electrical system. The 1 April date for having the vessel running and seaworthy still appears realistic.

The scallop gear literature search has continued both here and in Woods Hole. The Center Directorate and representatives from the New England Fishery Management Council will be meeting to determine specific areas requiring study.

The beam trawl, designed with application as a juvenile fish sampler and as an economic, species-selective commercial gear, is being loaned to a small vessel out of Newburyport, MA, for performance evaluation.

As a followup to prior meetings and conversations, a formal request was made to biologists at the Narragansett Laboratory for parameters for the design of a specific juvenile fish sampling device.

Work on the portable trawl mensuration system to be developed for the State of Massachusetts has been delayed by funding problems within the state.

Fisheries Engineering

Mike Corbett traveled with the Deputy Laboratory Director, Robert Learson, to the Milford Laboratory to view their aquaculture system and made arrangements for cooperative aquaculture studies with industry. Arrangements were also made to lend engineering assistance to the Milford Laboratory to help solve problems associated with their aquaculture system.

The makeup air system which supplies heated fresh air to the labs, offices, and various other parts of the building has been repaired and put back into operation. A substantial gain in heating capacity has been noticed. This will also help replenish air removed from the building by the laboratory hoods.

The heating system in the lobby has been overhauled and is operating correctly. Thermostats have been readjusted, and the night setback (65°F) thermostat system is now operational.

A new compressor has been installed in the ice maker and all is fine.

Freezer No. 5 is fully wired and waiting for controls.

Wiring changes and repairs including new controls were made to the heating system.

The minced fish flesh extruder is now complete and operational. Ron Lundstrom has been briefed, and as soon as his schedule permits, he will be operating the unit.

Two independent electrical circuits have been wired into the Instrument Room (Room 20)--one for the new gas chromatograph and the other for the International Centrifuge.

Resource Development and Improvement Investigation

Storage of Blue Mussels

A manuscript tentatively titled "Seasonal Variation and Storage Changes in Proximate Composition of Blue Mussels" is underway. The first draft should be completed by 1 March.

Blue Crabs

A taste test was conducted on pasteurized roller-extracted and commercially picked blue crab meat stored at 34°F for 5 mo. The results show that the roller-extracted meats were significantly superior to the commercially picked control in appearance, odor, flavor, and texture.

Storage of Surf Clams

The conditions for the protein digestion by micro-Kjeldahl have been pinned down. A specially blown piece of glassware has enabled recording of the digestion temperatures and this, in turn, has led to shortened digestion periods.

Cholesterol

Literature and equipment searching continues.

Frozen Storage Life of Fillets

In anticipation of beginning the study to guarantee US Grade A frozen fish at point of sale, plans are being formulated to determine the frozen storage life of fillets at different temperatures and in various packages. The frozen samples will be taste tested at given intervals, and the changes in color and texture will be determined by objective tests. The large amount of data that this experiment will generate will be placed into the computer for recall at the end of the experiment. The literature survey on freezing rates of fish, frozen storage data, and frozen fish packaging is continuing.

Exploratory tests on the freezing rate of fish fillets packed in an aluminum tray and overwrapped with Saran and polyethylene using a carbon dioxide quick-freezing tunnel is in progress.

Smoked Salmon

A sample of smoked salmon that had been prepared in a heat-processed retort pouch was received from Anacortes, WA. It is being shown to industry people who expressed an interest in smoked fish. If there are enough people interested in tasting the product, we will invite them to the Gloucester Laboratory for a large taste-testing session.

Pacific Hake Nomenclature

Work on two special assignments has been temporarily halted in order to provide information to the New England fishing industry relative to the attempt by the West Coast fishing industry to use the name "whiting" for the Pacific hake. The Pacific fish does resemble the Atlantic "whiting" (silver hake) to a great extent morphologically, but it is highly infested with a myxosporidian parasite which the silver hake lacks. The parasite can liberate an enzyme which softens the fish flesh to the point where liquefaction results.

It is chiefly, but not entirely, on this basis that objections will likely be forthcoming. Other arguments rest upon attempting to establish priority of a common name by virtue of use extended over a score of years, and also two points of law.

Product Quality, Safety, and Standards Investigation

Product Quality

The flavor of breaded sticks made from South American hake fillets which had been saberized and treated with sodium erythorbate was highly acceptable after 34 wk storage at 0°F. Sticks made from untreated fillets were rated poor in flavor due to development of oxidative rancidity; whereas, sticks made from fillets that were either saberized or treated with erythorbate were rated slightly poor.

In an accelerated storage study, the texture of red hake fillets (blocks) was extremely tough after 12 wk at 30°F; however, the flavor was acceptable and free of rancidity. The fat content was found to be about 0.6% for skin-on fillets

and 0.3% for skinless fillets for these November-caught fish. January-caught fish had approximately the same fat content. It appears that the problem of rapid textural deterioration will be the major obstacle to overcome for the successful commercial utilization of frozen red hake.

Since the frozen storage characteristics of bluefish, American sand lance, cownose ray, and red hake are being investigated, a proximate analysis was conducted on these species and found to be as follows:

Species	% moisture	% protein	% fat	% ash
American sand lance (whole)	73.7	17.4	6.9	2.3
American sand lance (edible portion)	75.7	18.6	4.9	1.6
Bluefish (skinless fillets)	74.7	20.8	3.4	1.2
Cownose ray (skinless)	77.2	18.3	0.8	2.2
Red hake (skin-on fillet)	81.9	16.7	0.6	1.1
Red hake (skinless fillet)	82.3	16.7	0.4	1.1

Isoelectric focusing of eye fluid, muscle tissue, and liver tissue proteins from whiting (silver hake) samples collected by the Woods Hole Laboratory on the fall bottom trawl survey was completed. General staining of proteins separated in a 3.5-9.5 pH gradient identified areas where some protein polymorphisms may exist, especially in the eye fluid and liver tissue samples. Further work using longer gels and narrow pH gradients is needed to confirm these observations.

The new Hewlett-Packard 5840 gas chromatograph was installed this month. Performance evaluation on the new instrument was carried out to insure it was operating properly. Work has begun on developing methodologies for the analysis of volatile amines in fish products.

The damaged electronic load cell for the Instron Universal testing machine was repaired and returned to us. We have been evaluating different test cells for use in the objective evaluation of texture in minced fish.

Product Safety

Workup of retail samples of smoked salmon (kippered, nova, lox), sablefish, and chub has been completed. A sample of sablefish fortified at the 5, 2, and 1 ppb levels is in the process of being worked up along with a control for recovery purposes.

The Sigma 10 Microprocessor is totally shutdown. The Sigma 10 controls the operation of the Sigma 1 gas chromatograph and collects data from the Perkin-Elmer 910 and Sigma m gas chromatographs. The service engineer of Perkin-Elmer has been contacted. We hope that the problem is not too serious and that appropriate circuitry boards can be replaced.

A literature survey was completed on nitrosamines in fish and fish products. Articles of interest are being ordered from the Massachusetts Institute of Technology. Don Gadbois is collaborating with Dr. Ira Krull of the New England Institute for Life Sciences for a forthcoming paper on this subject.

Product Standardization

Participation continued in the comparative edibility study at the US Army's North American Research and Development Command (NARADCOM) in Natick, MA. This month we were able to provide fresh fish samples despite the terrible weather conditions at sea.

This month's Codex (International standards development) activity includes obtaining comments on the Code of Practice for Minced Fish Blocks.

Comments received from Utilization Laboratories and Chief Inspectors on priorities for standards development and specification preparation are being resolved. A new schedule will be presented at the workshop on standardization to be held at the Washington Office during 27 February - 1 March 1979.

A complete bibliography and summation of all work done on time-temperature tolerance of seafood products plus a bibliography and summation on weight loss in seafood during distribution have been provided the Washington Office. Industry has become concerned about these products.

Technical Assistance

Division personnel provided information and technical assistance this month in the following areas: fishing vessel safety films; mineral content of canned clams and clam juice; source of reprints of NMFS fisheries articles; life cycle and food chain of fish; mussel transport; fish canning; fish buying, preservation, and nutrition; legal status of phosphates added to seafoods; use of alginates in seafoods; where to get frozen herring; where to buy or how to build a tuna press; how to freeze tuna ashore; information on smoked fish preparation; composition of fish cakes; import of freshwater fish blocks; sources of fabricated shrimp portions; moisture content of conch; ocean pout; weight gain and loss due to brine density; fishery publications; detailed information on fishery technology for Time-Life Books, Inc.; marine mining; growing lobsters in the British West Indies; dogfish; packaging film for fresh fish; value of true cuttlefish versus squid; design of systems for the aquaculture of shellfish; winch and rigging design for a research vessel; line trawl; gill netting; midwater trawling and purse seining; squid pair trawling; vessel hydraulics; freezing fish at sea; herring carriers; vacuum evisceration; chilled seawater; chlorinators; corn syrup brines; refrigerated systems; tank design; fish traps and pots; time lapse filming of lobster activities; chilled seawater systems; preparation of minced fish from haddock frames; squid held in chilled seawater; fiddler crabs; cooking of blue crab; sizes and meat/weight yields in surf clams and ocean quahogs; underutilized fish species to be used to prepare fish cakes and other products; canning of fish roe; and processing and marketing of fishery products.

Meetings, Talks, Visitors, Publicity

Judi Krzynowek attended the NEFC IYABA meeting in Narragansett, RI.

Joe Mendelsohn met with John Secrist, Bob Hillard, and Bob Scott of NARADCOM to discuss and taste test prefabricated fish fillets. These fillets are made from chipped fish which has been reformed under pressure. The texture of the reformed patty made from fillets was excellent and arrangements are underway to make a reformed fish patty from minced fish.

Perry Lane attended a meeting of the New England Fisheries Steering Committee.

Kurt Wilhelm gave a seminar to the students and faculty of the University of Rhode Island (URI) Food Science Department on heat penetration in foods. URI is emphasizing seafood processing in their curriculum and many questions were directed to the different programs being conducted at the Gloucester Laboratory.

John Ryan conducted a 3-hr class on standards and inspection as part of a 10-session course on fishery technology. This course is one of a series of subjects offered by the Institute of Marine Science of Salem State College in Salem, MA.

Rita Schenck of URI visited the Gloucester Laboratory to discuss the use of isoelectric focusing as a tool for fish and shellfish population analysis.

Bret Trent, representing the Grain Processing Corporation, also visited to discuss use of soy protein isolates in seafood products.

Manuscripts

Licciardello, J. J., E. M. Ravesi, and M. G. Allsup. 1979. Quality aspects of commercial frozen minced fish blocks. J. Food Protect. 42:23-26. (P)

NATIONAL SYSTEMATICS LABORATORY

Benthic Fishes Investigation

A first draft was completed of a manuscript clarifying the taxonomic status of two species of the gadiform family Moridae in the western North Pacific. A draft was completed of a manuscript describing the geographical distribution of deepwater ophidiiform fishes and an abstract was submitted to the organizing committee of the next Pacific Science Congress. Swimbladders, gonads, and gut contents of American toadfishes of the genus Batrachoides were studied.

Pelagic Fishes Investigation

Summaries of counts and measurements for Scomberomorus brasiliensis were revised.

Crustaceans Investigation

Work was done on the description of a new family of crabs from Tobago, and on a revision of the brachyuran genus Latreillia.

Miscellaneous

Advice was given to the NMFS Marine Mammals and Endangered Species Office on the endemic Florida Keys silverside (Menidia conchorum), a potentially endangered species. An exchange of fish specimens was arranged between the Smithsonian Institution and the Institute of Hydrobiology in Wuhan, China.

Meetings, Talks, Visitors, Publicity

Visitors included Dr. Walter Fischer from FAO-Rome, who discussed plans for the FAO species identification sheet publications for West Africa and the western Indian Ocean; Mr. Rob Mathewson of the NMFS Beaufort Laboratory, who studied western Atlantic groupers; Dr. Margaret Stewart of the State University of New York at Albany; and Mr. Les Kaufman of Johns Hopkins University.

Manuscripts

Cohen, D. M. Visit to the People's Republic of China. Copeia (A)

Herbst, G. N., A. B. Williams, and B. B. Boothe. 1979. Reassessment of northern geographic limits for decapod crustacean species in the Carolinian Province, USA; some major range extensions itemized. Proc. Biol. Soc. Wash. 91(4):989-998. (P)

ATLANTIC ENVIRONMENTAL GROUP

Ocean Monitoring and Climatology Investigation

The pronounced offshore surface extension of cold shelf water that developed off the New England and Middle Atlantic coast in January continued through February. Weekly frontal analysis charts from the National Environmental Satellite Service based on satellite infrared imagery have been the main source of information, although severely limited by cloud cover. However, an expendable bathythermograph (XBT) section, with surface water samples for salinity determinations, was obtained for AEG along the 71°W meridian by Dick Backus of WHOI during Oceanus Cruise 55 on 25 and 26 February. Shelf water was continuous at the surface to the offshore limit of the section, 98 nautical miles seaward of the 200-m isobath (38°27'N), where the surface temperature was 9.7°C and the salinity 34.5 ‰. Surface temperature and salinity were lowest at 39°05'N (6.3°C, 33.4 ‰) where water colder than 10°C reached a depth of 38 m. The areal extent of shelf water is similar to that observed at the peak of the phenomenon last year in March and April, but the depth of this water is less pronounced.

During February the cooperative Ship of Opportunity Program obtained eight XBT transects, two 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 three in the Gulf of Mexico.

A series of discussions in Columbia, MO, with the Models Branch of the Environmental Data and Information Service Climatic Impact Assessment Division revealed that they have acquired a computerized environmental time-series data base extensive enough to begin work with AEG and NEFC on studies of climate-fisheries interactions.

The data base includes: (1) meteorological observations from 27 US Atlantic coastal weather stations from the mid 1940's to date; (2) meteorological observations from six Canadian coastal weather stations from the mid 1950's to date; (3) computed winds and derived parameters for the Northern Hemisphere at 10-day intervals from 1946 to date; (4) North Atlantic sea surface temperature and winds by 1° square for 1948-78; (5) NOS tide station temperatures for 1929 to date; and (6) sea level observations for the Northern Hemisphere for 1946 to date.

It was decided that a useful initial project to be undertaken would be to develop field and trajectory portrayals of winds in the Middle Atlantic Bight for April-June during 1966-69 (strong Atlantic mackerel year classes) and 1961-64 (weak mackerel year classes) to see if there were significant differences in wind field and larval drift conditions between the two time periods.

Ocean Dumping Investigation

An radio-direction-finding (RDF) buoy experiment at DWD 106 is scheduled to

begin the first week in March 1979. The platform for release of the buoys has been changed to the Coast Guard cutter Unimak, since accurate scheduling of the Seahorse Marine vessels was not possible. Data from the first RDF buoy experiment (wind data) have been keypunched and verified by the URI data processing group.

George Maul of NOAA's Atlantic Oceanographic and Meteorological Laboratory in Miami has received approval from our organization for the loan of the NOS Offshore Dumping Program Plessey 9040 STD (salinity-temperature-depth) system. This would be used to conduct an STD transect aboard the Mt. Mitchell while enroute from San Juan, PR, to Galveston, TX.

A meeting on 16 February between NOS and NMFS personnel and the URI Department of Geology, assured the Department of Geology's involvement for the Philadelphia Sewage Sludge Dumpsite study. Budget and planning for the April 1979 cruise were considered. The first year of study by the group would ascertain the stratigraphic relations between sludge and non-sludge sediments in the area of the site. This would be accomplished by using natural stratigraphic horizons from within a series of closely spaced box cores from which resin "peels" and subcores had been removed.

Meetings, Talks, Visitors, Publicity

Mert Ingham attended a meeting of the editorial committee for the anoxic layer report which was held in Rockville, MD, on 6 February 1979.

Mert Ingham was visited by Kilho Park of the NOS Ocean Dumping Program Office on 7 February.

Grayson Wood traveled to Columbia, MD, on 15 February to visit Oxford Medilog, Inc., to pick up an MDTR and to discuss it with technicians of the company.

On 21 February, Steve Cook and Peter Celone went to Portland, ME, to meet the Marine Evangeline. Steve calibrated the equipment and trained Peter to collect XBT data aboard the Marine Evangeline.

Mert Ingham visited the Climatic Impact Assessment Division of EDIS at Columbia, MO, for a series of meetings on 26, 27, and 28 February.

Woody Chamberlin went to Suitland, MD, to confer with personnel at the National Environmental Satellite Service during 26-28 February.

Manuscripts

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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)