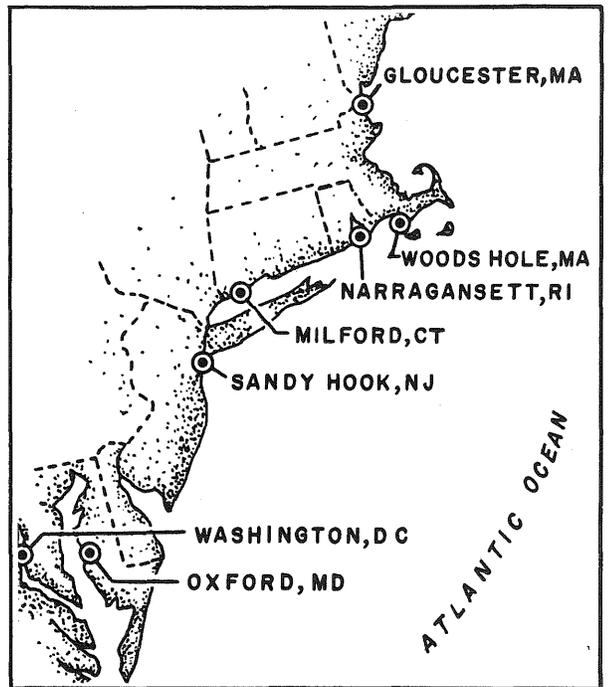


NEFC

Northeast Fisheries Center

NEWS

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



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

CENTER DIRECTORATE

Environmental Management Office

A definitive draft of a Program Development Plan for the Northeast Monitoring Program (NEMP) was completed by a NOAA interoffice group including Jack Pearce, Carl Sindermann, and Mert Ingham from NEFC, and Doug Lipka from the NMFS Office of Science and Environment. The 67-page document was prepared for consideration by the NOAA hierarchy, and includes integration of all ocean pollution activities in the Northeast into a single program. Ocean Pulse, an NEFC initiative, is the principal component, with contributions from the NOAA Office of Research and Development (Marine Ecosystems Analysis Program (MESA) New York Bight Project) and Office of Oceanic and Atmospheric Services (Ocean Dumping Program). An initial test phase of the program is planned to begin in July 1980.

Fisheries Utilization Office

Past reports by consumer advocates have disparaged NMFS for its activities in seafood quality and inspection. Recently, however, a Consumer's Union (publishers of the 2.5-million monthly issues of Consumer Union Reports) official has lauded the efforts of NMFS. He has stated that, "You (NEFC) have done as much or more than anyone to improve the quality of such products (fresh fish)."

Special Scientific and Technical Projects Office

Several meetings were prepared for and attended by Ron Smolowitz, including the NEFC Vessel Committee, a contractor's conference discussing the bid on the new Woods Hole pier, and the RUFUS II workshop in Bay St. Louis, MS.

Data from January's surf clam/ocean quahog stations in the marked clam/quahog test area were compared with previous tow data from that area. Work continued on the sea scallop project including the design and construction of a new scallop sampling trawl.

Technical Information Office

A proposed workshop on the fisheries biology of Cancer spp. crabs is scheduled for 21 and 22 April in Portland, ME. For more information (on attending, giving papers, etc.) contact Jon Gibson.

RESOURCE ASSESSMENT DIVISION

Resource Surveys Investigation

The final leg of the winter clam cruise aboard the NOAA R/V Delaware II was finished on 10 February, after completing 229 dredge stations. Chuck Byrne was chief scientist and Andrew Thoms and Dennis Hansford (a new member of the Technical Standardization Unit) also participated on this leg.

Henry Jensen participated between 27 January and 14 February with scientists from the Rhode Island Division of Fish and Wildlife on a yellowtail flounder bottom trawl survey. This survey was partly funded by the Pt. Judith (RI)

Fisherman's Co-op and consisted of several 1- and 2-day trips aboard the F/V Friesland out of Pt. Judith. Forty bottom trawl stations were completed from Shinnecock Inlet, Long Island, east to the Great South Channel between depths of 25 and 40 fm. The survey represented the first time in recent years that components of the fishing industry had volunteered to put its own resources into addressing assessment problems. This assistance was genuinely beneficial.

Linda Despres made a yellowtail flounder sampling cruise aboard the Polish R/V Wieczno during 11-16 February. This survey was conducted in the same area as the NEFC Rhode Island yellowtail flounder survey; fish were sampled for age, growth, and maturity. Live yellowtail flounder were also brought back to the Woods Hole Laboratory for a food habits study.

Donald Flescher and Malcolm Silverman participated as the fish survey specialists in the Ocean Pulse-petroleum hydrocarbon survey aboard the NOAA R/V Albatross IV from 4 to 18 February. Donald Flescher also video taped highlights of this cruise using a recording system assembled by Patrick Twohig.

Pat Twohig installed an expendable bathythermograph (XBT), television, and Loran "C" systems aboard the Wieczno. Pat continued to work on the installation of the CAMAC (computer-automated measurement and control) data logging system on Albatross IV. It is scheduled to be operational by June 1980.

Evelyn Howe and Eva Montiero continued routine work on survey cruise data coding and computer processing.

Linda Despres gave a microscope demonstration and slide presentation on fish pathology. This is one more step in acquainting scientists with the various fish disease conditions they will be looking for on upcoming survey cruises as part of a cooperative effort with the Pathobiology Division.

While the Delaware II was in the shipyard, the crew helped Warren Handwork prepare Yankee No. 41 trawls for the spring bottom trawl survey cruises.

Tom Azarovitz, Liz Bevacqua, Chuck Byrne, and Harold Foster continued working on the Bureau of Land Management (BLM) final report.

John Nicolas and Andrew Thoms were involved in the preparation of gear and charts for the spring bottom trawl survey and other upcoming cruises.

Jim Crossen was a member of the editorial group of the book, Findings of the Scientific and Technical Specialists: A Critical Review. This book is a report on the meeting on hydroacoustical methods for the estimation of marine fish populations held in Cambridge, MA, in June 1979.

Fishery Biology Investigation

Age and Growth

Kris Andrade completed aging the remaining haddock samples from the fall bottom trawl survey cruises (Albatross IV Cruise No. AL 79-12 and Delaware II Cruise No. DE 79-10) and sent the age sample sheets to the Woods Hole Laboratory Automatic Data Processing Unit (ADP) for keypunching. She also began examining edges on redfish otoliths with Vi Gifford as a part of the age validation study that Vi is working on.

Vi Gifford set up procedures for evaluating edge conditions on the redfish otoliths to be used for the age validation study and then began examining the otoliths, first by herself and then with Kris.

Judy Penttila checked summaries of Atlantic cod age samples from the spring bottom trawl survey cruises (Albatross IV Cruise No. AL 79-03 and Delaware II Cruise No. DE 79-04) and sent the age sample sheets to ADP for keypunching. She

also completed aging the following yellowtail flounder samples: State of Rhode Island inshore bottom trawl survey (33 fish aged); the complementary Wieczno Cruise No. 80-01 (63 fish aged); and first quarter 1980 commercial landings (January, Area 51 - 361 fish aged; February, Area 51 - 50 fish aged).

Finfish

Brenda Fields completed age determinations of summer flounder of the 1979 research surveys. Cathy Rearden, in addition to continuing work on the age and growth archiving project, completed one phase of the red hake otolith age validation study.

Louise Dery introduced Loretta O'Brien to scup age determinations and also aged a small sample of windowpane for Wally Morse at the Sandy Hook Laboratory. Several days were spent with Lynn Borger of the SEFC's Panama City Laboratory outlining bluefish scale sample preparation and aging criteria. About 2200 silver hake otoliths collected during the course of the stock separation study by Frank Almeida were aged.

Shellfish

John Ropes was at sea from late January to mid-February participating in the clam survey (Delaware II Cruise No. DE 80-01).

In the lab, John continued the study of aging ocean quahogs collected for an analysis of growth and sexual maturity. Methods of processing and aging them included: techniques for holding the shell during the polishing process, developing a device for making acetate peels, making shell length measurements, and staining-technique development to assess sexual maturity.

John also supervised two stay-in-school students, Peter DeSouza and Paul Skinner, who worked on surf clam shell samples collected during the aforementioned clam survey cruise. They completed rinsing most of the shells in an iodoform solution, drying them, repackaging each sample, and boxing them for later processing for age analysis.

Loretta O'Brien completed aging 291 sea scallops from a spring 1979 scallop survey (Strata 47-50) and sent the age sample sheets to ADP for keypunching. She also began aging scallops from the same scallop survey which were collected from Strata 59-60. Loretta spent time training Peter DeSouza to impress scup scale samples and in the logging-in process for sea scallop samples.

Sandy Hook Investigation

Stuart Wilk, working with Brad Brown, completed the first draft of a paper describing those fisheries which take place in the winter between the US-Canadian border and North Carolina which presently have or potentially could have user-group conflicts. The paper will be presented at the International Symposium on Resource Allocation in Vichy, France.

Wally Morse completed collating the groundfish station data (five cards) from 1971 to 1978 with the maturity observations.

Darryl Christensen and John Clifford, working with ADP, completed all modifications to the various programs necessary for the final analysis of the 1975-77 party and charter boat survey. Work has begun on preparation of tables for the report.

Fishery Assessment Investigation

Emma Henderson refereed four publications for the ICNAF Selected Publications and the Canadian Journal of Fisheries and Aquatic Sciences. She continued work on the course outline for the basic assessment course that she will soon be teaching at the Woods Hole Laboratory.

Ralph Mayo spent considerable time making arrangements for the second NEFC Research Meeting to be held in Woods Hole in April. He reviewed the Input-Output Computers Services, Inc. (IOCS), proposed software/data file computer information system.

Joan Palmer, upon special request from the US State Department, prepared catch and value data for the top 10 New England commercial species for each year during the 1964-78 period by statistical area.

Anne Lange, assisted by Kathi Rodrigues, began preparation and analysis of January 1980 data from a Spanish mesh-selection study on Loligo squid. She met with representatives of the Foreign Fishing Vessel Observer Program to determine whether mesh changes should be made for similar Japanese studies to be conducted in March. Anne prepared a 1979 update of the squid stock status for a US-USSR report. Anne reviewed the Draft Environmental Impact Statement (DEIS) for the US-Canadian East Coast Maritime Boundary Agreement for the NMFS International Organizations and Agreements Division.

Steve Murawski completed a review of the commercial sampling of summer flounder by NMFS from 1973 to 1980 for the NMFS State-Federal Program's Summer Flounder Committee. Steve, with the assistance of Maureen Griffin, summarized the 1978 Delmarva surf clam samples by month and started processing of 1979 interview records. He began analysis of the relative fishability of standard gear (dredges) used in NEFC surf clam and ocean quahog surveys with the help of Dea Freid. Steve also began statistical analysis of ocean quahog growth data from mark-recapture experiments and standard age-growth techniques.

Frank Almeida and Lou Kerr digitized 100 and 200-m depth contours and added the contour to the FISHMAP plot program. Frank assisted Louise Dery in sectioning and aging silver hake otoliths for stock identification studies. He also continued analysis of morphometric data for silver hake stock identification.

Margaret McBride, assisted by Louie Kerr, continued work on the 1980 yellow-tail flounder stock assessment, giving considerable attention to the analysis of data from the Rhode Island Fisherman's Co-op survey. Margaret coordinated a program for the Woods Hole Laboratory's recognition of Black History Month. The program involved a lecture and slide presentation by Dr. Kenneth Manning of the Massachusetts Institute of Technology (MIT) on the history of black scientists with special emphasis on the life of E.E. Just (a famous 19th century black marine developmental biologist who did research for a number of years at the Marine Biological Laboratory in Woods Hole).

Senior Assessment Scientists

Brad Brown met on 5 February with the NEFC staff concerning vessel coordination and planning. On 18 February, he presented two lectures on fisheries at the University of Maryland Eastern Shore in Princess Anne, MD. On the 19th, Brad met in Washington, DC, with staff of the Special Personnel Programs Division of NOAA Office of Personnel concerning upcoming participation in upward mobility programs. He prepared material for the Urban Environment Foundation relative to their studies of minority entry into environmental and natural resource

professions. Brad prepared his section of a joint paper with Stu Wilk of the Sandy Hook Laboratory to be given in April at the Vichy, France, symposium on recreational-commercial fishing conflicts. Brad met with Ken Sherman, Marv Grosslein, Ambrose Jearld, Jr., and Wally Morse to work out procedures for transition of fecundity work from the Marine Ecosystems Division to the Resource Assessment Division. He also completed his editorial duties for the multispecies workshop held last November in St. Johns, NF, and participated in review sessions on the groundfish assessments to be presented to the Regional Fishery Management Councils. He prepared testimony for NMFS Northeast Regional Director Al Peterson to use at the Senate hearings on Georges Bank and then attended those hearings on the 29th in Boston.

Mike Sissenwine has been busy with various efforts concerning striped bass as a result of passage of the Senator Chafee (R-RI) bill which allocates one million dollars for striped bass research. On the 4th and 5th, Mike met with the striped bass population dynamics group in Washington, DC, and on the 12th met with representatives of NMFS, the US Fish and Wildlife Service (FWS), and private citizens concerning striped bass research planning. Mike also attended the follow-up meeting in Gloucester, MA, on the 26th to review striped bass research proposals. On the 11th, he attended meetings in Peabody, MA, to review possibilities of developing a flexible management plan for Atlantic herring, and on the 14th he attended the Marine Ecosystems Division meeting to participate in the section on ecosystem studies. On the 27th and 28th, Mike presented testimony concerning the striped bass research interpretations presented by the Consolidated Edison Company of New York, Inc., on the Hudson River before the Federal Energy Regulatory Commission.

On the 20th, Brad, Mike, Henry Jensen, and Margaret McBride met with Mike Fogarty and Dave Borden of the Rhode Island Division of Fish and Wildlife concerning the results of the Rhode Island/NEFC yellowtail flounder survey. On the 21st and 22nd, several members of the assessment staff participated in meetings with J. P. Patil and the statistical ecology group from Pennsylvania State University to discuss recruitment and survey analysis for fisheries research.

Emory Anderson completed a project for the Mid-Atlantic Fishery Management Council (MAFMC) on pelagic sharks in the Atlantic and Gulf of Mexico. Completion of the project was facilitated by the efforts of Jack Casey and John Hoey of the Narragansett Laboratory and Wayne Witzel of the SEFC's Miami Laboratory. The project produced four documents, three on particular fisheries or sources of shark by-catch, and one on estimates from a variety of sources which attempted to examine overall levels of harvest in the US Fishery Conservation Zone (FCZ). Emory coordinated an NEFC review of the draft report description and evaluation of stock assessment activities within NMFS. This report was prepared by the NMFS Stock Assessment Task Force which was chaired by Dr. Dayton Alverson.

Fred Serchuk and Paul Wood completed the 1980 assessment of Georges Bank and Gulf of Maine Atlantic cod stocks. They continued analysis of sea scallop data. Fred met with personnel from the Massachusetts Division of Marine Fisheries to discuss cod aging contracts. He also met in Woods Hole on the 25th with Dr. Richard Lutz of Rutgers University to discuss ocean quahog research. During 17-19 February, Fred participated in the "Risk Benefit Analysis" course sponsored by the National Science Foundation at the University of Hartford (CT).

Steve Clark and Ron Essig completed the 1980 assessment of the Georges Bank and Gulf of Maine haddock stocks. Steve continued work on a manuscript dealing with the assessment of Georges Bank and Gulf of Maine haddock fisheries.

Vaughn Anthony returned to the NEFC on 1 February from an Intergovernmental Personnel Act (IPA) assignment to the State of Maine. From 1977 to 1979, Vaughn was Director of Marine Research for the Maine Department of Marine Resources. Vaughn attended the Alaska Herring Symposium in Anchorage during 19-21 February and presented a paper on the assessment and management of Northwest Atlantic herring.

Meetings, Talks, Visitors, and Publicity

Darryl Christensen attended a planning session of the Northeast Monitoring Program with representatives from the NEFC's Ocean Pulse Program, NOS's Ocean Dumping Program, and the MESA New York Bight Project, at the Sandy Hook Laboratory on 1 February.

On 1 February, an Equal Employment Opportunity Program (EEO) Training and Promotion Subcommittee meeting at the Woods Hole Laboratory was attended by G. Waring and F. Serchuk.

During 1 and 2 February, the Delaware II clam survey from Cape Cod to Cape Hatteras included S. Murawski, F. Almeida, D. Hansford, L. Kerr, and K. Rodriguez as participants.

On 4 February, an EEO Training and Promotion Subcommittee meeting at the Woods Hole Laboratory was attended by F. Serchuk and G. Waring.

On 4 and 5 February, a combined NMFS State-Federal Program Striped Bass Scientific and Statistical (S&S) Committee meeting and a Population Dynamics Workshop was held in Washington, DC, and attended by Stu Wilk and Mike Sissenwine.

On 8 February, an EEO Committee Meeting was held at the Woods Hole Laboratory.

On 11 February, a Lobster Plan Development Team meeting was held at Peabody, MA, and attended by T. Burns.

On 11 February, a New England Fishery Management Council (NEFMC) scientific staff meeting concerning Atlantic herring assessment for 1979 was held in Peabody, MA, and attended by G. Waring.

During 11-16 February, the Wieczno conducted a yellowtail flounder survey in Southern New England, and included R. Mayo.

On 12 February, a FWS-NMFS Emergency Striped Bass Studies Plan Development Team met in Newton Corners, MA, and was attended by Stu Wilk.

On 12 February, an Intercouncil Swordfish Steering Committee meeting was held in Atlanta, GA, and attended by E. Anderson.

On 13 February, an NEFMC S&S Committee meeting was held in Falmouth, MA, and attended by F. Serchuk.

Wally Morse attended an emergency haddock meeting at the Woods Hole Laboratory on the 13th and 14th of February.

On 14 February, a joint National Shellfisheries Association-Shellfish Institute of North America (NSA-SINA) Offshore Mollusk Program planning meeting (for the June 1980 annual meeting) was held in Boston, MA, and attended by F. Serchuk.

On 14 February, an IYABA meeting was held at the Woods Hole Laboratory and attended by F. Serchuk and R. Mayo.

On 15 February, an EEO Affirmative Action Subcommittee meeting was held at the Woods Hole Laboratory and attended by F. Serchuk and G. Waring.

During 19-21 February, an Alaska Herring Symposium was held in Anchorage, AK, and attended by V. Anthony.

On 21 February, the Human Sciences Research, Inc., held a regional meeting on the NMFS recreational fishing survey in Boston; it was attended by E. Anderson.

During 21-22 February, a meeting with the Institute of Statistical Ecology (headquartered at Pennsylvania State University) was held at the Woods Hole Laboratory and attended by Brown, Sissenwine, Henderson, Palmer, Serchuk, Jearld, Lange, Almeida, Kerr, Mills, and McBride.

On 22 February, an EEO Affirmative Action Subcommittee meeting was held at the Woods Hole Laboratory and attended by F. Serchuk and M. Sissenwine.

On 25 February, an NEFMC Herring Oversight Committee meeting was held in Peabody, MA, and attended by G. Waring and S. Clark.

On 26 February, an NEFMC Groundfish Oversight Committee meeting was held in Wakefield, RI, and attended by F. Serchuk.

On 27 February, an NEFMC monthly meeting was held in Wakefield, RI, and attended by F. Serchuk.

On 27 February, Black History Month was observed with a talk on "History of Blacks in Science" by Dr. Kenneth Manning of MIT and given in Woods Hole, MA.

On 28 February, an IYABA meeting was held at the Woods Hole Laboratory and attended by R. Mayo and F. Serchuk.

On 29 February, a US Senate hearing on Georges Bank oil drilling was held in Boston, MA, and attended by B. Brown.

On 29 February, an NEFC Factor IV Committee meeting was held at the Milford Laboratory and attended by M. Sissenwine.

Publications

Anthony, V. C.; Waring, G. T. A review of the herring fisheries, their assessment, and management in the Georges Bank - Gulf of Maine area. Proceedings of the Alaska Herring Symposium; Anchorage, AK. University of Alaska Sea Grant Program; Fairbanks, AK. (A)

Crossen, J.; Smolowitz, R. Power system requirements of an electro-hydraulic clam dredge. (Abstract). Paper to be presented at Conference on the Decade of the Oceans; 1980 October; Washington, DC. Marine Technology Society. (S)

Lange, A. M. T.; Johnson, K. L. Dorsal mantle - total weight relationships of the squids, Loligo pealei and Illex illecebrosus, from the Atlantic Coast of the United States. NOAA Tech. Rep. NMFS SSRF. (S)

Waring, G. T. A preliminary stock assessment of the little skate Raja erinacea, in the Northwest Atlantic. Bridgewater, MA: Bridgewater State Coll.; 1980. Thesis.

Reports

Anderson, E. D. Analysis of various sources of pelagic shark catches in the Northwest and western Central Atlantic Ocean and Gulf of Mexico. Woods Hole Lab. Ref. Doc. No. 79-56;1979. 37 p.

Clark, S. H.; Essig, R. J. Georges Bank and Gulf of Maine haddock assessment update. Woods Hole Lab. Ref. Doc. No. 80-06;1980.

Serchuk, F. M.; Wood, P. W., Jr.; Freid, D. M. Current assessment and status of the Georges Bank and Gulf of Maine cod stocks. February 1980. Woods Hole Lab. Ref. Doc. No. 80-07;1980. 52 p.

Sissenwine, M. P.; Waring, G. T. Status of sea herring fisheries of the Gulf of Maine - Georges Bank region. Woods Hole Lab. Ref. Doc. No. 80-09;1980.

MANNED UNDERSEA RESEARCH AND TECHNOLOGY PROGRAM

No report received. The December-February reports will be included in the March issue.

MARINE ECOSYSTEMS DIVISION

Ecosystems Dynamics Investigation

Work continued on developing daily ration estimates for finfish. Wendell Hahm and Brian Hayden, together with Rich Langton, began summaries of food habits data by time of day to develop feeding chronology estimates needed in the Elliott and Persson (1978) model of daily food consumption which is being applied to our data base by Ted and Ann Durbin at the University of Rhode Island (URI). The Durbins visited the Woods Hole Laboratory on 12 February to review progress to date with personnel of the Ecosystem Dynamics and Benthic Dynamics Investigations and to help establish computer plots and listings needed for the daily ration model.

Wendell Hahm reviewed a simulation model for coastal benthic ecosystems (out of Rensselaer Polytechnic Institute's Center for Ecological Modeling) together with Tom Leschine and Fred Grassle of the Woods Hole Oceanographic Institution (WHOI) modeling group, and continued his exchange of ideas with WHOI and State University of New York (SUNY) modelers on flow analysis, input-output models, etc. Wendell also presented a seminar on flow analysis of compartment models at the URI Graduate School of Oceanography.

Ecosystem Dynamics personnel participated in a statistical ecology workshop at the Woods Hole Laboratory on 21 and 22 February. Professor G. P. Patil and colleagues from the Pennsylvania State University Department of Statistics presented several seminars and NEFC people described problems of experimental design and statistical analysis related to the Marine Resources Monitoring, Assessment, and Prediction Program (MARMAP) and the Ocean Pulse Program.

Marv Grosslein, together with Rich Langton and Roger Theroux, reviewed NEFC benthic studies with Frank Steimle from the Division of Environmental Assessment at the Sandy Hook Laboratory, and made plans for developing an overall benthic research strategy for NEFC with coordination of food chain, MARMAP, Ocean Pulse, and ecosystem modeling activities.

Following a meeting on 14 February to consider completion of haddock reproduction studies by Robert Livingstone, Jr., prior to his retirement, Marv Grosslein, Mike Pennington, and Robert Livingstone finished a draft of the length-fecundity data for Georges Bank haddock. Analysis of these data, and transfer of all remaining reproduction data in Robert Livingstone's files to Wally Morse, are scheduled to be completed by the end of April.

Mike Pennington continued with his twice-weekly statistics lectures at the Woods Hole Laboratory with the recent focus on regression models using haddock fecundity data for class examples. About 10 people have been attending regularly.

Marv Grosslein attended an S&S meeting on 13 February, and Investigation personnel participated in the Division meeting on 14 February where research strategy for recruitment processes studies received considerable discussion.

Beth Donahue, a student volunteer from the Senior Intern Program of Wellesley (MA) High School, joined the Ecosystem Dynamics Investigation this month. Beth will assist with data processing in our group and will also work in other investigations at the Woods Hole Laboratory until May.

Recruitment Processes

Final analyses are underway by Greg Lough for a generalized larval Atlantic herring growth model derived from daily ring increments in their otoliths and from length-frequency modal analysis of International Commission for the Northwest Atlantic Fisheries (ICNAF) survey data. Various correction factors such as shrinkage of larvae, extrusion, and avoidance are being evaluated to obtain the best possible estimates of larval herring growth and mortality. George Bolz continued work on the ICNAF ichthyoplankton report after making corrections where possible for discrepancies between the 0.333-mm and 0.505-mm mesh summaries. The report is in its final stages and should be completed by early April. Dave Potter spent the early part of the month preparing the NEFC proposal for the US Department of Energy's Solar in Federal Buildings Demonstration Program, and continued working on the neustonic ichthyoplankton manuscript. Dave Potter, George Bolz, and Cabell Davis began Dr. Saul Saila's fishery biology course at URI two mornings a week.

Roz Cohen attended the meeting of the American Society of Limnology and Oceanography (ASLO) in Los Angeles, CA, during 31 January-4 February, and then visited the SWFC and Scripps Institute of Oceanography in La Jolla, CA, and the NWAFC and the University of Washington in Seattle, WA, until 7 February. She continued work on the ICNAF zooplankton data and larval herring gut content-condition factor data. Plankton displacement volumes have been entered for all cruises except one. The larval herring gut content files have been updated and we are assessing possible correction factors for all morphometric measures based on Gail Theilacker's manuscript (SWFC) dealing with larval shrinkage due to net treatment and preservative. V. Massard, a part-time temporary employee, resigned on 20 February to take a full-time position elsewhere. Her departure has stopped all fine-mesh zooplankton sorting until we can get Tom Morris trained. Hal Merry, an electronics technician, participated on the clam survey on Delaware II during 30 January-10 February. The remainder of the month he sorted multiple opening-closing net and environmental sensing system (MOCNESS) tape records with Robert Halpin.

Dave Potter and George Bolz attended the Marine Biological Laboratory symposium on oil in the marine environment in early February. George Bolz attended one NEFC EEO meeting, and Roz Cohen, one meeting of the Federal Women's Program (FWP) in Woods Hole. Greg Lough attended the Marine Ecosystems Division quarterly meeting on 14 February in Woods Hole.

Larval Physiology and Biochemistry Investigation

Adult haddock and winter flounder have been successfully spawned for experimental purposes. Research with summer flounder larvae was completed. The diurnal

variation in the rates of ammonia and primary amine production in summer flounder larvae was determined. The analytical scheme for estimation of RNA, DNA, and protein has been expanded to include lipid and carbohydrate analysis. This will allow us to get a more complete picture of the mobilization of energy reserves in developing embryos and larvae. We are looking at the quantitative changes in these classes of biomolecules during development of winter flounder and haddock at four temperatures.

Ocean Pulse research has been implemented with the receipt of funding. Equipment is being purchased and temporary personnel hired to begin research on biochemical indicators as monitoring tools to assess larval fish condition.

Planning has begun in cooperation with the FWS concerning the possibility of joint research of the effects of pollutants on early life stage survival of striped bass.

Geoff Laurence attended the second annual winter meeting of ASLO in Los Angeles, a Division meeting in Woods Hole, and a meeting of the Center Qualifications and Scientific Contributions (Factor IV) Committee at the Milford Laboratory.

Ichthyoplankton Investigation

MARMAP I surveys are underway on Wieczno and Albatross IV. Wieczno began survey operations in the Gulf of Maine with Doris Finan and Cindy Fahay participating. Albatross IV started working at Cape Hatteras. John Sibunka, Patty Rosenberg, and Tom McKenney are in the scientific party. In addition to routine survey operations, collections of fish, invertebrates, and bottom sediments are being taken on Albatross IV for petroleum hydrocarbon analyses.

Mike Fahay and Nancy Nazar met with Chris Powell, Jack Colton, and Cindy Jones at the Narragansett Laboratory to review progress on their taxonomic study of larvae of the genus Urophycis. Discussions centered on distribution and seasonal abundance of eggs and larvae <3 mm, statistical analyses of meristic and morphometric data, and priorities for the coming months.

Cindy Fahay represented NEFC's EEO Committee on a 4-day tour of colleges and universities in the Northeast, speaking largely to female audiences about careers in marine science. Discussions covered a wide range of topics, including information on laboratory and field responsibilities, and procedures for acquiring additional information on career opportunities.

John Antonellis joined the Investigation as a biological technician. He replaces Bill Brennen at the Woods Hole Laboratory.

Wally Smith attended the quarterly meeting of the Marine Ecosystems Division at Woods Hole.

Plankton Ecology Investigation

Work is continuing on estimates of seasonal residence times of ichthyoplankton on Georges Bank on a basis of larval fish distributions determined from MARMAP neuston and bongo net tows and residual drift patterns determined from Nimbus 6 Satellite-tracked current drogues.

Robert Marak, Joe Kane, and Jerry Prezioso participated on the first cooperative Gulf and Atlantic Survey (GAS I) aboard the Albatross IV. The main objectives were to collect fish and bottom sediment samples for petroleum hydrocarbon analysis and to obtain sea truth measurements with a backscattering radiometer for use in interpreting results from the Coastal Zone Color Scanner

(CZCS) on Nimbus 7. Samples of fish (1500 specimens) with different feeding habits were collected in the waters from Chesapeake Bay to Pascagoula, MS. Samples from the western Gulf of Mexico are being taken by the NOAA R/V Oregon II, and Albatross IV will complete the sampling in the Mid-Atlantic Bight, Georges Bank, and Gulf of Maine areas in conjunction with the MARMAP I survey. We had excellent cooperation in that scientists from NMFS laboratories at Woods Hole, Narragansett, Sandy Hook, Oxford, Pascagoula, from the State of South Carolina Marine Resources Laboratory, and from Manomet Bird Observatory participated.

This first leg of the survey was very successful as over 80% of the planned work was completed. All protocols were able to be completely followed ensuring uncontaminated samples. In addition to the 1500 fish specimens, 74 bottom sediment samples were also frozen for petroleum hydrocarbon analysis. Other sampling included hydrography, chlorophyll, neuston, phytoplankton species composition, birds, radiometry, mutagenesis, and pathology.

Donna Busch prepared a summary of primary productivity-related work conducted jointly with USSR scientists and Jack Green summarized the zooplankton-related work aboard the Soviet R/V Belogorsk for inclusion in the report of the joint NEFC-USSR cooperative studies for 1979.

Donna Busch spent 5 February at the Sandy Hook Laboratory preparing ^{14}C ampules with Jay O'Reilly and Ralph Bruno for upcoming MARMAP and Ocean Pulse cruises, and proofing primary productivity data print-outs from 1979 cruises. Donna and Jay also designed a phytoplankton sampling scheme for NEFC-Polish cooperative studies. Samples will be processed at the Polish Sea Fisheries Institute in Gdynia, and results integrated with those from NEFC samples.

Donna Busch attended an IYABA meeting at Woods Hole on 28 February.

Biostatistics

A report-writer module, which gives a sorted listing of the status of all data sets of the Marine Ecosystems Division, is now debugged and in use. An updated report will be mailed to investigation chiefs approximately monthly.

Debugging of a URUNFAGR module was completed. This module will produce a Fager's analysis of dominance. The previous version was limited to 50 taxa. It was expanded to 150 taxa and a few other bugs were taken care of. The new module will be pooled as one of the MARMAP Information System's (MIS) "stand-alone" application programs.

Julien Goulet attended a workshop on remote sensing at the National Fisheries Engineering Laboratory at Bay St. Louis, MS. The techniques demonstrated for analyzing LANDSAT data are applicable, with some modifications, to CZCS data. To use effectively the CZCS data on a routine basis, the NEFC would need an interactive graphics capability (i.e., terminal and microprocessor). Also, a protocol for routine production of compressed data tapes needs to be specified. These data tapes would be prepared by a contractor such as the group at the National Fisheries Engineering Laboratory and forwarded to NEFC for further analysis and interpretation.

Marie Carter left to work at the URI Graduate School of Oceanography as a programmer.

Fishery Oceanography Investigation

Red Wright and Timothy Cain loaded gear on Albatross IV for a MARMAP cruise before she departed for the Gulf of Mexico on 4 February. On 26 February, Tom Laughton and Dana Densmore flew to Norfolk, VA, to join the ship for Leg 1 of

Albatross IV (MARMAP) Cruise No. AL 80-02. Red put a new Niskin bottle rack on Delaware II to be installed inside the starboard laboratory to reduce damage to equipment and adverse conditions for scientists. Red and Timothy also equipped Wieczno with MARMAP gear, 1.7-liter Niskin bottles and rack (two were 2.5-liter Niskin bottles), salinity sample bottles, and XBT probes.

Steve Ramp completed computer processing of the larval Atlantic herring patch study wind and pressure data from the NOAA "Monster" buoy. He also made improvements in transport calculations for the Northeast Channel. Derek Sutton continued to process patch study data, STD (salinity-temperature-depth) data, and wind data. He also completed temperature sections from the Nantucket Shoals flux experiment. Gil Dering and Tom Laughton completed the wire instrumentation system. Sam Nickerson read XBT traces, plotted and contoured surface and bottom temperatures for West German R/V Anton Dohrn Cruises No. 78-01, 78-03; Soviet R/V Aliot Cruise No. 79-02, and Delaware II Cruise No. DE 80-01. Timothy and Roger Hernandez completed temperature-section salinity and temperature graphs for the yearly summary of the Gulf of Maine, Ship of Opportunity Program (SOOP) run to be published in Annales Biologiques, all sections and graphs were sent to Don Sousa at WHOI for final drafting. Dan Patanjo, Bruce Davis, and Ira Palmer continued to process data from MARMAP cruises during 1977-78 for all physical observations. Bruce and Ira also spent considerable amounts of time sorting and staging chaetognaths.

Red Wright and Derek Sutton attended a Marine Biological Laboratory symposium on 1 February on "Oil Pollution and Aquatic Ecosystems: Implications for Georges Bank." Red Wright, Steve Ramp, and Ron Schlitz participated in the Marine Ecosystems Division meeting at Woods Hole Laboratory on 14 February. Red began to assemble "Catalog of Regularly Issued Data Products" for International Council for the Exploration of the Sea (ICES) hydrographers. Red distributed calls for papers for the ICES 1980 statutory meeting.

Ron Schlitz attended International Decade of Ocean Exploration Program's (IDOE) International Symposium on Coastal Upwelling and presented a paper titled, "Evidence of Upwelling at the Northern Edge of Georges Bank;" Red assisted in the preparation of the paper.

Roger Hernandez joined the Investigation this month. He is a student of Southampton College in New York where he majors in oceanography. He is in his senior year.

Apex Predators Investigation

The month was spent preparing our annual summary newsletter that will be sent to cooperative taggers next month. In addition, we were preparing for the upcoming Wieczno cruise from 12 to 30 March.

Benthic Dynamics Investigation

Two manuscripts were completed and submitted for publication: (1) "Distribution of Gammaridean Amphipoda (Crustacea) on Georges Bank," by John Dickinson and Roland Wigley; and (2) "Diurnal Variation in the Feeding Intensity and Catchability of Silver Hake (Merluccius bilinearis)," by Ray Bowman and Ed Bowman.

Roger Theroux began the preparation of a manuscript titled, "Photographic Systems Utilized in the Study of Sea-Bottom Populations." This paper will be presented at an underwater photography symposium to be held in Woods Hole in April and will be published in the symposium proceedings. The last section of

the taxonomic section of the report on East Coast bivalves, by Roger Theroux, has finally been typed. It's currently being proofread while work on the distribution plots continues.

Ray Bowman completed the rough draft of a report on the food of juvenile haddock. Ray also revised a paper on silver hake for the upcoming IYABA meeting and is working on a manuscript describing the food of juvenile fish collected as part of the 1969-72 food habits data base.

Studies on digestion in winter flounder are continuing. Yellowtail flounder were collected during a recent cruise by the Wieczno and digestion studies will be initiated on these fish in March. Jim Towns participated on this cruise.

Two requests were received for a data subset from the benthic data base. Dr. Robert Whittaker of Cornell University is interested in utilizing the Mid-Atlantic Bight amphipod data to evaluate species patterns along environmental gradients. Dr. Sheldon Pratt requested information on the distribution and abundance of the amphipod Ampelisca agassizi to use as part of a life history study he is undertaking. Both of these requests are being processed to supply the necessary data.

Meetings, Talks, Visitors, and Publicity

On 1 February, Ken Sherman gave a talk at Yale University to students in coastal resources management.

On 4 February, Ken Sherman, Robert Edwards, and Helen Mustafa met with John Walsh and Bernie Manowitz at Brookhaven National Laboratories to plan joint studies for the remainder of FY80 and FY81.

A meeting was held at the Narragansett Laboratory on 7 February concerned with the establishment of a Northeast Regional Remote Sensing Institute to be located on the Bay Campus of URI. Representatives attended from the University of Rhode Island, University of Massachusetts, Yale University, University of Delaware, State of Rhode Island, US Air Force, FWS, US Environmental Protection Agency (USEPA), US Coast Guard (USCG), Bigelow Laboratory for Ocean Science, and Government Services Administration (GSA).

Ken Sherman convened a meeting of the Marine Ecosystems Division at Woods Hole on 13 and 14 February. On 15 February, 20 Yale University students visited the Narragansett Laboratory and were given brief talks by Geoff Laurence, Donna Busch, Larry Buckley, Jack Casey, Jack Jossi, Grayson Wood, and Ray Maurer after an introduction by Bob Edwards and Ken Sherman. They then toured the laboratory facilities. A group of NEFC administrative officers met at the Narragansett Laboratory on 27 February.

On 27 February, Ken Sherman met with Dr. Perry Jeffries, Dr. Alex Poularikas, and Ray Maurer regarding the Image Scanning Project. Ken Sherman met with Dean Knauss (URI), Tudor Davies (USEPA), Bob Sexton (URI), and Frank DiMeglio (URI) for a quarterly meeting of the Bay Campus Lab Directors.

Publications

Bowman, R.; Bowman, E. Diurnal variation in the feeding intensity and catchability of silver hake (Merluccius bilinearis). (S)

Dickinson, J.; Wigley, R. Distribution of gammaridean Amphipoda (Crustacea) on Georges Bank. NOAA Tech. Rep. NMFS SSRF. (S)

Olney, J. E.; Naplin, A. Eggs of the scalloped ribbonfish, Zu cristatus (Pisces: Trachteridae), in the western North Atlantic. Copeia 1:165-66;1980. (P)

RESOURCE UTILIZATION DIVISION

Fisheries Engineering Investigation

As weather permitted, hydrodynamic studies of an Isaacs-Kidd mid-water trawl have continued aboard the NEFC's R/V Rorqual. Instrumentation modifications for observation and monitoring of the gear have been completed.

Time was spent maintaining the Rorqual. A formal maintenance schedule was developed for the vessel and scheduled engine room maintenance was completed. In addition, the vessel boiler system was rewired and remote indicators for smoke alarms were designed.

Specifications are being prepared for a new larger beam trawl for use on the Rorqual. Planned is to construct a beam locally and purchase a Dutch net to duplicate the currently successful Dutch beam trawl. It will be tested in a technology transfer program to determine its success in these waters. It is expected to be more species selective than an otter trawl and small vessels should be able to handle it better than an otter trawl.

The preliminary design of an improved scallop dredging system is well underway. The first design drawings are expected to be ready for review in mid-March.

Fisheries Engineering was pleased to have Jon Rix, a student at the US Merchant Marine Academy, working with us for 2 wk as part of their Cooperative Education and Internship Training Program.

Facilities Engineering

The monthly activities for February consisted of: repairing and calibrating the recorder for Freezer #7; rewiring the freezer controls; repairing the oil return system for Compressor #5; repairing the timer mechanism on the plant emergency generator; and processing endless amounts of government paper work.

Resource Development and Improvement Investigation

Blue Crab

An experiment on the refrigerated shelf life of reformed pasteurized crab meat made from roller-extracted blue crab meat is continuing. Two methods of reforming were used in this study: steaming semi-cooked crab meat in a mold to form a lump and mixing fully cooked crab meat with sodium alginate to form a lump. After 3 mo of refrigerated storage, the steam-formed meats were comparable to the commercially picked lumpmeats (control). The alginate lumpmeats were significantly different from the control in texture.

Seafood Composition

Experiments to determine the optimum conditions for the analysis of fatty acids and sterols in seafood are continuing. Blue crab and surf clam samples have been tested with varying degrees of success. We are awaiting the arrival of standard compounds to aid in the identification of the fatty acid compounds.

Surf clams frozen in shell were organoleptically tested after 1 mo of storage and analyzed for their proximate composition.

New Product Development

A study to determine the storage life of US Grade A Atlantic cod fillets in a modified atmosphere was completed. The cod fillets, in trays similar to the trays used for packaging US Grade A fillets, were held in bags flushed with carbon dioxide at 34°F. The Gloucester taste-test panel judged the fillets as edible (above "5" on the organoleptic "1-9" scale) up until 14-15 days. The fish in trays held normally (in air) at 34°F were judged as poor after the 8th day of storage. Although the fish fillets stored in CO₂ did not last 30 days as reported by some researchers, there was 100% increase in storage life. The pH of all the cod fillet samples was measured just prior to being taste tested. In every case, the pH of the fillets packaged in air was much higher (pH 7 and above) than the pH of the fillets packaged in CO₂. On the 16th day of storage at 34°F, the CO₂-packaged fillets had a pH of only 6.7. This experiment will be repeated.

Product Quality, Safety, and Standards Investigation

Product Quality

Eleven weeks of storage have now elapsed for the frozen red hake fillet study. There has not been any major change in flavor of samples stored at temperatures ranging from +5 to -80°F, but a noticeable deterioration was observed in samples held at +10°F. Since there has been no significant increase in TBA number for any of the stored samples, it is presumed that no lipid oxidation is occurring. The principal quality change that has taken place is the development of a fibrous texture in the +10°F samples. The condition of texture at this time is "good" for samples stored at +5 to -20°F and on the verge of "borderline" for samples at +10°F. The texture change at +10°F is also reflected in high values of dimethylamine, formaldehyde, and shear values. It is believed that the loss in succulence in samples held at +10°F is responsible for the loss of flavor.

A storage study recently completed on frozen bluefish fillets showed this species to have better storage stability than was anticipated. In view of the fatty nature of this species, it was considered of interest to determine the relative proportion of light and dark muscle since this information was not found in the literature. The average content of dark meat present in fillet was 20.8% and for light meat the average value was 79.2%. The average lipid content (Bligh-Dyer method) of the dark and light muscle was 9.8% and 1.9% respectively. For the whole fillet (skinless), the average lipid content was 3.5%. These data were obtained from four different fish. Additional fish will be tested.

As a result of our work showing goosfish (monkfish) sarcoplasmic protein pattern variations with the Association of Official Analytical Chemists (AOAC) species identification methods based on cellulose acetate and disc electrophoresis and isoelectric focusing (IEF), we have requested that the AOAC not require an additional collaborative study of the IEF method. Since the protein variations are detectable using other methods, the protein variations are real and not an artifact of the IEF method. We feel a better approach than another collaborative study would be to publish a series of notes showing the range of variation of the protein patterns for each species. These "standards" could then serve as the basis for identification of unknowns by comparison of the photos with the unknown pattern instead of the current practice with electrophoresis of running authentic

standards along with unknowns. Photographic standards were demonstrated to be a viable technique in the IEF collaborative study where all unknowns (except monkfish) were identified correctly by comparison of unknown patterns with a photograph showing authentic protein patterns. In all cases where the monkfish was incorrectly identified, the pattern was later matched with one of the variant monkfish patterns. It is likely that if the collaborators had access to the variations, all of the monkfish would have been correctly identified.

As part of our work on the gas chromatographic determination of volatile amines in fishery products, we have adapted our assay for the dimethylamine-formaldehyde producing enzyme to the gas chromatographic method. Using crude enzyme preparations from red hake liver, we have determined optimum substrate concentration, enzyme concentration, methylene blue concentration, incubation time, pH optimum, and incubation temperature optimum.

Product Safety

Samples of striped bass (edible tissue) were fortified at the 100 ppb-level with Aroclors 1242 and 1260 (polychlorinated biphenyls-PCB's). Control samples were also included. Samples were worked up by the AOAC procedure. Additional cleanup by silica gel chromatography was done also. Percent recoveries are shown in Table 1 below.

Table 1. Percent recovery of fortified PCB's in edible striped bass tissue.

Sample No.	Aroclor 1242	Aroclor 1260
1	86.0%	80.2%
2	78.1%	76.8%
3	66.8%	84.2%

In the workup of samples fortified with Aroclor 1242, some of the extract was lost during the sodium sulfate chromatography step. This step is giving us some problems with some of the extracts. Steps are being taken to minimize this problem. Three days of work can be lost if some of the columns plug up.

A sample of striped bass gonad (left ovary) was worked up and analyzed. Because of the large amount of fat found in the sample (34%), the concentration tubes were modified. Total PCB's found in the sample were: Sample #1 - 3.4 ppm, Sample #2 - 3.6 ppm, Sample #3 - 3.0 ppm, and Sample #4 - 3.2 ppm.

Results of the last batch of samples sent out to John G. Reutter Associates for analysis have been received. We are presently working up and analyzing all of these samples. Some of the samples analyzed thus far compare well with some of their results. However, in some instances, some of their reported values are higher than ours. Their extracts were quantified by peak heights as Aroclor 1254. In all the fish extracts analyzed at this laboratory (Gloucester), none of the extracts were found to contain only Aroclor 1254. Results by the contractor and ourselves show that edible tissue contains low amounts of total PCB's (nine out of ten contain less than 100 ppb).

The AS-100 Autosampler was received and installed on the Perkin-Elmer Sigma 1. Familiarity with its operation is complete. The unit was working fine for 2 days. Some chips on the memory board in the programmer module are faulty and will be replaced shortly. However, the gas chromatograph will not be operational for 1 wk.

Attempts are being made to have collections made in the Galveston Bay area. Some contacts were made by Mr. Learson, but work and contract details have not been implemented.

No samples have been received this month from any of our contractors or Dr. Whipple.

Product Standardization

Taste-panel tests on portions made from belly flaps cut from large and medium-sized Atlantic cod have shown that these products are of good quality after 10 mo of storage at 0°F.

A draft revision of the US Standards for Grades of Frozen Precooked Fish Portions has been circulated and rewritten as a result of informal comments received. The purpose of this revision is to include new styles of products that have appeared since the original standards were written. We are fortunate to use the Northeast Regional Office's NBI Word Processor to rewrite this draft. It has already saved us a significant amount of retyping time.

A grading survey of products covered by the Codex Proposed Draft Standards for Fish Blocks and the Standard for Fish Sticks and Fish Portions is underway. Six major producers of sticks and portions and the US Department of Commerce Inspection Service are participating in this examination of products and the standards involved.

On 25 February, Fred King participated in a conference at the Boston, MA, laboratory of the US Food and Drug Administration (FDA). The other participants were Louis L. Gershman, General Referee for Seafoods of the Association of Official Analytical Chemists; Larry W. Strasburger, consultant out of Metairie, LA; and Leon J. Cebes, Jr., also a consultant out of Metairie, LA. The purpose of the conference was to present Strasburger and Cebes' proposal to revise the AOAC method for determination of drained weight of frozen blocks of raw P&D shrimp.

Technical Assistance

Resource Utilization Division personnel provided information and technical assistance in the following areas this month: marine-related educational materials; marketing pamphlets; laboratory activities; fishing vessel safety film; sturgeon; safety placards; aquaculture; "red snapper" from California; where to buy a grinder for a fish meal plant; shipping live marine fish to inland markets; controlled-atmosphere packaging of fish; world markets for minced fish; planning for a 3-day seminar in December 1980 on the status of minced fish; location of fishing effort and where to get a factory ship to harvest squid (Loligo and Illex); a suitable Sea Grant institution for an Indian Ph.D. to apply for a post-doctoral fellowship; amount of glaze on fish shipped from the West Coast to the East Coast for steaking and eventual sale to military agencies; what companies in the Northeast are engaged in aquaculture; binders which can be used with lobster meats to prepare new products; markets and marketing of fish; composition and nutritive value of monkfish; drying and salting of fish; film "Time Lapse Lobsters" for showing to a group of lobstermen; gill nets; small boat fishing

methods; ICES gear information; otter boards; the relationship between vessel displacement, horsepower, and the size of the trawl towed; beam trawls; otter trawl measurement methods; scallop gear and behavior; and electronic information.

Meetings, Talks, Visitors, and Publicity

Meetings

Members of the Fisheries Engineering Investigation conducted a seminar at the Gloucester Laboratory on otter trawls and doors for some local Rockport, MA, draggers experiencing problems with their trawls, and a lecture on gear and safety was prepared for a New England Fisheries Steering Committee (NEFSC) Safety Seminar.

Joe Carver attended a joint tuna industry, US Department of Commerce, and FDA meeting in Washington, DC, to discuss problems concerning the FDA Standard of Identity for Canned Tuna; viz, fill of container and color methodology.

Perry Lane attended workshops on net mending and electrical systems put on by the MIT-University of Massachusetts Sea Grant Program at the Essex Agriculture & Technical Institute. He also attended a workshop on energy economy put on by the New York Marine Advisory Service at Riverhead, Long Island; a meeting of the Long Island Fishermen's Association; and the monthly meeting of the NEFSC.

Visitors

Mary Jane Knudson, Director of Cooperative Education for Gordon College, visited the Gloucester Laboratory to discuss our research program.

Mr. Jack Farrell of the Gloucester Fishermen's Museum, and Prof. Bernard Gordon of Northeastern University, visited with 15 students to tour the Gloucester Laboratory.

DIVISION OF ENVIRONMENTAL ASSESSMENT

Behavior of Marine Fishes and Invertebrates Investigation

Work, supported in part by USEPA funding, is continuing on the study of the behavior and ecological requirements of juvenile hake. Using a specialized, low-light, video camera and video recorder, we are currently monitoring both day and night activity and behavior of juvenile red hake (50-100 mm in length) held under controlled conditions. Preliminary analysis of the data has shown that juveniles of this size that are associating with sea scallops exhibit a distinctly nocturnal activity and feeding rhythm. Following a night of high activity and foraging on their natural live prey, coastal/estuarine shrimp, the animals become inactive within 30-40 min after sunrise, associating with cover, in this case specifically sea scallops. This cover-seeking behavior appears to be an anti-predator strategy. At sunset the fish once again become active and resume foraging. Further experiments on activity rhythms and predator-prey interactions are being performed as well as the ongoing analysis of video tapes.

Biological Oceanography of Stressed Ecosystems Investigation

During February, we participated in the Albatross IV cruise from Chesapeake Bay to the Mississippi River. One of the purposes of the cruise was to collect

sea truth for the CZCS. Downwelling and upwelling irradiance measurements were accomplished by Mr. Bob Howarth of the Naval Ocean Systems Center in San Diego, CA, on six different days concurrent with the overpass of the CZCS. Chlorophyll-a, phaeophytin, and total suspended matter samples were also collected. The chlorophyll-a and phaeophytin samples were processed by the Environmental Chemistry Investigation.

On 6 and 7 February, a planning meeting was held at the Virginia Institute of Marine Science (VIMS) to bring federal and state agencies and academic institutions together for the purpose of advancing remote sensing. Present from the NEFC were Ms. Helen Mustafa and Drs. Robert Edwards, John Pearce, Merton Ingham, Aaron Rosenfield, and James Thomas. On 7 February, detailed planning for the Chesapeake Bay plume studies ("Superflux") occurred with an effort to establish sea-truth protocol. A follow-up meeting held at the NASA Langley Research Center in Hampton, VA, refined protocols and cruise tracks for participants (i.e., NASA, NMFS, VIMS, and Old Dominion University). Loyal Bouchard of the National Ocean Survey (NOS) Atlantic Marine Center in Norfolk, VA, was present and proved to be of invaluable assistance in coordinating our vessel activities, communications, and clearances. Clarence Brown of NASA, Loyal Bouchard, and Jim Thomas visited the US Navy Fleet Area Control and Scheduling Facility to obtain clearance for aircraft and ships involved in the experiment. We discovered that clearance for surface vessels was not required, but was advisable. Clearance for aircraft is strict and mandatory.

Helen Mustafa, Woody Chamberlin, Julian Goulet, and Jim Thomas attended a Landsat imagery data processing training session at the NOAA National Space Technology Laboratory (NSTL) near Bay St. Louis, MS. The session proved to be very enlightening. We discovered that all of the Landsat programs can be applied directly to the CZCS. Thus, we learned indirectly a great deal about the CZCS, which will have great utility over our outer continental shelves. We also found out that because of the relatively high resolution of Landsat, it should be useful for identifying and mapping estuarine plumes.

On 27 and 28 February, Craig Ohlhorst of the NASA Langley Research Center visited the Sandy Hook Laboratory to show us data collected from a U-2 aircraft during the Large Area Marine Productivity Experiment (LAMPEX I) during 19-21 April 1979. Present at the meeting were Craig Ohlhorst, Mert Ingham, Woody Chamberlin, Craig Robertson, and Jim Thomas. We examined and compared both black and white photography and ocean color scanner data for the New York Bight and Long Island Sound-to-Cape Cod areas. Many estuarine plumes were noted in both data sets. It was believed that such data would have high utility for "Superflux"-type activities, but would have to be evaluated more fully. Copies of these images are available for inspection at the Sandy Hook Laboratory via Jim Thomas.

In response to increased concern that *Ceratium* spp. may bloom this year in concentrations large enough to be a major influence on environmental quality in the Middle Atlantic Bight, and as part of the normal monitoring accomplished by the Ocean Pulse Program, Myra Cohn of the NEFC and Harold Marshall of Old Dominion University will continue to examine phytoplankton community structure and species abundance based on discrete 1-liter samples from five water depths at 60-70 stations.

Water samples are currently being collected on cruises of the *Wieczno* (Cruise No. 80-02) and *Albatross IV* (Cruise No. AL 80-02) as a part of this ongoing study. Samples will be collected from the Chesapeake Bay plume studies ("Superflux") and Ocean Pulse/MARMAP cruises to be conducted aboard the NOAA R/V *Kelez* during March-April 1980. Preparation of sample bottles for these cruises was accomplished during February. Planning sessions with Myra Cohn and Harold Marshall continue regarding prioritization of samples and data processing toward joint publication.

Particular emphasis in the above mentioned study will be on samples from the following cruises: Belogorsk Cruise No. 78-03 (October-November); Delaware II Cruise No. DE 79-03 (March); Delaware II Cruise No. DE 79-05 (May); Belogorsk Cruise No. 79-01 (August-September); Albatross IV Cruise No. AL 79-06 (June-July); Albatross IV Cruise No. AL 79-11 (October); and Delaware II Cruise No. DE 79-11 (December). These cruises provide the most complete coverage of stations from Cape Hatteras to Nova Scotia and comprise almost 600 stations.

Design of the first-year bioassay tests, which incorporate growth (cell division) response of the test diatom, Thalassiosira pseudonana, was completed. Required glassware, etc., for assay start-up was cleaned and sterilized. Assay spike solutions of N, P, Si, metals mix, and vitamin B₁₂ were prepared. Familiarization was begun with the simpler, but not always as reliable, carbon-14 assay method. Preparations were made for sampling on the March Ocean Pulse cruise.

Bill Phoel prepared a poster for the upcoming IYABA meeting in Woods Hole on the IXTOC I oil spill and is preparing a Sandy Hook Laboratory report on the same subject. His paper "Inorganic Nitrogen Regeneration and Total Oxygen Consumption by the Sediments at the Mouth of the York River, Virginia, U.S.A." has been received from the reviewers and minor alterations are being made for final submission. Bill presented his findings of submerged oil entering the Laguna Madre, TX, at the Hazardous Materials Response Projects Training Session in Santa Barbara, CA, and presented some of the problems and requirements for diving in hazardous materials spills. He then met with the diving officer of the SWFC's La Jolla Laboratory to discuss specialized diving techniques and attended the ASLO winter meeting in Los Angeles where he discussed further refinements to his techniques for obtaining seabed oxygen consumption data with Dr. Mario Pamatmat of San Francisco State University.

Preparations are being made to obtain seabed oxygen consumption data on the spring Ocean Pulse cruise aboard the Kelez.

Coastal Ecosystems Investigation

Community Structure

Clyde MacKenzie and Dave Radosh again dove on surf clam beds off Rockaway, Long Island, to monitor clam densities and growth, and abundance of several predator species. The study is designed to determine which environmental factors are limiting production of the clam beds. Clyde is designing experiments which may involve transplantation of clams and/or deployment of sediment trays, to examine growth and larval settlement at Rockaway versus a more polluted area off Sandy Hook. Dave is completing the analysis of grab samples collected off the central New Jersey coast in late 1979, to give us 3 yr of data on the sequence and timing of benthic macrofauna recolonization after the 1976 anoxia.

Bob Reid continued preparation of a Technical Development Plan describing overall rationale, sites, sampling frequencies, and parameters for the Northeast Monitoring Program. The program represents an attempt to integrate our Ocean Pulse monitoring with MESA's New York Bight Project and also with activities of the NOS at several Middle Atlantic dumpsites.

Bob also began reviewing bids by 25 potential contractors for the processing of Ocean Pulse benthic samples. The work would involve analyses of biomass, length-frequencies, and reproductive condition, as well as the traditional distribution/abundance data, for benthic macrofauna from 30+ Ocean Pulse sites. Ann Frame identified organisms from our Ocean Pulse and Long Island Sound surveys,

worked on distinctions between polychaetes of the genus Scoloplos, and helped Clyde MacKenzie with specimens from his study comparing macrofauna in areas which either had or had not recently been fished for ocean quahogs.

Benthic Energetics and Ocean Pulse Coordination

During this month Frank Steimle assisted Jim Thomas in the overall planning of the 12 March-10 April spring Ocean Pulse monitoring cruise aboard the Kelez. He and coauthor Dave Radosh corrected and resubmitted galley proofs of Chapter 12 of the NOAA Professional Paper titled "Oxygen Depletion and Associated Benthic Mortalities in New York Bight, 1976." He assisted Stan Gorski of the Northeast Regional Office's Environmental Assessment Branch in evaluating the merits of an application to construct an artificial reef off Atlantic City, NJ. With Russ Terranova, he compiled and forwarded a summary of portions of the Ocean Pulse hydrographic data set to Red Wright at the Woods Hole Laboratory.

Russ continued to combust specimens to complete our preliminary analysis of the caloric values of principal prey species of Georges Bank groundfish and assist Frank in preparing a summary report of all Ocean Pulse hydrographic data through December 1979.

Jan Ward completed corrections of the final draft and submitted for typing our manuscript on the abundance, distribution, and life history of 57 dominant benthic invertebrates for the New York Bight Atlas Monograph on Benthos of which she and Frank Steimle are coauthors with John Pearce and Dave Radosh.

Environmental Chemistry Investigation

In mid-February the Perkin Elmer model PE 5000 atomic absorption analyzer was installed in the heavy metals lab at the Sandy Hook Laboratory. Vincent Zdanowicz spent the latter part of the month learning how to program and operate the PE 5000.

Vincent Zdanowicz, working intensively with Dick Greig, Bob Marak, and SEFC personnel, assisted with the procurement and cleaning of materials and the development of protocol used during the shelf-wide survey of hydrocarbon concentrations in fish and sediments.

Jim Duggan participated in Part I of the MARMAP survey aboard the Wieczno. Jim measured netplankton and nannoplankton chlorophyll-a concentrations at 32 stations in the Gulf of Maine.

Several members of the investigation participated in Part I of the MARMAP survey aboard the Albatross IV (Cruise No. AL 80-02). Sue Barker and Steve Fromm measured chlorophyll concentrations, Ralph Bruno measured carbon-14 primary productivity, and Al Matte and Bill Felch (of the Narragansett Laboratory) filtered samples of seawater for nutrient (i.e., ammonium, nitrite, nitrate, phosphate, and silicate) analyses which will be run at the Sandy Hook Laboratory.

Ruth Waldhauer and Al Matte continued to reduce statistically and graphically those data on ammonium-nutrient measurements made between March 1979 and the present. The construction of cross-shelf profiles of ammonium concentrations was initiated in February. Ruth and Al also provided assistance and methods to Dick Greig of the Milford Laboratory on the processing of filtrates from aquaculture tanks to determine ammonium and other nutrient concentrations. Andy Braxler, Ruth Waldhauer, and Al Matte continued tests of the oxidation efficiency of the continuous ultraviolet (UV) digestion system for dissolved organic nutrients (i.e., N and P) in seawater. The present UV system photooxidizes urea with an efficiency of 40%. Urea, however, is one of the most difficult compounds to

mineralize. We are redesigning the optics of the digestion system to achieve urea degradation efficiencies greater than 95%.

Physiological Effects of Pollutant Stress Investigation

Physioecology

Work continued this month on the long-term exposure of Crepidula fornicata to silver. As mentioned in the last report, egg production has ceased. Animals of the F₁, F₂, and F₃ generations are being measured weekly.

A new experiment using American oyster gametes was initiated this reporting period. Both eggs and sperm of oysters will be individually treated with heavy metals to determine whether metals affect sperm or eggs or both. Various combinations of treatments will be used. This first phase was set up using mercury as the test pollutant.

Two 48-hr experiments to determine the effects of zinc (0, 150, 250, and 350-ppb concentrations) on embryos of the American oyster at various temperature (20, 25, and 30°C)-salinity (17.5, 22.5, and 27.5‰) regimes were performed this month.

A new study to compare the tolerance limits of American oyster embryos spawned from adults collected from three different areas, to effects of pollutants, was begun. Oysters were collected this month from the Quinnipiac and Housatonic Rivers (both considered to be "polluted areas") and from Greenport, NY ("clean area"), and are now being conditioned for spawning.

Considerable time was spent renovating one diluter and calibrating three others for future exposure studies.

Analyses of harbor seal tissues for heavy metals were initiated this month. Seal tissues were provided to us by staff of the New England Aquarium and were from those seals which were recently found dead on Cape Cod beaches. Analyses will be performed for cadmium, chromium, copper, nickel, lead, and silver.

Gill and blood samples were collected from windowpane (flounders) exposed to mercury for 60 days (see "Physiological Effects") and frozen for future analysis.

Routine monitoring of heavy-metal exposure tanks was performed weekly.

Physiological Effects

A comparison between rock crabs exposed to silver via the water column versus exposure via the food chain was initiated. One group of crabs is being exposed to silver in a flow-through diluter system and a second group is being fed blue mussels previously exposed to high levels of silver and, hence, have high body burdens of this metal. At the end of appropriate exposure periods, a variety of physiology measurements will be made to evaluate both exposure regimes.

A 60-day exposure of 60 windowpane to mercury was completed and the fish tested for gill-tissue respiration, hematocrit, hemoglobin, and red cell count. Plasma samples were frozen for analysis of sodium, potassium, calcium, magnesium, and osmolality.

Tests for osmolality, sodium, potassium, and calcium were completed on blood of scallops exposed earlier to either cadmium or silver. Similar tests are still in progress for windowpane collected from three stations in Long Island Sound.

The remainder of the month was spent working on Ocean Pulse samples, preparing for two March Ocean Pulse cruises, and working on several manuscripts.

Biochemical Effects

Analysis progressed on adductor muscle samples of sea scallops exposed either for 30 days to 10 ppb cadmium (as chloride) or for 60 days to 10 ppb silver (as nitrate). A second exposure of scallops to silver was begun; with these animals we hope to obtain some gill-tissue ATPase data.

Attention was given to technical refinements: 1 wk was devoted to the study of extractant variables and a study of relative stabilities of the enzymes examined in scallop adductor muscle. Another week was spent in working out optimal protocols for glutamate dehydrogenase and phospho(enol)-pyruvate carboxykinase, using muscle preparations from starved, exercised, or hypoxic animals. Lyophilized gill preparations were also made and used to explore a possible spectrophotometric method (double-coupled assay) for ATPase.

The Biochemical Effects Group is participating in the NOS cruise of the Kelez (Cruise No. KE 80-01), called Operation Longhaul, through and around the Philadelphia dumpsite. Scallop samples taken during this cruise will have backup data for PCB uptake in the adductor muscle.

Considerable time was spent on three manuscripts in varying degrees of preparation.

Anaerobic Bacteriology/Metabolism

Monthly activities concentrated on the completion of characterization of bacterial isolates from water and sediment samples obtained from recent Ocean Pulse cruises. Some additional 175 isolates have been characterized. Of these, 26% were in the Vibrio group -- the group of primary interest to fishery resources, while a second group, about 20%, were in the genus Aeromonas. The Aeromonas organisms are biochemically similar to the Vibrio's and are fish pathogens and also indicators of water quality. These organisms were not originally sought for in our studies. About 40% of the isolates remain unclassified under our present schemata, although additional tests are being made. For further identification, we will attempt to obtain computer assistance from API Laboratories, the manufacturers of our present identification system.

We recently reported on the isolation of four non-O1 V. cholerae from marketable American oysters in Long Island Sound waters. We have now further obtained five additional isolates from Ocean Pulse cruises at our offshore stations. A cursory examination of data obtained several years ago on various bacterial isolates from field-collected samples did not reveal this biotype. Further study is needed.

Blood sera obtained from two recuperating harbor seals at the New England Aquarium did not yield any significant bacteriological results -- neither toxins nor organisms.

Meetings, Talks, Visitors, and Publicity

Dr. Anthony Calabrese served on the Sea Grant Review Team for the New Jersey Marine Sciences Consortium during 4-6 February.

On 4 February, Dr. John Pearce met with Dr. Jerry Schubel, Director of the Marine Science Center at the State University of New York at Stony Brook, in regard to developing an environmental newsletter. Dr. Schubel is presently developing and submitting a proposal for funding under the Ocean Pulse Program. The

proposed newsletter will be published four times per year and will be principally concerned with East Coast environmental problems, but will cover major activities and events on the West Coast as well.

On 5 February, Dr. Pearce met with Dr. Gene Heyerdahl, Dr. Sukwoo Chang, and the ADP staff at Sandy Hook Laboratory in regard to developing further the Ocean Pulse statistics and ADP program. Further discussions on this topic were held during the IYABA meeting at the Woods Hole Laboratory on 28 February. Jay O'Reilly also attended the IYABA meeting with Dr. Pearce. Inputs were made by various IYABA persons as well as by Ms. Kay Paine, programmer at the Woods Hole Laboratory.

During 6-7 February, Dr. Pearce met at VIMS with other federal and state personnel concerned with remote sensing problems and integrated environmental studies. Dr. Pearce presented a talk on the Ocean Pulse Program -- its objectives and accomplishments to date.

On 8 February, Bob Reid chaired a second meeting of a working group to form a Technical Development Plan for NEMP. Attending were Darryl Christensen of NEFC, Mike Devine of NOS, and Dave Goodrich and Neal Millett of MESA.

Jay O'Reilly attended a National Research Council Workshop on Continuous Underway Water Sampling held in Washington, DC, on 11 February.

Mr. John MacInnes spent the week of 18 February at the Woods Hole Laboratory familiarizing himself with the NEFC computer setup and learning how to use computer terminals.

Dr. Fred Thurberg gave a seminar on "Biological Monitoring of Pollutants" at the University of Bridgeport (CT).

During 18-21 February, Drs. John Pearce and Fred Thurberg represented the NEFC and NMFS at the ICES Baseline and Monitoring Working Group meeting in Copenhagen, Denmark. This working group is concerned principally with establishing baselines for contaminants in the physical components of the environment as well as biota, and conducting trend monitoring in relation to contaminants in the environment and living resources. During the past 3 yr, the working group has been concerned with biological effects monitoring. Representatives from several European nations participated in the deliberations and there is a travel report available in Dr. Pearce's office which summarizes the meetings.

During 20-22 February, Frank Steimle and Sukwoo Chang met with other NEFC personnel at the Woods Hole Laboratory to review capabilities of the Penn State University International Statistical Ecology Program and receive their comments on the Ocean Pulse Program. During the same period, they also met with members of the Marine Ecosystems Division/Benthic Dynamics Investigation, concerning further interaction in the Division of Environmental Assessment's Coastal Ecosystems Investigation.

On 25 February, Dr. Pearce met with the New Jersey Shellfish Council. This council is responsible for establishing recommendations in regard to research and management concerned with shellfish resources in the State of New Jersey. Dr. Pearce briefed the Shellfish Council on an upcoming workshop concerned with shellfish depuration to be sponsored jointly by the States of New York and New Jersey, and the US Public Health Service.

On 27 February, Dr. Pearce visited the Milford Laboratory and gave a presentation to the staff on Ocean Pulse and state/federal activities that relate to marine environmental research and monitoring.

On 28 February, Frank Steimle met with personnel of the MESA New York Bight Project at Stony Brook, NY, to: (1) review the Division of Environmental Assessment's monitoring and research efforts this spring concerning Ceratium blooms and

oxygen depletion in the New York Bight, (2) further integrate the MESA monitoring plan with Ocean Pulse under the NEMP, and (3) increase cooperation and inter-calibration during future NEMP monitoring cruises.

Publications

- Pearce, J. B. Coastal and shelf environmental monitoring and the use of remote sensing techniques. (Abstract). In Proceedings of the Coastal Zone Color Scanner Workshop (sponsored jointly by the NEFC and SEFC); 1979 October 22-24. NOAA Tech. Memo. NMFS SEFC-9:26-27;1980. (P)
- Pearson, W. H.; Sugarman, P. C.; Woodruff, D. L.; Blaylock, J. W.; Olla, B. L. Detection of petroleum hydrocarbons by the Dungeness crab, Cancer magister. Fish. Bull., US. (A)
- Thomas, J. Large Area Marine Productivity-Pollution Experiments (LAMPEX). (Abstract). In Proceedings of Coastal Zone Color Scanner Workshop (sponsored jointly by the NEFC and SEFC); 1979 October 22-24. NOAA Tech. Memo. NMFS SEFC-9:28-29;1980. (P)

Reports

- Steimle, F. W., Jr.; Terranova, R. J. A preliminary assessment of the caloric content of some Middle Atlantic Bight predators and their prey. Sandy Hook Lab. Rep. No. SHL 80-05;1980.

AQUACULTURE DIVISION

Aspects of Nutritional Requirements of Mollusks Investigation

During the period of this report (December-February), harvests of algal food cultures from the carboy culture apparatus yielded, respectively, 1749 liters, 2293 liters, and 1916 liters of larval foods, and 1071 liters, 1516 liters, and 1235 liters of juvenile foods. These algal cultures were distributed to Milford Laboratory investigations as follows: Aquacultural Genetics, 1947 liters; Physiological Effects of Pollutant Stress, 2641 liters; Spawning and Rearing of Mollusks, 3084 liters; and Diseases of Larval Mollusks, 52 liters.

Stock cultures and various special strains were subcultured on schedule. The four remaining bacterized species in the collection (Skeletonema costatum, Chaetoceros calcitrans, Amphiprora hyalina, and Synechococcus sp.) were subjected to several treatments with a surgical scrub solution, but axenicity was not achieved. Apparently, the sensitivity of these algal species, combined with resistance of the bacterial contaminants, makes these cultures unresponsive to our various treatments designed to achieve axenicity. Requests for cultures were received from the following: Long Island Hatchery; Shinnecock Tribal Oyster Project on Long Island; Mark D. Leslie of Southeastern Massachusetts University in South Dartmouth, MA; and F. M. Flower and Sons Co. in Bayville, NY.

We have recently purchased an UV sterilizing unit (Aqua-fine) to replace the Milford-built unit we have been using, to achieve a "cleaner" seawater for use in oyster feeding experiments. Since this source of seawater is also used for preparation of algal culture media, it was important to be assured that the new UV unit did not induce chemical changes into the seawater that are different from those

of the previously used unit. Experiments were conducted in which our standard algal growth medium was prepared using seawater subjected to UV light in both old and new units. Daily growth measurements were made over a 3-wk period for the following species: Monochrysis lutheri, Isochrysis galbana, Dunaliella euchlora, Tetraselmis maculata, Chlorella autotrophica, Phaeodactylum tricoratum, Rhodomonas lens, Cyclotella nana, and diatom clone #1077. In all species, growth was identical in both types of seawater with the exception of M. lutheri. In this latter species, growth in the "Aqua-fine"-treated seawater was somewhat diminished from the Milford UV-treated water during the stationary phase; the significance of this small difference is questionable.

A large population of young oysters has been maintained in small tanks of standing seawater for future experimentation. Animals are washed daily and seawater is changed. Large volumes of algal foods are introduced daily and animals are showing a good increase in biomass with time. Feeding experiments were conducted with some of these oysters to observe the utilization of freeze-dried algae as food. Cultures (for this purpose) of both I. galbana and M. lutheri were concentrated by centrifugation, washed, and freeze-dried. Animals were weighed weekly (after drying each with absorbent paper by hand). Oysters that were fed live algae showed a reasonable growth increase, but those fed dried algae did not increase in growth. Recently, careful microscopic observations of animals in this latter group revealed that particles had accumulated at the closing edge of the right and left valves forming an excellent substrate for protozoan growth. This could inhibit normal pumping. We have now modified the feeding technique by reducing the quantity of dry food added to the seawater and by keeping the water in constant agitation. Initial observations show that animals are behaving in a more normal manner than previously by pumping vigorously and excreting waste material after feeding.

Dr. T. Matsusato was given a tour through our laboratories and work of the investigation was explained by Gary Wikfors. Dr. Ukeles attended an NEFC Factor IV Committee meeting and prepared several evaluations. Dr. Ukeles corrected galley proofs of a paper titled, "American Experience in the Mass Culture of Micro-Algae for Feeding Larvae of the American Oyster, Crassostrea virginica."

Aquacultural Genetics Investigation

Experimental Hybridization and Inbreeding of Oysters

Some oyster larvae may be exhibiting hybrid vigor with better survival and growth than local controls in a preliminary trial of a geographic hybrid cross. This kind of outcome appears to occur more often during certain culture times when progeny from local parents do not fare so well under seemingly typical culture conditions. In a "disturbed" or different environment, including intensive culture, hybrids potentially could thrive better than established parental populations which usually are so well adapted to existing conditions. For additional geographic hybrid studies, American oysters were obtained from Texas with the assistance of M. Duronslet of the SEFC's Galveston Laboratory. These oysters do not appear to be quite ripe as determined cytologically. Some gonadal cells still seem to be in pre-meiotic mitoses.

Discussions were held and contacts made in an effort to procure mangrove oysters (C. rhizophorae) from Trinidad, West Indies, through the cooperation of a marine biologist of the Institute of Marine Affairs there. Oysters are sold commonly by roadside vendors in Trinidad. Data were being collected on the

availability of this dwindling resource, including studies on possible effects of pollution in this oil-affluent area. Coast Guard personnel graciously provided a tour of the recently established museum for marine organisms at their post during a personal visit there.

The use of a recirculating seawater system for effluent control in the maintenance of oyster species and hybrids appears to have interesting possibilities for the conditioning and growing-out of oysters. This potential is being explored.

Mass Selection

A study examining selection response in 4-yr-old and 2-yr-old brood stock is underway. One cross in the 4-yr-old high line, two crosses in the 4-yr-old low line, and two crosses in the 2-yr-old high line have been made so far. We have not been successful in inducing the small 2-yr-olds to spawn. Larval and juvenile growth rates will be compared among lines to determine if selection is more accurate at one age than the other.

The F₂ generation in the larval selection experiment was measured to determine if selection for larval growth is having an effect on juvenile growth rate. Results are varied; however, overall it appears that no difference exists between growth rate in the high and low lines when lines are compared as a whole. There does seem to be some difference when the early setters only are compared. Early setting larvae in the high line grow somewhat faster as juveniles than do the early setting larvae in the low line, although this difference is not statistically significant. We are conditioning more F₁ larval selection brood stock to examine this response further.

A. Longwell was an invited speaker at an FDA-sponsored symposium on aquaculture held during 12-14 February in New Orleans, LA. Title of the talk (which will be published in the proceedings of the meeting) was, "Selective Breeding Programs and Genetics as Likely Impacts on Future Aquaculture Production Systems and Regulation of Aquaculture." This talk detailed the growing interest in genetic applications to aquaculture and in present restrictions on such applications. These latter restrictions include those shared generally with US aquaculture and the still-wild genotypes of "uncultivated" aquaculture species. The successful application of genetic principles should ultimately change the requirements and regulatory needs of hatcheries in relation to need for genetic variability in founding stocks, in relation to hybridization, and in relation to disease and prophylaxis. At the same time hatchery stocks are subjected to the process of domestication, the wild resource must be conserved as distinct gene pools for future artificial breeding programs.

Preparations are being made for the first meeting of the Genetic Study Group of the ICES Mariculture Committee. This will be held north of Bergen, Norway, in June.

Spawning and Rearing of Mollusks Investigation

Nutritional experiments, using 8-mm juvenile surf clams, have dealt with the effect of acclimatization to a constant algal density on feeding activity. Clams being maintained in a long-term growth experiment at different constant algal densities were temporarily removed. These clams were taken from treatments that represented low, medium, and high algal cell environments and then maintained at one of six algal densities for an 8-hr period. The filtration rate and algal

consumption were then monitored fluorometrically. The results indicate that the filtration rate is influenced by both the new level of cells at which the clams were temporarily maintained, as well as the environment to which they had been acclimated. In general, the pumping rate reduced as the level of available algae increased in the six treatments. Clams that had been previously acclimated to low algal levels tended to pump more rapidly, when exposed to high algal concentrations, than those clams that were acclimated to high algal levels. These induced changes in feeding activity illustrate a possible source of variability in the study of the nutritional requirements of bivalves.

Meetings, Talks, Visitors, and Publicity

Patricia Goertz has joined the Division and will assume the responsibility of maintaining an oyster brood stock and supplying oyster eggs to researchers at the Milford Laboratory on a weekly basis.

E. Rhodes, R. Goldberg, and J. Widman successfully completed a NOAA diving training course at the NOS Atlantic Marine Center in Norfolk, VA.

P. Riehl, a high school student from Trumbull, CT, has begun work on an independent study project at the Milford Laboratory.

PATHOBIOLOGY DIVISION

Microbial Ecology and Parasitology Investigation

A new strain of marine amoebae which transforms from an unflagellated to a flagellated stage, was isolated from sediments near the Philadelphia-Camden dumpsite. Infection experiments with laboratory mice conducted by collaborators at the American Type Culture Collection have shown that the amoebae are not pathogenic, although they survive and grow at temperatures up to 40°C. Isoenzyme analyses showed further that the amoebae are distinctly different from known species of soil or freshwater amoeboflagellates. Taxonomic studies are now in progress to determine whether the strain represents a new genus and species.

Ongoing studies of protozoa from "clean" and "polluted" ocean sediments have provided new insights into their value as indicators of high bacterial populations in organically enriched environments. Control stations which range from Ocean City, MD, inland for a distance of 12 mi and are bordered by agricultural, residential, or commercial pollution have provided reliable nearshore-to-inshore data which support some of our observations that relate to the microbial characteristics of offshore environments. Data analyses have shown that although pathogenic and nonpathogenic species of Acanthamoeba are routinely recoverable from sewage-sludge disposal sites, other genera of "soil" amoebae may be useful indicators for high populations of the natural marine bacterial flora. Most of the qualitative aspects of studies on amoebae have shown excellent reproducibility with respect to their geographical distribution, but quantitative studies have not been initiated. Standard statistical methods for estimating the numbers of protozoa in soil are now being evaluated to determine if they are adequate for counting amoebae in known amounts of ocean sediment. Dr. Stewart Bamforth of Tulane University has been consulted and will cooperate in developing quantitative methods. Dr. Bamforth has served as President of the Society of Protozoology and is a recognized authority on the population ecology of salt-marsh ciliates

and testate amoebae of soils. The success of this effort will greatly facilitate direct comparisons on the influence of bacterial abundance to the population dynamics of cyst-forming marine amoebae.

Adductor muscles from sea scallops were received from the Milford Laboratory and examined for evidence of disease. Distinct blackened abscesses, visible to the eye, were present as pinpoint foci in diseased specimens. Tissues that were teased apart under the dissecting microscope or examined by routine histological methods failed to yield any information on the cause of the striking tissue response. All of the abscesses were in an advanced stage of necrosis and degeneration, indicating that the host response probably was sufficient to similarly destroy any tissue-invading organism. Similar conditions have been studied by Mr. Fred Kern of the Oxford Laboratory, and in all instances when visible abscesses were present, causative agents were not detected. Recent studies on scallops from Florida and surf clams from Middle Atlantic coastal waters have shown that larval anisakid nematodes, Sulcascaris sulcatus, may infest both adductor muscles and gonads. Therefore, it has been suggested that surveys on New England sea scallops be conducted during seasons of the year when abscesses are not observed by visual examination. Cooperative studies submitted for publication this year list 11 species of marine mollusks as hosts for larval stages of the nematode, and the possibility should be considered that perhaps northern scallops encapsulate and destroy young larvae more effectively than do their more southern relatives.

Fish Pathology Investigation

The preparation and revision of manuscripts and in-house documents continued.

Preliminary ultrastructural studies conducted on olfactory organs of 4-wk-old (post-hatching) summer flounder larvae have indicated that ciliated receptor cells, ciliated and nonciliated supporting cells, as well as rod-shaped (apical ending) receptors were present in the tissue at this age. Ciliogenesis was observed for the receptor-type cells having these processes, and many of the cells in the basal and intermediate layers appeared to be undergoing rapid development, giving this pseudostratified epithelium a rather disorganized appearance. Thus far, microvillous-type receptor cells were not observed; however, these types of receptors are not necessarily distributed in a random manner and may be found upon further examination. One very interesting specimen, which is being examined carefully, demonstrated the connection of the olfactory nerve with the olfactory lobe in the brain and will allow for an evaluation of the synaptic relationship between receptor cell axons and the mitral cells located there.

A similar examination of the olfactory tissues from larvae exposed to 0.36-0.40 ppm of Cu^{++} for 24 hr has not clearly indicated any cellular necrosis; however, an evaluation of the apical receptor cell processes is continuing. Previously reported changes in the cytoplasmic density of the olfactory tissue cells were observed to be the result of ribosome-rich basal cells found in densely packed groups that extended further apically than was anticipated.

Much time has been spent laying the groundwork for spring spawning season studies of striped bass and anadromous clupeids. Field equipment has been gathered, and plans for collection and handling of fish are being formed with state and university collaborators. The clupeids will be monitored for the presence of IPN virus. Electron microscopic studies of IPN virus disease in Atlantic menhaden and American shad are in progress, and attempts are being made to visualize the virus in lesions of lab-infected moribund fish.

IPN-like cytopathic effect has been demonstrated in Atlantic menhaden cells inoculated with filtrates of macerated spleen from one of eight menhaden captured in December off the coast of North Carolina. The menhaden were examined virologically because of a mass mortality that was occurring in the area. This is the first evidence that a carrier state may exist with this disease.

Approximately 25 million young-of-the-year (YOY) spot (a sciaenid) died during the second and third weeks of February in the Upper Chesapeake Bay. The mortality appears to be attributable to low water temperature (below 3°C). Large concentrations of YOY spot stayed in Upper Chesapeake Bay several months later than normal. An unusually warm autumn and mild early winter period were probably contributing factors. A similar mortality involving spot and Atlantic croakers occurred in 1976.

Comparative Invertebrate Pathology Investigation

The staff spent much of this month in preparing manuscripts, bibliographies, reports, and other in-house documents.

In the continuing Ocean Pulse study of the parasites and pathology of planktonic crustaceans, archived samples of euphausiids collected on four MARMAP cruises were examined. A total of 839 euphausiids were examined grossly for focal gill melanization, and apostome and suctorian ciliate infestations. Of these, 63 (7.5%) had focal gill melanization, 330 (39.3%) had apostome infestations, and 21 (2.5%) had suctorian infestations.

The examination of MARMAP-collected euphausiids was begun in order to gain background information on their "normal" condition. In comparing data on euphausiids from Deepwater Dumpsite (DWD) 106 and MARMAP cruises, parameters of the physical environment are variables to be considered as affecting the condition of the organisms. Seasonality and depth are two parameters being considered. Depths at DWD 106 typically are over 1100 fm. Included in the present examination were euphausiids collected from two of the deepest MARMAP stations--422 fm and 720 fm, respectively--for comparison with DWD 106 data. The collection from 422 fm (Kelez Cruise No. KE 77-11) coincided seasonally with a DWD 106 cruise; the results of these two collections are given in Table 2 below. It appears that more pathology and ciliate infestations occurred in euphausiids collected at DWD 106. However, more detailed and continued examination of MARMAP samples is required before definite statements can be made as to the condition of DWD 106-collected euphausiids relative to the MARMAP specimens.

Table 2. Occurrence of pathological conditions and ciliate infestations in euphausiids collected at DWD 106 and at Station 68 of Kelez Cruise No. KE 77-11 in fall 1977.

Site	Depth (fm)	Gill melanization (%)	Apostome infestation (%)	Suctorian infestation (%)
DWD 106	>1100	171/435 (39.3)	331/435 (76.1)	22/435 (5.1)
Station 68	422	12/430 (2.8)	28/430 (6.5)	0/430 (0.0)

American oysters from Milford, CT, were examined to determine the cause of recent mortalities. Oysters from raceway tanks were compared to hatchery-reared oysters held in Milford Harbor and native Milford oysters. It was noted in the gross examination that the raceway oysters were in much poorer condition (being watery in appearance) than the other two groups of oysters. Signs of pathology, observed histologically, were more pronounced and more frequent in the raceway oysters than in the control. No parasites or pathogenic organisms were detected in any of the oysters examined. The types of pathology observed are compatible with physiological stress. Additional studies are planned in an attempt to resolve the problem.

Diseases of Larval Mollusks Investigation

A series of in vitro experiments were conducted to examine the effects of osmotic pressure and pH on the engulfment of bacteria by American oyster blood cells. When both variables were altered in the surrounding cell culture medium, the rates of bacterial engulfment changed in a patterned, but complex way. It was expected that bacterial uptake would be greatest at the normal osmotic pressure and pH of oyster hemolymph. This was not the case. Additional experiments to chart these effects may help to explain how mollusks respond to invading microorganisms.

Sucrose density gradient centrifugation was used to isolate a large-sized ferritin aggregate to be used in measuring phagocytic rates in oyster blood cells. These aggregates were found to be large enough to be within the measurement range for atomic absorption spectrophotometry. However, for an ideal assay, the background levels of iron, arising either from the reagents or leached from the assay tubes, should be reduced. Work is continuing on this problem.

Last month's report suggested that one of the bacterial isolates from a Long Island hatchery, FH1, could survive UV radiation when isolate FH3 was also present. Biochemical and physiological tests performed on bacterial colonies surviving the UV exposure, however, showed that the suspect FH1 colonies were, in fact, FH3 colonies. Thus, only FH3 was able to survive, regardless of whether the isolates were tested singly or together.

A study comparing oyster embryonic development to the straight-hinge stage in 10- μ m-filtered, UV-treated seawater with development in 10- μ m-filtered, charcoal-filtered, UV-treated seawater has been resumed. Comparisons will be made throughout the spawning season to determine whether charcoal filtration of seawater can enhance survival.

Sixteen different tests for sugar utilization/fermentation were completed with Vibrio sp. isolated from shellfish hatcheries in California and Maine. Differences in four of these tests were observed between the California and the Maine isolate which is thought to indicate slight strain rather than significant species differences between the two Vibrios. They are pathogenic to American oyster embryos, causing over 98% mortality at 10^3 cells/ml.

Three disinfection challenges were done with the California Vibrio sp. A chlorine study revealed that at residual oxidant levels of 0.5 ppm and above, no bacteria survived. Challenges at lower doses will be conducted in the near future. A second study indicated that at 0 and 24 hr after experimental exposure to UV light (flow rate = 3 l/min) there was no bacterial survival. An ozone experiment was inconclusive and is being repeated.

Meetings, Talks, Visitors, and Publicity

Dr. Rosenfield represented the Oxford Laboratory at the Superflux meeting held at Gloucester Point, VA, on 6 and 7 February; he attended the 529th meeting of the Helminthological Society of Washington on 8 February at the University of Maryland, College Park, where he cochaired the program with Dr. Jachowski of the University of Maryland; Dr. Rosenfield also attended a meeting of the New York Sea Grant Office at Riverhead, NY, on 26 and 27 February.

Dr. Murchelano met with Mr. Stern and Mr. Taormina at Sandy Hook, NJ, on 31 January and 1 February regarding Factor IV; he also attended a Vessel Committee meeting at Woods Hole, MA, during 5-8 February; and convened a meeting of the Factor IV Committee at the Milford Laboratory on 29 February.

Dr. Johnson attended a meeting of the graduate advisory committee of Mr. Frank Vella at the School of Life and Health Sciences of the University of Delaware in Newark on 4 February.

Mr. Galasso participated in a cruise aboard the Albatross IV from 4 to 19 February to collect tissues for hydrocarbon analysis and pathology.

Dr. Sawyer participated in a meeting with FDA personnel at Narragansett, RI, on 7 and 8 February to develop a cruise plan for an Ocean Pulse study in Narragansett Bay; he also attended the Helminthological Society meeting on the evening of 8 February at the University of Maryland.

Dr. Bodammer attended the 529th meeting of the Helminthological Society of Washington at the University of Maryland on the evening of 8 February and presented a talk on "An Ultrastructural Study of Paramoeba pernicioso and Its Interactions with Hemocytes in the Blue Crab (Callinectes sapidus)."

Ms. MacLean attended the Helminthological Society meeting on the evening of 8 February, and an IYABA meeting at Woods Hole, MA, on 28 and 29 February.

Dr. Blogoslawski attended the Sixth FDA Workshop on Aquaculture in New Orleans, LA, during 11-14 February.

Mr. Kern attended a meeting of the Special Committee on Pacific Coast Shellfish Import-Export Problems at Portland, OR, during 12-15 February.

Mr. Heister attended a Pre-Retirement Seminar at Norfolk, VA, on 27 and 28 February. A retirement luncheon was held in his honor on 29 February.

Visitors to the Oxford Laboratory during the month included Mr. Tim Cole of the University of Maryland's Center for Environmental and Estuarine Studies at Cambridge, MD; and Mr. Mark Hummel of Humco, Inc., in Glen Burnie, MD.

Publications

Lichtenfels, J. R.; Sawyer, T. K.; Miller, G. New host data for larval Sulcascaris (Nematoda: Anisakidae). Trans. Am. Microsc. Soc. (S)

MacLean, S. A. A study of Haematractidium scombri in Atlantic mackerel, Scomber scombrus. Can. J. Fish. Aquat. Sci. (A)

Murchelano, R. A. Environmental quality and the diseases of fish and shellfish. Maritimes 24:7-10;1980. (P)

NATIONAL SYSTEMATICS LABORATORY

Penaeoid Shrimp Investigation

Research continued on the systematics of the rock shrimp genus Sicyonia. These shrimps are now being exploited at an increasing rate in Florida. A key was completed to western Atlantic species and information was compiled on geographic and depth ranges. Dr. Isabel Canet studied Sicyonia at the University of Miami and also visited the Harbor Branch Foundation at Fort Pierce, FL, to study shrimp collections.

Crustacea Investigation

Preparation continued on a manual on temperate-water decapods of the eastern US.

Pelagic Fishes Investigation

Dr. Bruce Collette participated in the United Nations (UN) Food and Agriculture Organization (FAO)/DANIDA Expert Consultation on Field Identification of Commercial Marine Organisms in the Western Indian Ocean held at the Central Marine Fisheries Research Institute in Cochin, India.

Benthic Fishes Investigation

Work was done on six families of fishes for the UN Educational, Scientific, and Cultural Organization (UNESCO) publication "Fishes of the Northeast Atlantic and Mediterranean." A draft was completed of a paper describing a new species of deepwater ophidiid from the tropical eastern Atlantic.

Meetings, Talks, Visitors, and Publicity

Bruce Collette presented two seminars, one on adaptations of tunas and mackerels, the other on the ecology of coral reefs, at the Central Marine Fisheries Research Institute in Cochin, India.

J. Carter, R. Crabtree, and K. Sulak, all from VIMS, visited for discussions on benthic fish research.

Publications

Collette, B. B. Families Coryphaenidae, Rachycentridae, Pomatomidae, and Echinidae. In FAO Species Identification Sheets for the Western Indian Ocean. (S)

Williams, A. B.; Williams, D. McN. Carolinian records for two genera of decapod crustaceans (Nephropidae, Homarus; Portunidae, Callinectes): postulated means of dispersal. Fish. Bull., US. (S)

ATLANTIC ENVIRONMENTAL GROUP

Ocean Monitoring and Climatology Task

The cooperative Ship of Opportunity Program obtained five XBT and two continuous plankton record (CPR) transects in February: two XBT and one CPR transect in the Gulf of Maine, one XBT transect along $71^{\circ}00'W$ in Southern New England waters, one XBT transect and one CPR transect across the shelf and slope off New York, and one XBT transect in the Gulf of Mexico.

The following announcement of eddy conditions in the Georges Bank-Middle Atlantic Bight area was sent to the Commander of the Atlantic Area for the USCG for publication in the March issue of Atlantic Notice to Fishermen:

AEG/February 15, 1980

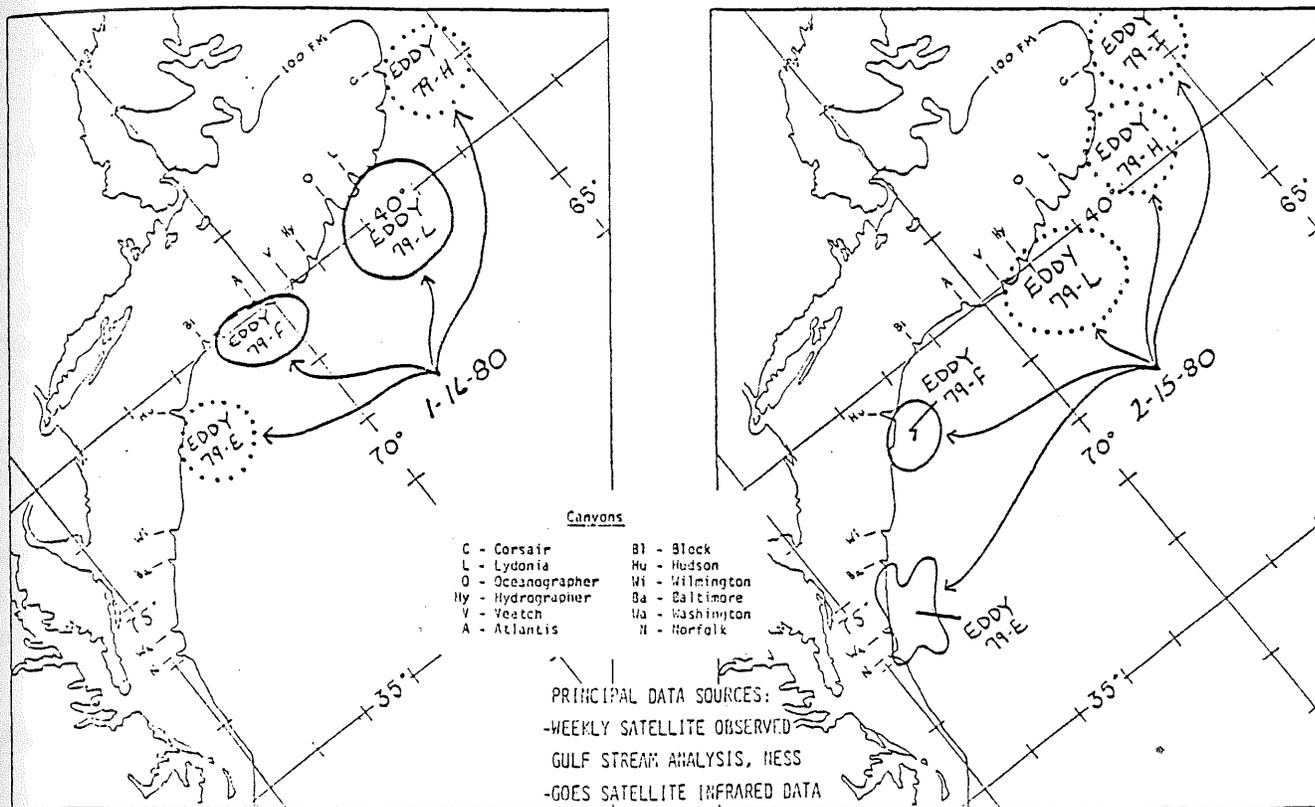
GULF STREAM EDDY LOCATIONS

The Atlantic Environmental Group of the National Marine Fisheries Service reports that there were five warm core Gulf Stream eddies present off the northeast coast of the United States in mid-February.

Eddy 79-E moved southwest for 135 nm (250 km) to a center position of $37.4^{\circ}N$, $74.0^{\circ}W$, east of Washington Canyon. Eddy 79-F traveled 74 nm (137 km) to the west and is now centered off Hudson Canyon at $39.1^{\circ}N$, $72.2^{\circ}W$. Eddy 79-L shifted westward 60 nm (111 km) to a location centered at $39.6^{\circ}N$, $68.8^{\circ}W$, south of Hydrographer Canyon. Eddy 79-H moved southwest for 58 nm (108 km) to a position east of Lydonia Canyon at $40.4^{\circ}N$, $66.5^{\circ}W$. Eddy 79-I advanced 80 nm (149 km) into the area of coverage and is now centered at $41.4^{\circ}N$, $65.3^{\circ}W$, east of Corsair Canyon.

During the next 30 days, Eddy 79-E probably will move southward and be absorbed by the Gulf Stream. Eddy 79-F may move southwest to Baltimore Canyon; Eddy 79-L west to Atlantis Canyon; Eddy 79-H west to Oceanographer Canyon and Eddy 79-I southwest to a position south of Corsair Canyon.

Fishermen are requested to report unusual conditions or catches occurring in the vicinity of these eddies to the Director, Atlantic Environmental Group, National Marine Fisheries Service, RR 7, South Ferry Road, Narragansett, RI, 02882, by mail. Updates on eddy positions and general information on Gulf Stream eddies may be obtained by calling the Atlantic Environmental Group (401-789-9326).



Ocean Dumping Studies Task

Construction of two sets of deepsea amphipod traps has proceeded. All necessary hardware has either been already delivered or is on back order. Paired timed releases supplied by Oceanographic Instrumentation Systems, one of which will employ a 12kHz pinger, will be used per set of traps. Each trap will also be equipped with a submersible xenon flasher and transmitter. Ballast weights (eight of them) will be constructed by MAFF Laboratory at Lowestoft, United Kingdom. This will allow a total of eight trap deployments.

Price quotes on the Ocean Research Equipment COSRAMS satellite-tracked buoy have been requested and will be received shortly. Arrangements were made through SERVICE ARGOS in Toulouse, France, to acquire the necessary identification numbers for use on the buoys beginning during the May 1980 cruise to DWD 106. As soon as quotes are received and studied, two buoys will probably be ordered.

Meetings, Talks, Visitors, and Publicity

On 4 and 5 February, Woody Chamberlin traveled to the Brookhaven National Laboratories in Upton, Long Island, NY, to attend the Coastal Processes Conference.

Mert Ingham went to VIMS in Gloucester Pt., VA, on 6 and 7 February to attend a remote sensing conference on "Superflux."

Woody Chamberlin and Lee Crist traveled to the NSTL to attend a remote sensing seminar/workshop hosted by NASA's Earth Resources Laboratory from 11 to 15 February.

On 11 and 12 February, Mert Ingham went to Washington, DC, to confer with members of the NMFS Office of Science and Environment.

Mert Ingham attended a meeting on statistics held at the Woods Hole Laboratory on 21 February.

From 25 to 28 February, Reed Armstrong attended a meeting in Galveston, TX, of principal investigators in studies of the Buccaneer Oil Field (Gulf of Mexico) and gave a presentation on progress in AEG's investigations of the hydrography and circulation around the field. The Buccaneer Oil Field studies are being managed by the SEFC's Galveston Laboratory and sponsored by the USEPA.

Mert Ingham, Woody Chamberlin, and Talbot Murray attended a conference on LAMPEX remote sensing data at the Sandy Hook Laboratory from 27 to 28 February.

Publications

Bisagni, J. J.; Kester, D. R. Physical variability at an East Coast United States offshore dumpsite. Proceedings of the First International Ocean Dumping Symposium; 1978 October.

Celone, P. J.; Chamberlin, J. L. Anticyclonic (warm core) eddies off the northeastern United States during 1978. *Annal. Biol.* 35. (A)

Cook, S. K.; Hughes, M. M. Water column thermal structure across the shelf and slope southeast of Sandy Hook, NJ, USA in 1978. *Annal. Biol.* 35. (A)

Crist, R. W.; Chamberlin, J. L. Bottom temperatures on the continental shelf and slope south of New England during 1978. *Annal. Biol.* 35. (A)

Hilland, J. E.; Armstrong, R. S. Variation in the shelf water front position in 1978 from Georges Bank to Cape Romain. *Annal. Biol.* 35. (A)

Ingham, M. C.; McLain, D. R. Sea surface temperatures in the northwestern Atlantic in 1978. *Annal. Biol.* 35. (A)

Leming, T. D.; Jossi, J. W. Observation of temperature and currents in the coastal waters near Cape Canaveral, Florida during 1970 and 1971. NOAA Tech. Rep. NMFS SSRF. (S)

Reports

Bisagni, J. J. July 1977 physical oceanographic studies at Deepwater Dumpsite 106. Prepared for Deepwater Dumpsite 106 Assessment Report.

Jossi, J. W.; Marak, R. R. MARMAP survey manual. 43 p. Contribution to NOAA Fisheries Technology Shipboard Manual.

Mizenko, D.; Chamberlin, J. L. Gulf Stream anticyclonic eddies and shelf water at Deepwater Dumpsite 106 during 1977. Prepared for Deepwater Dumpsite 106 Assessment Report.

Murray, T. E. A summary of waste inputs to Deepwater Dumpsite 106 during 1976 and 1977. Prepared for Deepwater Dumpsite 106 Assessment Report.