

J. Brownlow



NORTHEAST FISHERIES CENTER

NEWSLETTER

DECEMBER 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

The NEFC participated in the Third National Technical Seminar on Mechanical Recovery and Utilization of Fish which was held during 1-3 December at Raleigh, North Carolina. The seminar, which attracted over 160 registrants including representatives of 11 foreign countries, was cosponsored by NMFS, National Fisheries Institute, University of North Carolina Sea Grant Program, Gulf and South Atlantic Fisheries Foundation, Inc., North Carolina Marine Science Council, and the North Carolina Department of Administration's Office of Marine Affairs. NEFC contributions were papers, presented by Drs. Joseph Licciardello and Frederick King, titled "Microbial Aspects of Minced Fish" and "U.S. Grading Standards and Labelling for Minced Fish Blocks," respectively.

Data Management

Information on using ADP Network Services, Inc., time-sharing computers was provided to a group of Northeast Regional Fisheries Information System (NERFIS) users at Woods Hole. A session was devoted to demonstrating data management log-on procedures and use of the SOS editor. Several new systems have now been installed on ADP Net, including the NEFC's Financial Reporting System, and a major effort is underway to convert a portion of the Groundfish Survey System from the Sigma 7 in Woods Hole.

Kay Paine participated in a meeting of the NMFS National Data Management Committee Working Group on Documentation Standards. The results of this group's work will be a set of recommended guidelines to be followed when documenting automated data systems and will be incorporated into the NERFIS requirements for documentation in the Northeast.

RESOURCE ASSESSMENT DIVISION

Resource Surveys Investigation

Investigation activities centered around processing of data from the 1980 autumn bottom trawl survey and preparing for the upcoming winter bottom trawl survey. Investigation staff met with the NEFC's fisheries engineers to plan and coordinate 1981 surf clam - ocean quahog survey work. This year's surf clam - ocean quahog survey will include portions of Georges Bank and the Nova Scotian shelf as part of a cooperative investigation with Canada. Major renovation and maintenance work is planned on the submersible electric pump dredge and associated equipment prior to this survey.

Pat Twohig and Don Flescher obtained 16-mm films for fishery training purposes from NOAA's Office of Public Affairs and transferred these to videotape for NEFC use.

Fisheries Statistics Investigation

Reorganization of the Fisheries Statistics Investigation -- recently transferred from the Northeast Regional Office (NERO) to the NEFC -- continued. Darryl Christensen was appointed Investigation Chief to replace Frank Riley, who continued in his position until late in the month to assist with transfer of the Investigation. Ronnee Schultz was appointed New England Area Supervisor with the responsibility of overseeing field operations from Maine through Connecticut. An informational meeting was held at the Sandy Hook Laboratory on 3 and 4 December to acquaint Investigation personnel with administrative staff and future Investigation plans, policies, and procedures. Bradford Brown and Joan Palmer (Woods Hole Laboratory) and Bob Hall (NERO's Market News Branch) also attended this meeting.

Instructions and forms for the annual report "Fisheries of the United States, 1980" were received from the NMFS Central Office and end-of-year survey work was initiated.

Fishery Biology Investigation

Finfish

In December, Sherry Sass processed and aged alewife samples collected during 1978 and 1980 autumn bottom trawl surveys. She also aged scup scale samples collected from the 1980 commercial fishery, and conducted a literature search relative to summer flounder growth and culture. In connection with the latter, she and Ambrose Jearld visited both the NEFC's and US Environmental Protection Agency's (EPA) Narragansett Laboratories to study fish culture facilities.

Louise Dery continued age and growth studies on the European hake (Merluccius merluccius) with Sergio Iglesias, a visiting scientist from Spain. Louise also began training for a new position as Woods Hole area Equal Employment Opportunity (EEO) Counselor. She also completed aging work on several hundred summer flounder scale samples (report in preparation) and approximately 500 Atlantic herring otoliths (with Jean Chenoweth) as part of a fecundity study with Wally Morse at the Sandy Hook Laboratory. She also began aging silver hake otoliths from the 1980 autumn bottom trawl survey.

Shellfish

This month brought to an end the first co-op term of Uvetta Dozier. Uvetta spent most of the month working with Phil Chase building age files in computer mode and completed measurement of surf clams obtained from the Milford Laboratory's cultured stock. She also assisted with completion of aging surf clam samples obtained during the 1980 surf clam - ocean quahog survey.

Mark Costa continued preparation of surf clam and sea scallop shells for aging, and assisted with preparation of finfish samples for aging.

Maurice Crawford worked on aging the third priority (1979 cruise) sea scallop and first priority (1980 cruise) surf clam samples. Maurice also started analysis of shell measurement data for the Milford Laboratory's cultured surf clams. It is hoped that this analysis will aid in determining the first growth band laid down in the surf clam. Maurice also accompanied Ambrose Jearld to the Milford Laboratory to visit, tour the facilities, and discuss joint research work on surf clams and other species with Ron Goldberg, Dr. Carolyn Brown, and other Milford Laboratory staff. After spending a day at Milford, Ambrose and Maurice went to Rutgers University to meet with Dr. Churchill Grimes and his Graduate Assistant, Gary Shephard, to discuss biological research activities on weakfish. This meeting was followed by a visit to the Sandy Hook Laboratory.

John Ropes spent the better part of December working on ocean quahogs. Selected specimens of marked ocean quahogs recovered in 1979 were reexamined and reprocessed to identify various shell depositional features associated with growth before and after marking. Definite interruptions in shell deposition at the time of marking were seen, followed by a single growth line which was not unlike other growth lines thought to be annular marks. The reprocessing of these specimens has provided a basis for procedures to be used in examinations of marked clams recovered in August 1980, 2 yr after the marking operation. Photographic prints of acetate peels have been produced to demonstrate specific shell depositional features caused by marking; this has been essentially a trial-and-error effort that has resulted in inadequate prints.

Age and Growth

Kris Andrade and Melinda Grace continued processing frozen bottom trawl survey samples for scales and otoliths.

Fishery Assessment Investigation

Senior Assessment Scientists

Much of Brad Brown's time was spent organizing material for the Northeast Fishery Management Task Force Study Group on Biological Effects of Management Options. In addition, Brad and Mike Sissenwine, as well as Dick Hennemuth and Ken Sherman, prepared class outlines for the upcoming spring semester graduate seminar series on multispecies fisheries to be presented at the University of Rhode Island's (URI) Graduate School of Oceanography. The National Fisherman has requested permission to publish Brad's article on "Why We Count Fish" (earlier published in the fall 1980 issue of the Underwater Naturalist) in its 1981 annual issue. Brad also devoted considerable time to development of performance plans required under the new Merit Pay Performance Appraisal and Compensation System.

Early in 1981, Polish fishing vessels will once again be participating in the Northwest Atlantic mackerel fishery off the US coast. Emory Anderson has maintained liaison with the Polish fisheries attaché in New York concerning planned fishing activities and has been preparing the protocol for acquisition of biological data to be collected by NMFS foreign fisheries observers aboard these vessels. Emory has also reviewed relevant amendments to foreign fishing regulations. He also reviewed a first draft of a preliminary assessment of tilefish prepared by Steve Turner of the Sandy Hook Laboratory and Rutgers University.

The Hudson River hearings (concerning cooling tower requirements at the Indian Point, Bowline, and Roseton power plants) were settled out of court on 19 December. As part of the settlement, the utilities will shut these plants down during striped bass spawning and nursery seasons, stock striped bass fingerlings, and install new pumps and intake screens. The utilities have also donated \$12 million to an independent research fund and have stated their intentions not to proceed with the Storm King project. This ends 6 yr of involvement by John Boreman, who served as technical witness and consultant to the EPA during the hearings.

Steve Clark continued work on several manuscripts, and initiated updates of the haddock and yellowtail flounder assessments. He completed revisions to a comprehensive review of the Georges Bank and Gulf of Maine haddock fishery which had been prepared by Clark, Overholtz, and Hennemuth, and also completed a draft manuscript on the use of bottom trawl survey data in stock assessments.

Fred Serchuk devoted much of his time towards assessment and management aspects of the surf clam fishery. He provided results of additional analyses of data collected during previous surf clam research vessel surveys to the Middle Atlantic Fishery Management Council (MAFMC) for use in development of Amendment #3 to the Surf Clam/Ocean Quahog Fishery Management Plan. He also initiated analysis of surf clam and ocean quahog research vessel survey data obtained during the August 1980 shellfish survey and reviewed proposed surf clam fishery area closure criteria developed by NERO's Fisheries Management Division. He also initiated assessment analyses of 1980 commercial, recreational, and research vessel survey data for Atlantic cod.

Staff

Several members of the Investigation initiated analyses of commercial catch and effort data files as part of initial work by the Northeast Fishery Management Task Force Study Group on Biological Effects of Management Options. Information on dominant species and corresponding by-catch in specific time-area blocks will be analyzed in the coming months so as to provide insight into the occurrence of species associations which form the basis of commercial fisheries conducted off the Northeast coast.

Mike Fogarty worked with Thurston Burns on an evaluation of commercial statistics collection systems for American lobster in the Northeast, and continued summer flounder assessment studies. Anne Lange has been involved with analyzing trends in commercial fishing effort off the Northeast coast as part of preliminary studies by the aforementioned Study Group. Ralph Mayo reviewed several state anadromous alosine fisheries reports and proposals relative to federal funding under the Commercial Fisheries Research and Development Act of 1964, and is revising a draft assessment of the Southern New England and Middle Atlantic scup fishery. Loretta O'Brien completed an evaluation of yellowtail flounder catch-per-unit-of-effort data and initiated work on plotting geographic distribution of fishing effort by vessel size. Paul Wood provided information on location of capture of Maine sea scallop landings to the Maine Department of Marine Resources.

Fishery Socioeconomics Investigation

During December the Investigation completed preliminary programming for development of a financial simulator for the New England otter-trawl fleet in cooperation with NERO personnel. A paper on the economics of the surf clam fishery (coauthored by Jim Kirkley and Ivar Strand and Ted McConnell of the University of Maryland) was accepted for publication in a forthcoming text on fisheries management.

Meetings, Talks, University Relations, Training, and Public Affairs

Meetings and Talks

On 1 and 2 December, Brad Brown, Mike Sissenwine, Dick Hennemuth, and Joan Palmer met with Dr. G. P. Patil and staff at Penn State University to discuss statistical ecology contract work.

On 2 December, Steve Clark and Gordon Waring attended a Woods Hole Laboratory EEO Committee meeting.

On 3 December, Emory Anderson attended a meeting of MAFMC's Scientific and Statistical (S&S) Committee in Philadelphia.

On 3 and 4 December, Brad Brown, Joan Palmer, and Ron Schultz attended a meeting at the Sandy Hook Laboratory of the Fishery Statistics Investigation. Mike Fogarty attended a meeting of the New England Fishery Management Council's (NEFMC) Lobster Plan Development Team in Danvers, Massachusetts.

On 9 December, Brad Brown, Dick Hennemuth, Mike Sissenwine, and Anne Lange met with Jay Lanzillo, Candace Oviato, and Barbara Stevenson to discuss the activities of the Study Group on Biological Effects of Management Options.

On 10 December, Brad Brown, Vaughn Anthony, and Mike Sissenwine met with Dr. Katherine Green-Hammond at the Woods Hole Laboratory to discuss modeling activities. Steve Clark, Fred Serchuk, and Gordon Waring presented papers at the Southern New England Chapter meeting of the American Fisheries Society in Mystic, Connecticut. Linda Despres, Erika Faulk, Donald Flescher, Mike Fogarty, Evelyn Howe, Henry Jensen, Rhett Lewis, Ralph Mayo, Loretta O'Brien, and Malcolm Silverman also attended.

On 11 December, Fred Serchuk attended a meeting of the Woods Hole Laboratory EEO Committee's Training and Promotion Subcommittee. Jim Kirkley met with Leah Smith, Susan Peterson, and Jim Wilson of the Woods Hole Oceanographic Institution (WHOI) to discuss socioeconomic informational needs for fisheries management.

On 16 December, Mike Fogarty attended a meeting of the NEFMC's S&S Committee in Woods Hole.

On 18 December, Brad Brown, Dick Hennemuth, Anne Lange, and Gene Heyerdahl met with John Norton-Moore at the Woods Hole Laboratory concerning the negotiated settlement of the US-Canada disputed zone. Steve Clark attended a meeting of the

Northern Shrimp Section of the Atlantic States Marine Fisheries Commission in Portsmouth, New Hampshire, where he presented the October 1980 assessment of the Gulf of Maine northern shrimp stock. Fred Serchuk met with Joe Mueller, NERO staff economist, and reviewed the current surf clam and ocean quahog assessment. Fred also attended a meeting of the Woods Hole Laboratory EEO Committee's Executive Board.

On 23 December, Brad Brown met with Dr. Almeida of Virginia Polytechnic Institute (VPI) to discuss the potential for future image analysis research by the VPI Engineering Department based on previous diatom studies.

On 29 and 30 December, Brad Brown, Mike Sissenwine, Anne Lange, Ralph Mayo, Steve Murawski, and Rhett Lewis met at the Woods Hole Laboratory to outline future work by the Study Group on Biological Effects of Management Options.

University Relations

On 5 December, Steve Clark met with Pete Saunders, a University of Massachusetts graduate student, to review proposed cooperative finfish research projects for Gulf of Maine species.

On 11 December, Fred Serchuk attended a meeting of the Masters Thesis Committee of Patricia Gerrior, an MS candidate at Southeastern Massachusetts University.

Training

On 1 and 2 December, Fred Serchuk attended a merit pay appraisal course at the Milford Laboratory.

On 16 December, John Boreman participated in an automatic data processing (ADP) training workshop in Woods Hole.

On 17 December, Paul Wood completed computer programming courses in PASCAL and COBOL at Bridgewater State College. Frank Almeida completed a semester of graduate work in fisheries science at Oregon State University in Corvallis. Steve Murawski completed a semester of graduate work in fisheries science at the University of Massachusetts in Amherst.

Public Affairs

On 30 and 31 December, Brad Brown prepared material for Mr. White, a reporter for the "Cape Cod Times," for an article on fisheries related to Cape Cod ports.

Publications

Clark, S. H. Use of trawl survey data in assessments. Can. Tech. Rep. Fish. Aquat. Sci. (S)

Mayo, R. K. 1980. Exploitation of redbfish, Sebastes marinus (L.), in the Gulf of Maine - Georges Bank region, with particular reference to the 1971 year class. J. Northwest Atl. Fish. Sci. 1:21-37. (P)

Strand, I. E.; Kirkley, J. E.; McConnell, T. Economic analyses of the implementation of the Fishery Conservation and Management Act. Ann Arbor Science Publishers, Inc. (A)

Reports

Almeida, F. P.; Anderson, E. D. Discriminant function analysis of morphometric characters from silver hake in the New England - Middle Atlantic area. Woods Hole Lab. Ref. Doc. No. 80-36;1980. 24 p.

Clark, S. H.; Hennemuth, R. C. Assessment and management of the Georges Bank and Gulf of Maine haddock resource. Paper presented to meeting of Southern New England Chapter, American Fisheries Society. Mystic, Conn.; 1980 December 10.

Serchuk, F. M. Assessment and management of surf clam populations in offshore Middle Atlantic waters of the United States. Paper presented to meeting of Southern New England Chapter, American Fisheries Society. Mystic, Conn.; 1980 December 10.

Waring, G. T. The management and demise of the Georges Bank herring stock. Paper presented to meeting of Southern New England Chapter, American Fisheries Society. Mystic, Conn.; 1980 December 10.

MANNED UNDERSEA RESEARCH AND TECHNOLOGY PROGRAM

No report received. The September-December reports will be included in the January issue.

MARINE ECOSYSTEMS DIVISION

Ecosystem Dynamics Investigation

Ed Cohen and Wendell Hahm continued work on the description of GEORGE, the multispecies model, and Wendell made some preliminary computer runs of the model to begin exploring the sensitivity of the system to variations in mortality rates due to predation and fishing.

Mike Pennington completed the final draft of his paper, "Efficient Estimates of Abundance for Fish and Plankton Surveys," utilizing the delta distribution, and submitted it for publication in Biometrics.

Marv Grosslein attended a Georges Bank Biological Task Force (BTF) meeting on 15 December; discussion focused on the Department of Interior's response to the BTF's proposed research and monitoring plan. One result of the meeting was to establish a more formal structure to the so-called "Monitoring Subcommittee" for further development of research and monitoring of effects of oil and natural gas activities on Georges Bank. The Subcommittee, with one voting member for each of

the five member agencies [i.e., NOAA, EPA, Bureau of Land Management (BLM), US Geological Survey (USGS), and US Fish and Wildlife Service (FWS)] on the BTF, is to meet before the end of January to begin fleshing out a monitoring program for Georges Bank. Marv also attended an S&S Committee meeting of the NEFMC on 16 December, where a draft report on American lobster data requirements and statistical collection systems was reviewed.

Ichthyoplankton Investigation

Our final MARMAP (Marine Resources Monitoring, Assessment, and Prediction Program) ichthyoplankton-zooplankton survey of the calendar year ended on 23 December after completing 138, or 79%, of the 175 planned stations. Survey activities were completed in the Middle Atlantic, Southern New England, and Georges Bank subareas. The Gulf of Maine was not surveyed. Gross examination of the 61-cm bongo net samples revealed a dense concentration of recently spawned sand lance (*Ammodytes* sp./spp.) larvae on the southern edge of Nantucket Shoals; otherwise fish larvae were in short supply. This cruise brings to a close our fourth consecutive year of intensive field work. During the year we participated in 10 surveys, utilized 238 vessel days, collected 2800 plankton samples, and recorded nearly 50 000 observations of temperature, salinity, dissolved oxygen, chlorophyll-a, nutrients, and ^{14}C .

Wally Smith and Pete Berrien attended a meeting at the Narragansett Laboratory on 16 December where we agreed to work jointly with Dr. Saul Saila and his staff from URI. They are under contract with BLM to study the theoretical impact of an oil spill on the survival of fish larvae on Georges Bank, and we have requested access to the MARMAP ichthyoplankton data base. Bimonthly meetings will be scheduled to review progress, discuss science, and deal with any problems that might arise.

Larval Fish Dynamics Investigation

Experimental Studies

A 1981 research proposal and 1980 interim progress report for the joint NOAA-FWS study of the effects of contaminants on the early life stages of striped bass were prepared. Preliminary data on contaminant levels in adults are being compared with survival and growth of larvae.

A site evaluation for in-situ work was conducted the first week of December 1980. Five rivers tributary to Chesapeake Bay--Elk, Choptank, Nanticoke, Potomac, and Pawtuxent--and the Hudson River in New York were visited. Spawning and nursery areas were defined by local biologists and possible sites were evaluated for deployment of in-situ chambers to study striped bass growth and survival under natural-exposure conditions.

A rotifer culture system was established for production of food for larval fish. Survival of summer flounder, fed either wild zooplankton or cultured rotifers, was compared in a standardized viability test. Although large variability was observed between spawns, survival was much higher in groups fed rotifers. Two

possible reasons for the better survival on rotifers are the scarcity of wild zooplankton in the early winter months and the large temperature differential between the local estuaries and the rearing temperature of summer flounder (17°C).

Several methods for the determination of the nucleic acid (RNA and DNA) content of adult fish and bivalve mollusk tissue are being evaluated, since it was found that our standard methods for larval fish were not suitable for these adult tissues. Larry Buckley presented a summary of the Investigation's activities and results, as part of the Northeast Monitoring Program (NEMP), to a review panel consisting of biochemists and physiologists working in the area of biological-effects monitoring, which convened in Mystic, Connecticut.

Geoffrey Laurence attended a training course for merit-pay employee performance appraisal in Milford, Connecticut; two Marine Ecosystems Division meetings; and meetings with the FWS in Columbia, Missouri, regarding cooperative striped bass research.

Population Processes

Greg Lough completed the "Cruise Results" for NOAA R/V Albatross IV Cruise No. AL 80-11 (interdisciplinary sampling studies of larval fish and prey micro-distribution and associated processes) conducted during 3-14 November, and devoted the rest of the month to revising NAFO (Northwest Atlantic Fisheries Organization) Res. Doc. 80/IX/129 on larval Atlantic herring abundance and mortality estimates over the ICNAF (International Commission for the Northwest Atlantic Fisheries) time series, 1971-78. He also attended two Marine Ecosystems Division meetings at the Narragansett Laboratory on 4 and 16 December, to discuss research strategy.

George Bolz continued work on ichthyoplankton abundance and distribution on Georges Bank and Nantucket Shoals from the ICNAF time series and Dave Potter completed a draft revision of NAFO Res. Doc. 80/IX/133 on the vertical distribution of Atlantic herring larvae from a 1977 MOCNESS (multiple opening-closing net and environmental sensing system) sampling series made in the Nantucket Shoals area. Dave also assisted Sharon MacLean of the Oxford Laboratory with equipment and supplies for the Ocean Pulse Program survey aboard NOAA R/V Delaware II Cruise No. DE 80-09, and assisted Dr. Alan Hulbert and Dr. Richard Cooper in data processing, statistics, and plotting routines on our HP-85 for presentation of results at the December meeting of the American Society of Zoologists in Seattle. At the request of Herb Stern, Dave attended a meeting on 1 December with Stull Associates and LCDR Ronald Smolowitz concerning various Woods Hole Laboratory building audits and structural studies in relation to the placement of the Laboratory's solar energy system.

Roz Cohen completed a draft manuscript of the larval Atlantic herring gut-content data for the 1974-76 seasons and she has spent time organizing the computer programs involved in running "FISHMAP" in order to generate distributional plots of 0.333-mm-mesh-sampled zooplankton for 15 ICNAF cruises from the series under study. Station data for three of the ICNAF cruises (0.333-mm-mesh-sampled zooplankton) were transferred onto forms for the Woods Hole ADP Unit to enter into new files. New files were edited and ready to be merged with the species data. Considerable time was spent with John Hauser discussing the data set and required outputs. Peter Donnelly, Randy Goodlett, and Alicia Mann have been working on

larval Atlantic herring gut content and zooplankton identification from selected MOCNESS samples collected during the 1978 patch study.

The HIAC particle-size analyzer finally arrived on 10 December, nearly 6 mo after ordering, and the sales representative spent the day setting the equipment up and instructing all of us in its operation. Roz Cohen will process one of the fine-mesh (0.064-mm) MOCNESS series of samples from this November's special cruise by hand and by using the HIAC analyzer to compare methods needed for rapid plankton processing at sea in our spring larval Atlantic cod - haddock prey micro-distribution studies.

Roz Cohen organized a Federal Women's Program workshop and attended both sessions ("Assertiveness Training," "Decision Making and Goal Setting") on 4 December at the Woods Hole Laboratory.

Roz Cohen and George Bolz completed the first quarter of calculus given in night classes at the Massachusetts Maritime Academy in Bourne, Massachusetts.

Hal Merry, an electronics technician, has been checking out and repairing equipment used on the November cruise, as well as repairing three meter blocks for MARMAP surveys and another meter block for LCDR Ron Smolowitz. Hal is still trying to get the MOCNESS volume-filtered data logger system operational and he has set up and tested the Omega Satellite Navigator II System on rental from Tracor Instruments.

Peter Ortner of the NOAA Environmental Research Laboratories' Atlantic Oceanographic and Meteorological Laboratory in Miami, visited us 30 December to borrow MOCNESS equipment for a Gulf of Mexico cruise and showed us the Benthos prototype silhouette photography net system for in-situ microdistribution studies of zooplankton they will be testing on the cruise.

Benthic Dynamics Investigation

Ray Bowman completed a manuscript on "Food of Silver Hake" which will be available as Woods Hole Lab. Ref. Doc. No. 80-31 with final editing and approval. Ray also began summarizing distribution and abundance of juvenile fish from the 1975-79 bottom trawl surveys for use in developing area-season coefficients in the predator-prey components of the model GEORGE. Finally, he made preparations for sampling fish stomachs on the January bottom trawl survey, where special efforts will be made to obtain extra stomach collections for all priority species included in the food chain study over the past decade. This will be the only winter series in the food habits collection and therefore it is of unique importance for completing the minimum seasonal picture required for GEORGE.

Roger Theroux continued work on the northern benthic biomass report, completing part of the section related to the sediment organic carbon content, and also preparing photographic prints of illustrations for other sections. Roger compiled selected benthic data from canyon areas along Georges Bank in response to a request from a firm (Dames and Moore) with a NOAA contract for outer continental shelf (OCS) environmental impact analysis. He also met with Marv Grosslein and personnel of the WHOI Marine Policy and Ocean Management Program on joint studies of benthos in the area of Oil Lease Sale 52 on Georges Bank. Roger, Ray, and Marv, together

with Dick Cooper of the Manned Undersea Research and Technology Program, attended a meeting in Sandy Hook on 17 and 18 December to review progress in Don Maurer's synthesis of benthic data for Georges Bank and to coordinate various other NEFC benthic studies relevant to NOAA's and NEFC's role in research and monitoring of OCS impacts.

John Hauser completed two computer programs for plotting food habits data by size of predator, and made good progress on conversions of Roz Cohen's measured zooplankton data to standard formats.

Oceanic Gamefish: Apex Predators Investigation

December marked the start of the 1980 tag data summary keypunching and verification. In 1980 approximately 4000 reports were received from cooperative recreational fishermen on sharks they tagged. Preliminary analysis was performed by providing tabular summaries indicating the number of each species tagged during the year. Currently we have two-thirds of the recreational tag data base completed. Verification and preliminary analysis were completed on the 1980 ship survey data base which consists of 1500 sharks tagged during research cruises.

In December we received a tag from a sandbar shark that was at liberty for over 15 yr. The fish was tagged in Virginia in 1965 and was recaptured off Block Island in December 1980. Although the legend on the tag was unreadable, the number was legible. The shark measured 100 cm at tagging and showed an average growth of about 3 cm/yr. Nancy Kohler completed verification of the blue shark food habits data base inclusive of the data collected in 1980.

Two articles, titled "Research Cruises in 1980" and "Food Habits of the Blue Shark," were prepared by Charles Stillwell and Nancy Kohler for our semiannual "Shark Tagger" newsletter. In December Wes Pratt initiated an analysis of the shortfin mako recapture data to determine if they would support other sources of information being drawn together for an age curve. Preliminary findings indicate good agreement if assumptions are first made to purge the recapture base of extraordinary growth rates. Another large run of vertebrae were stained for ring reading. Eighty percent of the vertebrae needed for this study are now prepared for analysis. Alan Lintala embedded more of the summer reproductive samples in paraplast for later sectioning.

Plankton Ecology Investigation

Joe Kane completed two legs of the MARMAP survey aboard the Albatross IV as Chief Scientist. Paul Fofonoff has completed the sorting of water bottles and plankton pump samples from Soviet R/V Evrika Cruise No. 80-02 and is currently working on some taxonomic problems with calanoid nauplii. He has made excellent progress in developing new criteria for separating naupliar stages of three genera of predominant copepod species in the samples--Metridia, Pseudocalanus, and Paracalanus. His accomplishment is particularly useful, as nauplii of these copepods represent the principal source of food for first-feeding Atlantic cod and haddock larvae. Jack Green has been working on data collected from that same cruise based on opening-closing net samples.

Biostatistics

An account was opened on the EROS Data Center computer in Sioux Falls, South Dakota. It is now possible to access the satellite imagery catalog data base and obtain information on availability and quality of satellite data. The remote-sensing data-link study was completed. This is a proposal to the National Aeronautics and Space Administration for testing the feasibility of linking remotely sensed data sets and ship survey data sets for demographic analyses of marine populations. All zooplankton volume data for old ICNAF cruises have been merged into master files.

It has been recently suggested, based on model simulations and slowly accumulating but still fragmentary empirical data, that changes in the structure of marine ecosystems may be caused as much by changes in the trophic levels as by environmental factors. Support for this evolving paradigm is given in a report submitted by Division scientists to Nature. A similar shift in species dominance was observed by us in the Northwest Atlantic, where the ecosystem during the late 1960's and early 1970's was subjected to significant fishing stress.

High catches in the North Sea during the 1970's of small, fast-growing, opportunistic, plankton-feeding fishes--sprat, sandlance, and Norway pout--have been hypothesized to be the result of these species replacing depleted Atlantic herring and Atlantic mackerel stocks.

Fish biomass in the region was reduced by 50% from 1968 through 1975. Since 1975, the silver hake and various squid stocks have been increasing, but Atlantic herring and Atlantic mackerel stocks remain at a low level. From 1974 through 1979, coincident with the low in mackerel and herring stocks, we observed a population explosion of sandlance (Ammodytes sp./spp.) larvae, increasing from a low average shelf density of 49×10^{10} in 1974 to 964×10^{10} in 1979. During this 6-yr period, the percentage of sandlance increased from less than 50% of the total midwinter ichthyoplankton community to over 85%.

Our findings support the paradigm pointing to the significant consequences of structural change in marine ecosystems. When the structure is stressed through removal of a large biomass of mid-size predators, replacement can take the form of increases in smaller, faster-growing, opportunistic species as described for the North Sea and observed by us. The full consequence of structural change with respect to earlier unperturbed status has not yet been documented for large marine ecosystems. We are just beginning to obtain the multitrophic-level data needed to unscramble interspecific and intraspecific ecosystem relationships. The influence of structural changes to aquatic ecosystems can result in significant economic and esthetic loss. In a species succession model for the Great Lakes, removal of large predators resulted in the proliferation of fast-growing smaller alewives. A size-component-response to structural modification in a large marine ecosystem has been observed in the Antarctic where, based on recent population trends, the decline in the biomass of blue whales may be in the process of replacement by the faster-growing smaller minke whale and seals. However, generalities describing predictable events in large ecosystems are rare. The examples cited here for continental shelf ecosystems (e.g., North Sea and Northeast Atlantic) indicate that the intensive removal of larger predators through heavy fishing can favor the production of fast-growing, smaller-sized, opportunistic species. Continued monitoring of the shelf ecosystem is now underway in the Northwest Atlantic to measure the impact

of any increase in the demersal and pelagic fish predator field (e.g., Atlantic cod, haddock, silver hake, Atlantic mackerel, and Atlantic herring) on the changing structure of the shelf ecosystem.

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

On 1 December, Ken Sherman, Bob Marak, and Geoff Laurence attended the merit pay training sessions in Milford, Connecticut. Also, Carolyn Griswold presented a seminar to the Cooperative Fishery Research Unit at the University of Massachusetts titled "The Role of NMFS in Offshore Oil and Gas Development: The Georges Bank Example."

On 4 December, a Marine Ecosystems Division meeting was held at the Narragansett Laboratory and was attended by Marv Grosslein, Red Wright, Wally Smith, H. C. Boyar, Bob Marak, Ken Sherman, Greg Lough, and Jack Colton. Also on the 4th, Chris Philpott, Peggy Lamoureux, Lorrie Sullivan, and Carolyn Griswold attended a women's career program at the Woods Hole Laboratory.

Ken Sherman met with Bob Edwards on 5 December at the Woods Hole Laboratory to discuss the NEFC's remote sensing program.

On 6 December, Kenneth Sherman and Jack Casey lectured at the First Recreational Fisherman's Forum held at URI. The NEFC was cosponsor of this symposium, which was attended by about 200 people. An estimated 150 of these people visited the Narragansett Laboratory to view exhibits in the conference room.

Carolyn Griswold attended a meeting on 8 December of the North Atlantic Regional Technical Working Group at Providence, Rhode Island.

On 10 December, Wes Pratt, Cindy Jones, Lorrie Sullivan, Chuck Stillwell, Carolyn Griswold, Pat Hadfield, and Larry Lindgren attended a workshop meeting of the Southern New England Chapter of the American Fisheries Society. Lorrie Sullivan was elected Secretary-Treasurer for 1981.

Julien Goulet attended a Northeast Area Remote Sensing System, Alternative Committee meeting at Hanscom Field on 10 December.

From 11 to 12 December, Dr. Leonard Ejsymont, Director of the Polish Plankton Sorting and Identification Center, visited the Narragansett Laboratory to discuss operations at the Center, sorting priorities, and personnel needs.

On 12 December, Carolyn Griswold attended a meeting of the Mid-Atlantic Biological Task Force in Washington, DC.

From 15 to 16 December, Julien Goulet attended a MACH (mensuration and assessment of coastal habitat) planning meeting at the Southeast Fisheries Center.

From 15 to 23 December, Carolyn Griswold and Jackie Frisella participated in a MARMAP ichthyoplankton/primary productivity cruise on the Albatross IV.

On 16 December, there was a Marine Ecosystems Division meeting at the Narragansett Laboratory.

On 28 December, Wes Pratt exhibited underwater photographs of Narragansett Bay life at the Museum of Natural History, Roger Williams Park, Providence, Rhode Island, as part of the annual Bay Day celebration.

Publications

Pennington, M. Efficient estimates of abundance for fish and plankton surveys. *Biometrics*. (S)

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Richardson, S. L.; Dunn, J. R.; Naplin, N. A. Eggs and larvae of butter sole, *Isopsetta isolepis* (Pleuronectidae) off Oregon and Washington. *Fish. Bull. (US)* 78:401-418;1980. (P)

Sherman, K.; Jones, C.; Sullivan, L.; Smith, W.; Berrien, P.; Ejsymont, L. Congruent shifts in sandeel abundance in western and eastern North Atlantic ecosystems. *Nature*. (S)

Reports

Bowman, R. Food of silver hake. Woods Hole Lab. Ref. Doc. No. 80-31;1980.

RESOURCE UTILIZATION DIVISION

Fisheries Engineering Investigation

A meeting was held at the Woods Hole Laboratory to discuss the future of the survey clam dredge program. Consequently, plans are being made for new electric cables, for building a spare dredge with certain pump modifications, and for modifying and improving the dredge ramp assembly.

Engineering Assistance to Other Center Programs

The AEG's transect sampling program on the ferry Marine Evangeline continues. Tom Connors and Dan Baker went to Portland, Maine (one terminal on the ferry run, the other being Yarmouth, Nova Scotia) to install an overhauled expendable bathy-thermograph (XBT) launcher and recorder system after it had failed during a previous trip.

A research note on the use of notched filleting boards for increasing fillet yields is being drafted.

A paper on the design and installation of an energy-efficient heating system for use on commercial trawlers is also being written.

Research Vessel Activities

A generator set being rebuilt for the Gloucester Laboratory's R/V Gloria Michelle is nearly complete and will be tested.

Renovations to the inside of the vessel are continuing.

Facilities

The Gloucester Laboratory hot-water system is being renovated concurrent with the installation of a new hot-water heater.

Resource Development and Improvement Investigation

Thirteen canned fish samples arrived from NMFS's Pascagoula Laboratory for species identification by the isoelectric focusing technique. Kate Wiggin has focused several plates in an attempt to find the best pH range for speciation.

Blue mussels were packaged for frozen storage by a variety of methods to determine fatty acid and sterol composition -- seasonally, over frozen storage, and variation due to packaging methods.

Four species of crabs were analyzed for fatty acid and sterol composition. A manuscript from this should be forthcoming in January.

The Florida Department of Natural Resources submitted rock shrimp, white shrimp, and spiny lobster for nutritional analyses.

Pat Donahue conducted an experiment to determine the amount of extractions necessary to recover the sterols from seafood. This information has been incorporated into our sterol methodology.

We answered four nutritional information questions from outside NMFS.

Blue Crabs

A taste test conducted on crab meat pasteurized in a nylon pouch shows that there is no organoleptic difference between it and crab meat pasteurized in a metal can after 1 mo at 34°F.

An experiment to determine the preservative effect of potassium sorbate on blue crab meat was completed. Commercially picked regular grade blue crab meat was dipped in 2.5% and 5.0% potassium sorbate (KS) solution for 30 sec, and the meat was pressed to release free fluid and packed in plastic cups with snap-on lids. Some meats were not dipped and served as controls. The meats were stored at 34°F. Organoleptic testing determined that the shelf life of the meats dipped in 2.5% KS was over 13 days and the control 5-6 days. The 5.0%-KS-dipped samples were rejected because the panelists complained of a sweet and/or bitter taste in the crab meat.

New Product Development

Samples of frozen Atlantic cod fillets were withdrawn from storage at +5°, 0°, -5°, and -20°F after 15 mo (end of experiment). Overall taste-test results show these samples to be fair to borderline. The texture attribute was rated lowest, especially in the samples stored at +5° and 0°F.

The contract with the fish processor to supply the frozen fish for the "U.S. Grade A" frozen fish study was prepared, signed, and submitted. Arrangements have been made with the US Department of Commerce (USDC) Inspection Service for continuous in-plant inspection of the "U.S. Grade A" fish. If high quality fish remain available, then "U.S. Grade A" frozen fillets will be processed and distributed the first week in January to be sold in the six test supermarkets in Albany, New York.

The experiment to recalibrate the Gloucester Laboratory's taste-test panel on the quality of Atlantic cod has begun. Cod stored in ice up until 10 days were examined both in raw and cooked states every 2-3 days. The storage age was identified, and the sensory attributes were discussed with the Laboratory panel. These sessions will continue.

An exploratory experiment to determine the freezing rate of vacuum-packed, 1-lb Atlantic cod fillet packages in a plate freezer was completed. Although the fish samples froze fairly quickly, the outside surface of the fish in the package turned frost white. This chalkiness was somewhat less attractive than the natural color of the fish that were frozen in the -20°F room. The normal color of the plate-frozen cod return when the fish are thawed, or if they are held in 50°F tap water for 15 sec. Care must be taken to dry the package after the 15-sec dip or the package will become glazed with frost.

Product Quality, Safety, and Standards Investigation

Product Quality

A storage study was initiated to determine the shelf life of iced, headed, and gutted dogfish. The following parameters will be monitored: flavor, odor, texture, total bacterial plate count, total numbers of urease-producing bacteria, pH, TBA number, trimethylamine oxide, trimethylamine, dimethylamine (DMA), ammonia, and Torrymeter reading.

A frozen-storage study was also initiated with either vacuum-packed or air-packed fillets or belly flaps cut from either 3-day or 11-day iced dogfish. The purpose of using 11-day iced fish was to include the effect of relatively poor initial quality in our data. Samples will be tested monthly for quality by organoleptic and chemical methods.

An experiment was completed which showed that DMA and formaldehyde production in red hake fillets occurred during iced as well as frozen storage. With fresh red hake, the formation of DMA and formaldehyde was maximized under anaerobic conditions and minimized under aerobic conditions.

Due to restricted purchasing and delayed arrivals of supplies, the Association of Official Analytical Chemists' collaborative study of agarose gel isoelectric focusing has been postponed to mid-January.

Betty Tuhkunen has assumed responsibility for the work on developing a method for larval fish identification using isoelectric focusing. Initial work has centered on developing an electrophoretic protein extraction technique that will allow us to avoid any type of wet extraction methodology.

Ron Lundstrom and Fred Correia are preparing a manuscript, "Dimethylamine and Formaldehyde Production in Fresh Red Hake: The Effects of Packaging Material, Oxygen Permeability, and Cellular Damage," that will be presented next August at the International Institute of Refrigeration meeting.

A final report on the frozen red hake texture study is being prepared for the New England Fishery Development Foundation.

Joe Licciardello reviewed a manuscript for the editor of the Journal of Food Science.

Product Safety

The fall collection of 10 fish samples, plus corresponding archived samples of fish livers and gonads, were received from Texas A&M University.

A large shipment of samples of striped bass and rockfish was received from the NMFS's Tiburon Laboratory. The striped bass samples comprised muscle, liver, and gonads. Some of the samples could not be differentiated because the tag that had the code number became detached from the package. Therefore, some valuable samples will be lost.

Work-up of summer and fall samples from the Gulf Coast Research Laboratory for polychlorinated biphenyls (PCB) has been completed. All samples have been analyzed by gas-liquid chromatography. This completes the PCB work and collections of samples from Gulf Coast Research Laboratory. The results of our analyses indicate no high levels of PCB's in the muscles of the species analyzed.

Samples of sea scallops, winter flounder, windowpane, and red hake collected from various stations of the New York Bight have been worked up and analyzed. The scallop samples did not show any PCB's. Flounders were well below the 1-ppm level.

The Hewlett-Packard Model 5992B analyzer has been installed. Selected fish extracts will be analyzed for the presence of PCB's in the near future.

Product Standardization

An initial draft of a "U.S. Standards for Grades of Fresh and Frozen Fish Steaks" has been prepared and is being reviewed informally.

We are assisting in the selection of species for the nomenclature project being conducted by the US Army's Natick (Massachusetts) Laboratories. This month we selected snappers (the lutjanids) from the Gulf Coast area and rockfish (the scorpaenids) from the Pacific Coast area.

The proposed draft of the "Commercial Item Description (CID) for Frozen Fish Sticks and Portions" was discussed with members of the US Department of Agriculture's (USDA) Food Quality Assurance Division (FQAD) in Washington, DC. The draft was revised to reflect FQAD's needs and will be distributed to other USDA agencies, our inspectors, and the industry for comment.

A proposed CID for frozen precooked meals was reviewed for the FQAD and the Natick Laboratories.

Additional comments were received from the Technical Committee of the National Fisheries Institute (NFI) on the proposed unified shrimp standard. Mr. Roy Martin, Director of Science and Technology for NFI, was especially interested in the method of determining net weight and made several pertinent comments on the proposed method.

University Contacts

Information was supplied on species identification by polyacrylamide and agarose gel isoelectric focusing to Dr. Tzong-Shin Lin of North Carolina State University.

Information was provided on the G. F. Torrymeter to Dr. David Stanley of the University of Guelph.

Our assistance in formulating the program and locating speakers, especially those from overseas, was publicly acknowledged by Dr. Tyre C. Lanier of North Carolina State University at the beginning of the Third National Technical Seminar on Mechanical Recovery and Utilization of Fish, held in Raleigh, North Carolina, during 1-3 December 1980.

Technical Assistance

Information and technical assistance were given in the following areas: regulations governing disposal of fish processing waste; shad; tests for ammonia in dogfish; use of dogfish by-products; fish plant sanitation; new fish products; processing equipment; seafood quality and specifications; quality measurement of South American whiting; species identification by isoelectric focusing; mixed fillet-mince cod blocks; plate and blast freezing; insulated shipping containers; holding and transport of live lobsters; lobster-pot escape vents; open-date labeling of seafoods; equipment to make surimi; labeling of Pacific snapper; smoking fish; and the US Food and Drug Administration's proposed standard covering lobsters and sardines.

Meetings, Talks, and Visitors

Meetings

Staff of our Product Standardization Program participated in a meeting of USDC Inspection Service personnel and industry quality assurance personnel regarding labeling of seafood products for the USDA School Lunch Program. This meeting was held in the Gloucester Laboratory on 9 and 10 December 1980.

Perry Lane attended the monthly meeting of the New England Fisheries Steering Committee.

Talks

Joe Licciardello presented a paper, "Microbial Aspects of Minced Fish," and Fred King presented a paper, "U.S. Grading Standards and Labeling for Minced Fish Blocks," at the Third National Technical Seminar on Mechanical Recovery and Utilization of Fish, held in Raleigh, North Carolina, during 1-3 December 1980.

Perry Lane presented a lecture on "Handling Fish at Sea" to a class at the URI School of Fisheries.

Visitors

James and Susan Feener visited the Gloucester Laboratory to discuss green crabs.

Dr. Jette Nielsen of the Danish Ministry of Fisheries met with Ron Lundstrom to discuss our research on dimethylamine and formaldehyde production in red hake muscle. Dr. Nielsen was supplied with information on our gas chromatographic method for quantitative determination of volatile amines.

DIVISION OF ENVIRONMENTAL ASSESSMENT

Behavior of Marine Fishes and Invertebrates Investigation

As part of our NEMP activities, we are currently analyzing videotape recordings from a series of experiments examining the response of juvenile bluefish to reduced concentrations of dissolved oxygen (DO). Preliminary analyses have shown these animals capable of detecting and responding (i.e., exhibiting avoidance behavior) to sublethal levels of DO. When escape was not possible, changes in both activity and schooling behavior were observed at various DO levels. Presently we are quantifying these behavioral changes and correlating their occurrence to observed DO concentrations.

These results will be compared with those from our earlier temperature studies to determine the effect such changes in behavior would ultimately have on the species' survival.

Biological Oceanography of Stressed Ecosystems Investigation

Phytoplankton Growth Potential

Our contribution to the NEMP annual report was completed early in the month. This report analyzed the results obtained during the year on the two current major activities of the subtask, an algal bioassay survey of shelf water fertility and studies of the effects of metals on important phytoplankton species in the New York Bight apex. A complete set of samples for algal bioassay was collected on the December NEMP cruise. Tests initiated on the effects of 18 metals on phytoplankton species had to be scrubbed because of growth inhibition, apparently due to seawater toxicity. Manganese in concentrations of 20 and 30 $\mu\text{g}/\ell$ partly relieved the inhibition. Preparations were made for further experiments. Dr. Ravenna Ukeles of the Milford Laboratory kindly supplied a culture of Nannochloris atomis which will be used in these tests. Additional work was done on a paper by Draxler et al., "Nutrients, Hydrography and Their Possible Influence on Phytoplankton in the Hudson Estuary."

Phytoplankton Community Structure

To date, 78 samples have been processed from Delaware II Cruise No. DE 80-09, the Ocean Pulse Program-NEMP cruise conducted by Frank Steimle. Processing is still in progress. Still to be processed are samples from Albatross IV Cruise No. AL 80-11.

Dr. E. M. Hulburt of WHOI has returned a favorable review of the paper, "Phytoplankton Community Structure in Northeastern Waters of the United States. I. October 1978," by Harold G. Marshall and Myra S. Cohn and the paper has been submitted to the NMFS Scientific Editor.

Total Plankton Respiration

Data from Superflux I, II, and III are being plotted on graph paper and hand contoured in preparation for a data report and presentation at the Superflux Symposium to be held in January 1981. This same material is to be used in the NEMP annual report currently being prepared.

Seabed Metabolism

Our contribution to the NEMP annual report was completed during this month making use not only of FY 1980 data, but also of data going back to 1974. The document is presently being reviewed.

Coastal Ecosystems Investigation

Benthic Communities

Dave Radosh spent most of the month (1-19 December) aboard Delaware II making our semiannual collections of sediments and benthic macrofauna for NEMP. On his return, Dave worked with John LeBaron to complete the computer-based cluster analysis of selected benthic macrofauna data from past cruises. These analyses will be included in the NEMP annual report. Bob Reid, Ann Frame, Flo Wood, and Steve Fromm concentrated on preparing this report. Sediment and benthic macrofauna data for three cruises (April and September 1978 and December 1979) were coded, entered into the ADP system, and proofed. Analyses were made of spatial and temporal trends in biomass, numbers of species, and numbers of total and selected amphipods in the NEMP area. Historical data available to date were compared to our information for 1978-80; we are continuing to acquire these historical data. Some findings of our comparisons are presented elsewhere in the Division of Environmental Assessment's monthly narrative report.

Bob Reid also assembled all of the contributions of the NEMP work units into a single report. Clyde MacKenzie contributed a section on activities and findings of his surf clam studies for the annual report, and dove to collect further data on surf clam populations.

Benthic Energetics and Population Dynamics

Jan Ward completed final revisions of our New York Bight apex benthic macrofauna atlas and resubmitted it to the NMFS Scientific Editor for inclusion in the NOAA Technical Report series. Jan also corrected galley proofs of a MESA (NOAA Environmental Research Laboratories' Marine Ecosystems Analysis Program) symposium manuscript and returned it to the editor. Jan began adding new species to her invertebrate life history file and updating information on species already on our list. Dot Jeffress continued working on biomass determinations for New York Bight apex benthic samples from our historical collection to extend NEMP baselines.

Frank Steimle spent most of the month as Chief Scientist on the NEMP monitoring survey aboard the Delaware II. Sixty-eight of 82 stations were sampled; the 14 stations that were not completed, because of poor weather, were of secondary importance. A good collection of demersal forage species was obtained to begin examining any seasonal or geographic differences in caloric content of several key species. Several special samples of continental slope species were picked up from Don Flescher (Resource Assessment Division) to continue our investigation of the energetics of megafauna of deeper areas off the Northeast. The initial cruise plan for the April-May 1981 NEMP survey was also prepared. This survey will emphasize collecting Atlantic mackerel eggs for mutagenetics.

Environmental Chemistry Investigation

Tom Kiengle and Hank Rota participated in the MARMAP survey on Albatross IV Cruise No. AL 80-12, collecting 1470 seawater samples for nutrient analysis. The Ocean Pulse Program survey on Delaware II Cruise No. DE 80-09 took place during this same period. Vinnie Zdanowicz collected water samples only from areas not visited by the Albatross IV, such as offshore stations and locations in the estuaries. Phytoplankton primary productivity was measured at 20 stations during the Ocean Pulse survey and at 31 shelf stations occupied during the MARMAP survey. Chlorophyll-a in netphytoplankton and nannoplankton size fractions was measured at 137 stations during the MARMAP survey and at 65 stations during the Ocean Pulse survey.

Sediment cores (147) and tissue samples (172) were also collected for trace metal analysis during the Ocean Pulse survey. In the lab, trace metal analyses were completed for sediments collected during two recent surveys (Albatross IV Cruises No. AL 80-07 and AL 80-09). We initiated trace metal analyses in flounder and crab species collected during the MESA/NEMP survey of the New York Bight in August 1980 on NOAA R/V Kelez Cruise No. KE 80-07/08.

Ruth Waldhauer and Ingro Desvousges completed 612 analyses of inorganic nutrients (i.e., nitrate, nitrite, silicate, and phosphate) in seawater using the Technicon Autoanalyzer and 400 analyses for ammonium in seawater using the spectrophotometer. Salinity measurements for 200 water samples collected on the Ocean Pulse survey were completed.

Chris Evans and Jay O'Reilly revised a detailed manual on NEFC methods for chlorophyll-a analysis and distributed the manual to several First International Biomass Experiment participants.

Members of this Investigation spent most of the month developing our contribution to the NEMP annual report.

Physiological Effects of Pollutant Stress Investigation

The long-term exposure of slipper limpets, surf clams, blue mussels, and bay scallops to either copper or silver in a diluter system continues. About one-third of the bay scallops exposed to 10 ppb of Cu for 1 mo have died. This affirms our belief that copper is highly toxic to certain organisms. All slipper limpets exposed to 10 ppb of Cu died within the first 6 mo of exposure. Surf clams and bay scallops exposed to 0, 1, 5, and 10 ppb of Ag are surviving well. Likewise, adult and juvenile blue mussels exposed to 0, 5, 25, and 50 ppb of Ag are doing well.

Dick Greig was asked to participate in a Red Hake Task Group led by Dr. Murchelano of the Oxford Laboratory. This Task Group will be examining red hakes with lesions, as well as healthy animals, in an attempt to collect information that will lead to identification of the causative factors for these lesions. Attempts were made on 16 and 17 December to collect red hake from the New York Bight, but inclement weather prevented us from making many trawls.

Physiological Effects

This month the majority of the time was spent preparing for and participating in two Ocean Pulse Program surveys. We completed another in our series of monthly Long Island Sound Mini-Pulse surveys and participated in the winter Ocean Pulse survey on the Delaware II.

Lab work continues on Ocean Pulse samples. A study comparing the effect of cadmium on American lobsters was completed this month. That study compared cadmium exposure via the water column to exposure via a food source.

We also spent some time preparing for and presenting our work at a peer review for NEMP physiological studies.

Biochemical Effects

This month we participated in the aforementioned Ocean Pulse survey during which six stations produced sea scallops and none produced rock crabs. Adductor muscle and, for the first time, kidney samples were taken from 66 scallops. A study was also performed to determine the relative stability of enzyme systems in scallop kidney when frozen either as whole tissue or as a 10% homogenate. Although we consistently take scallops from the Baltimore Canyon area and from its control station (Delaware outer continental shelf), the past four Ocean Pulse cruises have produced no scallops from central Georges Bank, a station for which we particularly wish to have "before" data, to compare with data from animals taken after drilling activity begins. Earlier cruises produced many scallops from this station.

As a consequence of suggestions arising from the peer review meeting at Mystic, Connecticut, on 11 December, we are looking into various methods for glycogen analysis, which we hope to be able to add to our suite of tests for the monthly baseline sampling of single-population scallops (see below). By correlating glycogen levels in the adductor muscle (an energy store normally reserved for gametogenesis)

with the battery of energy-related enzymes that we are monitoring in this animal, we hope to achieve a more sharply focused picture of metabolic condition throughout the year.

We have also begun negotiations with Northeastern University's Nahant Marine Laboratory for collaborative work on sea scallops exposed to drilling muds. Final plans are to be made next month with Professor Patricia Morse.

In the lab, we started a 3-mo exposure of scallops to silver; monthly sampling will involve chemical analysis for silver and copper, as well as the standard enzyme assays. We will be sampling adductor muscle, gills, and kidney, and hope to have a good glycogen analysis on line by then.

Analyses for the sea scallop adductor muscle samples from the Ocean Pulse survey on Albatross IV Cruise No. AL 80-07 were completed, as were most of those from Albatross IV Cruise No. AL 80-09.

Anaerobic Bacteriology/Metabolism

The activities for the month included the identification of the bacterial isolates obtained from sediment and water samples collected during the recent Ocean Pulse survey on Kelez Cruise No. KE 11-80. An additional eight bottom sediment samples were obtained for analysis from the Ocean Pulse survey on Delaware II Cruise No. DE 80-09 (I-II).

Meetings, Talks, Visitors, and Training

Personnel from the Division participated in the Senior Executive Service's merit pay system training course held in Milford on 1 and 2 December.

On 3 December, Dr. James Thomas gave an overview of the Ocean Pulse Program-NEMP Chesapeake Bay plume studies (Superflux) to the monthly luncheon seminar sponsored by the New Jersey Marine Sciences Consortium and the Sandy Hook Laboratory.

On 4 December, at Sandy Hook Laboratory, Bob Reid met with Jack Pearce, Bill Phoel, and personnel from the New Jersey Marine Sciences Consortium and the New Jersey Department of Environmental Protection to compare data holdings and research activities in Raritan Bay. It is essential that the various agencies involved in specific estuaries or coastal waters meet to review activities so as to avoid duplication of efforts and to make the best use of funds available to all state and federal agencies.

Dr. A. Calabrese participated in a Joint Interagency Technical Committee meeting in Vicksburg, Mississippi, on 4 and 5 December, to review ocean dumping of dredged material.

During 9-10 December, the NEMP Management Team met at the Sandy Hook Laboratory to discuss the individual principal investigator reports which were submitted to date. In addition, the responsibility for developing the various synthesis and the final reports were assigned. A drafting meeting will be held during 27-30 January in order to finalize the NEMP annual report.

The Physiological Effects of Pollutant Stress Investigation (PEPSI), along with Dr. Lawrence Buckley of the Narragansett Laboratory, hosted a Peer Review Panel meeting of Ocean Pulse physiology/biochemistry activities held at Mystic, Connecticut, on 11 December. In addition to members of PEPSI, Drs. Pearce and Ingham participated on the panel.

On 17 and 18 December, Dr. Donald Maurer of the University of Delaware reported on the progress of his Georges Bank synthesis activities. Members of industry, as well as the NMFS Regional Director and his Environmental Assessment Branch staff participated in this review. Dr. Multer has suggested areas of Georges Bank which might be especially critical and which should be protected from the effects of petroleum exploration and development. Dr. Multer is planning to develop an executive summary based on his work to date; the summary will be used during upcoming meetings of the Biological Task Force which will be held to finalize the problems for short-term rig and long-term monitoring efforts.

Ann Frame and Bob Reid attended a meeting of the Ecological Society of America (cosponsored by six other ecological societies) in Seattle, Washington, during 27-30 December.

Miss Edith Gould presented a paper, "Short-term Low-salinity Response in Lead-exposed Lobsters, Homarus americanus," at the annual meeting of the American Society of Zoologists in Seattle, Washington.

Al Matte attended the American Society of Limnology and Oceanography meeting in Seattle, Washington.

Dr. Pearce finalized the review and drafted new sections of the report by the United Nations Group of Experts on the Scientific Aspects of Marine Pollution, concerned with criteria for ocean dumping. He also reviewed the extensive investigative reports which were drafted by Exxon and Getty Companies in relation to permit applications for petroleum exploration on Georges Bank. These reviews were used by the Northeast Regional Office in terms of commenting on the industry reports.

Publications

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Thurberg, F. P. Recent research and problems of using physiological techniques in pollution monitoring. Rapp. P.-V. Reun. Cons. Int. Explor. Mer 179;1980. (P)

Reports

Steimle, F. Cruise results, NOAA Ship Delaware II, Cruise No. DE 80-09, Northeast Monitoring Program (NEMP), Biological effects survey.

AQUACULTURE DIVISION

Aquacultural Genetics Investigation

Selection Experiments on the Commercial American Oyster

The annual census of the experimental American oyster population in the selection program is complete. The number of oysters in the 1976 and 1977 year classes was reported last month. There are now 4074 oysters in the 1978 year class, a 68% loss since 1979 and a 92% loss since 1978. The 1979 year class has 4166 oysters, a 75% loss since last December. Total number of spat collected in 1980 and still alive in December is 15 732.

We are beginning to condition for spawning the 1978 year class, the F₁ generation of the selection experiment. These animals will be the parents of the second generation of selected offspring, the F₂ generation.

Hybridization Studies on the Commercial American Oyster

Some holding tanks from the outdoor raceway were moved inside the new enclosed facility this month. Plumbing and installation for the facility were completed so that stocks could be consolidated and placed inside when remaining outside tanks were shut down for the winter.

An effort is being made to condition nonendemic oysters for hybridization while they are held in a small-scale recirculating system.

Oysters received from Maryland were forwarded to S. Singh, a geneticist and Assistant Professor at the University of Western Ontario, for a collaborative electrophoretic survey of American oyster populations for biochemic genetic variations.

Genetic Effects of Ocean Pollution

A collection of single species of ovigerous amphipods from several Ocean Pulse stations is being studied to ascertain the feasibility of studying their early-stage embryos and meiotic eggs for chromosome mutation, and other less genetically specific cytologic effects. This is of importance because of the documented impacts of oil pollution on amphipod populations. The material, as a whole, appears promising and there seem to be no particular methodologic problems that further use of amphipod embryos alone would not resolve.

Another single collection of spawned fish eggs (coho salmon) from consecutive prefertilization stages of the meiotic chromosome apparatus of the female gamete, through fertilization, first cleavage, and full development of the yolk-sac membrane, has been appropriately prepared for perfecting cytogenetic methodology. This is for assaying the normalcy of meiosis and the chromosome contributions of the male and female gametes, and for definitive chromosome (karyotype) analysis using eggs and the yolk-sac membrane.

Our contribution to the annual Ocean Pulse report was prepared and submitted.

Aspects of Nutritional Requirements of Mollusks Investigation

Feeding experiments with young American oysters are being continued in the polyvinyl chloride rearing chambers. Various feeding regimes are being studied to elucidate some of the questions on the rate of food uptake that developed in previous experiments. Algal growth experiments were conducted to determine if the concentration of nitrate that is used in the artificial seawater medium can be reduced. Densities of Monochrysis lutheri and Dunaliella euchlora were observed for 12 days in four concentrations of nitrate. Growth of M. lutheri indicates that the nitrate concentration can probably be decreased, but not for D. euchlora. In any event, experiments will need to be repeated for confirmation of results.

Dr. Ukeles and Gary Wikfors worked on the preparation of graphic diagrams, growth curves, and narrative sections of a manuscript titled "Evaluation of Five Species of Algae as Food Sources for Juvenile Oysters, Crassostrea virginica, in a Culture Chamber of New Design."

The semicontinuous algal culture system has yielded a harvest of 1648 liters of larval food and 1013 liters of juvenile food. The algal harvest was partially utilized to inoculate open mass-culture tanks and the greatest part distributed to the various Investigations as follows: Aquacultural Genetics, 501 liters; Spawning and Rearing of Mollusks, 1453 liters; Physiological Effects of Pollutant Stress, 286 liters; and Diseases of Larval Mollusks, 48 liters. Sterilized culture media were prepared and stock cultures, as well as special strains, were inoculated. Inoculations have fallen behind schedule due to holidays and inclement weather absences.

Requests for axenic starter cultures were received and subsequently cultures were forwarded to the following: Dr. D. T. Manahan of the University of California, and Dr. C. Rangel-Davalos of the Universite de Bretagne-Occidentale (France).

Spawning and Rearing of Mollusks Investigation

The seasonal bay scallop experiments designed to investigate size-specific density requirements and various handling strategies in off-bottom culture have been completed. Most of the month was spent retrieving the gear, measuring scallop lengths, and weighing adductor muscles. Our analysis of the data has just begun, but it is apparent that at some combinations of density and handling frequency, marketable bay scallops can be produced in one growing season. Scallops also grow faster in lantern nets than in cages when the scallops have access to the natural substrate. Statistical evaluation of our results is underway.

The level of filtration activity of surf clams of different lengths has been measured in flowing and nonflowing systems. In both systems, the algae consumed by the clams were replenished to effect a constant cell suspension of 2×10^5 algal cells per milliliter. No pseudofecal production was observed at this algal concentration. All experiments were carried out at 20°C. Using multiple linear regression methods, equations have been derived that define the relationship between dry tissue weight and rate of filtration in milliliters per minute. A decreased filtration rate per body weight was recorded in the nonflowing system. This is believed due to the necessity of the clams to overcome the inertia of the static medium. The filtration equations provide a means of estimating the feeding ration of different size clams held in specific volumes.

About 5000 seed scallops were provided for Dr. Lance Stewart's (University of Connecticut) research projects in the eastern end of Connecticut.

PATHOBIOLOGY DIVISION

Comparative Invertebrate Pathology Investigation

Samples of hard clams, blue mussels, and horse mussels were examined for pathology and parasites.

Hard clams and blue mussels collected from Falmouth, Massachusetts, (an oil spill area), were examined to compare with each other and with a sample of hard clam preparations sent to us by the Falmouth Conservation Commission. The following results were recorded from the Falmouth clams: hemocytic neoplasms - 6%, gill hyperplasia - 28%, inflammatory infiltration of gill and connective tissue - 72%, and trematode metacercaria - 8%. The other sample of hard clams had: neoplasms - 2%, gill hyperplasia - 40%, inflammatory infiltration of gill and connective tissue - 56%, and trematode metacercaria - 4%. A sample of blue mussels collected at the same time as the Falmouth clams and from the same location had no neoplasms and no gill hyperplasia, suggesting that at least in this instance no relationship exists between oil contamination and neoplasia in blue mussels (a virus has been implicated in the hard clam neoplasm, possibly acting synergistically with stress factors to enhance the development of the disease).

A sample of horse mussels was sent to us by the New Jersey Department of Environmental Protection because of heavy mortality in the population. Examination revealed only severe metaplasia of the digestive tubules and light inflammatory infiltration of the connective tissue. Other than light infection of the gill and plicate organ by ciliates, no parasites were found. A sample of horse mussels

collected last winter from Cape Henlopen was examined for comparison. Similar findings were recorded; however, the metaplasia was much less severe.

Samples of American oysters from Chincoteague Bay and James River, Virginia, were examined for parasites and pathology. Both samples were found to be infected at the 10% prevalence level with the oyster pathogen Minchinia nelsoni. The infections had not progressed much past the initial gill stage, indicating some degree of resistance in these oyster populations. No other pathogens were detected.

Amphipods collected on the Ocean Pulse survey on Albatross IV Cruise No. AL 80-07 comprised 32 species, 30 of them gammarids, 1 a caprellid, and 1 a hypereid. Linda Dorigatti prepared samples of the 22 species that were most common in the collections for histological examination. Eleven of the 22 species harbored one or more species of protistan or metazoan parasites and/or commensals. Ampelisca agassizi, the most abundant species both numerically and by number of stations occupied, also had the most species of parasites. Of 161 specimens examined histologically, 25 (9%) were parasitized or had commensals. Included were microsporidians, a protistan that may prove to be related to the parasitic dinoflagellate Hematodinium (known from the blue crab and various European crabs), gregarines, ciliates, and a protistan that forms multinucleate plasmodia and may be a member of the Haplosporida. Similar or identical Hematodinium-like organisms also occurred in Monoculodes edwardsi; multinucleated plasmodia were found in Orchomenella pinguis; and Pontogeneia inermis and Parahaustorius holmesi were infected with ciliates. Microsporidia occurred in several of the other species of amphipods, and gregarines occurred in most of them. Unidentified metazoans occurred in the brood pouches of A. agassizi and M. edwardsi, and a worm, tentatively identified (courtesy of Fred Kern) as a larval cestode, occupied the luminal apex of the hepatopancreas of one M. edwardsi and one Rhepoxinius epistomus.

Considering only A. agassizi, about 9% (67) of the total females (740) collected from seven stations were ovigerous. All ovigerous females of this species that were not used for histological examination have been sent to Dr. Arlene Longwell at the Milford Laboratory for possible use in chromosome studies.

Identification and embedment of amphipods collected on the September Ocean Pulse survey (as part of Albatross IV Cruise No. AL 80-09) were completed. The blocks are in the process of being sectioned.

Until we know which species of amphipods are most likely to be abundant enough throughout the year to afford statistically reliable samples, benthic amphipods will be collected and examined histologically from all stations where they occur. Experience gained through a year of cruises will, we hope, allow us to concentrate on certain stations and certain species of amphipods. At present, the only species we are reasonably sure will be useful is A. agassizi. Pontogeneia inermis and Leptocheirus pinguis may also prove to be good subjects.

The Histology Unit received approximately 600 specimens for processing this month. Special attention is being paid to working out details and perfecting methods to prepare euphausiids and other types of plankton taken in Ocean Pulse surveys for histological examination.

30% of the specimens (18/62) were over 5 cm in carapace width and none had black gills (more than 50% of gill surface blackened). Forty-two percent (26/62) had gills that were black at their bases or tips, 17% had shell erosion or ulceration, and only 45% (28/62) could be classified as having normal-appearing clean gills. The low incidence of clean gills was noteworthy since 71% (44/62) of the specimens ranged from 2.4 to 5.0 cm in width. Rock crabs measuring less than 5.0 cm, especially males, are considered to be subadults, which undergo repeated ecdysis during a single year and continually shed gill epicuticle and associated fouling organisms and debris. Frequent ecdysis of subadults previously resulted in collections in which most of the small crabs had clean gills. Studies during 1981 will be designed to test further our hypothesis that adult male crabs have either suffered serious mortalities or have moved away from the sewage-disposal site during the past 2-3 yr. For the present, our monitoring efforts during 1979-80 have shown that collection sites near the dumpsite no longer yield an abundance of adult male specimens in the 9-12 cm carapace width range.

Rock crabs collected on 16 December in the Sandy Hook Bay area presented an entirely different set of data than did the collection 1 wk earlier in the ocean. All 45 crabs from the follow-up collection were 5.0 cm in width or larger. Among 19 males and 26 females, the size ranged from 5.0 to 12.5 cm with a mean size of 7.6 cm. Seventy-one percent (32/45) of the animals had clean gills and less than 1% had shell erosion or black discoloration at gill tips or bases. Several premolt and postmolt (papershells) specimens were observed, indicating that the winter shedding period was in progress. The Bay collection showed that although large specimens were few in number near the dumpsite, the Bight apex does indeed remain populated by large adults. Monitoring efforts in the two collection areas have shown that changes in rock crab distribution have indeed occurred and that sampling strategies must be modified in order to better assess the incidence of black gill condition in the Bight apex. Monitoring efforts during December were seriously impeded because of the lack of travel funds to New Jersey and our success was due entirely to the excellent cooperation of John Ziskowski.

Diseases of Larval Mollusks Investigation

On 11 December, the Investigation completed its most recent monthly Mini-Pulse cruise to assess the "health" of certain natural shellfish beds in New Haven, Stratford, Bridgeport, and Norwalk, Connecticut. Forty isolates were selected from this cruise and subjected to biochemical testing for genus determination. In addition, the September isolates (30) and October isolates (35) were also biochemically evaluated. The cruise experience has been valuable in that shellfish pathogens are readily recognized from certain morphological characters on the original plate; the routine use of TCBS plating gave a quantitative determination of *Vibrio*-like organisms on shellfish beds, and the seasonal shifts of microbial flora associated with oyster beds are now documented.

Investigation of the toxic elements in a filtrate of a shellfish-pathogenic *Vibrio* sp. is continuing. What was thought to be a single toxic fraction is now known to consist of three components. Whether all three components are necessary for a toxic reaction is not yet known. Attempts to concentrate the toxic fraction(s) to a point where molecular weight determination could be made on Shephadex columns were not successful. Determination will be made on dodecyl sulfate-polyacrylamide gels once a sufficient quantity of the material has been obtained.

Experiments conducted to demonstrate a toxic effect in hard clam adults following injection of the Vibrio sp. filtrate into the anterior adductor muscle have been inconclusive; control animals, given sterile broth, have also died. Deaths between the two groups, however, have been markedly different. The dead experimentals showed gross pathological changes (e.g., flaccidity of the siphon); these changes were not noted in the control animals which have died.

Continuing attempts to identify the effects of handling and centrifugation stress on oyster hemocytes indicate that measurement of malic dehydrogenase could be used to indicate physical damage or lysis of cells. This cytoplasmic enzyme, which plays a major role in anaerobic metabolism of the cell, should be detectable only if the cell has become leaky or has lysed. Measurement of the enzyme also is useful in counting numbers of hemocytes attached to cell culture plates after first lysing the cells with triton X-100. However, 90 000 cells were required for measurable enzyme levels by a spectrophotometric method initially selected. A more sensitive spectrofluorometric method for malic enzyme is now being evaluated. The effectiveness of the method as a measure of cell numbers will be compared also with a sensitive fluorescence method for protein measurement.

Evaluation of the Minitex system for identification of bacteria pathogenic to marine mollusks is continuing. Variables which have been examined include presence or absence of HEPES buffer, as well as 0.07% agar in the base broth.

Telephone and letter contacts were made with six shellfish hatcheries to assess their bacterial problems and offer assistance. None have hatchery disease problems at present. A schedule to identify mortality problems of Ostrea edulis larvae from February through April 1981 was developed with Marine Bioservices, Inc., in Bristol, Maine.

Miscellaneous

At the request of the Connecticut Department of Environmental Protection (CDEP), liver, spleen, kidney, and dorsal lesion sections from a 25-lb striped bass were cultured for the presence of bacteria. A fisherman had brought the frozen fish to the CDEP for analysis, after noting the presence of a dorsal lesion and excessive bleeding at the time of catch. The lesion may have been caused by a boat propeller since no bacteria were cultured and the fish had recently been feeding. However, the absence of bacteria was inconclusive since freezing and thawing sometimes kill bacteria and destroy histological evidence of infection.

A coliform check of clam beds off Bayview, Milford, Connecticut, for the State of Connecticut Aquaculture Division showed waters within the National Shellfish Sanitation Program's guidelines for shellfish consumption.

University Relations

Dr. Julius Kuck of the Fairfield University Chemistry Department met with Dr. Blogoslawski on 4 December to discuss weaknesses in the published chemical assay for paralytic shellfish poison.

Messrs. Colin Campbell and William Condon of Fairfield University worked at the Milford Laboratory on isolation and identification of three hydrocarbonoclastic

bacteria on 5, 8, and 18 December. Their 1-yr student study of the degradation pathways of No.2 fuel oil in the marine environment is being monitored by Dr. Blogoslowski.

A bacterial isolate from the liver of a diseased bluefish was examined for possible antigenic relationship to an organism, Pasteurella piscicida, isolated from diseased Long Island Sound striped bass. The two organisms were found to be unrelated except for slight cross-reactivity of a minor antigen. The analysis was done for Timothy Miller of URI as an aid in identifying the bluefish pathogen.

Meetings, Talks, Visitors, Training, and Cruises

Drs. Rosenfield, Murchelano, Sawyer, and Blogoslowski attended the Merit Pay Appraisal Training Program at the Milford Laboratory on 1 and 2 December. Dr. Rosenfield represented the Oxford Laboratory on 8 December at a University of Delaware special program and symposium honoring the 30th anniversary of the College of Marine Studies. Dr. Rosenfield met with Dr. Banerjee of the NMFS Office of Utilization and Development, Dr. Junghans of the NOAA Office of Research and Development, and Dr. Suttmeier of the Hoover Foundation of Stanford University, on 10 December in the NMFS Central Office to discuss observations on scientific research progress in aquaculture in the Peoples Republic of China. Dr. Rosenfield attended the Joint Subcommittee on Aquaculture meeting in Washington, DC, on 12 December. Dr. Rosenfield also participated in a University of Maryland Sea Grant Citizens Advisory Board meeting in Annapolis, Maryland, on 16 December.

Ms. MacLean participated in a NEMP survey on the Albatross IV from 30 November to 21 December.

Dr. Murchelano sampled red hake from the New York Bight during 16-18 December.

Dr. Blogoslowski of the Milford Laboratory attended the US Food and Drug Administration - State of Connecticut-sponsored training course on "Shellfish Purification - Relaying and Depuration", held in Danielson, Connecticut, on 17 and 18 December; he presented a talk on "The Use of Ozone in Shellfish Depuration."

At the Milford Laboratory, Ms. Joyce Bowling returned to continue her Junior Fellowship assignment during semester break from Duke University; Ms. Lynne Gilson returned to Northeastern University after completion of a 6-mo cooperative assignment; Ms. Stephanie Hundley completed her cooperative assignment and returned to Lincoln University; and Mr. Gerhard Roland was granted a 1-yr extension.

Two seminars were presented at the Oxford Laboratory during the month. On 5 December, Dr. Rosenfield presented "The Peoples Republic of China Aquaculture and Fisheries," and on 17 December, Dr. Donald Lear presented "Extracting Impaction from the Continental Shelf."

Visitors to the Oxford Laboratory during December included Mr. R. Robinson of Wye Mills, Maryland; Mr. and Mrs. Fred Sieling of Annapolis, Maryland; Mr. and Mrs. William Sieling of Annapolis, Maryland; Dr. Donald Lear of the EPA in Annapolis, Maryland; Mr. Ed Tolley of Progressive Services, Inc., in Baltimore, Maryland; and several faculty members and graduate students from the Horn Point Center for Environmental & Estuarine Studies, located in Cambridge, Maryland.

Publications

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Ziskowski, J. J.; Anderson, V. T., Jr.; Murchelano, R. A. A bent fin ray condition in winter flounder, Pseudopleuronectes americanus, from Sandy Hook and Raritan Bays, New Jersey, and Lower Bay, New York. Copeia 1980(4):895-899;1980. (P)

NATIONAL SYSTEMATICS LABORATORY

Pelagic Fishes Investigation

Bruce Collette returned from a trip to the Republic of South Africa where he collected data for sections on the Scombridae, Belonidae, and Hemiramphidae to appear in a revision of Sea Fisheries of Southern Africa. A rough draft was completed (with R. Cressey of the Smithsonian Institution) of a paper on host specificity of copepods parasitic on scombrids. Work continued on a world revision of Spanish mackerels and halfbeaks from New Guinea and India.

Benthic Fishes Investigation

A first draft was nearly completed of the description of a new ophidioid from the Philippines. Data were taken from specimens of a new reef-dwelling ophidioid from Western Australia. Preliminary plans were drafted for 1982 dives with the DSRV Alvin on hard-bottom areas around the Virgin Islands. The work is in support of the Caribbean Fishery Management Council and is being coordinated by Walter Nelson of the Southeast Fisheries Center.

Penaeoid Shrimp Investigation

Research continued on the systematics of American Pacific rock shrimps, Sicyonia, and on the description of a new Sicyonia from the Philippines.

Crustacea Investigation

Preparation continued of a handbook of the decapods of the temperate waters off the eastern United States.

Meetings

D. M. Cohen attended a meeting of the Editorial Board of Fishes of the Western North Atlantic in Philadelphia on 11 December. Two volumes should be sent to the printer within the next 12 mo, one on pipefishes and seahorses, another on eels.

Visitors

Three students from the Virginia Institute of Marine Science--E. Anderson, J. Carter, and R. Crabtree--visited D. Cohen.

ATLANTIC ENVIRONMENTAL GROUP

Ocean Monitoring and Climatology Task

The cooperative Ship of Opportunity Program obtained five XBT transects and two continuous plankton recorder (CPR) transects in December: one XBT and one CPR transect in the Gulf of Maine, one XBT transect off Southern New England, two XBT and one CPR transect across the shelf and slope off New York, and one XBT transect across the Gulf of Mexico.

The following announcement of eddy conditions in the Georges Bank - Middle Atlantic Bight area was sent to the Commander of the Atlantic Area of the US Coast Guard for publication in the January 1981 issue of Atlantic Notice to Fishermen:

AEG/December 17, 1980

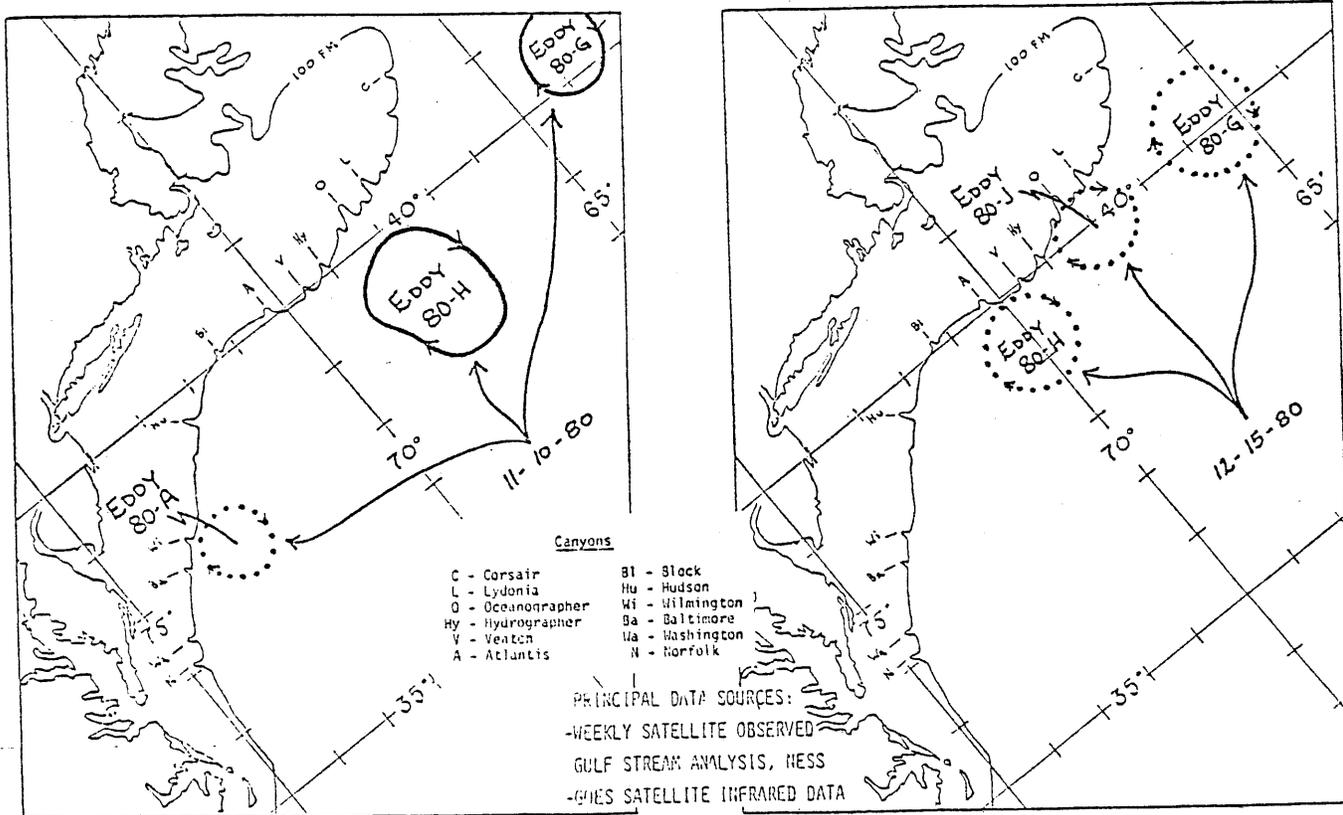
GULF STREAM EDDY LOCATIONS

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

Eddy 80-A travelled south and was resorbed by the Gulf Stream during the first week of December near 37.0°N, 74.3°W. Eddy 80-H moved west about 195 km (105 nm) to a center position at 39.4°N, 70.1°W, southeast of Atlantis Canyon. Eddy 80-J formed from a Gulf Stream meander about 20 November at 39.0°N, 65.8°W. This eddy is now located at 39.9°N, 68.0°W, south of Oceanographer Canyon. Eddy 80-G travelled about 150 km (80 nm) to the west and is now centered at 40.1°N, 65.5°W, southeast of Corsair Canyon.

During the next 30 days Eddy 80-H may move to a center position east of Hudson Canyon; Eddy 80-J may travel east to a location south of Veatch Canyon, and Eddy 80-G may move west to the area south of Lydonia Canyon.

Fishermen are requested to report unusual conditions or catches occurring in the vicinity of these eddies to the Director, Atlantic Environmental Group, National Marine Fisheries Service, RR 7, South Ferry Road, Narragansett, 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).



This month marked a milestone in an effort begun over 8 yr ago with the signing of a joint aide-memoire between NMFS and the United Kingdom's Institute for Marine Environmental Research. The development of the Undulating Oceanographic Recorder (UOR) has been completed with original design specifications either met or surpassed. The NMFS (AEG) has received the following tangible items as a result:

1. One production model Mark II UOR with selected spare parts;
2. Complete blueprints and tabular specifications with which to maintain the UOR and to invite possible future manufacture by domestic firms;
3. One microprocessor-based translator for formatting, calibrating, and displaying UOR data at sea or ashore; and
4. One pre-prototype Mark I UOR (obtained in 1975) suitable for research vessel deployment.

The Mark II UOR has just finished undergoing 2 wk of final check-out conducted in England by Grayson Woods of AEG. It was found to be fully acceptable. It arrived in the US on 28 December and is expected to be deployed on one of AEG's monthly East Coast monitoring transects by the end of the first quarter of 1981.

Ocean Dumping Task

Positional and sea-surface-temperature data from satellite-monitored drifting buoys No.'s 03020, 03021, and 03022 have been prepared for final processing and plotting by WHOI. Terry McKee from Dr. Philip Richardson's office at WHOI will be performing the final processing and plotting.

Two satellite fixes per day for each buoy have been obtained using certain quality factors, resulting in two positions and two sea-surface temperatures each day. These fixes on a day-to-day basis are usually separated by unequal periods of time. WHOI processing will perform a type of data smoothing, along with dividing each buoy trajectory into equal time segments of exactly 12 hrs. Finally, plots will be generated using the processed buoy trajectories, average buoy speeds, and sea-surface temperatures.

Processing of data from buoys No.'s 03020 and 03021 by Service ARGOS will be terminated in early January 1981 due to contract limitations. However, arrangements have been made with the US Coast Guard Oceanographic Unit to maintain reception of these buoys beyond early January until their transmitters fail. This will provide long-term drift trajectories for both buoys to both the NOAA Office of Marine Pollution Assessment (OMPA) and WHOI while incurring no cost to either user.

Meetings, Visitors, and Training

Woody Chamberlin attended a 2-day merit pay appraisal training session which was held at the Milford Laboratory on 1 and 2 December.

An NEMP Management Team meeting was held at the Sandy Hook Laboratory during 8-10 December and was attended by Mert Ingham. The following day, 11 December, he attended a physiology and biochemistry peer review committee meeting held at Mystic, Connecticut.

On 8 and 9 December, Woody Chamberlin traveled to Washington, DC, to confer on remote sensing with personnel from the National Aeronautics and Space Administration and the National Earth Satellite Service.

Steve Cook traveled to Philadelphia on 10 and 11 December to confer with Keystone Shipping Lines management. He also visited Bayonne, New Jersey, to talk with the Port Meteorological Officer and with Military Sea-lift Command Headquarters personnel.

CDR Nixon of the NOAA Corps and assigned to the Sea Grant Program at URI, visited with Mert Ingham during the afternoon of 17 December.

Kilho Park of OMPA in Rockville, Maryland, visited the AEG and conferred with Mert Ingham and Jim Bisagni on 19 December.

On 30 December, Steve Cook went to the Sandy Hook Laboratory to meet with personnel to discuss placement of bottom temperature recorders. He also visited the Moore McCormack Lines in Brooklyn, New York.

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- Armstrong, R. S. Transport and dispersion of potential contaminants at the Buccaneer Oil Field. EXPOCHEM '80;1980 October; Houston, Tex. (A)
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- 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)

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- 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.
- Bisagni, J. J.; Kester, D. R. Physical variability at an East Coast United States offshore dumpsite. Proc. First Int. Ocean Dump. Symp.;1978 October.



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