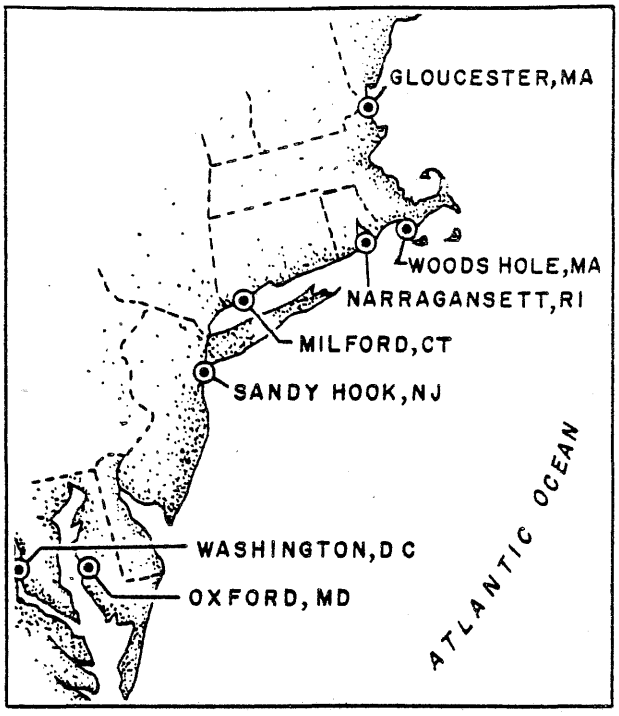
NEFC

Northeast Fisheries Center

NEWS



JULY 1978

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

RESOURCE ASSESSMENT DIVISION

Resource Surveys Investigation

The first leg of the summer bottom trawl survey began on 25 July aboard the Delaware II (Tom Azarovitz, Chief Scientist). For the first time the area surveyed was extended southward of Cape Hatteras to cover Cape Fear, NC. This additional area fills a sampling gap that has existed between the northern limits of the NMFS-supported survey conducted by the State of South Carolina and our traditional southern limits. Survey coverage will extend northward into the Gulf of Maine; the work will be completed by mid-August.

During July, work began in earnest on the ADP program development necessary to fulfill our BLM commitments with the arrival of contracted programmers. The work requires reformatting historic trawl data tapes to provide tabular and plotted summaries of trawl catches.

During July Jim Crossen made arrangements with WHOI to use the acoustic calibration facility on their dock during August for measuring specific operating parameters of our hydroacoustical equipment used in quantitative fisheries investigations. Jim Crossen with the help of summer engineering aids Jeff Mills and Bob Flynn designed and fabricated a calibration frame to be used in the experiment.

Age and Growth Investigation

Ms. Cathy Reardon completed back calculation of fourspot flounder otolith samples collected on Albatross IV Cruise No. AL 78-04, and will continue the study as samples are available. Cathy is presently aging butterfish samples collected on research cruises.

Ms. Louise Dery finished aging white hake otolith sections collected on Albatross IV and Delaware II research cruises in 1977. Aging this species is difficult, so the data will be reexamined and also compared to back-calculated data before undertaking other collections.

Mike Campbell has examined stained microsections from spiny dogfish vertebrae as an alternative to using spines for aging. No cyclic markings were observed on most of the prepared samples. Mike has made arrangements to visit the Narragansett Laboratory to observe the method used by Jack Casey for preparing shark vertebrae for aging. Mike has completed aging otoliths from ocean pout collected on Albatross IV Cruise No. AL 78-04, and has begun aging longhorn sculpin samples collected on past survey cruises.

About 15,000-20,000 age envelopes have been paper-lined and stamped for the summer survey cruises and also to have a sufficient quantity for the bottom trawl surveys while exuberant summer assistance is available.

Jacqueline Cook and Laurie Savelkaul are processing the large backlog of frozen yellowtail flounder from past survey cruises.

Fred Nichy revised a paper by Stender, Nichy, and Barans describing methods of removing otoliths via the parasphenoid bone. Nichy has also completed a series of silver hake otoliths for an otolith exchange among Canada, Cuba, USSR, and the US.

Age samples completed during July included: redfish (second quarter 1977 commercial samples); white hake (Albatross IV Cruises No. AL 77-07 and AL 77-12); ocean pout (Albatross IV Cruise No. AL 78-04); and fourspot flounder (Albatross IV Cruise No. AL 78-04).

Sandy Hook Investigation

Field sampling for information on bluefish and summer flounder recreational fishermen continued by utilizing on-board intercept interviews of party-

boat anglers. A total of 65 bluefish and 5 summer flounder trips were made in July by Bob Matus, Paul Yuschak, Russel Terranova, and Bill Rogers from Sandy Hook. They completed 2,100 interviews and measured over 3,000 bluefish and summer flounder. In addition, they collected bluefish scales and ovaries for Wally Morse and summer flounder scales and fin rays for age analysis at the Woods Hole Laboratory.

Eric Goldring and Pernell Lewis continued lab work to determine bluefish fecundity and initiated preparation of bluefish scales for age analysis.

John Clifford and June Sebaste completed coding of all creel census logs collected through June 1978 and John worked closely with the Sandy Hook Laboratory ADP unit to revise programs for analysis of the data.

Steve Turner collected data for the SEFC at two marlin and tuna tournaments held in Cape May, NJ, during 4-7 and 11-14 July.

Darryl Christensen continued work on the analysis of the 1978 spring Atlantic mackerel recreational fishery catch survey. Darryl also conferred with Dr. Mike Pennington of the Woods Hole Laboratory on revision of variance and confidence intervals around the 1975-77 creel survey data and participated on a bottom trawl survey aboard the Delaware II from 25 July to 4 August.

Wally Morse concentrated on preparing a report on Atlantic mackerel fecundity for the upcoming ICES meeting.

Fishery Analysis Investigation

Steve Murawski continued the analysis of distribution and relative abundance of ocean quahog populations in the Middle Atlantic using survey data derived from shellfish assessment cruises during 1966-78. Steve also participated in an ocean quahog cruise during 24 July - 4 August, to mark quahogs for age and growth studies.

Ralph Mayo's redfish assessment is almost complete. Liz Bevacqua and Helen Markestyn assisted in the redfish analyses in determining von Bertalanffy growth parameters and calculating mortality rates for 1975-77.

Bill Callahan and Ralph Mayo provided data for the following individual requests: (1) catch and monetary value for all species caught by the US in the Georges Bank disputed zone for Fred Olsen, International Fisheries Division, Washington, DC; and (2) catch summaries by month, state, and management area for Atlantic cod, haddock, and yellowtail flounder for the Statistics Branch of the Regional Office in Gloucester, MA.

Paul Wood participated in the Canadian sea scallop research survey cruise on Georges Bank during 3-24 July. Four sea-sampling trips were completed in July under Paul's supervision. Steve Clark assisted in coordinating several of the trips during Paul's tenure at sea. Vessels participating in the program during the month included the Christopher and Andrew, General George S. Patton, Riga, and the recreational party boat Capt. Red.

During the month, Maureen Griffin continued her aging studies of ocean quahogs and additionally summarized red crab catch and effort data derived from interview records.

Fred Serchuk assumed responsibility as Chief of the Fishery Analysis Investigation. Fred continued preparation of a sea scallop assessment and analyses related to Regional Fishery Management Council assessment and management activities. An analysis of the biological effects of the New England Fishery Management Council's emergency plan actions on the Georges Bank and Gulf of Maine groundfish stocks was accomplished by Fred on 13 and 14 July, and forwarded to NMFS, Washington, DC, for use as needed. On 30 July, Fred participated in a sea-sampling trip aboard the Capt. Red, a recreational party boat out of Newburyport, MA. The results of Fred's sea-sampling trip aboard the Mary A. Kelly were summarized in a trip report completed during the month.

Investigation personnel completed assessment summaries for Atlantic cod,

sea scallop, red crab, redfish, scup, surf clam, ocean quahog, weakfish, commercial fishery trends, and recreational fishery trends for inclusion in a Resource Assessment Division status of the stocks report.

Fishery Assessment Investigation

Investigation personnel prepared summaries of stock assessments to be included in a Division report describing the current status of over 30 species-stocks of finfish and shellfish in the Northwest Atlantic. Emory Anderson coordinated the preparation and editing of the report.

Steve Clark has continued to work on the northern shrimp assessment with the help of Barry Armet and on a paper to be given jointly with Vaughn Anthony in August at the annual meeting of the American Fisheries Society. Thurston Burns spent considerable time auditing and preparing commercial length frequencies of American lobsters for 1974-76 for loading onto computer tape, and coding 1977 length frequencies for keypunching.

Bill Overholtz continued to work on the haddock assessment, particularly on the recalculation of the numbers and age of the foreign catch beginning on the early 1960's and recent US and Canadian catches for use in virtual population analysis. Work was also initiated on FRG and USSR research vessel survey catch data to determine, if possible, indices of year-class strength.

Emma Henderson participated in reviewing and evaluating various multispecies fishery models with personnel of the Ecosystem Dynamics Investigation (Marvin Grosslein, Chief), and prepared an outline of a simulation model for multispecies management analyses. She also prepared some assessment information on summer flounder.

Frank Almeida completed the assessments of silver hake and red hake (with the help of Hillary Herring) including tables and figures; the written reports have not been prepared yet. Frank also completed the final draft on a manuscript on silver hake growth equations which will soon be submitted for journal publication. Work has begun on dividing the silver hake catch statistics for ICNAF Subdivision 5Ze into northern and southern components, as a result of possible realignment of silver hake stock boundaries for use in future assessments. Frank has also participated in a project with other Division personnel to modify the currently used virtual population analysis program to accommodate the analysis of multiple year classes from stored catch-at-age (numbers) data of up to 30-40 yr (requiring only minimal input data and instructions for a variety of analytical options), and to provide a complete printout of catch, stock size, and fishing mortality at age.

Hillary Herring has continued the coding and auditing of commercial length-frequency data, completed the assessment of red hake stocks (with Frank Almeida), spent some time on goosefish aging, and has begun work on calculating pre-1968 red hake catch-at-age (numbers) data to be used in expanding the assessment data base.

Brian Hayden has been making computer runs of survey data for haddock and bluefish, working on an assessment report for bluefish to be used by the Mid-Atlantic Fishery Management Council, and assisting with the logistical support for the sea-sampling program.

James Baker, a summer NOAA Junior Fellowship student, who will enter college in September has assisted in a variety of activities including data preparation and analysis involving silver hake, haddock, little skates, "other finfish", and northern shrimp, and has also learned some basic computer operations.

Fishery Systems Investigation

During July the Investigation's contribution to the annual status of the stocks report was completed.

Gordon Waring commented on the revised PMP for Atlantic herring for 1978. He also continued to work on the development of a method for aging little skate.

Margaret McBride made a sea-sampling trip on the General George S. Patton from New Bedford, MA. We believe this is the first occasion on which a female staff member has made a sea-sampling trip on a commercial fishing vessel. The rumor among mariners that women are a jinx at sea has been given a severe blow; the trip went smoothly.

Anne Lange continues in her role as scientific advisor to the US delegation negotiating fishing boundaries with Canada. She attended a meeting of the delegation in Huntsville, MD, on 13 July.

Michael Sissenwine met in Woods Hole on several occasions with an ad hoc ecosystem modeling task force. The principal immediate objective of this task force is to develop a functioning ecosystem model for presentation at a workshop to be held at Harvard University in November. The workshop will probably be sponsored by the New England Fishery Management Council. The Woods Hole Modeling Task Force realizes that its model will probably raise more questions than it answers.

Meetings, Talks, Visitors, Publicity

George Ridgway talked with Dr. Thomas Brodie of Hebrew University (Israel) on biochemical studies vis á vis fish and lobster genetics.

Stuart Wilk attended a meeting of the Scientific and Statistical Committee of the Mid-Atlantic Fisheries Management Council held in Claymont, DE, on 7 July. Stuart also presented a briefing on the biology of the weakfish at an EPA hearing held in New York City on 13 July. The EPA hearing was held in response to reports that vast numbers of young-of-the-year weakfish were being impinged on screens at the Salem, NJ, nuclear power plant. He is presently preparing a manuscript on biology and fisheries data of the weakfish.

Steve Murawski met with US Justice Department lawyers in Washington, DC, on 13 July to discuss and review the biological data used in the surf clam assessment used by the Mid-Atlantic Fishery Management Council in preparing the fishery management plan for the surf clam and ocean quahog fisheries. A law suit against NMFS is currently pending on the assessment data employed in the surf clam resource evaluation.

Ralph Mayo met with members of the Regional Office's Statistics Branch and Fisheries Management Division on 26 July to discuss the design of commercial fishery logbooks. The requirements of NEFC research programs and the needs of the Division were considered in formulating a suitable logbook format.

Fred Serchuk attended a meeting with Evelyn Murphy, Secretary of Environmental Affairs for Massachusetts, to discuss the current groundfish management plan on 3 July in Boston, and met with the Groundfish Oversight Committee of the New England Fishery Management Council on 5 July in Peabody, MA, on similar groundfish matters. Fred participated also in a meeting of the Groundfish Oversight Committee with the Groundfish Industry Advisors on 10 July in Peabody to discuss long-term management objectives for the Groundfish Management Plan.

Fred Serchuk organized and participated in a red crab meeting held at Woods Hole on 12 July with NMFS personnel and Drs. Charles Epifanio (University of Delaware) and Steven Sulkin (University of Maryland) to review a research proposal submitted to NMFS on red crab growth and mortality.

Fred Serchuk attended, with other Resource Assessment Division personnel, a US/ICES meeting held on 13 July in Woods Hole.

Fred Serchuk met with Richard Frank, Administrator of NOAA, to discuss recent activities when Mr. Frank visited the Woods Hole Laboratory on 28 July.

Emory Anderson was in Europe during 1-17 July, attending and presenting a review paper on the Northwest Atlantic mackerel fishery at the ICES/FAO/ICNAF Symposium on the Biological Basis of Pelagic Fish Stock Management held in

Aberdeen, Scotland, during 3-7 July, and during the following week visiting the Institute of Marine Research in Bergen, Norway, and the Danish Institute for Fisheries and Marine Research in Charlottenlund, Denmark.

On 28 July, Emory participated in a briefing and discussion session concerning assessments, management, and related topics held at the Woods Hole Laboratory with Richard Frank, NOAA Administrator, and Ron Costlow, Washington correspondent of the Los Angeles Times.

Lynn Cleary of the Marine Fish Division, Resource Branch, Department of Fisheries and Oceans at the Bedford Institute of Oceanography, Dartmouth, NS, was at the Woods Hole Laboratory during 18-21 July working with Steve Clark and Thurston Burns on a review paper of the Northwest Atlantic pollock fishery to be presented at the October statutory meeting of ICES.

Steve Clark was at the Maine Department of Marine Resources (MDMR) Laboratory in West Boothbay Harbor, ME, on 28 July to assist Vaughn Anthony, Director of Research for MDMR, in planning summer survey activities in the Gulf of Maine with the Challenge.

Gordon Waring worked on posters to be displayed at the American Fisheries Society meetings at the University of Rhode Island in August 1978.

Michael Sissenwine attended a Groundfish Oversight Committee meeting of the New England Fishery Management Council in Peabody, MA, on 10 July, an ICES delegation meeting in Woods Hole on 13 July, a State-Federal striped bass scientific committee meeting in Philadelphia on 19 July, and the International Predator-Prey Symposium in Atlanta during 24-27 July. Mike also met with Herrick Johnson, the new commercial fisheries specialist of the University of Rhode Island Marine Advisory Service, and Richard Frank, the Administrator of NOAA, during the month of July. The topic of both of these meetings was the fisheries management situation in New England.

Manuscripts

Clark, S.H., L. Cleary, and T.S. Burns. A review of the Northwest Atlantic pollock fishery. ICES 66th Statutory Meeting, October 1978.

Murawski, S.A., D.G. Frank, and S. Chang. 1978. Biological and fisheries data on butterfish, Peprilus triacanthus (Peck). NMFS, NEFC, Sandy Hook Lab. Tech. Ser. Rep. No. 6. 39 p.

Murawski, S.A., F.M. Serchuk, and M.C. Aelion. 1978. Shell length - meat weight relationships of ocean quahogs, Arctica islandica, from the Middle Atlantic Shelf. NMFS, NEFC, Woods Hole Lab. Ref. No. 78-38. 20 p.

MARINE ECOSYSTEMS DIVISION

Ecosystem Dynamics Investigation

Several meetings of the multispecies modeling group were held during the month. The group, consisting of Marv Grosslein, Mike Pennington, Ed Cohen, Gilbert Walter, Wendell Hahm, Brad Brown, Mike Sissenwine, and Emma Henderson decided that the model should be written in such a manner that it would not only be easily modified but also be user oriented. As the model is presently conceived, the parameters will be estimable both from the existing data base, such as that of the food chain group, and statistically from the historic levels of the stocks derived by virtual population analysis.

The model being developed by the ecosystem group and programmed by Wendell Hahm is "George," a trophic interaction simulation model of Georges Bank. "George" is an on-line, interactive model with visual output, i.e., tables and plots. Its modular structure and liberal use of commentary will make the program

self-explanatory and easy to modify. As of August, "George-I," a prototype, is on-line and running. "George-I" is an interactive, linear model with options for changing coefficients and displaying time-series tables and plots. In the coming months, provisions will be made for geographic detail and nonlinear interactions between populations. The addition of geographic detail will enable the ecosystem group to study the effects of the heterogenous distribution of fish populations and the implications of fish migrations on and off the Bank.

In other work, Grosslein completed drafts of the final sections on pollution and zoogeography for the New York Bight Atlas. Ed Cohen and Red Wright started writing up the phytoplankton and physical oceanographic data for a paper to be presented at the ICES symposium in the fall. Mike Pennington continued work on developing estimators for Darryl Christensen's creel survey data. While in Sandy Hook he also assisted various other people with their statistical problems.

Recruitment Processes Group

During July the Recruitment Processes Group has been involved in a variety of activities from processing plankton samples to various analytical tasks to preparing for this fall's larval Atlantic herring patch experiment. Greg Lough, along with Rich Langton, attended a special working meeting at the Bedford Institute of Oceanography in Dartmouth, NS, during 26-28 July, to confer with Canadian scientists (Dan Ware, Paul Lett, Bob O'Boyle, Dan Sameoto, Ronald Trites) regarding the sampling strategy for the upcoming larval herring patch experiment on Georges Bank. Biologists and physical oceanographers from five countries (US, Canada, Poland, USSR, and FRG) and eight vessels are presently committed to this experiment. Significant progress was made at the meeting regarding the sampling strategy for Albatross IV, Lady Hammond, Dawson, and another Canadian vessel to be chartered for sampling mid-water predators. Greg Lough is serving as task force leader and will summarize the minutes of this meeting. Also in preparation by Greg Lough for the patch experiment are detailed sailing orders for Albatross IV Cruises No. AL 78-13 and AL 78-14, Anton Dohrn Cruise No. 78-03, and Wieczno Cruise No. 78-05. George Bolz prepared the sailing order for the December larval herring survey (Albatross IV Cruise No. AL 78-15) and Dave Potter is spending considerable time assembling gear and supplies for this fall's activities.

Recently hatched herring larvae from 66 standard bongo samples were finally sorted and measured for a preliminary patch study of the Nantucket Shoals area for 19-22 October 1977 by Wieczno Cruise No. 77-06. The plotted results are very encouraging in that a definable patch of larvae can be recognized by two orders of magnitude of density above the background concentrations. One mode of larvae had a mean length of 8.8 mm. The herring larvae density distribution for samples within the definable patch was fairly homogenous with a calculated negative binomial K of 2.52.

George Bolz, Dave Potter, and Greg Lough are continuing their analysis of the larval herring data base for 1968-78. An attempt is being made to follow modes of herring larvae from cruise to cruise for growth and mortality estimates to compare with the overall seasonal average methods. The few "patches" of larvae we have been able to discern have growth and mortality rates similar to the seasonal average methods; however, survey coverage of 3-4 wk intervals seems to be too long to resolve sufficiently short-term estimates that will be studied in this fall's patch study. In our comparison of larval herring distributions by various size groups with bottom and 30-m temperature for the 1971-77 seasons, we have not been able to come forth with any striking correlation so far. In fact, we are impressed by the similarity of temperature trends rather than any differences.

Roz Cohen, Mike Pennington, and Greg Lough began analysis of a comparison of available zooplankton data on simultaneous catches of 60-cm bongo, 0.333-mm mesh samples with 20-cm bongo, 0.165-mm mesh samples collected by Albatross IV Cruise No. AL 78-02. Statistical comparisons were run using eight common zooplankton species. The 0.165-mm net caught statistically significantly greater numbers of all species (including copepod nauplii) than the 0.333-mm net, except for Centropages typicus and C. hamatus according to most tests used, and except for Calanus finmarchicus according to a t-test.

Ichthyoplankton Investigation

We completed the fifth of six ichthyoplankton surveys scheduled this year in waters from Cape Hatteras to the Gulf of Maine. During the cruise aboard Albatross IV from 26 June to 17 July, 149 plankton-hydrography-productivity stations were completed, with John Sibunka serving as Chief Scientist. John reports that larvae of Atlantic mackerel and yellowtail flounder were relatively abundant from the New York Bight northward. The sixth cruise in this series, to be conducted aboard the Soviet research vessel Belogorsk, is now in preparation.

Art Kendall and David Gordon determined the growth rate of larval and juvenile Atlantic mackerel collected in the New York Bight in the spring of 1978 by examining daily growth increments in the otoliths. Growth was rapid in that fish grew from 5 to 75 mm (SL) in about 40 days. There may be differences in growth rate in mackerel spawned at different places and times. By knowing the growth rate of larval fishes, several other population parameters such as mortality and production can be estimated from appropriate samples.

Work is continuing on the BLM contract to provide information on ichthyoplankton, temperature, and salinity in the Middle Atlantic Bight. NODC has digitized and returned XBT temperature data from our semiannual surveys. We now have both temperature and salinity data in hand and can proceed with formatting and drafting hydrographic tables. Personnel from the Sandy Hook Laboratory met with the ADP group at the Narragansett Laboratory to discuss priorities for wrapping up machine-generated outputs that will be incorporated in the final report. We are completing figures depicting distribution and abundance of the most abundant larvae and/or juvenile fishes taken in both plankton and neuston nets. Catches in the two nets are similar.

Fishery Oceanography Investigation

MARMAP's Albatross IV Cruise No. AL 78-07 began in June and continued into July. Tom Laughton, Bill Burns, and Dan Patanjo were at sea on the second leg of the cruise. Meanwhile, processing of the data obtained on the first leg and on the previous hydrographic cruise (Albatross IV Cruise No. AL 78-06) was carried out ashore.

Jim King plotted horizontal charts of temperature and salinity at the surface and at selected subsurface depths from the thermosalinograph records and from STD and XBT casts. Tim Cain plotted the Albatross IV Cruise No. AL 78-06 section through Gulf Stream ring "S". Sam Nickerson and Anne Dorkins worked on the MARMAP data.

Steve Ramp and Ron Schlitz have been accumulating gear for the current meter and marker buoy installations for the patch study, to be deployed in September. Gil Dering has been checking out the current meters themselves, after a visit to the current-meter facility at Nova University in Dania, FL.

The Investigation is involved in two papers being submitted to ICES for the October meetings, one by Ed Cohen and Red Wright on productivity and hydrography on Georges Bank and one by Steve Ramp and Bob Vermersch (WHOI) on current-meter observations in the Northeast Channel.

The analysis and evaluation of quantitative data pertaining to the New England macrobenthic invertebrate fauna were continued. The write-up of another section (Pelecypoda) for a report on the distribution of these fauna was nearly completed. A substantial amount of augmentation, coding, and updating of the quantitative macrobenthic, amphipod, and bivalve mollusk data bases was accomplished.

Analysis of the contents of stomachs from priority demersal species collected on bottom trawl survey cruises was continued throughout the month. Additionally, the fish digestive tracts collected on the feeding chronology cruise (Albatross IV Cruise No. AL 78-05) conducted in May and June were measured and the contents analyzed. The food habits data base from the 1973-76 collections is currently being prepared for computer processing.

Apex Predators Investigation

Tagging activity by our cooperative sportsfishermen doubled the previous month's effort with over 900 sharks tagged. Thirty-one recaptures were reported, most of them depicting localized movements of the blue sharks on the continental shelf off southern New England.

One major tournament was attended, the Montauk Shark Fishing Tournament on 22 and 23 July. Fifty-three sharks of five species were landed. From this tournament sample tissues were obtained for reproductive, food habits, condition, and age determination.

Highlights include the earliest stage of pregnancy ever recorded for the blue shark on the East Coast. Of the 14 sharks with uneverted stomachs, only 5 contained natural food. This food included bluefish in the 4-5 kg size class, red hake, and spiny dogfish.

The shark tagging data base (approximately 21,000 fish) is punched and verified for 1963-75 for cruise data and 1962-76 for sport-tagged fish.

The backlog of 3 yr of reproductive tissue samples has been embedded and is in the process of being histologically prepared by Alan Lintala. This brings the reproductive data up to a real-time analysis.

Larval Physiology and Biochemistry Investigation

Experiments on the microdistribution of zooplanktonic prey organisms in our 38 and 64-liter aquaria were completed. A new discrete sampler was designed and constructed for these experiments. Adult summer flounder are being brought into the laboratory for spawning in the fall. The electrophoretic sex determination study with summer flounder is continuing. Serum samples from 50 summer flounder have been collected to date. The new cooling system which will handle all the aquaria at the Narragansett Laboratory is nearing completion and testing is scheduled for next month.

Jan E. Beyer, Danish Institute of Fishery and Marine Research, began his 6-mo stay at the Narragansett Laboratory. He will be working with Geoff Laurence on models of larval fish survival.

Plankton Ecology Investigation

Plankton Sorting Group

Excellent progress has been maintained in the processing of the MARMAP zooplankton samples for 1977. Samples collected from waters of southern New England, Georges Bank, and the Gulf of Maine during October, November, and December have been sorted and identified.

Although the processed samples cover a time span of March through December,

no significant numbers of larval fish have been observed with the exception of one station taken by Kelez off the tip of Long Island on 8 December. This sample contained 5,696 Ammodytes sp. with many in the yolk-sac stage of development.

Two members of the group participated in sampling cruises during July. Jacquelyn Frisella was aboard Albatross IV Cruise No. AL 78-07 and Vivian Botelho on Delaware II Cruise No. DE 78-04.

Specimens of seven copepod species have been provided to Dr. Longwell of the Milford Laboratory; they will be photographed with a scanning electron microscope to compare differences in the morphology of metasomal segmentation.

Biostatistics Unit

Data-processing efforts continued during July on the BLM contract data, Polish Sorting Center data, and recent cruise data. Considerable progress was made to incorporate this data into the MARMAP Information System (MIS). Training of members of the Biostatistics Unit in the operation and maintenance of the MIS was continued through July with semiweekly lectures by members of Harold Peterson's staff at University of Rhode Island.

Several informal meetings were held during July to discuss ADP matters. Dave Bearse met with Al Cutting of the Graduate School of Oceanography (GSO) at the University of Rhode Island on 10 July to discuss the potential involvement of the Narragansett Laboratory with the updated computer system to be installed at the GSO this fall. A meeting was held at the Narragansett Laboratory on 17 July with Art Kendall, Ann Naplin, and Patty Rosenberg from the Sandy Hook Laboratory and several members of the Biostatistics Unit at Narragansett. Attention was focused on identifying responsibilities of the ADP personnel at the two labs in dealing with data flow and data processing. Patty Rosenberg visited the Narragansett Laboratory to receive further training in the use of the MIS programs. A meeting was convened by Mert Ingham on 19 July with personnel present from AEG, the Apex Predators Investigation, and the Biostatistics Unit to discuss the continued use of the MIS after 1 October 1978. Coordination of application-programming efforts, data-base management responsibilities, and maintenance of a single operating MIS system was arranged.

Jerry Prezioso returned on 31 July from a 16-day cruise aboard the Soviet vessel Aliot conducting MARMAP Survey I operations in the southern New England and Middle Atlantic regions.

Image Analysis Project

Ray Maurer joined Luther Bivins (NOAA/OOE) and Peter Ortner (AOML) in a visit to Virginia Polytechnical Institute. Francis Almeida, a physicist at VPI, has been working on an NSF-sponsored grant using enhanced optics to achieve automatic identification of diatom species. The capabilities of this system were demonstrated and discussed. Francis Almeida is interested in the zooplankton identification problem and requested samples of zooplankton to test using his holographic techniques.

Gary Johnson has begun a size-frequency analysis of zooplankton taken in the Nantucket Shoals area on Albatross IV Cruise No. AL 78-02. Trends in available prey size distribution will be analyzed with respect to larval fish distribution.

Bill Johnson (URI) is completing his morphometric measurements on ~150-200 species of zooplankton. When finished Bill will run a discriminant function analysis in an effort to separate 15 major zooplankton groups according to morphometric ratios.

Pat Carter attended the federally employed women's conference in Denver during 12-16 July. She has sent a report of the proceedings of that meeting to the FWPC and EEO committee of all laboratories in the NEFC.

On 11 July Joanne Lynch of the GSA computer services contractor in Huntsville AL, visited the Narragansett Laboratory to gather information on computer programs used by personnel at the lab. She is compiling a directory of all of the computer software used within the NEFC.

Dr. West of Suffolk University and members of his group from Cobscook, ME, visited the plankton laboratory for invertebrate identification assistance.

Steve Ramp, Ron Schlitz, and Red Wright spent 1 day at the Bedford Institute of Oceanography discussing patch study operations with Ron Trites and others. Red Wright also attended a meeting of the US delegation to ICES at WHOI and a Division meeting on 14 July.

David Gordon presented a demonstration on the use of otoliths to determine the age and growth of larval fish to Narragansett Laboratory personnel on 27 July.

On 17 July Art Kendall, Anne Naplin, and Patty Rosenberg discussed the MARMAP Information System with ADP personnel at the Narragansett Laboratory.

Chuck Stillwell attended an international predator-prey symposium sponsored by the Sport Fishing Institute in Atlanta, GA, during 23-29 July. Wes Pratt gave a lecture on sharks and reproduction to the St. Georges School summer oceanography session in Newport, RI, on 3 July.

Some of the Apex Predators Investigation's research was described in an article by Bruce Fellman in the 30 July edition of the Rhode Islander Magazine. On 5 July, Jack Casey was interviewed by Janet Gauss of the local NBC television news regarding white sharks off Montauk, NY. On 9 July, photographer Al Maley and pilot Ken Grimshaw visited the Narragansett Laboratory with color slides of large sharks off Montauk. These photos eventually became the subject of a New York Daily News cover story.

Numerous other interviews were granted by Jack Casey with Long Island and local radio and newspaper reporters.

Final plans for the AFS Bay Campus Field Day are being made. Perry Lane from the Gloucester Laboratory visited Narragansett on 20 July to inspect the facility prior to the Field Day and Jon Gibson came on 31 July to help coordinate the set up of displays which will be provided by the various Investigations. Additional arrangements are being made with representatives from the URI Graduate School of Oceanography and the EPA.

Bob Marak met with H.C. Boyar and Wally Smith to set up personnel and program requirements for MARMAP survey cruises for the remainder of FY78 and for six of those in FY79. Details have been worked out with personnel from Sandy Hook, Woods Hole, and Narragansett to ensure that data on ichthyoplankton, primary production, and hydrography will be collected. The Soviet vessel Belogorsk will be utilized for the first three cruises.

Ken Sherman had a luncheon meeting on 5 July with representatives of EPA and URI--Eric Schneider, Dean Knauss, Bob Sexton, and Frank Dimeglio.

On 13 July Ken Sherman went to Woods Hole to attend a meeting of the US delegation to ICES and a Marine Ecosystems Division Investigation Chief's meeting held on 14 July.

On 20 July Robert O'Boyle (Bedford Institute of Oceanography) discussed with Ken Sherman, Ray Maurer, Bob Marak, and Jack Colton the use of in situ electronic particle counters for plankton sorting and counting at sea.

On 26 July Eric Schneider visited with Ken Sherman to discuss the status of the microcosm studies at URI and the status of fish stocks on Georges Bank.

A meeting chaired by Perry Jeffries of URI was held at the Narragansett

Laboratory to review results of our joint URI-NMFS experiment on image scanning on 21 July.

Rich Langton attended the ICES symposium in Aberdeen, Scotland, where he presented a paper on the recent fluctuations in pelagic fish stocks as related to species interactions in the Northwest Atlantic. After the symposium he conferred with foreign specialists engaged in food habits studies. Later in the month Rich Langton also visited Canadian scientists at the Bedford Institute of Oceanography to discuss arrangements for the collection of pelagic fish for stomach analyses during the upcoming herring larvae patch study.

Ray Bowman attended the predator-prey symposium sponsored by the Sports Fishing Institute in Atlanta, GA, where he and Bob Edwards presented a paper entitled "An Estimate of the Food Consumed by Continental Shelf Fishes in the Region between New Jersey and Nova Scotia."

MANNED UNDERSEA RESEARCH AND TECHNOLOGY PROGRAM

The MURT Program was fully occupied in July with two major field operations. During 8-18 July we utilized the Perry PC-14C submersible Diaphus for benthic studies at Wilmington, Delaware, and Washington Canyons. Fifteen dives of 2-3 hr duration to depths of 400 m were completed for a first assessment of the benthic fauna in these Middle Atlantic canyons. A preliminary summary of the collective observations from these dives suggests that these canyons are not as biologically productive as the canyons of the southern New England continental shelf.

The MURT team was also involved in the second year of a surf clam-ocean quahog Ocean Pulse program from 24 July to 6 August 1978 along a transect perpendicular to Rockaway Beach, Long Island, NY. Two, 5-m^2 grids were layed out each near a navigational buoy for easy relocation. In each grid 3,000 marked clams were placed; one grid contained ocean quahogs, the other surf clams. In addition, the 11 stations sampled during the 1977 clam cruise were resampled. A large concentration of surf clams was found at Station 2, where the following experiments were conducted: (1) total seabed oxygen; (2) biological and chemical oxygen consumption partitioning; (3) macrofaunal versus merofaunal-microbiotic partitioning of oxygen consumption; (4) nutrient fluxes between the seabed and overlying waters; and (5) quantitative testing of a airlift clam sampler using diver-collected samples as the control.

DIVISION OF ENVIRONMENTAL ASSESSMENT

Behavior of Marine Fishes and Invertebrates Investigation

A school of adult bluefish captured in the vicinity of Ambrose Light and ranging in length from 60 to 70 cm, has been introduced into our 32,000-gal experimental aquarium. Acclimation to laboratory conditions as determined by stabilization in feeding, swimming speed, and patterns of schooling will take 1-2 mo. Following this period, experiments will be conducted to examine the influence of thermal edges on the fishes' movements. Results from these studies will be compared with those studies presently in progress on juvenile bluefish.

This past month we completed and submitted our yearly progress reports to the Department of Energy (DOE) and NOAA's Environmental Research Laboratory (ERL). The report to DOE includes a final report on the effect of temperature on juvenile bluefish and progress on the influence of petroleum hydrocarbons on the behavior of red hake and blue crabs. The report to ERL presents the results from both laboratory and field studies on the effects of petroleum hydrocarbons on chemoreception in Dungeness crab.

Biological Oceanography of Stressed Environments Investigation

Susan Barker and Steven Ward participated in the second leg of the phytoplankton baseline survey/ichthyoplankton cruise aboard the Albatross IV during 5-17 July. Samples for chlorophyll analyses were collected at 83 stations from the New York Bight to the Gulf of Maine. During the entire cruise (149 stations) 2,466 samples were collected from Cape Hatteras to the Gulf of Maine and prepared for analyses. In addition, samples were collected on this cruise in order to conduct experiments to determine the effect of freezing on chlorophyll concentrations. Samples frozen for 2 wk and 1 mo were processed in the laboratory. The freezing tests are to last 6 mo to see if and how chlorophyll samples decay with time while frozen. This information will be extremely important in planning and implementing Ocean Pulse cruises and in providing high quality data to be used in NEFC ecosystem studies. The processing of previous samples collected onboard the USSR Argus during 13-27 April was completed. We are presently analyzing the Argus samples collected in May.

Plans were initiated by Myra Cohn to study the community structure and population dynamics of phytoplankton at nearshore and Ocean Pulse stations from Cape Hatteras to Maine. This study, in conjunction with efforts by Dr. H. Marshall (Old Dominion University), will be conducted as part of the Ocean Pulse program to examine phytoplankton assemblages over the continental shelf between Cape Hatteras and Canada. Recent changes in the community/population structure of phytoplankton are deemed of considerable importance in regard to marine food webs as well as to shellfish resources; areas off New England and in Funka Bay, Japan, have been closed to harvesting because of outbreaks of paralytic shellfish poisoning (PSP).

Bill Phoel conducted seabed oxygen consumption investigations in Long Island Sound and the New York Bight during the Ocean Pulse cruise of the Delaware II. Baseline oxygen consumption values for Long Island Sound and the proposed offshore sewage sludge dumpsite were obtained. Additionally, stations from which seabed oxygen consumption data were obtained in June 1977 were reoccupied to look for confirmation of previous data which suggested that higher seabed metabolism occurred along the New Jersey coast than along Long Island. We hope to use the seabed oxygen consumption data as an indication of the flux of oxidizable organic carbon to the seabed (that organic carbon available to benthic organisms).

Entry to our new Wang computer is continuing for our nutrient source data from Advance Cruise No. AD 77-01 and Albatross IV Cruise No. AL 77-05. Also continuing is the organization of symap's of nutrients and related parameters from a series of 1974 cruises in Raritan Bay and the New York Bight for publication as a technical report. These data are extremely important in regard to planning activities for continuing environmental studies as well as in relation to data being developed from offshore sites in the Middle Atlantic Bight.

A manuscript by John B. Mahoney and Frank W. Steimle entitled "A Mass Mortality of Marine Animals Associated with a Bloom of Ceratium tripos in the New York Bight" has been prepared and submitted for inclusion in Proceedings of the Second International Conference on Toxic Dinoflagellate Blooms. Another paper entitled "The Decomposition of the Ceratium tripos Population off New Jersey During July-August 1976" by John B. Mahoney has been revised; this paper will be included in the final report on the 1976 New York Bight anoxia problem.

Coastal Ecosystems Investigation

Most of our effort was spent on a 12-20 July Delaware II cruise to Long Island Sound and the New York Bight. Seven people from our Investigation participated. We collected benthic macrofauna samples from 48 stations in Long Island Sound, continuing a study begun in 1972 of long-term faunal fluctu-

ations in the Sound. We also took grab samples in the New York Bight to: (1) characterize the macrofauna of an alternate sewage sludge disposal site 60 nautical miles east of New York City; (2) observe the progress of recolonization in the 1976 anoxia area off New Jersey; and (3) determine surf clam spatfall inside and outside the anoxia area (we found only sparse populations of juvenile clams, about $1/m^2$). Three other Investigations also participated on this small-scale Ocean Pulse cruise; we collected samples for analysis of seabed respiration, phytoplankton species composition, and fish egg and larva mutagenesis.

We also continued work on distributional maps for New York Bight apex benthos, and on several benthic data sets collected under the MESA program. Our draft final report to the Bureau of Land Management (BLM) concerning the benthos of the Baltimore Canyon Trough was reviewed by BLM and is now undergoing minor revisions. We began preparation of a short review paper, "Interactions of Offshore Oil Production and U.S. Fisheries," for the upcoming ICES meeting.

Drs. Pearce and Chang continued to analyze data on epibenthic community structure at stations off Gloucester, MA; Shrewsbury Rocks, NJ; and Charleston, SC. The data are being analyzed and considered for interactions between species for settling space, changes in population structure through periods of time up to 24 mo, and effects of different types of substrata (concrete, rubber, and steel). These data are extremely important in understanding the relationship between demersal fish and natural and artificial reefs. The information will be of importance in developing and managing artificial reefs for inshore recreational fisheries.

Environmental Chemistry Investigation

After several months of difficult work on the "ASV" instrument for analyses for metals in seawater, we have, in consultation with Dr. Fitzgerald of the University of Connecticut concluded that the present setup of equipment is not capable of measuring lead or cadmium directly in seawater at levels below about 1-2 ppb. This detection limit could be useful in our studies of relatively polluted estuarine areas such as Raritan Bay; it is, however, too high to use in studies related to Ocean Pulse and offshore waters. We are looking into various alternatives concerning the use of this instrument for open ocean seawater analyses.

We participated in another cruise in Long Island Sound related to our Ocean Pulse activities. Trawling activities were not completely successful and thus we only obtained a few finfish for metals analyses.

Doug Wenzloff traveled to Seattle, WA, the last week of July. He will be obtaining hands-on experience with researchers at the NMFS Seattle Laboratory for the analyses of petroleum hydrocarbons and PCB's. This training should allow us to start conducting these types of analyses in the near future.

Physiological Effects of Pollutant Stress Investigation

Physioecology

A long-term (45-day) pollutant-exposure experiment with the deposit-feeding duck clam, Macoma balthica, was initiated. The clams are being exposed to copper as the chloride at concentrations of 5, 25, and 50 ppb. Parameters to be examined are oxygen consumption, metal uptake, and behavior. Two experiments to determine the effect of silver and zinc on embryos and larvae of the American oyster, Crassostrea virginica, were performed this month. Five spawnings of the surf clam, Spisula solidissima, were obtained this month and studies of the effects of metals on embryos are continuing. Measurements of oxygen consumption in oyster larvae exposed to mercury are still in progress. Considerable time was spent in manuscript preparation.

Physiological Effects

A series of blue mussels, Mytilus edulis, was retrieved from stations in Narragansett Bay, RI, this month. These mussels, which had been placed in baskets at stations varying in pollutant levels, are part of a cooperative effort between the physiological studies programs of the EPA's Narragansett Laboratory and NEFC's Milford Laboratory. We will be examining these mussels for changes in serum ions and metabolic parameters, such as oxygen consumption, filtration rates, metal uptake, and others. These measurements will be divided between the two laboratories and will be conducted at monthly intervals.

Work continues on the effects of silver and nickel on the metabolism of bivalves. Additional data have also been collected from Long Island Sound flounders to add to the physiological baselines for Ocean Pulse studies.

Biochemical Effects

Groups of enzyme assays were variously performed on preparations of hearts, gonads, and antennal glands from American lobsters previously exposed to cadmium chloride (0 or 6 ppb of Cd for 30 days) and subsequently held at either low or ambient salinity (17 or 26 ppt for 7 days) with or without Cd. Testing was completed on the hearts from both series and on the antennal glands and gonads from the low-salinity series which have been examined so far. Data are presently being analyzed.

Gills and posterior adductor muscles were excised from blue mussels collected from both polluted and control areas in Narragansett Bay, RI. The study is also a collaborative one with the EPA's Narragansett Laboratory. Homogenates of the fresh gill tissue were prepared and stored frozen (-29°C) according to our sampling protocol for bivalve gills, a consequence of observations made during and after the recent Ocean Pulse Researcher cruise. Testing is now underway on the thawed and centrifuged gill homogenates. The adductor muscle, packaged and stored frozen (-80°C, our normal frozen-storage temperature), will be analyzed later.

Considerable time was spent in manuscript preparation.

Anaerobic Bacteriology/Metabolism

Studies are continuing on the characterization and identification of bacterial isolates obtained from the Ocean Pulse Researcher cruise. To date, some 38 isolates have been subject to a battery of chemical tests.

A cooperative experiment with the Charleston (SC) Laboratory of the Southeast Fisheries Center on growth and possible toxin production in heated oysters was completed. A report on the findings is in preparation.

Ocean Pulse Activities

Ocean Pulse sampling in Long Island Sound was continued this month. A variety of gear and instrumentation was employed to determine its utility in future Ocean Pulse research.

Coastal Monitoring, Assessment, and Prediction Investigation

Sampling for larval American lobsters with neuston gear was continued weekly in Buzzards Bay throughout the month. The predominance of stage IV lobster larvae, noted in June, has continued. Telephone conversations with cooperating investigators at the Cape Cod Canal and Charlestown, RI, indicate that stage IV larvae are similarly prominent at both locations. The southern New England group of investigators will meet in September for more detailed comparisons of lobster sampling results.

Fred Lux is preparing the biology section of the provisional fishery management plan for "other flounders." Anne Lange of the Resource Assessment Division is working on the population dynamics section. This plan, which includes flounders other than yellowtail flounder and summer flounder, should be in rough draft form by the end of August.

Larry Davis is revising his manuscript on "Bottom-Water Temperature Trends from Cape Cod to Cape Hatteras During Spring and Autumn, 1964-1976" to include documentation of the relationship of distribution of several species of finfish to water temperature in the Middle Atlantic Bight.

In mid-month, plans were discussed with Jack Pearce for the expansion of environmental assessment activities in southern New England waters within the COMAP Investigation. An integrated program measuring the distribution of nutrients and contaminants, variations in basic productivity, and relative abundance of invertebrate and finfish species, within the framework of the proposed Ocean Pulse program, is anticipated.

Progress reports for two State-Federal fisheries projects were reviewed for the NMFS Northeast Regional Office by George Kelly. The first report covered a series of studies of age-growth and early life history of cisco in Lake Champlain by LaBar, Peters, and their colleagues at the University of Vermont. They are also investigating the state of maturity of American eels in Lake Champlain using histological examination of gonad tissue to determine the rate of sexual development during residence of the eels in the lake.

The second project is a study of the distribution and abundance of shortnose and Atlantic sturgeon in the Kennebec River, ME, by Squiers and Smith of the Maine Department of Marine Resources. Successful tagging of a considerable number of shortnose sturgeon shows a well defined movement of adults upstream in the Kennebec in late spring.

A group of eight technical representatives from nuclear power plants throughout New England visited the Woods Hole Laboratory on 18 July and were given a briefing on the NEFC program by Jon Gibson and George Kelly. All of the group are engineers who serve as spokesmen for their respective plants in dealing with licensing agencies and the public. Most of their questions concerned inshore studies that might have application to the operation of their plants and the influence of the power plants on the marine environment.

Meetings, Talks, Visitors, Publicity

On Wednesday, 12 July, Dr. John Pearce and Mr. J. O'Reilly met with Mr. George Kelly and COMAP personnel to discuss the development of inshore Ocean Pulse activities in Buzzards Bay and waters north of Cape Cod.

On 13 July Dr. Pearce participated in a meeting of delegates and committee members to ICES. Future activities of US representatives to ICES were discussed and plans made for the upcoming 66th Statutory Meeting.

Dr. Robert Tucker, New Jersey Department of Environmental Protection (NJDEP), visited the Sandy Hook Laboratory on 18 July to continue interactions between the NJDEP and the NEFC, especially in regard to future Ocean Pulse research. Dr. Pearce and Dr. Tucker planned a meeting at NJDEP headquarters in Trenton on 24 August. This would be the third meeting of NJDEP and NEFC personnel in regard to implementation of the Ocean Pulse Program.

Dr. Pearce participated in a meeting chaired by the MESA New York Bight Project Office personnel on Thursday, 20 July. The MESA personnel presented a draft of their ocean monitoring plan to NEFC personnel at the Sandy Hook Laboratory, as well as to the Center Director, Dr. Robert Edwards.

Frank Steimle attended a predator-prey symposium in Atlanta, GA, during 24-27 July.

Dr. James Thomas, Jay O'Reilly, and Craig Robertson attended a MESA/SINC meeting on 27 July at SUNY, Stony Brook, to discuss planning for FY79. Following

of Brookhaven National Laboratories (BNL) to discuss cooperative interaction(s) between NEFC/BNL programs. A meeting was scheduled tentatively in September to be held at the Sandy Hook Laboratory to continue discussions with BNL personnel.

Dr. Ted Maull, Morgan State University, Baltimire, MD, visited the Sandy Hook Laboratory on 26 July. Dr. Maull was interested in talking with Division of Environmental Assessment personnel in regard to their past associations with work/study and other cooperative programs that have been developed between universities and the Sandy Hook Laboratory. Dr. Maull is preparing a report on this subject for NMFS/NOAA.

Manuscripts

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Pearce, J., J. Caracciolo, M. Halsey, and L. Rogers. 1978. Distribution and abundance of benthic macrofauna in the sewage sludge disposal area, New York Bight apex, February 1975. NOAA Data Rep. ERL MESA-36. (P)

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AQUACULTURE DIVISION

Spawning and Rearing of Mollusks Investigation

A second tank farm experiment with the surf clam was started in early July. At that time, a population of 45,000 surf clams was established in each of four fiberglass tanks at flow rates of 10, 20, 30, and 50 1/min. The clams were 4-6 mm at the beginning of the experiment. After a 2-wk interval, the fastest growing clams averaged 11.3 mm in length. By the second biweekly interval, the clams averaged 18.1 mm in length. The total increase in length over the 1-mo period represents an increase of about 1,500 times in total biomass in tanks at 30 and 50 1/min. By the second biweekly interval, clams in the tanks at 10 and 20 1/min were significantly smaller than those maintained at higher flow rates. Phytoplankton levels were monitored during the experimental period so that an optimum number of clams at a given flow rate could be ascertained. Experiments to determine if high stocking densities at identical flow rates can hinder growth will be carried out this summer. The results of these two experiments will allow us to predict the capacity of our system and, therefore, the economic feasibility of pumped raceway systems.

Spawning of laboratory-ripened bay scallops and rearing of larvae were

exceptionally good in early July. One spawning at the end of the month resulted in good fertilized egg production, but development to the larval stage was very poor (2%). We are renewing our efforts to understand better the "ripeness" in scallop gonads as it relates to viability.

We have been exploring various strategies for handling metamorphosing scallop larvae and for optimizing conditions for early juvenile growth. A comparison of settlement success in flowing and static systems was recently made. Settlement was high (greater than 75%) and no differences were apparent in the two systems. The best early juvenile growth occurred in the static, cultured-algae-fed systems, but early juveniles grown in unfiltered seawater with no supplemental algae grew nearly as fast and required much less maintenance. In fact, we are very satisfied with the results we have achieved with scallop metamorphosis and growth in modified 20-liter lobster rearing tanks through which unfiltered seawater is run after settlement is complete.

About 4,000 of our laboratory-reared bay scallops averaging 21 mm in length were planted in the Poquonock River in Groton, CT, in conjunction with the Connecticut Marine Advisory Service and the Shellfish Warden of the Town of Groton.

Aquacultural Genetics Investigation

Experimental Inbreeding and Hybridization in the Commercial American Oyster

Initial analysis of a geographic hybrid cross between American oysters from South Carolina and Long Island Sound showed differences between hybrid and local non-hybrid larvae in mean size values at 7 and 14 days, with non-hybrids being larger. There were no differences in sizes at 2 and 21 days. By 21 days though, many of the larger larvae had set or died, which accounts to some extent for a lower control value. The control culture initiated at the same volume as the hybrid culture did not do as well overall as the hybrid culture in numbers of larvae surviving to metamorphosis. Larvae from another control culture carried in a larger volume, yet at the same density, survived to metamorphosis. Recently metamorphosed oysters (spat) from inbred and outcross controls are growing in the outdoor tank farm. Spat have been obtained also from new foundation crosses of wild oysters intended for establishing additional inbreeding lines. These spat are especially important because of the loss of some of the stocks.

Mass Selection of the Commercial American Oyster

Spawning of selected adult oysters of the 1976 year-class to produce the first generation of selected offspring is continuing. Seven high-line crosses, four low-line crosses, and two control-line crosses have now been made. The last 1977 year-class animals are being measured for meat weight and genetic variation studies. The data from these animals will be analyzed in forthcoming months. Routine care, feeding, and cleaning of 1976, 1977, and 1978 year-class animals in the outdoor tank raceway system continue.

Cytological and Cytogenetic Studies of Planktonic Fish Eggs

A paper was prepared for presentation at a symposium (sponsored by the Japanese Society of Scientific Fisheries) on "Recent Progress and Future Prospects of Fish Genetics and Genetic Improvement." The meeting will be held in October in Shimizu, Japan, and proceedings will be published. The title of the paper is "Cytological and Cytogenetic Development of Atlantic Mackerel (Scomber scombrus) Eggs in Ocean Surface Waters and in Migrating Fish."

Aspects of Nutritional Requirements of Mollusks Investigation

Recent experiments with the pollutant, selenous acid, were conducted to investigate population growth inhibition in 11 algal species, each cultured in two types of growth media. The degree of inhibition of algal population growth by three selenium concentrations (100, 10, and 1 mg%) dissolved in an artificial seawater growth medium was compared to that which occurred in a natural seawater growth medium. At the two highest selenium concentrations, inhibition in the artificial seawater medium was generally more severe than in the natural seawater medium. For example, at 100 mg% selenous acid, there was 100% inhibition (no growth) in eight of the tested species. In the natural seawater medium, however, these eight species were capable of some reproduction; growth ranged from 5.4 to 91.6% of the control populations. At the lower concentration, 10 mg% selenous acid, there was 100% inhibition of five species when cultured in the artificial seawater medium, but in the natural seawater medium these five species could multiply to some extent, with a growth range of 5.5-24% of that of the control. Since selenium is a sulfur antagonist, these results suggest that the sulfur concentration in the natural seawater was sufficient to reverse partially the selenium inhibition.

To test the above hypothesis, experiments were conducted in an artificial seawater growth medium in which the normal $MgSO_4$ component was replaced by MgCl. The absence of sulfur in the medium should result in still greater inhibition of growth than in the normal artificial seawater medium with $MgSO_4$ included. These effects were indeed noted in all the species (with one exception) at the 1-mg% and 0.1-mg% selenium concentrations. The percent inhibition in these latter concentrations of selenous acid was always larger in the medium without sulfate than in the medium with sulfate.

Although there were several malfunctions of the temperature control system and shutdown in the aeration system several times in the algal mass culture room, harvests from algal culture carboys were good. The yield was 2,050 liters in the past 4 wk. This harvest was distributed to the various investigations in need of larval and juvenile foods: Aquacultural Genetics, 631 liters; Spawning and Rearing of Mollusks, 833 liters; Physiological Effects of Pollutant Stress, 436 liters; and Control of Larval Disease, 88 liters. Mixed algal species were also cultured in open fiberglass tanks so that a continuous supply of food was available to adult and juvenile scallops at a rate of 300 ml/min.

Algal stock cultures were sent to several investigators on their request: Long Island Oyster Farms' Maine installation; André La Bonte of Florida; J. Carogul of Carogul Inc. in New York City; and Ecology Consultants of Colorado.

Meetings, Talks, Visitors, Publicity

Mr. Reuben Valdez of the Shinnicock Tribal Oyster Project consulted with Dr. Ukeles on methods of algal culture for the hatchery that is now being constructed. Mr. Manaham, University of North Wales, visited Dr. Ukeles to observe the Milford Laboratory facilities and to discuss problems of mutual interest in oyster larvae nutrition.

Barry Gold, University of Connecticut, spent a day with us discussing bivalve culture; Patricia Rogers, Universidad Nal de Mexico, spent 2 days discussing aquaculture; Victorio Garrido, Division Proteccion Pasquera SAG, Santiago, Chile, was with us for half a day reviewing aquaculture and environmental work; Steve Conway, University of Bridgeport, was provided with 500 juvenile scallops for a thesis project.

PATHOBIOLOGY DIVISION

Comparative Pathobiology Investigation

Minchinia sp. again was found in Korean oysters; one oyster in a sample of 200 was heavily infected with this sporozoan parasite. Spore stages were present throughout the tubules of the digestive gland diverticulae.

The histologic examination of the March sample of duck clams from the Tred Avon River, MD, was completed. The prevalence of neoplasia in Fox Hole clams was 14%. One animal from the Double Mills control site had an infiltrative lesion associated with muscle tissue of the foot. The cytology of the infiltrating cells suggests neoplastic transformation, however, no mitotic figures were noted. A cytozoic, multinucleated parasite was seen in the affected muscle tissue. Additional studies using special stains have been initiated to clarify the identity of this organism.

Preparation of clean copy for the monograph on the normal histology of the blue crab, *Callinectes sapidus*, continues.

Various larval fishes and adult American sand lances collected on the April Ocean Pulse cruise (Researcher) have been examined for the presence of gross abnormalities. An interesting parasitic copepod has been found on many of the sand lances, both larvae and adults. Type specimens have been sent to Dr. Z. Kabata at Nanaimo, BC, for identification. Some of the gross lesions of gadid and other larvae will be studied further. Radiographic examination of adult sand lances will be initiated soon.

Various crustacea from the July 1977 Ocean Pulse cruise to DWD 106 were examined for gross abnormalities or were processed for histopathological examination. Euphausids were the most interesting animals and may prove to be useful study organisms. *Euphausia krohnii*, *Thysanopoda raschii*, and other Euphausiacea from sewage and acid sites were infested with ciliates on the setae of the thoracic and abdominal appendages. Several ciliates are known from planktonic crustacea and special staining is needed to identify them. The presence or absence of these ciliates may serve as indicators of environmental conditions. Fifty percent and 65% of *E. krohnii* from sewage and acid sites, respectively, showed evidence of black gill tissue. These black areas were composed of cellular material and histologically appeared melanized and necrotic. Black gills have been reported from shrimp exposed to heavy metals and other chemicals. Unfortunately, euphausids were not obtained from DWD 106 control sites, and, as yet, no correlation can be made between ocean dumping and black gills in euphausids.

Analysis of brains for cholinesterase activity did not show any differences between 5 control and 17 "whirling" Atlantic menhaden. All values obtained were within normal limits of those known for other species of fishes. These preliminary results suggest that organophosphate pesticides are not the cause of the demyelination seen in the brains of some "whirling" menhaden. Additional, apparently healthy, menhaden have been collected for use as controls in blood chemistry studies.

During the month the histology laboratory sectioned 805 blocks and stained 1,177 slides from a large variety of marine fishes, crustaceans, and mollusks.

Disease and Environmental Stress Investigation

Two cruises were conducted in Sandy Hook/Raritan Bay to collect winter flounder (13 and 21 July). Two hundred thirty-two flounder were examined for the presence of fin rot disease; none of the fish examined had fin rot. Of the 232 winter flounder examined, 110 were young-of-the-year (YOY) fish; none had epidermal papillomas. Two cruises were conducted at the sewage sludge site

in the MESA apex (11 and 20 July) and 139 winter flounder were examined; only 2/139 (1.4%) had fin rot. None of the 47 YOY fish had epidermal papillomas. One cruise to Great Bay, NJ (5 July), provided 29 winter flounder for examination; none had fin rot disease. Beach seining for YOY winter flounder was conducted on eight occasions during the month. Sampling sites included several localities in Sandy Hook/Raritan Bay, Navesink River, and the Arthur Kill. None of 360 YOY winter flounder examined had epidermal papillomas.

Peritoneal blood cells from striped bass and cunner exposed to 10 ppm of cadmium for 96 hr and collected after intraperitoneal injections of Bacillus cereus have been processed for examination by electron microscopy. On the basis of agglutination tests, the effect of cadmium on the humoral immune systems of these two fish is different. Present studies are evaluating the effects of cadmium on cellular immunity by assessing the ability of phagocytes to ingest and lyse bacteria.

A manuscript entitled "An Introductory Light and Electron Microscopic Survey of Bacteria and Protozoa Found on the Gills of the Rock Crab, Cancer irroratus" is near completion in rough draft. This paper includes a reasonably thorough review of a flagellate which, on the basis of its fine structure, appears to have both euglenoid and kinetoplastid characteristics. The literature search on this protist has been extensive because the cytology of protozoans is complex and well studied. Thus far, a comparable organism, except for members of the genus Isonema for which two species have been described, has not been found. The reasons for examining this organism with some care are twofold: (1) it may represent a new species; and (2) there has been a great emphasis on so-called "indicator species" and the metabolic requirements of certain protozoa are specific and possibly of significance in environmental monitoring.

Aquaculture: Control of Larval Disease Investigation

Studies comparing larval oyster development in UV-treated seawater with development in non-UV-treated seawater are continuing. A study was initiated to evaluate the effectiveness of a 3 gal/min Aquafine UV unit. A comparable Refco UV model also was tested. Cursory examination of bacteriological plates suggest that of the four bacterial pathogens tested, the Aquafine model was effective in killing three and the Refco model in killing two pathogens. Biochemical characterization of the recovered microorganisms is in progress.

In studies of the ozone-UV quarantine system, the presence of hypobromous acid (HOBr) has been detected after about 35-45 min into the 80-min treatment cycle. Since this chemical is very reactive and long lived (48 hr), tests to determine its disinfection potential have begun. The ozone dose needed to initiate formation of HOBr is also being determined to prevent HOBr formation while still achieving sterilization of the effluent.

Comparative studies of immunity in adult and larval oysters require cell preparations containing high percentages of phagocytic cells. These preparations easily are obtained with adult oysters because phagocyte-rich hemolymph can be obtained with a syringe and needle. It is more difficult with larval animals because they must be crushed to release cells; consequently, phagocytes are intermixed with other cells. A technique is being developed to recover larval phagocytes based on the principle that phagocytes attach to surfaces while other cells do not. By utilizing thin surface films of collagen to which phagocytes can attach, washing away other cells, and then dissolving the film with collagenase, it is expected that pure suspensions of physiologically undamaged larval phagocytes can be obtained. During the past month work was centered on getting collagen into solution, freeing the solutions from toxic metabolites, and preparing adequate collagen films on glass slides.

Meetings, Talks, Visitors, Publicity

Dr. Murchelano and Dr. Blogoslawski attended the Workshop on Marine Pollution at Estes Park, CO, during 10-14 July.

The annual seafood picnic was held at the Oxford Laboratory on 19 July. Several Washington Office staff and guests attended.

Visitors to the Oxford Laboratory this month included Mr. Stewart Sherburne, State of Maine Sea and Shore Fisheries, who studied shellfish pathology for 2 wk with Mr. Kern and faculty. Mr. Leonard Mangiaracina and Mr. Richard Pepino, EPA Regional Office, Philadelphia, PA, visited the Laboratory on 18 and 19 July to discuss future Pathobiology Division participation in the EPA Chesapeake Bay Program. Dr. Thomas O'Connor, NOS Ocean Dumping Program, visited the Laboratory on 21 July for a briefing on the Pathobiology Division's studies on DWD 106 and to discuss future research on ocean dumping. Other visitors included Mr. John Ropes of the Woods Hole Laboratory on 13 July; Mr. Scott Skrupski, Florida Institute of Technology, on 28 July; and Mr. J. S. Kepley, Director of Baltimore Aquarium, and family on 26 July.

Manuscripts

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Sawyer, T.K., M. Light, B.A. Harke, and E. J. Lewis. Marine amoebae (Protozoa:Sarcodina) as potential indicators of oiled bottom sediments in the Gulf of Mexico. Proc. 1979 Oil Spill Conf. (Abstract). (S)

RESOURCE UTILIZATION DIVISION

Resources Development and Improvement Investigations

Fisheries Engineering

The bulk of Fisheries Engineering's time continues to be spent on the design and development of the NEFC's new shellfish assessment system. Under development are a larger dredge using the submersible pumping system, a redesigned stern ramp system to handle the dredge, a redesigned winch for the electrical cable supplying power to the submersible dredge mounted pump, and instrumentation systems to monitor dredge performance.

The dredge design has been set and detail construction drawings are in progress. Their completion is expected in mid-August. The modifications to the stern ramp dredge handling system have been layed out and detail drawings will commence when the dredge drawings are completed. The winch is being modified hydraulically to simplify operation, and we are awaiting parts to complete that modification. Additionally, the winch is being rebuilt to carry more electrical cable. This involves repowering with a larger motor, a new foundation, and a larger drum. Because of time and budget constraints and the NEFC's past poor

initially consist of a direct-reading odometer instead of the remote unit under design.

The 65-ft research vessel Rorqual was hauled and the hull was sandblasted, surveyed, and painted. She was found to be structurally sound and was given a clean bill of health. On return from the boatyard, a number of Gloucester Laboratory personnel donated their time after hours to paint freshly the vessel superstructure and hull above the waterline. There is still work to be done on the vessel, but she is shaping up very nicely.

Testing of the experimental beam trawl was limited to 1 day as the cooperating commercial vessel Peggy Bell II was hauled out for most of the month. The trawl, principally designed as species-selective (flatfish) commercial hard-bottom gear, is also being evaluated as a juvenile sampling device. Its fixed-mouth opening can provide accurate quantitative measurements of water filtered and area covered.

Processing Engineering

Tom Connors completed his work on the silver hake processing machine (modified LaPine heading and cleaning machine). It is now operational in an East Boston processing plant. He continues to work on the minced fish extruder which will be used for in-house studies.

Bob Van Twuyver has continued to refurbish the Gloucester Laboratory's experimental freezer system and restore some of its subsystems. In addition to improving the reliability and flexibility of the system, he has apparently also effected a significant decrease in our electrical power usage for the past quarter.

Bob provided engineering assistance and has participated in experiments using a modified canned tuna press to evaluate press drip of fish blocks and fillets.

Also, an experimental chiller was produced to maintain a constant temperature (31°F) for use in American sand lance utilization studies being carried on in conjunction with the New England Fisheries Development Program.

Storage Study of Mytilus edulis

The microKjeldahl method is proving very successful and has replaced the AutoAnalyzer method for determining proteins in mussels. Mussels were finally obtained and put up for storage. Proximate analyses are now being run on these and on a sample of American sand lance.

Species Identification

Plates showing: (1) species differences among eight species of frozen crab; (2) similarities between canned and frozen crab meat of the same species; and (3) similar patterns among individuals of one species have been prepared for inclusion in a paper to be submitted in early August to the Journal of the Association of Official Analytical Chemists.

Pasteurization of Reformed Crab Meat

Studies continue on pasteurization of reformed crab meat in flexible pouches. Thus far, efforts have been somewhat unsuccessful. Steam lumps do not have the rigidity to endure the filling, sealing, pasteurizing, and handling process. The alginate product also has a mushy texture following processing. It is hoped these problems will be overcome by the next report.

Guaranteed Quality Program

Owing to the erratic landings of fresh fish, we are experiencing considerable difficulty in obtaining 1-day-old fish for our tests. In spite of the shortage of fish, we have started tests to determine the fresh storage life of fillets packaged in overwrapped plastic trays as used in meat display cabinets. Preliminary results indicate tha fillets packaged in this manner have a longer 33°F storage life than fillets packed in glass beakers sealed with aluminum foil. It also appears that once the plastic package is opened, the fillets lose quality quite rapidly.

We have now examined three test shipments of Virginia seafoods that have been subjected to air-shipping stress. In one test, the fish were flown from Norfolk, VA, to Detroit, MI, to Wilmington, DE, to Atlanta, GA, to California, to Detroit, to Newark, NJ, to Boston, MA, and thence in open truck to Gloucester, Ma. Examination by our inspectors show that most are Grade A in freshness. Taste panel results are being evaluated.

New Product Development

We were most fortunate to obtain about 300 lb of freshly caught round American sand lance. These ranged in size from 12 to 17 g. In the initial panel test, they received a hedonic score of 7.9 (nearly "like very much") when cooked by deep fat frying. These fish were initially poorly iced and within 24 hr most showed signs of belly burn. Those fish in contact with ice did not show signs of belly burn after 1 wk of iced storage. These latter fish scored an average of 7.6 on the hedonic scale (between "liked moderately" to "very much"), thus showing that these fish have a good iced-storage characteristic. Enough H&G fish were frozen for use in frozen storage tests.

The first large-scale test of a LaPine heading/gutting machine was completed in a commercial fish processing plant. Although the silver hake used were quite soft and much larger than the machine was designed for, just about all the fish below 12 inches were satisfactorily cleaned. Additional runs are planned to complete the contract.

A sample of frozen butterflied silver hake prepared by the LaPine machine was given to a local fish processor for smoking. A preliminary examination of the smoked fish showed it to be very acceptable--with none of the inherent problems of the Great Lakes fish. With its lower price than most smoked fish products on the market today and its high quality, smoked silver hake appears to have good commercial potential.

Product Quality, Safety, and Standards Investigation

Product Quality

During this period, routine storage tests were performed on studies in progress. These involved defatted Argentine whiting fillet blocks, laminated minced/fillet Atlantic cod blocks, and minced silver hake blocks made from different-sized fish, or minced at different temperatures.

Microbiology (total plate count and coliforms) of the filleting operation was monitored over a 4-day trial with the Arenco filleting machine. Complete results are not available yet. A storage study was initiated with frozen silver hake blocks prepared from skinless fillets obtained with the Arenco machine. The variables under study include packaging material, packaging atmosphere, storage temperature, and addition of antioxidant.

A comparison of sarcoplasmic proteins from 14 species of fish has been completed. The protein extracts were run on both commercially prepared (LKB-

PAG plate) polyacrylamide gels and our own formula polyacrylamide gels. No major differences in the protein patterns were observed. When Brinkman phisolytes were substituted for the LKB ampholine-carrier ampholytes, the pattern obtained was somewhat different, and a linear pH gradient was not obtained.

Recovery experiments for the available lysine assay have yielded generally poor results. Incoming tap water used to cool the reflux condensers is too warm (about 20-22°C), and losses are much higher than normal. Mike Allsup and Bob Van Twuyver are rebuilding an old compressor which we will use to circulate chilled glycol through our condensers.

Product Quality and Safety

A considerable amount of time was spent in testing the Perkin-Elmer 910 gas chromatograph. The noise generated by contaminated lines, valve, rubidium source, and the detector itself was excessively high. At the sensitivites that are needed to detect N-nitrosamines in fish extracts (less than a single nanogram), the instrument was useless. It was necessary to bake out the interface lines from the column outlet to the detector and the valve at 300°C.

The nitrogen-phosphorus detector was disassembled, the collector electrode and jet thoroughly cleaned to remove contamination due to excessive column bleed. A new rubidium source was replaced. Contamination of the system was caused at the repair factory by careless inattention of the service engineer not removing our columns from the GC oven before testing the system out. After all this, the new rubidium source proved to be defective. We are awaiting shipment of a new one from the factory. As soon as it arrives and is installed, the GC will be tested out.

Two new glass columns were received and conditioned. These new columns will be used to analyze about 100 extracts.

Workup of hot-smoked lake whitefish samples and hot-smoked lake whitefish spiked with N-nitrosamines at the 1, 2.5, and 5 ppb levels has been completed.

Dr. Moreau has completed a report on the confirmation of N-nitrosamines in fish by GC-MS. A copy of this report was given to Tom Billy and Mel Ecklund.

Product Standardization

Instructions and score sheets for use with the Codex (International) Standard for Lobsters have been sent to Area Inspection Chiefs and the Central Office for review and comment. It is expected that this document will be used for lot inspection of imports and for inspection of lobsters for military procurement.

The research study of cook drip and press drip methodology and objective measurement of bone in fillets and fish blocks has been concentrating on a modified canned tuna press for evaluating press drip of fish blocks and fillets.

Technical Assistance, Meetings, Talks, Visitors, Publicity

Assistance was provided to Mr. Sudip Jhaver of the University of Rhode Island in determining process times for sterlization of Atlantic mackerel packed in 6-1/2 oz cans. It was determined that in order to obtain an F value of 5.0 under the test conditions, it is necessary to process the mackerel packed in oil for 38.8 min, and 34.9 min is required for the mackerel packed in water. The retort temperature was 250°F.

Kurt Wilhelm visited the Stonington Lobster Cooperative in Stonington, ME, to assist in evaluating problems ("blackening" and high total plate counts of picked meats) in processing rock crab.

Mr. Chikaso Ito, Tokyo Maruichi Shoji Co., Ltd., and Mr. Cornelius K. Ito,

International Fisheries Division, visited the Gloucester Laboratory to investigate the possibility of making surimi and kamaboko from silver hake. They visited the Channel Fish Co. in East Boston to view its operation and came to the Gloucester Laboratory to prepare kamaboko. Using a home-type recipe, the kamaboko they prepared was quite acceptable to them. Several of the Laboratory personnel were given some kamaboko to taste. Most comments received were that kamaboko had very little fish flavor, and it probably would not be accepted as an American dish. While at the Channel Fish Co., Mr. Ito noticed that the female silver hake were filled with roe. Some of the roe was salted, cooked, and taste tested. Mr. Ito thought that this roe might be exported to Japan.

The Codex Working Group meeting on battered and breaded fish sticks and portions has been changed from Boston to another undetermined city.

At a meeting of the Armed Forces Product Evaluation Committee held at Fort Lee, VA, on 12 July, John Ryan presented a proposal to amend the Federal Specification for Oysters to include breaded oysters with a maximum of 40% breading and the use of plastic containers in place of the 1-gal cans now being used. After sampling the product and viewing the plastic containers, the committee voted to accept these changes.

A demonstration of the Arenco filleting machine for silver hake was held for the industry. Over 45 people attended the demonstration on the fish pier which was followed by a presentation at the Gloucester Laboratory. Representatives from Arenco, our staff, and the New England Fishery Development Program participated; and samples of fillet blocks and fried portions were shown to the group. In general, the overall reaction was quite favorable, and Arenco has agreed to make some modifications to the machine which should increase fillet yield.

Mike Corbett and Al Blott met with Bob Marak and Ray Maurer at the NEFC's Narragansett Laboratory to discuss the NEFC's needs for juvenile sampling devices for sampling the bottom and mid-water region. A joint report will be forthcoming.

Mike Corbett and Al Blott also attended a meeting in Woods Hole of those involved in ICES, both past and present. Mike reported on his recent participation in three working groups of the Gear and Behavior Committee.

Manuscripts

A paper on Atlantic cod and its utilization has been sent out for publication in Marine Fisheries Review.

Dan Baker completed a paper on "Applications of Refrigeration and the Freezing and Storage of Food." This is an expansion and more detailed version of his recent IYABA presentation.

NATIONAL SYSTEMATICS LABORATORY

Shrimps

A systematic revision of the genus Penaeopsis was nearly completed. Studies continued on the taxonomy of American Pacific penaeoids.

Other Crustaceans

The draft of a manuscript on the distribution of several decapods off the Carolinas was completed. Preparation continued of a guide to temperate-water decapod crustaceans of the US East Coast.

Benthic Fishes

A manuscript on the taxonomy and distribution of North Atlantic rocklings was revised. Research was done on the classification of gadiform families.

Pelagic Fishes

Research continued on the anatomy and classification of Spanish mackerels and halfbeaks.

Meetings, Talks, Visitors, Publicity

Dr. Cohen presented a seminar on the classification of gadiform fishes at the Smithsonian Division of Fishes and the Huntsman Marine Laboratory, St. Andrews, NB. He also taught the fish section of a course on marine vertebrates at the Cobscook Bay Laboratory of Suffolk University.

Visitors included Dr. Angeles Alvariño of the SWFC, Dr. D. V. Lightner of the University of Arizona, and Dr. M. A. McWhinnie of De Paul University.

Manuscripts

Cohen, D. M. Review of Francis Day (1829-1889) and his collections of Indian fishes, by P.J.P. Whithead and P.K. Talwar. Copeia 1978: 377. (P)

Cohen, D. M., and J.L. Russo. Variation in the fourbeard rockling (Enchelyopus cimbrius), a North Atlantic gadid fish, with comments on the genera of rocklings. Fish. Bull., US. (A)

ATLANTIC ENVIRONMENTAL GROUP

Ocean Monitoring and Climatology Task Group

A one-page report updating the location and configuration of warm-core Gulf Stream eddies adjacent to the continental shelf in the Middle Atlantic Bight was submitted for publication in the August Atlantic Notice to Fishermen, and also was released to a mailing list of interested individuals at the same time. This report points out that during mid-July three warm-core eddies were present off the Northeast coast, one near Atlantis Canyon (centered at 39°00 70°00'W), the second near Oceanographer Canyon (39°00'N, 67°30'W) and the third farther east and offshore at 40°13'N, 64°52'W. All three eddies are expected to move generally westward which should bring the easternmost one in close proximity to Georges Bank.

During July the cooperative Ship of Opportunity Program obtained eight XBT transects, two in the Gulf of Maine, two across the southern New England shelf along the 71°W meridian, two across the shelf and slope off New York City, one off Norfolk, VA, and one in the Gulf of Mexico. Also, continuous plankton and temperature records at 10 m were obtained along one of the Gulf of Maine rou and the transect of the shelf and slope off New York City, and a continuous plankton record was collected northeastward from Norfolk, VA. One of the transects across the southern New England shelf was made by Steve Cook on board an offshore lobster boat, the Jennie and Jacky out of Westport, MA.

Ocean Dumping Task Group

Copies of a proposal to study the near-surface currents at DWD 106 using radiosonde drogues, have been supplied to the NEFC's Sandy Hook Laboratory and the University of Delaware's College of Marine Studies at Lewes, via Drs. John B. Pearce and Christopher N. Mooers. Along with the proposal was sent a letter requesting cooperation regarding the set up and operation of the two radio directional finding stations at those locations. Two radiosonde drogues have

been purchased for the initial phase of the experiment, which is expected to begin in late August or early September.

Meetings, Talks, Visitors, Publicity

On 20 July, Mert Ingham traveled to Sandy Hook, NJ, to attend a briefing on the New York Bight Monitoring Plan presented by members of the MESA-New York Bight Program to NMFS scientists.

Starting 30 July, Steve Cook participated in a 4-day lobster fishing trip across southern New England waters collecting an XBT transect and obtaining bottom temperature data to compare with fish vent temperatures.

Manuscripts

Cook, S.K. Expendable bathythermograph observations from the NMFS/MARAD Ship of Opportunity Program for 1975. NOAA Tech. Rep. NMFS SSRF. (A)

Cook, S.K. Water column thermal structure across the shelf and slope southeast of Sandy Hook, N.J. in 1977. Annales Biologiques. (S)

Cook, S.K., and C. Gardner. An example of rapid change in the summertime water column over the continental shelf southeast of Sandy Hook, N.J. Gulfstream. (A)

Crist, R.W., and J.L. Chamberlin. Bottom temperatures on the continental shelf and slope south of New England during 1977. Annales Biologiques. (S)

Gunn, J.T. Variation in the shelf-water front position in 1977 from Georges Bank to Cape Romain. Annales Biologiques. (S)

Mizenko, D., and J.L. Chamberlin. Gulf Stream anticyclonic eddies (warm-core rings) off the northeastern United States during 1977. Annales Biologiques. (S)