

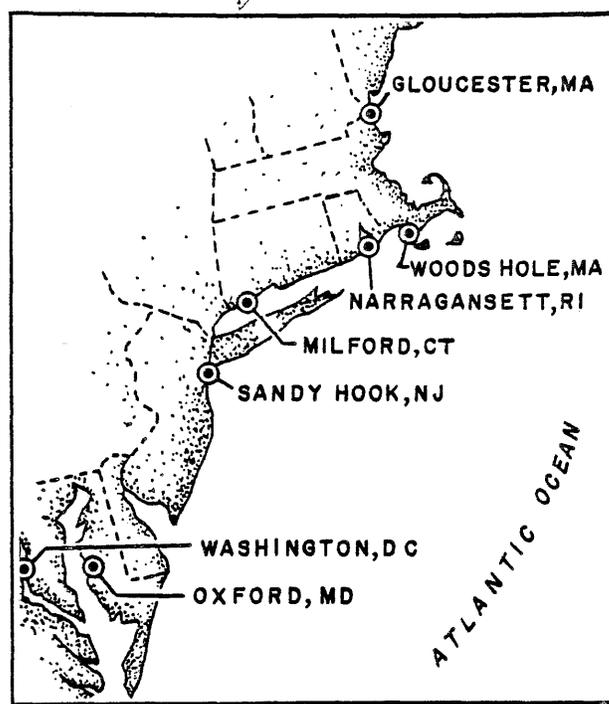
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NEFC

Northeast Fisheries Center

NEWS

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NOVEMBER 1978

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



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CENTER DIRECTORATE

Art Merrill was requested by the Center Director to oversee the input by NEFC personnel towards the development of a position statement on the proposed Hampton Roads Energy Company's Portsmouth Refinery. A task force met twice in Washington, DC (1 November and 6-7 November) to work out the details of the statement. The group representing the NEFC who helped to document our concerns relative to oil refinery-related impacts in Chesapeake Bay included Dr. Phyllis Johnson of the Oxford Laboratory (crustacean shellfish), Clyde MacKenzie and Anthony Pacheco of the Sandy Hook Laboratory (molluscan shellfish and fish, respectively), Dr. Mert Ingham of the Atlantic Environmental Group (oceanography), and Jon Gibson of the Woods Hole Laboratory, who with Art Merrill, helped organize and edit the report into a rough draft stage.

Ron Smolowitz continued to process the data from the fourth mesh experiment conducted from the New Bedford draggers Valkyrie and Patton. Work commenced on preparing the final report for the mesh study with plans to complete it by April. In other work, all components for the new clam dredge system being coordinated by Ron Smolowitz are on hand and being assembled and prepared for testing. Fourteen requests for technical information were processed during the month.

RESOURCE ASSESSMENT DIVISION

Resource Surveys Investigation

The R/V Delaware II returned to Woods Hole on 3 November after completing Part IV of the fall bottom trawl survey. Linda Despres was Chief Scientist and the area of operation was the Gulf of Maine. Part V (Henry Jensen, Chief Scientist) was during 7-22 November and the areas surveyed included Browns Bank, the Gulf of Maine, Georges Bank, and Southern New England. The end of Part V also marked the end of the fall bottom trawl survey. During the course of the survey, 560 trawl stations were occupied between Cape Fear, NC, and Nova Scotia. Twenty-five additional hydrographic and plankton stations were also completed.

As a result of extensive gear losses suffered during the fall bottom trawl survey, Warren Handwork is now constructing new trawls to replace those which were lost.

A new clam dredge designed for use aboard the Delaware II was delivered during November. This new dredge (60-inch knife), equipped with an electric submersible pump, will replace the old one (48-inch knife), which was equipped with a deck-mounted diesel pump and hose. The new dredge is scheduled to be field tested for the first time on 3 January 1979. This dredge was designed and built using technology representing the "state of the art."

The electronics group is continuing the necessary preparations for the 3 January test date. A sonic locator was purchased for installation on the new clam dredge. In the event that the dredge is lost, it can be located by using the sonar aboard the Delaware II.

Tom Azarovitz and Chuck Byrne are continuing to work on the Bureau of Land Management (BLM)-NMFS Interagency Agreement to provide background data on fisheries on the Middle Atlantic shelf. To date, reports for one subtask have been delivered and approval of formats for three others have been received. Reports for these will be generated during December. Development of software necessary to present these data graphically is currently under way.

Fishery Biology Investigation

November was the first full month of existence for the Fishery Biology Investigation. It replaces the former Age and Growth Investigation. The new Investigation, under the direction of Dr. Ambrose Jearld, Jr., is divided into three tasks. The Shellfish Biology Task, headed by John Ropes, will have Loretta O'Brien assigned to it and primarily will be responsible for: (1) aging scallops; (2) monitoring the surf clam contract with University of Maryland Eastern Shore along with Dr. Jearld; and (3) maintaining continual contact with the work being developed through Sea Grant at Princeton University and other places for ocean quahog aging. Secondly, the Task will be responsible for developing certain new techniques in shellfish aging, and thirdly, for maturity studies.

The Age and Growth Task will be headed by Judy Penttila and will consist of Vi Gifford and Kris Kantola, and at present, a temporary appointee, Gary Shepherd, and a Stay-in-School student working after school. This Task will be responsible for basic production aging of haddock, yellowtail flounder, and redfish. It will be responsible for technical monitoring of the contract for aging Atlantic cod with the Massachusetts Division of Marine Fisheries. It will also be responsible for the technical aspects of the automatic age reading system development working through Dr. Jearld with the NOAA Office of Technology which will be the overall developer.

The final Task will be the Finfish Biological Studies Task led by Dr. Jearld himself. Assigned to this task will be Louise Dery, Cathy Rearden, Lauri Savelkoul (Co-op Student), and Mike Campbell (half-time intermittent). Louise Dery will be responsible for technical monitoring of the Atlantic herring aging contract with the State of Maine along with Dr. Jearld. The Task will also be responsible for the needed aging of silver and red hake, Atlantic mackerel, butterfish, and other species as assigned. It is expected that most of this aging will not be a production-based aging, but will be the development of specific age material for a variety of species as needed for assessments.

Gary Shepherd completed aging 120 summer flounder samples from New Jersey party boats and sent the results to the Sandy Hook Laboratory for analysis in a recreational fishing survey. He also assisted in making circuli counts on haddock scales for the automatic age reading system (AARS) development.

Kris Kantola finished summarizing Albatross IV Cruise No. AL 78-04 haddock age samples and sent the age sheets to ADP for keypunching. Most of her time was spent in helping to get ready the haddock scale samples for the AARS development.

Vi Gifford completed aging 235 commercial redfish samples from the first quarter of 1976. She also spent time in helping with the haddock scale samples for the AARS development.

Judy Penttila spent the whole month working on haddock scale samples for the AARS development.

John Ropes and Loretta O'Brien worked on development of a technique utilizing photographs of the chondrophore sections of surf clams which should speed up the process of measuring sections and also storing them. They also had good success with a time-saving technique developed to remove the chondrophores from surf clams by use of a double blade instead of a single blade -- now one cut is required instead of two.

Louise Dery completed 271 Atlantic herring samples, 241 from the FRG R/V Anton Dohrn fall cruise and 30 from the fall herring tagging cruise.

Cathy Rearden was on loan to assist in Ron Smolowitz's (see "Center Directorate" column) research project in November.

Laurie Sauvelkoul prepared silver hake otolith sections of the 1978 summer survey and participated in the fall bottom trawl survey aboard the Delaware II, Cruise No. DE 78-06, Part V.

Mike Campbell is continuing on a part-time basis to work on scup while completing his final year at Southeastern Massachusetts University.

Sandy Hook Investigation

Darryl Christensen completed the first draft of a report on the age composition of recreational catches of summer flounder. He continued a revision of an analysis of the spring 1978 Atlantic mackerel recreational catch in an effort to establish confidence intervals about the estimated catch. John Clifford concentrated his efforts in correcting and summarizing the data collected during the summer 1978 survey of recreational catches of bluefish.

Cataloguing and ADP processing of historical maturity observations continued. Approximately 10,000 observations, collected during 1971-75, were reformatted and put on computer tape. About 9,000 maturity observations from the fall bottom trawl survey were coded, punched, and corrected. Preliminary work was begun on the fecundity of silver hake.

Fishery Analysis Investigation

November activities primarily involved continuation of analytical efforts of various single species assessments. Redfish, ocean quahog, Atlantic cod, red crab, and sea scallop data were further evaluated and updated. Results of these and previous assessment efforts were presented at a NEFC Resource Assessment Division Review held 22 November in Woods Hole. Participating Investigation personnel included Ralph Mayo, Steve Murawski, Harold Foster, Joan Palmer, and Fred Serchuk.

Bill Callahan continued his updating of the commercial fishing vessel history record file and additionally provided data for the following requests: (1) 1977 Atlantic cod commercial catch for the Northeast Regional Office Statistics Branch; (2) January-September 1978 Atlantic cod commercial catch for the Northeast Regional Office Statistics Branch; and (3) commercial catch and effort data for the USA 21B summary report for ICNAF.

Joan Palmer and Brenda Fields resumed analytical efforts on the development of a multispecies model. Joan also assisted Ambrose Jearld in formulating an experimental field design for evaluating ocean quahog growth rates in relation to population density.

Fred Serchuk reviewed the current status of sea scallops for the Sea Scallop Oversight Committee of the New England Regional Fishery Management Council on 9 November in a meeting held in New Bedford, MA. Paul Wood and Brad Brown also participated in this presentation.

A review of principal Atlantic cod spawning areas in the Northwest Atlantic was presented by Fred Serchuk at the New England Regional Fishery Management Council Groundfish Oversight Committee meeting held 13 November in Peabody, MA.

Steve Murawski presented the sampling design of the December surf clam/ocean quahog resource survey to industry personnel at the November meeting of the Mid-Atlantic Fishery Management Council on 16 November in Philadelphia.

Fishery Assessment Investigation

The month was devoted primarily to a variety of assessment tasks. Emory Anderson continued work on yield-per-recruit and mesh selectivity studies for silver hake; Emma Henderson continued work on a multispecies model of the New England groundfishery and preparation of materials for a modeling workshop scheduled in December. Steve Clark completed an assessment document for the Gulf of Maine northern shrimp stock in cooperation with other members of the Northern Shrimp Scientific Committee which he presented at the Atlantic States Marine Fisheries Commission Northern Shrimp Section Meeting on 9 November. Frank Almeida, Jim Baker, Pat Carter, and Hillary Herring participated in the Delaware II autumn bottom trawl survey (Cruise No. DE 78-06) as well as in a variety of research projects including silver hake stock identification studies and the 1978 silver and red hake stock assessments. Bill Overholtz has continued assessment work on haddock and Atlantic mackerel. Thurston Burns and Steve Clark completed a draft of a brief paper describing applications of bottom trawl survey data to assessments of offshore lobster stocks.

Fishery Systems Investigation

The Atlantic herring tagging activity was completed during November. Between 3 October and 15 November 10,000 fish were tagged. As of 28 November a total of 318 (3.2%) of the tags had been recovered.

Anne Lange has continued to participate in the US-Canada negotiations to mediate the boundary dispute. She serves as a scientific advisor to the NMFS and State Department negotiating team. During November, Ann participated in meetings in Boston, MA, and Washington, DC.

On 21 November, the Resource Assessment Division conducted a review of stock assessments in the Woods Hole Laboratory conference room. Mike Sissenwine was the moderator of the session. Stock assessments were reviewed by Investigation members Margaret McBride, Anne Lange, Gordon Waring, and Mike Sissenwine.

Preliminary data on yellowtail flounder from the autumn bottom trawl survey were analyzed by Margaret McBride. The results indicate that yellowtail flounder abundance is still very low in the Southern New England and Georges Bank areas, but that there has been slight improvement in recruitment prospects. More thorough analyses are underway.

Meetings, Talks, Visitors, Publicity

Fred Serchuk attended the Annual Meeting of the Atlantic Fishery Biologists in Mystic, CT, during 3-4 November and presented a paper on the status of Northwest Atlantic sea scallop populations.

Mike Sissenwine participated in a meeting of the Northeast Fisheries Center ecosystem working group held in Woods Hole on 7 November. He also attended a New England Regional Fisheries Management Council meeting in Peabody, MA, during 28-29 November.

Stuart Wilk completed a training session in effective supervision in Rockville, MD, during 12-17 November. He also attended a State-Federal* Striped Bass Management Program's Scientific and Statistical Committee meeting in Norfolk, VA, during 30 November-1 December 1978.

Ralph Mayo attended an ICNAF STACRES meeting during 13-17 November in Bergen, Norway, and participated in an ICES working group on standardization of reporting procedures for sampling data.

Fred Serchuk participated in an informal meeting of NEFC scientists and fishing industry representatives to discuss groundfish management on 27 November in Woods Hole.

Manuscripts

Serchuk, F. M., P. W. Wood, and B. E. Brown. 1978. Assessment, current status, and future outlook of sea scallop populations (Placopecten magellanicus) in the Georges Bank and Mid-Atlantic regions. NMFS, NEFC Woods Hole Lab. Ref. No. 78-52. 38 p. (P)

Wilk, Morse, and Ralph. 1978. Length-weight relationships of fishes collected in the New York Bight. Bull. NJ Acad. Sci. 23(2):58-64. (P)

MARINE ECOSYSTEMS DIVISION

Ecosystems Dynamics Investigation

Recruitment Processes

The objectives of the larval Atlantic herring patch study were achieved during the second part of the multiship operation, 31 October-10 November. While Albatross IV, and the Canadian vessels Dawson, Lady Hammond, and Canso Condor were making a port stop in Yarmouth, NS, during 27-30 October, the Polish vessel Wieczno discovered recently-hatched herring larvae in the northern Nantucket Shoals area. Prior to converging in the Nantucket Shoals area following the Yarmouth port stop, a couple of days were spent in the northeastern part of Georges Bank to complete some final coordinated experiments on a "patch" of chaetognaths. A distinct "patch" of herring larvae was identified just east of Nauset Beach, Cape Cod, and the patch was mapped five successive times. Dimensions of the patch were about 3 x 10 mi with maximum larval densities in the range of 30-100/m². The patch study included fine-scale sampling of the vertical and horizontal distribution of both the larvae and their food organisms, sampling for mid-water and bottom predators, and physical oceanography studies using drogues to identify the movement of the larvae in relation to water motion.

Following the retrieval of current meters off the northeast peak of Georges Bank, the Albatross IV returned to the Nantucket Shoals larval patch site in mid-November for mapping and MOCNESS (Multiple Opening-Closing Net and Environmental Sensing System) operation. The patch center was still located in the same area. After a few days in port for Thanksgiving, Albatross IV departed for the regular December larval Atlantic herring survey covering Georges Bank and Nantucket Shoals.

Ecosystem Dynamics

Work continued on the structure of GEORGE II, the multispecies model for Georges Bank. Wendell Hahn spent much of November developing a subroutine to reduce the size of the species interaction matrix by eliminating segments of the matrix which are all zeros; this will reduce memory requirements and central processing unit time needed to solve the matrix, thereby significantly increasing

efficiency and reducing costs of simulation runs. Brian Hayden continued development of output subroutines for the finfish food habits study.

Mike Pennington was involved with several projects including statistical analyses of Atlantic mackerel egg densities, fecundity estimates for gadids, and sport fishery survey sampling procedures in conjunction with Sandy Hook Laboratory personnel.

Marv Grosslein prepared current year task plans and FY 81 task development plan material and initiated a seminar series at the Woods Hole Laboratory. He also attended a meeting of the Scientific and Statistical Committee of the New England Regional Fishery Management Council on 14 November, and reviewed a draft discussion paper on "Management of the Commercial Groundfish Fishery off the U. S. Northeast Coast."

Fishery Oceanography Investigation

The group participated in the larval Atlantic herring patch study on Georges Bank and Nantucket Shoals making hydrographic stations and expendable bathythermograph (XBT) observations on the Albatross IV and Dawson, launching and tracking drogues, doing some dye-marker work, and helping the biologists with plankton sampling as needed. The cooperative work on the northern edge of Georges Bank went very well, particularly during investigation of a patch of chaetognaths which were located early in the month and followed for several days. Later, when Albatross IV and other vessels became involved with a patch of larval Atlantic herring in the Nantucket Shoals region, Dawson remained on Georges Bank to pick up the three Canadian current meter moorings there and make some other observations, and to deploy a mooring for another purpose on the way back to Halifax, NS.

As soon as that phase of the work was completed, Albatross IV went to sea again to recover the three current meter moorings set by NEFC along $66^{\circ}40'W$ for the patch study. Before the ship left on 13 November, reports had been received that the northernmost mooring had broken loose, and two Canadian fishing vessels each brought in part of the gear. During the cruise no trace was found of the middle mooring, but all three of the marker buoys had moved toward the southeast for distances of 1-2 mi. The ENDECO current meter on one of them was lost. The southern mooring was recovered intact along with all three of the marker buoys there. Only one of the markers at the northern position was located and recovered; a second was reported drifting through Northeast Channel on 6 November, and there was no sign of the third. On returning to Woods Hole it was learned that the missing middle mooring had been dragged over by a Canadian scalloper and the subsurface float and three of the four current meters were recovered and brought in to port in Nova Scotia. The score so far: three current meters recovered intact by NEFC; six recovered by various Canadian fishing vessels; and four still not accounted for.

On Monday, 27 November, Steve Ramp and Tom Laughton went to Halifax, NS, with a rental truck to pick up the NEFC gear that had been used aboard Dawson and other Canadian vessels, and all the current meters and associated gear that had been rescued by fishermen.

Red Wright completed plans for the next current meter experiment, a cooperative effort by NEFC, WHOI, and USGS to monitor the flow along the shelf south of Nantucket Shoals and observe the fluctuations of the shelf/slope boundary there. NEFC is to supply three of the six moorings in the array, which is expected to go into the water in March 1979. It is hoped that it will be possible to get a hydrographic section along the line of moorings at least monthly during a year of deployment.

When time has permitted, Sam Nickerson, Dan Patanjo, and Tim Cain have been plugging away at the formidable collection of salinity samples that accumulated during the patch study and MARMAP (Marine Resources Monitoring, Assessment, and Prediction Program) field work. On the last day of the month, Belogorsk arrived with a new supply; there are now 52 cases to be analyzed--2,500 samples--or a full month's work at the salinometer.

Lt. Derek Sutton, NOAA Corps replacement for Lt. Robert Pawlowski, reported for duty and was assigned responsibility for plotting patch study data and redesigning the marker buoys for the March deployment. Also, Dan Patanjo returned for another 130-day appointment.

Benthic Dynamics Investigation

Work on the fishery management plan for the deepsea red crab was one of the principal activities conducted this month. The plan is being prepared in collaboration with other NMFS personnel and the New England Regional Fishery Management Council. The paucity of life history studies on this species is becoming more evident as work on the plan progresses.

Food habits studies involving both laboratory and field activities were continued. Stomachs of fish were collected by Rich Langton from aboard the Canadian vessel Canso Condor in the Georges Bank-Gulf of Maine region. The primary objectives of this sampling were to document predation on Atlantic herring eggs and larvae; the operations were conducted in close collaboration with the larval Atlantic herring patch study. Due to the scarcity of herring larvae and loss of some sampling gear, the predation on larvae was not adequately determined. However, predation on herring eggs by Atlantic cod, haddock, and winter flounder was detected. Also, during this cruise the feeding chronology of groundfish over a 2-day period was completed. Additional food habits work consisted mostly of laboratory studies. Processing of stomach and intestinal contents of fish collected on the Belogorsk October cruise was started and a large proportion finished. Rich Langton began the analysis of the 1969-72 pleuronectiform data base. Ray Bowman continued the analysis of the 1953-76 juvenile haddock data.

Several examples of research activities conducted by this Investigation were assembled by Roger Theroux for display at the Woods Hole Laboratory open house on 27 November. Two large panels depicting benthic invertebrate studies and food habits research were made and exhibited in the aquarium building. Benthic sampling equipment was prepared for viewing on the main deck of Albatross IV. The specimen collection room was opened and manned for the day.

Ichthyoplankton Investigation

Our second MARMAP I survey of FY 79, scheduled for completion in mid December, ended ahead of schedule after completing only 72 of the 185 survey stations. Despite the abbreviated nature of the cruise, the area covered included the western part of Georges Bank and Gulf of Maine so the results should provide significant followup information to the just completed larval Atlantic herring patch study in that area.

Several members of the Investigation have submitted titles for the ICES symposium on larval fish to be held in Woods Hole in April 1979. Subject matter ranges from descriptions of larval tilefish to egg production estimates for Atlantic mackerel and yellowtail flounder.

Work continues on the BLM contract report. In addition to compiling the report we are now actively involved in reformatting data from our series of site-specific cruises designed to investigate the vertical distribution and diel movements of larval fishes.

Plankton Ecology Investigation

Plankton Sorting and Identification

Invertebrate samples from the Georges Bank area taken on Albatross IV Cruise No. AL 78-07 are completed and we are now processing the remaining samples from the Gulf of Maine for this monitoring series for July. Selected species of adult copepods and euphausiids, male and female, were provided for use in the development of an image scanning system for processing plankton samples.

Biostatistics

Processing of ichthyoplankton data for the BLM contract is continuing. Lorrie Sullivan and Chris Lindgren continued updating the files of the ICNAF data base with 0.333-mm-net-mounted flowmeter data. Op-scanning of the ichthyoplankton files for that data base is nearly complete. Zooplankton data from Albatross IV Cruises No. AL 73-09, 74-02, and 76-01; Anton Dohrn Cruises No. 74-01 and 75-01; and Prognoz Cruise No. 74-01, were received from Poland and were forwarded to the Sandy Hook Laboratory for keypunching. As soon as zooplankton data on hand are entered, listings will be sent to the Woods Hole Laboratory for quality control. Bongo net (0.505-mm mesh) samples from Belogorsk Cruise No. 78-03 (MARMAP) and bongo net (0.333-mm mesh) samples for Wieczno Cruise No. 78-04 (larval Atlantic herring patch study), as well as the density gradient columns, were sent back to Poland on board the Wieczno. Jerry Prezioso participated in the Anton Dohrn patch study cruise.

Lars Hernroth of the Swedish Institute of Marine Research and Jack Green carried out a comparison of the at-sea plankton sorting protocol. They concluded that the at-sea technique used by Soviet scientists, while useful for obtaining rapid and qualitative estimates of the abundance of dominant organisms, was not appropriate for quantitative analyses.

Joe Kane participated in Belogorsk MARMAP Cruise No. 78-04 from 15 November to 3 December to take primary productivity measurements twice daily. Chlorophyll *a* determinations were made at every station by Sandy Hook Laboratory personnel. Analyses of primary productivity data are progressing. Belogorsk MARMAP Cruise No. 78-01 data have been processed through the computer state (calculation of production rates) and are ready to be plotted. Data from a September Ocean Pulse cruise have been keypunched and are in the computer. Belogorsk MARMAP Cruise No. 78-03 (October-November) data have been coded and are being keypunched. Scintillation counting is proceeding for Belogorsk Cruise No. 78-04 (November-December) and coding of data will begin after Christmas. An NEFC data report will be issued for each cruise as the plots of primary productivity values are completed.

Apex Predators Investigation

Eight sharks were recaptured during November, seven blues and one brown. Blue shark recoveries demonstrated the fall emigration southward from shelf waters. Greatest distance traveled was 330 mi from Montauk, NY, to Nags Head, NC, in 60

days. Longest time at liberty for a blue shark was from a female traveling 51 mi in 128 days. The brown shark traveled 301 mi from the "HA" buoy off Fire Island, NY, to Cape Hatteras, NC, in 146 days. Four of the seven blue sharks were recaptured by American longliners.

Wes Pratt and Alan Lintala are working up the summer's collections of reproductive tissues. Modifications of the histological technique used to prepare vertebrae for aging are being made to permit the infiltration and embedding of lamnid vertebrae. This activity initiates an age and growth study of mako and white sharks.

Larval Physiology and Biochemistry Investigation

Experiments assessing daily mortality rates and growth of Atlantic herring larvae at a fixed prey concentration have been completed and the data are being analyzed. Preliminary results for mortality indicate an initial constant level followed by a significant increase 10-14 days after feeding initiation and then a subsequent decrease to a constant level in older larvae.

Daily feeding studies of individual 1-mo-old Atlantic herring larvae at a fixed prey density of 0.5 prey organisms per milliliter showed that they consumed six prey per hour on the average.

Larval digestive enzyme studies began with the development of a trypsin assay for isolated larval Atlantic herring gut. Studies of the protein and nucleic acid content of larval herring were continued through the month. Mortality of herring larvae after handling created problems in nitrogen assimilation experiments. This problem was greatly reduced for the older larvae (those older than about 3 wk).

Drs. Beyer and Laurence continued work on the development of a larval growth and survival model with particular emphasis on incorporating changes in the assimilation rate, metabolic rate, and activity level, and on searching ability components of the existing barrier model.

Meetings, Talks, Visitors, Publicity

On 1 November a meeting was held at the Narragansett Laboratory to review progress of the joint University of Rhode Island (URI)-NMFS image scanning project during the first 6-mo period. This meeting was attended by Luther Bivins, Project Leader from the NOAA Office of Ocean Engineering (OOE). Drs. Poularikas and Jeffries (URI) presented results of initial experiments in image formation and shape discrimination. Initial discussions focused on the natural variability in image quality and optical density within and among groups of plankton organisms. Dr. Poularikas outlined future experiments using laser optics and two camera systems for improving image quality. The results and future plans were well received by Mr. Bivins, who expressed OOE's interest in continuation of the project. A formal proposal for the development of an automated plankton analysis system was submitted by Drs. Jeffries and Poularikas to NOAA for funding consideration.

A meeting was held at the Narragansett Laboratory on 3 November with representatives from URI and NMFS Northeast Regional Office on building lease plans.

Kenneth Sherman and Dr. Robert Edwards attended meetings on 8 and 9 November at the NASA Langley Research Center and at the NEFC Oxford Laboratory. A second meeting was held at Langley during 20-21 November and was attended by Sherman and Edwards.

Wes Pratt gave a general shark talk at the Mystic Marine Life Aquarium on 17 November.

Geoff Laurence attended two meetings on the development of laboratory research in connection with the Ocean Pulse Program.

Ken Sherman spoke on marine ecosystems studies to Dr. Alexander's class on marine affairs at URI on 21 November.

Dave Bearse and Lorrie Sullivan met with Ken Sherman, Doice Carrington, Mert Ingham, Jack Jossi, Jack Casey, Geoff Laurence, and the IOCS contract group to discuss the priorities of the contract. Dave and Lorrie also met with Mary Grosslein to update progress on the ICNAF data base. Later, Marv Grosslein, Greg Lough, Wally Smith, and Ken Sherman met to discuss priorities for the next few months and how to get on with meeting Division output schedules considering the personnel reductions resulting from budget reductions.

Manuscripts

Laurence, G. C., T. Halavik, B. Burns, and A. S. Smigielski. An environmental chamber for monitoring "in situ" growth and survival of larval fishes. *Trans. Amer. Fish. Soc.* (A)

Pratt, H. W., Jr. Reproduction in the blue shark (Prionace glauca). *Fish. Bull.*, US 77(2). (In press.) (A)

MANNED UNDERSEA RESEARCH AND TECHNOLOGY PROGRAM

The MURT Program personnel conducted three undersea research cruises during September through October 1978. The support vessel Lulu and submersible Alvin supported six exploratory dives in Oceanographer Canyon. Dive durations ranged from 3 to 6 hr and covered a depth range of 300 to 2,000 m. Distribution and relative abundance of bottom-oriented fauna were related to canyon geology. Examination of certain canyon head sites was made with the immediate goal of establishing an Ocean Pulse station (site specific) to be monitored through submersible diving. Guest scientists from USGS participated in the cruise. Photographs, video tapes, voice tapes, sediment and rock samples, current and temperature measurements, and biological samples were collected.

The second cruise represented the sixth consecutive year of monitoring deep-water Atlantic herring spawning grounds on Jeffreys Ledge (Gulf of Maine) and an examination of the ecological factors that affect survival during this early life history stage. Searching for the herring spawning grounds encompassed otter trawling, Smith-McIntyre grabbing, diving, and discussions with commercial fishermen. One herring egg bed was located at the southwest corner of Jeffreys Ledge; samples of the eggs, substrate, and predators were collected. Stomachs of fish located in the spawning area were collected before, during, and after spawning for an indication of degree of egg-bed predation by local fish species.

The third cruise utilized the same diver scientists and support vessels as the herring spawning program, and was directed towards Ocean Pulse baseline monitoring. Here, diver scientists established a site-specific and permanent Ocean Pulse station on Pigeon Hill (Jeffreys Ledge, Gulf of Maine). Two depth strata (100 ft and 125 ft) were studied with permanent transects set up along horizontal and vertical surfaces of the bedrock and boulder substrates. Attached and semimobile invertebrates and algae were collected from 0.25-m² grids and compared with faunal estimates from 0.25-m² photographs. Respiration was measured in situ on two species of starfish. Bottom-fixed fouling racks were emplaced.

Collections of several "key indicator" species were made for contaminant analyses. An overall definition of the bottom fauna and associated substrate was accomplished and will serve as a quantitative baseline to compare with future levels of contaminants. Guest scientists from NMFS, NWAFC, and SEFC participated in the program, as well as from Southeastern Massachusetts University and URI.

A significant R&D accomplishment was realized in the diving technology aspects of cruises two and three. A mixed-gas breathing mixture was utilized by scientists diving at the 100-130 ft depths, termed NITROX-I. NITROX-I permitted divers to double their "bottom time" and significantly increased their scientific productivity. A 1-wk training program in the use of NITROX-I was conducted at Woods Hole prior to the cruise with the assistance of NOAA's Manned Undersea Science and Technology Office in Rockville, MD.

Manuscripts

Meyer, T. L., R. A. Cooper, and R. W. Langton. Relative abundance, behavior, and food habits of the American sand lance, Ammodytes americanus, from the Gulf of Maine. Fish. Bull., US. (A)

Pecci, K. J. Comparative trap catches of American lobster, Jonah crabs, and red crab at Veatch Canyon. Mar. Fish. Rev. (S)

DIVISION OF ENVIRONMENTAL ASSESSMENT

Behavior of Marine Fishes and Invertebrates Investigation

In completing our research on social behavior in adult tautog, Tautoga onitis, we are analyzing data collected from a series of studies on their reproductive behavior. In the latter phase of this work, involving five males and three females, we confirmed that this species is capable of two spawning patterns, i.e., group (several males and one female) and paired (one male and one female), and that any adult can participate in either or both of the patterns. It is also apparent that a female may exhibit dynamic shading changes and particular behaviors prior to spawning which serve to attract and communicate to one or more males her readiness to spawn. However, there appeared to be a relation between the number of males which courted a female and her level of shading achieved at spawning. The data are also being analyzed to examine the degree to which social factors (e.g., sex ratios and large versus small groups) and physical factors (e.g., presence and utilization of cover) contributed to the female's coloration and the resulting spawning pattern.

Biological Oceanography of Stressed Environments Investigation

Algal Physiology, Bioassay, and Bloom

Counts of phytoplankton in samples from the spring Ocean Pulse cruise were completed. The dominant species in the Middle Atlantic Bight at that time has been identified as the diatom Coscinodiscus wailesii. C. wailesii probably produced a slime which clogged fishing gear off the Delmarva Peninsula in April. A note, "A Fishery Nuisance Associated with a Diatom Bloom Problem in the Middle Atlantic Bight," is in draft.

A visit was made to the laboratory of Dr. John McLaughlin at Fordham University to discuss algal bioassay methods; a culture of Skeletonema costatum for use in algal bioassays was provided.

Phytoplankton Species Composition

Samples for phytoplankton species composition and cell counts were collected at the surface at selected stations on the Belogorsk during an Ocean Pulse/MARMAP cruise from 5 October to 3 November between Cape Hatteras and Nova Scotia. These samples were collected as part of the Ocean Pulse Program in conjunction with Dr. Harold G. Marshall of Old Dominion University. Thirty-nine samples have been mailed to Dr. Marshall and an additional 50 samples have been received at the Sandy Hook Laboratory for analysis by Myra Cohn. Samples are being examined under the microscope to identify species present and determine their cell numbers in order to investigate seasonal changes in phytoplankton distribution, abundance, succession, and overall community structure, and to compare the efficiency and utility of Lugol's iodine preservative vs. buffered Formalin preservative. Samples were obtained on the October cruise (under the direction of Christine Evans) by Chris Barker and Bill Hoagland, members of the chlorophyll collection crew. Jim Duggan also participated in obtaining samples on the second leg of that cruise.

A cooperative paper to be published by Mrs. Cohn with Paul Olsen of the New Jersey Department of Environmental Protection's Division of Water Quality, titled "Phytoplankton in Lower New York Bay and Adjacent New Jersey Estuarine and Coastal Waters," has been revised for possible publication in The Bulletin of New Jersey Academy of Science. This paper features a list of over 350 species of phytoplankton found during 4 yr of exhaustive sampling in the areas of Lower New York Bay and adjacent New Jersey estuarine and coastal areas. It provides a current assessment of phytoplankton populations in these areas, against which changes in water quality can be evaluated. Smayda (1973) has observed that the scarcity of detailed phytoplankton studies along the New Jersey coastline is surprising, considering the importance of local fishery resources ultimately sustained by phytoplankton and the environmental problems associated with the New York-New Jersey coastal region.

Benthic Community Metabolism

Ocean Pulse in situ investigation of benthic community metabolism and indicator species O:N ratios on Pigeon Hill (Jeffreys Ledge, Gulf of Maine) were concluded and the data reduced. Additionally, data obtained from a similar in situ Ocean Pulse investigation into the community metabolism of the surf clam beds off Rockaway Beach (New York Bight apex) have been reduced. A final report of both investigations is in preparation.

Data reduction of in situ investigations concerning oxygen consumption and nutrient exchange at the hypoxic water-sediment interface of the York River, VA, continues. This investigation is a cooperative study with the Virginia Institute of Marine Sciences.

Total Plankton Respiration

Data from the MESA/Synoptic Investigations of Nutrient Cycling (SINC) cruises during 1977-78 were verified on a final listing compiled by the Bigelow Laboratory. The data are being illustrated in final form for a compendium report with other

investigators in the MESA Program, as well as for formal publication. Total plankton respiration in the nearshore Hudson River plume, highly impacted by man, equals $850 \text{ g}\cdot\text{cm}^{-2}\text{yr}^{-1}$, an amount almost comparable to the $1,000 \text{ g}\cdot\text{cm}^{-2}\text{yr}^{-1}$ produced in Lower New York Bay. We are using this information in the assessment of health of these waters as part of the Ocean Pulse Program.

Coastal Ecosystems Investigation

We completed, on schedule, the processing of 25 benthic macrofauna samples taken along the Hudson Shelf Valley in 1974. This work was done under contract to MESA, to clarify impacts of ocean disposal at the head of the Valley. We are now concentrating on samples taken off the New Jersey coast in the area of the 1976 anoxia. Enough samples taken in the fall of 1976 have now been worked up to begin an in-depth analysis of areal extent of impacts and species affected. Samples taken from Ocean Pulse strata in and near the anoxia area on several cruises are being processed to determine the sequence and timing of recolonization, especially for the surf clam. Sorting of Long Island Sound samples continues, and we are just beginning a study of caloric contents of important invertebrate species of the northeastern shelf.

Other Ocean Pulse (OP)-related work involved developing a revised planning document for OP, and preparation of the initial OP newsletter which describes OP activities of the past 6 mo. Future newsletters will be issued on a quarterly basis.

A draft of the Mollusca section of the New York Bight apex benthic atlas was completed, and work continued on the many distribution maps to be incorporated in the atlas.

Meetings, Talks, Visitors, Publicity

John Mahoney attended the Second International Conference on Toxic Dinoflagellate Blooms in Florida and presented a paper, "A Mass Mortality of Marine Animals Associated with a Bloom of Ceratium tripos in the New York Bight."

Clyde MacKenzie and Tony Pacheco attended a workshop in Washington, DC, on 7 and 8 November to discuss possible impacts of an oil refinery proposed for Portsmouth, VA.

On 8 November, Frank Steimle, Jim Thomas, and others met with visiting Swedish scientist Lars Henroth to discuss anoxia and environmental monitoring programs such as Ocean Pulse.

Dr. John Pearce met with Dr. Peter Larsen and other personnel from the Bigelow Laboratory of West Boothbay Harbor, ME, on 8 November, in regard to their possible participation in the Ocean Pulse Program. Bigelow personnel are interested in aspects of phytoplankton productivity and benthic community studies that are being conducted within the Ocean Pulse Program. Also, Bigelow personnel are interested in participating in remote sensing programs that would be conducted under Ocean Pulse.

On Thursday, 9 November, Dr. Pearce met with NEFC personnel at the Oxford Laboratory to discuss the possibility of conducting remote sensing activities in conjunction with the Ocean Pulse Program. Staff members from the University of Delaware and the Virginia Institute of Marine Science also met with NEFC personnel and representatives of the fishing industry to hear a review of current remote sensing programs.

Ann Frame attended the course, "Effective Supervision," in Rockville, MD, during 13-17 November.

Allen Bejda attended the Middle Atlantic Bight Oceanography Workshop on 15 and 16 November at Williamsburg, VA.

Frank Steimle met with Milford Laboratory personnel on 13 and 14 November to discuss ways of integrating lab and field studies.

Jack Pearce, John Mahoney, Jim Thomas, Frank Steimle, Sukwoo Chang, and Bob Reid attended a review of Ocean Pulse planning and progress to date at the Milford Laboratory on 14 and 15 November.

On Monday, 20 November, Dr. Pearce met with Dr. Vic Klemas, University of Delaware, and Dr. Robert Harris, NASA Langley Research Center, to discuss further the possibilities of remote sensing of chlorophyll and other variables over the continental shelf between Cape Hatteras and Nova Scotia. Other NEFC personnel at the meeting held at the Langley Research Center included Mr. Kenneth Sherman, Dr. Woody Chamberlin, and Dr. James Thomas. Plans were made for a final planning meeting to be held in Woods Hole on 6 December.

Dr. Thomas met with Dr. Robert Johnson (NASA Langley Research Center) on 21 November to discuss data reduction of our joint operations in the New York Bight and over Georges Bank which occurred during our Albatross IV cruise in June and July 1977. Additional discussions were held with Dr. Frank Farmer and Mr. Clarence Brown concerning the use of laser beams to determine phytoplankton pigment diversity via remote sensing.

During 27 November-1 December, Drs. James Thomas and John Pearce participated in the EPA/NOAA oil spill familiarization and training workshop. Dr. Pearce was chairman of the offshore response section designed to determine the feasibility of immediate first order responses in terms of dictating second order responses to major spills of oil and hazardous substances. Over 50 persons from several federal and state agencies, as well as from universities and private organizations participated in the training session. Dr. Pearce presented a lecture concerned with previous evaluations of offshore oil spills, as well as the feasibility of using Ocean Pulse techniques for providing baseline and historical data that would be useful in assessing the impacts of oil spills and other hazardous materials.

Field training involved the use of helicopters in collecting plankton and bottom grab samples off Coal Oil Point, an area of natural oil seepage. Plankton samples compatible with those taken from surface vessels were obtained from a helicopter and it proved possible to launch an Ekman bottom grab from a helicopter hovering several meters above the water. The grab sampler was able to be retrieved from the helicopter at that height.

Manuscripts

Koons, C. B., and J. P. Thomas. C₁₅₊ hydrocarbons in the sediments of the New York Bight. Proceedings 1979 Oil Spill Conference (Prevention, Behavior, Control, Cleanup), 19-22 March 1979, Los Angeles, CA. (S)

Olla, B. L., and A. L. Studholme. 1978. Comparative aspects of the activity rhythms of tautog, Tautoga onitis, bluefish, Pomatomus saltatrix, and Atlantic mackerel, Scomber scombrus, as related to their life habits. Pages 131-151 in J. E. Thorpe, ed. Rhythmic activity of fishes. Academic Press, London. (P)

AQUACULTURE DIVISION

Spawning and Rearing of Mollusks Investigation

We have terminated our seasonal tank-farm experiments with bay scallops. Some growth of these animals occurred even during the last 2-wk sampling period when water temperatures declined from 10°C to 7°C. Data accumulated from this system are being analyzed in an attempt to show the effects of temperature, phytoplankton abundance, water flow rate, and stocking density on scallop growth.

Over 50,000 seed scallops from 10 to 40 mm in length were planted in suitable areas in the Towns of Madison, Groton, and Stonington, CT. This planting program was performed in cooperation with shellfish officers in the respective towns. We will make some attempt to determine whether these animals survive and grow in the planted areas.

During early November, surf clams maintained at 15°C continued growth, while clams held at ambient temperatures of 8-10°C did not. In the latter part of the month, ambient phytoplankton levels decreased and growth in both groups was minimal.

Nearly ten thousand 10-mm surf clams were harvested after the termination of this summer's experiments in the tank-farm system. These clams will be overwintered in the laboratory and then raised to a size of 55 mm during the next growing season. The problems of overwintering large numbers of seed clams will be explored.

Aquacultural Genetics Investigation

All American oysters in the selection and heritability studies have been moved from the outdoor raceway system into the indoor holding area. The animals are now being counted and categorized.

Analysis of larval samples from F₂ full-sib crosses and their outbred controls made this past spring is near completion. Surviving spat from these crosses and other genetic stocks of oysters have been moved from the outdoor raceway system to an inside tank and to the underwater dock, where they will be maintained during the winter months.

The increasing variability in size of oyster larvae over the larval culture period has been recorded. Larvae differing widely in size at later culture stages show little or no size differences at day 2 shortly after reaching the first, straight-hinge stage of development.

In response to inquiries regarding interest of the ICES Mariculture Committee in establishing a Working Group in Genetics, the Committee Chairman requested that A. Longwell prepare, in cooperation with geneticists of other countries, a position paper on the role of genetics in aquaculture. This is to be presented at the 1979 Statutory Meeting at which time the decision presumably will be made regarding such a working group.

Meetings, Talks, Visitors, Publicity

Chris Emery of the Ira C. Darling Center in Walpole, ME, toured our facilities.

Two thousand 15-mm surf clams were provided to William Nickel of Lower Bay Mariculture in Melfa, VA.

Manuscripts

Losee, E. Relationship between larval and spat growth rates in the oyster (Crassostrea virginica). Aquaculture. (A)

Longwell, A. C. 1978. Field and laboratory measurements of stress responses at the chromosome and cell levels in planktonic fish eggs and the oil problem. Pages 116-125 in In the wake of the Argo Merchant. University of Rhode Island Center for Ocean Management Studies. Kingston. (P)

PATHOBIOLOGY DIVISION

Comparative Pathobiology Investigation

Comparative hematology studies of mollusks and other invertebrates are being conducted for the purpose of developing a quick, easy assay method for use in the field and as an in vitro system of assay for contaminants. Methodology for sampling hemolymph of live mollusks and crustaceans has been developed which permits a wet-cell setting of hemocytes on slides. These are fixed and stained appropriately for the needs of the specific study. Studies include: (1) types of blood cells, based on morphology, size, organelles, staining characteristics, behavior, histochemistry, and functional morphology; (2) diagnosis of blood parasites, proliferative diseases, and cell-type shifts due to systemic disease; (3) in vivo studies of disease progression and pathologic responses; and (4) in vitro studies involving short-term exposure of hemocytes to contaminants and pathogens. Baseline hematologic material has been produced for Crassostrea virginica, Macoma balthica, Mytilus edulis, Mya arenaria, Mercenaria mercenaria, Brachydontes recurvis, Callinectes sapidus, and Limulus polyphemus.

An ad hoc committee was formed in Washington to provide a position paper for the National Marine Fisheries Service regarding a proposed oil refinery at Portsmouth, VA. The committee was chaired by Dr. Robert L. Lippson of the Northeast Regional Office's Environmental Assessment Branch, and included NMFS personnel from Sandy Hook, NJ, Woods Hole, MA, Oxford, MD, Washington, DC, and Seattle, WA. Dr. Johnson was responsible for providing a narrative on the effects of oil spills, etc., on crustaceans, particularly crabs. The committee met to decide on content and approach on 31 October and reconvened on 7 and 8 November to draft the paper.

The occurrence of ulcerative lesions of red hake in the New York Bight was investigated. The lesions were first noticed by John Ziskowski in fish collected in the vicinity of Ambrose Light. The prevalence in early November was about 25%; 2 wk later the lesions were found in 5 of 63 (8%) red hake captured. The five affected fish were between 34 and 40 cm long, whereas the majority of hake caught in the five 30-min trawl hauls were less than 34 cm. Blood taken aseptically from the caudal veins of two of the ulcerated hake and inoculated into trypticase soy broth yielded pure cultures of an as yet unidentified gram-negative rod.

During the month, 1,748 blocks were cut and 956 slides were stained from a large variety of marine fishes, crustaceans, and mollusks.

Disease and Environmental Stress Investigation

Gross and histological observations were completed on planktonic crustaceans collected in January and February 1978 from Deepwater Dumpsite (DWD) 106. Seventy

eight Idotea metallica, 120 euphausiids, over 250 Parathemisto compressa, and a variety of copepods were examined for gross abnormalities and parasites. The isopod I. metallica, in general, appeared worse in this collection than in July 1977. Discoloration and lack of pigmentation in the dorsal exoskeleton were observed in isopods from dump stations (21/67 = 31%) and from control areas (1/11 = 10%). Necrotic lesions and pitting of the exoskeleton were evident in isopods from the dump stations only (9/67 = 13%). Presumably this was not a result of trawl damage and the actual cause remains to be determined. White, subcuticular masses were observed in the head and segmental plates of 10 isopods from the dump sites (15%) which in extreme cases penetrated through the body to the ventral surface. Five Idotea had large puslike masses in the pleon, dorsal to the pleopods. One specimen showed extension of this into the posteriormost pleopods, which normally function as gills. Stained smears showed this to be comprised of hemocytes and cellular debris, yet no etiological agent was apparent.

Investigation of striped bass phagocytic activity continued this month. Peritoneal exudate cells were collected after intraperitoneal stimulation with Bacillus cereus for 1 or 1.5 hr. The cells were prepared for observation by electron microscopy and will subsequently be examined to observe the extent to which phagocytosis and lysis of bacteria have occurred. The results from this work are being compared to similar defense mechanism studies involving winter flounder. In both instances, the elapsed time between the introduction of the bacteria to cell recovery is quite short and indicates that the response to foreign protein by granulocytic leukocytes in these fishes is rapid and efficient.

Histological examination of 13 juvenile American lobsters was completed as a service to collaborators at the Massachusetts State Lobster Hatchery in Vineyard Haven, MA. Nine of the animals were moribund and four were alive when processed for study. All lobsters had bacterial growth and various fouling organisms such as diatoms and sessile ciliate protozoa on the exoskeleton. Moribund animals, although dead for less than 6 hr, showed apparent accelerated decomposition of the hepatopancreas and thoracic musculature. Accelerated decomposition prompted a closer look at the muscles and hepatopancreas of the specimens that were sacrificed and two of them showed microscopic foci of muscle lysis. Very small clusters of bacteria were sparsely distributed in tissues of the animals with focal lysis. Preliminary findings suggest that affected animals were stressed by environmental conditions present in experimental holding trays.

Aquaculture - Control of Larval Disease Investigation

Identification studies of pigment from a bacterium pathogenic to shellfish larvae revealed that prodiginine may be the unknown active substance responsible for lethality. Purification and spectral comparison of the unknown substance indicated agreement with values for prodiginine as published in the literature.

Since the oyster spawning season has ended, there will be no further use of the ozone-UV quarantine system until February 1979.

Success in maintaining cultures of larval oyster cells was short-lived since a contaminating fungus eventually grew at the 15°C incubation temperature. However, by micromanipulation one patch of cells was retrieved free of contamination. These cells, which are now proliferating, have characteristics suggestive of a sporozoan.

Meetings, Talks, Visitors, Publicity

Dr. Rosenfield attended the 2nd Workshop on Marine and Freshwater Ozone Applications in Orlando, FL, during 1-3 November, and presented a paper titled "Molluscan Imports and the Usefulness of Quarantine Systems to Control Shellfish Disease;" he also met with Society for Invertebrate Pathology committee members in Gainesville. Dr. Rosenfield met with State and Federal representatives in Kittery, ME, on 28 November to discuss programs on marine fish and shellfish disease control and habitat protection.

Dr. Blogoslowski chaired the Aquatic Applications of Ozone Workshop in Orlando, FL, during 1-3 November; he presented a paper titled "Ozone-UV Water Treatment System for Shellfish Quarantine." Dr. Blogoslowski also chaired the Shellfish Detoxification Session of the Second International Conference on Toxic Dinoflagellate Blooms in Miami, FL, during 3-5 November.

Dr. Johnson attended the Portsmouth, VA, refinery working group meeting in Washington, DC, on 8 November.

Dr. Murchelano attended meetings on experimental research for Ocean Pulse at the Narragansett Laboratory on 15 November and 28 November.

Ms. Charles consulted with Tom McKenny at the Narragansett Laboratory on 4 and 5 November regarding fish specimens collected at Deepwater Dumpsite (DWD) 106; Ms. Charles and Mr. Crosby assisted in trawling for diseased fish at Sandy Hook, NJ, on 14 and 15 November.

Mr. Ziskowski participated in the bottom trawl survey cruise during 6-22 November.

Ms. MacLean participated in the DWD 106 sampling cruise aboard the R/V Mt. Mitchell from 13 to 20 November.

Ms. Patrice Hambleton's temporary appointment terminated on 1 December.

Mr. William Walsh joined the Pathobiology Division at the Milford Laboratory on 6 November on a temporary appointment.

Visitors to the Oxford Laboratory during November included Dr. Hiroshi Kawatsu of the Freshwater Fisheries Research Institute in Tokyo, Japan; Dr. Richard Dillaman of Duke University in Durham, NC, who presented a seminar on "Carapace Repair in the Green Crab, Carcinus maenas;" Mr. Fred Holland of Martin Marietta Corp. in Baltimore, MD; Drs. Steve Sulkin, William Van Heukelem, and Robert Miller of the University of Maryland at Cambridge, MD; Mr. Chris Ostrom of the Maryland Department of Natural Resources in Annapolis, MD; Mr. Gregg Stanton of Florida State University in Tallahassee, FL; and Dr. Stanton Adkins of Princeton University in Princeton, NJ.

A remote sensing, blue crab climatology, and oceanography meeting was held at the Oxford Laboratory on 9 November. Dr. V. Klemas of the University of Delaware presented a seminar on the use of satellites for remote sensing. Among the visitors and participants in the discussion were Calvert Tolley, Ted Reinke, and Clayton Brooks of the National Blue Crab Industries Association; Ed Tolley of the Shellfish Institute; Jack Pearce of the Sandy Hook Laboratory; Kenneth Sherman of the Narragansett Laboratory; Woody Chamberlin of the Atlantic Environmental Group; J. B. Suomala of the C. S. Draper Laboratory in Cambridge, MA; R. L. Edwards of the Center Directorate; Bob Learson of the Gloucester Laboratory; and W. A. Van Engel and Robert Harris of the Virginia Institute of Marine Science in Gloucester Point, VA.

Manuscripts

Brown, C., and D. J. Russo. Ultraviolet light disinfection of shellfish hatchery seawater. I. Elimination of five pathogenic bacteria. Aquaculture. (S)

Johnson, P. T. New information on viral diseases of the blue crab, Callinectes sapidus. Abstract. Proc. Sec. Int. Colloq. Invertebr. Pathol. XIth Annu. Meet. Soc. Invertebr. Pathol. (S)

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Sawyer, T. K., P. Ghittino, S. Andruetto, P. Pernin, and M. Pussard. Vexillifera bacillipedes Page, 1969, an amphizoic amoeba of hatchery rainbow trout in Italy. Trans. Am. Microsc. Soc. (A)

Schmidt, G. D., and S. A. MacLean. Polymorphus (Profilicollis) major Lundstrom 1942 juveniles in rock crabs, Cancer irroratus. J. Parasitol. (A)

RESOURCE UTILIZATION DIVISION

Fisheries Engineering Investigation

Sampling and Harvesting Gear Development

The current year task plan and FY 81 task development plan were completed this month.

The dredge for the NEFC's 60-inch shellfish assessment dredge has been shipped from Rockport, MA, to Woods Hole, MA, and modifications to the Delaware II stern-ramp handling system are being carried out in Woods Hole in preparation for the 1 December cruise using the old 48-inch dredge and deck pump. Work on the electric cable winch for the submersible pump is continuing and should be completed by the first week in December. Instrumentation design work is continuing.

Gallows for the R/V Rorqual were designed, and an estimate of the remaining outfitting costs was completed for Woods Hole. The engine repair parts were received.

Preliminary specifications for a portable trawl mensuration system under development for the Commonwealth of Massachusetts have been written.

The maintenance staff has finished construction of the gear shed.

Process Engineering

Work on Freezer No. 4 of the Gloucester Laboratory's experimental freezer system has been stopped while we wait for parts. Freezer No. 5 is currently being converted to a low-temperature box with a defrost cycle.

Preliminary tests of the prototype divergent roller-sorting system have been completed and a draft report was written.

Resources Development and Improvement Investigation

Storage of Blue Mussels

October's mussels were considerably smaller by about 30 mm than the mussels from the preceding 3 mo. Minor changes in the Kjeldahl method have contributed to better precision in the results.

Blue Crabs

Taste-test results from the second storage study on roller-extracted pasteurized blue crab meat showed that meat stored at 34°F for 2 mo was of acceptable quality (appearance, odor, flavor, and texture, AOFT). The commercially picked control sample, also pasteurized and stored at 34°F for 2 mo, rated significantly lower than the roller-extracted meat in all attributes (AOFT). Total aerobic plate counts for all samples were very low, and all coliform determinations were negative.

Retorted blue crab bodies and legs were extracted on the Baader 696 meat/bone separator at the Stonington (Maine) Co-op. Leg meat recoveries were 45.7% of the total leg weight and 5.6% of the total live crab weight. Body meat recoveries were 75.4% of the total body weight and 18.5% of the total live crab weight.

Lobster bodies, carapace removed, were also processed on the Baader 696. Meat recovery was about 50% of the total body weight. The meat was pastelike in texture, but excellent tasting.

Rock Crab Processing

Shell content of rock crab meat extracted on the Baader 696 was 0.08%, well below the acceptable limit of 0.2-0.3%. The diameter of these particles was about 1-1.5 mm.

New Product Development

Our contract with the commercial fish processing company to evaluate the modified LaPine heading and cleaning machine using silver hake (whiting) has been completed, and the unit has been returned. It is being put back into operation for use in preparing minced whiting for laboratory experiments. An evaluation of the whiting machine performance has been submitted by the processor. It stresses the need to increase the throughput in order to have about 95% of the fish completely free from viscera, including the black-belly lining. In the commercial fish processing plant, using dayboat (very fresh) whiting, excellent minced whiting blocks were prepared and will be distributed by the Northeast Regional Office's Marketing Division to prospective buyers. A questionnaire will also be distributed to determine if this product has commercial potential.

A proposal is being prepared to build a second-generation heading and cleaning machine. This new unit would be built incorporating all the information learned by both the commercial and laboratory experiments with the prototype machine.

Surf Clams

Depuration at the Woods Hole Laboratory proved effective in removing coliforms from Milford Laboratory-cultured surf clams. Taste tests after 1 mo of frozen storage (October) and 2 mo of frozen storage (November) indicate that the

quality (appearance, odor, flavor, and texture) of the surf clams is still acceptable. General consensus is that the surf clams are "tough."

Cholesterol and Fatty Acids

Work has been initiated on a literature review for a report tentatively titled "A Review on Cholesterol and Fatty Acids as They Pertain to Marine Species." Equipment is being resurrected at the Milford Laboratory which may enable us to do very preliminary qualitative work with fatty acids.

Antarctic Krill

The first draft of a paper on krill and its utilization is nearing completion.

Product Quality, Safety, and Standards Development Investigation

Product Quality

Whiting fillet blocks which had been prepared from fillets obtained with the Arenco SFA-4 were analyzed after a 4-mo storage at 0°F. The effect of various treatments to retard rancidity is being studied. These include deep-skinning, vacuum-packaging, erythorbate, and tripolyphosphate dips. Similarly, South American hake fillet blocks prepared from deep-skinned, antioxidant-treated, or control fillets were examined after 6 mo of storage at 0°F.

An accelerated storage study at 20°F was initiated with red hake fillet blocks to identify problem areas associated with this particular species during frozen storage. Treatment variables included deep-skinning, vacuum-packaging, anti-oxidant dip, and control. It is planned to determine proximate analysis of this species at various times of the year so that any seasonal variability can be considered in nutritional tables such as Handbook No. 8.

The Torrymeter is being evaluated on radiation-treated Atlantic cod stored on ice to determine the effect of autolysis on quality and Torrymeter readings. The meter is also being tested on red hake which had been frozen at various stages of freshness. The purpose is to determine the utility of the instrument as a device for indicating whether "fresh" fish has been previously frozen and thawed.

SDS electrophoresis methodology is being converted from a disc-gel to a thin-layer procedure. The new methodology is simpler, and the results are more reproducible.

Delivery is expected of some LKB-PAG plates and whiting tissue samples collected on a recent cruise from the Woods Hole Laboratory. Isoelectric focusing will be used to compare sarcoplasmic protein patterns from whiting collected in various geographical areas to determine the possible existence of different races.

Product Safety

Workup of smoked sablefish samples by the multidetection method of FDA and vacuum distillation technique of Fine, et al., has been completed. Extracts, isolated by the vacuum distillation technique were analyzed by GC-TEA and on the Perkin-Elmer 910 gas chromatograph equipped with a nitrogen-phosphorus detector. GC-TEA analysis revealed the presence of only one compound in the entire chromatogram,

namely, N-nitrosodimethylamine at a concentration of 3.1 ppb. Analysis on the GC-nitrogen-phosphorus detector showed the presence of many compounds at high concentrations. These extracts were determined to be very dirty and not amenable to the present system of GC nitrosamine analysis. The extracts were further cleaned up by liquid solid chromatography on silica gel. Rechromatography showed that a great deal of the background was removed, but that it was still greater than the extracts isolated by the multidetection method. It was concluded that the vacuum distillation technique for screening purposes could not be used at the Gloucester Laboratory without the thermal energy analyzer detector.

Smoked whitefish samples spiked with 14 N-nitrosamines at levels of 5 ppb and 100 ppb were forwarded to Dr. Moreau for analysis by GC-MS. The entire mass spectrum of each compound will be recorded and up to nine characteristic ions will be selected from each spectrum. The new program will be used to identify N-nitrosamines at 5 ppb or higher by monitoring characteristic ions of a suspected nitrosamine.

The valve on the Sigma-1 GC is working very well, and the GC is now operational.

A literature survey on polynuclear aromatics was completed.

Work was also done on researching methods for the analysis of polychlorinated biphenyls.

Product Standardization

The proposed shrimp standard has been in-plant tested at a number of USDC-inspected plants in the Southeast to determine its practicality. Many helpful comments were received, and a revised draft is being prepared for public review based upon the comments.

Proposed resolution of comments received on the revision of the US standards for frozen fried scallops have been discussed with the Washington Office. All three comments were concerned with the scallop meat requirements for raw breaded and fried scallops.

A Federal Register article on standardization activities was published on 15 November 1978. It is an advance notice of proposed rulemaking which discusses: (1) guidelines used in the development of US grade standards; (2) development of inspection specifications; and (3) date labeling for perishable fresh fish and fresh fish fillets. Comments are due by 13 February 1978.

We continued a collaboration with scientists at the Army's Natick (MA) Research and Development Command to compare edibility characteristics of different species. This month we distributed a preliminary "shopping list" of species desired and discussed "how-to-get-the-fish" with nearby fresh fish dealers.

Fred King participated in a collaborative study conducted by AOAC Associates Referee Dr. Raymond Branshaw of the California Division of Measurement Standards. This study concerns measurement of net weight (more accurately, drained weight) of glazed, peeled, and deveined shrimp.

Technical Assistance

Division personnel provided information and assistance in the following areas: talk on fish handling at sea to a URI Department of Fisheries and Marine Technology class; packaging and shipping fish for foreign markets; information for an announcement of a stock assessment workshop at the Woods Hole Laboratory; vessel design related to fish handling; aquaculture; Scottish seining; pots; long-lining; gill nets; otter trawls; vessel rigging; local vessel for a company to make a film of a trawling operation; harvesting, processing, and marketing, and species identification.

cation of squid; canning of mackerel products, use of fish meal as a pet food supplement; formulation of smoked fish chowder; drying, salting, and smoking fish; heading and cleaning machines; making fish blocks; freezing fish; exports of frozen fish; pickling fish; new frozen fish products; smoking whiting; fresh fish marketing; mullet; hake; whale meat; New Zealand monkfish; mackerel; herring; age of commercial sea scallops; weakfish; definitions of scrod; trout feed; spawning period of butterfish; anglerfish; marine algae; review copy for Readers Digest identifying an escolar; sea urchins; aquaculture of eels; porpoises; talk to seafood brokers; use of polyphosphates and chlorinated dip solutions; mixed fillet/minced fish blocks; measurement of excess moisture in fish blocks; MIL STD 105's sampling plans; explanation of inspection by attributes system; source of fish block frames and packaging materials; incidence of bones in fish portions; sources of sea urchins in Maine; nutritional information on skates; and monkfish tails.

Meetings, Talks, Visitors, Publicity

Dr. Neils Rorholm and others from URI met with Division personnel to discuss programs of mutual interest.

Dr. Perry Lane attended a meeting with Mr. Joseph Slavin and representatives of other federal agencies to hear a proposal for a Great Lakes fishing program presented by Mr. Gerald Haegele. He also attended a meeting of the New England Fisheries Steering Committee in Boston.

Judi Krzynowek presented a paper titled "Identification of Species in Cooked Crabmeat" at the Atlantic Fisheries Technology Conference.

Burt Tinker and Bob Learson attended the National Blue Crab Industry Association meeting.

Joe Mendelsohn attended a meeting with Fred King and Fukuo Nukito of Hokuho Fisheries Co., Ltd., of Hokkaido, Japan, and Hideo Adachi of Tokyo Maruichi Shoji Co., Ltd., of Tokyo, Japan, to discuss the preparation of surimi from local fish species.

Joe Licciardello presented a paper at the Atlantic Fisheries Technology Conference at Williamsburg, VA.

Donald Gadbois met with Dr. Pearce, Chief of the Division of Environmental Assessment, on Thursday, 9 November, in regard to the possibility of the Gloucester facility beginning participation in the Ocean Pulse Program for analysis of samples for petroleum hydrocarbons and polychlorinated biphenyls.

We organized a seminar for Dr. A. C. Jason of the Torry Research Station in Aberdeen, Scotland. He spoke on the "Torrymeter" (an instrument designed to measure bacterial growth rates).

Dr. Fred King participated in the 23rd Annual Atlantic Fisheries Technology Conference in Williamsburg, VA, during 5-8 November. He was elected Secretary for the 24th Conference which will be held at the Kings Grant Inn in Danvers, MA, during 14-17 October 1979.

Ron Lundstrom attended a 2-day short course on food enzymology sponsored by Food and Nutrition Press.

Craig Sneider (LKB Instruments, Inc.) visited to discuss new developments in isoelectric focusing and to assist in locating laboratories interested in participating in the AOAC collaborative study on species identification by thin-layer isoelectric focusing.

Dr. Jim Rasekh of the Seafood Quality and Inspection Division spent the week of 30 October-4 November 1978 visiting the Gloucester Laboratory.

John Winninghoff and Russell Smith of Winninghoff Boats, Inc., visited to discuss vessel design.

Manuscripts

Ryan, J. J. 1978. Inspection by attributes. NMFS Seafood Quality and Inspection Div. Tech. Notes. (P)

Ryan, J. J. 1978. How to use the cumulative sum sampling plan (CUSUM) for attributes standards. NMFS Seafood Quality and Inspection Div. Tech. Notes. (P)

NATIONAL SYSTEMATICS LABORATORY

Shrimps Investigation

Nearly completed was a note extending the known range of Penaeopsis serrata north to New Jersey and south to Rio Grande do Sul, Brazil. Research continued on the systematics and distribution of eastern Pacific penaeids.

Other Crustaceans Investigation

Preparation continued of a guide to marine decapod crustaceans of the temperate eastern United States. Studies included the taxonomy of the primitive crab genus Latreillia.

Pelagic Fishes Investigation

Work continued on a revision of the Spanish mackerels. We revised sections of a manuscript on Indo-West Pacific halfbeaks.

Meetings, Talks, Visitors, Publicity

Visitors included Dr. Margaret Bradbury of San Francisco State University, who studied ogocephalid fishes, and Mr. Jack Wise of the Washington Office.

Manuscripts

Cohen, D. M. 1978. Observations from a submersible on abyssal fish populations in the vicinity of Hudson Canyon (Abst.). Rev. Trav. Inst. Pêches Maritimes, tom. 40, fasc. 3 et 4, p. 547. (P)

Collette, B. B., and E. A. Lachner. 1978. Fish collections in the United States and Canada (Abst.). Ibid., p. 548. (P)

Perez Farfante, I. 1978. Intersex anomalies in shrimp of the genus Penaeopsis (Crustacea: Penaeidae). Fish Bull., US 76:687-691. (P)

ATLANTIC ENVIRONMENTAL GROUP

Ocean Monitoring and Climatology Investigation

A one-page report updating the location and configuration of warm-core Gulf Stream eddies adjacent to the continental shelf in the Middle Atlantic Bight was submitted for publication in the December Atlantic Notice to Fishermen, and also was released to a mailing list of interested individuals at the same time. The report describes the movement of three eddies southwestward along the edge of the shelf, in the period between mid-October and mid-November. Eddy S, which was located off the Virginia Capes in mid-October, was reabsorbed by the Gulf Stream by the end of the month. Eddy U moved WNW about 35 nautical miles (nm) to a position SSW of Hudson Canyon, 38°10'N, 71°35'W. Eddy A, which was weakly expressed in the satellite imagery at 39°30'N, 68°15'W in mid-November, has disappeared from the imagery since then. An interesting manifestation of the presence of Eddy U was observed by Grayson Wood during a ship-of-opportunity run to a drilling platform on the outer shelf in the vicinity of Hudson Canyon. While there he learned that the crew aboard a picket boat circling the platform were catching dolphin fish, a subtropical fish assumedly carried along with the Gulf Stream and Sargasso Sea water in the eddy.

During November, the cooperative Ship-of-Opportunity Program obtained eight XBT transects, two in the Gulf of Maine, one across the Southern New England shelf along the 70°W meridian, three across the shelf and slope off New York, one off Norfolk (VA), and one in the Gulf of Mexico.

Continuous plankton and temperature records at 10 m were obtained along one of the Gulf of Maine routes, and from Ambrose Light to Deepwater Dumpsite (DWD) 106. A continuous plankton record (CPR) was taken northeastward from Norfolk, VA. CPR data are presently processed for us by the Institute for Marine Environmental Research (IMER) in the United Kingdom. Work is proceeding on the transliteration of IMER's computer programs from "British" Basic to "American" Basic. Neuston sampling in the US Coast Guard's Offshore Law Enforcement Patrol area resulted in five samples during the month.

Ocean Dumping Investigation

Derived wind data for the October 1978 radio directional finding buoy study at DWD 106 was requested from Andy Bakun of the Pacific Environmental Group of Monterey, CA. Observed wind data were requested from four data buoys through the National Data Buoy Office. Six RDF buoys will be ordered shortly for future experiments.

Final preparations were made for the November cruise to DWD 106 including delivery of 500 lb of Rhodamine dye to Dupont's Grasselli Plant in Linden, NJ. Arrangements were made through Dupont for installation of the dye during the barge-filling procedure.

Multivariate analysis of temperature, salinity, and oxygen data from the July 1977 cruise to DWD 106 is being conducted for our contribution to the First International Ocean Dumping Symposium Proceedings volume. This report is due in final form by the middle of December.

Meetings with the Department of Geology have been conducted to gain a commitment for their involvement in the Philadelphia Sewage Sludge Site investigation. Some finalized plan should be available by 19 December 1978 when a second meeting between EPA and NOS staff will discuss future plans concerning the site.

Meetings, Talks, Visitors, Publicity

Mert Ingham attended two meetings of the Portsmouth Refinery Task Group in Washington, DC, on 1 November and 6-8 November.

Steve Cook and Jack Jossi went to Governors Island, NY, for a meeting with the Marine Science Branch of the US Coast Guard to discuss the Ship-of-Opportunity Program on 7 November.

On 8 and 9 November, Woody Chamberlin attended a demonstration of an airborne color scanner by NASA personnel and the University of Delaware scientists at Langley Air Force Base, MD. He returned on 20 November for a further demonstration.

Mert Ingham, Woody Chamberlin, Reed Armstrong, Jack Jossi, and Steve Cook attended the Middle Atlantic Bight Physical Oceanography Workshop in Williamsburg, VA, from 14 to 16 November.

On 17 November, Mert Ingham had a series of conferences with staff members and graduate students at VIMS regarding fishery climatology or fishery oceanography studies in progress, and also presented a seminar to Dr. Herb Austin's fishery oceanography class.

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)

Chamberlin, J. L. 1978. Unusual offshore distribution of cold shelf water during the spring and summer of 1978. Coast. Ocean. Climat. News 1(1). (P)

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)

Cook, S. K. 1978. The effect of the anomalously cold winters of 1976-1977 and 1977-1978 on spring bottom temperatures in the Middle Atlantic Bight. Coast. Ocean. Climat. News 1(1). (P)

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

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)