

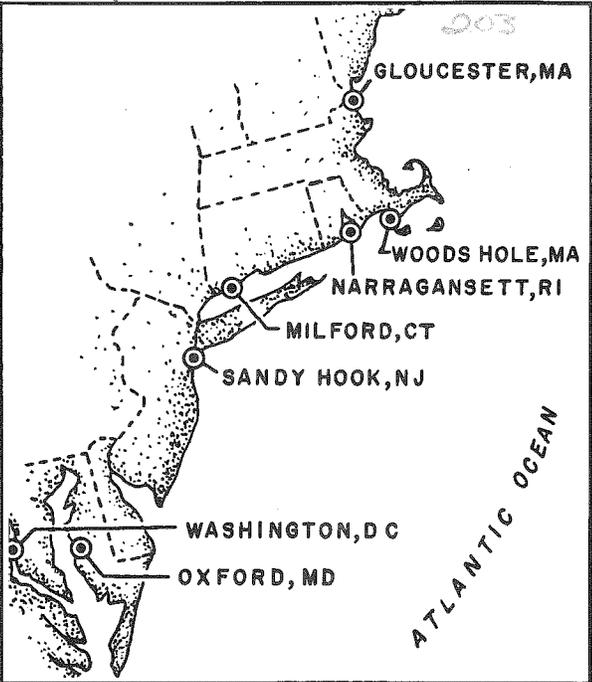
ALL JAN TO DEC "79"

NEFC

Northeast Fisheries Center

NEWS

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JANUARY 1979

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



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NORTHEAST FISHERIES CENTER
WOODS HOLE, MASSACHUSETTS

RESEARCH ADMINISTRATION

CENTER DIRECTOR. ROBERT L. EDWARDS
ASSISTANT CENTER DIRECTOR
FOR FISHERIES MANAGEMENT
AND NORTHEAST LABORATORIES RICHARD C. HENNEMUTH
ASSISTANT CENTER DIRECTOR
FOR ENVIRONMENTAL MANAGEMENT
AND MID-ATLANTIC LABORATORIES. CARL J. SINDERMANN
ASSISTANT CENTER DIRECTOR
FOR FISHERIES UTILIZATION. LOUIS J. RONSIVALLI
CENTER OPERATIONS OFFICER. HERBERT STERN, JR.
CENTER PLANNING OFFICER. GEORGE J. RIDGWAY
RESOURCE ASSESSMENT DIVISION CHIEF BRADFORD E. BROWN
MARINE ECOSYSTEMS DIVISION CHIEF KENNETH SHERMAN
MANNED UNDERSEA RESEARCH
AND TECHNOLOGY PROGRAM CHIEF RICHARD A. COOPER
DIVISION OF ENVIRONMENTAL
ASSESSMENT CHIEF JOHN B. PEARCE
AQUACULTURE DIVISION CHIEF JAMES E. HANKS
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RESOURCE UTILIZATION DIVISION CHIEF. LOUIS J. RONSIVALLI
NATIONAL SYSTEMATICS LABORATORY DIRECTOR DANIEL M. COHEN
ATLANTIC ENVIRONMENTAL GROUP DIRECTOR. MERTON C. INGHAM

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CENTER DIRECTORATE

Environmental Management Office

Dr. Sindermann participated in the 10th annual meeting of the World Mariculture Society as Chairman of the Aquaculture Disease Session and as a member of the Board of Directors of the Society. He was elected President of the Society for 1980-81.

The NOAA book Anoxia in the New York Bight, edited by C. Sindermann and L. Swanson, has had final editorial review and will be submitted soon for NOAA and USDOC approval.

Fisheries Utilization Office

Louis Ronsivalli was a member of a Sea Grant Review Committee at Cornell University. This university has had, and continues to have, an effective seafood program which reflects its sound leadership and an enthusiastic faculty. There is an excellent mixture of applied and basic research which seems to have relevance to the needs of the consumer and the smaller elements of the domestic seafood industry. With strong emphases on marketing and extension activities, they have succeeded in transferring advanced technology with relative ease to processors in the Great Lakes area and on Long Island.

Special Scientific Investigations Office

Arthur Posgay continued to assemble data on the growth rate of the sea scallop from the Strait of Belle Isle to the Virginia Capes. A computer program has been written and coding has started to derive von Bertalanffy parameters from about 1,200 tagged scallop returns that had been out between 20 and 260 wk. These data will be compared with the results of reading the annual rings on about 12,000 shells.

Special Technical Projects Office

The clam survey and test cruise was conducted this month with the new electric-driven, submersible pump, clam dredge. A 1-day test/demonstration cruise was held on 3 January and the ship commenced surveying/testing on the 4th through the 31st. Severe weather only allowed for the completion of 148 stations. Overall, the new system worked well with the weak point being the cable as expected. From observations made during this cruise period, an improved cable will be designed.

Work continued on the final report for the mesh study. A literature search was started on scallop gear as a part of a new project to be coordinated by Ronald Smolowitz.

Operations Office

Data Management

On-site contract analysis and programming support for the Narragansett Laboratory have now been expanded to include Dave Margolis (Input/Output Computer

Services, Inc.) who will be working with the MARMAP Information System evaluation team. Similar contract involvements at the Woods Hole Laboratory have been extended to 1 June and work is being concentrated on the development of "Graphic Illustrations of Research Vessel Trawl Survey Analysis", designed initially to support specific Bureau of Land Management (BLM) task requirements, but with built-in flexibility for alternative applications.

The data management task at Woods Hole has also been augmented with the acquisition of Otis Jackson and William Callahan from the Resource Assessment Division at Woods Hole. New equipment acquisitions include two wide-column cathode ray tube terminals for the Sandy Hook Laboratory and an interactive digital plotter and cassette recorder to support the graphics terminal in Woods Hole.

Meetings, Talks, Visitors, Publicity

Ronald Smolowitz chaired a panel discussion, sponsored by the Gloucester Fishermen's Wives Association, on mesh size. The panel consisted of Dan Arnold (New England Fishery Management Council), Mike Corbett (Gloucester Laboratory), and eight leading trawler captains.

Eugene Heyerdahl attended the National Data Management Committee (NDMC) meeting during 23-25 January in Arlington, VA. The major focus of the meeting, as requested by Terry Leitzell, was to provide input to the task of reformalizing the concept of a National Data Management System for NMFS and the mechanisms for control, planning, and coordination. The results of the discussions will be summarized by the NDMC and presented to Mr. Leitzell.

Eugene Heyerdahl also attended two meetings (30 January in Peabody, MA, and 1 February in Philadelphia) involved with the coordination of statistical collection and data management programs between NMFS, the Regional Fishery Management Councils, and States within the Northeast Region. Unanimous agreement was reached at both meetings on the formation of a technical committee with representatives from all interests whose goal would be to identify the current range of fishery statistical programs, the needs for integration and commonality, and the development of a plan for coordination and exchange of information.

Manuscripts

Sindermann, C. Environmental stress in ocean bivalve populations.
Proc. Nat. Shellfish. Assoc. (A)

RESOURCE ASSESSMENT DIVISION

Resource Surveys Investigation

A shellfish resource assessment survey was conducted aboard the R/V Delaware 1 during 3 January - 1 February 1979. Henry Jensen was Chief Scientist and the area surveyed was from Martha's Vineyard, MA, to Cape Charles, VA. Although as expected a few technical problems were encountered, no significant loss of survey time due to gear failure occurred. Weather, however, was unusually severe, and approximately one-half of the allotted work time was lost due to weather. In spite of those problems, 148 dredge stations were completed. The new 60-inch dredge and electric pump generally worked well. Ron Smolowitz is coordinating the remaining work

necessary to complete the dredge gear as designed, as well as a few needed modifications discovered during the cruise, with the Fisheries Engineering Investigation. This work will be completed prior to a clam dredge testing cruise scheduled aboard the Delaware II in August.

Warren Handwork is continuing to ready the trawl gear for the spring bottom trawl survey which begins in the middle of March.

Five major cruises are planned for the spring. Four of these will be legs of the spring bottom trawl survey (two on the Delaware II and two on the R/V Albatross IV) and fifth is a scallop survey aboard the Albatross IV which is scheduled to start after the last trawl survey ends.

On 9 January, Tom Azarovitz and Chuck Byrne met with Eiji Imamura, the BLM's Contracting Officer's authorized representative, in New York and discussed the outline for the proposed final report. The outline, in draft form, was submitted to BLM for comment early in December. Mr. Imamura had only a few comments and a final outline of the proposed final report will be submitted early in February.

Fishery Biology Investigation

Age and Growth

Kris Kantola finished aging and summarizing second quarter 1978 commercial haddock samples. She also impressed, aged, and summarized haddock samples in the 20 and 45-cm range from the 1978 fall bottom trawl survey. She then began impressing the remaining haddock samples from that survey. She also audited the listings of pollock age data for the 1977 summer bottom trawl survey.

Judy Penttila evaluated four proposals for "Development of a Software Program to Automatically Age Fish Scales." She also prepared a summary evaluation report and comparative analysis of the proposals for a meeting on 16 January with Mr. Anthony Bocelle, Contracting Officer from the NMFS Northeast Regional Office, and the members of the Technical Evaluation Team for the proposals. Judy also worked with Tom Hotz, from the Massachusetts Division of Marine Fisheries, aging Atlantic cod from the 1978 spring bottom trawl survey. She completed aging and summarizing Atlantic cod samples from Strata 13 through 25 (Georges Bank) from 1976 and 1978 fall bottom trawl surveys.

Gary Shepherd continued data analysis for his paper on summer flounder. Back calculations were done on 1-yr-old samples of fin rays and scales, 22 samples in all. The length-frequency data for summer flounder from 1977-78 bottom trawl surveys were summarized. The length-frequency data from the 1977 summer inshore bottom trawl survey were graphed, along with the same data using a three-point-running average. The focus-to-edge measurements from the summer flounder fin rays, scales, and otoliths were compared to fish lengths using regression analysis with exponential, logarithmic, and power curve fits. The edge measurements were then adjusted using the resulting power curve fit. A graphic comparison was done for the fin rays, scales, and otoliths fit along a power curve with adjusted measurements. An ANOVA comparison was done for each age class for the fin rays, otoliths, and scales. A T-test for paired statistics was also done comparing rays to scales, rays to otoliths, and scales to otoliths. The von Bertalanffy growth curve was calculated for the mean length at age of otoliths, scales, and fin rays, as well as for the combined mean lengths. The resulting growth curve for the four sets of data was then plotted.

Shellfish

John Ropes spent most of his time during January preparing two manuscripts, "The Atlantic Coast Surf Clam Fishery," and "Biological and Fisheries Data on the Atlantic Surf Clam, Spisula solidissima (Dillwyn)."

Some of his time was spent overseeing Loretta O'Brien on various shellfish projects. In addition to these projects, Loretta spent a considerable amount of time at sea participating in the shellfish assessment survey aboard the Delaware II. Loretta also worked with Maureen Griffin on shell measurements of ocean quahogs. All of the shells collected during January 1978 have been measured and the data submitted to automatic data processing (ADP).

Finfish

Louise Dery completed aging and summarizing 1,800 silver hake samples from Albatross IV Cruise No. AL 78-04. Her aging activities also included checking 205 Atlantic herring commercial samples, aging 60 Atlantic herring samples from the November tagging cruise, aging 285 Atlantic mackerel samples taken from party boats in the Sandy Hook, NJ, area, and comparatively aging skate vertebrae with Gordon Waring.

Cathy Rearden spent several days working with Ron Smolowitz on a mesh selectivity study. She completed and summarized aging of 538 butterfish samples from Delaware II Cruise No. DE 78-09 and Albatross IV Cruise No. AL 77-07, and began aging samples from Albatross IV Cruise No. AL 77-02.

Laurie Savelkoul completed sectioning the 1978 summer bottom trawl survey silver hake samples and the Delaware II Cruise No. DE 78-05 red hake samples. She completed aging and summarizing 1,302 red hake samples from Albatross IV Cruise No. AL 78-04.

Louise, Cathy, and Laurie prepared for processing age and growth samples (frozen) from summer and fall bottom trawl surveys. They also readied for processing Atlantic herring, Atlantic mackerel, and butterfish samples as well as Atlantic herring samples from both the West German R/V Anton Dohrn fall bottom trawl survey and several November tagging samples.

Mike Campbell continued aging scup samples from Delaware II Cruise No. DE 78-06, and working on a research paper concerning age and growth of scup.

Ambrose Jearld, Jr., completed the evaluation of proposals submitted for "Development of a Software Program to Automatically Age Fish Scales" and conferred with Judy Penttila on the preparation of a comparative analysis of the proposals and evaluations completed by the technical evaluations team. Based on the recommendation from this team, a contract has been awarded to Cambridge Instrument Co. Ambrose also participated in Parts I and IV of Delaware II Cruise No. DE 79-01 (shellfish resource assessment survey).

Sandy Hook Investigation

Darryl Christensen completed a report on the age composition of recreational catches of summer flounder and forwarded it to the Mid-Atlantic Fishery Management Council. He also completed a first draft of a report to the Council on day-night differences in 1978 party-boat catches of bluefish. His report to the Council giving estimates of the 1978 recreational catch of Atlantic mackerel was forwarded to Woods Hole Laboratory for review. John Clifford completed corrections to the 1978 bluefish data.

Stuart Wilk conferred with Robert Hutton, Austin Magill, Richard Stone, and Dave Deuel in Washington, DC, on 22 and 23 January. Topics discussed included planning for the NMFS recreational fisheries program, availability of the national recreational fisheries survey data to NEFC personnel, and opening better lines of communication between the NEFC Resource Assessment Division and NMFS recreational fisheries personnel. Stuart and Erin Feeney completed a BLM report titled "Annual Cycle of Gonad-Somatic Indices as Indicators of Spawning Times for Fifteen Species of Fish Collected from the New York Bight, June 1974 to June 1975."

Fishery Analysis Investigation

Ralph Mayo completed the Gulf of Maine redfish assessment. Mortality analyses suggest that instantaneous total mortality (Z) in recent years is probably in the order of 0.20-0.25, considerably below previous results. The calculated instantaneous fishing mortality (F) is also quite low, between 0.1 and 0.2. Yield-per-recruit analyses indicate that yield values close to maximum yield per recruit can be achieved at the current F levels. A general production model, utilizing standardized effort data, provides maximum sustainable yield (MSY) estimates of 14,000-15,000 metric tons. The 1978 results will soon be available for analysis and will be incorporated into the final redfish assessment document.

Ralph also reviewed all of the 1978 observer logs and prepared a sampling activity report for the NMFS Observer Field Office.

Joan Palmer continued her efforts on multispecies modeling data, and attended a meeting in New Bedford, MA, with personnel from the Narragansett Laboratory on the modeling project. Joan also worked on density-dependent growth analyses of various fish species in preparation for a paper summarizing these processes in Northwest Atlantic fishes.

Harold Foster participated in the shellfish resource assessment survey (Delaware II Cruise No. DE 79-01) from 4 January to 2 February.

Paul Wood and Fred Serchuk continued updating the Atlantic cod assessment. Results from the 1978 autumn bottom trawl survey were analyzed for both the Georges Bank and Gulf of Maine stocks.

Rhett Lewis and Fred Serchuk derived spring and autumn Atlantic cod age composition data (mean number per tow at age) for 1970-78 based on age-length keys from each of the appropriate survey cruises. Total mortality values between survey years, and for individual year classes, were determined from these data.

Rhett Lewis and Fred Serchuk also initiated analytical efforts to determine short and long-term gains and losses from mesh size changes in the groundfish fishery based on the results of the cod-end mesh selection experiments performed in 1978 by Ron Smolowitz.

Fred Serchuk and Steve Murawski participated in a 1-day surf clam/ocean quahog gear trawl on the Delaware II on 4 January to evaluate the operation of the new surf clam/ocean quahog dredge.

Steve Murawski, in collaboration with Fred Serchuk and John Ropes, completed an initial draft of a paper on the dynamics of ocean quahogs in the Middle Atlantic Bight. Steve also initiated surf clam analyses of shellfish survey data (1976-78 cruises), vessel interview records (1977-78), and logbook information on landings by area, time of year, and vessel class.

Fishery Assessment Investigation

Steve Clark completed a manuscript containing a review of the Georges Bank - Gulf of Maine haddock fishery and an updated assessment for presentation to the New England Fishery Management Council. Steve also worked on the revision of the Northern Shrimp Management Plan incorporating the most recent assessment.

Thurston Burns adjusted pre-1973 spring bottom trawl survey data for American lobster obtained with the No. 36 Yankee trawl to that comparable to the No. 41 Yankee trawl by means of appropriate correction factors to individual trawl catches. Thurston also completed final revisions to a paper dealing with the assessment of offshore American lobsters based on bottom trawl survey data to be published as a (Canadian) Fisheries and Marine Service Technical Report, and worked to finalize the 1978 commercial length-frequency data base for all species.

Frank Almeida devoted most of his time to the silver hake stock delineation study. He supervised two student volunteers from Smith College of Northampton, MA (Caryn Ward and Carolyn Robin), who assisted in obtaining morphometric measurements from silver hake. Jeffrey Floyd also started measuring silver hake. As fish samples are completed, the respective measurements have been entered into a computer file, and preliminary analysis of the data has begun. Attempts have been made to determine the characters which show principal differences among areas. Data from selected samples have been used in an attempt to duplicate results obtained from a similar study conducted by the Bureau of Commercial Fisheries in the 1950's. Frank also completed (with Emory Anderson) an assessment document of the Georges Bank red hake.

Emma Henderson completed the development of computer programs of simulation models of groundfish populations for the New England Fishery Management Council and reviewed a completion report of a grant-in-aid for marine worm research.

Emma Henderson also worked with Steve Clark on a young-of-the-year index for haddock, and she and Jeffrey Floyd participated in the shellfish resource assessment survey aboard Delaware II Cruise No. DE 79-01 from 23 January to 1 February.

Hillary Herring devoted much of her time to processing commercial length-frequency data for 1978, but she continued work on the red hake biostatistics runs for 1963-67 and assisted briefly in extracting young-of-the-year survey data for haddock. Hillary also participated in the shellfish resource assessment survey aboard Delaware II Cruise No. DE 79-01 during 15-19 January.

Emory Anderson and Frank Almeida (with assistance from Ralph Mayo and Joan Palmer of Fishery Analysis Investigation) completed some computer analysis of retransformed indices of Atlantic mackerel catch per tow at age from spring and autumn bottom trawl surveys. Emory devoted much of his time working on shark catch data to be used in the preparation of fishery management plans for sharks. By-catch of sharks in the foreign trawl fishery in the Northwest Atlantic in 1978 was estimated from observer reports. International commercial shark catch data, used previously by a working group which met in 1977 in La Jolla, CA, to calculate an MSY estimate for Northwest Atlantic (FAO areas 21 and 31) sharks, were revised, and Japanese long-line effort data for area 31 for 1956-76 were tabulated from computer records obtained from James Zuboy at the SEFC's Miami Laboratory. Estimates of the American recreational catches of sharks from 1965 to present are also being reexamined. This catch and effort data base will be used to calculate an MSY for all pelagic sharks in aggregate for the Northwest Atlantic for use in the management plan.

Fishery Systems Investigation

The activity of the Investigation during January centered around yellowtail flounder and Atlantic herring stock assessments. Margaret McBride and Mike Sissenwine updated the yellowtail flounder assessment. The most recent data indicate little improvement in any of the three stocks.

Gordon Waring and Mike Sissenwine worked on the development of a new method for assessing Atlantic herring stocks. In this method, starting fishing mortality rates for the virtual population analysis are based on a cumulative frequency distribution of past fishing mortality rates. Thus, pseudo confidence limits can be calculated about current estimates of stock size.

Meetings, Talks, Visitors, Publicity

Emory Anderson attended the 3-4 January meeting of the New England Fishery Management Council and the 4 January meeting of the Council's Silver Hake Oversight Committee.

Otis Jackson, Pat Carter, and Mike Sissenwine attended an NEFC EEO Committee training session during 8-10 January at the Milford Laboratory.

Emma Henderson attended an NEFC workshop concerned with the Georges Bank ecosystem model held in New Bedford, MA, on 12 January, where she reported on methods for estimating recruitment applicable to the model.

Mike Sissenwine, with Gordon Waring, attended an Atlantic herring working group meeting in Peabody, MA, on 16 and 17 January.

Bradford Brown, Emory Anderson, and Emma Henderson met on 18 January with Sal Testaverde of the Northeast Regional Office staff and Paul Scarlett of New Jersey who is Chairman of the State-Federal Summer Flounder Management Plan Working Group, to review the biological and statistical data base available at the NEFC for summer flounder.

Steve Murawski attended the regulation review team meeting on 29 January in Gloucester, MA, to discuss Atlantic herring regulations.

Ralph Mayo presented a review of sampling methods and proper coding procedures to NMFS foreign fishing observers at a review session held in Woods Hole during January.

Anne Lange continued activity as a member of the American team negotiating the Georges Bank boundary with Canada.

Mike Sissenwine met with the NEFC modeling group on several occasions during the month. He also met with Gordon Swartzman of the University of Washington Quantitative Science Center to discuss methods of modeling biological systems. Swartzman is conducting a long-term survey of methods used in published reports on models.

Manuscripts

Almeida, F. P., E. D. Anderson, and H. A. Herring. 1979. Status of the Georges Bank red hake stock - 1978. NMFS, NEFC, Woods Hole Lab. Ref. No. 79-01. 22 p.

Clark, S. H., and W. J. Overholtz. 1979. Review and assessment of the Georges Bank and Gulf of Maine haddock fishery. NMFS, NEFC, Woods Hole Lab. Ref. No. 79-05. 41 p.

MARINE ECOSYSTEMS DIVISION

Ecosystem Dynamics Investigation

Marv Grosslein together with Emory Anderson compiled a report on 1978 joint US-USSR fishery research in the Northwest Atlantic in preparation for the February meetings in Moscow. An extensive series of joint cruises was carried out in 1978 and included: (1) life history and assessment studies on seven important species (red and silver hake, Atlantic herring, Atlantic mackerel, short- and long-finned squid, and spiny dogfish); (2) food habits of finfish and squid; (3) MARMAP zooplankton, hydrographic, and productivity surveys; (4) larval Atlantic herring patch study; and (5) survey of distribution and feeding of sea birds. Marv Grosslein also attended a Scientific and Statistical (S&S) Committee meeting for the New England Fishery Management Council where further clarification was made of the Committee's views regarding the Vidaeus-Mueller discussion paper.

A meeting of the NEFC modeling group was held in New Bedford, MA, on 12 January to review status of the multispecies model (GEORGE II) and to consider future interactions with Jan Beyer as well as Erik Ursin (Danish Institute for Fisheries and Marine Research) on development of such models. The need for keeping NEFC personnel and others in the region and NMFS informed of our progress in modeling was discussed. Ken Sherman, Marv Grosslein, Mike Sissenwine, and others began preparation of a short issue paper on status of NEFC ecosystem studies including modeling. This memorandum will be circulated next month and progress will be reported in this manner from time to time.

During January, Wendell Hahm and Ed Cohen participated in an intensive modeling workshop at the Woods Hole Oceanographic Institution (WHOI) run by John Steele, Woolcott Smith, and Dale Haidvogel. The workshop consisted of discussions of the mathematical properties of a model system contrasted with its ecological properties. Lotka-Volterra equations representing a phytoplankton-herbivore system were used for the model system. The workshop was a practical course in modeling ecological systems, starting with developing programs for numerical approximations of differential equations, deterministic and stochastic systems, and modifying the original equations to provide more realistic representations of a phytoplankton-herbivore system.

Ed Cohen continued to work on the problem of differential digestion rates for the Georges Bank model, as well as working with Rich Langton on the digestive process in fish to be used in a queuing-theory model of feeding by Jan Beyer.

Wendell Hahm continued work on the structure of GEORGE II, the multispecies model of Georges Bank, and together with Brian Hayden assisted Rich Langton and Ray Bowman with development of computer programs for analysis of the size-specific food habits data on finfish.

Mike Pennington attended a 3-day course on the analysis of variance for unbalanced data. He also continued work on estimating Atlantic mackerel egg densities with Pete Berrien, and haddock fecundity levels with Robert Livingstone.

Gordon Swartzman (University of Washington Quantitative Science Center) presented a seminar on 26 January in Woods Hole on a comprehensive inventory and evaluation of ecosystem models. This work promises to be of significant value in promoting general standardization in terminology and understanding of basic rationale and control functions used in ecosystem models.

Recruitment Processes

The recruitment processes group completed an inventory and quality control of all plankton samples collected on the fall 1978 larval Atlantic herring patch study. A priority list of selected samples was prepared for sorting by the Polish Sorting Center in the coming year and these samples were delivered to the Narragansett Laboratory. Preparations began for the 14-24 February standard larval Atlantic herring survey of the Georges Bank - Nantucket Shoals area on the R/V Mt. Mitchell. A major effort has now begun to pull together materials in time for the ICES Larval Fish Symposium this April. Roz Cohen and Janet Murphy have been assisting with the auditing of computer files of the ICNAF time series of zooplankton data (0.333-mm mesh). Also, Cabell Davis and Roz Cohen began summarizing the fine-mesh (0.165 mm) data for 1974 and 1975 so that we will have a sufficient size range of prey data for relating to larval Atlantic herring feeding during those years. George Bolz, Dave Potter, and Greg Lough began summarizing by hand the results of the ICNAF time series of ichthyoplankton studies from basic data summaries just received from the Narragansett Laboratory. Greg Lough began preparation of a manuscript summarizing the relationship between larval Atlantic herring production, spawning stock size, and recruitment in the Georges Bank area for the 1968-77 seasons.

Robert Livingstone is nearing completion of the first draft of the manuscript on haddock fecundity. Greg Lough presented a talk on preliminary results of the fall 1978 larval Atlantic herring patch study at the WHOI Coastal Processes Seminar series on 26 January. William Michaels, a University of Massachusetts Co-op student, completed his first session with us and returned to school. Dana Temple, another University of Massachusetts Co-op student, has returned for his final session until June.

Fishery Oceanography Investigation

Assembling equipment for the Nantucket Shoals flux experiment has kept the Investigation busy in January. In mid-March we will go to sea on the R/V Oceanus to deploy five moorings including 11 NEFC vector-averaging current meters (VACM's) and four of our releases. All but one of the moorings will be bracketed by two marker floats equipped with radar reflectors and flashing lights. Steve Ramp and John Vermersch of WHOI have designed extra heavy moorings because of the extensive fishing activity in the region. Derek Sutton has prepared plans for improved towers on the marker floats and bids are coming in for that construction job. Gil Dering and Steve Fogg have readied the various instruments and Steve has designed a new release rack for the lab. Steve Ramp and Steve Fogg sailed on a 3-day buoy cruise on Oceanus to become familiar with the ship and techniques used aboard it.

Steve Ramp and Red Wright are working with Ed Brainard of ENDECO on a comparison between the ENDECO meter and two VACM's that were at the same depth in the Northeast Channel in the spring of 1978. Initial results suggest that the ENDECO is very close to the VACM's, but with more scatter at high frequencies; we hope to determine whether the noise is in the instrument or the slack mooring. An abstract has been submitted to the Marine Technology Society Bulletin.

Tim Cain has continued to work on the larval Atlantic herring data reports, Dan Patanjo has continued to work on his cruise summary, and Steve Fogg has begun to pull together MARMAP hydrographic data for a report series.

Kathy Bush's temporary appointment expired, but she continues to work with University of Delaware support to complete her "box model" study of exchange between the shelf regions and the slope water. Cynthia Chappell of Falmouth High School arrived on a stay-in-school appointment.

Ichthyoplankton Investigation

Our contribution to the NOAA-BLM Interagency Agreement was completed and submitted to the Program Manager for review. It summarizes ichthyoplankton data collected in the Middle Atlantic Bight from 1965 to 1976. Wrapping up the report before the end of the month required an accelerated effort and most members of the Investigation had a hand in the final preparation.

Our winter ichthyoplankton survey scheduled for the Soviet's R/V Belogorsk was cancelled. Thus, we missed the opportunity to conduct a coastal survey during the height of the spawning season of sand lance. In the meantime, John Sibunka and Bill Brennan are involved in preparations for the next survey which is scheduled for Delaware II in February.

Staff biologists at the Sandy Hook Laboratory are busy preparing for the April symposium at Woods Hole. At the Narragansett Laboratory, Tom McKenney and Chris Powell are putting together a report summarizing plankton and neuston collections taken during the past few years at Deepwater Dumpsite (DWD) 106.

Benthic Dynamics Investigation

Preparation of the biological aspects of the fishery management plan for the deepsea red crab was continued from time to time throughout the month. Sections that received the most attention were recruitment mechanisms, seasonal movements and behavior, and reproductive potential. Practically all of the biological information known to us concerning this species pertains to the stocks inhabiting the Gulf of Mexico and the waters north of Cape Hatteras. Information on stocks inhabiting the continental slope off the southwestern US is extremely sparse. Other work concerning benthic invertebrates pertained to two major groups, bivalve mollusks and gammaridean amphipods. Principal effort involving these groups consisted of summarizing and analyzing distributional information.

Research pertaining to food habits of fishes was continued with work dealing with both data processing and stomach analyses. Good progress was made in the analysis of the 1969-72 flatfish that will facilitate the computation and summary listing of the data. Also, the KWIC computer program for reference listings has been debugged and run successfully on Rich Langton's reference literature. Analyses of the stomach contents from fish feeding-chronology studies are underway; approximately 500 silver hake stomachs and 70 Atlantic herring stomachs have been analyzed. Ray Bowman is making progress on the juvenile haddock data base. A preliminary analysis of the data is completed and the preparation of a report has been started. Key punching of the 1973-76 food habits data base has been completed and Wendall Hahm is preparing to write audit programs to facilitate processing of these data. Also, the stomach contents data from the 1969-72 juvenile fish have been keypunched and audited.

Plankton Ecology Investigation

Donna Busch and Jay O'Reilly (Sandy Hook Laboratory) prepared a primary productivity data report for presentation at a NMFS-USSR joint progress and planning meeting to be held in Moscow during February 1979. The data report provides computer listings of results of ^{14}C measurements taken on three fall MARMAP cruises aboard the Belogorsk and also graphically presents total daily primary production, euphotic layer depths, percent of total daily production due to nanoplankton, and the percent of daily production incorporated into dissolved organic matter release by the phytoplankton community at each station. During the August-September cruise, measurements were taken at 44 stations extending from Nova Scotia to Cape Hatteras. On the October cruise, coverage ranged from the Gulf of Maine to south of Delaware Bay with 42 stations occupied. On the third cruise, from 15 to 30 November, coverage was limited to the area from the Gulf of Maine to the eastern tip of Long Island with ^{14}C measurements at 24 stations only. The ranges of total daily primary production ($\text{g}(\text{C})\cdot\text{m}^{-2}\cdot\text{day}^{-1}$) for the three cruises were 0.6-3.7 for August-September, 0.9-4.2 for October, and 0.2-2.3 for the latter half of November.

Biostatistics

Larval fish summary tables were produced for 22 ICNAF larval Atlantic herring survey cruises using the 0.333-mm mesh bongo samples during 1974-77. These were sent along with net tow data to the Ecosystem Dynamics Investigation for further analysis for the larval fish symposium. The outputs for cruises during 1971-73 are nearly finished.

Zooplankton data listings were sent to Roz Cohen for quality control. These included data for Anton Dohrn Cruise No. 75-187, Anton Dohrn Cruise No. 74-01, Albatross IV Cruise No. AL 73-09, Mt. Mitchell Cruise No. MM 77-01, and Prognoz Cruise No. 74-01.

Tom Plichta continues work on the BLM data base. He also created a master file for R/V Argus Cruise No. 77-01, which was the first cruise to use the key-punch format logs. Unfortunately, due to software problems which occurred when the formats were switched, the data could not be merged into a master file from the cards and Tom had to enter all of the data at the terminal. Oke Lundin is currently working to resolve the programming problems caused by the use of the card formats.

Gary Johnson and Chris Lindgren have returned to school for the spring semester and will be working about 10 hr/wk.

Jerry Prezioso assisted Lori Sullivan in processing plankton data for Marv Grosslein. He also conducted a preliminary analysis of data from Strider Cruises No. 78-01 and 78-02, the environmental damage assessment surveys made after the grounding of Ocean Barge 250. There appeared to be no change in either abundance, diversity, or dominance of various zooplankters between the two cruises with the exception of Oikopleura which dominated samples from the first cruise, but was absent from the second.)

Jerry Prezioso completed an inventory of all fine-mesh samples stored at Davisville, RI, and entered it into the plankton inventory computer file and commenced preparations for the next shipment of plankton to the Polish Sorting Center. He also rendezvoused in Connecticut with a staff member from the Sandy Hook Laboratory to exchange plankton samples and data. Belogorsk Cruise No. 78-03

samples were picked up, having been volumized, and Belogorsk Cruise No. 78-04 samples were dropped off for volumizing.

Apex Predator Investigation

Eight tag returns from silky (2), sandbar (2), tiger (1), and blue (4) sharks were received this month. The tiger shark was at liberty for 2.5 mo and traveled approximately 800 mi from Ft. Pierce, FL, to Samana Bay, Dominican Republic. One of the blues tagged from the R/V Wieczno NE of Oregon Inlet, NC, was recaptured after 2 yr off the northeast coast of Cuba.

Members of the Southeast Foreign Fisheries Observer Program returned tagging records from 150 blue sharks. The sharks were tagged during fishing operations being conducted by Japanese longliners in the northeastern part of the Gulf of Mexico.

The annual newsletter summarizing accomplishments of the Investigation during 1978 has been drafted and will be sent to cooperating sportsmen in February.

Larval Physiology and Biochemistry Investigation

Studies of the intensity of winter flounder metabolic rates were started. Basal routine and maximum active respiration potential were measured at 8°C. Condition and its effect on metabolism were also evaluated from larvae starved varying periods of time. Daily mortality rates for different age groups of fed larvae subjected to starvation were determined in the newly designed funnel aquaria. Studies on the changes in the respiratory electron transport activity (RETS) and the protein and nucleic acid content of starved and fed winter flounder larvae were continued.

Meetings, Talks, Visitors, Publicity

On 4 January, Chuck Stillwell gave a talk and slide presentation to the Northeast Foreign Fisheries Observer Program at the Woods Hole Laboratory. Topics included procedures to follow in tagging apex predators, species identification, and a discussion of problems relating to the tagging work.

Ken Sherman attended the Board of Directors meeting at the Gloucester Laboratory during 3-5 January.

Tim Cain and Pat Carter were co-organizers of a successful 3-day NEFC-wide EEO workshop at the Milford Laboratory. More than 40 NEFC personnel and several Washington, DC, representatives took part in a series of stimulating talks and discussions. Red Wright and Ed Cohen attended for 2 days.

On 19 January, research programs of EPA and NEFC were reviewed. Special focus was given to the Ocean Pulse initiative. In attendance at the meeting at the Narragansett Laboratory were: Bud Walsh, NOAA Deputy Administrator; Judith Roals, NOAA Special Assistant; Daniel Banks, NOAA Special Assistant; Steve Gage, EPA Assistant Administrator for Hazardous Substances; Ken Sherman, NEFC, Narragansett; Carl Sindermann, NEFC, Sandy Hook; Jack Pearce, NEFC, Sandy Hook; Mert Ingham, Atlantic Environmental Group; Arlene Longwell, NEFC, Milford; Fred Thurburg, NEFC, Milford; Aaron Rosenfield, NEFC, Oxford; Carolyn Griswold, NEFC, Narragansett; Don Phelps, EPA, Narragansett; and Jan Prager, EPA, Narragansett. In the afternoon Bud Walsh, the Special Assistants, Ken Sherman, and Eric Schneider sat on a panel discussion with the faculty and staff of the University of Rhode Island (URI) to

discuss the implications of the National Ocean Pollution Research and Development and Monitoring Planning Act of 1978. The panel discussion was held at the Watkins Center at URI.

From 22 to 24 January, Ken Sherman attended meetings at Boulder, CO, with Robert Edwards, Jack Pearce, and Lockwood Chamberlin.

On 31 January, a review was held at the Narragansett Laboratory on the application of system-recognition technology to plankton identification and scale and otolith interpretation. Among those present were: M. P. DeRegt, NOAA, Rockville, MD; Peter Verity, URI Graduate School of Oceanography (GSO), Narragansett, RI; J. B. Suomala, C. S. Draper Lab., Cambridge, MA; J. B. Lozon, C. S. Draper Lab., Cambridge, MA; Richard Hennemuth, NEFC, Woods Hole, MA; A. Jearld, Jr., NEFC, Woods Hole, MA; Brad Brown, NEFC, Woods Hole, MA; Judy Penttila, NEFC, Woods Hole, MA; Rosalind Cohen, NEFC, Woods Hole, MA; A. Poularikas, URI, Narragansett, RI; Vance McCollough, Raytheon Co., Portsmouth, RI; Daniel O'Neill, GSO, Narragansett, RI; Ray Maurer, NEFC, Narragansett, RI; Luther Bivins, NOAA, Rockville, MD; Russell A. Kirsch, National Bureau of Standards, Washington, DC; H. P. Jeffries, GSO, Narragansett, RI; and Kenneth Sherman, NEFC, Narragansett, RI.

Manuscripts

Langton, R., R. Howells, and C. Karp. Occurrence of a rare mantis shrimp, Platysquilla enodis (Manning, 1962), in the Middle Atlantic Bight Region.

Laurence, G. C., A. S. Smigielski, T. Halavik, and B. Burns. Changes in RNA, DNA and protein content of cod and winter flounder larvae and the implications of direct competition on growth and survival of cod and haddock in the laboratory studies. ICES/ELH Symp. FM:3.

MANNED UNDERSEA RESEARCH AND TECHNOLOGY PROGRAM

No report received. January report will be included in the February issue.

DIVISION OF ENVIRONMENTAL ASSESSMENT

Behavior of Marine Fishes and Invertebrates Investigation

Experiments conducted in cooperation with Battelle Pacific Northwest Laboratories under a contract with the US Department of Energy, have been initiated to examine the response of blue crabs to oiled sediments. Experimental systems were developed which allow animals free choice between oiled and non-oiled sediments over extended time periods. In the first of this series of experiments, juveniles were exposed to sediments with initial concentrations of 10,100, and 1,000 ppm (by volume) of Prudhoe Bay crude and observed 24 hr/day over a 5-day period. Preliminary analysis of the data showed that the juveniles tended to avoid the oiled sediment at all three levels. The data are, however, being analyzed further for effects of concentrations and duration of exposure on the response, as well as for the period of differential responsiveness by animals on a 24-hr basis. Experiments with juveniles are continuing.

Coastal Ecosystems Investigation

Frank Steimle and Jan Caracciolo neared completion of a draft of the report,

"Distribution and Abundance of Dominant Benthic Invertebrates in the New York Bight Apex, with a Review of Their Life History." This large manuscript is being prepared for submission to the NOAA Technical Report NMFS Circular series and will be ready for inhouse review next month.

Frank and Tom Wilhelm made an excellent start in developing a series of caloric values for dominant benthic invertebrates of the Middle Atlantic Bight, Georges Bank, and the Gulf of Maine. Replicate caloric determinations for 12 species have been made to date; we have prepared another 25 species for calorimetry in the near future. These studies will increase our ability to develop total energy budgets for these regions and will have additional use as condition indices in Ocean Pulse studies.

Frank also continued compiling and analyzing data from the 1976 Block Island Sound benthic survey, and assisted John Mahoney in preparing a manuscript, "Possible Association of a Fishery Nuisance with a Diatom Bloom in the Middle Atlantic Bight," which will be submitted to Estuaries.

Bob Reid worked with Ichthyoplankton Investigation and Pathobiology Division personnel in an effort to complete and submit final reports on ichthyoplankton and pathology of the Middle Atlantic Bight to BLM. He also continued preparation of a report on benthic baseline conditions in Long Island Sound, while Dave Radosh was busy with analyses of samples and data concerning impacts and recolonization following the 1976 anoxia off New Jersey. Ann Frame was involved in species identifications for these studies, and also completed revision of a manuscript on new haustoriid amphipods from the Sound and New York Bight.

Clyde MacKenzie analyzed benthic faunal samples taken from presently fished, recently fished, and unfished ocean quahog beds in relation to a pilot study of effects of fishing and quahog populations on species composition and productivity of associated fauna. Finally, Investigation personnel began preparations for the third major Ocean Pulse cruise, which will assess and monitor an area between Nantucket Shoals and Cape Hatteras during 12-21 February.

Biological Oceanography of Stressed Ecosystems Investigation

During January, Jim Thomas, Jay O'Reilly, and Craig Robertson completed a report to the Marine Ecosystem Analysis Program's (MESA) New York Bight Project concerning synoptic investigations of nutrient cycling in the New York Bight apex. Sections for which we were responsible included dissolved oxygen concentrations, dissolved organic carbon standing stocks, release of dissolved organic matter from phytoplankton, total (particulate plus dissolved) primary production, and total plankton respiration. Of surprising interest were the very high rates of total plankton respiration ($698 \text{ g(C)} \cdot \text{m}^{-2} \cdot \text{yr}^{-1}$) and the high percentage of photo-assimilated carbon released as dissolved organic matter by the phytoplankton (20-30%). Both facts are significant. Productivity-to-respiration (P/R) ratios turned out to be less than 1.0 during most of the year, meaning that the system operates heterotrophically except during spring when autotrophic processes (primary productivity) outweigh heterotrophic (respiratory) processes. Such P/R ratios suggest significant organic loading from the New York Metropolitan Area. Further, they indicate that a significant portion of the food web in the New York area is detrital based. Contaminants associated with organic material therefore have real relevance for their potential for impacting on higher trophic levels. The percentage of photoassimilated carbon released as dissolved organic matter was not only significant, but appeared to be abnormally high for rich

coastal waters. The question is why? Contaminant stresses are suggested; perhaps copper, a known algicide. These results were reported at a MESA meeting of principal investigators on 18 January.

Seabed oxygen consumption data from an Ocean Pulse cruise (Delaware II Cruise No. DE 78-04) were mapped along with historical data from 1975-77 for a total of six New York Bight cruises. From these data it appears that seabed oxygen consumption during the summer of 1976 during the anoxic episode, was significantly higher than in 1975, 1977, or 1978, demonstrating that additional organic loading of the seabed occurred during 1976. We know from other data (Mahoney 1979) that this probably was a result of the decay of a massive Ceratium tripos bloom which had settled to the seabed. Additionally, sediment organic carbon from selected stations during 1977 and 1978 has been determined and also will be plotted. We are planning to use this kind of observation in our research, monitoring, and assessment studies under the Ocean Pulse Program to pinpoint areas receiving high organic loading.

John Mahoney began statistical treatment of data on winter flounder blood characteristics including red blood cell counts, hematocrit, hemoglobin, and serum protein. These data were gathered from several hundred fish during 1969-72 as a component of the study of "fin rot" disease in the New York Bight.

A paper, "Environmental and Physiological Factors in the Growth and Seasonal Maxima of the Dinoflagellate Ceratium tripos," by John B. Mahoney, was accepted for publication in the spring issue of the Bulletin of the New Jersey Academy of Science. Another paper, "Possible Association of a Fishery Nuisance with a Diatom Bloom in the Middle Atlantic Bight," by John B. Mahoney and Frank W. Steimle, is nearly ready (in final review) to be submitted.

Myra Cohn began actual counts on samples which are part of the cooperative study she and Dr. Harold G. Marshall (Old Dominion University) are conducting in the Ocean Pulse mode. An interesting, very preliminary finding is the presence of cysts of Gonyaulax excavata (tamarensis), a "red tide" organism, at a station offshore from Boston Harbor in October 1978. It should be interesting to follow any numbers and locations of this organism through cruises in November-December, February-March, May, June-July, and September. This was not a dominant organism at the location. Samples of the cyst, G. tamarensis, are being sent out to known authorities for verification.

A cooperative paper by Myra S. Cohn and Paul Olsen of the New Jersey Department of Environmental Protection was accepted for publication in the 25th anniversary edition of the Bulletin of the New Jersey Academy of Science in fall 1979. Titled "Phytoplankton in Lower New York Bay and Adjacent New Jersey Estuarine and Coastal Areas," it is based on biweekly (more frequently in summer) sampling from 1975 through 1978.

Physiological Effects of Pollutant Stress Investigation

Physioecology

A long-term exposure (45 days) to copper of the deposit-feeding clam Macoma balthica was continued this month. At the 30-day point the copper-exposed clams appeared to be less affected by winter conditions than those exposed similarly during summer. Tissue and sediment samples were taken for future copper uptake analyses.

A study to determine the effect of several metals on embryos and larvae of the American oyster under various salinity-temperature regimes was resumed this month.

A long-term study initiated in June 1978 to determine the effect of silver on reproduction in the slipper limpet (Crepidula fornicata) and on the resulting larvae is still in progress. Approximately 120 mated pairs of Crepidula have been exposed to 1, 5, and 10 ppb of Ag as the nitrate for 7 mo. The number of larval releases by each of 10 females at each concentration has been followed as well as the number and size of larvae at each release. Developing eggs have also been sampled for cytogenetic examination. Forty limpets, five males and five females from each test concentration and control, were sampled after 7 mo for Ag uptake analyses. Larvae released earlier have now been raised to sexual maturity and have spawned. These second generation larvae have not fared very well, however. We hope to continue this study for at least 5 mo more to determine Ag uptake levels after 1 yr of exposure.

Physiological Effects

Much of this reporting period was taken up with familiarization and training sessions with a new blood-gas analyzer that will be used in some of our finfish studies this spring. We have also been working with impedance recordings of crustacean heart and gill-bailer activity. The remainder of this period was spent completing another phase of our continuing study on the effects of heavy metals on molluscan metabolism.

Biochemical Effects

We continue to gather biochemical data for adductor muscle tissue of sea scallops taken during the bottom trawl surveys. To broaden our monitoring effort, optimal protocols were determined for adductor muscle of surf clams, ocean quahogs, and horse mussels, and analyses made for those samples collected during the bottom trawl and shellfish resource assessment surveys.

In an attempt to adapt for our use the Nebert-Gelboin assay for aryl hydrocarbon hydroxylase (AHH), which calls for spectrofluorimetric capability that we do not have, we have been working with flounder liver preparation (AHH, a liver enzyme involved in the metabolism of polycyclic aromatic hydrocarbons, can be induced in marine vertebrates by exposure to petroleum fractions, and has been suggested as a monitoring device in oil-polluted areas of the ocean). Apart from the lesser sensitivity of photometry as compared with fluorimetry, we find that substrate precipitation poses problems with an optical monitoring system during the long (30+ min) reaction period. We hope to overcome these problems with the help of a Pye-Unicam spectrophotometer.

We have also begun a study of the differences in properties of MDH isoenzymes in immature as compared with ripe winter flounder gonads. Last year we discovered puzzling metabolic profiles for this enzyme that differed with sex in gonads of different maturation stages, observations that strongly suggested a changing proportion of the mitochondrial and sarcoplasmic forms of this enzyme, possibly related to the changing proportion of somatic and gonadal tissues. This spring we hope to resolve that question, the more knowledgeably to interpret field data.

The MESA New York Bight cruise late this month (Kelez Cruise No. KE 79-01) during which sea scallops are to be collected and sent to the NWAFC's Seattle Laboratory for petroleum hydrocarbon analysis, offered us a chance to piggyback.

We are, therefore, sampling scallop adductor muscle in subsets from each collection for Seattle, to produce biochemical data on animals from stations also producing hydrocarbon-uptake data. Our samples will be divided into two parts, with the second part going for heavy-metal analysis. On the same cruise, flounder livers (winter or windowpane) will be sampled from animals taken at dumpsites and from "clean" areas; the livers will be homogenized fresh, then frozen and returned to the laboratory for work with what we hope will be a spectrophotometric assay for AHH.

Anaerobic Bacteriology/Metabolism

Ocean Pulse activities were concentrated on the collection of the biochemical characteristics of the many isolates obtained from the last cruise for placement in proper groupings. Biochemical similarities do occur between the isolates, but significant differences between isolates exist making groupings into established guidelines somewhat difficult. Distribution of bacterial groups with water temperature and geographical location will be attempted.

A report on the second cooperative experiment with the Charleston Laboratory of the SEFC on the outgrowth of C. botulinum Type E in heated American oysters was completed this month. Except for a few of the oysters incubated at the optimum growth temperature for Type E, none of the scores of samples (oysters) tested after treatment and incubation at refrigerated temperatures contained toxin. It is not certain at this time whether growth by the spores occurred without toxin production.

Environmental Chemistry Investigation

In January, the Environmental Chemistry Investigation finished computerization and calculation of 17,302 measurements of chlorophyll a concentrations made between October 1977 and November 1978 during nine MARMAP/Ocean Pulse surveys of coastal waters between Cape Hatteras and Nova Scotia. Contour maps of chlorophyll distributions were constructed for each of the nine surveys. A data report on chlorophyll distribution was prepared for the Soviet-American meeting in Moscow (February 1979). Also, copies of cruise tracks were sent to Dr. V. Klemas (University of Delaware) so that he could initiate correlations between satellite images and our chlorophyll data.

We finished computer calculations of primary productivity measurements made during the November Belogorsk (Cruise No. 78-04) survey. A data report (SHL-79-09) was prepared on measurements of productivity made during Belogorsk Cruises No. 78-01, 78-03, and 78-04. A manual (SHL-79-06) was completed which describes our method for measuring primary productivity. Mr. S. Ward made measurements of chlorophyll and primary productivity aboard the recent Delaware II shellfish resource assessment survey.

The Investigation also completed analyses of nutrient samples taken during Belogorsk Cruise No. 78-04. A data report (SHL-79-07) was subsequently prepared.

Meetings, Talks, Visitors, Publicity

Jay O'Reilly and Ruth Waldhauer met with Dr. T. Loder (University of New Hampshire) to discuss our participation in cooperative studies of organic nutrient distributions along the shelf area off Rhode Island. The group discussed details

of automated nutrient measurement as well as the necessity of establishing a nutrient intercalibration laboratory network along the East Coast.

Members of the Environmental Chemistry Investigation (V. Zdanowicz, A. Draxler, R. Waldhauer, and A. Matte) visited trace metal laboratories at the University of Connecticut, Noank, CT; US Department of Energy, New York City; and the University of Delaware, Lewes, DE, in order to discuss laboratory design requirements and analytical procedures with the staffs of these facilities in connection with the newly acquired Perkin Elmer (PE) Model 5000 Atomic Absorption Spectrophotometer. PE 500's were set up at two of the locations and information was obtained on the instrument's operation and reliability.

During 3-5 January, Dr. John Pearce participated in a Board of Director's meeting held at the Gloucester Laboratory. Al Matte attended a 2-day course on hazardous chemical safety at Drew University on 8 and 9 January sponsored by the Baker Chemical Company.

Clyde MacKenzie attended a conference on improving oyster yields and the oyster industry in Annapolis, MD, on 9 January.

Frank Steimle attended a 3-day training session, "Basic EEO Counseling," in New York City during 9-11 January.

Myra Cohn attended an EEO workshop at the Milford Laboratory on 9 January at which she reported on the Assertiveness Training Seminar she organized at the Sandy Hook Laboratory in recognition of NOAA Women's Week in November. The 3-hr Assertiveness Training Seminar was conducted by Professor Newana Barnes of Brookdale Community College in Lincroft, NJ, and was attended by 53 persons, 20 of them men, meeting in two sessions.

During 9-11 January, Drs. Pearce and Sindermann participated in a special meeting held at the MESA Project Office headquarters in Stony Brook, NY. The meeting was concerned with long-range monitoring activities to be conducted by NOAA and how to implement coordinated/cooperative activities between NMFS and its Ocean Pulse Program and the Ocean Dumping and Monitoring Program being operated by the NOAA Office of Oceanic and Atmospheric Services. Principal activities were to outline major goals and objectives of monitoring programs and to relate these to the information needs of environmental members. The meeting resulted in the formulation of protocols and one-page descriptions of principal components of long-range monitoring programs.

Jan Caracciolo and Ann Frame met with Gary Gaston, a Virginia Institute of Marine Sciences taxonomist, on 10 and 11 January at the Sandy Hook Laboratory to discuss species identifications and other aspects of our extensive New York Bight apex benthic data set, which VIMS is analyzing under contract to MESA.

On Thursday, 18 January, Dr. Pearce presented a seminar to students in a course on marine diseases being taught by Dr. Frederick Bang, Marine Biological Laboratory. Dr. Pearce talked on the relationships between "disease" and marine pollution.

On Friday, 19 January, Dr. Pearce met with other NEFC personnel at the Narragansett Laboratory to provide a review of the Ocean Pulse Program, especially as it relates to ongoing US Environmental Protection Agency (USEPA) research at the Environmental Research Laboratory in Narragansett. Mr. James Walsh, Deputy Administrator of NOAA, and Dr. Steven Gage of the USEPA were present from Washington to review and assess Ocean Pulse and similar USEPA programs. Dr. Fred Thurberg gave a presentation on biological-effects monitoring using physiological and biochemical techniques.

During 23-25 January, Dr. Pearce met with NEFC and Environmental Research Laboratory personnel at the NOAA Boulder, CO, facility. This meeting was held to present a seminar and to review the Ocean Pulse Program, especially as it relates to upcoming remote-sensing programs to be conducted jointly by NASA and NMFS. Also present at the Boulder Laboratory was Dr. Victor Klemas of the University of Delaware's Center for Remote Sensing who is presently working under contract with the Ocean Pulse Program to develop and implement certain aspects of remote sensing in relation to measurements being made at the sea surface by NEFC personnel.

Dr. James Thomas attended a NASA Remote Sensing and Problems in the Hydrosphere Workshop in Warner Springs, CA, during 29-31 January. At the meeting were 40 scientists from all over the US. The purpose of the meeting was to provide NASA with advice on ways to use their remote sensing capabilities to respond to problems in the aquatic (marine and fresh) ecosystem. The output of the workshop will be a volume edited by E. D. Goldberg.

On Tuesday, 30 January, Mr. Bori Olla and Dr. Pearce met with the Center Director in Woods Hole to discuss the Behavior of Marine Invertebrates and Fishes Investigation.

On 31 January, Garry Mayer of the MESA Project Office in Stony Brook, met with Dr. Pearce at the Sandy Hook Laboratory to discuss further cooperative research being done by Division personnel and the MESA Program. The current status of the data relating to the development of anoxic conditions as well as C-O-N recycling was discussed. Also, participants in the meeting talked about planning and additional proposals to the MESA Office for funding of work concerned with the collection and analyses of certain contaminants, including petroleum hydrocarbons and heavy metals.

Manuscripts

Draxler, A. F. J., R. Waldhauer, and A. Matte. 1979. Nutrient data from Belogorsk Cruise 78-04, 16-29 November 1978. NMFS, NEFC, Sandy Hook Lab. Rep. No. SHL-79-07.

Evans, C. A., J. E. O'Reilly, and J. P. Thomas. 1979. Report on chlorophyll measurements made on MARMAP surveys between October 1977 - December 1978. NMFS, NEFC, Sandy Hook Lab. Rep. No. SHL-79-10.

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

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

O'Reilly, J. E., and D. A. Busch. 1979. Summary of measurements of primary productivity made during MARMAP surveys (Belogorsk 78-01, 78-03, 78-04). NMFS, NEFC, Sandy Hook Lab. Rep. No. SHL-79-09.

O'Reilly, J. E., and J. P. Thomas. 1979. A manual for the measurement of total daily primary productivity using ^{14}C simulated in situ sunlight incubation. Ocean Pulse Tech. Man. No. 1. NMFS, NEFC, Sandy Hook Lab. Rep. No. SHL-79-06.)

Pearson, W. H., P. C. Sugarman, D. L. Woodruff, and B. L. Olla. Thresholds for detection and feeding behavior in the Dungeness crab, Cancer magister (Dana). J. Exper. Mar. Biol. Ecol. (A)

Thomas, J. P., J. E. O'Reilly, and C. N. Robertson. 1979. Synoptic investigations in nutrient cycling 1) dissolved oxygen concentrations; 2) percent oxygen saturation in water column; 3) dissolved organic carbon concentrations; 4) incident radiation, light extinction, alkalinity and pH; 5) release of dissolved organic matter from phytoplankton; 6) total phytoplankton primary productivity; and 7) total plankton respiration. Report to MESA/New York Bight Project. NMFS, NEFC, Sandy Hook Lab. Rep. No. SHL-79-05.

Thurberg, F. P. The use of physiological techniques in monitoring pollution: A consideration of its problems and current research. ICES Monitoring of Biological Effects Workshop. No. 24. (S)

AQUACULTURE DIVISION

Aquacultural Genetics Investigation

Mass Selection of the Commercial American Oyster

Juvenile oysters from the mass selection experiment collected during the spring and summer of 1978 are currently being sorted, counted, and measured. These spat represent the first generation of selected oysters from three selection lines, a high-growth line, a slow-growth line, and a random control line. Brood stock from these animals will be selected in the fall of 1979 and bred in the spring of 1980 to produce the second generation of selected oysters in the mass selection lines.

Conditioning of oysters in the family selection lines has begun. These oysters will be used to study the feasibility of selecting for increased meat weight based on pedigree data. Oysters whose siblings have high proportions of dry meat weight to total animal weight will be mated among themselves. Similar assortative matings will be made among oysters whose siblings have low proportions of dry meat weight to total weight. Care will be taken to avoid inbreeding. Control oysters will be produced from random matings.

Preparations for the 1979 spawning season are under way. Repairs and alterations of spawning and rearing facilities and equipment are being made. Breeding plans are being updated and advanced. Routine care of 1976, 1977, and 1978 year-class animals continues.

Experimental Inbreeding and Outbreeding of the Commercial American Oyster

Statistical analyses were completed for growth rate comparisons between F_2 full-sib inbred larvae and outbred controls which were spawned in the spring of 1978. At day 2, inbred and outbred larvae averaged approximately the same

size. By day 7, the size of outbreeds was greater. At days 14 and 21, outbreeds were still larger, but not significantly. At day 28, the difference was significant (Student's "t" test). Surviving juveniles from these groups have been measured to determine any differences beyond the larval stage. Juveniles from F₁ full-sib groups also have been measured prior to conditioning for producing additional family lines. Multilines are needed to compensate for expected loss due to inbreeding depression. These homozygous lines then can be crossed to test for hybrid vigor, a breeding technique used successfully in the development of some commercial agricultural species. In addition, homozygous lines of other organisms, including mammals, provide a uniform genetic background for other experimental purposes, for example, in environmental effect studies. More experimental approaches are being investigated to produce inbreds in a shorter period of time compared with several generations of full-sib inbreeding. Thermal shock and ammoniacal seawater were tested on oyster eggs as methods of producing parthenogenetic inbreds. Related experiments on doubling of chromosome number of parthenogens were initiated with two chemical mitotic inhibitors. Treated eggs will be studied cytogenetically with phase microscopy. Wild adult American oysters, having been conditioned successfully in the laboratory for the beginning of the new spawning season, provided the experimental eggs.

Spawning and Rearing of Mollusks Investigation

We have been attempting to find a method suitable for marking large numbers of juvenile bay scallops for field identification. In a test completed this month, alizarin red sulfate failed to produce a usable shell mark on scallops at concentrations in seawater up to and exceeding a lethal dose of this material.

We began to spawn bay scallops in January. The two populations produced have been variable in both development to the larval stage and growth rate. We intend to spawn scallops on a biweekly schedule in order to produce the quantities of seed animals required by our field work.

Surf clams which had undergone gametogenesis last spring were collected and maintained at 10°C throughout the summer and fall, delaying normal spawning activity. These animals were recently spawned in the laboratory and produced viable gametes. The survival from fertilized eggs to the veliger stage was 64%. The larvae are currently in culture and growing normally. This delay of spawning of 11 mo is longer than any previously incurred in our laboratory. Since the gonad is not resorbed, spawning may be carried out throughout most of the year if naturally ripened brood stock is collected in the spring and maintained at 10°C.

Groups of 12-mm surf clams have continued slight growth throughout the winter months. This growth was observed in 15-liter trays containing only 50 clams. No growth was recorded when the biomass of the trays was doubled. This indicates that the available phytoplankton was insufficient to support growth of larger numbers of animals.

Meetings, Talks, Visitors, Publicity

Ellen Losee presented a paper titled, "Relationship Between Size of Young Adult Crassostrea virginica and Larval Growth Rate in Their Offspring," at the 10th annual meeting of the World Mariculture Society in Honolulu, HI, during 22-26 January.

Ms. Andrea Bemke of Wheaton (Massachusetts) College spent 3 wk at the Milford Laboratory as a student intern.

Messrs. Vincenzo and Francisco Coppola of Caserta, Italy, conferred with personnel on aquaculture procedures.

Bay scallops were provided to Project Oceanology of Groton, CT, for use in classroom projects.

PATHOBIOLOGY DIVISION

Comparative Shellfish Pathobiology Investigation

Cooperative Ocean Pulse-MARMAP studies were begun with Marine Ecosystems Division personnel at the Narragansett Laboratory. Aliquot samples of archived euphausiids taken during routine MARMAP cruises are being examined for suctorian and apostome ciliate infestation, gill melanization, and other lesions and anomalies. Data from gross examinations of 349 euphausiids collected during 1977-78 MARMAP cruises were analyzed and compared with data derived from Deepwater Dumpsite (DWD) 106 and other Ocean Pulse cruises. It appears that euphausiids from DWD 106 cruises have a markedly higher prevalence of gill melanization and a lower prevalence of suctorian infestation than those from other MARMAP and Ocean Pulse cruises. Furthermore, data from MARMAP and DWD 106 cruises that occurred on approximately the same dates were also compared, and melanization and prevalence results seem consistent. Thus, it appears that gill melanization is not a consequence of tow damage or related to seasonal factors as previously thought. The results of these examinations suggest that differences in population susceptibility to other physical and biological factors are involved in the occurrence of melanization. Furthermore, the differences in prevalence in ciliate infestation may reflect depth tolerances and other environmental limitations under which these forms proliferate and are transmitted. Melanization was observed to be infrequent and golden brown in color in MARMAP specimens taken from the Gulf of Maine. This was in contrast to extensive gill blackening in the DWD 106 euphausiids.

During January, labeling and photographing of the figures to be included in the treatise on "Histology of the Blue Crab" were completed and several additions based on recent literature were made to the manuscript. A start has been made on retyping of the rough draft, but the largest part remains to be accomplished.

As part of the Division's cooperative training program with Johns Hopkins University, Mr. Farley spent most of the month at the Marine Biological Laboratory in Woods Hole, MA, participating as an instructor in the "Comparative Pathology of Marine Invertebrates" course. Four lectures were presented on: (1) oyster histology; (2) oyster pathology; (3) molluscan virology; and (4) molluscan oncology. In vitro and in vivo methods for studying comparative hematology and cytology were taught and several research projects by students using those methods were supervised. Students came from all over the country and ranged from undergraduate to professional scientists and technicians.

The Division's Histological Services Unit embedded over 350 tissue blocks, cut over 450 sections, and prepared approximately 500 stained sections of mollusks, crustaceans, fish, and other miscellaneous tissues for microscopic examination.

Larval Diseases of Mollusks Investigation

Pathobiology Division personnel at the Milford Laboratory are working with the Fairfield University Chemistry Department in purification studies of Gonyaulax tamarensis toxin by high-pressure liquid chromatography. Initial toxin separations were poor as tested by mouse assay, but a new protocol has been developed which should improve the concentration stages.

During continuing tests of the pathogenic red pseudomonad, shellfish larvae were used to increase the virulence of this bacterium. These virulent organisms will be tested for their susceptibility to hypobromous acid, a by-product of seawater disinfection by chlorination or ozonization.

Other studies with a pathogenic Vibrio species have shown that toxic metabolites are elicited which cause a high incidence of larval shellfish mortality. Filtrate from this Vibrio is being concentrated by dialysis. The concentrate is being purified by paper chromatography separation. When sufficiently purified, each separate band will be further concentrated and tested in larval bioassays.

An unidentified organism with characteristics suggestive of a sporozoan has been isolated from a culture of larval oyster cells. The organism is being tested in adult oyster hemocytes for evidence of parasitic potential. Under examination is the ability of the organisms (1) to proliferate inside hemocytes; (2) to reduce hemocyte attachment to plastic surfaces; and (3) to limit hemocyte phagocytosis of fluorescent latex spheres. Development of this system is expected to be useful in testing other microorganisms for evidence of pathogenicity in oysters.

Work has also been started on a system to measure quantitatively particle uptake in oyster hemocytes. This consists of an incubation procedure allowing phagocytosis of horse ferritin followed by atomic absorption spectrometry to detect iron levels (iron being a major constituent of ferritin particles).

Microbial Ecology Investigation

Data from collections of rock crabs collected from the Philadelphia-Camden ocean dumpsites have been summarized in order to begin a comparative analysis with data derived from similar collections in Sandy Hook Bay and the New York Bight apex. Histological examinations have been completed on 373 rock crabs from the Philadelphia sites, 317 animals from Sandy Hook Bay and adjacent waters, and 472 animals from the Bight apex. Analyses completed this month indicate that the total sample of 1,162 animals should be adequate for making valid statistical comparisons on several important parameters: (1) influence of molting cycle and gill fouling; (2) lack of influence of molting cycle on tissue necrosis and destruction of gill lamellae; (3) influence of water depth on presence or absence of sessile protozoa; and (4) influence of molting cycle on incidence of discolored or blackened gills. Microscopic studies on 100 crabs collected during the September USEPA cruise to the Philadelphia-Camden dumpsite also were completed this month. Data from the cruise showed that 22% of the 100 animals had undergone a recent molt, and equal numbers of males and females had molted during the same time period. In marked contrast, crabs collected from Sandy Hook Bay and the New York Bight apex have always shown separate molting cycles. Twenty-one of the September crabs had copepods between the gill filaments, and they ranged in number from 1-14 per gill; 10 crabs had necrotic foci or necrotic filaments.

The cause or causes of tissue necrosis in gills are unknown but published data have shown that such conditions are common in laboratory crustaceans exposed to copper or cadmium. New cooperative studies have been planned to investigate metal levels in rock crabs from which complete gill lamellae from each crab will be examined histologically for evidence of tissue pathology. The large amount of information that has been accumulated on rock crabs from stressed areas now makes it possible to conduct precise studies on the effects of environmental stress on specific host responses. All worksheets for ADP processing have been completed and submitted for card punching.

Fish Pathology Investigation

A preliminary light and electron microscopis evaluation of the effects of No. 2 fuel oil on yolk-sac stage winter flounder larvae suggests that the surface epithelium of the dorsal fin fold and the skin near the developing spinal cord are adversely affected when the animals are exposed to 500 ppb of oil for 24 hr. It is difficult to evaluate these observations because of the rapid growth occurring in the animals at this time. The accelerated maturation of the surface cells during this stage of development often presents a discordant, if not chaotic intracellular picture, which if observed in a mature animal would most likely be interpreted as aberrant. The heavy-metal tracer lanthanum (lanthanum hydroxide) was used to determine if oil enters the larval fish by disrupting the junctions between epithelial cells, thereby gaining free access to the animal's internal organs. Under normal circumstances, the junctional relations between epithelial cells preclude the passage of this tracer through the skin. Unfortunately, the distribution of the tracer compound was not observed to differ in a comparison of oil-exposed and unexposed fishes.

Meetings, Talks, Visitors, Publicity

Dr. Rosenfield attended the NEFC Board of Directors meeting in Gloucester, MA, during 3-5 January to discuss programs and budgeting for 1979 and 1980. Drs. Rosenfield and Murchelano attended a meeting at the National Library of Medicine in Washington, DC, on 10 January; they also met with Dr. Sindermann at the Sandy Hook Laboratory on 11 January to discuss BLM projects. Dr. Rosenfield attended an Advisory Committee meeting at FDA headquarters on 16 January; past contracts were reviewed and a new contract was discussed. Dr. Rosenfield attended a meeting at the Narragansett Laboratory on 19 January to present a talk on "Disease and Marine Pollution." His talk was part of a meeting on NOAA/NMFS and USEPA studies that relate to PL 95-273, the pollution monitoring law recently enacted.

Mr. Gerry Kovach and Mr. Greg Dahl of the Senate Committee on Commerce, Science, and Transportation, visited the Oxford Laboratory on 8 January to meet with Drs. Rosenfield and Murchelano to discuss the role of the Ocean Pulse Program as an aid to developing a comprehensive national ocean pollution plan.

Ms. Carolyn Brown attended an EEO workshop for NEFC personnel on 9 January as the Milford Laboratory representative for the Federal Women's Program.

Mr. Farley spent the month of January at the Marine Biological Laboratory in Woods Hole, MA, serving as instructor in a course in comparative pathobiology. Dr. Johnson also participated in teaching the course from 15 to 17 January by presenting lectures on the normal histology and diseases of the blue crab.

Dr. Julius Kuck and Father Elder, SJ, of Fairfield University visited Dr. Blogoslawski at the Milford Laboratory on 19 January.

Ms. Brown attended the World Mariculture Society meeting in Honolulu, HI, during 22-27 January, and presented a talk titled "The Importance of Experimental Design in Determining Bacterial Diseases Associated with Molluscan Aquaculture."

Ms. Charles and Mr. Newman obtained fish blood specimens from the SEFC's Beaufort Laboratory during 23-25 January.

Dr. Pei W. Chang of the University of Rhode Island discussed ozone-quarantine seawater treatment systems with Dr. Blogoslawski at the Milford Laboratory on 15 January.

Dr. Donald Munson of Washington College in Chestertown, MD, conferred with Dr. Johnson on 26 January concerning projects he might undertake on pathobiology of Chesapeake Bay crustaceans.

Dr. Murchelano visited with John LeBaron at the Sandy Hook Laboratory on 30 January with regard to preparation of a final BLM machine-listing for the Registry of Marine Pathology.

Ms. Elizabeth North, a 6-mo CCSC cooperative work-study student, replaced Mr. Pendoley at the Milford Laboratory on 2 January.

Mr. Crosby, Ms. Charles, and Ms. Cassanelli terminated their temporary appointments at the Oxford Laboratory on 26 January.

Manuscripts

Blogoslawski, W. J., M. E. Stewart, and E. W. Rhodes. 1978. Bacterial disinfection in shellfish hatchery disease control. Pages 589-602 in James W. Avault, Jr., ed. Proceedings of the World Mariculture Society Annual Meeting, Vol. 9. Louis. St. Univ. Div. Contin. Educ. (P)

Johnson, P. T., and C. A. Farley. A new enveloped helical virus from the blue crab, Callinectes sapidus. J. Invertebr. Pathol. (S)

Newman, M. W., and W. E. Ribelin. A histopathologic evaluation of "puffy-snout" disease of captive tunas. J. Wildl. Dis. (S)

Robohm, R. A., C. Brown, and R. A. Murchelano. A comparison of antibodies in marine fish from clean and polluted waters of the New York Bight: relative levels against 36 bacteria. Appl. Environ. Microbiol. (A)

Schmidt, G. D., and S. A. MacLean. 1978. Polymorphus (Profilicollis) major Lundström 1942 juveniles in rock crabs, Cancer irroratus, from Maine. J. Parasitol. 64:953-954. (P)

RESOURCE UTILIZATION DIVISION

Fisheries Engineering Investigation

Sampling and Harvesting Gear Development

The surf clam and ocean quahog resource assessment survey is currently underway using the new 60-inch blade dredge and the submersible pumping system. The new system was checked out and tested in a 1-day cruise. Vern Nulk also participated in the first leg of the assessment survey.

The dredge proved to be very well balanced and handled well. The results of the assessment survey have not been analyzed yet, but there appears to be a significant increase in efficiency over the old 48-inch dredge. It also filters trash and mud much better, giving a cleaner catch of shellfish. The redesigned after-cage makes dumping of the catch easier as there are fewer places for the catch to hang up inside the cage. There is also a noticeable difference in the "feel" of this dredge on the bottom indicating it is tending bottom more consistently. Further evidence of its bottom-tending is the greatly reduced number of cut clams in the catch. Cut clams occur when the dredge lifts out of the bottom, allowing the blade to penetrate only a few inches. The blade then cuts through the clams instead of scooping under them.

The new winch to handle the electric cable for the submersible pump also performed very well as designed. It has increased wire capacity over the old winch and is simpler in operation.

Work is continuing on surf clam and ocean quahog gear in preparation for a summer gear study cruise. On the board presently is a new design for the dredge-handling system. The old system has had 10 yr of hard use and abuse and is due for replacement. Further design and refinement of dredge instrumentation are also underway.

We have begun a scallop gear literature search in preparation for scallop gear studies requested by the Regional Fishery Management Councils.

Lt. (JG) John Moakley of the NOAA Corps came on board this month. He holds a mechanical engineering degree from Northeastern University and will be of great assistance in our program. With his arrival, work has recommenced on the R/V Rorqual. We expect to have her running and seaworthy by 1 April.

Resource Development and Improvement Investigation

Storage of Blue Mussels

Taste-test evaluations have been completed. Chemical analyses will, however, continue in order to collect a full year's worth of Kjeldahl nitrogen data.

Storage of Roller-Extracted Pasteurized Blue Crab Meat

Taste-test results show that untreated roller-extracted pasteurized blue crab meat was of acceptable quality after 4 mo of refrigerated storage. The commercially picked control sample, also pasteurized, rated significantly lower than the roller-extracted meats in all attributes (A,O,F,T). Roller-extracted meats that had been dipped into a solution of flavor enhancers prior to pasteurization were spoiled. Total aerobic plate counts for the control and the nondipped meats showed no growth, and all coliform determinations were negative.

Blue Crab Reformed Lumpmeats

A taste-test was conducted on frozen (-5^oF for 1 mo) simulated blue crab lumpmeats. These lumpmeats were made by combining roller-extracted meats 1:1 with Baader-extracted meats, passing the mixture through the Bock extruder which formed the lumpmeats. They then were given a second cook in steam and in a microwave oven. The texture of both samples averaged below borderline (5.0) because of excessive toughness and moisture.

Minced Rock Crab

Minced rock crab samples were prepared at the lab for product formulation and a market study to be conducted by a commercial processor. Earlier arrangements by Maine interests to obtain a supply of crab meat were unsuccessful and it is questionable whether the samples we obtained will be sufficient for the study.

From 13,721 gm of hard-shell rock crab (average weight was 225 gm), 3,248 gm of minced meat was recovered. A 5% cook loss resulted during the 15-min cook in boiling water, and when the crabs were butchered, there remained 3,422 gm of legs and 2,364 gm of bodies. Based on the live weight, the meat recovery from the legs was 13.0% and the yield from the bodies was 10.7%.

Surf Clams

After 5 mo of frozen storage, the surf clams, both fried and steamed, were rated as acceptable by the taste panelists. There is a slight problem with starvation of the control clams being held in Woods Hole.

Cholesterol

Lipid fractions of blue mussels were prepared and sent to Waters Associates for analysis of cholesterol by liquid chromatography. Very preliminary and primitive thin-layer chromatography was attempted using mussel lipids. It appears that there is a large zone of triglycerides.

Antarctic Krill

The second draft of the krill paper is now in progress. In this connection, representatives of a large and successful manufacturer of shrimp-peeling machines have been most anxious to get information on the keeping qualities of krill (or rather, lack of keeping quality). Enzymatic degradation proceeds too swiftly for the krill to be used effectively in their machine. One representative has made a quick trip to the Falkland Islands and will inform us of his findings.

After extensive preparation and hectic travel connections, Mike Allsup made it aboard the Polish research vessel that will study the krill fishery in the Antarctic.

Product Quality, Safety, and Standards Investigation

Product Quality

Sarah Roderick, a student aid from Essex Agricultural Institute who has been with us since last spring, has resigned her position here due to conflicting class schedules. Her absence will be a great loss; she had become very adept with the isoelectric focusing technique.

We also welcome Terese Gibney, a senior at Gloucester High School, who will be working with Ron Lundstrom as a student aid as part of her senior work experience project.

Flavor and texture of stingray were still highly acceptable after 20 wk at 0°F. The extractable protein nitrogen is decreasing slowly and the concentration of ammonia is increasing.

Fillet blocks of South American whiting were rated borderline in flavor (due to rancidity) after 33 wk at 0°F; whereas, blocks prepared from fillets which had been either treated with sodium erythorbate, deep-skinned, or both, were still acceptable.

After 8 wk of storage at 20°F, there has been no appreciable development of oxidative rancidity in red hake fillet blocks. This has been indicated by both organoleptic and chemical tests. The texture of the fish was considered unacceptable after 3 wk.

In a cooperative study with the University of Massachusetts Department of Food Science, red hake fillet blocks were prepared for a preliminary storage study at 0°F to work out methodology. Members of the Department who will participate in the study were also given a demonstration on the preparation of breaded sticks.

Assays for the dimethylamine/formaldehyde (DMA/FA) enzyme were run for microsomal and soluble fractions of red hake liver and muscle tissue. No DMA/FA enzyme activity was found in the microsomal fractions of liver or muscle tissue. The soluble fraction from the red hake liver showed very high activity; about three times more DMA was formed from crude extract of red hake liver as from crude extract of silver hake (whiting) liver. The crude enzyme from red hake also appears more stable than that isolated from whiting. Crude extracts from whiting lose more than one-half of their activity during overnight storage at 4°C, while extracts from red hake lose less than 10% of their initial activity. Attempts to isolate and purify the enzyme will continue for both species in order to compare their properties.

Isoelectric focusing of eye fluid, muscle tissue, and liver tissue proteins from whiting samples collected by Woods Hole Laboratory personnel on the fall bottom trawl survey was initiated. This analysis should be completed by the first week in February.

The new H-P gas chromatograph (GC) has been received. Minor renovations and wiring are being completed in the instrument room to accommodate the new instrument. This GC will be used for the analysis of volatile amines and fatty acids.

Damage to one of our electronic load cells for the Instron Universal Testing Machine has resulted in the cell having to be rebuilt at the factory. It may be as long as a month before the machine is operational again.

Product Safety

Workup has been completed of samples of smoked sablefish, kippered salmon, nova lox, lox, chub, butterfish, mackerel, and sturgeon purchased from local retail outlets. Gas liquid chromatographic analysis of the above samples is nearly completed.

A considerable amount of time is being spent in reading the USEPA and FDA manual on pesticide residues as well as reprints on N-nitrosamines.

Results of the cold-smoked salmon study have been forwarded to Dr. Melvin Ecklund of the NWAFC's Seattle Laboratory.

The report on the analysis of whitefish extracts by GS-TEA and HPLC-TEA has been forwarded to Tom Billy and Dr. Ecklund.

A great deal of time is being spent in cleaning glassware generated in the workup of N-nitrosamine samples. An average of 3-4 hr/day is being allocated on this phase of the work.

Product Standardization

Word has been received from the Central Office that three standards are to be published in the Federal Register. They are: (1) unified fillet standard covering all forms of fillets except those already published; (2) frozen minced fish block standard; (3) revision of fried scallop standard including breaded scallops; and (4) a notice of availability of unified shrimp standard as a proposed document.

Recommendations were prepared for items to be considered at the workshop on standardization to be held at the Washington Office from 27 February to 1 March 1979. Comments were invited from all laboratories and chief inspectors. Representatives from USDA, FDA, DOD, and OMB have been invited. The purpose of the meeting is to take an in-depth look at the expanded responsibilities with respect to the development and maintenance of federal specifications for fishery products, the many requests for new standards as well as changes and modifications in our standardization activities (quality standards, Codex standards, and our inputs to regulatory standards). A Federal Register request for informational comments on our standardization program has a due date of 13 February 1979. Comments received on this will be considered at the meeting.

At a meeting of the Armed Forces Product Evaluation Committee (AFPEC) held on 10 and 11 January in Fort Lee, VA, samples of battered fish portions were served. The 3-oz battered fish portions were provided by the Gloucester Laboratory. Trial blocks of whiting fillets processed on the leased Arenco filleting machine were provided by the Northeast Regional Office's Fisheries Development Division and made into commercial battered fish portions by a local fish processor. The military services expressed an interest in adding this new item to their a la carte meal system. A simple purchase description was provided to the committee for initial use in purchasing the item.

The development and coordination of US comments on the Codex proposed standards for frozen fish blocks and canned mackerel were undertaken during this period.

This month's work on the comparative edibility study at NARADCOM in Natick, MA, emphasized revising our requirements for buying fish and fine-tuning how to test edibility. It included a workshop meeting at Natick. Bad weather this month made it difficult to obtain very fresh fish.

Technical Assistance

Division personnel provided information and technical assistance in the following areas this month: fishing vessel safety placards; eel supply and marketing; fish handling for sport fishermen; laboratory research program; fish processing in general; plant sanitation; setting up a microbiological control lab; storage life of krill; construction of lobster tanks; information on 16 species of European fish; difference between Pacific mackerel and jack mackerel; temperature of fresh fish in distribution channels; cooked spiny lobster tails; lobster trap design; infeasibility of attempting to grow lobsters as a hobby; anglerfish; cultivation of snails; irradiators for knocking down high bacterial counts on frozen shrimp; packaged fresh fish; equipment for making experimental runs of comminuted gurry; prepared minced rock crab samples for commercial evaluation; machine processing whiting; irradiation of fish; fishing gear including otter boards, scallop dredges, vessel hydraulics, and pair trawling; fishing vessel

design; methods of setting fish traps; complete bibliography on shelf life of frozen seafoods; complete bibliography on moisture migration and loss during frozen storage of seafoods; manufacture of fish blocks from freshwater species; winter flounder; yields from fishery products; availability of tongues and cheeks of fish; UPC of the Uniform Grocery Product Code Council; uses for whiting and open-date labeling including present regulations of the Massachusetts FDA and alternative kinds of open-date labels that are being considered on a federal level.

Meetings, Talks, Visitors, Publicity

Perry Lane attended a meeting of the NEMAS Executive Committee and a meeting at Woods Hole to discuss NEFC traveling exhibits. Mike Corbett participated in a panel discussion on mesh selectivity sponsored by the Gloucester Fishermen Wives Association. Al Blott taught a class on twine and netting and their use in various fishing gear as part of the Gloucester Adult Education Fisheries Course. Al Blott and Vern Nulk attended a 1-day fishing vessel hydraulics course given by the Massachusetts Maritime Academy.

Manuscripts

Licciardello, J. J., and W. S. Hill. 1978. Microbiological quality of commercial frozen minced fish blocks. J. Food Prot. 41:948-952. (P)

Krzynowek, J., and K. Wiggin. Identification of species in cooked crabmeat in thin layer isoelectric focusing. J. Assoc. Off. Analyt. Chem. (A)

NATIONAL SYSTEMATICS LABORATORY

Shrimps Investigation

Work continued on a revision of the American Pacific rock shrimps of the genus Sicyonia. Work continued as well on a study of Solenocera taken in commercial catches from northern Australia.

Other Crustaceans Investigation

Preparation continued of a guide to temperate-water crustaceans of the US East Coast. Progress was made on the description of a new genus and species of crab from Tobago and on a revision of the crab genus Latriellia.

Benthic Fishes Investigation

A first draft was completed of a note describing the occurrence of the common eel Anguilla from the deep sea in the Bahamas. Work was done on a paper describing the geographical distribution of deepwater ophidioid fishes, to be presented at the Pacific Science Congress. Studies were made of 5,000 photographs taken with time-lapse cameras on the bottom in the eastern Pacific thermal vent area near the Galapagos Islands. Work was done on a systematic revision of the American toadfish genus Batrachoides.

Meetings, Talks, Visitors, Publicity

Daniel M. Cohen talked to a Smithsonian seminar group on marine and aquatic biology in the People's Republic of China. Bruce Collette stepped down after serving 5 yr as Secretary of the American Society of Ichthyologists and Herpetologists. Collette began teaching a course in ichthyology at George Washington University. Visitors included Dr. N. B. Marshall of Cambridge University.

Manuscripts

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

Perez Farfante, I. Revision of the penaeid shrimp genus Penaeopsis (Crustacea: Decapoda). *Fish. Bull.*, US. (S)

ATLANTIC ENVIRONMENTAL GROUP

Ocean Monitoring and Climatology Investigation

Special attention has been given to pronounced offshore extension of shelf water, which apparently developed during January off the entire coast north of Cape Hatteras. The situation appears to be a repetition of what occurred during March-April 1978, but starting 2 mo earlier. Repetition of the phenomenon, which apparently had not been observed prior to last year, strengthens our suspicion that the phenomenon may occur as a delayed response to anomalies of oceanic circulation induced by the record cold winters of 1976-77 and 1977-78. If it is the cold winters that are forcing this condition, we have no experience to guide us in anticipating how similar the shelf water response now being witnessed will be to the response of a year ago. Will it be more or less pronounced, or of longer or shorter duration, and how different in geographical pattern? In this regard, however, it is noteworthy that the onset of anomalously cold weather started and ended later last year than 2 yr ago, whereas the present offshore extension of shelf water off northern New England and the Middle Atlantic has started about 2 mo earlier than it did a year ago.

Our principal information on the shelf water extension during January has been the weekly satellite-derived Gulf Stream analysis charts issued by NESS. These charts have provided poor and largely tentative analysis because of almost continuous cloud domination of the NOAA 5 infrared imagery on which they are based. It is important, therefore, to have obtained verification of the imagery interpretation from a special section that was obtained for us by Hovey Clifford of Woods Hole Oceanographic Institution (WHOI) while crossing the shelf and slope water region, along 71°W longitude, aboard the R/V Oceanus on 21 January. The section, consisting of expendable bathythermographs (XBT), surface salinities, and a continuous plankton recorder (CPR) equipped with a temperature recorder, shows offshore shelf water (<10°C, 33.3-33.8 ‰) at locations consistent with the imagery interpretation. The plankton from the CPR is being examined for differences in faunal composition between the onshore and offshore shelf water.

During January, the cooperative Ship of Opportunity Program (SOOP) obtained eight XBT transects, two in the Gulf of Maine, two across the Southern New England shelf along the 71°W meridian, one across the shelf and slope off New York, one

off Norfolk, (VA), and two in the Gulf of Mexico. One of the Gulf of Mexico transects, extending 500 mi from Dry Tortugas to 91°W off the Louisiana Coast was made by Steve Cook who rode the tanker Edgar M. Queeny from New Haven, CT, to Lake Charles, LA. There was no MARAD cadet scheduled for the vessel in January, so Steve made the trip to avoid losing the monthly transect. While in the Gulf area, he also took care of other program business in New Orleans, LA, and Galveston, TX.

Continuous plankton and temperature records at a 10-m depth were obtained across the Gulf of Maine and along a special route southward along the 71°W meridian to study the anomalous position of the shelf-slope water front. The latter transect was occupied by WHOI's Oceanus. The status of completion of CPR transects out of New York and Chesapeake Bay is uncertain because the Coast Guard cutters are still at sea (at this writing) and have been involved in search and rescue operations.

The one-page report on Gulf Stream eddy locations, sent to the Coast Guard for publication in the January Atlantic Notice to Fishermen, points out that only one warm-core eddy was possibly present off the northeastern coast of the United States in January. Because no certain locations of this eddy have been seen in satellite imagery since the third week of November, it can be concluded that it has either dissipated or has become weakly organized. If it still exists, it may be somewhere in the slope water region between Block and Hudson Canyons.

Ocean Dumping Investigation

Plans for the second RDF buoy experiment at DWD 106 studying water movement at and near the site are being finalized. The continued cooperation of the University of Delaware's College of Marine Studies and the Sandy Hook Laboratory in the experiment is assured. The release platform for the six free-drifting buoys to be used in the study will be either a Seahorse Marine, Inc., supply vessel (enroute to the Hudson Canyon oil-drilling rig), or a Coast Guard cutter from New York City.

Data analysis for the initial October RDF experiment is being handled by the University of Rhode Island (URI) Data Processing Group. A draft report discussing this experiment should be available by late spring 1979.

The paper titled "Physical Variability at an East Coast United States Offshore Dumpsite" is in preparation for publication in the Proceedings of the First International Ocean Dumping Symposium held in West Greenwich, RI, during October 1978. The final version of this paper is due on 9 March 1979. The paper will be coauthored by Jim Bisagni of NOS, and Professor Dana R. Kester of the URI Graduate School of Oceanography, as it draws upon work Professor Kester is presently completing under an Office of Naval Research cyclonic rings study.

Mr. John Hartley was hired 15 January 1979 as the new physical science technician assigned to the AEG Ocean Dumping Task Group.

Meetings, Talks, Visitors, Publicity

Mert Ingham attended an NEFC Board of Directors meeting in Gloucester, MA, on 3 and 4 January.

On 14 January, Steve Cook boarded the Edgar M. Queeny and traveled to Lake Charles, LA, to collect an XBT transect across the Gulf of Mexico. He continued on to Galveston, TX, and New Orleans, LA, to train cadets in these areas and also visited the National Fisheries Engineering Laboratory in Bay St. Louis, MS.

Bob Benway traveled to Norfolk, VA, on 15 January to deliver a continuous plankton recorder and train a cadet in its operation.

On 18 January, Mert Ingham presented a seminar at the Woods Hole Laboratory on fishery climatology and time-series data held by AEG.

Woody Chamberlin attended a meeting on remote sensing applications at ERL headquarters in Boulder, CO, on 22 January.

From 22 to 25 January, Grayson Wood was on board the Alaskan Seahorse in order to tow the continuous plankton recorder from Quonset Point, RI, to the Ocean Victory, an oil drilling site in the Atlantic.

During 24-26 January, Mert Ingham was in Washington, DC, to confer with NMFS and NOAA headquarters' staff members on fishery climatology.

Steve Cook traveled to the Brooklyn and Governors Island, NY, area on 30 and 31 January to confer with personnel from SOOP vessels and to train Bill Callanan, a new employee, in the Ship of Opportunity Program procedures.

Manuscripts

Armstrong, R. S. Environmental assessment of an active oil field in the northwestern Gulf of Mexico. Current patterns and hydrography. Final report. (S)

Bisagni, J. J. July 1977 physical oceanographic studies at Deepwater Dumpsite 106. Deepwater Dumpsite 106 Assess. Rep. (S)

Cook, S. K. Expendable bathythermograph observations from the NMFS/MARAD Ship of Opportunity Program for 1975. NOAA Tech. Rep. NMFS-SSRF. (A)

Cook, S. K. Water column thermal structure across the shelf and slope southeast of Sandy Hook, NJ, in 1977. Annales Biologiques. (S)

Crist, R. W., and J. L. Chamberlin. Bottom temperatures on the continental shelf and slope south of New England during 1977. Annales Biologiques. (S)

Gunn, J. T. Variation in the shelf water front position in 1977 from Georges Bank to Cape Romain. Annales Biologiques. (S)

Jossi, J. W., and R. R. Marak. MARMAP Survey Manual. Contribution to NOAA Fisheries Technology Shipboard Manual. 43 p. (S)

Mizenko, D., and J. L. Chamberlin. Gulf Stream anticyclonic eddies (warm-core rings) off the northeastern United States during 1977. Annales Biologiques. (S)

Mizenko, D., and J. L. Chamberlin. Gulf Stream anticyclonic eddies and shelf water at Deepwater Dumpsite 106 during 1977. Deepwater Dumpsite 106 Assess. Rep. (S)

Murray, T. E. A summary of waste inputs to Deepwater Dumpsite 106 during 1976 and 1977. Deepwater Dumpsite 106 Assess. Rep. (S)