

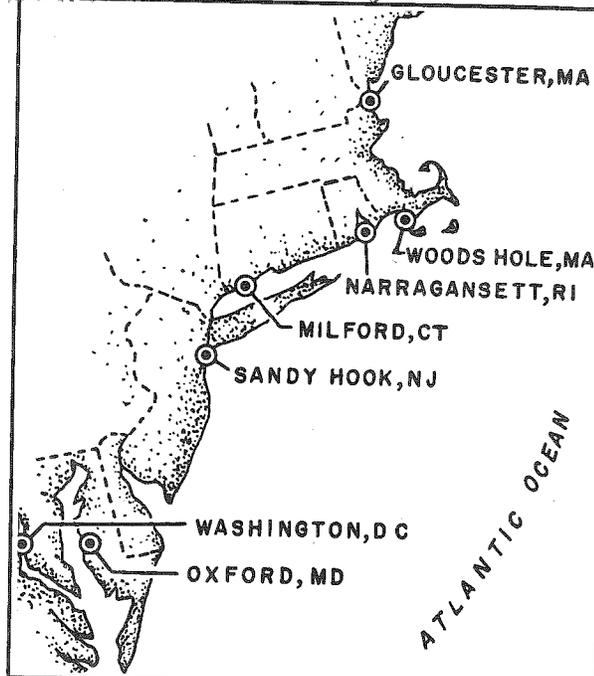
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# NEFC

Northeast Fisheries Center

# NEWS

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JUNE 1979

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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

Dr. Carl Sindermann served as Chairman of a Workshop on Effects of Environmental Stress from Pollutants on Fish and Shellfish, as part of NOAA's Environmental Research Laboratories' Marine Ecosystems Analysis Program (MESA)-sponsored New York Bight Symposium held at the Hotel Taft in New York City during the week of 11 June. The Symposium included representation from management and political action groups, and was considered highly successful. Proceedings will be published in book form, and should serve as an excellent summary of knowledge on persistent problems in the New York Bight.

Other NEFC members also participated in the Symposium. Dr. Pearce and Dr. Sawyer were members of the Workshop on Ecological Effects of Environmental Stress on Benthos; Dr. Murchelano and Ms. Gould were members of the Workshop on Ecological Effects of Environmental Stress on Fishes; Dr. Longwell was a member of the Workshop on Ecological Effects of Environmental Stress on Plankton/Neuston; and Dr. Calabrese was a member of the Program Committee as well as the Workshop on Effects of Toxic Substances on Communities and Ecosystems. All this represented a substantial contribution by the NEFC to the success of the Symposium.

### Fisheries Utilization Office

Louis Ronsivalli attended the Massachusetts Institute of Technology's (MIT) 1979 Technology Day which culminated Alumni Week at the Institute. Among the several morning programs, the highlight was the keynote speech by Dr. Jordan J. Baruch, Assistant Secretary of the US Department of Commerce for Science and Technology. His talk on "Federal Policy and Industrial Innovation" was at least one inspiration to the hundreds of alumni in the audience. The highlight of the afternoon was a panel discussion, chaired by the Assistant Secretary, on "Technology in Innovation." The message that was clear throughout the day was the need for the US to engage in the generation of "generic technology" in collaborating with the US industries to reassert this country's leadership role in industrial innovation and technological supremacy. This is becoming an area of major interest to the Carter Administration, according to Dr. Baruch.

### Special Scientific Investigations Office

Arthur Posgay continued to work on his manuscript on the growth rate of the sea scallop (Placopecten magellanicus) and started work on an International Council for the Exploration of the Sea (ICES) document demonstrating that scallops from shallow water grow much faster than those from deeper water.

### Special Technical Projects Office

Most of this month was spent on sea scallop gear trials. The NOAA R/V Rorqual spent 10 days at sea with engineers and divers using underwater color television to film scallop drags in action. The field tests were completed and a short film is being edited.

Specifications for a CAMAC (computer automated measurement and control) data system for the NOAA R/V Albatross IV were completed.

## RESOURCE ASSESSMENT DIVISION

### Resource Surveys Investigation

A new unit, the Technical Standardization Unit, was formed within the Resource Surveys Investigation to handle more effectively the increased responsibilities of the Investigation. Charles Byrne will be acting leader for the Unit, which will include Harold Foster, Warren Handwork, John Nicolas, and Andrew Thoms. This Unit will be responsible for pre-cruise activities such as station selection, chart preparation, and handling all matters of cruise-associated gear and supplies. The Unit will also be responsible for the maintenance and storage of all Division sampling gear (e.g., trawls, hydraulic dredges, and scallop dredges), and the maintenance of accurate records of use, repairs, and current inventory. They will work closely with engineering support services in the development of better overall sampling techniques. Office space for this Unit on the second floor over the Maintenance Shop is presently being prepared.

The existing Survey Unit spent most of this month finishing the data processing of the 1979 spring bottom trawl and sea scallop surveys. A field aid illustrating common external pathological conditions of fish was completed for use in examining fish during trawl surveys. Linda Despres will take the lead responsibility in the collection of fish pathology data in the new cooperative biopathology effort with the Pathobiology Division. John Nicolas took part in two University of Rhode Island (URI) right whale counts on Stellwagen Bank.

### Fishery Biology Investigation

#### Age and Growth

Age samples completed were haddock and Atlantic cod samples from Albatross IV Cruise No. AL 79-03 and NOAA R/V Delaware II Cruise No. DE 79-04 and redfish commercial samples from all four quarters of 1969 and first and second quarters of 1970. Gary Shepherd and Jim Plescher removed age structures from 416 frozen samples of haddock, Atlantic cod, yellowtail flounder, redfish, and summer flounder.

#### Finfish

Emphasis in June was on bluefish, Atlantic mackerel, and Atlantic herring. Cathy Rearden and Laurie Savelkoul completed aging half of the 1978 recreational bluefish samples from the Sandy Hook Laboratory. Mackerel and herring from the 1979 spring bottom trawl survey were aged by Louise Dery in addition to commercial samples of both species. A sizable sample of mackerel from the 1979 Mid-Atlantic recreational fishery was also aged.

Beth Shiftman began sectioning silver hake otoliths as part of the stock separation study, and our new college student, Lisa Diaz, began work on the development of routines for the aging of goosefish using fin rays and otoliths.

#### Shellfish

Dr. Thomas Hopkins from the University of Maryland Eastern Shore (UMES) was at the Woods Hole Laboratory to work with John Ropes and Loretta O'Brien on the thin-sectioning technique during 4-15 June. The thin sectioning of the chondrophores of surf clams (Spisula solidissima) sampled by UMES continued through

15 June. Preparation of 180 thin sections from shells was accomplished. John, Ambrose Jearld, Brad Brown, and Dr. Hopkins participated in several sessions discussing the aging project at UMES and going over earlier sample records. Requirements for the project were reviewed in light of the new processing techniques. The procedures were outlined in detail to assist in future preparation of reports by UMES.

A summer aid, Jim Whalen, joined us on 25 June. His duties include assisting in preparing sea scallop and surf clam samples for age determination, e.g., excising the chondrophore pieces from clam shells and measuring shell dimensions and weights for both sea scallops and surf clams.

Loretta O'Brien sectioned sea scallop shells for microscopic examination of age marks and prepared some acetate peels of the cut edges. The age marks in these latter preparations appeared to be of limited use.

### Sandy Hook Investigation

Darryl Christensen and John Clifford completed the first draft of a manuscript comparing day catches with night catches of bluefish made on party boats. They completed a laboratory reference report on summer flounder and submitted it to the Northeast Regional Office's State-Federal Program Summer Flounder Scientific and Statistical Committee. They also completed a collection of Atlantic mackerel age samples from the spring recreational fishery of New York and New Jersey and forwarded it to the Woods Hole Laboratory for age analysis. John Clifford started collecting bluefish and summer flounder age samples from the recreational fishery.

Stuart Wilk worked on final revisions of a manuscript on linear discriminant analysis of summer flounder stocks and also on revisions and updating of his bluefish briefing book. He was appointed the NMFS National Plan Coordinator for Bluefish, a position in which he is responsible for overseeing that NMFS interaction with regional fishery management councils is effective and efficient for the development of any Bluefish Fishery Management Plan.

### Fishery Analysis Investigation

Ralph Mayo began development of a series of computer programs to summarize US and Canadian historical commercial fishery statistics for each of the stocks involved in the US-Canada fisheries treaty. Anne Lange and Joan Palmer also assisted in the effort.

Ralph continued content analysis and automatic data processing (ADP)-suitability review of the domestic vessel and processor logbooks received by the NEFC. Garrett Flaherty (Southeastern Massachusetts University summer student) is entering selected portions of the logbook records into the First Data Computer System to establish an inventory file of all records received by the NEFC.

Steve Murawski initiated effort to re-stratify surf clam and ocean quahog (*Arctica islandica*) research survey tow data into newly established shellfish strata. Marge Aelion and Maureen Griffin are assisting Steve in re-stratifying results from the the 1965-74 shellfish assessment cruises.

Maureen Griffin also began analysis of Georges Bank and Gulf of Maine Atlantic cod tag return records from unpublished data of William Schroeder collected during the early 1930's.

Liz Bevacqua continued analysis of commercial and research survey scup data. Liz also assisted in processing domestic vessel and processor logbook records received during June.

Joan Palmer continued to analyze the early growth rate of various finfish species in relation to population densities.

Paul Wood coordinated four sea sampling trips during June: (1) the F/V Barbara Jean, a groundfish vessel out of Gloucester, MA, during 9-15 June (Jim Coyne, sea sampler); (2) the F/V Brandywine, a surf clam vessel out of Chincoteague, VA, during 18-19 June (Steve Murawski, sea sampler); (3) the F/V Kristy Lee, a surf clam vessel out of Ocean City, MD, on 20 June (Steve Murawski, sea sampler); and (4) the F/V Norman D., an ocean quahog vessel out of Ocean City, MD, during 21-22 June (Steve Murawski, sea sampler).

Fred Serchuk and Paul Wood continued analyses of Atlantic cod data for the populations south of Georges Bank for an assessment report summarizing the status of these populations.

#### Fishery Assessment Investigation

Emory Anderson worked on a manuscript on "The Silver Hake Stocks and Fishery off the Northeastern United States," to be coauthored by Fred Lux and Frank Almeida and published in the Marine Fisheries Review. Emory has also been organizing a State-Federal Program assessment workshop to be held in Woods Hole on 24 and 25 July which will focus on assessments and supporting data bases of Southern New England stocks. Participants will be from Massachusetts, Rhode Island, Connecticut, New York, the New England and Mid-Atlantic Fishery Management Councils, the Northeast Regional Office, and the NEFC's Resource Assessment Division.

Steve Clark has continued to update assessment data for pollock and other finfish and has also, with Joan Palmer, updated the analyses on trends in total biomass abundance based on research vessel survey data.

Pat Carter has been creating computer tape files for haddock and pollock catch statistics for 1964-78. She has also been preparing data outputs requested by Canadian scientists, and analyzing 1977-78 pollock gill-net catch statistics.

Bill Overholtz returned for the summer recess from graduate school at Oregon State University on 11 June. He has been involved in several activities including a fishery assessment technology paper for the NMFS-RFMC (regional fishery management councils) multispecies task force, copying computer tapes of the Gulf of Maine - Georges Bank bottom trawl survey data for use in multispecies fishery analysis, and preparation of data for use in updating the Atlantic mackerel assessment.

Frank Almeida completed the first draft on a silver hake mesh-selection and yield-per-recruit paper and began revising a silver hake growth paper. He also completed the computer calculation of 1978 numbers-at-age for the silver and red hake commercial landings. Frank has worked with Kay Paine and Mike Thompson of the ADP Unit at the Woods Hole Laboratory on revising a computer program for virtual population analysis, and has begun analyzing inshore research survey catch data for bluefish.

Jeffrey Floyd, Bill Burns, and Steve Morrison have continued processing silver hake samples for morphometric measurements. Dennis Hansford has been coding and auditing 1978 commercial age-sampling data for haddock, pollock, and redfish, and 1979 commercial length-frequency data in cooperation with Thurston Burns. He has also worked on northern shrimp (Pandalus borealis) data.

Thurston Burns has been making preparations for a joint US-USSR silver hake tagging experiment to be conducted in September. He has also been working on an ICES document on the review and assessment of the US offshore American lobster (Homarus americanus) fishery in cooperation with Ron Essig and Steve Clark. Thurston also organized two sea-sampling trips aboard a groundfish vessel out of Gloucester, MA, and a lobster vessel out of Fairhaven, MA.

#### Fishery Systems Investigation

Routine assessment and advisory activity (to the regional fishery management councils, NMFS Washington Office, Federal Energy Regulatory Commission, US State Department, and others) continued during June. Mike Sissenwine also began development of an issue paper for the FY82 budget. The title of the paper will be "Man the Predator in Disequilibrium With His Prey."

#### Fishery Economics Investigation

During June, major emphasis of the Fishery Economics Investigation has been on the development of a New England groundfish management model. Jim Kirkley made several trips to URI to estimate and test the model. A preliminary draft of the model and its results has been prepared by Jim, Joe Mueller of the Northeast Regional Office, and Lars Videans of the New England Fishery Management Council.

Jim Kirkley has prepared a preliminary draft jointly with Mike Pennington on an approach for analyzing the effects of fisheries management. Other preliminary drafts or manuscripts in review during June are "The Relationship Between Capacity and Stock Assessments: The Atlantic Sardine Fishery," and "A Policy Framework for Fisheries Management," coauthored with Brian Rothschild of the NMFS Office of Policy and Planning and Lee Anderson of the University of Delaware.

Two summer employees were hired within the Investigation: Laura Murphy from Dartmouth College, and Jim Coyne from the University of New Hampshire. Jim Coyne will be working on determining availability of socioeconomic data; Laura will be assisting in the development of a data base.

#### Meetings, Talks, Visitors, Publicity

Emory Anderson and Stuart Wilk attended a meeting of the Mid-Atlantic Fishery Management Council's Scientific and Statistical Committee in Philadelphia, PA, on 4 June.

Stuart Wilk attended a meeting at the NMFS Office of Resource Conservation and Management to discuss the Bluefish Fishery Management Plan, in Washington, DC, on 11 and 12 June.

Paul Wood and Fred Serchuk met with Lowell Fritz, a graduate student at the Virginia Institute of Marine Science (VIMS), to discuss sea scallop at-sea sampling techniques on 13 June at the Woods Hole Laboratory.

Fred Serchuk presented a review of recent groundfish management and assessment at the semiannual Woods Hole Laboratory staff meeting on 14 June.

Fred Serchuk and Mike Sissenwine attended a conference on Comparative Marine Policy sponsored by the URI Center for Ocean Management Studies during 18-20 June.

Stuart Wilk attended a Northeast Regional Office State-Federal Program Summer Flounder Program Scientific and Statistical Committee meeting in Philadelphia, PA, on 19 and 20 June.

Ralph Mayo participated in a meeting of state and NMFS scientists involving stratification schemes for inshore bottom trawl surveys held on 21 June at the Woods Hole Laboratory.

Fred Serchuk and other Divisional personnel met with Langdon Warner, Science Associate of the Environmental Defense Fund, at the Woods Hole Laboratory on 22 June to discuss fishery management under the Fishery Conservation and Management Act of 1976.

Steve Clark lectured on fish population dynamics at the Shoals Marine Laboratory on 24 and 25 June.

A paper titled "Assessment and Status of the Ocean Quahog *Arctica islandica* Off the Middle Atlantic Coast of the U.S.," by Steve Murawski and Fred Serchuk, was presented (in absentia) at the 1979 annual joint Shellfish Institute of North America-National Shellfisheries Association meeting at Vancouver, BC, on 26 June.

Fred Serchuk and Ralph Mayo attended a meeting of IYABA on 26 June at the Woods Hole Laboratory.

Mike Sissenwine attended New England Fishery Management Council meetings in Peabody, MA, on 26 and 27 June.

Jim Kirkley met with other individuals in Washington, DC, on 27 and 28 June to select a contractor for conducting a study on capital needs in aquaculture. Wharton Associates was tentatively selected.

Mike Sissenwine attended a session of the US-USSR meeting on hydroacoustic methods held at the MIT C.S. Draper Laboratories on 28 June.

Ralph Mayo attended the 1979 annual meeting of the NMFS Statistics Branch on 28 and 29 June in Gloucester, MA.

Stuart Wilk attended a Mid-Atlantic Fishery Management Council Bluefish Advisory Subpanel meeting in Philadelphia, PA, on 29 June.

Jim Kirkley discussed with Ira Sohn of New York University, some possible fishery-related economic problems about a proposed bioeconomic input-output model.

Jim Kirkley met with Mike Morford of the NOAA Office of Coastal Zone Management to discuss economic impacts of proposed oil drilling operations on Georges Bank.

Jim Coyne made visits to URI, University of New Hampshire, University of Maine, Rhode Island and New Hampshire Marine Advisory Services, and the Massachusetts Division of Marine Fisheries during June to discuss availability of fishery-related socioeconomic data.

### Manuscripts

Almeida, F. P., and E. D. Anderson. 1979. Status of the Georges Bank silver hake stock-1978. ICNAF Res. Doc. 79/VI/84, Ser. No. 5446. 11 p.

Almeida, F. P., and E. D. Anderson. 1979. Status of the Southern New England-Middle Atlantic silver hake stock-1978. ICNAF Res. Doc. 79/VI/85, Ser. No. 5447. 11 p.

Almeida, F. P., E. D. Anderson, and H. A. Herring. 1979. Status of the Georges Bank red hake stock-1978. ICNAF Res. Doc. 79/VI/86, Ser. No. 5448. 12 p.

Almeida, F. P., E. D. Anderson, and H. A. Herring. 1979. Status of the Southern New England-Middle Atlantic red hake stock-1978. ICNAF Res. Doc. 79/VI/87, Ser. No. 5449. 12 p.

- Almeida, F. P., and E. D. Anderson. 1979. Status of the Gulf of Maine silver hake stock-1978. ICNAF Res. Doc. 79/VI/88, Ser. No. 5450. 12 p.
- Anderson, E. D., and W. J. Overholtz. 1979. Status of the Northwest Atlantic mackerel stock-1978. ICNAF Res. Doc. 79/VI/90, Ser. No. 5452. 21 p.
- Christensen, D. J., and W. J. Clifford. In press. Composition of catches made by anglers fishing for summer flounder (Paralichthys dentatus) from New Jersey party-boats in 1978. Mar. Fish. Rev. (A)
- Clifford, W. J., and D. J. Christensen. 1979. Length-frequency of party- and charter-boat catch of summer flounder (Paralichthys dentatus), 1975-1978. NMFS, NEFC, Sandy Hook Lab. Ref. No. 79-25. 122 p.
- Grosslein, M. D., W. Hahm, M. P. Sissenwine. 1979. Status report on development of a multispecies model of fish production. ICNAF Res. Doc. 79/VI/115.
- Lange, A. M. T. 1979. Squid stock status: June, 1978. ICNAF Res. Doc. 79/VI/89.
- Mayo, R. K., E. Bevacqua, V. M. Gifford, and M. E. Griffin. 1979. An assessment of the Gulf of Maine redfish, Sebastes marinus (L.), stock in 1978. NMFS, NEFC, Woods Hole Lab. Ref. No. 79-29. 63 p.
- Murawski, S. A., and G. T. Waring. 1979. A population assessment of butterfish in the Northwest Atlantic. ICNAF Res. Doc. 79/VI/92.
- Serchuk, F. M., S. A. Murawski, E. M. Henderson, and B. E. Brown. 1979. The population dynamics basis for management of offshore surf clam population in the Middle Atlantic. Pages 83-101 in Proceedings of Northeast Clam Industries Conference on Management for the Future. (P)
- Wilk, S. J., and W. W. Morse. 1979. Annual cycle of gonad-somatic indices as indicators of spawning times for fifteen species of fish collected from the New York Bight, June 1974 to June 1975. NMFS, NEFC, Sandy Hook Lab. Ref. No. 79-11. 54 p.

#### MARINE ECOSYSTEMS DIVISION

##### Benthic Dynamics Investigation

The benthic invertebrate fauna inhabiting the continental shelf area south of Martha's Vineyard and Nantucket was the principal subject of study this month. Analyses of the density and biomass of the major taxonomic groups in relation to the more important environmental characteristics were the main tasks performed. Condensation of the data in both graphic and tabular form is progressing satisfactorily. Our goal of preparing a report on this interesting fauna is well advanced. Roger Theroux continued the analyses of the distribution of bivalve mollusks from the eastern coast of the US, based on specimens in the NEFC's invertebrate collection. A report by John Dickinson, Roland Wigley, Richard

Brodeur, and Susan Brown-Ledger, titled "Distribution of Gammaridean Amphipoda (Crustacea) in the Middle Atlantic Bight Region," was submitted to the NMFS scientific editor for review.

Research on the food habits of fish and invertebrates was continued with emphasis on juvenile haddock, flatfishes, and the ocean quahog. Ray Bowman continued with the analysis of juvenile haddock food habits data. He submitted an abstract of his recent poster session report, titled "Food and Feeding of 0-Group Haddock in the Northwest Atlantic," that was presented at the ICES Early Life History of Fish Symposium held in Woods Hole in April. He is currently preparing a more extensive report on this subject. Rich Langton has made good progress on the preparation of a report on the food habits of nine species of flatfishes. Also, a paper by William Robinson and Richard Langton, titled "Digestion in a Subtidal Population of Mercenaria mercenaria (Linn.) (Bivalvia)," was submitted to Marine Biology for publication. The manuscript by Thomas Meyer, Richard Cooper, and Richard Langton, titled "Relative Abundance, Behavior, and Food Habits of American Sand Lance, Ammodytes americanus, from the Gulf of Maine," was published in the Fishery Bulletin.

## Ecosystem Dynamics Investigation

### Ecosystem Modeling

On 25 June, Ed Cohen participated in the first meeting of a special NEFC task force to devise a research program for fine-scale processes related chiefly to fish recruitment. Ed and Jack Green jointly have responsibility for primary and secondary production studies on this task force. Greg Lough is also a member of the task force. Discussions were held with George Grice of the Woods Hole Oceanographic Institution (WHOI) and with the NEFC's Geoff Laurence, Ed Cohen, and Marv Grosslein regarding possible CEPEX (controlled ecosystem population experiment)-type experiments on larval fish, particularly for FY82 initiatives. In addition, Ed Cohen, Cabell Davis, and Jack Green reviewed Slava Sushin's (AtlantNIRO) proposal for zooplankton grazing experiments on the USSR R/V Belogorsk from August to September. Cabell Davis is making preparations to provide the phytoplankton cultures needed by Slava Sushin; Jack Green and Donna Busch are assembling shipboard supplies and equipment; Marv Grosslein arranged for loan of a Coulter counter from WHOI for Sushin's experiments and related studies by the Plankton Ecology Investigation.

The modeling group (Ed Cohen, Mike Pennington, Wendell Hahm, and Marv Grosslein) attended a seminar at WHOI by I. Sohn and F. Hoppensteadt of New York University on development of their input-output model for a multispecies fishery. Following the seminar there was a good exchange comparing their model with the linear mode of GEORGE, and Wendell and Ed demonstrated the latest nonlinear version of GEORGE on the computer.

Ed Cohen began evaluation of the USSR model of primary and secondary production with the help of translations of two volumes on ecosystem modeling in the USSR by Debbie Dwyer and Helen Mustafa. We may attempt to link this model to GEORGE, making it a fairly complete ecosystem model.

Wendell Hahm and Brian Hayden, together with Rich Langton, continued work on analysis of the food habits data base. Marv Grosslein and Tom Azarovitz continued work on the New York Bight Atlas, and Marv Grosslein and Brad Brown finished final editing of page proofs for the paper on NEFC ecosystem research for the Journal of the International Statistical Ecology Program.

## Recruitment Processes

Greg Lough spent the first part of the month preparing a talk with Red Wright in June for the American Society of Limnology and Oceanography on interaction of the northeastern Georges Bank tidal front and plankton populations. After the American Society of Limnology and Oceanography meeting, Greg Lough attended a second task force meeting on larval fish survival studies at the Woods Hole Laboratory on 25 June to plan future work within the NEFC. Two manuscripts presented at the ICES Early Life History of Fish Symposium were completed and submitted for inclusion in the Early Life History of Fish Symposium volume.

George Bolz continued analysis on the autumn and winter abundance and distribution of ichthyoplankton on Georges Bank and Nantucket Shoals during 1971-77. Dave Potter aided Kevin Powers of the Manomet Bird Observatory with neuston sorting equipment and procedures and aided personnel of the Sailing Education Association in the silhouette photography method for field experiments with spiny lobster (Panulirus argus). He also completed the analysis and draft manuscript of the 1974-75 neustonic ichthyoplankton work, which includes information on general distribution and abundance in the Georges Bank - Gulf of Maine region, a comparison of neuston versus bongo net tows, day-night abundance, and catchability of the large and small neuston nets.

Roz Cohen extracted haul factors from the Marine Resources Monitoring, Assessment, and Prediction Program (MARMAP) Information System (MIS) master files for 14 International Commission for the Northwest Atlantic Fisheries (ICNAF) larval Atlantic herring cruises for 0.333-mm-mesh-caught zooplankton during 1974-75. She met with Bobbie North of the ADP Unit at the Woods Hole Laboratory to discuss programming needs for the 0.333, 0.165, and 0.053-mm-mesh-caught zooplankton data, and provided her with a detailed outline of preliminary computer outputs needed to link up with the larval herring gut content data for the same period. Janet Murphy is assisting with the computer processing of the larval herring gut content data using the WHOI canned computer program SPSS (Statistical Package for the Social Sciences). Janet has prepared summary charts of all station data for the 1974-75 seasons larval gut contents, fine and coarse-mesh plankton data. She also completed laboratory counting of zooplankton from four MOCNESS (multiple opening-closing net and environmental sensing system) hauls from the 1978 Larval Atlantic Herring Patch Study so that we could look at preliminary data on the composition of zooplankton in the two water-mass types on northeastern Georges Bank. Distinct faunal assemblages were observed in the two water types and this information was presented by Greg Lough and Red Wright at the American Society of Limnology and Oceanography meeting.

Robert Livingstone, Jr., continued work on the haddock fecundity manuscript, checking on questions raised by Marv Grosslein concerning egg subsampling variability. He met several times with Kay Paine and Gene Heyerdahl to examine the feasibility of retrieving the SV70 haddock data tape for probit analysis by lengths and ages at maturity. On 14 June, he presented a 4-hr workshop to a corps of foreign fishery observers dealing with maturity stages of selected species of groundfish.

## Ichthyoplankton Investigation

Our early summer MARMAP survey on the Albatross IV has been set back because of recurring vessel problems which delayed cruise operations. Ichthyoplankton was not abundant in the southern part of the Middle Atlantic Bight where the

survey began. The only species moderately abundant in the samples were larval butterfish and witch flounder. Because of the mechanical problems with Albatross IV, we will not have sufficient time to complete the survey. Our best projections indicate that we will survey the Middle Atlantic Bight, Southern New England waters, and most of Georges Bank before the cruise ends in mid-July. In the meantime, preparations are underway for the next survey, a cooperative effort with the USSR, tentatively scheduled with the Belogorsk in August. Wally Smith, Peter Berrien, John Sibunka, and Mike Pennington are preparing an analysis of Atlantic cod and haddock larval data from 1974 through 1978, for the upcoming autumn meeting of ICES in Warsaw, Poland. Tom McKenney is preparing a report on plankton and neuston collections taken at Deepwater Dumpsite (DWD) 106. Mike Fahay, Cindy Obenchain, and Chris Powell will be presenting reports to the upcoming American Society of Ichthyologists and Herpetologists meetings at the University of Maine.

### Plankton Ecology Investigation

Jack Green attended the 1979 American Society of Limnology and Oceanography (ASLO) meetings at Stony Brook (Long Island), NY. He is also involved in preparation for the upcoming joint work with Soviet scientists from AtlantNIRO aboard the Belogorsk. One of the areas of interest in the cooperative research will be studies of the role of phytoplankton size-selection on the feeding rates of Pseudocalanus minutus with some possibility of work on Paracalanus and Centropages depending on their availability. Joe Kane is preparing a summary report on his findings on the dry weight - wet volume data. Jerry Prezioso is preparing plots of distribution and abundance of euphausiids from 1977 and 1978 plankton samples.

Bob Marak met with Dr. J. McCleve of the University of Maine and Dr. R. Kleckner to discuss the distribution of American eel larvae and make arrangements for the loan of MARMAP samples to aid them in their research on the larvae, or leptocephali.

Bob Marak attended a meeting with scientists from the USSR R/V Aliot to discuss the program of work.

Preliminary plans were initiated for a mid-water trawling cruise in conjunction with predator-prey studies. Two Isaacs-Kidd trawls and two Canadian euphausiid nets will be available as samplers.

A facility status and projected needs report was prepared for the Narragansett Laboratory. Preparation for NMFS participating in the National Maritime Heritage Festival to be held in Newport, RI, during 13-15 July was begun.

The density gradient equipment to carry out extraction of fish eggs from plankton samples was obtained and set up. Protocols will be written for the system to be used at the Polish Sorting Center.

Martin Belsky of the NOAA headquarters staff spent 2 hr discussing our work here at the Narragansett Laboratory as well as our involvement with the Regional Fishery Management Councils.

A comparison was made of the ichthyoplankton species composition collected in simultaneous surface and subsurface tows taken on USSR R/V Argus Cruise No. 78-04 during 18 April-23 May 1978. Marked differences in species composition and in taxon rank (order of abundance) and frequency (number of positive tows) were observed between samples collected. The most notable differences were: (1) The mean length and range in length of Ammodytes sp. (the most abundant taxon in the surface samples and the second-ranked taxon collected in the bongo net) captured in surface waters were appreciably greater (i.e., range of 5 - 212 mm and mean

of 24.4 mm) than in samples collected within the water column. This is somewhat surprising, considering the close association of adults with the bottom. (2) Open ocean (mesopelagic) species of the families Myctophidae and Gonostomatidae, which were among the most common taxa in the bongo net samples (five species ranked in top 20), were absent or rarely found in the neuston samples. This indicates that these taxa do not migrate, relative to the ambient environmental conditions, at night to the surface as a few species of mesopelagic fishes have been observed to do.

### Plankton Sorting and Identification

In June, species information on zooplankton sorted from 200 samples from the Polish R/V Wieczno Cruise No. 78-04 and from Belogorsk Cruises No. 78-01 and 78-03, was forwarded to the Narragansett Laboratory from the Polish Plankton Sorting Center in Szczecin, Poland. Seventy-three samples from Albatross IV Cruises No. AL 78-07 and AL 78-13 are being sorted for zooplankton. Ichthyoplankton data from 152 samples taken on Belogorsk Cruise No. 78-01 have been sent to the Sandy Hook Laboratory. Data from a total of 287 ichthyoplankton samples collected on Albatross IV Cruises No. AL 78-07 and AL 78-13 are being coded, and 59 samples from Albatross IV Cruise No. AL 78-15 are under analysis. A shipment of 500 samples of ichthyoplankton and zooplankton from MARMAP Survey I and Larval Atlantic Herring Patch Study cruises have been sent from the Narragansett Laboratory to Szczecin.

Ichthyoplankton is being processed from the neuston samples taken on Argus Cruise No. 77-01 during 18 October - 9 November 1977). This will provide information for the fall season and enable a comparison with the completed spring cruise -- Argus Cruise No. 78-04. In the samples processed to date (Cape Hatteras to Long Island), Urophycis sp. are the most dominant (47%). Species identifications based upon fin-ray and gill-raker counts include the red hake, spotted hake, and long-finned hake. These identifications will be verified with precaudal vertebrae counts after cleaning and staining the specimens.

Two student research papers have been completed: "The Fifth Stage Holdover of Calanus finmarchicus in the Gulf of Maine," by Roger Taylor; and "The Distribution and Density of Pseudocalanus minutus, from Cape Hatteras to Nova Scotia, April to May 1979," by Christopher Brooks. Both students are 1040 appointments and presented these papers at seminars at Roger Williams College prior to their graduation this June.

Ann Mason from the Manomet Bird Observatory spent a week at the Narragansett Laboratory learning processing techniques and plankton identification.

### Biostatistics

During June, the Master Bridge Logs and Zooplankton Sampling Logs were merged into new MIS master files for nine cruises (Delaware II Cruises No. DE 76-07, DE 76-10, DE 77-05, DE 77-07, DE 77-09, and DE 78-02; and Belogorsk Cruises No. 78-01, 78-03, and 78-04). The Ichthyoplankton Data Logs for the German Democratic Republic (GDR) R/V Goerlitz Cruise No. 77-01, USSR R/V Noglicki Cruise No. 77-02, Albatross IV Cruise No. AL 77-02, Delaware II Cruise No. DE 78-02, and Belogorsk Cruise No. 78-03 were also merged into the appropriate master files.

Zooplankton Data Logs from Wieczno Cruise No. 78-04 were received from Poland.

Format changes are now plaguing us. These format changes are just reaching us now because of the time interval between "approval" of a change, implementation of that change, and keypunching of the results. Because of the very rigid input

requirements of the MIS, every minor format change requires reprogramming.

Severe disk problems on the URI system have impacted our operation. Because we are now using the MIS in an active mode (as distinct from the earlier development and test phase), our disk requirements have grown to about 1,500 tracks of on-line batch storage and 1,500 tracks of interactive storage. The University cannot provide that storage without imposing strict controls on disk allocation. We have cleaned up about 2,500 tracks of on-line batch storage and about 800 tracks of interactive storage. We can tighten our controls further; this frees up storage.

Because the MIS is a system, standard protocol must be followed for many phases of operations with the MIS. During June, revised protocol for archiving of interactive files was instituted. Also, the naming of conventions for master files and for user-originated files was reaffirmed. The Zooplankton Data Logs (ZDL) had been unmergeable for some time. An old version of the ZDL table segment was discovered, updated, and debugged. Zooplankton Data Logs are now mergeable, and that backlog will be queued in our operations. The detective and debugging work for this event was done primarily by AEG. The final report for Input-Output Computer Services, Inc., (IOCS) tasks ending 1 June has been delayed. The IOCS task group has been waiting for comments on the draft version before submitting the final. Gene Heyerdahl, NMFS Regional Data Base Coordinator, was unfortunately not informed by the Government Services Administration (GSA) project manager of this, and no copy of the draft final report was provided to us. This situation is being resolved.

The General Reformatting System, developed by IOCS, was used by Roz Cohen at the Woods Hole Laboratory to extract data. These data were then copied onto an unlabeled tape and sent to the Woods Hole Laboratory for further processing. Our long-awaited data communications lines have finally arrived. Our terminal situation has been partially relieved by rentals from URI. Terminals for IOCS, which are being rented from the URI Graduate School of Oceanography rather than from the Academic Computer Center, are caught in a bureaucratic tangle and have not yet been delivered.

With the beginning of the new contract period for IOCS, 4 June, Julien Goulet became project manager. Informal weekly reviews are being held.

Kay Paine sent a tape that had been given to her by Dave Bearse. It contains source-code listings of many files, some with unheard of names. These may be some of our missing source codes stored in files whose names are distinct from the contained program.

Gary Johnson, Chris Lindgren, Louis Coakley, and Marie Carter will be working in the Biostatistics Group full-time during July and August, Marie Nakamura will work half-time.

Julien Goulet visited the Woods Hole Laboratory on 19 and 20 June for a presentation of the final report by Computer Science Corporation, on development of the NEFC Software Catalog System, and for a review of documentation requirements for software development.

#### Environmental Assessment Liaison

From 18 to 20 June, Carolyn Griswold attended a Marine Policy Conference sponsored by the URI Center for Ocean Management Studies. The Conference was held on the Bay Campus and focused on international policy dealing with coastal zone management, offshore fisheries management, oil and gas development, and other environmental issues.

Carolyn Griswold attended a Bureau of Land Management (BLM) Biological Task Force meeting in New York City on 26 June. The topic discussed was the effects of exploratory drilling on deepwater corals.

### Larval Physiology and Biochemistry Investigation

Research with larval scup has been retarded because of apparent seawater system contamination due tentatively to the abnormally heavy spring rains and runoff. Attempts are being made to isolate and positively identify the cause.

Geoff Laurence attended an IYABA meeting at the Woods Hole Laboratory and chaired a task force on microdistributional studies in relation to larval fish survival. A major amount of time was devoted to a manuscript on yellowtail flounder embryo survival and development as affected by temperature and salinity. A research paper describing the results of winter flounder growth and survival in the prototype in situ environmental chamber was published in the Transactions of the American Fisheries Society.

### Apex Predators Investigation

We sampled the 18th Annual Bay Shore Mako Tournament at Bay Shore (Long Island), NY. Our sampling at this tournament continues 14 yr of uninterrupted population data and completes the third year of our tagging experiment. It was a good year for mako sharks with 43 landed. Eighty blue sharks and one thresher brought the total dock sample to 123 sharks. One hundred sixty-four sharks were tagged during the 2-day tournament and 119 were released without tagging. Wes Pratt sampled 14 female blue sharks to compare sexual development and activity with data from previous years. Twenty mako vertebrae were collected for age and growth analysis. The shark tournament on 16 June at the B & B Tackle Shop in Moriches Inlet (Long Island), NY, was sampled for us by Bob Conklin, a cooperating biologist from Long Island. Eighteen makos and four blue sharks were weighed in. The largest mako was 354 lb. Chuck Stillwell and Nancy Kohler conducted a long-lining cruise aboard the R/V Geronimo (from St. Georges School in Newport, RI) along the edge of the continental shelf in the area of Hudson and Block Canyons. Ninety-one sharks including 69 blues, 21 sandbars, and 1 mako were caught on nine longline sets. Of these fish, 27 were tagged, 61 were taken on board for food habits studies, and 3 were lost at the rail. Food items found included Atlantic herring, butterfish, hake, anglerfish, dogfish, skate, and squid beaks, and various fish body remnants. One sandbar shark also contained a fist-sized chunk of tuna flesh most likely from a carcass discarded by a fisherman.

The June edition of our biannual newsletter, the Shark Tagger, was prepared and mailed to 2,000 cooperative taggers.

### Fishery Oceanography Investigation

Our Investigation spent a considerable amount of time on data analysis and preparation for cruises. The staff prepared for a MARMAP cruise on Albatross IV, a Georges Bank drogue experiment on the S/V-R/V Westward, and also arranged to repair a damaged marker buoy on Nantucket Shoals marking a location for the Nantucket Shoals Flux Experiment. Ron Schlitz spent a considerable amount of time on the Westward. The cruise went from Bermuda to Nova Scotia and included some drogue work on Georges Bank. Derek Sutton designed and constructed new radar reflectors. Steve Ramp assisted the NOAA Office of Coastal Zone Management in establishing the NOAA

position regarding the establishment of a marine sanctuary on Georges Bank. Timothy Cain prepared Niskin bottles for MARMAP cruises aboard Albatross IV. Ron Kirschner readied the Winkler dissolved oxygen system for sea, and also gave David Swift instruction on the process. Gil Dering continued preparing vector-averaging current meters (VACM's) for sea. Timothy Cain and Dan Patanjo met with Soviet scientists from AtlantNIRO to discuss manpower and equipment needed for upcoming cruises.

Sam Nickerson continued processing of hydrographic data from Delaware II Cruise No. DE 79-05. He also tested and calibrated the new Auto Salinometer, obtained from the Sandy Hook Laboratory. Steve Ramp processed data from the ENDECO Instrument used in the Larval Atlantic Herring Patch Study last year. Ron Kirschner prepared several temperature sections for the Nantucket Shoals Flux Experiment. Gil Dering has continued his further investigation into the expendable bathythermograph (XBT) digitizers. Anne Dorkins has been involved in computing volume transport through the Northeast Channel. She also spent considerable amounts of time at sea on Albatross IV Cruise No. AL 79-06. Jim King has made salinity determinations, made thermometer corrections, and made completions on some hydrography logs. Cindy Chappel carried the load of all our Investigation's xeroxing, XBT traces, data logs, and charts. She has also assisted Tim, Ron, and Dan in the completion of various projects. Tim Cain continued processing and acquiring data for the publication of a data list of all hydrographic cruises with our Investigation during 1971-79. Salinities were run on the Auto Salinometer by Sam, Jim, Anne, Tim, Ron, and Cindy.

Red Wright participated in planning the FY82 budget proposal on "Man the Predator in Disequilibrium with His Prey." Steve Ramp prepared the final draft of the ENDECO-VACM comparison paper along with Ed Brainard of ENDECO. Tim Cain, with the assistance of Ron Kirschner, finished the monthly Gulf of Maine report. Dan Patanjo finished the cruise summaries and equipment list for 1976-79.

#### Meetings, Talks, Visitors, Publicity

Greg Lough, Dave Potter, George Bolz, Roz Cohen, Ed Cohen, and Wendell Hahn attended the 42nd Annual Meeting of the American Society of Limnology and Oceanography in Stonybrook, NY, during 18-21 June.

Robert Livingstone, Jr., presented a description of the maturity stages of selected groundfish species to a special workshop convened at the Woods Hole Laboratory for the NMFS Foreign Fishery Observer Program on 14 June.

George Bolz and Roz Cohen attended an NEFC Equal Employment Opportunity (EEO) meeting on 5 June at the Woods Hole Laboratory.

Roz Cohen attended a US Office of Personnel Management training course in Boston, MA, during 25-27 June on "Women in Management." She highly recommended the course for women aspiring to, or in, management positions.

Greg Lough attended the second task force meeting on larval fish survival process-oriented studies on 25 June at the Woods Hole Laboratory.

All members of the Ecosystem Dynamics Investigation attended J. H. Steele's seminar on "Fisheries Management" on 6 June at the Woods Hole Oceanographic Institution.

Marv Grosslein attended a meeting of Working Group V (US-USSR World Ocean Studies Program) on 22 June at Charleston, SC.

Greg Lough and Red Wright gave a talk on "Preliminary Observations on the Interaction of the Oceanographic Front and Plankton Populations Along the Northeastern Edge of Georges Bank during October 1978," at the 42nd Annual Meeting of the American Society of Limnology and Oceanography at Stonybrook, NY, on 19 June.

On 7 June, Jerry Prezioso, Chris Powell, and Carolyn Griswold attended a Southern New England Chapter meeting of the American Fisheries Society in Sturbridge, MA. The topic discussed was the impacts of water diversions on fish stocks. Wally Smith attended two Division meetings, one at the Narragansett Laboratory, the other at the Woods Hole Laboratory, to discuss current research and FY82 initiatives.

Ken Sherman was awarded an honorary Doctor of Science degree by Suffolk University during the June Commencement, in recognition of his work in plankton ecology and contributions to international marine science.

Ken Sherman attended a meeting of the Technical Group on Methods for the BIOMASS Program at Buenos Aires, Argentina, during 3-8 June.

Ken Sherman attended a quarterly meeting of the Bay Campus Laboratory Directors. In attendance were John Knauss (URI), Don Phelps (USEPA), and Frank DiMeglio (State of Rhode Island Nuclear Reactor Facilities) for the 19 June meeting.

Ken Sherman attended the joint NEFC-SEFC Board of Directors meeting at Charleston, SC, and presented an outline of the NEFC's MARMAP fisheries ecosystem studies on 20 and 21 June.

The NEFC task force visited the NEFC's Narragansett facilities on 25 June to review administrative operations and needs.

Roger Theroux gave a lecture at the Foreign Fishery Observer Training Session held at the Woods Hole Laboratory.

Richard Langton participated as a committee member at a master of science thesis defense by Paul Higgins of the University of Delaware.

Roland Wigley participated at the Georges Bank sanctuary meetings held at the Woods Hole Laboratory on 26 and 27 June (with representatives from the NOAA Office of Coastal Zone Management and the NMFS Office of Habitat Protection).

Lorrie Sullivan visited the Sandy Hook Laboratory on 5 June to review chlorophyll sampling procedures with Chris Evans. She also participated in the first leg of Albatross IV Cruise No. AL 79-06 during 12-25 June.

Jack Casey and Wes Pratt traveled to Brielle, NJ, to meet with members of the Jersey Coast Shark Anglers to coordinate their tournament.

Jack Casey and Wes Pratt attended the fisheries session of the Marine Policy Conference at URI; Wes gave a talk on Narragansett Bay as part of an evening program for the conference.

Jack Casey addressed the captains meeting of the Bay Shore Mako Tournament.

Division members participated in two seminar presentations as part of the Narragansett Laboratory's In-House Seminar Series: "The Undulating Oceanographic Recorder: The Ship of Opportunity Version," by Grayson Wood and Dr. James Aiken (of the Institute for Marine Environmental Research in Plymouth, England) on 15 June; and "Down East, Down Under: A Photographic Essay on the Marine Life of Eastport, Maine," by H. Wes Pratt and Jerry Prezioso on 1 June.

#### Manuscripts

Bolz, G. R., R. G. Lough, and D. C. Potter. Autumn and winter abundance and distribution of ichthyoplankton on Georges Bank and Nantucket Shoals, 1974-76, with special emphasis on dominant species. ICES Early Life Hist. Fish. Symp. 11 p. (S)

- Brooks, C. 1979. The distribution and density of Pseudocalanus minutus, from Cape Hatteras to Nova Scotia, April to May 1979. NMFS, NEFC, Narragansett Lab. Student Pap. No. S-79-03.
- Cain, T., and R. Kirschner. 1979. June 1979 temperature transects of the Gulf of Maine. NMFS, NEFC SOOP Rep.
- Dickinson, J., R. Wigley, R. Brodeur, and S. Brown-Ledger. Distribution of gammaridean Amphipoda (Crustacea) in the Middle Atlantic Bight Region. Fish. Bull., US. (S)
- Kendall, A. W., Jr., and L. A. Walford. 1979. Sources and distribution of bluefish, Pomatomus saltatrix, larvae and juveniles off the East Coast of the United States. Fish. Bull., US 77(1):213-227. (P)
- Laurence, G. C., T. Halavik, B. Burns, and A. Smigielski. 1979. An environmental chamber for monitoring "in situ" growth and survival of larval fishes. Trans. Am. Fish. Soc. 108:197-203. (P)
- Lough, R. G., G. R. Bolz, M. D. Grosslein, and D. C. Potter. Abundance and survival of sea herring (Clupea harengus L.) larvae in relation to environmental factors, spawning stock size, and recruitment for the Georges Bank area, 1968-1977 seasons. ICES Early Life Hist. Fish Symp. 7 p. (S)
- Meyer, T., R. Cooper, and R. Langton. 1979. Relative abundance, behavior, and food habits of American sand lance, Ammodytes americanus, from the Gulf of Maine. Fish. Bull., US 77(1):243-254. (P)
- Potter, D. C., and R. G. Lough. 1979. Neustonic ichthyoplankton of the Georges Bank and Nantucket Shoals area: distribution and abundance, diel variation, and neuston-bongo catch comparison. 24 p.
- Robinson, W., and R. Langton. Digestion in a subtidal population of Mercenaria mercenaria (Linn.) (Bivalvia). Mar. Biol. (S)
- Taylor, R. 1979. The fifth stage holdover of Calanus finmarchicus in the Gulf of Maine. NMFS, NEFC, Narragansett Lab. Student Pap. No. S-79-02.

#### MANNED UNDERSEA RESEARCH AND TECHNOLOGY PROGRAM

No report received. Both the May and June reports will be included in the July issue.

#### DIVISION OF ENVIRONMENTAL ASSESSMENT

##### Behavior of Marine Fishes and Invertebrates Investigation

As part of our Investigation's cooperative research project with Battelle, Pacific Northwest Laboratories, with funding from the USEPA, experiments are continuing to examine the effects of petroleum hydrocarbons on the chemosensory abilities of the Dungeness crab (Cancer magister). When tested in a flow-through

laboratory system, following 24-hr exposure to an oil-in-water dispersion (OWD) of Prudhoe Bay Crude and still in the presence of OWD, the ability of the crabs to detect both high and low concentrations of a freeze-dried food extract was impaired. Feeding behavior per se appeared unaffected by OWD exposure. When the flow of OWD was stopped and replaced by clean seawater, recovery of detection ability occurred within 1 day. These results indicate that Dungeness crabs would have reduced ability to detect and locate food under concentrations of petroleum hydrocarbons that can reasonably be expected to occur following an oil spill.

### Biological Oceanography of Stressed Environments Investigation

During June, analyses for sea-truth data collected during the Large Area Marine Productivity Experiments (LAMPEX I) in April were completed, and data typed and verified. Yet to be completed are figures for inclusion in a data report to be released during July.

Phytoplankton species abundance, distribution, and diversity are being examined in the shelf waters between Cape Hatteras and Nova Scotia by Dr. Harold G. Marshall of Old Dominion University and Myra Cohn of the Sandy Hook Laboratory. Dr. Marshall was recently awarded a contract to work up phytoplankton samples collected on Ocean Pulse Program/MARMAP cruises since October 1978. To date he has received collections from five cruises, a total of 229 samples. Most of the samples were collected from the surface. However, samples from standard depths were also taken at selected stations. These samples are being examined with an inverted plankton microscope. Analyses include species identification and cell counts for each station.

Myra Cohn, using similar methods but examining principally the nearshore stations from these same cruises, submitted an Ocean Pulse Program survey report for the entire April 1979 cruise on the R/V Advance II. Diatoms were dominant at most stations examined. Of particular interest was the finding of the large (>160  $\mu$ m) centric diatom Coscinodiscus in low numbers in the near-bottom water of the New York Bight and off Chesapeake Bay. Ceratium tripos was found in low numbers only off the coast of southern New Jersey.

Dr. John Mahoney completed a draft of a paper on "Normal Seasonal Fluctuations and Changes Due to 'Fin Rot' Disease in the Blood of the Winter Flounder, Pseudopleuronectes americanus." A procedure was chosen and preparations begun for the handling of algal bioassay samples to be taken on the Ocean Pulse Program cruises beginning in September 1979.

Bill Phoel and Dr. James Thomas presented papers at the ASLO meeting held at the State University of New York at Stony Brook, Long Island. Bill Phoel's paper was presented in the Continental Shelf Interactions Session with Kevin Gashlin and Chuck Byrne as coauthors and was titled "Some Effects of Hurricane Belle on the Anoxic Water Mass Off Atlantic City, New Jersey, During 1976." Dr. Thomas' paper was presented during the Symposium on Oxygen Depletion in the New York Bight and was titled "Organic Loading."

### Environmental Chemistry Investigation

Members of the Environmental Chemistry Investigation participated in the June MARMAP ichthyoplankton-oceanography-primary productivity survey aboard the Albatross IV. Chlorophyll data collected during the May 1979 MARMAP survey aboard the Delaware II were computerized and contoured. A very interesting distributional pattern of phytoplankton biomass existed in the Georges Bank area in May. Average

chlorophyll-a concentrations progressively decreased from 6 mg/m<sup>3</sup> at the center of Georges Bank to 0.5 mg/m<sup>3</sup> at the periphery of the Bank. This sharp decrease in phytoplankton abundance was accompanied by a progressive transition from a netplankton (>20 µm)-dominated community at the center of Georges Bank to a nannoplankton (<20 µm)-dominated community at the perimeter of the Bank.

Progress continued toward completion of a data report summarizing chlorophyll-a data collected during the April LAMPEX study.

We continued analyses of dissolved organic carbon in samples collected during the April Ocean Pulse Program survey, and completed analyses for ammonium in samples collected on the May MARMAP survey. Progress continues in our refinement of the hydraulics of the ultraviolet components of the Technicon Autoanalyzer system, and in the testing and automation of the Technicon-Wong computer terminal used for nutrient analyses.

All available data on heavy metal concentrations in sediments were extracted from the Sandy Hook Laboratory ADP Unit system for the purpose of examining variability within and among sampling stations and for better assessing reliability and generality of metals data generated at a single station.

A portion of June was spent preparing for the Ocean Pulse Program survey which will begin on 16 July.

### Coastal Ecosystems Investigation

Bob Reid, Clyde MacKenzie, and Dave Radosh conducted diving surveys of surf clam populations off Sandy Hook and Long Island. We are studying growth, reproduction, setting, predation, and other mortality in clams from relatively high and (eventually) low pollution areas, under the Ocean Pulse Program. Clyde also made observations on densities of possible American oyster (*Crassostrea virginica*) predators, such as flatworms and anemones, in the Navesink River. Bob and Frank Steimle met with US Army Corps of Engineers (COE) personnel to explore ways of merging the COE's monitoring surveys of the dredge spoil disposal sites from Long Island to Portland, ME, with the Ocean Pulse Program. The NEFC may, as part of the Ocean Pulse Program, become involved with the COE monitoring program. Bob and Frank were also involved with the committees developing issues and initiatives for the 1982 budget submission. Frank continued preparations for the July, September, and October Ocean Pulse Program cruises, and worked on manuscripts concerning the benthos of Block Island Sound and the New York Bight apex. Jan Caracciolo prepared another set of apex benthic data for Dr. Donald Boesch of VIMS who is analyzing faunal patterns in the apex as influenced by contaminant inputs.

We assisted Dr. Gray Multer of Fairleigh Dickinson University in beginning a benthic sampling program in Raritan Bay. Dr. Multer is reoccupying stations sampled by Sandy Hook Laboratory personnel in 1973-74, and is examining benthic macrofauna, sediments, and levels of metals and hydrocarbons in sediments. We supplied sampling equipment and instructions, and Greg Parker participated on the initial cruise to insure methodological comparability to our in-house benthic surveys. Sukwoo Chang neared completion of his manual on statistical analyses to be used in the Ocean Pulse Program.

### Meetings, Talks, Visitors, Publicity

During June, Dr. John Pearce participated with other NEFC personnel in further meetings concerned with remote sensing and cooperation with the NASA Langley Research Center in the LAMPEX project. Meetings were held to consider proposals

being submitted by NASA personnel for future cooperative efforts with NEFC.

Dr. Pearce also participated in the NOAA Environmental Research Laboratories' Marine Ecosystems Analysis Program (MESA) symposium concerned with finalization of documents on the current status of the New York Bight, especially as it is being affected by ocean dumping and other forms of pollution. Dr. Pearce presented a paper to the benthic panel in the symposium on the status of benthic communities in the New York Bight. Dr. Pearce also met with personnel from the COE's New England Division in regard to the possible incorporation of the COE Disposal Area Monitoring System Program (DAMOS) into the overall Ocean Pulse Program assessment and monitoring structure. Personnel from the National Ocean Survey (NOS) were also involved in the meetings with the COE personnel to determine what activities might be conducted by the NOS Ocean Dumping Program. The DAMOS Program has been concerned in the past with monitoring the effects of dredging and spoiling in coastal estuaries and marine environments. Other Division personnel participating in these meetings were Frank Steimle and Bob Reid.

During 18-21 June, Bob Reid, Frank Steimle, and Jay O'Reilly attended the ASLO meetings at Stony Brook (Long Island), NY. As indicated in an earlier paragraph, Dr. James Thomas and Bill Phoel presented papers at this meeting.

Acting in the capacity of a representative of the NOAA Diving Safety Board, Bill Phoel participated in an inspection and evaluation of the NOAA Underwater Laboratory (NULS) I and its associated operation procedures.

Dr. Pearce also participated in the Center Board of Directors meeting which was held in Charleston, SC, on 20 and 21 June. This was a joint meeting with personnel from SEFC attending.

On 20 June, Chris Evans met with Dr. Nagle of Drew University to discuss volunteer and cooperative agreements between Drew University and the Sandy Hook Laboratory.

#### Manuscripts

Frame, A. B. Two new species of sand burrowing amphipod crustaceans from Long Island Sound and the New York Bight (Amphipoda: Haustoriidae). Estuaries. (A)

Olla, B. L., A. J. Bejda, and A. D. Martin. 1979. Seasonal dispersal and habitat selection of cunner, Tautogolabrus adspersus, and young tautog, Tautoga onitis, in Fire Island Inlet, Long Island, New York. Fish. Bull., US 77:255-261. (P)

Olsen, P., and M. Cohn. Phytoplankton in Lower New York Bay and adjacent New Jersey estuarine and coastal waters. NJ Acad. Sci. Bull. Vol. 24. Iss. 2. (A)

Reid, R. N., A. B. Frame, and A. Draxler. Environmental baselines in Long Island Sound, 1972-73. NOAA Tech. Rep. NMFS-SSRF. (S)

## AQUACULTURE DIVISION

### Aquacultural Genetics Investigation

#### Cytological and Cytogenetic Effects of Contaminants on Fish Eggs

A. Longwell participated in a symposium on "Ecological Effects of Environmental Stress" with emphasis on the New York Bight. She worked on the Neuston Committee (Dr. A. McErlean of the USEPA, Chairman) from which statements were prepared on the ichthyoplankton component. As a background paper for the Neuston Committee statements, she prepared a review covering just about all published experimental work on the effects of marine contaminants on fish eggs. The review included a discussion of likely effects of certain categories of environmental pollutants, namely N-nitroso compounds, chlorination, mutagens, atmospheric fallout, acid-iron waste, sewage sludge, radioactivity, oil, aromatic hydrocarbons, and trace metals. Sections were further prepared on adaptation to pollution by natural selection, synergisms among contaminants in the natural environment, natural environmental factors, oxygen demand, increased mortality of early life stages, and impacts at the population level.

At that same symposium, J. Hughes presented a poster display by himself and A. Longwell on methodology for cytological study of fish eggs and results of our Atlantic mackerel egg study in the New York Bight. The poster is available for other use upon request.

#### Experimental Inbreeding and Hybridization in the American Oyster

A recirculating seawater system was set up as a test grow-out unit for young juvenile oysters (set or spat), especially of non-locals. The water is changed every other day and food is added daily. The system appears to be working well as new shell growth has been observed on the spat. Fluorometry readings conducted as an inverse measure of food uptake showed low levels after 22 hr. Other recently metamorphosed oysters have been put in the tank farm raceway where much new shell growth has been observed also. Growth is particularly noticeable on 1978 year-class animals. As done annually, ultraviolet (UV) light units have been connected to tanks with the youngest spat to prevent contamination by wild set.

Progeny of inbreeding and geographic hybrid groups, including backcrosses, have been setting for the past few weeks. Full sibs from 1976, 1977, and 1978 year classes were involved in the crosses. One-year-old spawners, though producers of fewer eggs compared with spawners from older year classes, are providing set.

#### Mass Selection and Heritability of the American Oyster

Breeding of 2-yr-old oysters in the meat yield selection and larval growth rate selection experiments has continued throughout May and June. Since breeding began in March, 14 crosses in the low meat yield line and 21 crosses in the high meat yield selection line have been made. In the selection experiment for larval growth rate, 29 crosses in the slow growth line and 13 crosses in the fast growth line have been made. Initial comparisons of larval growth rate between the fast and slow larval growth rate lines indicate no growth rate differential.

## Spawning and Rearing of Mollusks Investigation

An unusual phenomenon was observed in our task farm system. A small percentage of surf clams in each of several tanks exhibited the symptoms of gas bubble disease. Within the affected clams, bubbles had formed between the mantle and the shell. The clams had secreted a calcareous layer over the irritating bubbles as a protective mechanism. The enclosed bubbles caused the clams to become buoyant. High levels of dissolved gas are not usually present in unheated, natural seawater. Both physical and biological factors are being explored to determine the cause. Pumps with faulty impellers can drive air into seawater. Carbon dioxide and free oxygen analysis of seawater, taken from above and within the sand sediment, did not detect elevated levels. Bacteriological tests are being performed to identify whether large numbers of gas-producing bacteria are present. Another possibility being weighed is that large amounts of oxygen were released during a phytoplankton bloom as the respiratory product of photosynthesis. Records indicate that temperature and fluorescence rose sharply prior to the onset of the condition. Since elevated levels of gas are not currently being detected and the number of affected clams has been reduced, it is speculated that the phenomenon that produced the supersaturation was short-lived.

We have tried numerous methods to mark en masse juvenile bay scallops (Argopecten irradians) for eventual field identification of planted stocks, but have yet to find a suitable substance or technique for application. Some preliminary work performed last year indicates that we can induce check marks in scallops by periodically shocking them for short intervals. We are now attempting to determine a shock technique which will produce a recognizable check and be a reasonable procedure for mass marking.

Most of our hatchery-produced bay scallop seed from this year's spawning is now in our outdoor raceway system. These scallops are about 10 mm in length and will be the major part of the stock we use in our field-growth studies later this year.

## Aspects of Nutritional Requirements of Mollusks Investigation

Experiments conducted on four algal species, Monochrysis lutheri, Isochrysis galbana, Dunaliella euchlora, and Phaeodactylum tricorutum, to determine toxic concentrations of the heavy metals zinc, cadmium, and copper, were completed with the exception of one line of experiments, i.e., those relating to the question of adaptation, which is a long-term study. These studies revealed that there was a marked difference in the response to each metal between species belonging to different taxonomic groups. We also observed that the concentration of metal that would decrease the growth rate or increase mortality in the algal population was dependent upon several extraneous factors, e.g., the population density and the type of growth medium. Clear experimental evidence was obtained (perhaps for the first time) for the magnification of pollutant toxicity through the food chain. Algal food organisms, cultured in the presence of high concentrations of cadmium and subsequently fed to American oyster larvae, concentrated enough metal in the oyster larvae to cause a greatly inhibited rate of growth and excessive mortality.

Extensive experiments were conducted with American oyster larvae as a continuation of our previous studies on the utilization of lyophilized algae as a food source. The present work was designed to investigate the utilization of the dried material in a lower range of concentrations than in the previous studies. All dried material was subjected to sonification so that the presence of large clumps of material could be avoided. Controls to the study of dry food utilization

consisted of living algal cells (the normal feeding method), living algal cells that were disrupted by sonification, and lyophilized seawater. Several interesting observations were made from these studies. Disrupted living algae continued to support a growth increase in the larvae similar to that of the living algae for 8 days. However, by the 10th day larvae fed the living whole algal cells were much larger than those fed the disrupted cells. Mortality was low in both feeding regimes. Larval growth in experimental organisms fed dry algae in three concentrations indicated that growth of larvae fed 50 mg/l or 75 mg/l was three times better than growth of larvae fed 100 mg/l of dry material. Although the larval growth upon feeding with dry material at each concentration was poor as compared to the living whole cells or even sonified living cells, a size increase of larvae from 68  $\mu\text{m}$  to 130-150  $\mu\text{m}$  was observed and mortality was low.

Gary Wickfors is to be congratulated on successfully completing the requirements and passing the oral examination to qualify him for the Master of Science Degree from Bridgeport University. Dr. Ukeles acted as his thesis advisor and was invited to act as a member of the examining committee.

#### Meetings, Talks, Visitors, Publicity

E. Rhodes visited the Shinnecock Tribal Oyster Project in Southampton, NY, and talked with personnel there about existing hatchery operations and their plans for an expanded operation.

E. Rhodes and J. Widman collected adult bay scallops to be used in a transplant study on Prince Edward Island, Canada.

#### Manuscripts

Longwell, A., and J. B. Hughes. Cytologic, cytogenetic and embryologic state of Atlantic mackerel eggs from surface waters of the New York Bight in relation to pollution. Proceedings of a MESA-sponsored Symposium on the Ecological Effects of Environmental Stress, New York City, 10-15 June 1979. (S)

#### PATHOBIOLOGY DIVISION

##### Comparative Invertebrate Pathology Investigation

Serial sections of pelagic crustaceans, the amphipod Parathemisto compressa and the isopod Idotea metallica, have been studied to gain familiarity with the general histological facies of these animals. Organs and tissues have been identified. Storage depots for glycogen and other polysaccharide-protein complexes have been determined for intermolt animals, and preliminary information on premolt animals has been gathered. All this information will be of value when analyzing data gathered during histological study of Ocean Pulse Program samples. Because of the prior intensive histological study of normal and diseased blue crabs (Callinectes sapidus) and recent study of the American lobster (Homarus americanus), time necessary for this preliminary survey has been greatly shortened.

Complex crystals containing protein, calcium, and iron are present in the hepatopancreas of certain Idotea specimens. Iron-bearing crystals also occur in semiterrestrial isopods, and calcium-iron complexes are present in the blue crab hepatopancreas. Disposal of excess iron, an abundant metal in the marine environment, may create a problem for at least some crustaceans. The blue crab apparently

rids itself of excess iron in a variety of ways, including excretion into newly forming cuticle and expulsion of epithelia of the midgut and hepatopancreas. Excretion storage of iron in insoluble protein complexes within cells of the hepatopancreas of isopods is an efficient method, since all hepatopancreatic cells are a renewing population and are eventually sloughed into the gut. In freshwater crayfish, excess copper (gained from environments abnormally high in copper) is excreted in a similar fashion. It is possible that other metals will be sequestered in the same way, and that histochemical procedures will help identify their presence. Thus, *Idotea* might prove to be an indicator of heavy metal pollution in the marine environment.

Samples from the deepwater dumpsite (DWD) over the Puerto Rico Trench were sorted and catalogued. From the neuston samples, there are over 1,500 Latreutes fucorum, 200 euphausiids, 180 amphipods, 140 mysids, and 260 various decapods for gross observation. From the bongo net samples, there are over 1,300 euphausiids, 200 amphipods, and 180 mysids for gross examination. Subsamples will be selected for subsequent histologic examination.

Eleven Latreutes (<0.01%) measuring 4.0-6.2 mm in carapace length had tumorlike growths in one branchial chamber. The growths measured 1.4-2.0 mm across the base. Dissection of these revealed gravid female bopyrid isopods with smaller male isopods attached. According to Dr. Bowman of the Smithsonian Institution, these are Probopyrus latreuticola (Richardson 1905). Six of the parasites were found in the left branchial chamber. Only one bopyrid has been found among the Latreutes sampled from the DWD 106 area, probably due to the fewer numbers of Latreutes collected there. Histologic examination of parasitized Latreutes should reveal the extent of damage to underlying host tissue.

A survey of American oysters collected from seven areas of Massachusetts in June of 1974 was completed with the following results: populations from all areas showed perivascular infiltration ranging from 30 to 66%; granulocytic infiltration from 50 to 94%; cirroidosis from 80 to 100%; and metaplasia of the digestive tubules from 56 to 86%. Hyaline hemocyte infiltration was seen in oysters from Westport River in Westport Township (14%); Bumps River in Barnstable Township (10%); Sippicon River in Marion Township (8%); Pocasset River in Bourne Township (2%); Cat Narrows in Wareham Township (2%); and Duck Creek in Wellfleet Township (30%). Papovavirus infections of gametocytes were seen in most samples ranging from 2 to 8%. Chlamydia-like inclusions were seen in six of seven areas; also found were Nematopsis, Sphenophrya, Bucephalus, and an unidentified metazoan parasite in the gut of several oysters. Interestingly, the Wellfleet Township sample had 28% Minchinia nelsoni (epizootic level). M. nelsoni is believed to have been introduced into this area in the late 1960's and continues to show relatively high prevalences.

Neoplasms were found in one oyster each from Vineyard Sound in Falmouth Township and the Bumps River in Barnstable Township. Samples from Barnstable, Marion, and Bourne Townships were positive for mutagenic activity; Wellfleet and Wareham Townships were negative.

Personnel of the histology lab have spent much of the month in developing and providing special histochemical stains for application in histopathology studies on marine organisms collected for the Ocean Pulse Program. New techniques are being devised including experiments with plastic embedding for light microscopy. Histologic services included sectioning of 1,815 blocks and staining of over 2,200 slides for the Pathobiology Division staff and the Registry of Marine Pathology.

## Microbial Ecology Investigation

Histological examinations were completed on 25 rock crabs (Cancer irroratus) collected in or near the Philadelphia-Wilmington dumpsites in April 1979. The collecting cruise was made in cooperation with Dr. Don Lear of the USEPA in Annapolis, MD, and provided data on crustacean health for comparison with companion collections made in the New York Bight apex during March and June of this year. Crabs from the Philadelphia-Wilmington stations routinely have gills that are infested with copepods. Histological evidence suggests that feeding copepods puncture the gill cuticle and cause a significant host response; affected gills appear to be swollen and engorged with infiltrating hemocytes. The copepod-associated gill pathology represents the first step in attempting to catalogue abnormal gills into subgroups such as: (1) blackened and necrotic; (2) swollen and congested; (3) occluded by necrotic nodules; and (4) fouled by bacteria, diatoms, or protozoa. In the April collection of 25 crabs, 10 had copepod infestations and 9 had abnormal lamellae.

Isozyme analyses on several species of Acanthamoeba have been completed by Dr. Pierre Marc-Daggett and Mr. Tom Nerva of American Type Culture Collection in Rockville, MD. The cooperating investigators compared the isozyme patterns (leucine aminopeptidase, starch hydrolase, acid phosphatase, etc.) in A. culbertsoni strains (pathogenic to animals) isolated from tissue cultures, the New York Bight apex, a human nasal swab, and the St. Martins River in Ocean City, MD. Differences were noted in amoebae from differing geographical sources and further studies are in progress to test other New York Bight strains to determine whether or not new isolates from the same location have similar patterns.

## Fish Pathology Investigation

As reported in the March issue, postmortem examinations were conducted on 309 western North Atlantic groundfishes during the conduct of a resource assessment cruise on the Federal Republic of Germany (FRG) R/V Anton Dohrn. At sea, all gross lesions in the fish necropsied were described, excised, and fixed in 10% seawater formaldehyde. In the laboratory, the tissues were processed for routine paraffin embedding, sectioned at 6  $\mu$ m, and stained with hematoxylin and eosin.

Microscopic examinations (number in parentheses) of lesions from Atlantic cod (10), haddock (9), Atlantic herring (3), pollock (2), red hake (4), yellowtail flounder (13), and winter flounder (2) verified predicted expectations. Of the 43 lesions, liver lesions (15) were most abundant, followed by lesions of gill (13), integument (8), heart (5), pseudobranch (1), and pyloric caecae (1). All liver lesions were caused by roundworms and/or flatworms. Most of the gill lesions were caused by microsporidians. Two gill lesions were characterized by the presence of large basophilic inclusions in lamellar epithelial cells (similar to epitheliocystis); one gill lesion was caused by a monogenetic trematode. Most of the integumental lesions were caused by larval trematodes; one case each of lymphocystis, ulcer, and proliferative bone lesion (cod fin ray) was also noted. All the heart lesions consisted of fibrous pericarditis. Although no worms were seen, migrating worms can cause fibrous inflammation of visceral surfaces. Two bilateral pseudobranch adenomas were noted in cod and masses of cysticerci were found in the pyloric caecae of a red hake.

None of the lesions observed can be considered unusual; all have been noted previously in marine fishes. Since the cruise covered an area minimally impacted by man's activities, the data provide a useful baseline for future surveys in ecologically impacted areas.

## Larval Disease of Mollusks Investigation

A technique has been developed which may allow an early assessment of microbial disease in larval mollusks. American oyster larvae infected with a suspected bacterial pathogen were obtained from dying animals in a Long Island hatchery. During the early stages of infection, phagocytic cells in the larvae were found to be depleted (compared with those in healthy controls), but during later stages of infection, surviving larvae had increased numbers of spreading (activated) phagocytes. If the technique can be proved reliable through repetitive experiments, it should be useful in evaluating the health of larval animals since it can be completed in 2-3 hr.

Challenge of fertilized oyster eggs with bacterial strains isolated from moribund oyster larvae obtained from Flowers Hatchery in Bayville (Long Island), NY, indicated that two strains of Vibrio were pathogenic to oyster larvae. The two isolates were pathogenic when used both singly and as a pair. Further challenges are being made to duplicate the disease process as it occurs at the hatchery.

Another of the monthly sampling cruises to assess disease-induced natural larval mortality was completed on 13 June.

Forty new isolates were obtained and challenged against oyster larvae. So far, 10 suspected pathogens have been tested and their dose response curve tentatively established.

Water samples were taken from the Bluepoints Company for identification of the unknown microflora. The water contained a total plate count of  $2.9 \times 10^5$  cells/ml and contained Melosira sp. and a Navicula-like diatom as the predominant phytoplankton.

## Meetings, Talks, Visitors, Publicity

Dr. Rosenfield visited the NWAFPC in Seattle, WA, its field station in Manchester, WA, and the State of Washington Shellfish Laboratory in Brinnon during 20-23 June; Dr. Rosenfield attended the joint SINA-NSA meeting in Vancouver, BC, during 24-27 June and was installed as President of the NSA for the coming year.

Dr. Murchelano visited the Sandy Hook Laboratory to sample red hake on 31 May and 1 June; Dr. Murchelano and Mr. Newman participated in the Aquavet Course at the Woods Hole Laboratory on 6 and 7 June; Dr. Murchelano and Dr. Sawyer attended the MESA Symposium on Ecological Effects of Environmental Stress on 11 and 12 June in New York City; and Dr. Murchelano also attended the joint NEFC-SEFC Board of Directors meeting in Charleston, SC, during 20-22 June.

Mr. Farley participated in the Aquavet Course at the Woods Hole Laboratory on 13 and 14 June.

Mr. Kern returned the first of June from a full-time training assignment at the Johns Hopkins School of Hygiene and Public Health; he also attended the Joint Subcommittee on Aquaculture meeting in Washington, DC, on 14 and 15 June.

Dr. Sawyer and Mr. Galasso visited the Sandy Hook Laboratory to collect crustaceans for metal analysis and histology on 21 and 22 June.

Dr. Joel Bodammer conferred with Dr. Laurence and Mr. Buckley on larval fish experiments at the Narragansett Laboratory, and attended an IYABA Prediction Group meeting at the Woods Hole Laboratory during 25-27 June.

Dr. Robohm, Dr. Johnson, and Mr. Newman attended the Fourth Annual Eastern Fish Health Workshop at Halifax, NS, during 25-28 June. Dr. Robohm presented a paper on "Pasteurella piscicida, the Etiologic Agent of an Epizootic in Striped Bass (Morone saxatilis) in Long Island Sound;" Dr. Johnson presented a paper on

"Histopathology of Gaffkemia in the Lobster, Homarus americanus;" and Mr. Newman presented a paper on "Granulomatous Oophoritis and Other Visceral Lesions of Spawning Female Striped Bass, Morone saxatilis."

Mr. Lewis and Mr. Galasso visited the Sandy Hook Laboratory on 26 and 27 June to collect sediments with US Food and Drug Administration (FDA) personnel for Ocean Pulse Program protozoa studies.

Dr. Blogoslawski visited International Shellfish Enterprises in Moss Landing, CA, to assist them in solving an oyster larval disease problem.

Ms. Gretchen Roe entered on duty 4 June as a biological aid for the summer at the Oxford Laboratory; Mr. Stephen Tettelbach arrived on 25 June as a summer biological laboratory technician at the Milford Laboratory.

Mr. Ron Landy, an Aquavet student from the University of Pennsylvania School of Veterinary Medicine, will be studying fish pathology at the Oxford Laboratory during the next 8 wk.

Dr. Murchelano presented a seminar at the Oxford Laboratory on 15 June on "Some Comments on Japan and Japanese Aquaculture."

Visitors to the Oxford Laboratory during the month of June were Mr. Richard Myers of Bay Industries in Dover, PA; Mr. Robert Prier of Chesapeake Bay Seafood Industries Association in Easton, MD; Messrs. David and Michael Cohen of Baltimore, MD; Mr. and Mrs. Don Abrams of the American Littoral Society at Sandy Hook, NJ; a Frostburg (MD) State College Ecology Class; Mr. David Maneval of the University of Maryland in College Park, MD; Mr. Michael Tankis of Berkshire College in Pittsfield, MA; Dr. Steve Rebach of the University of Maryland Eastern Shore Branch in Princess Anne, MD; and the Miller Highlife Testers Association of Milwaukee, WI.

#### Manuscripts

Lewis, E. J., and T. K. Sawyer. 1979. Identification of free-living amoebae (Protozoa: Acanthamoebidae) from fresh- to salt-water gradient in the St. Martin's River, Ocean City, Maryland. (Abstr.). Trans. Am. Microsc. Soc. 98:152-153. (P)

Sawyer, T. K., and J. Forns. 1979. Muscle lysis in hatchery-reared juvenile lobsters (Homarus americanus). (Abstr.). Trans. Am. Microsc. Soc. 98:156. (P)

Sawyer, T. K., M. Light, B. A. Harke, and E. J. Lewis. 1979. Marine amoebae (Protozoa: Sarcodina) as potential indicators of oiled bottom sediments in the Gulf of Mexico. (Abstr.). Trans. Am. Microsc. Soc. 98:153. (P)

#### RESOURCE UTILIZATION DIVISION

##### Fisheries Engineering Investigation

The major portion of this month was spent studying and recording gear-related sea scallop behavior and the performance of a standard 8-ft New Bedford-style scallop drag at the request of the Scallop Oversight Committee of the New England Fishery Management Council. Parameters studied are the relative efficiency of the drag, gear-related mortality, and size selectivity. This work is being done aboard the refurbished Rorqual in Massachusetts Bay and Nantucket Sound. Observations of the gear and scallops are made with a diver-held color underwater television

camera and the activity recorded on video tape. At the conclusion of this study, we expect to have an improved understanding of the parameters affecting catchability, mortality, and selectivity. This information will aid us in the modification of existing gear and possibly the design of alternative gear.

Work is also underway in preparing for a joint cruise next month aboard the Rorqual with the MURT diving team in the traditional Atlantic herring spawning area some 10 mi off Rockport, MA.

Additionally, equipment is being prepared for an August cruise aboard the Delaware II to compare the performance of the new shellfish sampling dredge, which we designed, with the old one.

## Resource Development and Improvement Investigation

### New Product Development

A reproducible procedure for preparing both raw and cooked fillet samples for measurements of their color on the Hunter L Colorimeter has been worked out and tested. Several techniques are being tried to prepare a reproducible sample size for texture measurement on the Instron.

### Species Identification

Work is being continued with the sample of cooked fish allegedly involved in human ciguatera poisoning.

J. Krzynowek and K. Wiggin visited Dr. Calvin Saravis at Boston City Hospital to learn his method of agarose gel isoelectric focusing (IEF).

### Surf Clams

Samples have been analyzed in June and are still not significantly different from the control after 9 mo of storage.

A report on the storage and acceptability of surf clams has been presented at the SINA meeting.

### Krill

The revision to the second draft of the krill (Meganyctiphanes norvegica) paper has now been written, typed, and distributed for review.

## Product Quality, Safety, and Standards Investigation

### Product Quality

Several fish fillets were identified by isoelectric focusing as part of the US Army North American Research and Development Command (NARADCOM) Edibility Characteristics Study.

All collaborators have reported their results on the Association of Official Analytical Chemists (AOAC) collaborative study of the fish species identification by isoelectric focusing method. Seven collaborators were sent frozen fillets from eight species of fish, in duplicate. Following a standardized method, they were requested to identify all unknown samples by comparing their sarcoplasmic protein patterns from 14 species of fish. Current AOAC-approved methods based on starch gel, disc gel, and cellulose acetate electrophoresis require that unknowns be identified by comparison of the unknown patterns with patterns from simultaneously

run authenticated samples. With the IEF method, using photographic standards, all unknown samples were identified with 93% accuracy. All the incorrectly identified samples were goosfish. Collaborators who identified the goosfish, or monkfish, samples correctly returned gels showing monkfish patterns matching the pattern on the "library gel." Collaborators who identified the monkfish samples incorrectly returned gels showing a different pattern than the one shown for monkfish on the "library gel." The pattern was the same in all cases where monkfish was misidentified. It appears that we inadvertently sent out two species of monkfish as unknown samples. Possibly, some of the monkfish were imported from another area and were really a related species. The other possibility is that the Gulf of Maine harbors two morphologically similar species that have not been recognized as separate species. Additional work is underway to determine the exact nature of the two patterns for monkfish.

Preparation of the manuscript on the collaborative study was initiated. The results will be reported in October at the annual AOAC meeting at which time the method will be recommended for adoption as an official AOAC method.

Samples of Atlantic cod and Pacific cod were compared by IEF. The protein patterns were very similar, but differed in two areas, enough to differentiate the two species.

Ron Lundstrom and Rita Schenck met with Dr. Tracy McLellan of the Harvard University Museum of Comparative Zoology and with Mr. Hennemuth and Dr. Ridgway of the Woods Hole Laboratory and Center Directorate, respectively, to discuss enzyme polymorphism as it relates to fish population studies.

Work is progressing slowly on adapting Dr. Saravis' agarose gel IEF to our needs in the silver hake (whiting) population study. Samples of agarose were obtained from both LKB Instruments and Marine Colloids. We feel the time spent on working out several minor problems with the agarose gels is well justified because of the rapidity with which we can separate and visualize proteins using this method.

An accelerated storage study was initiated with minced whiting sticks and blocks to compare the effect of antioxidant treatment, vacuum packaging, and combined antioxidant-vacuum packaging on stabilizing flavor during frozen storage. This is the third and final phase of the study dealing with this aspect of quality deterioration in whiting.

In an attempt to correlate objective texture measurement with sensory methods, samples of minced whiting were treated with five different levels of formaldehyde ranging from 0 to 200 ppm in order to produce rapidly a range of samples with varying degrees of toughness. Since the experimental extruder was not functioning satisfactorily, a manual spray technique was devised to apply uniformly the additive. Tests thus far with the Kramer Shear Press cell on the Instron have indicated a linear relationship between peak force and toughening (induced by addition of formaldehyde). However, sample size is critical and must be defined. For any given treatment, there appeared to be a linear relation between sample size and peak force.

A survey of the literature on the Ames test is being conducted in preparation for gearing up to monitor samples for carcinogens or mutagens as part of the Ocean Pulse Program.

#### Product Safety

Workup of samples of cold-smoked salmon, hot-smoked salmon, and hot-smoked sablefish for the isolation of volatile N-nitrosamines is continuing. These

samples have been processed at the NWAFC's Seattle Laboratory and contain various concentrations of nitrite and chloride.

### Product Standardization

The Federal Register of 6 June 1979 contained three "U.S. Standards for Grades" that we had worked on for a considerable period of time. These Standards are: (1) for "Minced Fish Blocks;" (2) for "Fish Fillets" (which covers all commercial species, fresh or frozen); and (3) a revision of the standards for "Frozen Fried Scallops."

NMFS has a contract with NARADCOM titled "Consumer and Instrumental Measures for Grouping of Fish Species." For the past few months, a trained flavor-profile panel and a trained texture-profile panel have been evaluating several species of fish fillets. This month, the sensory evaluations were expanded to include a consumer panel. The approximately 80 members of this panel include both sophisticated and unsophisticated consumers of fish. Most of the species they are evaluating are underutilized in the New England area.

One of the USDOC Inspectors in this area has suggested that the present U.S. Standards for Grades of Raw Scallops discriminate against scallops packed in large containers. After reviewing this situation, we suggested that the USDOC Inspection Service test his proposed revision of the Physical Defects Table for a period of at least 1 yr.

At its 13th session last month, the Codex Committee for Fish and Fishery Products considered a Proposed Draft Standard for Quick Frozen Fish Sticks (Fish Fingers) and Fish Portions Breaded or in Batter at step 3 of the Codex procedure. The Committee made certain changes in the test and asked the US to make a general revision of its Table of Defects. We are now working on this bit of editorial surgery.

Samples of "new to the military" fish products are being prepared for the 10-11 July meeting of the Armed Forces Product Evaluation Committee. Any "new" food item to be purchased by the military establishment requires the approval of this Committee.

In preparation for July's international conference sponsored by the Torry Research Station in Aberdeen, Scotland, a manuscript on NARADCOM's edibility study has been prepared and coordinated with the coauthors. Fred King will present it at the conference and will be chairman of a session in the general area of analyses.

At the request of NMFS Office of Utilization and Development, we are preparing for a 9 July workshop in Washington, DC, on NARADCOM's comparative edibility contract.

### Technical Assistance

Resource Utilization Division personnel provided information and technical assistance in the following areas: scallops; sources of information of fish species in South China Seas; regulations on mercury in swordfish; oily secretion from shark skulls; smoked fish; design of an "A-frame" for research vessel; source of feed for aquaculture study; source of temperature charts and vessel repair information; squid; use of soy products to improve texture of fishery products; processing equipment; methods to improve texture of fish blocks; products from ocean quahogs; rearing of lobsters; mercury limits of fishery products for France, Italy, FRG, and Spain; nematodes in fish fillets; dogfish; scientific name of the quahog;

determine whether fish steak was swordfish or shark; ocean perch; name for slipper lobster; authenticate five species of commercial fish; measurement of "K-value" and its instrumentation as an objective procedure to measure sensory quality of fresh or frozen fish; flesh content of breaded seafoods; current and former species names for ocean perch; inquiries on smoked fish from Egypt; the Organization of American States; state standards for sanitation in seafood processing plants; and failure of a batter coating to adhere to fish portions or chicken pieces.

The Regional Fuel Officer, Perry Lane, completed a survey of diesel fuel used by the fishing industry in the NMFS Northeast Region. He also answered numerous calls from individuals in the fishing industry seeking information or assistance with fuel problems.

#### Meetings, Talks, Visitors, Publicity

Joe Mendelsohn attended the Import Workshop at Boston's Logan Airport sponsored by the National Food Institute (NFI) and the FDA. The rules and regulations governing food imports and exports were discussed. He also attended the "Seminar and Mini Shop on Appearance of Materials" at Logan in which Dr. Fred King participated. At this seminar, the theory behind the measurements of color on the Hunter L Colorimeter was discussed.

Elinor Ravesi attended a 3-day training course in "Understanding Human Behavior."

Joe Licciardello and Louis Ronsivalli attended a seminar on food irradiation at NARADCOM in Natick, MA.

Louis Ronsivalli and Perry Lane attended a meeting of the Food Science and Nutrition Advisory Board at the Essex Agricultural and Technical Institute.

Perry Lane attended the monthly meeting of the New England Fisheries Steering Committee and a workshop on aquaculture sponsored by the Committee.

Perry Lane and Matthew MacConnell prepared a fresh fish display for the Plymouth Fishermen's Festival sponsored by the Massachusetts Cooperative Extension Service.

#### Manuscripts

Craig, R. A., and J. Krzynowek. 1979. Mercury concentrations in three species of tunas collected from various oceanic waters. Bull. Environ. Contam. Toxicol. (S)

Krzynowek, J., and K. Wiggin. 1979. Identification of species in cooked crabmeat by thin layer isoelectric focusing. J. Assoc. Off. Anal. Chem. (S)

Lundstrom, R. C. 1979. Fish species identification by thin-layer isoelectric focusing. J. Assoc. Off. Anal. Chem. 62(3):624-629. (P)

#### NATIONAL SYSTEMATICS LABORATORY

##### Benthic Fishes Investigation

Dan Cohen participated in the eastern Bering Sea groundfish survey on board a Japanese trawler. A collection of fishes and invertebrates was preserved for return to Washington, DC. The Bering Sea has a fauna of about 400 species. Approximately 100 were caught, including four species never before recorded from the Bering Sea.

## Pelagic Fishes Investigation

Work was done on a final version of a guide to fishes caught on longlines in the tropical Atlantic.

## Crustaceans Investigation

A description was prepared of an unknown crab from the East Pacific thermal vent area.

## Meetings, Talks, Visitors, Publicity

Mr. David Johnson of the South Carolina MARMAP program was a visitor.

## Manuscripts

Cohen, D. M. Names of the hakes. Mar. Fish. Rev. (A)

Cohen, D. M., and J. L. Russo. 1979. Variation in the fourbeard rockling, Enchelyopus cimbrius, a N. Atlantic gadid fish, with comments on the genera of rocklings. Fish. Bull., US 77(1):91-104. (P)

Springer, S. 1979. A revision of the catsharks, family Scyliorhinidae. NOAA Tech. Rep. NMFS CIRC-422. (P)

## ATLANTIC ENVIRONMENTAL GROUP

### Ocean Monitoring and Climatology Investigation

During the interval between mid-May and mid-June one of the four Gulf Stream eddies (79-C) off Georges Bank and Southern New England encountered a Gulf Stream meander and was absorbed by the Stream. The remaining three (79-A, 79-B, and 78-I) moved westward or southwestward, approximately parallel to the local bathymetry. Their positions on 13 June 1979 were: 79-A--38.6°N, 72.2°W, southwest of Hudson Canyon; 79-B--39.3°N, 68.8°W, off Hydrographer Canyon; and 78-I--40.3°N, 66.2°W, between Lydonia and Corsair Canyons.

Ten XBT transects were obtained by the cooperative Ship of Opportunity Program (SOOP) during June, two in the Gulf of Maine, two across the Southern New England shelf along the 71°W meridian, three across the shelf and slope off New York City, and three in the Gulf of Mexico.

Reed Armstrong prepared recommendations for the FY82 initiative in remote-sensing technology.

Data Analysis Products 12 and 13 were distributed to various interested scientists in NEFC laboratories in June. Number 12 consists of five brief reports which have been submitted to ICES' Annales Biologiques, dealing with oceanographic conditions in the northwestern Atlantic during 1978. Number 13 comprises graphical displays and listings of average monthly values and anomalies of scalar wind speed, vector wind speed, wind stress, wind speed cubed, and air temperature from the Nantucket Island weather station during 1948-77. Additional copies are available to other interested scientists.

Continuous plankton recorder (CPR) transects were obtained from ships of opportunity in the Gulf of Maine and the shelf and slope waters off New York City.

No continuous temperature records were obtained in June due to malfunctions. Conversion of digital cassette data tapes from the undulating oceanographer recorder (UOR) to nine-track tapes has been accomplished and a program has been written to calibrate these data and convert them to engineering units.

### Ocean Dumping Investigation

Work completed this past month included a report on "Physical Oceanography of Deepwater Dumpsite 106 January - February 1978" by H. Kathleen Langone. The report discusses the water masses present at DWD 106 during an Albatross IV cruise (Cruise No. SC502-AL-78) and their interactions with anticyclonic Gulf Stream eddy

Also completed this past month was the first progress report on long-term waste plume movement studies at DWD 106 using free-drifting drogued radiosonde buoys. The report is titled "Fall 1978 Current Measurements Near Deepwater Dumpsite 106 and Evaluation of a Quasi-Lagrangian Measurement Technique" by James J. Bisagni. This report discusses the initial feasibility study conducted last October, the experimental results, the suitability of the equipment and plans for work. The final buoy drifter study scheduled for this year will be conducted during the second and third weeks of August 1979. The study will employ new 4-MHz buoy systems which are presently under procurement. After the completion of this study, a report will be produced which will discuss the winter, spring, and summer 1979 studies.

### Meetings, Talks, Visitors, Publicity

Mert Ingham attended a joint NEFC-SEFC Board of Directors meeting which was held in Charleston, SC, from 20 to 22 June.

Steve Cook and Bob Benway traveled to Brooklyn, NY, to meet the NOAA R/V Whiting and the M/V's Rigel and Lash Atlantico to pick up SOOP data and to New Haven, CT, to meet the M/V E. M. Queeny to pick up data and train a cadet on 15 June.

On 28 June, Woody Chamberlin went to New Bedford, MA, for a meeting with fishermen and to the Woods Hole Laboratory for a meeting with Dr. Robert L. Edwards.

### Manuscripts

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

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