



# NORTHEAST FISHERIES CENTER

## NEWSLETTER

OCTOBER 1980

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**US DEPARTMENT OF COMMERCE  
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
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"NORTHEAST FISHERIES CENTER NEWSLETTER"

THE "NORTHEAST FISHERIES CENTER NEWSLETTER" IS A MONTHLY NARRATIVE REPORT ON THE RESEARCH AND DEVELOPMENT ACTIVITIES OF THE NORTHEAST FISHERIES CENTER (NEFC). SUBMISSIONS TO THIS REPORT ARE PREPARED BY THE ABOVE RESEARCH ADMINISTRATORS, AND COMPILED AND EDITED BY JON A. GIBSON, TECHNICAL WRITER-EDITOR, NEFC.

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## CENTER DIRECTORATE

### Fishery Technology

Bob Learson of the Gloucester Laboratory traveled to Newfoundland, Canada, at the invitation of Memorial University and its Fisheries College in St. John's. He gave a 3-hr lecture on technological research to the Fisheries College and visited several fish processing plants and governmental fisheries installations.

Fish Expo '80 was held in Boston during 22-25 October at the Hynes Memorial Auditorium. This year's Expo appeared to be attended extremely well with thousands of daily visitors. Over 400 exhibitors, representing every phase of commercial fishing, were present. Seminar sessions were held every day dealing with all aspects of the fishing industry from governmental policy to aquaculture. Bob Learson from the Gloucester Laboratory moderated a panel discussion on innovative processing methods.

### RESOURCE ASSESSMENT DIVISION

#### Resource Surveys Investigation

On 3 October, the NOAA R/V Delaware II returned to Woods Hole after completing the first leg of the autumn bottom trawl survey. Tom Azarovitz was Chief Scientist, and Don Flescher and Evelyn Howe also participated. The area surveyed was between Cape Fear, North Carolina, and Cape May, New Jersey.

The autumn survey was continued as the Delaware II departed Woods Hole on 6 October. Mal Silverman was Chief Scientist, and John Nicolas and Liz Bevacqua also participated. The ship returned to Woods Hole on 16 October, after completing the survey as far north and east as the southwestern third of Georges Bank.

On 20 October, the Delaware II departed to conduct the third leg of the survey. Henry Jensen was Chief Scientist, and Evelyn Howe, Eva Montiero, and Don Flescher were also aboard. During this leg, the rest of Georges Bank, the Scotian Shelf, and most of the Gulf of Maine were expected to be surveyed. The Delaware II was expected to return on 6 November.

Tom Azarovitz, Chuck Byrne, Linda Despres, Eva Montiero, and Liz Bevacqua all worked on the final report to the Bureau of Land Management. This report was nearly completed during October and will be submitted for review in November.

Pat Twohig repaired and modified the long-range radio at the Sandy Hook Laboratory. As a member of the Woods Hole Laboratory Space Committee, Pat assisted in drawing specifications and obtaining bids for the modification of the tank room in main building and the women's rest room on the second floor of the aquarium building. In support of the Resource Surveys Investigation's efforts, Pat repaired and installed a Loran C receiver and two expendable bathythermograph (XBT) instruments aboard the Delaware II.

Jim Crossen and Ron Smolowitz attended the annual meeting of the Marine Technology Society and presented a paper to the Seafloor Engineering Session titled "Power System Requirements of an Electro-hydraulic Clam Dredge."

#### Fishery Biology Investigation

##### Age and Growth

Vi Gifford and Kris Andrade completed the photography for the redfish age validation paper.

Kris Andrade participated as a member of the scientific party on Delaware II Cruise No. DE 80-07, the second leg of the 1980 fall bottom trawl survey.

Judy Penttila met with Ambrose Jearld and Maurice Crawford to discuss proper procedures for a surf clam age validation study. Problems discussed included: proper chondrophore sectioning techniques, time of formation of summer and winter-type zones, back-calculation techniques, determination of first annulus, and comparison of ring counts by different readers.

Aging work completed in October included: first quarter 1972 commercial redfish samples (second aging completed), second and third quarter 1972 commercial redfish samples (first aging completed), 1980 summer bottom trawl survey haddock samples (aged and sent to the Woods Hole Laboratory's Automatic Data Processing (ADP) Unit), 1980 spring bottom trawl survey yellowtail flounder samples (aged and sent to the ADP Unit), and second quarter 1980 commercial yellowtail flounder samples (aging completed).

### Finfish

In early October, Sherry Sass joined the Finfish Group on a temporary appointment as a fishery biologist. She and Mark Costa brought the processing of frozen alewife specimens up to date with the completion of 1978-80 sampling for lengths, weights, and otoliths. Ms. Sass completed age determinations and age-length summaries for alewives from the 1979 spring bottom trawl survey, and began aging 1980 spring bottom trawl survey samples. A literature search was begun for Ambrose Jearld pertaining to fish behavior as related to fishing activity.

Louise Dery re-aged white hake from the 1977 spring, summer, and fall bottom trawl surveys and completed age-length summaries. Progress was continued with Mark Costa sectioning silver hake otoliths from the 1980 spring bottom trawl survey, and preparing summer flounder scales for a photography project by Myron Silverman at the Sandy Hook Laboratory as part of a summer flounder workshop report. Ms. Dery was appointed the local NOAA Equal Employment Opportunity (EEO) Counselor at the end of October.

### Shellfish

Uvetta Dozier, a co-op student from South Carolina State University, participated in Delaware II Cruise No. DE 80-07, the second leg of the fall bottom trawl survey. Upon her return she continued to photograph and age surf clams from the January 1980 shellfish assessment survey.

Mark Costa also participated in a leg of the fall bottom trawl survey on Delaware II Cruise No. DE 80-08. He also continued to prepare the chondrophores of surf clams for aging.

Maurice Crawford and Ambrose Jearld conducted a workshop at the University of Maryland Eastern Shore (UMES) on the aging of surf clams. The UMES participants were Professor Thomas Hopkins, Mike (Steve) Morrison, and Joe Hogue--the latter two being students in the marine science program. Maurice Crawford also aged scallops from the 1979 spring sea scallop assessment survey, and surf clams from the January 1980 shellfish assessment survey.

### Contract Aging and Related Biological Sampling

Doris Jimenez of the Massachusetts Division of Marine Fisheries aged 139 Atlantic cod otoliths from commercial samples collected during August and September

1980. Also, 22 samples from the State of Massachusetts' resource assessment cruise (No. 0926) were aged. She also began measuring age rings on Atlantic cod otoliths from 1980 commercial samples.

Since her last progress report on 19 September, Jean Chenoweth has processed 73 Atlantic herring age samples. Five of these samples were from the Isles of Shoals fishery and 68 were from the north-of-Cape-Elizabeth fishery, both fisheries in the southern Gulf of Maine. Sample data were sent to Bernice Kingsley at the Woods Hole Laboratory on 26 September and 3, 10, and 17 October. All samples for the northern Gulf of Maine have been completed through September; work on October samples is beginning. The August samples picked up from the port samplers in mid-September in the southern Gulf of Maine have been completed; work on the remaining September samples is beginning.

As time permits, gonads are being saved for the Atlantic herring fecundity study. Only 50 gonads were obtained from the Penobscot Bay area in the northern Gulf of Maine, due to the State of Maine's closure of the fishery to protect spawning individuals. The southern Gulf of Maine collection now numbers 216, with probably 150 more to be processed.

The Maine herring fishery is about over for the year, with the exception of east of Cutler where there is a school of herring 7 mi long (mostly 1977 year class).

### Fishery Assessment Investigation

#### Senior Assessment Scientists

Considerable time was spent during October devising task development plans for FY 1983. Mike Sissenwine assumed lead responsibility within the Division for preparing these plans, proposing new initiatives in the areas of population genetics, statistical ecology, marine mammals - fishery interactions, and biostatistical data collection (including sea sampling, State-Federal Program cooperative inshore bottom trawl surveys, and socioeconomic studies).

Michael Sissenwine and Vaughn Anthony attended the annual statutory meeting of the International Council for the Exploration of the Sea (ICES) in Copenhagen, Denmark. Vaughn also represented the US in the ICES Arctic Working Group, undergoing assessments of arctic cod and haddock. While at ICES, Mike and Vaughn were nominated for Chairpersons of the Advisory Committee for Fishery Management (ACFM) and the Demersal Fish Committee, respectively. While at the ICES meeting, they had discussions with numerous faculty members from the University of Rhode Island (URI), University of Washington, Virginia Institute of Marine Science (VIMS), University of Miami, University of Maryland, and others.

On 3 October, Brad Brown spoke on the role of assessments in fishery science to the annual meeting of the American Littoral Society. He also met with Dick Hennemuth, Mike Sissenwine, and Dr. Bennington of the United Kingdom to discuss cooperative research in fisheries dynamics based upon empirical ecosystem studies. On 24 and 25 October, he attended a meeting in Washington, DC, at the Human Environment Foundation on opportunities for minorities in the natural resources-related professions. On the 28th, Brad participated in a meeting conducted by NOAA Office of Coastal Zone Management's Sanctuary Programs Office concerning a potential sanctuary in Nantucket Sound. On that day he also participated in a panel in the Marine Policy Seminar Series at the Woods Hole Oceanographic Institution (WHOI) on the Fishery Conservation and Management Act. Other time was devoted to developing the first draft of operational procedure that would be required for a new

implementation of the three-tiered fishery statistics system proposed by the Northeast Fishery Management Task Force.

Steve Clark initiated work on annual haddock and yellowtail flounder assessments. He conferred with Dr. Earl Whitener of Louisiana State University on pandalid shrimp biology and distribution in the western Gulf of Maine. Steve and Loretta O'Brien provided information and data on distribution of argentine in the Georges Bank - Gulf of Maine area to fishery biologists at the Bedford Institute of Oceanography in Dartmouth, Nova Scotia. Steve also conferred with Maine Department of Marine Resources personnel on pandalid shrimp research procedures and with the New Hampshire Fish and Game Department and the Massachusetts Division of Marine Fisheries concerning State-Federal Program contract work on northern shrimp.

Emory Anderson reviewed the annual report of the Wisconsin Department of Natural Resources project on "Rehabilitation of the Green Bay Walleye Fishery" for the Federal Aid Branch of the NMFS Northeast Regional Office. He is currently working on an analysis of the natural mortality rate for Atlantic mackerel. Emory also lectured to a class from the Sea Education Association in Woods Hole on the mission of NMFS, NEFC, the Woods Hole Laboratory, and the Resource Assessment Division.

Fred Serchuk presented reviews of the surf clam and ocean quahog assessments at a meeting of the Mid-Atlantic Fishery Management Council (MAFMC) in Philadelphia. He also attended the masters thesis committee meeting of Patricia Gerrior, a degree candidate at Southeastern Massachusetts University.

John Boreman met with Geoff Laurence of the Marine Ecosystems Division and with representatives of the Columbia National Fisheries Laboratory of the US Fish and Wildlife Service (USFWS) at our Narragansett Laboratory to discuss the progress of their research on the effects of contaminants on striped bass eggs and larvae.

### Staff

Emma Henderson drafted sections on software to be included in the Woods Hole Laboratory's ADP Unit's revision of the research vessel survey software manual.

Anne Lange met with a member of the NMFS Northeast Regional Office's Foreign Fisheries Observer Program to explain squid sampling procedures.

Mike Fogarty continued to work on the summer flounder assessment. He also worked with Thurston Burns on an evaluation of American lobster management data requirements and existing state statistical systems.

Rhett Lewis began work on a black sea bass assessment for the MAFMC. He and Margaret McBride spent considerable time coordinating the NEFC Workshop on Cooperative Student Programs.

### Meetings, Training, Cruises, and Public Affairs

#### Meetings

On 1 October, a MAFMC Scientific and Statistical (S&S) Committee meeting was held in Philadelphia. Emory Anderson attended.

During 1-4 October, an ICES Arctic Working Group meeting was held in Copenhagen, Denmark. Vaughn Anthony attended.

On 3 October, the annual meeting of American Littoral Society was held on Cape Cod. Brad Brown attended the Woods Hole meetings.

On 4 October, the "dialogue meeting" between European administrators, managers of fishery resources, and members of the ACFM was held in Copenhagen, Denmark. Vaughn Anthony attended.

During 6-15 October, the 68th Annual Statutory Meeting of ICES was held in Copenhagen, Denmark. Vaughn Anthony and Mike Sissenwine attended.

On 7 October, the Woods Hole Laboratory EEO Committee held its regular meeting. Gordon Waring, Fred Serchuk, Steve Clark, Rhett Lewis, and Margaret McBride attended.

On 11 October, a meeting of the ACFM was held in Copenhagen, Denmark. Vaughn Anthony attended.

On 14 October, a Center Factor IV Committee meeting was held at the Milford Laboratory. Mike Sissenwine attended. Also on 14 October, the Center Molluscan Ecology and Population Enhancement Task Force held a meeting at the Milford Laboratory. Fred Serchuk and Mike Sissenwine attended.

On 15 October, a MAFMC meeting was held in Philadelphia. Fred Serchuk attended. Also on the 15th, a New England Fishery Management Council (NEFMC) S&S Committee meeting was held in Boston. Mike Fogarty and Thurston Burns attended.

On 16 October, an IYABA meeting was held at the Milford Laboratory. Ralph Mayo attended.

During 22-24 October, the Center Board of Directors meeting was held in Woods Hole. Brad Brown, Mike Sissenwine, Ralph Mayo, and Margaret McBride attended.

On 23 October, the Massachusetts Institute of Technology's Sea Grant Program held a seminar in Cambridge, Massachusetts. Rhett Lewis attended.

On 23 and 24 October, Fish Expo '80 was held in Boston. Fred Serchuk, Gordon Waring, Rhett Lewis, Margaret McBride, Thurston Burns, and Chuck Byrne attended.

On 28 October, the NEFMC Silver Hake Oversight Committee met in Hyannis, Massachusetts. Emory Anderson attended.

On 29 October, the Woods Hole Laboratory Promotions Committee met. Margaret McBride attended.

On 29 and 30 October, the State-Federal Program's Northern Shrimp Scientific Committee met in Gloucester, Massachusetts. Steve Clark attended.

On 30 October, the NEFMC and its Groundfish Oversight Committee met in Hyannis, Massachusetts. Joan Palmer and Emory Anderson attended. Also on 30 October, the Center EEO Committee met at the Narragansett Laboratory. Brad Brown, Mike Sissenwine, Rhett Lewis, and Margaret McBride attended.

### Training

On 20 and 21 October, the Merit Pay System Training Program was held in Woods Hole. Vaughn Anthony, Mike Sissenwine, John Boreman, Emory Anderson, and Brad Brown attended.

### Cruises

From 6 to 16 October, the second leg of the autumn bottom trawl survey (Delaware II Cruise No. DE 80-07) occurred in Mid-Atlantic to Southern New England waters. Anne Lange, Patricia Chew, and Ruth Gutjahr participated.

From 20 October to 7 November, the third leg of the autumn bottom trawl survey (Delaware II Cruise No. DE 80-07) occurred on Georges Bank and in the Gulf of Maine. Fred Serchuk participated.

## Public Affairs

On 3 October, Tom Azarovitz, Chuck Byrne, and other NEFC staff participated in two special half-day cruises aboard NOAA R/V Albatross IV. The purpose of these cruises was to demonstrate groundfish survey techniques to members of the American Littoral Society, who were attending the annual meeting of that Society.

Judy Penttila gave a tour of the Fishery Biology Investigation's Age and Growth Unit to 20 students from Baker River (New Hampshire) High School on 3 October.

Don Flescher and Dave Potter set up exhibits and represented the NEFC at the NOAA 10th Anniversary Open House aboard the R/V Researcher in Washington, DC, during 11-14 October.

## Publications

Boreman, J. Characteristics of fall and spring migrant rainbow trout in Cayuga Inlet, New York. N.Y. Fish Game J. (In press.) (A)

Boreman, J.; Goodyear, C. P.; Christensen, S. W. An empirical methodology for estimating entrainment losses at power plants sited on estuaries. Trans. Amer. Fish. Soc. (In press.) (A)

Crossen, J. J.; Smolowitz, R. J. Power system requirements of an electro-hydraulic clam dredge. Mar. Technol. '80 Conf. Rec.:342-347;1980. (P)

Hennemuth, R. C.; Palmer, J. E.; Brown, B. E. A statistical description of recruitment in 18 selected fish stocks. J. Northwest Atl. Fish. Sci. 1:101-111. (In press.) (A)

Mayo, R. C. An age validation study of redbfish, Sebastes marinus (L.) from the Gulf of Maine - Georges Bank region. J. Northwest Atl. Fish. Sci. (S)

Sissenwine, M. P.; Brown, B. E.; Palmer, J. E.; Essig, R. J.; Smith, W. G. An empirical examination of population interactions for the fishery resources of the northeastern USA. Can. J. Fish. Aquat. Sci. (A)

## Reports

Clark, S. H. Use of trawl survey data in assessments. Paper presented at Workshop on research vessel trawl survey. Ottawa, Canada;1980 November 12-14.

Cohen, E.; Grosslein, M.; Sissenwine, M.; Steimle, F. A comparison of energy flow on Georges Bank and in the North Sea. Int. Counc. Explor. Sea Comm. Mem. 1980/L:64;1980.

Serchuk, F. M.; Murawski, S. A. Assessment and status of surf clam Spisula solidissima (Dillwyn) populations in offshore Middle Atlantic waters of the United States. Woods Hole Lab. Ref. Doc. No. 80-33; 1980. 46 p.

Serchuk, F. M.; Murawski, S. A. Evaluation and status of ocean quahog, Artica islandica (Linnaeus) populations off the Middle Atlantic Coast of the United States. Woods Hole Lab. Ref. Doc. No. 80-32;1980. 7 p.

## MANNED UNDERSEA RESEARCH AND TECHNOLOGY PROGRAM

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

## MARINE ECOSYSTEMS DIVISION

### Ecosystem Dynamics Investigation

Ed Cohen and Wendell Hahm worked on revisions of papers for publication. Ed made further changes in the Georges Bank energy budget to take account of new information and comments from reviewers; the paper has now been accepted for publication in the Canadian Journal of Fisheries and Aquatic Sciences pending final editing. Ed also began work with Mike Pennington on a short paper describing a generalized model for estimating daily ration of fish, and including comparisons with the Elliott-Persson model used by Ted and Ann Durbin (on an intergovernmental personnel assignment from URI) for estimating daily rations of silver hake and Atlantic cod on Georges Bank. Ed reviewed an estuarine model by the Rand Corporation and started a general bibliography on ecosystem modeling and related studies with a focus on Georges Bank.

Wendell began revision of the ICES document (C.M. 1980/L:62) on prey selectivity of fishes, in line with critical suggestions from Erik Ursin and others at the 1980 ICES meeting. Wendell also continued to work on documentation of the energy flow analysis methods for both GEORGE and MERLIN (a simulation model by the URI Marine Environmental Research Laboratory which is analogous to GEORGE in many respects).

Mike Pennington completed a paper describing the various statistical methods used in analysis of the Marine Resources Monitoring, Assessment, and Prediction Program's (MARMAP) bottom trawl survey data, which is to be presented at a November workshop on trawl survey methodology in Ottawa. Mike also consulted on statistical problems with Chuck Stillwell at the Narragansett Laboratory and with Bob Reid and Wally Morse at the Sandy Hook Laboratory.

Marv Grosslein prepared paper work for a FY 1983 initiative on expanded food web studies needed for refining estimates of daily rations and prey selectivity used in the multispecies models. He also attended a number of meetings including: (1) an S&S Committee meeting for the NEFMC; (2) a Subcommittee on Lobster Data Requirements meeting for the S&S Committee; (3) an Ad Hoc Technical Advisory Committee meeting for the US Geological Survey's (USGS) Supervisor for the North Atlantic District, who is responsible for implementing studies of impacts of oil and gas pollution on Georges Bank; and (4) a Georges Bank Study Committee meeting at WHOI.

The above-mentioned and so-called Georges Bank Study Committee is a group of nine scientists from NEFC, WHOI, USGS, Marine Biological Laboratory, and Brookhaven National Laboratory, who are promoting the analysis and synthesis of data on Georges Bank as a unique ecosystem. The first objective of the Committee is to prepare a book summarizing the latest information on Georges Bank, and a tentative outline of the book was presented at the NEFC's Marine Ecosystems Division meeting on 28 October at the Narragansett Laboratory. Possible NEFC contributions to the book in the form of review articles or background scientific papers were discussed at

that Division meeting. A copy of the first draft book outline approved by the Georges Bank Study Committee will be circulated to other NEFC divisions in the near future, and Marv Grosslein will be soliciting ideas about possible NEFC contributors for the book as well as relevant scientific papers based on NEFC data within the next 2 yr.

#### Benthic Dynamics Investigation

The paper by John Dickinson and Roland Wigley, describing the distribution of Georges Bank amphipods, was accepted for publication as a NOAA Technical Report NMFS Special Scientific Report-Fisheries. The paper should be in print in approximately 6 mo.

Dr. John Hauser joined the staff as a computer programmer at the Woods Hole Laboratory. John was introduced to the staff, to the Sigma 7 computer, and is now tackling some of our outstanding programming needs. Jackie Murray also rejoined the staff this month on a 130-day appointment. Jackie is continuing her duties on the computer: listing, auditing, and updating food habits and benthic data.

Rich Langton spent a good deal of time analyzing the yellowtail flounder food habits data base for 1973-76. He also tried to get things in order in anticipation of his departure to accept a job with the State of Maine. Rich will take up the duties as the Director of the Bureau of Marine Science for the State on 1 December 1980. Marv Grosslein will be Acting Chief of the Benthic Dynamics Investigation in Rich Langton's absence.

#### Fishery Oceanography Investigation

Preparation for the November larval fish dynamics cruise on Albatross IV, participation in the first FY 1981 MARMAP cruise, and involvement in a series of meetings highlighted the Investigation's month.

The first larval fish dynamics cruise, successor to the 1978 larval Atlantic herring patch study on Georges Bank, will be an effort to mesh advanced biological and physical techniques at sea for the purpose of relating larval survival to small-scale physical variability. The Fishery Oceanography Investigation's contribution to this effort includes vertical profiling of horizontal currents (using the Cyclesonde free-fall current profiler) and continuous observation of temperature and salinity in both the vertical [using a conductivity-temperature-depth recorder, a salinity-temperature-depth (STD) recorder, and an XBT] and the horizontal (using a thermosalinograph) planes, with real-time, shipboard data output. Gil Dering has had principal responsibility for preparing the equipment with Ron Schlitz and Steve Ramp. He has also developed interface programs for quality control and data reduction.

The Cyclesonde was successfully tested on a 1-day cruise on WHOI's R/V Asterias. At the same time, a successful field test was made with Derek Sutton's pressure-activated water sampler which will make it possible to obtain bottom salinity samples at trawl stations.

The season's first MARMAP cruise was completed. Participating in various legs were Derek Sutton, Tom Loughton, Bob Backman, Dana Densmore, Sam Nickerson, and Bruce Davis. Those who were not at sea plugged away on the salinity samples.

Red Wright delivered three papers (listed in August "Newsletter") at the Hydrography Committee sessions of the ICES statutory meeting in Copenhagen, and also participated in meetings of the Oceanic and Shelf Seas Hydrography Working Groups. Ron Schlitz gave a presentation on the Nantucket Shoals flux experiment at the annual Middle Atlantic Bight Physical Oceanography and Meteorology Workshop held this year

in Annapolis. Gil Dering and Art Allen attended the Marine Technology '80 meetings in Washington, DC, where Art also visited the US Coast Guard's Oceanographic Unit. Red and Ron also presented a proposal at the Center Board of Directors meeting for a biological-physical investigation of the fisheries-related impact of warm-core Gulf Stream rings. More details of the proposal were considered at a subsequent Marine Ecosystems Division meeting.

Several members of the Investigation spent an afternoon with Mr. W. Phillips of Wildlife Supply Co. of Saginaw, Michigan, who is attempting to improve upon the Niskin bottle with a water sampler of his own design. Other activities included processing of STD tapes for the Bigelow Laboratory of Ocean Sciences (Sutton), design and fabrication of improved radar reflectors for our marker buoys (Sutton), further processing of 1978 larval Atlantic herring patch study current-meter data (Allen), plotting of flux experiment hydrographic data (Laughton) and ship-of-opportunity (SOOP) runs (Backman), and construction of a new rack for weather maps. Seven vector-averaging current meters were loaned to Brad Butman of USGS for deployment in Lydonia and Oceanographer Canyons to assist a joint MURT/USGS exercise. Cindy Chappell departed for a job in Washington, DC. Steve Ramp began his coursework at URI. Tom Laughton and Dan Patanjo received permanent intermittent appointments as physical science technicians.

## Larval Fish Dynamics Investigation

### Experimental Studies

Geoff Laurence and Larry Buckley presented talks describing our larval fish program to the Marine Fish Larvae Session of the Atlantic Region Fish Health Workshop recently held in Halifax, Nova Scotia. Culture techniques and biochemical condition indexes were discussed. The Canadians are interested in establishing a rearing facility and a lab research program to work with the early life stages of marine fish. A meeting between NOAA and USFWS personnel was held at the Narragansett Laboratory to review results from the joint striped bass study and to make plans for future cooperative research. Work on the aquarium facility and biochemistry laboratory was continued. Hormone induction of summer flounder was begun and a culture of rotifers was started for feeding larval fish during a standard viability test.

### Population Processes

Final revisions were made on Northwest Atlantic Fisheries Organization (NAFO) Scientific Council research documents by Greg Lough dealing with larval Atlantic herring abundance and mortality estimates in relation to spawning stock and recruitment (Research Document 80/IX/129), and by David Potter dealing with larval Atlantic herring vertical distribution data collected in November 1977 with the multiple opening-closing net and environmental sensing system (MOCNESS) (Research Document 80/IX/133). Dave Potter also helped Herb Stern with a building audit addendum for the Center. George Bolz continued analysis of the total ichthyoplankton for the Georges Bank - Nantucket Shoals area as determined from 1971-76 larval Atlantic herring surveys. Roz Cohen completed final editing of the larval Atlantic herring gut content - condition factor data report, and she is well into the first draft of a summary document for the 3-yr series of larval herring feeding and condition data. Peter Donnelly, a biological oceanographer, began a 1-yr temporary appointment with us on 20 October, and Roz Cohen is training him in larval gut processing of MOCNESS samples collected from the 1978 larval Atlantic herring patch study. Hal Merry has

been extremely busy preparing gear for our interdisciplinary larval fish-prey microdistribution studies during 3-14 November on Albatross IV Cruise No. AL 80-11.

Hal Merry and Jim Crossen attended Fish Expo '80 in Boston on 22 October specifically to meet with EPSCO engineers to learn more about the high-frequency chromoscope we will be using on our cruises.

Dave Potter participated in NOAA's 10th National Open House aboard the R/V Re-searcher in Washington, DC, during 10-14 October. He represented the NEFC and explained our mission to the public and to a special group of VIP's including US Senators and Representatives.

Roz Cohen talked to a student group from Baker River High School (Wentworth, New Hampshire) about larval fish feeding studies on 3 October. She also attended an EEO meeting in Woods Hole on 7 October and spent some time on Federal Women's Program (FWP) work in preparation for a career workshop on 4 December.

Greg Lough and Roz Cohen attended the quarterly Marine Ecosystems Division meeting at the Narragansett Laboratory on 28 October.

### Oceanic Gamefish Investigation

In October, tags were returned from two swordfish, two sandbar sharks, and one each blue, blacktip, dusky, and nurse sharks. The dusky was free for 4 yr and was recaptured from the same North Carolina pier from which it was tagged in 1976. One of the sandbar sharks was free for a little over 3 yr and traveled from New Jersey into the Gulf of Mexico off Alabama (1520 mi). The other sandbar was free for only 38 days and remained within the Chesapeake Bay. One of the swordfish was at liberty for 643 days and was recaptured within 100 mi of the tagging site off North Carolina. The other tagged swordfish moved from the Dry Tortugas in the Gulf of Mexico through the Straits of Florida to Palm Beach, Florida (263 mi in 299 days).

Chuck Stillwell completed a revision of the food habits manuscript for the shortfin mako. In connection with the paper, discussions were held with Mike Pennington at the Woods Hole Laboratory and Ann Durbin from URI on how best to approach the problem of determining daily ration with available field data. Nancy Kohler prepared a seminar for the URI Graduate School of Oceanography based on our blue shark liver data base. The presentation will include information on liver condition and function with respect to lipid reserve and buoyancy control. Verification of blue shark food habits data now in computer files was continued. Chuck Stillwell discussed with Wendell Hahn of the Woods Hole Laboratory the options for including apex predator food and population dynamics data in the Georges Bank energy budget model. In October, Wes Pratt continued efforts to age mako sharks with trials of different methodologies for interpreting vertebral rings. Examination of unstained vertebral faces using a combination of incident and transmitted light showed promising results.

A note for Copeia, "Observations on Large White Sharks, Carcharodon carcharias Off Long Island, N.Y.," by Harold L. Pratt, Jr., John G. Casey, and Robert Conklin was completed.

Dr. Kzyuyuki Teshima, a Japanese specialist in shark reproduction from the Shimonoseki University of Fisheries visited Jack Casey and Wes Pratt on 2 and 3 October. Plans for cooperative work were discussed. On 9 October, Thomas S. Estes, President of the Newport Council for International Visitors, accompanied Raphael DiPouma, Minister of Fisheries from Gabon (Africa), in a visit with the staff of our Investigation, and on 10 October, Richard Huang from Taiwan visited the Narragansett Laboratory and with our staff.

## Plankton Ecology Investigation

Robert Marak participated in the 68th Statutory Meeting of ICES from 6 to 10 October held in Copenhagen, Denmark. The Baltic Fish Committee sessions were considerably better than last year in that only 24 papers were presented, leaving considerably more time for discussion. The subjects of these papers ranged from early life history studies to multispecies modeling. Papers concerning herring populations using a 32-yr data base and discussing the use of models in multispecies assessments were highlights. Discussions -- concerning standardization of sampling gear and methods for plankton and micronekton in the Baltic Sea -- with participants from the North and Baltic Sea areas were encouraging.

The Polish Plankton Sorting and Identification Center in Szczecin, Poland, is now supporting more NMFS research with the initiation of the processing of samples in September from the Northwest & Alaska and the Southeast Fisheries Centers (NWAFC and SEFC). The Southwest Fisheries Center (SWFC) is also interested in exploring the possibility of using the services provided by the Sorting Center. Meetings were held in Szczecin with Ejsymont and his staff from 13 to 16 October. US participation included Art Kendall (NWAFC), Tom Potthoff (SEFC), and Reuben Lasker (SWFC). Robert Marak (NEFC) chaired the discussions. Scientists from the other Fisheries Centers were provided with in-depth descriptions of operations at the Sorting Center. The first set of samples from NWAFC were completed and discussions were held concerning further work and training visits to Seattle for Polish scientists.

Ray Maurer represented NMFS at NOAA's 10th National Open House held on 20 and 21 October at the National Ocean Survey's facility in Norfolk, Virginia. The event was well attended by students, fishermen, and the general public. Fisheries displays were the focus of local and national (NBC and CBS) television news programs. Governor Holden of Virginia was provided with a synopsis of NMFS programs and activities as he toured the exhibits.

Carolyn Griswold participated in a MARMAP ichthyoplankton cruise on Albatross IV. She tested fixation and preservation techniques on gelatinous micronekton including ctenophores, hydromedusae, and salps. On 14 October, Carolyn Griswold attended a meeting of the Mid-Atlantic Biological Task Force in New York City, and she attended a North Atlantic Technical Working Group meeting in Somerville, Massachusetts, on 15 and 16 October. On 24 October, Lorrie Sullivan and Carolyn Griswold attended the Ninth Annual Sea Grant Lecture and Symposium on Georges Bank, titled "Fish and Fuel," at the Massachusetts Institute of Technology.

### Biostatistics

The Biostatistics Unit staff has been internally reorganized. Tom Plichta is now heading a data processing group responsible for all data base operations (input, edit, update, and standard products) and all user services. The remaining members of the staff will work on individual and collective projects. This will insulate them from user demands and allow progress on some of the targeted goals of our group. Karen Johnson came on board as a 1040-hr temporary employee. She will work on an atlas of net tow locations using data from the MARMAP Information System, the FISHMAP package at the Woods Hole Laboratory, and the Zeta plotter of the AEG. Ann Davis, a programmer, came on board with our IOCS, Inc., contractee, replacing Dave Margolies, a systems analyst. Otis Jackson of the Woods Hole Laboratory is debugging FISHMAP for use on the Zeta plotter. The Map Analysis Package, obtained from Yale University, has been tested on the ADPNET computer in Waltham, Massachusetts. It is operational and demonstrations of contouring can be produced. It needs to be generalized in order to access cruise data.

Fager statistics on 12 cruises were run for Roz Cohen. Station activity summary (SAS) programming was done to assist the Oceanic Gamefish Investigation. Master bridge logs and ichthyoplankton sampling logs were edited for the EK8004 and DL8003 data base files.

A thorough search of the entire data base is continuing. One hundred sixty-five data base files have been identified. Twenty-five data base files that were duplicates or subsets of other data base files have also been identified. Data found on logs, but not in data base files, are now being entered. Standard products, such as SAS, fish summary, etc., are being run to provide an up-to-date collection.

### Ichthyoplankton Investigation

Our MARMAP I survey operations for FY 1981 got off to a resounding start. Thanks to the crew's outstanding spirit of cooperation, the professional enthusiasm and efficiency of the scientific party, and the cooperation of the weather, all 175 stations were successfully completed. John Sibunka and Pete Berrien served as Chief Scientists on the three-part survey. Carolyn Rogers and Don McMillan assisted with plankton sampling. Gross examination of the 6B5 plankton samples taken during the survey revealed that larvae were abundant throughout much of Middle Atlantic and Southern New England waters, but moderate to scattered over Georges Bank and the Gulf of Maine. The following four species of bothid flounders numerically dominated the larval fish population: Gulf Stream flounder, smallmouth flounder, windowpane, and fourspot flounder. Catches of Urophycis spp., silver hake, and butterfish were light to moderate on Georges Bank and in the Gulf of Maine. Atlantic herring larvae were observed in collections taken at a few stations on Browns Bank and along the western part of the Gulf of Maine off Massachusetts and Maine. Preparations are underway for the next survey which begins in November and carries through Christmas Eve.

Midway through the above survey, John Sibunka participated in a 1-day outing on Albatross IV to explain plankton sampling techniques to members of the American Littoral Society. Chris Powell's temporary appointment expired during the month. He was a productive and enthusiastic member of this Investigation for the past 2 yr. All of us wish him well in his future endeavors. Tom McKenney transferred from the Narragansett Laboratory to the Sandy Hook Laboratory where he will be working on egg production and spawning stock estimates for Atlantic cod and haddock, and quality control and archiving aspects of larval fishes received from the Plankton Sorting and Identification Center in Szczecin, Poland. Wally Smith attended a meeting of the Marine Ecosystems Division at the Narragansett Laboratory on 28 and 29 October.

### Meetings, Talks, Visitors, and Public Affairs

On 3 October, Julien Goulet visited Dr. Joseph Berry of Yale University to deliver data and review proposed work on a contract which demonstrates the capability of co-analysis of remotely sensed data and ship survey data. On 7 October, Julien Goulet attended a symposium presented by New England Telephone in Foxboro, Massachusetts. The symposium presented the company's approach to the data processing market. On 20 and 23 October, Lorrie Sullivan presented lectures on the application of statistical methods to the biological oceanography course at the URI Graduate School of Oceanography. On 28 and 29 October, Julien Goulet attended the Marine Ecosystems Division's investigation chiefs meeting. On 30 October, Ann Davis of

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IOCS, Inc., presented a short introduction to SESAME, a user's interface to ADPNET's data base management system, and Otis Jackson of the Woods Hole Laboratory visited the Narragansett Laboratory to work on the FISHMAP-Zeta plotter interface.

Jennie Dunnington and Julien Goulet attended a WANG demonstration of their information processors on 8 October at Providence, Rhode Island.

Thomas S. Estes, President of the Newport Council for International Visitors, accompanied Raphael DiPouma, the Minister of Fisheries for Gabon (Africa), in a visit to the Narragansett Laboratory.

Richard Huang of Taiwan visited the Narragansett Laboratory.

Kenneth Sherman chaired the Marine Ecosystems Division meeting at the Narragansett Laboratory on 28 and 29 October.

On 28 October, Aaron Rosenfield accompanied Liu Tianjing (Deputy Director of the Yellow Sea Fisheries Research Institute and head of the delegation), Yan Conghai (researcher at the Institute), Zhang Lian (researcher at the Institute), and Liu Rensheng (interpreter with the Chinese State Bureau of Aquatic Science) from the Peoples Republic of China on a tour of the Narragansett Laboratory.

Ken Sherman served as Chairman of the Biological Oceanography Committee during the 68th Statutory Meeting of ICES held in Copenhagen during 6 - 15 October. Following the scientific sessions he participated in the meetings of the Consultative Committee which is concerned with both the organization of the statutory meeting and with formulating scientific policies of ICES. The Committee agreed to encourage effort on the following lines of research during the 1980's: (1) climate as related to ocean circulation; (2) functioning of ecosystems with particular reference to the ecology of larval fish and to species interactions; (3) pollution and diseases of fish and marine mammals; and (4) changes in fisheries in relation to the energy shortage. With the exception of the last one, the issues reflect the research emphasis in NEFC and AEG. As in the past, our future contributions to ICES should be well received.

A meeting of the Working Group on Larval Fish Ecology will be convened by Ken Sherman in Lowestoft in June. This Working Group will complete a cooperative research report that will include: (1) Evaluation of ichthyoplankton survey sampling designs will be dealt with, taking into account mesodistribution and microdistribution of larvae of different species and in different areas. This will be accomplished through statistical analyses of survey results and by studies of small-scale variability at single locations and between sampling locations based on continuous plankton recorder (CPR) data. (2) Review will be made of the results of recent patch studies and of research on the growth and survival of larvae in enclosures.

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### Publications

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

Sherman, K.; Sullivan, L., Busch, D.; Honey, K. Prey of larval herring (Clupea harengus) in relation to zooplankton abundance in Maine coastal waters. NOAA Tech. Rep. NMFS SSRF. (S)

Smith, W. G. What studies of young fish tell about fish populations. Underwat. Natur. 12(4):9-16;1980. (P)

Theroux, R. B.; Wigley, R. L. Distribution and abundance of East Coast bivalve mollusks in the NMFS Woods Hole Collection. NOAA Tech. Rep. NMFS SSRF. (S)

## RESOURCE UTILIZATION DIVISION

### Fisheries Engineering Investigation

The welded rod mesh has been installed on the experimental sea scallop drag, and fishing trials were started aboard our R/V Rorqual this month.

Extra cutting blades were added to the squid ring cutter, and it is now ready to be demonstrated.

### Engineering Assistance to Other Center Programs

Cooperation with AEG on the October trip of the ferry Marine Evangeline and with the Woods Hole Laboratory on the clam dredging system continues.

Reports to the various NEFC laboratories on the findings of the safety inspection team are being completed.

### R/V's Gloria Michelle and Rorqual

NOAA's Fleet Inspector performed an inspection of our R/V Gloria Michelle, and an article on her appeared in the October issue of "Commercial Fisheries News."

The Rorqual was used as a diving support vessel for the Manned Undersea Research and Technology Program in its continuing Ocean Pulse Program studies.

### Facilities and Safety

The solar energy project is still being held up for lack of a qualified architectural and engineering firm. A canning machine and carpentry tools in the shop are being upgraded to meet safety standards. A preliminary design for a chemical storage building has been completed.

## Resource Development and Improvement Investigation

### Blue Crab

An exploratory experiment in pasteurizing blue crab meat in plastic pouches was completed. One pound of meat was pasteurized in 43 min in a water bath at 192°F. The nylon pouches held up very well and will be used in future experiments.

### Nutrition

Gas chromatographic analysis of blue mussels has shown that a plant sterol (still unidentified) is present in the same quantity as cholesterol. All the plant sterols combined are present in greater quantity than cholesterol.

### New Product Development

The grant for the project to determine the economic feasibility of producing and distributing guaranteed "U.S. Grade A" frozen fish was received. Arrangements

are being made with a fish processor to prepare the "U.S. Grade A" fish and a supermarket chain to distribute and sell them. A new employee has been hired for this project and arrangements are being made for inspection of the fish from the boat to the supermarket by US Department of Commerce fish inspectors. An initial meeting is already planned to meet the owners, supermarket managers, and frozen food managers of the markets involved in the project.

Interest in our work on modified-atmosphere storage of fish and extended shelf life of fish using a potassium sorbate dip is shown by the many inquiries on these subjects. Several trips to local fish processing plants were made to explain the techniques and discuss the results.

The proper temperature for holding the taste-test samples for the Gloucester Laboratory panelists has been determined. As time and fresh fish become available, taste panel training will begin.

## Product Quality, Safety, and Standards Investigation

### Product Quality

A study was conducted to determine the effect of scaling and washing on aerobic plate counts and MPM coliform counts of mince prepared from red hake and held for 24 and 48 hr at either 33-35° or 52-54°F. The process was done on fish held 1, 5, or 8 days on ice prior to processing.

The aerobic plate count of the flesh of the iced round fish increased steadily over a 7-day period from an initial number of 35 000/g to a final number of 580 000/g. Scaling and washing the fish reduced the plate count; however, mincing the fish returned the count to about what it was originally prior to scaling. With the stored mince, the plate count of subsurface samples generally remained static over a 48-hr period at either 33-35° or 52-54°F. However, on surface samples, there usually was a large increase in count at either of these two temperatures.

Coliforms on the whole fish were low ( $\sim 100$ /g or less) and did not increase during 7 days of iced storage. Scaling and washing also reduced the coliform count, but mincing increased it, usually beyond the level initially present on the whole fish. This may have been due to the human handling involved in feeding the fish into the mincing machine. The count of the minces made from 1, 5, or 8-day iced fish did not change significantly after a 24 or 48-hr storage period at 33-35°F. At a storage temperature of 52-54°F, the coliform count did increase significantly for surface mince but not for subsurface mince.

These results indicate that the bacterial count of red hake mince is directly related to the bacteria count of the raw material. Red hake mince prepared in accordance with good manufacturing practice and properly refrigerated could be stored up to 24 hr if circumstances arose which prevented the mince from being processed immediately after production.

The ammonia content of dogfish held on ice for periods of 0-21 days was determined by the Seligsson method as modified by the Belgian investigator Vyncke. As with the other chemical indexes (trimethylamine and pH) used to monitor quality changes in these fish, only small increases in the ammonia nitrogen content were detected during the first 15 days of storage. During this period, the values ranged between about 100 and 200 ppm (i.e., 10-20  $\mu\text{g-N/g-fish}$ ). However, after 19 days on ice, values increased to about 500 ppm and after 21 days to more than 800 ppm (i.e., 80  $\mu\text{g-N/g-fish}$ ) of ammonia nitrogen. It was after 19 days of storage that the sensory evaluation scores dropped to the unacceptable level. This range of 100-800 ppm

(i.e., 10-80  $\mu\text{g-N/g-fish}$ ) of ammonia nitrogen found in the dogfish over this period of time makes the ammonia nitrogen test kit provided by Chemetrics, Inc., very convenient to use. Two comparators are included in the kit to cover the ranges of 0.1-1 ppm and 1-10 ppm. If a weighed quantity of flesh is blended with a 100-fold quantity of dilute acid or water, the filtered extract will fall within the 1-10 ppm range. With this kit, an inspector can get an estimate of the ammonia content of the flesh. It will surely indicate whether the fish is in the acceptable or non-acceptable category. For a more precise determination of the ammonia content, a chemical test would have to be employed. It is planned to continue this investigation of dogfish storage characteristics when a supply of these fish becomes available.

The texture of shelf-frozen and plate-frozen red hake fillets stored for 4 mo at 0°F was rated as fair by the sensory panel, and liquid-nitrogen-frozen fillets were rated as good. The shelf-frozen and plate-frozen samples were also judged as moderately fibrous while the liquid-nitrogen-frozen fish was described as only slightly fibrous. The flavor of all three treatments was rated as good. Shear-force measurements of the liquid-nitrogen-frozen samples continued to increase at a linear rate, measuring 235 lb after 4 mo of storage. The force measurements of the plate-frozen and shelf-frozen fillets have declined from a peak of 350 lb and now measure 298 and 281 lb, respectively. The reason for the decline is inexplicable at this time.

A joint collaborative research proposal on the red hake texture problem was written with University of Massachusetts and submitted to the newly formed New England Fisheries Development Foundation for funding.

#### Product Safety

A shipment of fish samples has been received from the University of Southern California for polychlorinated biphenyl (PCB) testing. The samples were collected from the frontside and backside of Catalina, inside Los Angeles Harbor, and at Horseshoe Kelp. Species received from this shipment were sanddab, halfmoon, mackerel, sculpin, white croaker, kelp bass, and surf perch.

Workup of muscles and gonads of striped bass for PCB's is complete for the NMFS Tiburon Laboratory's first shipment to us. Analysis of the extracts by gas-liquid chromatography (GLC) is nearly complete. A preliminary report on the PCB findings is being forwarded to Dr. Jeannette Whipple.

The  $^{63}\text{Ni}$  electron-capture detector is totally down. The amplifier circuiting appears to be the source of the trouble. We still have over 20 extracts that await GLC analysis. The service engineer of Perkin-Elmer will check the electronic portion of the detector.

An ICES report and interpretation of the fifth PCB intercalibration exercise participated in by the Gloucester Laboratory have been received.

#### Product Standardization

After review by the NOAA General Counsel's office and NMFS's Chief of Inspection, a draft update of the "U.S. Standards for Grades of Frozen Fried Fish Portions" is being expanded to include grading by attributes.

An initial draft of a "U.S. Standards for Grades of Fresh and Frozen Fish Steaks" has been prepared and has been typed on the Northeast Regional Office's word processing system.

For the past several months, we have assisted in the selection of species for the US Army's Natick (Massachusetts) Laboratories' nomenclature project. This month, selections from the New England area ceased and a draft report is being prepared. We are still assisting in selection of snappers (Lutjanus spp.) from the Gulf Coast area and rockfish (Sebastes spp.) from the West Coast area.

Skinless widow rockfish fillets stored for 6 mo at 0°F (-18°C) were judged to be unacceptable due to rancidity and toughening of their texture. The storage life of these fillets would probably be improved by removal of the fatty tissue found directly below the skin.

Additional industry comments have been received on the commercial item description (CID) for canned tuna. Fortunately, these comments do not affect the technical contents of the CID.

We reviewed draft US Department of Agriculture guidelines for preparing specifications and a proposal for codifying import requirements of foreign countries.

### Technical Assistance

Information and technical assistance were given in the following areas: availability of NOAA Technical Reports NMFS Circulars; quality control; marine-related employment opportunities; fishing vessel safety placards; surf clams and mahogany quahogs; Food Fish Facts; eel marketing; salt fish processing; shipping lobsters; smoked fish; dipping fish fillets in potassium sorbate solutions; experimental data on the preservative effect of potassium sorbate in fish; cleaned squid for the production of a smoked product; new products from minced fish; storage of fish in modified atmospheres; storing fresh fish under vacuum; packaging material for fishery products; temperature monitors for fishery products; smelt; assembling a worldwide library of references giving Latin and common names of seafoods; a response to an article on seafood in Outer Bank Currents; federal loan programs; uses of vegetable protein in seafood products; proposed draft standards for grades of eight underutilized species; flesh requirements in breaded clams; packaging trout for supermarkets; live holding of lobsters; net construction and operation; fyke nets; identification of species of 16 fillet samples by agarose gel isoelectric focusing; analysis of trimethylamine oxide, trimethylamine, dimethylamine, and formaldehyde on two samples of long-finned squid; isoelectric focusing species identification of cooked and uncooked fishery products; information on isoelectric focusing species identification methods for Dr. Tzong-Shin Lin, a visiting professor at North Carolina State University's Seafood Laboratory; objective textural analysis of fish; mercury levels in seafood; and factors affecting shelf life of fish.

### Academic Affairs

Dr. Robert Leamonson of Southeastern Massachusetts University met with Ron Lundstrom to learn the technique of agarose gel isoelectric focusing.

Dr. Ernest Johnson of the University of Massachusetts in Amherst visited the Gloucester Laboratory concerning his upcoming sabbatical leave period in which he wants to spend time at each of the NMFS's fisheries centers to learn more about fishery biology and technology. Mr. Kent Songer, also of the University of Massachusetts in Amherst, visited concerning mass and energy balances in a production flow chart for making fish cakes.

Dr. Tyre C. Lanier of North Carolina State University in Raleigh visited concerning an upcoming seminar on minced fish.

Dr. Richard Whitaker of the College of Fisheries in St. John's, Newfoundland, visited concerning field and lab methods to measure appearance (color) of fish which have or have not been bled.

George Lye and several faculty members and students of Johnson and Wales College in Providence, Rhode Island, visited to tour the Gloucester Laboratory.

Other academicians with whom we had contact during the month include Dr. Tzong-Shin Lin of North Carolina State University, Dr. David Stanley of the University of Guelph, Dr. Chong Lee of the University of Rhode Island, and Dr. H. O. Hultin of the University of Massachusetts.

## Meetings, Talks, Visitors, and Training

### Meetings and Talks

Judy Krzynowek presented the results of the collaborative study for the isoelectric focusing method of species identification at the 94th Annual Meeting of the AOAC in Washington, DC.

Judy Krzyonwek presented a paper on seafood nutrition at the National Seafood Nutrition Symposium held in Charleston, South Carolina. She was also cochairperson of the Symposium. Kate Wiggin and Betty Tuhkunen also attended. Betty was also an organizer of the Symposium.

Fred King participated in the semiannual meeting of the Research and Development Associates of the Natick Laboratories on 8 and 9 October.

Al Blott attended the October IYABA meeting at the Milford Laboratory. Several members of the Fisheries Engineering Investigation attended an open house at Pearce Equipment, Inc.

Ron Lundstrom presented two papers at the 94th Annual Meeting of the AOAC.

Perry Lane attended a meeting of the Maine Development Foundation in Augusta, and participated in discussions on a proposed quality control program. He also attended the monthly meeting of the New England Fisheries Steering Committee and Fish Expo '80, both in Boston. Dr. Lane represented the Gloucester Laboratory at the annual Massachusetts Institute of Technology Sea Grant luncheon and lecture.

### Visitors

Albert Blackadar and Martha Fletcher of the Blackadar Insurance Agency in Plaistow, New Hampshire, visited for information on fishing vessel safety.

### Training

L. J. Ronsivalli, J. J. Licciardello, J. D. Kaylor, J. J. Ryan, D. F. Gadbois, and B. L. Tinker attended a 2-day training course on merit pay.

Elinor Ravesi attended a 3-day course on women in management.

Betty Tuhkunen attended a 3-day course on an introduction to statistics.

## Publications

- Callan, J. G.; Ryan, J. J. Instrument for determining depth of dehydration for frozen fish. Mar. Fish. Rev. 42(6):32-34. (P)
- Kaylor, J. D.; Slavin, J. W.; Ronsivalli, L. J.; Lane, J. P. A prototype seafood irradiator. Proc. Amer. Meat Sci. Assoc. 1:217-220. (P)
- King, F. J. Fish and seafood products. Parker, S. J. ed. Encyclopedia of science and technology. 5th ed. New York. McGraw-Hill. (In press.) (A)
- King, F. J.; Kapsalis, J. G.; Cardello, A. V.; Brooker, J. R. Consumer and instrumental edibility measures for grouping of fish species. Connell, J. J. ed. Advances in fish science and technology. Farnham, Surrey, England: Fishing News Books, Ltd.;1980:404-409. (P)
- Licciardello, J. J.; Ravesi, E. M.; Allsup, M. G. Extending the shelf life of frozen argentine hake. J. Food Sci. 45:1312-1317. (P)
- Lundstrom, R. C. Fish species identification by isoelectric focusing: sarcoplasmic protein polymorphism in monkfish (Lophius americanus). J. Assoc. Off. Anal. Chem. (A) (This paper represents an Annual Associate Referee Report to the Association of Official Analytical Chemists.)
- Lundstrom, R. C. Rapid fish species identification by agarose gel isoelectric focusing. J. Assoc. Off. Anal. Chem. (A) (This paper represents an Annual Associate Referee Report to the Association of Official Analytical Chemists.)

## DIVISION OF ENVIRONMENTAL ASSESSMENT

### Behavior of Marine Fishes and Invertebrates Investigation

As part of our Investigation's ongoing research on the effects of petroleum hydrocarbons on the behavior of various marine species, a series of lab experiments were initiated during the past month to examine the effects of oiled sediment on the vertical distribution of the hard clam (northern quahog), a valuable commercial species in the Middle Atlantic Bight and one which is highly susceptible to being impacted by petroleum hydrocarbons. The experiments are designed to compare the depth of distribution of clams in clean and oiled sediments with periods of exposure being varied. An important aspect of these experiments, which are still in progress, is that while exposure to oiled sediments may not result in direct mortality, any oil-induced change in distribution may influence their ultimate survival. Such an effect was observed in an earlier study, conducted in cooperation with Battelle, Pacific Northwest Laboratories, in which little neck clams were observed to be more shallowly distributed and thereby more vulnerable to predation by the Dungeness crab when exposed to oiled sediments.

## Coastal Ecosystems Investigation

### Benthic Communities

Clyde MacKenzie and Dave Radosh continued their field experiments on the influence of sediment quality on surf clam setting and burrowing. Trays of contaminated versus clean sediment were retrieved from a dense clam bed off Rockaway, Long Island; these samples are being examined for differential setting. Our routine observations on growth, setting, and predation and other forms of mortality were also made on the Rockaway population. Sediment trays held off Shrewsbury Rocks could not be relocated. Additional polluted sands were collected from the Arthur Kill River for the burrowing studies. Clyde also met again with the new NEFC Task Force for Molluscan Ecology and Resource Enhancement, and prepared data on the benthos of fished and unfished ocean quahog beds for cluster analysis. Dave prepared the extensive Ocean Pulse Program (OP) benthic macrofauna data sets, generated by both inhouse and contract sample processing, for ADP entry. Ann Frame worked with the processing contractor to standardize species identifications for all of the OP samples.

Bob Reid began analysis of the OP sediment and macrofauna data for inclusion in the first OP annual report. He continued gathering what historical data are available to extend the temporal baselines back prior to the beginning of OP sampling. Bob organized a session reviewing the several benthic projects being conducted under OP as part of the OP management meeting held at the University of New Hampshire in late October. Bob and Frank Steimle gave presentations on objectives and progress of the inhouse benthic projects. Bob devised a plan for grab sampling at Deepwater Dumpsite (DWD) 106 to attempt to detect presence on the bottom of flyash from a recent experimental dump. With the renewed interest in coal-fired power plants, large quantities of flyash, a waste product, will be generated; DWD 106 is a candidate disposal area for this flyash.

### Benthic Energetics

This month Jan Ward and Frank Steimle continued to work on several manuscripts including the Block Island Sound benthos paper, the New York Bight apex benthic atlas, the NOAA Environmental Research Laboratories' Marine Ecosystems Analysis Program (MEAP) benthic monograph, a note on the Northeast Monitoring Program (NEMP) for the Coastal Ocean Pollution Assessment Bulletin, and the NEMP annual report. Dot Jeffress began a course in computer software and is 60% through with the biomass determinations for the New York Bight apex. Russ Terranova received and is processing new calorimetric material supplied to us by Don Flescher at the Woods Hole Laboratory. Frank Steimle completed planning and organizing the 28 October-6 November NEMP monitoring cruise on the NOAA R/V G. B. Kelez which will concentrate on primary productivity, anaerobic bacteriology, and mutagenic studies in the Middle Atlantic Bight and attempt to detect the presence of flyash on the bottom from a recent test dump at DWD 106. He also worked with the Sandy Hook Laboratory ADP Unit and the Environmental Chemistry Investigation to have the hydrographic results of the September NEMP cruise made available for use.

Frank, Jan, and Dot participated in a 2-day introductory session (27 and 28 October) in the use of the 1022 computer system at the Sandy Hook Laboratory.

## Environmental Chemistry Investigation

During the October MARMAP survey (Albatross IV Cruise No. 79-10), approximately 1200 samples of seawater for nutrient analyses were taken by Al Matte, Hank Rota, and Tom Kienzle. Ralph Bruno and Jim Nickels measured integral daily phytoplankton organic carbon production at 43 stations during that survey. Chlorophyll concentration was measured in netphytoplankton and nannophytoplankton size fractions at 178 stations occupied during this survey.

Ruth Waldhauer and Ingro Desvousges completed analyses for ammonium-nutrient concentration in seawater collected during the September OP survey (Albatross IV Cruise No. AL 80-09). Approximately 550 salinity samples collected during the latter survey were analyzed and the data were submitted along with other hydrographic data for keypunching. Ruth Waldhauer worked intensively with Ingro Desvousges (a 1-yr-appointment biological aid), training him in the operation of the five-channel Autotechnicon nutrient analyzer. Approximately 1800 nutrient analyses were completed this month. The addition of Mr. Desvousges to the Nutrient Monitoring Subtask will allow us to catch up on the backlog of frozen nutrient samples collected this past year under an intensive sampling program.

Andrew Draxler completed calculations of benthic ammonium flux measured in core samples of seabed collected during the aforementioned OP survey. From this survey, Mr. Draxler produced the first shelfwide (Cape Hatteras to Nova Scotia) map of ammonium nutrient flux at the seabed. The highest rate of ammonium flux from sediment to water was observed at the sewage sludge dumpsite in the New York Bight apex (i.e.,  $494 \mu\text{M-NH}_4/\text{m}^2/\text{yr}$ , an average of four cores). High ammonium flux rates extended down the Hudson Shelf Valley. Rates decreased to  $25 \mu\text{M-NH}_4/\text{m}^2/\text{hr}$  at 60 km offshore. High rates of ammonium flux (i.e., to  $300 \mu\text{M-NH}_4/\text{m}^2/\text{hr}$ ) were observed near the mouth of the Delaware estuary, whereas sediments at the mouth of Chesapeake Bay produced only  $33 \mu\text{M-NH}_4/\text{m}^2/\text{yr}$ . Rates off the coast of New England south of Cape Cod ranged between 39 and  $70 \mu\text{M-NH}_4/\text{m}^2/\text{hr}$ . Flux in the remaining areas ranged between -8 and  $21 \mu\text{M-NH}_4/\text{m}^2/\text{hr}$ , the higher values generally observed inshore between Cape Cod and Delaware.

Vincent Zdanowicz and Tony Ruiz made considerable progress in finishing analyses of heavy metals in seabed sediments collected during two 1979 OP surveys (Delaware II Cruise No. DE 79-11 and R/V Advance Cruise No. 79-01). We initiated analyses of metal concentrations in sediments collected during the intensive NEMP survey of the New York Bight conducted this past August.

We computerized and edited data on rates of phytoplankton production measured during four surveys in late summer/fall 1979 (Albatross IV Cruises No.'s AL 79-06, AL 79-07, AL 79-10, and AL 79-13). Primary productivity data collected by us between August 1978 and December 1979 were used to make the first shelfwide estimates of annual primary organic production. It appears that much of the shelf between Cape Hatteras and Nova Scotia produces more than  $400 \text{ g-C}/\text{m}^2/\text{yr}$ . The coastal area off New Jersey and the center of Georges Bank are areas of exceptionally high annual primary productivity ( $>700 \text{ g-C}/\text{m}^2/\text{yr}$ ).

## Biological Oceanography of Stressed Ecosystems Investigation

The third joint NOAA-NASA-academia Superflux experiment took place during 13-22 October 1980 from the mouth of Chesapeake Bay east to the continental shelf edge and south to Oregon Inlet, North Carolina. The research vessels from NOAA, NASA, VIMS, and Old Dominion University (ODU) participated in the experiment. Two aircraft from NASA and one from VIMS also participated.

The experiment began with a presurvey flight by a VIMS Beaver aircraft on 13 October. The results of the flight plus recent satellite imagery of the area were presented at a meeting that same day by Dr. John Ruzicki (VIMS) and Dr. Fred Vukovich (Research Triangle Institute, North Carolina).

On 14 October, the Kelez departed Norfolk, Virginia, to begin sampling in the Chesapeake Bay mouth. On 15 October, the first of three Ocean Color Scanner (OCS) overflights occurred. For this overflight of the Chesapeake Bay plume, four research vessels were stationed along four transects of the plume. The object was to sample the plume--vertically and horizontally--with ships during the same time interval as the aircraft overflights. This was accomplished successfully.

From 16 to 19 October, the Kelez accomplished its 24-station plume survey. At the northern 14 stations, samples were collected for hydrocarbons (ODU) and heavy metals (VIMS) associated with total suspended matter, as well as bacterial biomass (VIMS), hydrography potential (VIMS), dissolved and particulate organic carbon (ODU), dissolved and particulate nitrogen (ODU), and algal bioassay (ODU). At all 24 plume stations, samples were collected throughout the water column for temperature, salinity, dissolved oxygen, dissolved organic nutrients, chlorophyll-a and phaeophytin, phytoplankton species composition, total suspended matter, and total plankton respiration.

On 20 October, the second OCS overflight occurred, again over the plume area. Only the Kelez was able to participate due to rough sea. In addition, the Kelez ran a 12-hr study in the plume to elucidate the characteristics of the stations at high and low slack waters.

On 21 October, the Kelez was directed offshore to the continental shelf edge to provide sea truth for a Multichannel Ocean Color Scanner (MOCS) overflight. Chlorophyll was sampled every 10 min along the 80-mi transect across the shelf.

On 22 October, NASA flew both OCS and MOCS overflights on different aircraft from the Chesapeake Bay mouth out to the shelf edge. Two research vessels, the VIMS R/V John Smith and the Kelez, participated. The John Smith participated in and near the Chesapeake Bay mouth and the Kelez participated near the shelf edge and in the "green river" offshore to help NASA establish its algorithms.

#### Phytoplankton Growth Potential and Bloom

Experiments were set up to test the effects of 18 metals on growth of the phytoflagellates Olisthodiscus luteus, Katodinium rotundatum, and Prorocentrum micans. The present tests are a continuation of some earlier work and feature environmentally relevant metal concentrations and culture incubation in seawater from the New York Bight apex. Additional work was done on the preparation of two manuscripts.

#### Phytoplankton Community Structure

Phytoplankton populations sampled at stations between Delaware Bay and the Gulf of Maine in October 1978 are described in a paper by Dr. Harold G. Marshall (ODU) and Myra S. Cohn (Sandy Hook Laboratory). This paper is currently undergoing editorial review, but will report that a diatom, Skeletonema costatum, was the dominant phytoplankton throughout the shelf area, reaching maximum concentrations at nearshore stations. The nearshore populations consisted mainly of diatoms, with ultraplankton components also common. Changes in composition and lower concentrations were noted seaward along our transects. A total of 368 phytoplankton species were observed during this cruise; the publication classifies these taxonomically and

lists them by station. Other parameters are noted as well. There is representation from the Bacillariophyceae (185 species), Pyrrophyceae (147), Haptophyceae (14), Cyanophyceae (14), Chrysophyceae (7), Cryptophyceae (5), Chlorophyceae (3), and Euglenophyceae (3).

Highest concentrations (cell counts of one to three million per liter) of the dominant S. costatum were found at stations just beyond the lower New York Bay. The diatom averaged over 73 000 cells/l during this cruise. Small diatoms, including Leptocylindrus danicus, Asterionella glacialis, Chaetoceros simplex, and Rhizosolenia delicatula predominated at the nearshore stations. Ultraplankters, round to irregularly shaped green forms, 5 to 10  $\mu$ m in size, probably Nannochloris atomus, were abundant at the majority of nearshore stations.

A mixed variety of phytoplankton was observed in the Gulf of Maine, with the diatoms S. costatum, Rhizosolenia spp., Chaetoceros spp., and A. glacialis most common. Dominant at several of the more central locations were L. danicus and Nitzschia pungens; these were also found in high concentrations over Georges Bank. The highest cell concentrations, with cell counts over two million per liter, were outside lower New York Bay and directly south and east. Along the transect from New York eastward and over the shelf, there was a marked decrease in the concentrations of the phytoplankton, a shift in diatom composition, and a decrease in the number of species found at the seaward stations. Species diversity was lower within the discrete plume waters in contrast to higher diversity values at more distant stations over the shelf. Seaward composition included a more prominent influence by Chaetoceros spp. and Rhizosolenia spp. In the nearshore collections the small-sized, chain-forming diatoms, often characteristic of rapid growth, were prevalent. Seaward, S. costatum was still a major species, but there was a shift in composition, with other diatoms and various phytoflagellates becoming more characteristic of the phytoplankton assemblage.

Myra Cohn participated in the open house held at the Sandy Hook Laboratory on Friday, 17 October, by presenting several graphic displays and some microscopic views of some phytoplankton (e.g., Olisthodiscus luteus) to about 500 visitors.

## Physiological Effects of Pollutant Stress Investigation

### Physioecology

Work with the limpet Crepidula fornicata continued this month. The few animals that remain are being saved for egg collections for cytogenetic studies. At this time, egg production has ceased, but is expected to restart shortly.

Two spawnings of American oysters and one spawning of surf clams were performed this reporting period. Unfortunately, normal development in all spawnings was 25% or less.

Metals analyses were completed on eastern rock crab samples collected from the New York Bight as part of a cooperative project with the Oxford Laboratory. This effort is being supported by a contract with the National Ocean Survey.

Sea scallops exposed to cadmium for 60 days were analyzed for body burdens of this metal as part of a cooperative project with the Biochemical Effects and Physiological Effects Subtasks.

PCB analyses of eastern rock crab and flounder tissues collected from our Long Island Sound "mini" Pulse stations were continued.

### Physiological Effects

This month we initiated a new series of tests with American lobsters exposed to cadmium. One group will be exposed to cadmium in solution via a dilution system, while the second group will be fed chopped hard clams which have been experimentally contaminated with cadmium.

We also completed monthly sampling of three Long Island OP stations. Blood from windowpane flounders is now being analyzed in the lab. We are also measuring magnesium levels in a large backlog of flounder blood samples collected from earlier cruises.

### Biochemical Effects

Work continued this month on sea scallop adductor muscle samples obtained during Albatross IV Cruise No. AL 80-06, examining them for baseline activities of energy-related enzymes. Scout work for enzyme protocols on the sea scallop kidney was begun and two new ones (i.e., IDH, GluDH) were checked out for eastern rock crab hearts. Rock crab hearts collected during the summer OP cruise, Albatross IV Cruise AL No. 80-07, were analyzed for the two new enzymes as well as for the standard suite (i.e., MDH, LDH, PK, AAT).

### Anaerobic Bacteriology/Metabolism

Lab activities for this reporting period have continued on the API speciation of the many isolates obtained from sediments and animals collected on the OP and New York Bight monitoring cruises of July and August 1980. Some additional 100 isolates have been biochemically identified. Good confirmation on the selectivity of the various selective and differential media being employed in our studies for isolation of bacterial types is being obtained, although some significant differences are being noted. The specific data are being compiled for the forthcoming annual NEMP report.

The Milford Laboratory hosted the annual meeting of the Interagency Botulism Research Coordinating Committee, with John T. Graikoski as Chairman, during 8-10 October. Some 26 participants representing six government agencies, three industry laboratories, two universities, one state laboratory, and one Canadian agency were in attendance. Some 15 papers were presented on the various aspects of botulism in man and animals. Discussion centered around the recent outbreak of botulism-abotulism ecology of the organism, newer methodologies for the isolation of Clostridium, infant botulism, newer methodologies for control of botulism in several food products, and the new Type "G", especially the human aspects as being researched by the Swiss investigators. As in the past, the papers were informative and stimulated some provocative discussions.

### Meetings, Talks, Visitors, Training, and Public Affairs

Miss E. Gould visited the New England Aquarium to talk with Dr. Tom Gilbert and David Wayne about their work with sea scallops exposed to drilling mud, performed with the help of Dr. Patricia Morse of the Northeastern Marine Laboratory in Nahant, Massachusetts. We plan to talk further with Dr. Morse about the possibility of some collaborative work.

Miss M. Dawson attended the annual meeting of the American Society of Physiologists held in Toronto during 12-17 October.

Dr. F. Thurberg hosted the Center IYABA meeting held at the Milford Laboratory on 16 October.

The Physiological Effects of Pollutant Investigation hosted an invertebrate zoology class from the University of Massachusetts at Amherst on 7 and 10 October. This visit included a tour of the lab, a sampling trip on our R/V Shang Wheeler, and field work in local marshes and beaches.

Mr. D. Nelson presented a poster at the 5th ASTM (American Society for Testing and Materials) Symposium on Aquatic Toxicology held in Philadelphia on 7 and 8 October.

On 15 and 16 October, Frank Steimle and Bob Reid attended a NEMP management meeting at the Sandy Hook Laboratory, and during 29-31 October, they attended another NEMP management and program review meeting in Durham, New Hampshire, where they presented progress reports on their inhouse benthic studies. Frank also attended a Georges Bank Biological Task Force (BTF) meeting in Woods Hole on 17 October where Bureau of Land Management comments to the BTF's draft oil drilling monitoring plan were discussed.

On 9 and 10 October, Bob Reid attended the New England Estuarine Research Society's semiannual meeting at Boothbay, Maine.

Clyde MacKenzie presented a paper on "Revitalizing Oyster Beds," to the Interstate Seafood Seminar in Ocean City, Maryland, on 23 October.

Ruth Waldhauer, Chris Evans, and Andrew Draxler attended a 2-day course on the use of the ADP timeshare system and SOS text editing.

Jay O'Reilly attended the Marine Ecosystems Division meeting held at the Narragansett Laboratory on 28 and 29 October, and presented results of chlorophyll and primary productivity baseline studies conducted over the past year.

During the period of 30 September through 2 October, Dr. John Pearce participated in the United Nations' Inter-Governmental Maritime Consultative Organization's Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) meeting concerned with revising the criteria for ocean dumping. The meeting brought together nine persons from North America, Europe, and Africa to review GESAMP "Report No. 3" which was produced in 1975. The objective of the workshop was to update this report which is regularly used by the London and Paris Conventions and other international organizations interested in problems of marine pollution. Assignments were made to the members of the committee in terms of specific areas where the present "Report No. 3" should be revised and updated.

During the period of 5-10 October, Dr. Pearce participated in the 68th Statutory Meeting of ICES which was held in Copenhagen. The principal theme of the Marine Environmental Quality Committee was, once again, "effects of pollution on estuarine habitats." Dr. Pearce presented a paper on this subject which attempted to review the current status of knowledge of the principal estuaries along the eastern seaboard. This paper updates the seven individual papers on various estuarine systems that were presented at the 1979 statutory meetings. In addition, Dr. Pearce presented two papers concerned with ocean disposal of dredging spoils for authors who were unable to attend the meetings. One paper had to do with the use of "capping" procedures to isolate contaminated dredge spoils from the overlying waters and the second was concerned with evaluating toxic substances in draft materials. European contributions this year largely emphasized the fluxes of contaminants from various estuarine systems. A paper from Canada was also concerned with the same subject. It was decided that the series of estuarine papers for 1979 and the papers presented this year will be published by ICES as a Cooperative Research Report with an introduction and summary to be developed by Dr. Pearce. The main theme for the 1981 ICES Marine Environmental Quality Committee meeting will be the biological effects of contaminants and their use in long-term monitoring programs. During the Marine Environmental Quality Committee meetings, Dr. Pearce was elected Chairman of the Committee for the next three meetings.

On 15 and 16 October, Dr. Pearce and other personnel from the Division of Environmental Assessment participated in a NEMP management meeting which was the basis for the development of the annual status of the fisheries report.

On 17 October, Dr. Pearce gave a talk at the annual open house at Sandy Hook Laboratory. The talk was concerned with the current status of the estuarine coastal habitat and activities being conducted by NMFS to provide information useful in managing the fishery habitat.

On 22 and 23 October, Dr. Pearce participated in the Center Board of Directors meeting at the Woods Hole Laboratory. He presented a brief review of the current status of the Division, as well as OP and NEMP.

On 24 October, Dr. Pearce gave a talk to the Garden Club of New Jersey. This group is currently interested in environmental matters, and particularly in the "Year of the Coast" program. Dr. Pearce was asked to work further with the New Jersey and National Association of Garden Clubs in terms of continuing the "Year of the Coast" in 1981, on a state and national basis.

During 29-31 October, Dr. Pearce attended the NEMP management meeting held at the Alumni Center of the University of New Hampshire. Contract and inhouse benthic programs being supported by OP funds were reviewed, as were the NEMP statistics and ADP programs. In addition, the NEMP management staff considered current problems of vessel time, publication of the annual report, and assignment of NOAA Corps officers to NEMP.

### Publications

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Steimle, F. W., Jr. NEMP-NOAA's pilot program monitoring the health of the Northeast coastal marine environment. Coast. Ocean Poll. Assess. Bull.

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## AQUACULTURE DIVISION

### Aquacultural Genetics Investigation

#### Selection and Hybridization of Commercial Oysters

A comparison growth rate study between 3-yr-old American oysters introduced into Long Island Sound in two lantern nets, and 3-yr-old oysters kept in the Milford Laboratory raceway system was begun on 1 July 1980 by E. Losee. Four different stocking densities are being studied: 82 oysters/m<sup>2</sup>, 102/m<sup>2</sup>, 122/m<sup>2</sup>, and 143/m<sup>2</sup>. Two-and-a-half months later, the oysters kept in Long Island Sound were significantly ( $P < .001$ ) larger than those kept in the laboratory raceway system. There were no density effects, indicating that maximum stocking density is greater than 143 oysters/m<sup>2</sup> for the size of oyster we are using. Mortality in the experimental oyster groups ranged from 13 to 31%. The mortalities appeared to be random and not associated with any particular experimental factor (e.g., stocking density, grow-out location, vertical placement in water column).

A. Longwell was instrumental in having the Mariculture Committee of ICES propose a working group in genetics, a proposal now formally accepted by the organization. The first meeting of the Genetics Working Group will take place at the ICES headquarters in Copenhagen in May 1981.

#### Mutagenic Effects of Marine Contaminants on Fish

In a field survey begun only about 3 mo ago, the circulating red blood cells of a small but significant percent of Atlantic cod were found to contain micronuclei, most simply interpretable as the result of chromosome mutation or chromosome misdivision. Samples of red hake now being examined reveal a similar phenomenon, which may be related to sample area. Flounders are currently being sampled in Long Island Sound in a coordinated study with the Division of Environmental Assessment's Physiological Effects of Pollutant Stress Investigation, and other fish are being sampled on the ongoing OP cruise.

Related experiments set up on Fundulus sp. employing an alkaloid with strong mitotic disruptive properties and ionizing irradiation are showing, nor surprisingly, that, like mammals, the blood cells of fish respond to chromosome or mitotic-active agents by producing blood cells with micronuclei. The micronuclei are the result of either chromosome mutation or misdivision. While it will take several months to complete these experiments, the use of a modified micronuclear test on fish in the field appears justified as a means of monitoring sublethal effects of certain classes of marine pollutants. Application of this test to the erythropoietic tissue of the head kidney of fish in lab bioassays should also be effective and reasonably rapid.

#### Aspects of Nutritional Requirements of Mollusks Investigation

We have completed another experiment in our newly designed oyster chamber. Growth of American oysters in this chamber with a flowing seawater supply was

considerably more rapid than for those held in basins with a static seawater supply. In 13 wk, oysters in the chamber were at least twice as heavy as those in the basin. The growth response to various feeding regimes was as follows, in decreasing order of growth stimulation: Tetraselmis maculata, Thalassiosira nana, Dunaliella euchlora, Phaeodactylum tricorutum, no algae, and Chlorella autotrophica. Photographs and a manuscript are being prepared to describe this work in a formal report. Oyster culture chambers and algal cultures are now being prepared for another experiment.

Harvests from the mass algal culture apparatus yielded 1472 liters of larval food and 1304 liters of juvenile food. These food cultures were distributed to the various Investigations as follows: Spawning and Rearing of Mollusks--1274 liters, Aquacultural Genetics--1081 liters, Physiological Effects of Pollutant Stress--135 liters, and Diseases of Larval Mollusks--15 liters.

### Spawning and Rearing of Mollusks Investigation

The severe late October storm that struck our area apparently had little effect on the bay scallops in lantern nets in Long Island Sound. Some damage to wire cages did occur and the extent of the damage will be assessed next month. Much of the month was spent obtaining and analyzing samples of scallops from the density, handling and site experiments. The scallops in these experiments exhibited very rapid growth during this period, typical of post-spawning scallops.

An experimental device has been designed and constructed to maintain filter-feeding surf clams in a constant algal cell concentration and record their filtration rate. Filtration rates of differently sized clams are being measured at 20°C with an Isochrysis-Monochrysis mixture of  $2 \times 10^5$  cells/ml. Clams of an average length of 60 mm cleared seawater at about 1500 ml/min in an 18-hr experiment. Experiments are planned to measure filtration activity at different cell concentrations, temperatures, and flow rates. Future work may investigate oxygen consumption and the effect of varying algal species. This system offers several advantages over standing water systems and can be operated for long-term experiments.

Surf clams were recovered from the tank farm system to terminate the growing season. Most growth occurred during June and July. Growth during August, September, and October was slight. These results relate to the average levels of in-vivo fluorescence recorded over these months. Possibly, the lack of rain this summer precluded nutrients entering Long Island Sound in the form of runoff, thus limiting algal productivity.

Patricia Boyd was added to the staff this month as a 1-yr appointment employee.

### Meetings, Visitors, Training, and Public Affairs

A. Longwell participated in the interagency (Committee on Ocean Pollution Research, Development and Monitoring) program review on petroleum hydrocarbons in Boulder, Colorado, just before attending the 68th Statutory Meeting of ICES during 6-10 October in Copenhagen. Slides of photomicrographs have been requested by the Massachusetts League of Women Voters for a show on oil and the biological resources of the sea.

D. Perry and J. Hughes spent a week assisting Dr. Arthur Merrill in the preparation and scanning electron microscopy of the opercular and mantle parts of deepwater snails as part of his Center-supported research at the Harvard University Museum of Comparative Zoology.

J. Choromanski and E. Losee attended a 1-day training session on 27 October on "Introduction to ADP" at the Sandy Hook Laboratory.

Visitors to the Milford Laboratory included two zoology classes from the University of Massachusetts, and a group of professional microbiologists. Dr. Thomas Neudecker of Institut fuer Kuesten und Binnenfischerei (Federal Republic of Germany) and in charge of oyster culture there, spent a day discussing oyster studies at the Milford Laboratory. On 27 October, a delegation from The Peoples Republic of China concerned with aquaculture toured the facility and was given a considerable amount of printed material. Earlier in the month the staff of the Aquacultural Genetics Investigation attended a seminar at the Yale University Biology Department on "Genetics in China," presented by the Vice-President of Fudan University in China.

## PATHOBIOLOGY DIVISION

### Comparative Shellfish Pathology

Studies to characterize the oyster papovavirus are continuing with the cooperation of Dr. K. Shah of the Johns Hopkins University School of Public Health and Hygiene. Twenty-five oysters were sacrificed using fresh tissue cryostat methods to diagnose for the virus. One oyster was found to be infected with virus and tissues were frozen for virologic studies at the Johns Hopkins University School of Public Health in Baltimore. Histologic examination of an additional sample of oysters from Maine revealed a 25% infection level with papovavirus. This recently examined material initially showed about a 10% infection level which apparently dropped to 4% after holding at cold temperature for 2 wk. This may indicate that the infections become undetectable or are "lost" over a period of time when animals are kept in cold water.

Samples of blue mussels were obtained from Maine and New Jersey for our coastal OP studies. Collections from Massachusetts are in progress and should be received before the end of the next reporting period.

Three samples of soft shell clams from the Milford Laboratory were processed and examined histologically for the probable cause of observed mortalities: one group consisted of controls from a tank not exhibiting clam mortalities, another group of dead clams was from the affected tank, and the third group consisted of "live" clams from the same affected tank. The control group showed some signs of "stress," e.g., edema, metaplasia of diverticula, and a few bacterial colonies peripheral to the tissues. The live clams from the affected tank showed heavy edema, with some necrosis of tissues which was associated with bacteria. The dead clams were very necrotic, showing heavy edema and massive bacterial populations. No protozoan parasites were observed in any of the clams examined. The clams from the affected tank appeared to be stressed severely prior to the invasion of bacteria into the necrotic tissues.

The Histology Unit received over 700 individual specimens of fish and shellfish for processing. Over 250 sections were prepared for resident pathologists and cooperative investigators to examine.

In other OP activities, Linda Dorigatti has completed identification of amphipods collected on the July cruise. Ampelisca agassizi was the most abundant and widely distributed species collected. It was taken from 9 of the 13 stations yielding benthic amphipods, and was abundant (60-300 specimens per station) at Stations 1, 5, 23, 37, and 57. Samples of A. agassizi and of Byblis serrata, Unciola irrorata, and Leptocheirus pinguis, which are other species that may prove to be good monitor species, are currently being processed for histological examination. Amphipods of the September cruise, also participated in by Ms. Dorigatti, are not yet identified.

Gross examination suggests that A. agassizi is present in good numbers for at least some of the 19 stations where amphipods were collected.

A picornalike virus (CBV) is apparently present in blue crabs taken this summer from the Tred Avon River. This virus was first seen in young crabs dredged from Tangier Sound in 1976, and tentatively identified in a few sick crabs taken from a Tilghman Island shedding tank in 1977. While the present crabs have tissue lesions consistent with CBV infection, identification must be confirmed by electron microscopic examination. The reolike virus (RLV), presumably in company with the rhabdovirus (RhVa), and a baculovirus (Baculo-B) that attacks hemocytes, were also present in various Tred Avon crabs collected during summer 1980.

### Microbial Ecology and Parasitology Investigation

Studies on the occurrence and distribution of pathogenic and nonpathogenic species of Acanthamoeba in the Philadelphia-Camden sewage disposal site have been completed and all data have been analyzed for publication. The investigation covers eight separate cruises conducted by personnel from NMFS, the Food and Drug Administration (FDA), and Environmental Protection Agency (EPA), and the results are based on bacteriological analyses of 440 sediment samples of which 229 were cultured for amoebae. The sediments were collected from 315 different stations located from approximately 1 mi off of the Maryland-Delaware coast seaward for approximately 45 mi. Bacteriological data showed that fecal coliforms were present only at stations located 30 or more mi from shore between approximately the 20 and 30-fathom lines. The dumpsite which is located between these two depth contours was positive for fecal coliforms for a distance from its center to approximately 20-22 mi to the northeast and southwest, and 5-6 mi to the east and west.

Bacteriological analyses by collaborators from FDA and EPA were extremely important for evaluating data on the distribution of Acanthamoeba. The two sets of data showed that of the 28 stations which yielded amoebae, 26 were in the tract that harbored fecal coliforms; none of the stations located to the north or south of the dumpsite were suitable as controls since the bacteria were present for 20 mi or more in either direction. Among 26 control stations located outside of the area impacted by fecal coliforms, only 2 harbored Acanthamoeba. One station was located at a site previously used for sewage disposal and the other near the 20-fathom line several miles west of the impacted area. Fifty percent of the stations positive for fecal coliforms also were present for Acanthamoeba by methods employed during study. The high correlation between amoebae and bacteria is remarkable since each amoeba culture was initiated with a single bacteriological loopful of sediment (less than 0.5 g).

The influence of bacteria on the distribution and species diversity of Acanthamoeba was revealed further by the fact that among seven stations which yielded three or more species of Acanthamoeba, all seven were positive for the total coliform group and four were positive for fecal coliforms. All of the species of Acanthamoeba isolated from the dumpsite form resistant cysts which survive in the dried or frozen state, and all of them may be maintained in culture on agar medium to which bacteria have been added as food. Three species (culbertsoni, hatchetti, and rhyodes) have been reported to kill experimentally infected mice; four species (culbertsoni, rhyodes, castellanii, and polyphaga) have been identified in tissues of humans who have died of amoebic disease; and one species (triangularis) originally isolated from stool samples in France has not yet been implicated in disease. Our multi-authored publication now in preparation will summarize the foregoing results and propose that Acanthamoeba is an excellent indicator for studying the health of the seabottom in coastal and offshore environments. The amoebae are especially useful

for measuring the persistence of sewage-associated bacteria long after they are no longer viable since bacteria, living or dead, are suitable food organisms. Furthermore, when suitable bacterial food is no longer available, the resistant cysts may be present for extended periods of time.

### Fish Pathology Investigation

Dr. Robert Murchelano spent the entire month of October either on travel or the conduct of administrative duties in the absence of the Laboratory/Division Director.

Mr. Newman attended the ICES Special Meeting on Diseases of Commercially Important Fish and Shellfish in Copenhagen, Denmark, during 1-3 October. A paper titled "IPN Virus Disease of Clupeid Fishes" was presented which described the pathology and preliminary epizootiological studies of this disease in Atlantic menhaden and American shad. In Copenhagen, the problems of nematode parasites of American eels exported to Denmark were discussed with Professor N. O. Christensen of the Royal Veterinary and Agricultural University. A consensus on the genus of the worm in question was reached and future studies were outlined which are needed to determine the specific identification and the temporal and geographic extent of the problem.

An Atlantic menhaden cell culture obtained from the University of Maryland has been passaged in preparation for a survey of IPN virus in anadromous clupeids from the Chesapeake Bay and in moribund menhaden from New England. The subcultures are growing well and isolation attempts will begin in early November and will continue through January. The fish being examined for the presence of virus are alewife, blueback herring, hickory shad, and American shad.

Studies continued this month on the olfactory organs of haddock larvae that had been exposed to 500 ppb of  $\text{Cu}^{++}$  for 18 hr. As indicated in last month's narrative report, lesions were observed in the olfactory organs of these fish upon preliminary examination with light microscopy. Electron microscopic evaluation of the most severely affected tissues demonstrated almost complete cellular disorganization with a prominent loss of mitochondrial integrity and severe disruption of the RER system (nissl bodies). The cytoplasm of these cells was filled with vacuoles and their nuclei were pyknotic. When observed along the apical border of the epithelium, their luminal cell membranes were extensively blebbed and in some instances ruptured. In specimens demonstrating a lesser degree of toxicant-induced cytopathology, the most frequently observed changes were blebbing of the apical plasmalemma and enlargement or swelling of the endoplasmic reticulum cisternae. This information is in good agreement with that of others regarding the sensitivity of the olfactory organ in fish to the presence of copper.

Two trawl collections were made with the NEFC's R/V Kyma in Raritan Bay to collect winter flounder in order to develop field protocols for the determination of microhematocrit and hemoglobin levels in fish which have the "bent fin" skeletal anomaly. It appears that hematocrit levels can be determined easily on board the vessel using one-half drop of blood. Also, hemoglobin samples can be taken conveniently by employing capillary pipettes and 5-cm<sup>3</sup> reservoirs filled with cyanide solutions: the "Un-Opette" clinical chemistry system developed by Becton-Dickinson which requires only 20  $\mu\text{l}$  of whole blood (about one-half drop). A B&L Spectronic 20 spectrophotometer was obtained on loan from the New Jersey Marine Sciences Consortium and will be used to determine hemoglobin levels in the lab.

### Diseases of Larval Mollusks Investigation

In paralytic shellfish poison (PSP) studies, 40 specimens of surf clams containing about 750  $\mu\text{g}$  of PSP per 100 g of meats were received from the Maine Department of

Marine Resources on 30 September. These were divided into two sets; one portion received ozonized seawater while the other received untreated seawater (control) for 7 days. About 100 g of clams were sacrificed from each group every 24 hr until no animals remained. These were acid-digested and extracted for PSP. Mouse bioassays on the extracted materials are not yet completed; data on this experiment will be reported next month.

The Aquacultural Genetics Investigation provided oyster (Crassostrea gigas) eggs for a larval challenge using CA-10, a shellfish pathogen isolated from a hatchery in California. The results of this experiment strongly agree with those of an earlier experiment showing that C. gigas is resistant to CA-10. This information has been made available to the hatchery manager; his field experience also agrees with our experimental evidence.

A pathogenic Vibrio sp. is being grown in bulk quantities to determine the optimal incubation period for maximum toxin production. After each incubation period the cells are removed and the supernatant fluid is concentrated. Protein and carbohydrate determinations are being made on the concentrated fluid of each culture.

In-vitro cell culture studies using oyster hemocytes sometimes require washing of cells during the centrifugation sequence of preparation. Cells were pelleted at 2°C under varying combinations of centrifuge forces and times and then examined for ability to attach to plastic cell culture plates. Initial experiments indicated that cells may be lost through clumping at low centrifuge forces and through stress if cells are pelleted for prolonged times at higher centrifuge forces. Successful recovery of hemocytes appeared to require a careful combination of short centrifuge times with moderate centrifuge forces.

#### Academic Affairs

Rev. Elder, S. J., of the Fairfield University Chemistry Department picked up additional PSP extracts at the Milford Laboratory for cooperative work on chemical separation, purification, and identification.

#### Meetings, Talks, Visitors, and Public Affairs

Dr. Rosenfield and Mr. Kern attended the Exotic Species Ad Hoc Gulf States Committee meeting at Orlando, Florida, during 14-16 October. Dr. Rosenfield met with The Peoples Republic of China Aquaculture Delegation and attended meetings in Washington, DC, during 17-20 October. Dr. Rosenfield attended the Center Board of Directors meeting at Woods Hole during 21-24 October. He also escorted The Peoples Republic of China Aquaculture Delegation on tour of the NEFC and fishing industry facilities at Sandy Hook, New Jersey; New York City; Milford, Connecticut; and Woods Hole and Boston, Massachusetts, during 24-31 October.

On 29 September, Dr. Murchelano (with Dr. Sindermann) attended a meeting in Paris, France, to discuss US/France cooperative research on fish diseases; the meeting was chaired by Dr. Pierre Nounou of the French National Center for the Exploitation of the Ocean. Dr. Murchelano attended the ICES Special Meeting on Diseases of Commercially Important Marine Fish and Shellfish during 1-3 October at the Royal Veterinary and Agricultural University in Copenhagen, Denmark. He presented a paper on "An International Registry of Marine Pathology." After the ICES meeting, he visited colleagues at the Ministry of Agriculture, Fisheries, and Food's Fish Diseases Laboratory in Weymouth, England. On 14 October, Dr. Murchelano held a meeting of the Center Factor IV Committee at the Milford Laboratory to evaluate credentials of candidates to be presented for promotion at the Center Promotion Review Board. On

22 October, Dr. Murchelano hosted a visit to the Oxford Laboratory by aquaculture scientists from The Peoples Republic of China. On 24 October, Dr. Murchelano attended meetings of the Center Board of Directors and Promotion Review Board at the Woods Hole Laboratory. And, during 28-30 October, Dr. Murchelano was a panelist on the site team for review of the Sea Grant Program of the University of Maryland; the review was held at College Park, Maryland.

Dr. Johnson, Dr. Sawyer, and Mr. Newman attended the ICES Special Meeting on Diseases of Commercially Important Marine Fish and Shellfish at the Royal Veterinary and Agricultural University in Copenhagen, Denmark, during 1-3 October. Dr. Johnson presented a paper on "Diagnosis of Crustacean Diseases." Dr. Sawyer presented two papers--"Black Gill Conditions in the Rock Crab, Cancer irroratus, as Indicators of Ocean Dumping in Atlantic Coastal Waters of the United States," and "Identification of Parasitic Nematode Larvae in the Calico Scallop, Argopecten gibbus (Linn.), and the Surf Clam, Spisula solidissima." Mr. Newman also presented a paper on "IPN Virus Disease of Clupeid Fishes."

Ms. Smith attended the Fisher Scientific Symposium 80 held in Wilmington, Delaware, on 1 and 2 October.

Dr. Blogoslawski attended the Interagency Conference on Botulism at the Milford Laboratory during 8-10 October; he also attended the second meeting of the new NEFC task force on molluscan ecology at the Milford Laboratory on 14 October.

Ms. Slater visited the Milford Laboratory on 16 and 17 October to work on the scanning electron microscope.

Dr. Robohm from the Milford Laboratory attended a seminar titled "Advances in Immunopathology" sponsored by the Scripps Clinic and Research Foundation at San Diego, California, during 24-26 October.

Ms. Hines attended a portion of the Federal Interagency Field Librarian's Workshop in Washington, DC, on 28 and 29 October.

Ms. MacLean participated in the IYABA meeting held at the Milford Laboratory on 16 and 17 October. She also attended the Center EEO Committee meeting at the Narragansett Laboratory, and conferred with John LeBaron at the Sandy Hook Laboratory on operation of a computer terminal, during 29-31 October.

Visitors to the Oxford Laboratory during the month included Dr. Shigeru Arai of the National Research Institute of Aquaculture in Mei-ken, Japan; Dr. Charles Graham of Loyola College in Baltimore, Maryland; Mr. and Mrs. Robert Brink of Edina, Minnesota; Mr. and Mrs. Herman Altschuler of Silver Spring, Maryland; Ms. Anne Stinson of the "Star-Democrat" newspaper in Easton, Maryland; and members of The Peoples Republic of China Aquaculture Delegation--Liu Tianjing (Deputy Director of Yellow Sea Fisheries Research Institute), Yan Conghai (Researcher at Yellow Sea Fisheries Research Institute), Zhang Liyan (Researcher at Yellow Sea Fisheries Research Institute), and Liu Rensheng (Interpreter with the State Bureau of Aquatic Sciences).

#### Publications

Blogoslawski, W. J. Use of chlorination in the molluscan shellfish industry.

Jolley, R. L.; Brungs, W. A.; Cumming, R. B.; Jacobs, V. A. eds. Proc. Third Conf. Water Chlorin.: Environ. Impact Health Effects. Ann Arbor, Mich.: Ann Arbor Sci. Publ., Inc.;1980:487-500. (P)

Johnson, P. T. Histology of the blue crab, Callinectes sapidus (Decapoda: Portunidae). A model for the Decapoda. New York: Praeger Publ.;1980. (P)

Johnson, P. T.; Stewart, J. E.; Arie, B. Histopathology of gaffkemia in the lobster, Homarus americanus, and a comparison with histological reactions to a gram-negative species, Pseudomonas perolens. J. Invertebr. Pathol. (A)

Stephens, E. B.; Newman, M. W.; Zachary, A. L.; Hetrick, F. M. A viral aetiology for the annual spring epizootics of Atlantic menhaden Brevoortia tyrannus (Latrobe) in Chesapeake Bay. J. Fish. Dis. 3: 387-398;1980. (P)

## NATIONAL SYSTEMATICS LABORATORY

### Benthic Fishes Investigation

Work continued on the fish families Argentinidae, Moridae, and Gadidae for "FAO Species Identification Sheets for Fishery Purposes in the Eastern Central Atlantic (Fishing Area 34)."

### Pelagic Fishes Investigation

Research continued on the systematics of Spanish mackerels. Writing began on a paper (with R. F. Cressey of the Smithsonian Institution) on host specificity of scombrid copepods. First drafts of manuscripts on two Indo-Pacific halfbeaks were completed.

### Penaeoid Shrimp Investigation

Work continued on a revision of American Pacific rock shrimps, Sicyonia, and on the description of a new species of Solenocera from the Indo-West Pacific.

### Crustacea Investigation

Progress was made on the preparation of a monograph of the decapod crustaceans of the temperate US East Coast.

### Academic Affairs

Dr. Austin Williams presented a seminar on new crab families from the West Indies and the Galapagos Rift at the George Washington University.

### Visitors

Dr. E. M. del Solar of the Instituto del Marin Callao, Peru, visited Dr. Canet to discuss shrimp research. Dr. Gilbert Rowe of the Brookhaven National Laboratory visited Dr. Cohen to discuss deepsea fishes. Mr. David Kulka of Fisheries and Oceans Canada in St. John's Newfoundland, was assisted in studying blue hake. Mr. K. Sulak and J. Carter of VIMS were assisted in their research. G. P. Hoskin of the FDA Microbiology Division was assisted by Dr. Williams in learning about tanner and king crabs.

## Publications

Cohen, D. M. Families Argentinidae and Moridae. FAO Species Identification Sheets for Fishery Purposes in the Eastern Central Atlantic. (S)

Williams, A. B. Western Atlantic species of the caridean shrimp genus Ogyrides. J. Crustac. Biol. (A)

Yabe, M.; Cohen, D. M.; Wakabayashi, K.; Iwamoto, T. Fishes new to the eastern Bering Sea. Fish. Bull. (US). (A)

## ATLANTIC ENVIRONMENTAL GROUP

### Ocean Monitoring and Climatology Task

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

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AEG/October 1, 1980

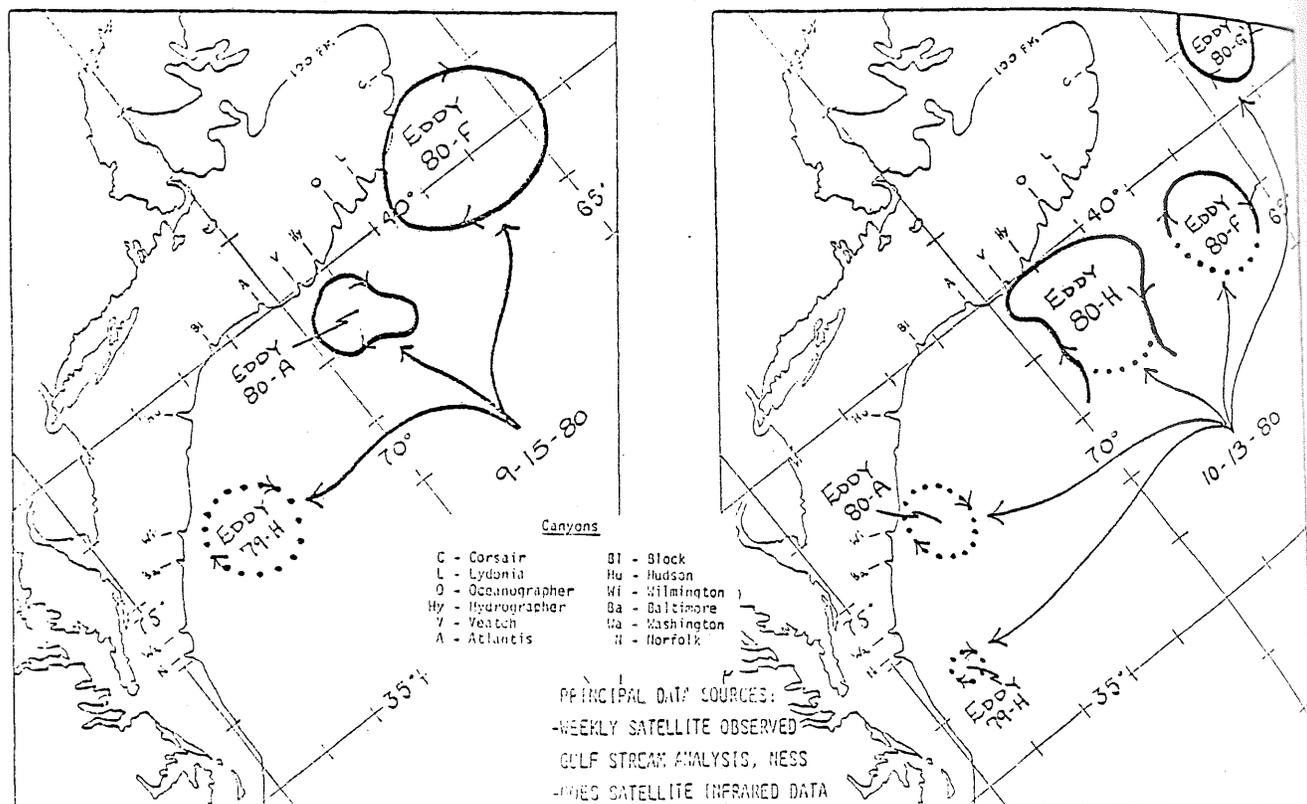
### GULF STREAM EDDY LOCATIONS

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

Eddy 79-H did not appear in satellite imagery, but did continue to entrain shelf water as it moved about 215 km (115 nm) to the southwest. The eddy is now centered near 36.4°N, 74.0°W, southeast of Norfolk Canyon. Eddy 80-A apparently traveled about 350 km (188 nm) west and southwest, to a center position at 38.2°N, 72.8°W, east of Baltimore Canyon. Eddy 80-F moved south and offshore about 130 km (70 nm) and is centered at 39.0°N, 66.2°W, south of Corsair Canyon. Eddy 80-G advanced into the area of coverage during early October, after being formed at 40.3°N, 61.7°W in early August. The center position of the eddy is at 40.8°N, 64.0°W, east of Corsair Canyon and far offshore of the 100-fm line. Eddy 80H formed in mid-October from a large Gulf Stream meander and is now centered at 39.4°N, 68.6°W, southwest of Oceanographer Canyon.

During the next 30 days Eddy 79-H will be resorbed by the Gulf Stream; Eddy 80-A may move south to a location east of Norfolk Canyon; Eddy 80-F may travel west to a center position south of Lydonia Canyon; and Eddy 80-G may move west and southwest to a center location south of Corsair Canyon. Eddy 80-H will completely separate from the Gulf Stream and may travel west along the 100-fm line to a center position south of Veatch Canyon. Fishermen can expect strong clockwise currents in the offshore area between Atlantis and Oceanographer Canyons.

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



The cooperative Ship of Opportunity Program obtained six XBT transects and three CPR transects in October: two XBT and one CPR transect in the Gulf of Maine, one XBT transect off Southern New England, one XBT and one CPR transect across the shelf and slope off New York, one XBT and one CPR transect across the shelf off Norfolk, and one XBT transect across the Gulf of Mexico.

#### Ocean Dumping Task

Satellite-tracked ocean drifting buoys 3020 and 3021, which were deployed at DWD 106 on 8 August 1980, moved east-northeast since the previous report, probably to entrainment by the Gulf Stream. Then the buoys crossed the Gulf Stream and are now located south of the Stream moving in a southwesterly direction. Buoy 3022, deployed at the Puerto Rico dumpsite, is presently located at 20°19.9'N, 65°36.0'W, and moving slowly northwest.

Meetings, Talks, Visitors, Training, and Public Affairs

Reed Armstrong attended EXPOCHEM '80, a special symposium on "Environmental Effects of Offshore Oil Production" which was held at Astrohall in Houston, Texas, from 6 to 9 October. He presented an invited paper on "Transport and Dispersion of Potential Contaminants at the Buccaneer Oil Field."

During 8-10 October, Mert Ingham traveled to Washington, DC, for a conference with NOAA managers on the Coastal Ocean Pollution Assessment Bulletin and then went on to Norfolk, Virginia, to review the status of contracted studies at VIMS in Gloucester Pt., Virginia.

Raphael Dipouma, the Minister of Fisheries for Gabon (an African country), visited AEG on 9 October and discussed the UNIFAX II recorder and its application to fishery oceanography with Woody Chamberlin.

Woody Chamberlin went to the Milford Laboratory on 14 October to attend a Center Factor IV Committee meeting.

A NEMP management team meeting, held at the Sandy Hook Laboratory, was attended by Mert Ingham on 15 and 16 October.

Reed Armstrong attended an IYABA meeting on 16 October which was held at the Milford Laboratory.

On 17 October, Woody Chamberlin went to the Sandy Hook Laboratory to present a eulogy at the Lionel Walford Lecture Series.

The Mid-Atlantic Bight Physical Oceanography and Meteorology Workshop was held at Annapolis, Maryland, during 19-21 October and was attended by Woody Chamberlin, Steve Cook, and Dan Smith. Dan presented a paper at the "Workshop on Mid-Atlantic Bight Plankton, Bathythermograph and Sea Surface Salinity Monitoring 1974-1980."

Mert Ingham attended the Merit Pay Appraisal Training Course which was given at the Woods Hole Laboratory on 20 and 21 October. Following the course, he attended the Center Board of Directors meeting from 22 to 24 October also held at the Woods Hole Laboratory.

From 21 to 23 October, Reed Armstrong attended the Merit Pay Appraisal Training Course held at Rockport, Massachusetts.

Woody Chamberlin attended a session of the Center Board of Directors meeting on 22 October.

On 24 October, Woody Chamberlin visited Boston, Massachusetts, to attend FISH EXPO '80 and present a paper on "Satellite Information on Gulf Stream Eddies Can Aid Fishermen To Conserve Fuel."

Steve Cook attended the Port Meteorological Officers' Conference and Workshop in Washington, DC, on 23 October and presented a paper on "Overview of the NMFS/MARAD Ships of Opportunity Ocean Monitoring Program."

On 27 October, Lianne Armstrong visited Cambridge, Massachusetts, to attend Crimson's Annual Trade Show and Seminars.

From 29 to 31 October, Mert Ingham traveled to the University of New Hampshire in Durham, New Hampshire, to attend a NEMP management team meeting. Jim Bisagni also participated in the meeting on 30 and 31 October.

AEG was visited on 29 October by four scientists from The Peoples Republic of China who discussed the new UNIFAX II recorder and the applications of remote sensing to fishery oceanography, as well as AEG's contribution to this discipline, with Woody Chamberlin and Lee Crist.

## Publications

- Armstrong, R. S. Transport and dispersion of potential contaminants at the Buccaneer Oil Field. EXPOCHEM '80;1980 October; Houston, Tex. (A)
- Crist, R. W.; Chamberlin, J. L. Bottom temperatures on the continental shelf and slope south of New England during 1979. Ann. Biol. 36. (A)
- Fitzgerald, J. L.; Chamberlin, J. L. Anticyclonic warm core Gulf Stream eddies off the northeastern United States during 1979. Ann. Biol. 36. (A)
- Hilland, J. E. Variation in the shelf water front position in 1979 from Georges Bank to Cape Romain. Ann. Biol. 36. (A)
- Hughes, M. M.; Cook, S. K. Water column thermal structure across the shelf and slope southeast of Sandy Hook, New Jersey in 1979. Ann. Biol. 36. (A)
- McLain, D. R.; Ingham, M. C. Sea surface temperatures in the northwestern Atlantic in 1979. Ann. Biol. 36. (A)

## Reports

- Bisagni, J. J.; Kester, D. R. Physical variability at an East Coast United States offshore dumpsite. Proc. First Int. Ocean Dump. Symp.;1978 October.
- Armstrong, R. S. Hydrodynamics of the Buccaneer Gas and Oil Field. Jackson, W. B. ed. Environmental assessment of an active oil field in the northwestern Gulf of Mexico. NOAA Final Report to EPA; Proj. No. EPA-IAG-D5-E693-E0;1980. 41 p.