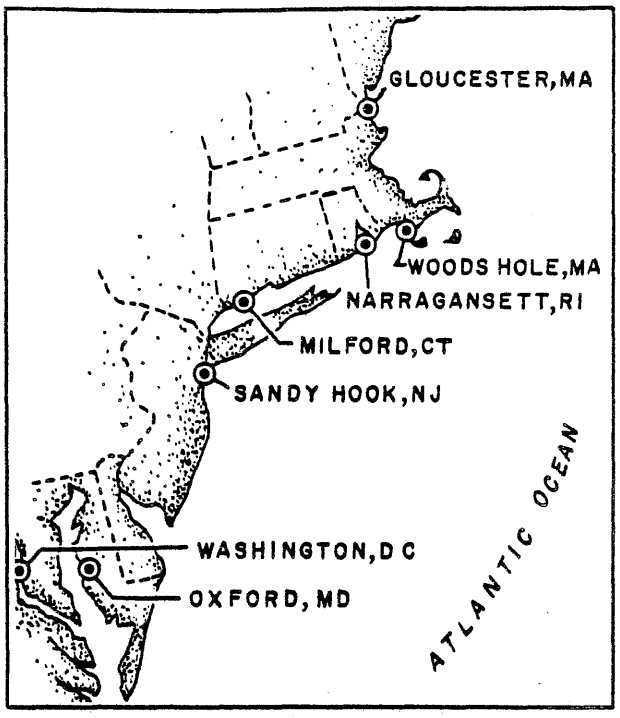
NEFC

Northeast Fisheries Center

NEWS



SEPTEMBER 1978

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

CENTER DIRECTORATE

Art Merrill is presently working on two manuscripts to be submitted to the Environmental Research Laboratories (ERL) Marine Ecosystems Analysis Program (MESA) for their Data Report Series. One of the reports covers distributional patterns of invertebrate species found in the Middle Atlantic Bight on Delaware II Cruise No. DE 60-07. The other relates to distributional patterns of fossil oysters taken from the offshore waters of the Atlantic Ocean.

Art Posgay spent the month completing the summary of all the sea scallop shell samples that have been read for age, and recalculating the growth equations. In all, there are 63 samples, totalling 12,500 shells, collected from the Strait of Belle Isle to the Virginia Capes. These data form the basis for a manuscript on the growth of the sea scallop throughout its range.

Most of Ron Smolowitz's time this month was spent in completing the report on the third mesh experiment. The report is now being typed.

Meetings, Talks, Visitors, Publicity

Art Merrill attended a workshop in Woods Hole on the Introduction of Exotic Species for Mariculture during 18-20 September sponsored by the Marine Policy and Ocean Management Program, and the Sea Grant Program, of the Woods Hole Oceanographic Institution (WHOI). Art Merrill also attended the sixth Annual Convention of the Conchologists of America during 27 September - 1 October at Westbury, Long Island, NY.

Ron Smolowitz attended the NEFC News Media Workshop on 19 September at Woods Hole and the NMFS Vessel Meeting in Denver, CO, from 25 to 27 September. Mike Corbett (Gloucester Laboratory) joined Ron Smolowitz to give a presentation on the new clam dredge to the Sea Clammers Association in Ocean City, MD, on 29 September. Twelve requests for technical information were also processed by Ron Smolowitz.

RESOURCE ASSESSMENT DIVISION

Resource Surveys Investigation

During September, the fall bottom trawl survey was begun. This year only the Delaware II will be used to conduct the survey. The survey began on 5 September and is not scheduled to be completed until 22 November. The first part (covering from Cape Fear, NC, to Long Island, NY) was completed on 22 September (Tom Azarovitz and Linda Despres as Chief Scientists for legs one and two, respectively). Part two began on 25 September and is scheduled to be completed on 6 October (Malcolm Silverman as Chief Scientist), and will extend coverage to the southern sections of Georges Bank.

On 30 September, Henry Jensen participated on a 1-day segment of the State of Massachusetts inshore trawl survey. Henry was able to advise the state biologists in sampling methodology concerning the frequent large catches of juvenile fishes aboard the state-chartered fishing vessel Francis Elizabeth.

In the electronics section, preparations were made for the R/V Anton Dohrn hydroacoustics cruise (No. 78-02) in October. Bill DeRusso of the C. S. Draper Laboratory in Cambridge, MA, and Jim Crossen calibrated the Anton Dohrn's Atlas Werke 33 kHz echosounder at the WHOI dock. Connections were made to the vessel's transducer to enable the recording of echo signals.

Specifications were developed for the electrical tie-in of the surf clam dredge submersible pump to the 460-V, 3-phase, 150-kW generator aboard the Delaware II. A 1,000-ft length of cable has been procured and underwater connectors are presently being tested.

Pat Twohig completed work on the radiotelephone for Woods Hole (KAC). This modification enables Woods Hole Radio to accept radio traffic from all NOAA vessels and also increases its operating range. He has started modifying Sandy Hook (KAF) radiotelephones to be compatible with Woods Hole. This work is expected to be completed by mid-October. Preparation for the larval Atlantic herring patch study cruise has been underway during September. The following new instruments have been received and are being prepared for sea trials: Cyclesonde data synchronizer, towed fluorometer, and a second MOCNESS (Multiple Opening and Closing Net and Environmental Sensing System) unit.

Expendable bathythermograph (XBT) systems were installed on four vessels during September. The Soviet vessel Belogorsk was outfitted with a complete deck-launcher system with two XBT recorders which enabled it to make 200-m and 460-m records simultaneously.

Age and Growth Investigation

Judy Penttila, Vi Gifford, and Kris Kantola spent 3 wk choosing a series of 179 haddock scale impressions to be used as the sample for development of an automatic age-reading system. Gary Shepard worked on photographing the haddock scale impressions and completed about 120 negatives. The RFP for development of the automatic age-reading system will be advertised from 11 October to 17 November

Fred Nichy worked with Rafael Robles, showing him our technique of sectioning otoliths. Material was supplied to assist him in setting up a similar unit in his lab at Vigo, Spain. Rafael also worked with Judy Penttila, learning to use her growth rate programs for the HP-67/97 programmable calculator.

Age samples worked on during September were: summer flounder from June and July 1978 party boat samples; butterfish from Delaware II Cruise No. DE 77-12; haddock from Albatross IV Cruise No. AL 78-04; and silver hake from Albatross IV Cruises No. AL 77-01, 77-04, and 77-05 (3,835 fish). Age samples completed during September were: Atlantic herring from commercial samples (1,050 fish aged); and redfish from fourth quarter 1977 commercial samples (127 fish aged).

Sandy Hook Investigation

No report received. Report will be included in next month's (October) report

Fishery Analysis Investigation

Investigation personnel continued assessment analyses and preparation of research reports. Ralph Mayo and Liz Bevacqua analyzed commercial and research bottom trawl survey catch-at-age data in attempting to estimate total and fishing mortality rates for Gulf of Maine redfish. Steve Murawski continued to evaluate ocean quahog distribution and relative abundance from NMFS shellfish assessment cruise data for 1966-68. Fred Serchuk and Paul Wood began analysis of recent (1975-77) sea scallop commercial landings, by area and size composition, in order to estimate recent fishing mortality and relate this to survey abundance indices. Both American and Canadian landings and size-frequency information are being utilized. Harold Foster continued to investigate past foreign landings of George

Bank Atlantic cod to formulate a more complete representation of catch composition in ICNAF (International Commission for the Northwest Atlantic Fisheries) Subarea 5.

Bill Callahan provided data for the following individual requests: (1) groundfish (Atlantic cod, haddock, and yellowtail flounder) landings during January-July 1978 for the Statistics Branch of the Northeast Regional Office; (2) Atlantic cod landings during 1975 for Joe Mueller, Economist, of the Northeast Regional Office; and (3) US commercial vessel activity in the North Atlantic during 1977 for ICNAF. Bill also provided the following analyses for Investigation personnel: (1) processing of Coast Guard computer tapes on fishing vessels; (2) processing Washington (DC) vessel list; (3) analysis of Woods Hole Master Vessel list with Washington (DC) and Coast Guard data; and (4) catch and value report for individual groundfish vessels.

Two sea-sampling trips were accomplished in September under Paul Wood's supervision. Vessels participating in the program during the month were the F/V Friesland (Mike Sissenwine as sea sampler on 19 September) and F/V Francis J. O'Hara (Ralph Mayo as sea sampler during 22 September - 1 October).

Harold Foster participated in the autumn bottom trawl survey during 5-22 September.

Brenda Fields joined the Investigation and is working with Joan Palmer analyzing bottom trawl survey abundance indices and VPA (virtual population analysis) year-class abundance estimates.

Fishery Assessment Investigation

Steve Clark and William Overholtz have continued work on a haddock assessment paper which involves analyses based on a revised time-series of numbers-at-age catch data. Steve has also been working on the assessment of the northern shrimp stock and attended a meeting on 20 September of the Northern Shrimp Sub-Board at which time a draft EIS/FMP (environmental impact statement/fishery management plan) for shrimp was accepted for public distribution and comment.

Emma Henderson has been working with James Kirkley, NEFC's Fishery Economist, on economic modeling using operations research techniques, and together with Brad Brown and Joan Palmer (Fishery Analysis Investigation), is developing stochastic recruitment functions for eventual input to fisheries models for Georges Bank.

Frank Almeida and Hillary Herring were aboard the Soviet R/V Aliot for a juvenile red and silver hake trawl survey in the Georges Bank - Southern New England area. Frank and James Baker have continued work on computing silver hake numbers-at-age catch data for redefined stock areas in the Georges Bank area.

A contract proposal has been submitted to the New England Regional Fishery Management Council to do a stock delineation study for silver hake based on discriminant function analysis of morphometric characters. Samples will be collected during bottom trawl surveys. Joe Wade will be assisting with the laboratory processing of fish samples, with Frank Almeida responsible for the statistical analyses. Frank has conducted a literature review and is becoming familiar with the computerized discriminant function analysis program.

Hillary Herring continues to process the commercial length-frequency samples, and has also been working on 1963-67 red hake catch data. Hillary is also taking a course in calculus - analytical geometry at Bridgewater State College (BSC). Frank Almeida is also taking a course in linear algebra at BSC.

Thurston Burns and Gordon Waring (Fishery Systems Investigation) participated in tagging operations for Atlantic herring in the Boothbay Harbor, ME, area during 15-30 September. NEFC is providing personnel support to Maine during this study contracted to the State by NMFS. Approximately 10,000 fish were tagged during this period. Operations were conducted aboard a commercial purse seiner chartered by the State of Maine.

Emory Anderson completed revisions on two manuscripts on Atlantic mackerel to be published in the near future.

Fishery Systems Investigation

Anne Lange completed a manuscript on "Other Flounders" (winter flounder, American plaice, witch flounder, windowpane)with Fred Lux (Coastal Monitoring, Assessment, and Prediction Investigation). The manuscript will serve as the biological bases for the other flounder management plan being developed by the New England Regional Fishery Management Council. Anne also completed a paper on squid stock status.

Gordon Waring spent the second half of September in Boothbay Harbor, ME, and Gloucester, MA, tagging Atlantic herring.

Mike Sissenwine spent much of the month considering and discussing multispecies modeling and multispecies fisheries management. He met in Narragansett, RI, with Robert Scott of the Washington Office to discuss (with Ken Sherman of the Marine Ecosystems Division) a position on this subject that is being developed for the Assistant Administrator for Fisheries. Other meetings to discuss the multispecies modeling problem were with William Bossert and Kevin Cain of Harvard and Geoff Laurence and Jan Beyer of the Narragansett Laboratory, as well as with other Woods Hole Laboratory staff. Mike also made a 1-day sea-sampling trip on the F/V Friesland, a 117-ton stern trawler from Point Judith, RI. The trip documents the reports of fishermen on the great abundance of small butterfish, Loligo squid, and scup.

Meetings, Talks, Visitors, Publicity

Steve Murawski attended a regulation review team meeting in Gloucester, MA, on 6 September to discuss current surf clam regulations, and also attended public hearings in Norfolk, VA (20 September),and Ocean City, MD (21 September),on the Atlantic mackerel, squids, and butterfish FMP's.

Fred Serchuk attended a resource assessment program held in Woods Hole for the New Hampshire Oceanographic Foundation on 8 September. Fred presented a review of the assessment of the Gulf of Maine and Georges Bank Atlantic cod stocks.

Fred Serchuk, Paul Wood, and Brad Brown attended a public meeting with representatives of the sea scallop industry in New Bedford, MA, on 14 September. Fred and Paul reviewed the status of sea scallop populations on Georges Bank and in the Mid-Atlantic and briefed the industry members on on-going sea scallop assessment activity.

Joan Palmer and Fred Serchuk participated in the NEFC News Media Workshop on the status of marine fisheries and marine fishery research in the Northeast, held in Woods Hole on 18 and 19 September. Joan participated as a member of the scientific crew aboard the Albatross IV demonstration cruise on 18 September, and Fred presented a review of stock assessment techniques and methodologies and a summary of the 1978 Atlantic cod assessment on 19 September.

Fred Serchuk met with Brian Rothschild to discuss groundfish assessment activities on 28 September in Woods Hole.

On 7 September, Emory Anderson, Brad Brown, Henry Jensen, and Charles Byrne attended a meeting in Peabody, MA, to explain the 1978 autumn bottom trawl survey to members of the fishing industry and other interested individuals and solicit their input for possible additional sampling. Emory and Charles made a similar presentation on 14 September at a meeting of the Mid-Atlantic Fishery Management Council in Philadelphia, PA. Emory also gave a talk on 8 September explaining the NEFC bottom trawl survey to a visiting group from New Hampshire sponsored by the New Hampshire Oceanographic Foundation.

Anne Lange made a presentation on the squid assessment at the NEFC News Media Workshop held in Woods Hole on 18 and 19 September. Anne also represented the NEFC at public hearings on squids, Atlantic mackerel, and butterfish FMP's in Cape May and Asbury Park, NJ.

On 14 September, Mike Sissenwine attended a stock assessment workshop at the University of Rhode Island to discuss how biologists can better communicate with fishermen. The major conclusion of the workshop was that Sea Grant should take the lead in producing and distributing the layman's version of stock assessments. The NEFC will cooperate fully with this effort.

Manuscripts

Anderson, E. D. Assessment of the Northwest Atlantic mackerel (Scomber scombrus) stock. NOAA Tech. Rep. NMFS SSRF. (A)

Anderson, E. D., and A. L. Paciorkowski. A review of the Northwest Atlantic mackerel fishery. Intern. Counc. Explor. Sea Symp. Biol. Basis Pel. Fish Stock Mgmt. Pap. No. 11. (Revised for publication in proceedings)

Lange, A. M. T., and F. E. Lux. 1978. Review of the other flounder stocks (winter flounder, American plaice, witch flounder, windowpane flounder) off the northeastern U.S.A. NMFS, NEFC Woods Hole Lab. Ref. No. 78-44. 53 p.

Lange, A. M. T. 1978. Squid (Loligo pealei and Illex illecebrosus) stock status: June 1978. NMFS, NEFC Woods Hole Lab. Ref. No. 78-36. 17 p.

Murawski, S. A., and G. Waring. 1978. Status of the northwestern Atlantic butterfish population: September 1978. NMFS, NEFC Woods Hole Lab. Ref. No. 78-47. 15 p.

Murawski, S. A., and G. Waring. 1978. A population assessment of the butterfish Peprilus triacanthus, in the northwestern Atlantic. Trans. Amer. Fish. Soc. (S)

Murawski, S. A., and F. M. Serchuk. 1978. Shell length - drained meat weight relationships of ocean quahogs, Arctica islandica, from the Middle Atlantic. Proc. Natl. Shellfish. Assoc. (S)

Serchuk, F. M., P. W. Wood, J. A. Posgay, and B. E. Brown. 1978. Summary and review of the 1978 assessment and status of sea scallop (Placopecten magellanicus) populations off the Northeast Coast of the United States. NMFS, NEFC Woods Hole Lab. Ref. No. 78-45. 26 p.

MARINE ECOSYSTEMS DIVISION

Ecosystem Dynamics Investigation

Ecosystem Dynamics

The main focus in September was on modeling. Wendell Hahm continued expansion and refinement of the multispecies model GEORGE, adding further details to the structure of the major components of the model, including the INTERACT subroutine which in the nonlinear mode controls the interactions between all the other subroutines which control recruitment, predator-prey interactions, food consumption, size-specific mortality due to fishing, etc. The modeling group met with Geoff Laurence and Jan Beyer to review various approaches to estimation of the predator-prey interactions in a multispecies model and also to consider modeling larval fish survival. Wendell Hahm and Jan Beyer agreed to do some joint work, particularly in the development of prey-predator subroutines which take account of size selectivity. Other topics included aspects of linking up the data base on environmental events (via Mert Ingham, Atlantic Environmental Group) to larval fish survival models, and ways of integrating field and laboratory studies of larval fish, particularly in relation to larval Atlantic herring and the October 1978 patch study on Georges Bank (Greg Lough, George Bolz, and Ed Cohen of the Recruitment Processes Task participated in the discussion).

Mike Pennington examined the time series of data on recruitment patterns for the major species on Georges Bank, and noted that there was evidence for recruitment of certain species to be correlated; such correlations should be taken into account when constructing the recruitment functions for input to the multispecies model. Several nonlinear candidate models for simulating multispecies fisheries are to be reviewed at an informal workshop scheduled for next December; the workshop is to be jointly sponsored by NEFC, the New England Regional Fishery Management Council, and Harvard University. A tentative agenda was established at a meeting in Woods Hole on 15 September.

Ed Cohen and Marv Grosslein worked on a revision of the paper for the International Council for the Exploration of the Sea which compares empirical and theoretical ratios of primary production to fish production for the various parts of the MARMAP (Marine Resources Monitoring, Assessment, and Prediction Program) area covered by NEFC. Mike Pennington assisted the following people with data analysis: Roz Cohen, plankton distributions; Bob Livingstone, fecundity studies; Ron Smolowitz, gear selectivity; Cindy DeGorgue, larval fish associations; Darryl Christensen, creel survey analysis; and Pete Berrien, Atlantic mackerel egg density estimates. Pat Carter worked on production of computer outputs of bottom trawl survey abundance data for selected species, for use in a study of shifts in fish distribution relative to temperature trends. Marv Grosslein participated in the 26 September meeting of the Science and Statistical Committee for the New England Regional Fishery Management Council. Ed Cohen left for 10 wk of training at the University of Washington where he will take several advanced courses in population dynamics and ecosystem modeling at the Quantitative Science Center.

Recruitment Processes

Final preparations are being made for the Georges Bank larval Atlantic herring patch study to begin in the next few weeks. Greg Lough visited the Bedford Institute of Oceanography on 26 and 27 September to discuss final details of the patch study with Canadian scientists involved (Dan Ware, Jeff McCruer, Robert O'Boyle, Scott Akenhead, and Ronald Trites). Everything is going according to the plans most recently outlined in the Fifth Planning Meeting Report. Everyone was most impressed by our recent developments in the use of Edgerton's silhouette photography technique for rapid shipboard counting and measuring of fish larvae. Both Albatross IV and Lady Hammond will use this technique for making real-time quantitative estimates of herring larvae during the larval patch mapping. Dave Potter visited Harold Edgerton at the Massachusetts Institute of Technology (MIT) early in September to see if his silhouette photography technique could be adopted for counting fish larvae at sea.

Gred Lough also was involved in the cruise planning meeting (29 September) of the Canadian vessel Canso Condor, whose mission in the patch study is to investigate predator-prey relationships by mid-water and bottom trawl sampling. Participants included Ken Waiwood and Pete Kohler from the St. Andrews Biological Station, and Rich Langton of the Woods Hole Laboratory, who is responsible for the sampling program.

Other significant activities in our group involved: (1) consolidation of materials for two reports on the 1968-77 larval Atlantic herring time series by Greg Lough, George Bolz, and Mary Nolf; (2) processing of November 1977 Anton Dohrn MOCNESS vertical samples for fish larvae by William Michaels, Beatrice Hess, and Virginia Wixson; (3) larval Atlantic herring condition factor-gut content processing of November 1975 Anton Dohrn specimens by Janet Murphy, Judy Lettes, and Mary Nolf; (4) computer processing of larval Atlantic herring condition factor-gut contents from 1977 Albatross IV data by Roz Cohen; (5) larval Atlantic herring length-weight measurements by Janet Murphy and Judy Lettes; (6) identification and enumeration of selected (10 stations) fine-mesh (0.165-mm) samples from the 1977 Wieczno preliminary patch study by Tim Cole; (7) development of a computer program to produce relative composition histograms of the fine-mesh (0.165-mm) zooplankton data collected on larval Atlantic herring surveys for the 1974 and 1975 fall and winter periods to compare with larval Atlantic herring condition-prey selection by Cabell Davis; (8) preparation of MOCNESS and related gear for the Albatross IV (Cruise No. AL 78-13) patch study by Hal Merry; (9) major logistical preparations for the eight-vessel patch study being carried out by Dave Potter and Robert Halpin; and (10) final preparation of an Atlantic cod and haddock maturity manuscript by Robert Livingstone.

Dave Potter and Hal Merry attended the fourth annual combined Oceans '78 Conference sponsored by the Marine Technology Society and the Institute of Electrical and Electronic Engineers during 6-8 September in Washington, DC.

Larval Physiology and Biochemistry Investigation

Analyses of data for inclusion in the stochastic barrier model of larval fish growth and survival have been completed with the recent addition of scup and Atlantic herring. New experimental designs with the aim of establishing individual larval variability have been developed for future studies on growth, survival, feeding relationships, physiology, and biochemistry. Adult summer flounder are currently under hormone induction to produce embryos for experimental

studies. A prototype design of an experimental aquarium to be used in establishing hourly and daily mortality rates of larval fishes is completed and ready for testing. Extensive preparations to prepare for participation in the larval Atlantic herring patch study are underway. Experimental studies of first feeding Atlantic herring larvae will be conducted on board the Atlantis II.

Studies of methods for the analysis of micro quantities of nucleic acids in fish flesh were continued. We are currently looking at nucleic acids in muscle tissue from juvenile winter flounder.

Fishery Oceanography Investigation

Virtually all of our efforts during the month were devoted to preparation for, participation in, and sorting out after the current meter deployment and recovery cruise, Albatross IV Cruise No. AL 78-11. The cruise was the initial step in the larval Atlantic herring patch study that takes place this October and November.

Last-minute preparations were a little more pressing than usual, with construction of nine marker buoy moorings added to the regular current meter moorings. Anchors (surplus railroad wheels) for the marker buoys were picked up on 7 September in Rhode Island and there were three trips to Boston's Logan Airport in the last few days to pick up current meters from Nova University, drogue radio transmitters and receivers from Maryland, and flashing lights from Miami. The last were delivered by Tim Cain at 6 am on Wednesday, 13 September, 15 min before the ship sailed. The sailing was delayed for nearly 2 days--original departure was scheduled for 11 am Monday--because of trouble with the ship's power, but the weather was so bad during that time that very little could have been accomplished at sea anyway.

The weather improved on the way to the launching site, on northeast Georges Bank, and at 6 am Thursday conditions were good. Eighteen hours later, with no break for the scientific party and continuous effort on the part of the ship's watch on deck, we had succeeeded in setting all three current meter moorings and all nine marker buoys. The entire operation was directed by Steve Ramp, who worked out details with the lead fishermen, Nick Vadala and Tom Fronteiro. At each location, the marker buoys were set in a triangle about 0.5 mi on a side, with the current meter mooring in the middle.

Except for XBT work, scientists slept until 6 am Friday, when they were at the first recovery location in the Northeast Channel. The weather was calm and the AMF transducer homed in to each mooring in turn; each one surfaced within sight of the ship and was hauled on board in good order. That work was completed by noon. All hands--science and ship--deserve high praise for the setting and recovery operations.

A hydrographic section across the Northeast Channel completed the scientific work although we had hoped to have time for some experimental drogue tracking to test the new radio system. Three stations were made with the old Plessey STD (salinity, temperature, depth), and then three with the new Neil Brown CTD (conductivity, temperature, depth), which performed beautifully coupled with the Tektronix Graphic System. Curves of temperature and salinity versus depth were drawn as the instrument was lowered, and values at selected depths were printed in a table.

Friday evening an attempt was made to recover one marker buoy to replace a light that had failed, but after one pass in the dark with building seas the effort was abandoned and the ship headed in, arriving in Woods Hole Saturday evening. We unloaded at once.

Inspection of the current meters from the Northeast Channel shows that the tapes ran properly in eight of the nine instruments, but we don't know yet what sort of data was recorded.

Other business for the month included an attempt to organize the XBT requirements for FY 79, Red Wright taking part in a 1-day cruise for representatives of the press, and Red Wright leaving on 26 September for the annual meeting of ICES in Copenhagen.

Plankton Ecology Investigation

Plankton Sorting

Zooplankton samples collected on Argus Cruise No. 78-04 from the Mid-Atlantic have been processed. Analysis of the species distribution and abundance from these samples will indicate whether there is a delineation in the zooplankton composition between the areas of Southern New England and the Mid-Atlantic.

We are processing the invertebrate samples from Albatross IV Cruise No. AL 78-07.

Jacquelin Frisella participated in Belogorsk Cruise No. 78-02 which engaged in fish and squid food habit studies. Aliquots of invertebrate samples taken over the continental shelf off the Middle Atlantic States on six monitoring cruises have been sent to Andrew Sweatt, a graduate student at Duke University, who is working on a NOAA technical report, "Marine Flora and Fauna of the Northeast United States," with Dr. Melbourne Carriker of the University of Delaware. He is completing a manual on the identification of chaetognaths and will utilize the samples to complete specimen information from this area.

Biostatistics

September prompted the return to college for the many part-time employees in the Biostatistics Unit. Five students have returned to the University of Rhode Island and one started at Rhode Island Junior College. As a result, the pace of operations has slowed considerably. The Bureau of Land Management (BLM) contract continued to be the focal point for our data processing efforts. Programing efforts were directed at revising the length-frequency program for summarizing plankton data and at writing new programs to deal with data on keypunched cards.

Image Analysis

Ray Maurer prepared a progress report on the status of the image analysis project. This report was submitted to Dr. Perry Jeffries for review. Robert Marak prepared to leave for a 6-wk assignment to the Polish Sorting Center. He will initiate larval fish feeding studies on several gadid species and sand lance. This research is part of an ongoing cooperative effort involving American and Polish scientists.

Ichthyoplankton Investigation

Tom McKenney is participating in the second major Ocean Pulse cruise in coastal waters from Cape Hatteras to the Gulf of Maine. He is part of a multi-disciplinary team of scientists sampling a variety of marine organisms and their environment to monitor the health of the shelf. Meanwhile, preparations are underway for our next MARMAP survey, the first of FY 79. The 30-day cruise, one of our series of cooperative endeavors with the USSR, is scheduled to begin on 5 October on the R/V Belogorsk. John Sibunka will be Field Party Chief. He and Bill Brennan will represent the Ichthyoplankton Investigation. We will deviate from our normal procedure of starting the survey off Cape Hatteras by beginning off Southern New England. From there we will proceed eastward onto Georges Bank to locate concentrations of recently spawned Atlantic herring larvae for the patch study, which is scheduled to begin in mid-October.

As we enter the final phase of the BLM contract period, accomplishments are generally in line with scheduled completion dates. ADP will be completed for semiannual cruises for the 1973-76 series by the end of this month. Work on monthly cruises in the New York Bight is scheduled for completion in November. All of the historical data must then be reformatted, a contract obligation only recently brought to light. The task of reformatting has been discussed with ADP personnel and we expect it to be completed by the end of the calendar year.

Benthic Dynamics Investigation

Substantial effort this month was devoted to the preparation of a management plan for the deepsea red crab fishery. Joint effort by other staff members of NMFS, in cooperation with the New England Regional Fishery Management Council staff, was concentrated on the biological aspects. Description of the stocks, distribution of commercial concentrations, migrations, behavior, and reproduction were some of the principal topics dealt with so far. In another matter pertaining to red crabs, Roland Wigley collaborated with two statisticians, G. P. Patil and Charles Taillie, in preparing a report for ICES titled "Transect Sampling Methods and Their Applications to the Deep-Sea Red Crab."

Work on the food habits of fishes and squids produced considerable, though varied, results. Of particular importance were two cruises of the R/V Belogorsk conducted jointly with Soviet scientists for studying food habits of demersal fishes in the Southern New England - Georges Bank region. One special aspect included in this study was the diurnal difference in feeding of six major fish species at one locality on western Georges Bank. Planning for a joint American-Canadian study of food habits of pelagic fishes continued. Emphasis in this investigation will be directed toward obtaining a better understanding of predation on Atlantic herring, particularly on the larval stages. Limited effort was devoted to the study of the 1956-76 juvenile haddock food habits and to processing the 1969-77 pleuronectiform data base. Once again, preparations were made for the collection of stomachs from demersal fishes on the fall bottom trawl survey cruises.

Roger Theroux prepared the benthic sampling gear and participated in the demonstration cruise aboard the Albatross IV on 18 September, which was conducted for the purpose of keeping news media personnel informed of our sampling methods.

Roland Wigley met with the Executive Director and three members of the New England Regional Fishery Management Council staff, together with representatives from the NMFS Northeast Regional Office's Fishery Management Division. Purpose of the meeting was to decide on the scope and contents of the red crab fishery management plan, currently in preparation, and to discuss some of the biological and socioeconomic aspects of the red crab fishery.

Rich Langton participated in the Atlantic herring spawning study (fish predation aspects) conducted by the Manned Undersea Research and Technology Program (MURT) dive team on Jeffreys Ledge off Cape Ann, MA.

Apex Predators Investigation

Investigational personnel attended one tournament this month, the Rhode Island Tuna Tournament in Galilee during 2-4 September. Larry Lindgren and John Hoey participated in a longline and tagging cruise on the R/V Geronimo during 15-17 September. Jack Casey, Chuck Stillwell, Wes Pratt, and Alan Lintala (all of the Narragansett Laboratory), and George Benz (University of Connecticut) are aboard the R/V Wieczno on a combined longlining/trawl cruise. The Wieczno sailed on 26 September and is expected back on 12 October. The Wieczno also participated in the Coast Guard's search for the missing commercial vessel Lobsta I from Pt. Judith, RI.

Forty-five tagged sharks were recaptured in September. They can be broken down as follows: (1) Thirty-four blue sharks, all short-term, short-distance migrations. The longest time out for a blue shark was 140 days; this shark traveled from Cape Hatteras, NC, to Wilmington Canyon, a distance of 147 mi. (2) Four mako sharks, two of which were at liberty over 1 yr. One shark was at liberty for 534 days, traveling from Cape Hatteras, NC, to Wilmington Canyon. This shark was tagged on the Wieczno in 1977. The other mako shark which was at liberty over 1 yr was tagged aboard the Wieczno in 1976. This shark was at liberty 660 days, and moved 329 mi northeast--from Cape Hatteras, NC, to just off Montauk, NY. (3) Five sandbar sharks and one sandbar/dusky were recaptured this month. The most exciting recapture is for a male sandbar which was tagged southeast of Montauk, NY, and recaptured at Jesus Maria, Mexico. This shark was at liberty for 6 yr, 17 days, and traveled 1,989 mi, the longest distance migration to date for a sandbar. (4) One tiger shark was recaptured in September. The shark, a male, was at liberty for 403 days and moved from Aransas Rock, TX, to the Matagorda Peninsula, TX, a distance of 73 mi.

Meetings, Talks, Visitors, Publicity

Rafael Robles (Director of Vigo Laboratory, Spain) visited the Narragansett Laboratory on 7 and 8 September.

From 11 to 22 September, Drs. Ryszard Maj, Leonard Ejsymont, Jan Piechura, and Henryk Kurowski, from Poland, visited all of the NEFC laboratories and the Washington NMFS and NOAA offices.

Ken Sherman, Jack Casey, and Robert Marak participated in the NEFC News Media Workshop at Woods Hole on 18 and 19 September.

On 25 September, Frank Monastero of BLM in Washington, DC, visited the Narragansett Laboratory.

On 30 September, Ken Sherman left for the ICES Annual Statutory meeting at Copenhagen, Denmark.

Carolyn Griswold attended a BLM Biological Task Force Meeting in New York City on 20 September. Lease areas in the Mid-Atlantic were discussed with emphasis on those tracts which bordered on canyons. "A Draft Plan for Assessing the Impacts of Acute Spills of Oil and Other Toxic Substances on Fishery Resources" was completed during September.

MANNED UNDERSEA RESEARCH AND TECHNOLOGY PROGRAM

No report received. September and October reports will be included in the November issue.

DIVISION OF ENVIRONMENTAL ASSESSMENT

Behavior of Marine Fishes and Invertebrates Investigation

In conjunction with Battelle Northwest Laboratories and under joint funding from the US Department of Energy, we are presently observing and defining behavioral responses of the blue crab to the presence of the water-soluble fraction (WSF) of crude oil. The results of these studies will be used as a baseline to establish a detection threshold for the WSF. Results from earlier studies have shown that the blue crab can detect napthalene at 10^{-7} mg/1. In addition we have been developing experimental systems to examine the behavior of these animals when exposed to oiled sediments. Sediment is an important factor in the crab's life history, related either directly or indirectly to feeding, mating, molting, predator avoidance, and overwintering. An understanding of the crab's behavior when presented with oiled sediments will allow us to predict the possible long-term effects that oil may have on a population.

Coastal Ecosystems Investigation

Much of our effort involved preparing for and beginning the second full-scale Ocean Pulse cruise, which is being conducted aboard Albatross IV from 19 September to 12 October. Frank Steimle is Chief Scientist on this cruise, and Tom Wilhelm, Chuck Idelberger, Greg Parker, Dave Radosh, and Clyde MacKenzie are each participating on a leg of the cruise. As of 29 September, sampling was slightly ahead of schedule, and adequate materials for Ocean Pulse physiology, biochemistry, genetics, and chemistry studies had been obtained at most stations. Frank and Tom also began preparing specimens from the first (April-May 1978) Ocean Pulse cruise for calorimetry measurements, and are continuing surveillance of dissolved oxygen conditions in the New York Bight. Oxygen values below 2 ml/l were reported at several inshore areas in late August and September; Tom and Greg confirmed these low readings while sampling in areas 3-9 mi off Manasquan and Seaside, NJ, aboard a Coast Guard vessel. The oxygen depressions were not as severe or extensive as in the two prior years, and there was some evidence that water-column mixing was increasing bottom concentrations by mid-September.

Jan Caracciolo completed work on a benthic data set based on a 1973 reconnaissance survey of the New York Bight apex for the MESA program. With submission of these data, we fulfilled the last of our original obligations to provide benthic data to MESA. Jan is currently working on the polychaete section of an atlas of distributions and life histories of Bight benthic invertebrates. Under a new MESA contract, we are processing benthic samples taken along the Hudson Shelf Valley axis, to determine faunal changes with distance from ocean

disposal in the uniformly muddy substrate of the shelf valley. Ann Frame is supervising workup of these samples, while Dave Radosh is continuing to analyze impacts and recolonization of benthos following the 1976 anoxia off New Jersey.

Knee McNulty is working on the Center's oil spill response plan, and also on a manuscript concerning the benthic macrofauna of the Bight apex. Bob Reid is preparing a report on benthic macrofauna distributions and fluctuations in Long Island Sound. Bob and Greg Parker are assisting the Atlantic Environmental Group in attempting to track radio buoys deployed at Deepwater Dumpsite 106 off southern New Jersey. We submitted a quarterly report to BLM on progress of "baseline" (pre-oil development) finfish, ichthyoplankton, benthos, and pathobiology studies in the Middle Atlantic Bight. The benthos task was completed with submission of a revised final report to BLM.

Biological Oceanography of Stressed Environments Investigation

In early September, the phytoplankton biomass study (PBS) and primary productivity groups completed their first cruise aboard the Soviet R/V Belogorsk. On this cruise, PBS sampling procedures were changed. Instead of freezing chlorophyll samples and analyzing them at the Sandy Hook Laboratory, all samples were processed in the field. This procedure proved highly successful, but resulted in the need for modification of field equipment. Most of the activity this month focused on redesign and modification of equipment so that chlorophyll samples could be processed more efficiently in the field. Remaining samples from the Soviet R/V Argus May cruise were processed. Eleven stations from the summer Albatross IV cruise were analyzed.

Primary productivity and chlorophyll samples were taken on the second full-scale Ocean Pulse cruise which left on 19 September. Twenty stations were sampled.

Myra Cohn completed preparation to begin a study to identify and enumerate phytoplankton species at selected PBS stations from Cape Hatteras to Nova Scotia. This is part of a cooperative study with Dr. Harold G. Marshall of Old Dominion University.

Environmental Chemistry Investigation

Douglas R. Wenzloff died at age 34 on 6 September 1978. He will be missed greatly by those in the Investigation, Division, Center, and Service. He provided the stability and continuity necessary to achieve good, quantitative data on trace metals in the marine environment and made significant achievements since his arrival at the Milford Laboratory in 1971. Doug was working on an important paper dealing with trace metals in clams of the north and mid-Atlantic coast of the US. This paper was accepted by Fishery Bulletin and should appear in the spring of 1979.

Physiological Effects of Pollutant Stress Investigation

Physioecology

Experiments with surf clam embryos exposed to seven heavy metals have been temporarily interrupted because of poor viability of the gametes. This experiment will be continued as soon as gamete viability improves.

Two experiments to determine the effect of zinc on embryos of the American oyster held at different salinities were performed this month, with inconclusive results. In both experiments there was higher abnormality and mortality in the high salinity controls (27.5 °/oo) than in low salinity controls (17.5 °/oo). No explanation for this can be given at this time.

Physiological Effects

The effort this month concentrated on a continuation of laboratory studies of metal effects on the metabolism of bivalves and examination of a second sample of mussels collected by the federal EPA as part of a cooperative study. The remainder of the month was spent on annual leave, jury duty (Margaret Dawson) and preparation for the September Ocean Pulse cruise on the Albatross IV.

Biochemical Effects

Attention this month focused on manuscript preparation. Bench work concentrated on examination of scallop adductor muscle taken from oil-exposed animals in collaboration with the federal EPA's Narragansett Laboratory and from animals taken during our scallop and bottom trawl survey cruises and packaged for us by the Woods Hole Laboratory. The past few months have produced tissue preparations comparatively low in protein and MDH activity, as compared with last year's scallop survey data.

Anaerobic Bacteriology/Metabolism

Sampling in Long Island Sound was performed to develop and analyze methodologies to be employed on the Albatross IV Ocean Pulse cruise. Prelimmary examination of samples showed high bacterial counts. Characterization indicated some Clostridia other than C. perfringens to be present.

Characterization of bacterial isolates from the spring Ocean Pulse cruise aboard the R/V Researcher was completed.

Ocean Pulse

This investigation (Fred Thurberg, Jack Graikoski, Margaret Dawson, David Nelson, Barry Nawoichik, Susan Schurman, Kenneth Buckland, and Martin Kent) participated in the Ocean Pulse cruise aboard the Albatross IV. A 1-day cruise was also made in Long Island Sound aboard the Shang Wheeler to demonstrate Ocean Pulse techniques to our new students and temporaries who participated in the Albatross IV Ocean Pulse cruise.

Meetings, Talks, Visitors, Publicity

On 14 September, Dr. John Pearce and Frank Steimle met with Dr. Alex Malahoff of the National Ocean Survey (NOS) in Washington, DC, to discusss NOS involvement in Ocean Pulse.

Dr. Anthony Calabrese met with the MURT group at Woods Hole on 19 September to discuss Ocean Pulse activities.

On 27 September, Bob Reid described Division of Environmental Assessment programs (with emphasis on ocean dumping studies) to Dr. David McGuire of Upsala College (NJ) and 20 students of his environmental science course.

The Physiological Effects of Pollutant Stress Investigation hosted a zoology class from the University of Massachusetts on 28 September. The group toured the Milford Laboratory and made some sample collections from the Shang Wheeler.

Manuscripts

MacKenzie, C. L., Jr. Relation of biological and environmental factors to clam management. Proc. Conf. Northeast Clam Industries, Hyannis, MA, 27-28 April 1978. (A)

MacKenzie, C. L., Jr. Biology and fisheries data on sea scallop Placopecten magellanicus (Gmelin). NMFS, NEFC Sandy Hook Lab. Tech. Ser. Rep. No. 19. (S)

Pearce, J. Trace metals in living marine resources and their habitats; Northwest Atlantic waters. Proc. Internat'l Workshop on Monitoring Environ. Materials and Specimen Banking, Berlin, West Germany, 23-28 October 1978. (S)

AQUACULTURE DIVISION

Spawning and Rearing of Mollusks Investigation

A final tabulation of growth data of surf clams maintained in raceway systems shows substantial increases in length and weight between May and August. By logarithmically transforming the change in length or weight over biweekly intervals, the percent increase in growth per day can be calculated. This value, designated as K, enables comparison of growth at various times throughout the growing season. K values were plotted versus time. Periods of optimal growth were identified. During the 1978 summer growing season, best growth occurred during the first two weeks of June. At this time, temperatures averaged 16°C and chlorophyll-a values were approximately 10 µg/l. Daily fluorometric readings through the optimal growth period steadily increased and then fell sharply. Correspondingly, the rate of growth decreased by 60% in the following biweekly interval. It is speculated that the period of optimal growth occurred during a phytoplankton bloom and terminated as the bloom dissipated.

Experiments are in progress to determine optimum stocking densities for seed-scallop production from our pumped raceway system. Recent observations show that at phytoplankton levels averaging 6 µg chlorophyll-a/1, biomass doubled (in a 2-wk period) in raceways with low stocking densities, but biomass increased only marginally in heavily populated raceways. More specific calculations will be made of the food requirements for juvenile bay scallops, as the experiments continue.

Cooperation with the Prince Edward Island Department of Fisheries is continuing in an effort to assess the possibility of introducing bay scallops into that area. A sample of some of our hatchery-reared seed scallops was sent to the Oxford Laboratory for necessary examination before shipment of scallops can be made to the quarantine system established on Prince Edward Island.

Aquacultural Genetics Investigation

Heritability and Family Selection

During the spring and summer of 1977, 43 full-sib families of the American oyster were established for the dual purpose of estimating genetic variation in commercially important traits (growth rate, meat weight, etc.) and to provide family stocks for family selection of meat weight. Subsequent loss has reduced the number of familes to 27. Data on shell size, whole animal weight, and wet and dry meat weights from these animals, now 1 yr of age, are being collected. Twenty-four families have been measured. Statistical computations and analysis of genetic variation have not yet been completed. However, basic parametric estimates based on samples of 50 animals from each family are complete. Family means for wet meat weight range from 2.04 ± 0.77 g to 0.32 ± 0.17 g. Means for dry meat weight range from 0.13 ± 0.05 g to 0.04 ± 0.01 g. Part of this variation is due to seasonal variation. Oysters spawned in the early spring of 1977 tend to be larger and heavier than those spawned in mid-summer of 1977. Correction for this will be made by using absolute values, i.e., proportion of dry meat weight to whole animal weight, for selection purposes. This value ranges from 0.0300 to 0.0176 and shows no seasonal variation. Genetic variation will be determined among families spawned on the same day. This will involve three such family groups, each group consisting of at least six families.

Experimental Crossbreeding with the Commercial American Oyster

Larval American oysters from hybrid crosses between local and Gulf Coast specimens have survived to metamorphosis. Stripping and spawning techniques were used to obtain gametes for the crosses. Initial crosses were poor and resulted in low survival. However, at the same time, larval survival in local non-hybrid crosses was also quite poor. This generally poor survival in early cultures for both groups was reflected in an unsuccessful small-scale experiment to test for possible differential resistance between hybrid and non-hybrid oyster embryos to a known bacterial oyster pathogen. Additionally, non-local control larvae, from a mass spawning of the Gulf Coast oysters in their native water, failed to survive beyond a week in the laboratory. These larvae appeared well and active on first arriving in two test tubes via special delivery. Some larvae from the successful hybrid cultures have manifested better survival and growth (the traits being emphasized for improvement through crossbreeding trials for possible heterosis) than local controls. Sufficient hybrid larvae were obtained for conical rearing where the effluent is exposed to the recently completed ozone-UV quarantine system. Cultures have been sampled for cytogenetic examination and for other studies, such as scanning electron microscopy, immunology, and biochemistry.

Meetings, Talks, Visitors, Publicity

S. Stiles attended the symposium, "Biological and Legal Aspects of Introduction of Exotic Species for Marine Mariculture: *Crassostrea gigas* - A Case History with Implications for Other Fisheries," held at the Woods Hole Oceanographic Institution during 18-20 September.

Mr. Rafael Robles, Director of the Institute of Oceanography in Vigo, Spain, and his family visited the Milford Laboratory.

Ed Rhodes participated in a workshop on the importation of exotic species for mariculture purposes held at the Woods Hole Oceanographic Institution.

Manuscripts

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

PATHOBIOLOGY DIVISION

Comparative Pathobiology Investigation

A service sample of oysters from Montauk, NY, was received and processed for histopathologic examination. Gonadal infection with papovavirus was noted in one animal; however, no other pathogens were observed, although inflammation and cirroidosis were in high prevalence. Two service samples of scallops from New England also were received and processed for microscopic examination. Use of the thioglycolate technique showed that Labyrinthomyxa-like organisms may be associated with muscle lesions.

As part of a survey project to study neoplasms in Chesapeake Bay shellfish, field samples of Macoma balthica were collected from stations in the Tred Avon River, MD. Thioglycolate cultures of the clam tissues indicated that all animals from these stations were infected with L. marinum. Sediments were also collected from these areas, processed, and frozen for future chemical analyses. Gram stains on M. balthica tissue sections from previous collections revealed the presence of two different gram-negative organisms--one infecting connective tissue fibers and the other muscle tissue.

In molluscan virus studies, a lesion was observed in an oyster from Delaware Bay which contains inclusions consistent with herpes-type virus infections. The block will be deparaffinized for electron microscopy. Thick sections from a hard clam with a gonadal neoplasm being prepared for electron microscopy were examined. Intranuclear inclusions were present which are also very suggestive of herpesvirus infection.

A new method of recording pathology and parasitology by a unique coding system has been developed and implemented. The system should be compatible for computerization of data and will permit rapid and quantitative recording of all types of lesions according to tissue type and location.

With the help of Tom McKenney at the Narragansett Laboratory, almost all larval fish collected at the Ocean Pulse station Deepwater Dumpsite 106 have been identified. Approximately 100 species have been collected on the three cruises conducted to date. Examination of the larvae for gross abnormalities is almost complete, although histologic examinations yet must be made. With the exception of several larvae exhibiting either scoliosis, exostoses, and ophthalmic scleral granulation, the larvae appeared essentially normal.

Determination of serum total protein, albumin, blood urea nitrogen, sodium, potassium, and osmolality for normal and spinning Atlantic menhaden is continuing. Determination of serum calcium must await receipt of a standard for calibrating the flame photometer. There are differences between normal and spinning menhaden for both total protein and potassium; however, additional control sera must be analyzed.

During the month 843 blocks were cut and 1,697 slides were stained from a large variety of marine fishes, crustaceans, and mollusks.

Disease and Environmental Stress Investigation

Six cruises were conducted in the New York Bight to collect winter flounder (6, 12, 13, 19, 20, and 26 September). A total of 370 winter flounder were examined for the presence of fin rot disease; 3 (0.8%) of the fish examined had fin rot. No epidermal papillomas were noted on any of the fish examined. Because of poor weather, only one cruise was conducted at the sewage sludge site in the MESA apex (20 September) and only 13 winter flounder were examined; 9 had fin rot. Five cruises were conducted in Sandy Hook/Raritan Bay (12, 13, 19, 20, and 26 September) and 357 winter flounder were examined; 3 (0.8%) had fin rot.

Rock crabs were collected from Sandy Hook Bay in July to test the hypothesis that at this time of year crabs are scarce and gill fouling is at its peak. Only seven specimens were obtained from five 20-min tows. Four were small, newly molted males with clean gills and three were adult males with totally discolored gills; histologically all three had areas of gill necrosis. Histological examinations made during this reporting period showed that six of the seven had sessile peritrich and suctorian ciliates attached to their gill surfaces. One adult male had a massive infestation of the suctorian Acineta sp.; 726 organisms were counted on one stained section. Previously, the highest count was 573 organisms observed on a rock crab collected in October 1975.

Aquaculture: Control of Larval Disease Investigation

Twenty ozone-UV disinfection tests of the 300-gal quarantine system were completed. Fifteen tests were used to check disinfection of normal bacterial flora in 10-μ filtered seawater. Five additional tests were completed to check disinfection of effluent from larval rearing tanks containing the hybrid cross of Crassostrea rhyzophorae and C. virginica. The numbers of bacteria in effluent which was treated for 80 min were determined by plating samples at 10^{-1} -10^{-4} dilutions on OZR media. No bacteriological colonies appeared after a 7-day incubation period of the 80-min treated samples, whereas counts of 10^5 cells/ml were frequently found in the untreated effluent.

A new water table was installed. During the week's installation period, all water was off allowing only four oyster larval challenge experiments. Purified red pigment from a pathogenic red Pseudomonas sp. was tested against fertilized oyster eggs and found to be toxic.

Much of the month was spent in manuscript preparation and data analysis.

Techniques developed for working with phagocytic cells of larval oysters are now being used to examine two areas of potential usefulness in molluscan aquaculture. Relative vigor of larval phagocytes from interspecific or geographic oyster crosses is being examined as a possible predictor of disease resistance and/or survival of larvae and spat. Cooperative work has been initiat with Dr. K. Kanunga of Western Connecticut State University to examine the abilit of larval phagocytic cells to divide and establish cell culture lines. If dividing cells can be maintained, they may have great practical usefulness in diagnosing oyster viral diseases and in studying immunity.

Work is continuing on a technique to isolate and harvest large numbers of larval phagocytes. At least 25% of the cells removed from the surface of plastic cell-culture dishes with a capillary-sized jet of seawater can reattach to plastic surfaces; however, there is evidence of some cell damage. Survival of these cells will be compared with that of enzymatically removed cells.

Meetings, Talks, Visitors, Publicity

Drs. Rosenfield and Johnson attended the XIth Annual Meeting and International Colloquium of the Society for Invertebrate Pathology held in Prague, Czechoslovakia, during 10-17 September. Dr. Johnson presented a paper titled "New Information on Viral Diseases of the Blue Crab, Callinectes sapidus," and Dr. Rosenfield presented a paper titled "Molluscan Imports and the Introduction of Molluscan Disease Organisms." Dr. Johnson was installed as Vice President (President Elect) of this Society of approximately 650 members representing over 30 countries; Dr. Rosenfield is Permanent Program Chairman for the Society.

Drs. Rosenfield and Blogoslawski attended the Crassostrea gigas workshop at the Woods Hole Oceanographic Institution in Woods Hole, MA, during 18-21 September, where Dr. Rosenfield presented a paper.

The work of Dr. Robohm in identifying a bacterial pathogen of striped bass in Long Island Sound was a featured article in the September 1978 edition of the "Salt Water Sportsman."

Ms. Ann Charles, Mr. Morris Ellison, and Mr. Tony Laudadio completed their temporary assignments at the Oxford Laboratory on 30 September. Mr. Daniel Russo and Mr. Val Anderson completed their temporary assignments at the Milford Laboratory and Sandy Hook Laboratory, respectively.

Ms. Patrice Hambleton's temporary assignment was extended to December.

Dr. Murchelano left for Japan as part of the US-Japanese Natural Resources Aquaculture Group to present his work on the development of the National Registry of Marine Pathology.

Visitors to the Oxford Laboratory during September included Dr. and Mrs. Max Gabe, Venice, FL; Mr. Rubin Borasky, Silver Spring, MD; and Mr. Charles Sheldon and Mr. A. B. Charles, Development Sciences, Inc.,Sagamore, MA.

Manuscripts

Ziskowski, J. J., V. T. Anderson, Jr., and R. A. Murchelano. A bent fin ray condition of winter flounder, Pseudopleuronectes americanus (Walbaum), from Sandy Hook and Raritan Bays, New Jersey, and Lower Bay, New York. Copeia. (S)

RESOURCE UTILIZATION DIVISION

Fisheries Engineering Investigation

Fisheries Engineering

Construction of the Center's new 60-inch shellfish assessment dredge is under way locally. A contract has been let and construction has begun on the new electric cable winch to supply power to the submersible dredge-mounted pump. A number of miscellaneous system components such as electric motors, hydraulic pumps and motors, bearings, chains, etc., were specified and ordered this month. Design work on the revised Delaware II stern ramp handling system to accommodate the new larger dredge is scheduled for completion in mid-October. Due to a shortage of personnel, further design work on dredge instrumentation must wait until that time.

Rorqual renovation slowed this month and was mostly limited to a few after-hours volunteer painting sessions. The vessel is coming along very well and, if funding can be made available for deck equipment, it will be a valuable tool for Center programs. A trip was made to Sandy Hook, NJ, to pick up a number of miscellaneous Rorqual-related parts that had been removed from the vessel over the years.

Video tapes of underwater dredge performance, made last year during the successful dredge-study cruise, are being reviewed and edited as a possible aid to industry. Copies of some of the preliminary tapes are being sent to Ocean City, MD, as part of a presentation to local fishermen. The existing dredging system and the new system are to be explained and input from industry will be requested.

Preparations for the Gloucester Laboratory open house have begun. Engineering is putting together this year's prerecorded slide presentation explaining the laboratory and its programs.

Continuing our program of maintaining close contacts and developing new contacts with the harvesting industry, an additional trip was made this month on a Gloucester purse seiner to observe and participate in Atlantic menhaden seining operations.

Work is also continuing on a small gear shed to hold and protect our increasing supply of nets and fishing gear. Our critical storage problem was made worse this month by the necessary vacating of storage space at Otis Air Force Base on Cape Cod.

Process Engineering

Freezer No. 4, part of the Gloucester Laboratory's experimental freezer system, has had both the freezing and defrosting systems restored and updated. The freezer, currently undergoing testing, is designed to cool and defrost simultaneously while closely maintaining a constant temperature.

A prototype divergent roller system to test fish sorting by size is being completed and a program will begin next month to gather sorting data on specific species.

The shellfish program was assisted this month by reconditioning pumping equipment in the fish tank building used for experiments with live animals.

Resources Development and Improvement Investigation

Storage of Blue Mussels

The attempt to salvage last year's protein data proved unsuccessful. There was no correlation found between the autoanalyzer results, including results corrected for turbidity, and the Kjeldahl results.

With John Davies' assistance, all the mussel data was put on the computer to aid in the manipulation of one and one-half years' worth of mussel data.

Mechanically Reformed Crab Meat

The Bock Model No. 300 extruder has been taken out of dead storage, cleaned, and is now being used to make crab meat lumps mechanically. A preliminary run was successful in producing alginate-treated red crab lumpmeats. Three different extrusion heads were tried. The alginate-treated meats were extruded directly into a bath of 5% calcium chloride. A round head (0.5-inch) produced

119 pieces of small cylindrical lumps weighing 2.4 g each. Production was 7,140 lumps per hour, weighing 37.6 lb. A small rectangular head (0.75x0.44 inches) produced longer lumps averaging 4.6 g each. Production was 6,480 lumps per hour, weighing 65.7 lb. A longer rectangular head (2.00x0.38 inches) produced lumps averaging 6.5 g each. These lumps looked much like crab legs. Production was 6,780 lumps per hour, weighing a total of 97 lb. This machine can be modified to accept seven heads, thus increasing production sevenfold. Experimental work is now in progress both with alginate-treated cooked meats as well as steamed or hot-water-treated lumpmeats.

Guaranteed Quality

Because of poor weather and the enforced quotas governing fishing, we have been unable to obtain 1-day old Atlantic cod for our test panel. As soon as fish of the required freshness are available again, a frozen storage study will be done using Grade A fish packaged in plastic trays overwrapped with plastic film.

Air Cargo Research Institute plans to ship us more Virginia fish for our taste panel and for grading by the Inspection Service. The ultimate in stress-testing will be the shipping by air of samples of Virginia fish to London and thence to the Torry Station. While not familiar with these American species, it will be of interest to see how Torry rates the fish against that of our panel.

The DeMoulas Supermarkets have US Grade A fish in all retail outlets and plan to put on a strong advertising campaign for US Grade A fish in their stores. It will coincide with the advent of colder weather, and the effect on sales will be watched closely. A disastrous possibility would be sharply increased demand, but failure to produce by reason of lack of supply.

New Product Development

The Channel Fish Company has completed about one-half of the minced blocks under contract using the modified LaPine heading and cleaning machine. The pan-ready form (dressed, reverse butterfly type of product) is scheduled next. Lack of fresh, small silver hake and an electronic circuit control board failure are presently causing a temporary delay. The control board is being repaired and will be reinstalled in a few days. Fish sticks made from the minced silver hake blocks were taste-tested and received a rating of fair to borderline. These will be compared with minced sticks made from very fresh fish and with sticks made from fillet blocks.

Blue Crabs

Taste tests are continuing on pasteurized alginate as well as steam-formed lumpmeats held at 33-35°F. After 3 mo of storage, pasteurized lumpmeats made from steamed roller-extracted meats have spoiled. The alginate-formed meats are of good quality and do not differ significantly from commercial lumpmeats.

Study No. II on the quality of roller extracted pasteurized blue crab meat was begun.

Surf Clams

Surf clams grown at the Milford Laboratory were picked up at the EPA's Narragansett Laboratory where they had been depurating for 19 days. Raw and hot-dipped clams were put up for storage and an initial taste test was run. Each month, protein, fat, and moisture analyses will be run along with similar tests for mussels.

Product Quality, Safety, and Standards Development Investigation

Silver hake fillet blocks were still acceptable in flavor and texture after 40 mo storage at -5°F. These blocks did not have any protective film overwrap other than the standard waxboard block carton and were severely dehydrated at the surface. For organoleptic evaluation, the dehydrated layer was removed and only the inner portion of the block was sampled. This would indicate that with proper packaging and storage temperature, a reasonably long shelf life is feasible with frozen silver hake.

After 3 mo storage at 0°F, the flavor of South American hake (Merluccius hubbsi) was found to be notably protected from rancidity by the addition of sodium erythorbate. This was more apparent in the product stored as precooked sticks compared to raw blocks. Thus far, saberizing appears to be equally effective in stabilizing flavor during frozen storage as the erythorbate treatment; however, the combined process of saberizing and treating with erythorbate does not seem to offer any additional benefit at this time.

A study was initiated to determine the frozen storage life at 0°F of bluefish fillets packaged either in an air atmosphere, in polyethylene (oxygen permeable), or under vacuum in Cryovac bags (oxygen permeable). Although a strong domestic, commercial market does not exist for the species, the Japanese have expressed a keen interest. There is not much available information on the frozen storage characteristics of bluefish although it is recognized as being a fatty fish prone to developing oxidative rancidity.

A study was initiated to determine the reliability of the Torrymeter for measuring quality of iced whole silver hake. The usual organoleptic, chemical, and microbiological tests are being conducted parallel with Torrymeter readings.

Mike Allsup demonstrated the use of the Torrymeter at Golden Eye Seafoods in New Bedford, MA. That company will be field testing the instrument over the next 2 mo.

We have received our Instron 1132 Universal Testing Machine. Preliminary testing will begin shortly to determine optimum testing methodology for measuring minced fish texture.

SDS electrophoresis of silver hake myofibrillar proteins, using a disc gel electrophoresis apparatus, has worked out very well. We recently purchased an LKB Multiphor for isoelectric focusing and will also use the multiphor for SDS electrophoresis in thin-layer gels. The methodologies are simpler and the results more reproducible than the disc method.

A manuscript on species identification by isoelectric focusing is being prepared for possible publication as a LKB Application Note.

Analysis was completed of sarcoplasmic proteins by isoelectric focusing from three authenticated shark species and a suspected hybrid shark species for Charles Stillwell of the Narragansett Laboratory. Although our results are

far from conclusive, they do seem to indicate that the suspected hybrid was closely related to one of the three known shark species. We hope these results will complement morphological studies being carried out on the subject.

Product Quality and Safety

Sixty-six extracts of cold-smoked Atlantic salmon have been analyzed by GLC. GC-TEA analyses of lake whitefish, cold-smoked Atlantic salmon, and spiked lake whitefish extracts have been completed. Eleven of these extracts will be further analyzed by HPLC-TEA for purposes of confirmation. Nitroso compounds to be confirmed by this technique are dimethyl, methylethyl, diethyl, pyrrolidine, and morpholine.

Workup of commercial lake whitefish samples from the Miami and Los Angeles areas is nearing completion. Whitefish samples from the Boston and Washington areas will be arriving shortly. We are planning to use a vacuum distillation technique for the isolation of volatile N-nitrosamines as a screening technique and to use the multidetection technique of the FDA for samples that contain levels of nitrosamines greater than 5 ppb. This will only be possible if both techniques give the same quantitations by the AFID detector. Also, the extract from the vacuum distillation should be sufficiently clean to be amenable for GLC analysis.

Product Standardization

John Ryan and Fred King participated in the 25-27 September Codex Working Group Meeting on breaded/battered fish fingers (sticks) and portions at Portsmouth, NH. Over 50 representatives from nine countries and the FAO Secretariat were in attendance. The proposed Codex Standard for these products was revised and recommendations were prepared for the Codex Fishery Committee Meeting to be held at Bergen, Norway, in April 1979.

On 14 September, Fred King participated in a meeting of the Armed Forces Product Evaluation Committee at NARADCOM in Natick, MA. In the area of seafoods, the discussion focused on the possibility of military procurement of canned pink salmon. Tom Billy of NMFS' Washington Office summarized the work that NMFS has done since this possibility was first mentioned 6 mo ago.

On 13 September Fred King participated in a discussion of NARADCOM's contract proposal with Mr. Wil Doyle of the Brand Group, Inc., in Chicago, IL. Mr. Doyle was the contractor for the previous series of contracts on comparative edibility characteristics of fish species. Also present were Tom Billy and Jim Brooker of NMFS' Washington Office.

Technical Assistance

Division personnel provided information and assistance on the following: mortality of lobsters in pounds; inspection of imported fish; labeling of canned clam meats; inquiry on an African grouper; data on stock assessment of silver hake; authentication of samples of whole frozen Greenland turbot; relation of dolphin to labeled maki-maki; lobster rearing; freezing of lobsters; chemical composition of fish and crustaceans; market sizes of fish; construction of lobster pots; fishing in Icelandic waters; squid; cod; dogfish; capsule review of the lobster fishery; labeling of Pacific hake as Pacific whiting; dehydration of local squid for a

Chinese broker; showing university students how to make and dry menhaden fish meal; how to clean and salt eels for smoking; evaluating smoked eels; handling and smoking of silver hake, Atlantic herring landings and processing; new products from minced fish; handling squid; pictures of fishing vessels; providing minced silver hake salad, red crab salad, and marinated squid for use at the NEFC News Media Workshop; scientific names of hakes; preparation of dried fish; source of sea scallops.

Meetings, Talks, Visitors, Publicity

Fred King participated in the New England Task Group Meeting to discuss NARADCOM involvement in measuring comparative edibility of seafood products.

Kurt Wilhelm and Burt Tinker visited the Stonington Lobster Coop in Stonington, ME, to talk about the microbiological problems the Coop is having with hand-picked rock crab meat.

Joe Licciardello and Louis Ronsivalli attended the Sixteenth Annual Underwood-Prescott Memorial Award Presentation at MIT in Cambridge, MA. The topic was "Food and Its Effect on the Quality of Life."

Louis Ronsivalli participated in the NMFS/FDA Meeting in Washington, DC, to discuss the results of the MIT report on the carcinogenicity of nitrites in foods and to explore courses of action to circumvent the potential hazard.

Perry Lane participated in meetings of the NEMAS Task Group on Communications and the NEMAS Board of Directors.

Mr. Hideo Adachi, representative from Tokyo Maruichi Shoji Co., Ltd., visited the Gloucester Laboratory to discuss fishery items of common interest.

Leon Brandshaw from the California Division of Measurement Standards visited to discuss a test for measuring net weight of IQF shrimp.

Mr. Ernest Newberry, Group Development Manager, Irwin and Johnson, Republic of South Africa, visited and exchanged information on minced fish. He was accompanied by Mr. Swartzchild of Specialty Products, Inc., of New York City.

NATIONAL SYSTEMATICS LABORATORY

Shrimps Investigation

Studies continued on the systematics of the genera Sicyonia and Penaeopsis.

Other Crustaceans Investigation

Preparation continued of a guide to temperate-water decapod crustaceans of the US east coast.

Benthic Fishes Investigation

Data were revised on western Pacific gadiform fishes in preparation for a study trip to Japan. A meeting was participated in to plan submersible dives in the Galapagos deepsea thermal vent area.

Pelagic Fishes Investigation

Research continued on the systematics of Spanish mackerels and Indo-West Pacific halfbeaks. Preliminary work was conducted on the classification of snake mackerels (Gempylidae) and cutlass fishes (Trichiuridae).

Meetings, Talks, Visitors, Publicity

Dr. Bruce Collette taught a graduate-level ichthyology course at the Marine Science Institute of Northeastern University in Nahant, MA. Dr. Collette presented a seminar on the results of the Tektite Program at the Field Museum of Natural History in Chicago.

Three visitors from Poland including Dr. Leonard Ejsymont, Director of the Plankton Sorting Center, and Marilynn Seymour of the Narragansett Laboratory toured the Systematics Laboratory. Dr. Ejsymont is also interested in the taxonomy and ecology of the sand lance (Ammodytes).

Manuscripts

FAO Species Identification Sheets for Fishery Purposes. Western Central Atlantic. Fishing Area 31. 7 vols. (P). Systematics Laboratory staff prepared the text for shrimps (I. Perez Farfante), crabs, (A. Williams), and a number of families of bony fishes (Argentinidae, Brotulidae, Gadidae, Moridae, Ophidiidae - D. M. Cohen; Batrachoididae, Belonidae, Coryphaenidae, Hemiramphidae, Lampridae, Pomatomidae, Rachycentridae, Scombridae, and Xiphiidae - B. B. Collette).

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 October 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-August and mid-September. Eddy S moved southwest about 70 nautical miles (nm) to a position just east-southeast of Wilmington Canyon, eddy U moved west-southwest about 45 nm to a position south-southeast of Atlantis Canyon, and eddy W moved west-southwest about 45 nm to a position southeast of Lydonia Canyon. In addition, eddy X entered the monitoring area about 150 nm southeast of Georges Bank. The center positions of the four eddies in mid-September were as follows: S - 38°10'N, 72°30'W; U - 38°50'N, 69°55'W; W - 39°00'N, 66°30'W; and X - 39°00'N, 65°00'W. These eddies can be expected to continue moving southwestward about parallel to the shelf edge at about 1-5 nm per day, until reabsorbed into the Gulf Stream.

During September the cooperative Ship of Opportunity Program obtained five XBT transects: one in the Gulf of Maine; one across the Southern New England shelf along the 70°W meridian; one 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 between New York and Deepwater Dumpsite (DWD) 106. A continuous plankton record was collected northeastward from Norfolk, VA. Plans have also been finalized with Seahorse, Inc., and their contractors, Texaco, Inc., and Exxon, Inc., to use supply ships travelling between Quonset Point, RI, and the area of Baltimore Canyon to obtain monthly continuous plankton recorder (CPR) records. Legal details had to be worked out, postponing the initiation of this route until October.

A final report was completed and submitted to the NMFS/SEFC Galveston Laboratory on studies of dispersion and transport of potential contaminants from outer continental shelf petroleum operations (Buccaneer Field studies). AEG's investigation was conducted by Reed Armstrong and amounted to analyses of: (1) 1 yr of current meter and wind records; (2) 2 yr of records of movements of drifting transponding buoys; and (3) results from a series of dye diffusion studies. This research was part of an EPA-sponsored investigation of a developed oil field in the northwestern Gulf of Mexico with the Galveston Laboratory managing the project. Results from AEG's effort will be used by other contractors during the next year for developing predictive models of movement and spread of contaminants that may be released into the marine environment from offshore petroleum operations.

Ocean Dumping Investigation

Revisions are being completed on a paper titled "Physical Variability at an East Coast United States Offshore Dumpsite." This paper has been accepted for publication by the 1978 Ocean Dumping Symposium and will appear in the symposium volume, but will not be presented at the meeting.

Work will soon begin on the cruise reports from the 1978 efforts at DWD 106. Quality control and plotting routines are at present being applied to these data sets. Some of these data have already been entered into the Ocean Dumping data base, while others will be added shortly.

A meeting between NOS staff and Public Health Service officials was held 6 September at Davisville, RI, to finalize plans for the October cruise to the Philadelphia sewage site aboard the Albatross IV. During 19-26 September Jim Bisagni took part in a joint EPA - NOAA cruise to the Philadelphia site to conduct intensive bottom sampling. Ten cores were taken by NOAA personnel to be used in conjunction with mineralogical and sedimentological studies. Other cores will be taken by Duane Simpson aboard the Albatross IV during the 6-11 October cruise to the site.

Two radiosonde drogued buoys were successfully launched from the Rebecca K within DWD 106 on 28 September. The buoys are being tracked at shore stations in the vicinity of Sandy Hook, NJ, and Cape Henlopen, DE, about 140 nm away.

Meetings, Talks, Visitors, Publicity

Steve Cook attended an Awards Committee meeting at Woods Hole on 7 September.

On 8 September, Woody Chamberlin went to Woods Hole to confer with Soviet scientists.

Gertrude Kavanagh attended a Travel Seminar at Woods Hole on 14-15 September.

Grayson Wood traveled to Washington, DC, to visit the Coast Guard Oceanographic Unit to receive training on the RS7-B salinometer and to Columbia, MD, to visit Oxford Medilog, Inc., during 17-21 September.

Jim Bisagni participated in an 8-day Ocean Dumping cruise to the 40-mi sewage sludge site from 18 to 26 September.

Mert Ingham and Jack Jossi traveled to the Models Branch of the Climatic Impact Assessment Division (EDIS-NOAA) at Columbia, MO, on 26-28 September to confer with CIAD staff on a proposed cooperative fisheries climatology monitoring study.

On 25 September, Woody Chamberlin went to Miami, FL, to confer with personnel at the Atlantic Oceanographic and Meteorological Laboratory and SEFC and returned on 30 September.

Manuscripts

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)