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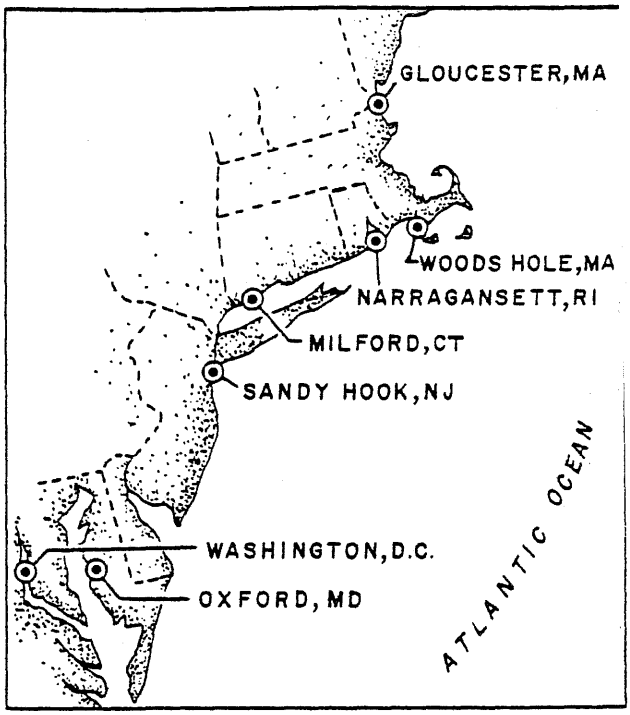

MONTHLY NARRATIVE REPORT
AUGUST 1977

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE

RESOURCE ASSESSMENT DIVISION

Resource Surveys Investigation

The major activity during August was the summer bottom trawl survey. The primary objective was to sample the inshore waters between Cape Hatteras and the Gulf of Maine (<27 m south of Cape Cod and <55 m north of Cape Cod) to obtain information on recreationally important species. The Delaware II (Charles Byrne, chief scientist) returned on 5 August after having completed 115 stations between Cape Hatteras and Block Island during a 10-day period. The Albatross IV completed 30 stations between Block Island and the Great South Channel during 1-5 August (Linda Despres, chief scientist). The final portion of the survey, which included Nantucket Sound, Georges Bank (waters <110 m), inshore waters from Cape Cod Bay to Grand Manan Island, and the western half of the Gulf of Maine, was completed by Albatross IV (Henry Jensen, chief scientist) during 16 August - 1 September. A total of 149 stations was occupied during this part. The inshore stations north of Cape Cod were particularly difficult to complete because of the treacherous bottom and extensive numbers of lobster pots. The duration of the trawl tow at many of these stations was considerably less than the usual 30 min in order to avoid severe damage or possible loss of the net and trawl doors. One door and most of one net were lost at one station.

A hydroacoustical experiment was conducted during 7-12 August using Albatross IV (John Suomala, C.S. Draper Laboratory, MIT, Cambridge, Massachusetts, chief scientist). The work was accomplished in the Stellwagen Bank area and in Provincetown, Massachusetts, harbor, with the primary objective to obtain hydroacoustical backscattering data from fish targets supported by simultaneous videotape and diver observations. The underwater observations were accomplished in cooperation with the MURT dive team (Richard Cooper, in charge). In conjunction with the hydroacoustical objective, a 24-hr period was devoted to a series of bottom trawl tows to collect fish for a study of diel feeding habits (Richard Langton, Marine Ecosystems Division, in charge).

Age and Growth Investigation

Atlantic mackerel and red hake age samples that were received from the USSR and that were aged by their age readers, were examined by the investigation. A comparison of US and USSR ages for these species shows significant differences in the computed age compositions. The samples will be returned for review by the USSR age readers.

Age samples completed were: haddock (Albatross IV Cruise 77-02 and second quarter 1977 commercial samples); redfish (Albatross IV Cruise 77-02); scup (Delaware II Cruise 77-02); summer flounder (Albatross IV 1976 commercial samples); and red hake (Albatross IV Cruise 75-3 and Albatross IV Cruise 75-12).

Sandy Hook Investigation

The first two parts of a three-part inshore fisheries bottom trawl survey were completed during August. A detailed cruise report was prepared and distributed. The third part, utilizing a mid-water trawl, was rescheduled for early September.

Processing of data collected during a 2-yr New Jersey creel survey of charter and party boats continued during August. All of the data have been coded, keypunched, and processed through initial audits. Estimates of the numbers of fish caught for all major species have been completed from July 1975 through mid-September 1976. Estimates of the number of boat trips made have been completed for the entire survey.

Fisheries Statistics Investigation

Investigation personnel participated in a series of cruises. Ralph Mayo acted as chief US scientist on the second leg of the Suzuka Maru squid trawling experiment comparing catchabilities and by-catch components of off-bottom and bottom-skimming mid-water trawls. Steve Murawski participated in and then helped in the summarization of the surf clam surveys for the winter of 1976 and spring of 1977 as related to the reduced oxygen levels in the mid-Atlantic Bight during the summer of 1976 (draft manuscript has been completed). Barry Armet, Maureen Griffen, Mike Morrison, Liz Bevaqua, and Helen Markestyn participated in the August groundfish cruises on the Albatross IV.

Gordon Waring and Frank Almeida returned from summer school at Iowa State University and resumed work on Atlantic herring and hake assessments. Candy Cain completed the yellowtail flounder biostatistical summaries and then accepted a reassignment to the Washington office to work with the marine mammals program. Joan Palmer left for an academic year at Iowa State University in the math/statistics department. Anne Tibbetts completed an updated draft of her 1975 ICNAF squid research document to be used as a regional fishery management council review paper. Thurston Burns, Gordon Waring, and Frank Almeida completed initial preparations for the continuing international Atlantic herring tagging program scheduled to commence in September. Ralph Mayo, Bill Callahan, and Otis Jackson prepared detailed summaries for the regional office on the Atlantic cod by-catch problem being addressed by the New England Fishery Management Council. Paul Woods prepared summaries for updating the assessment of the Atlantic cod stocks for 1978.

Fisheries Analysis Investigation

Brad Brown, Vaughn Anthony, and Paul Wood attended the New England Fishery Management Council meeting in Brunswick, Maine on 2 and 3 August, to provide assessment advice on Atlantic cod, silver hake, sea scallops, and Atlantic herring. Vaughn Anthony also attended the Statistical and Scientific Committee meeting of the Mid-Atlantic Fishery Management Council (8-9 August) and the New England Fishery Management Council (16 August). Advice was given on a variety of species. Written assistance was provided also to the staffs of both councils on squid, Atlantic mackerel, and Atlantic herring management plans.

Steve Clark attended a meeting of the Groundfish Management Plan Oversight Committee of the New England Fishery Management Council on 18 August, and provided assessment information on Atlantic cod and haddock stocks. In response to requests made at that meeting, Fred Serchuk and Steve Clark prepared an assessment of the impact of anticipated overruns in Atlantic cod quotas from Georges Bank and the Gulf of Maine for 1977. Steve Clark and Brad Brown presented the results of these analyses at the September meeting of the New England Fishery Management Council.

John Ropes and Steve Murawski participated in a shellfish assessment research cruise in the Mid-Atlantic area during 16-29 August.

Meetings, Talks, Visitors, Publicity

Donald Flescher and Eva Montiero staffed a NMFS display during 12-13 August at the New Bedford Seafood Heritage Days.

Emory Anderson attended a meeting in Woods Hole on 23 August of the Hake Oversight Committee of the New England Fishery Management Council. Emory also met with Jeff Tobolski, analyst with Earl R. Combs, Inc., of Seattle, and discussed Atlantic mackerel and silver hake assessments. This consulting firm is under contract to the New England Fisheries Development Program to do an economic venture analysis and feasibility study with respect to potential expansion of US fisheries on these two species.

Tom Azarovitz, Charles Byrne, and Malcolm Silverman transferred from the Sandy Hook Laboratory to the Woods Hole Laboratory. Andrew Thoms will similarly move sometime in September.

Gene Heyerdahl attended the Ninth Session of the Coordinating Working Party for Atlantic Fishery Statistics held in Dartmouth, Nova Scotia on 17-23 August. Organized in 1959 by the FAO and the regional fisheries commissions (e.g., ICNAF and ICES), this working party serves as the vehicle for coordination and standardization of the collection of Atlantic fisheries statistics.

Mike Sissenwine attended a 1-day IYABA conference on 9 August held in Milford, Connecticut.

Fred Serchuk and Judy Brennan attended the Second International Ecological Congress Satellite Program on Statistical Ecology in Berkeley, California, during 1-13 August.

Manuscripts

Emory Anderson is preparing a manuscript on "Assessment of the Northwest Atlantic Mackerel Stock," for the 1977 ICES meeting.

Mike Sissenwine and Ed Bowman completed and submitted an ICES research paper entitled "Fishery Power of Two Bottom Trawls Towed by Research Vessels Off the Northeast Coast of the USA During Day and Night."

MARINE ECOSYSTEMS DIVISION

Oceanography Investigation

Current-meter data from the first setting of instruments in the Northeast Channel (September 1976 to April 1977) have been filtered and reduced to the point where they can be examined for nontidal flow in and out of the channel. The two complete records that have been looked at so far show highly energetic flow with velocities greater than 1 knot. Inflows are more vigorous than outflows, with bursts lasting typically from 3 days to 1 week. The two records are from different depths on different moorings but they appear to be closely correlated; furthermore, the inflows appear to coincide with the passage of storm systems past the Northeast Channel.

There is still some hope that the third string of instruments from the first setting will be recovered, but the attempt to retrieve them by submarine in early August was a total failure. Steve Ramp and Gil Dering sailed on 3 August on Eileen B, the escort vessel for the submersible Mermaid III, with scientists from US Geological Survey. The escort ship proved to be unsanitary, unsafe, ill-equipped, and inexpertly manned, and ultimately the cruise was canceled. In the meantime, preparations were made for a dive in the Northeast Channel, but fog made it impossible

and there was no time for a second try. In the process, however, the batteries in the transponder in the missing release were worn down by repeated efforts to position the ship, so that they may no longer function. An effort will be made on Albatross IV Cruise No. 77-09 on 19-25 September to find the missing gear with side-scan sonar and to determine what, if anything, is left besides the release itself. If it can be established that instruments and flotation are intact, further attempts to retrieve the gear will be made.

Preparations for Albatross IV Cruise No. 77-09 continue. All the hardware for the moorings has been purchased; the radios and lights have been renovated; a new Niskin bottle rack, STD mount, and hardware box are being constructed; and the thermosalinograph has been readied for use.

Sam Nickerson has completed the charts of surface temperature and salinity for the groundfish survey cruises since 1972 and Bob Pawlowski is preparing the text. We hope to publish the charts as an in-house operation sometime in the fall. Sam Nickerson is continuing work on the plots of temperature at various depths for the larval Atlantic herring cruises and has plotted the XBT data from the 1977 cruises of the Nogliki.

Ron Schlitz has completed his analysis of hydrographic data and satellite observations in the Great South Channel region and has prepared his poster presentation for the Chapman Oceanic Fronts Conference to be held in New Orleans in October. His conclusion is that water from the Gulf of Maine does not flow out through the channel in quantity at any depth, and that the Gulf of Maine is probably not the source of the "cold pool" of low salinity water found along the edge of the continental shelf.

Ron Kirshner, Amy Briggs, and Tom Laughton completed their compilation of weather data for the Northeast Channel (see above). The tabulation gives geostrophic wind speed and direction, pressure gradient, atmospheric pressure, and air temperature at 6-hr intervals during the period of the first current-meter setting. The data will be converted to computer format for correlation with the current-meter data.

Tom Laughton and Ron Kirshner have also completed most of the data plotting for a volumetric temperature-salinity census of the deep water in the Gulf of Maine, based on data obtained in Albatross IV Cruise No. 76-03 in May 1976. Volumetric charts have been prepared for four of the five major basins in the Gulf of Maine.

The STD computer programs have now been virtually completed by Steve Ramp working with Maxine Jones as consultant. The new programs will make it possible to go directly from the tapes produced on shipboard to a computer plot of data and a printout including both observed data and calculated values such as density and sound velocity. The first direct test of the system will be with the stations from Albatross IV Cruise No. 77-09.

Tim Cain has run more salinities, including those from samples stored since January for the intercomparison of salinometers and storage techniques being conducted jointly with the US Coast Guard. Tim has also been working with Joe Penini, a summer employee of NODC, in getting our backlog of hydrographic station data into NODC computer format. Cruises in 1977, 1976, and 1975 have been completed; they are now working on 1974 and 1973.

Bob Pawlowski has completed the report on the August SOOP runs across the Gulf of Maine. The July report was issued early in August.

Red Wright attended the Hartford, Connecticut workshop sponsored by EPA the last week of August to draw up a regional plan for oil spill damage assessment. He helped draft the physical processes section of the plan and will have an opportunity to review the entire plan before it is formally issued.

Ecosystem Dynamics Investigation

In the ecosystem dynamics task group Ed Cohen and Pat Carter continued work on processing and analysis of the nutrient and chlorophyll samples from the 1976 larval Atlantic herring cruises, and Cohen also worked on a summary of primary production data needed for the Georges Bank energy budget. Marv Grosslein prepared a summary of the third workshop on the Georges Bank energy budget which included brief reviews of recent data on biomass and food consumption of zooplankton and finfish; copies of this report and summaries of the earlier workshops are available on request. Grosslein also prepared a brief summary of NEFC studies on recruitment processes with emphasis on the larval Atlantic herring program and presented this at a plankton workshop in St. Andrews, New Brunswick.

Recruitment Processes

The recruitment processes task group concentrated on preparation of the two reports for ICES which were mentioned in the July report. Analysis was continued on larval Atlantic herring mortality rates based on the 6-yr time series (0.505-mm mesh samples) using various estimates of growth rate, and refined computational procedures which take into account the change in form of the growth curve with increase in larval age. Janet Murphy participated in two plankton-hydrographic-productivity cruises aboard the Soviet vessel Yubileiniy, and Roz Cohen continued work on analysis of the fine-mesh zooplankton samples.

Plankton Ecology Investigation

US-USSR Joint MARMAP Surveys

The second US-USSR ecosystem monitoring cruise on the USSR vessel Yubileiniy was conducted during August. On the first leg of the cruise from 30 July to 15 August, a total of 107 stations was sampled in the Gulf of Maine, Georges Bank, and southern New England. Janet Murphy and Donna Busch from Narragansett participated in the cruise in addition to three scientists (an ichthyologist, a zooplankton specialist, and a hydrographer) from AtlantNIRO and two university students. Routine monitoring at each station included neuston and paired 61-cm bongo samples, and at every third station, paired 20-cm bongo (253 and 163 μ-mesh) samples, so that the zooplankton data can be examined with respect to predator-prey relationships of fish larvae and their zooplankton food. In addition, XBT's and Nansen casts were made at every station for temperature-depth-salinity profiles. The Soviet scientists took water samples for phytoplankton species composition analyses and nutrient content, which will be processed in Kaliningrad. During daylight, Niskin casts were made at six depths to obtain seawater for chlorophyll, and dissolved oxygen determinations. All salinities were processed aboard the Yubileiniy. The second leg of the cruise, 17 August-3 September, covered the continental shelf from southern New England to Cape Hatteras, with Jerome Prezioso and Janet Murphy participating from Narragansett. Observations were similar to those on the first leg, except that chlorophyll and dissolved oxygen work was conducted 24 hr/day, rather than during daylight only.

The staff in the plankton laboratory has been involved in efforts to estimate the secondary production of Georges Bank based on a series of samples collected on six cruises of R/V Atlantis in the spring of 1940. A total carbon production of 79.46 mg/m^2/day was calculated for Calanus finmarchicus. The results of this work were incorporated into an ICES paper authored by J. R. Green, J. B. Colton, and D. T. Bearse. Jack Colton is currently digitizing XBT data from the spring 1975 groundfish survey in an effort to generate integrated temperature values to correlate with plankton distributions.

Biostatistics

During August station data were entered into the computer from three cruises: Albatross IV Cruise No. 77-02, Goerlitz Cruise No. 77-01, and Annandale Cruise No. 77-01. Work continued on the data from Nogliki Cruise No. 77-02 and Delaware II Cruise No. 76-13. Zooplankton data from the Albatross IV Cruise No. 75-02 which were entered into the computer system have been edited and are being merged with the updated master file for the cruise. Programs for the newly designed zooplankton data summaries for this cruise are being developed and the output should be available soon. The zooplankton data from the Belorgorsk Cruise No. 75-02 will be processed in the same manner as the data from the Albatross IV Cruise No. 75-02 based on the advantages found in the new techniques applied to the Albatross IV data. The Belogorsk data are being prepared for keypunching.

Automated plots of zooplankton displacement volumes for spring and fall stations from 1971 to 1975 on Georges Bank are completed and available. Comparisons of these wet displacement volumes with the dry weights computed for the same stations from Georges Bank during the fall of 1971-1975 have been made using regression analysis and associated scatter diagrams. Several stations have been identified as outliers and will be reanalyzed for errors in measurement or calculation.

Considerable effort has gone into the statistical computations required for input into the paper being prepared for ICES on the ichthyoplankton stomach contents performed by the plankton sorting laboratory. Corrections were made to the "Fager Statistics" program prior to application to this set of data. Preliminary documentation for the use of this program by personnel having access to the URI computer has been prepared and is available from David Bearse.

The second leg of the Yubileiniy Cruise No. 77-02 was completed (Donna Busch and Janet Murphy aboard), and the station records and zooplankton logs are being prepared for processing into the computer system. The third leg of the cruise will be completed on 3 September (Jerry Prezioso and Janet Murphy aboard).

Gina Garafalo has temporarily joined the biostatistics group and is being trained in data entry, quality control, and data retrieval routines.

Plankton Sorting and Identification

A study of predator-prey relationships in the spring between zooplankton and larval fish communities on Georges Bank was initiated with the examination of the stomach contents of 750 larval fish, representing nine taxa. Results indicate that in 1975 the following were abundant -- Atlantic cod, haddock, pollock, redfish, gunnels, and cottids. Of the 33 taxa of zooplankton in the area, only two--Calanus finmarchicus and Pseudocalanus minutus--were important as food of larvae.

Preparation continued for the visit in September by five Polish scientists from the sorting center in Szczecin. This workshop is designed to provide a review of existing sorting methods and will develop a standard sorting protocol for mesoscale and microscale plankton sampling that will allow for a one sample per day per person output.

Arrangements were made with Joyce-Loebels Company of Boston to evaluate an image scanning system for identification, counting, and sizing of zooplankton and ichthyoplankton. Their technical representatives are scheduled for a 2-wk demonstration of a scanning system at the Narragansett Laboratory in September.

Ichthyoplankton Investigation

In the Georges Bank region there was a precipitous decline in larval Atlantic herring in the winter and spring of 1976-77, with the lowest numbers recorded since the larval survey program was instituted in 1971. This appears to be linked to the declining size of the spawning stock.

In the fall of 1974 the catch of Atlantic croaker larvae in the Mid-Atlantic Bight increased 90% over the previous year and represented our largest catch of young croakers since we began surveying larval fish in the bight in 1965. The center of distribution for the young croakers (sciaenids) occurred in nearshore waters off the coast of Virginia. The large larval densities of 1974 are now showing up as adults. Trawl data from the fall 1976 groundfish survey show croakers nearly six times greater than in the fall of 1973. Commercial landings in Virginia, Maryland, and New Jersey during the same period increased from 220 to 3,500 metric tons. This year sport fishermen report their best catches of croakers in 20 years. Adult fish, estimated at ages II and III, are being taken by hook and line as far north as Cape May, New Jersey.

The sand lance, Ammodytes americanus, is another species we are watching closely. Their larvae have completely dominated our spring catches for the past 4 yr. Our survey data show that in the spring of 1977, the average catch of larval sand lance ($11.77/m^2$) was 43 times greater than in the spring of 1966 ($0.273/m^2$), and 4 times greater than in the spring of 1974 ($3.53/m^2$) in the Mid-Atlantic Bight. In addition to the record catch, they were most widely distributed during the spring of 1977, occurring at nearly every station in the Mid-Atlantic Bight. Both their distribution and numbers have increased similarly on Georges Bank. Sand lance is an important forage species for many economically important species such as Atlantic cod, haddock, hakes, bluefish, and flounders. Our plankton surveys indicate greater availability of Ammodytes as food for these and other species. There is, however, reason for some concern over the precipitous increase in sand lance larvae. It appears that they so dominate the winter-spring ichthyoplankton community that larvae of other species spawned at the same time (i.e., Atlantic cod, Atlantic herring) might not compete successfully, and poor year classes could result. Atlantic herring stocks on Georges Bank have declined drastically over the past 10 yr. Our recent surveys in that area indicate a paucity of larvae. NEFC scientists are now investigating the food habits of larval herring and sand lance to determine the extent of their competitive relationship. In the spring of 1977 unusually dense concentrations of sculpins were found on Georges Bank along with low numbers of Atlantic cod, haddock, and pollock larvae. Catch records from the groundfish surveys of the past 5 yr suggest that commercially underutilized species including sculpins and skates (Raja spp.) may be increasing in abundance. Whether

these species are exploiting a food base formerly utilized by other demersal species that have shown declines in abundance (e.g., haddock, yellowtail flounder), or if the apparent increase in abundance is the result of other factors, is not clear. This is a problem area that is receiving increasing attention. Studies of trophic interactions of larval, juvenile, and adult fishes are now underway in NEFC.

Late in July a member of the Ichthyoplankton Investigation (Tom McKenney) participated in the 10-day cruise of Albatross IV to Deepwater Dumpsite 106 to provide fresh ichthyoplankton samples for various biological studies and to identify the material. Forty-three samples were taken with neuston nets, bongo nets, and an Isaacs-Kidd midwater trawl. The neuston net seemed to be the most generally useful device of those employed to provide the kinds of material required by the biological investigations involved. The organisms captured represented slope water and Sargasso Sea communities of fish larvae and invertebrates.

Larval Physiology Investigation

Adult summer flounder have been captured and are being maintained for brood stock for October experiments. The experiments, currently being designed, will examine digestion and assimilation processes of larvae. A manuscript on the length-weight relationships of seven species of larvae has been completed. All data on the environmental chamber experiment have been analyzed and a first draft manuscript is in preparation. Dr. Jan E. Beyer of the Danish Institute of Fishery and Marine Research spent 1 wk in Narragansett consulting with Dr. Laurence about the development of stochastic models of larval fish survival and future cooperative plans. Dr. Laurence attended a IYABA meeting in Milford, Connecticut.

Benthic Dynamics Investigation

Updating and augmentation of the benthic invertebrate data base for the Gulf of Maine-Georges Bank region were continued throughout the month. Data base records for 12 cruises have been successfully updated using WHOI information Processing Center's EDIT Processor. Basic checking and the construction of data files pertaining to bivalve mollusks were started.

A report on the food habits of 15 species of gadiform fishes is in an advanced stage of preparation. This report describes the foods of these species by ecological area, sex, season, year, plus an overall summary. The report concludes with a discussion of diet overlap and resources partitioning between species. A follow-up report on the food habits of fish collected in the region of the Argo Merchant oil spill is also in preparation. This report is based on previous analyses of fish stomachs plus the results of recently collected specimens.

Dr. Langton participated on Albatross IV Cruise No. 77-07, Part II, 7-12 August. Stomachs were collected from spiny dogfish, silver hake, and sand lance every 4 hr during a 24-hr period. Analyses of these specimens are presently in progress to determine if any of the fish species are periodic feeders.

Dr. Wigley participated in three meetings at the Woods Hole Laboratory pertaining to the establishment of marine sanctuaries in the New England region.

Apex Predators Investigation

Tags from 26 recaptured tagged sharks were returned during August. This is the largest number of tag recoveries for any 1-mo period. Approximately 400 sharks were tagged in August. The longest time at liberty came from a tagged blue shark returned after 750 days; the longest distance traveled was 390 mi, also by a blue shark.

On 5 August, Robert Conklin of Riverhead, New York, brought in the head, fins, and viscera of a 1,250-lb female mako shark harpooned off Montauk on 28 July. This is the largest mako reported from the Atlantic. A detailed examination was conducted at the laboratory. The stomach contained 79 lb of swordfish in chunks. The skull was present but lacked the bill. We estimate the swordfish weighed over 400 lb in the round. After examination and measurement, the jaw was returned to the fisherman who will appear on public television this fall.

Several stomach samples, reproductive organs, and dipnet collections were received from cooperating commercial fishermen this month.

The 15th Annual Roger Williams Shark and Billfish Tournament in Point Judith, Rhode Island, was attended during 5-8 August; 26 blue, 1 make, and 1 sandbar shark were landed. All sharks brought to the dock were measured and examined by our staff.

Meetings, Talks, Visitors, Publicity

Richard Ellis gave a short presentation on "Megamouth," the new species of shark caught off Hawaii. Ellis is a marine artist, author, and associate of our project. The Apex Predator Investigation provided information on sharks to several representatives of the news media during August.

On 12 August Carolyn Rogers participated in a meeting of the BLM Biological Task Force at the Narragansett Laboratory to begin discussing areas of special biological significance in the Georges Bank region. Kenneth Sherman gave a presentation on productivity of the area and how future studies can be integrated with the Ocean Pulse program.

On 15 and 16 August Carolyn Rogers attended a meeting in Oxford, Maryland, to discuss the operational test phase at DWD 106 and plans for future NOS DWD 106 cruises. A new format for the Ocean Pulse program document was also discussed at length. A follow-up meeting on the revisions was held in Milford, Connecticut, on 23 August.

Carolyn Rogers attended a 4-day oil spill workshop convened by EPA in Hartford, Connecticut, on 28-31 August. Participants drafted a plan to be followed in the event of either an onshore or offshore oil spill. Research proposals were drawn up and the executive committee of the workshop drafted a series of statements on how best to implement the plan.

Mike Pennington attended the International Statistical Ecology Workshop in College Station, Texas, and Berkeley, California, and also meetings of the American Mathematical Society and Institute of Mathematical Statistics of Seattle where a special session was held on mathematical modeling of natural resource management. Dave Potter left for 1 yr of academic studies at Virginia Institute of Marine Sciences.

Ken Sherman attended a workshop at St. Andrews, New Brunswick, convened by Canadian fisheries scientists to plan a MARMAP-type survey of the Scotian shelf area. He presented a paper summarizing NEFC studies in marine ecosystems focusing on the MARMAP and Ocean Pulse projects now underway. Among the attendees were scientists from Environment Canada (St. Andrews, Bedford, and St. John laboratories) Dalhousie University, Halifax; Huntsman Marine Station, St. Andrews; Canadian National Museum, Ottawa; University of Kiel; MAF Laboratory, Lowestoft; and NMFS, La Jolla.

Dr. Gothilf Hempel, Vice President of ICES and Director of the Fisheries Department of the University of Kiel, visited the laboratory. He presented a well received seminar on changes in the fish stocks and the North Sea ecosystem.

MANNED UNDERSEA RESEARCH AND TECHNOLOGY PROGRAM

During 7-12 August, hydroacoustic experiments were conducted from the Albatross IV on Stellwagen Bank and off Provincetown, Massachusetts. Purpose of the experiments was to obtain hydroacoustical backscattering data on identified targets with simultaneous observations by video camera and diver scientists. Verified sonar targets included spiny dogfish (Squalus acanthias), silver hake (Merluccius bilinearis), sand lance (Ammodytes americanus), and jellyfishes. Behavioral observations and photographic documentation of these target species were made by the diver scientists.

The Delaware II and Rorqual operating out of Sandy Hook, New Jersey, served as research platforms for diver assessment of clam dredge performance in an area of dense surf clam populations off Rockaway Beach, New York. Diver scientists evaluated clam dredge efficiency at various towing speeds and various settings of hydraulic jets; population structure of a closed area was examined intensively before and after clam dredge passage to obtain estimates of dredge harvesting efficiency. Observations on post dredging mortality and predation in dredge path were photographically documented.

Manuscripts

Cooper, R. A., and J. R. Uzmann. 1977. Ecology of juvenile and adult clawed lobsters, Homarus americanus, Homarus gammarus, and Nephrops norvegicus. Austr., Commonwealth Sci. Indus. Res. Org., Div. Fish. Ocean Circ. No. 7: 187-208. (P).

RESOURCE UTILIZATION DIVISION

Finfish Resources Development and Improvement Investigation

As a result of our study to insure that the quality of fresh fillets is of US Grade A quality at the time of purchase, two supermarket chains are now using this concept in over 200 retail outlets. This month, a third supermarket chain (the largest in the country) has assimilated the concept and has started shipping New England caught fish to some of its retail outlets in the midwestern part of the country.

Shellfish Resources Development and Improvement Investigation

Results of our tests on the use of the isoelectric focusing technique for identifying species were submitted to the General Referee of Methods for the Association of Official Analytical Chemists. Work on pretreatment techniques proposed for use in processing of rock crabs is continuing.

Product Safety and Standardization Investigation

Research results on minced fish that focus on safety and public health aspects, particularly on residual bone material, were collected and presented in a report to be used for a briefing with the Food and Drug Administration. Work is continuing on the evaluation of bone detection methods for minced fish blocks. The calcium content of bones in commercial fish blocks is being investigated. Drawings for two devices that employ different principles for measuring bones have been completed. One device, a two-way, "go - no go" gage, for evaluating lengths and widths of bones against critical dimensions for each has already been fabricated, and a number of these are undergoing evaluation at various facilities. The second device, employing a magnifying lens and a graduated scale to make actual measurements of bone dimensions, is under fabrication.

Product Quality and Safety Investigation

Work on the isolation and analysis of volatile N-nitrosamines in cold-smoked king salmon products (red and white) is continuing. These products have been vacuum packed, stored at 34°F for 0-21 days and contain various concentrations of nitrite and chloride.

Southern New England Fisheries Development Program

The Gloucester Laboratory participated in a collaborative study sponsored by the National Fisheries Institute to determine the variance in results of certain widely used analytical tests for assessing quality of fish. The test included total plate count, coliforms, *E. coli*, trimethylamine, and thiobarbituric acid number, and were performed on nine spiked samples of Atlantic cod.

During this period, organoleptic and chemical tests were routinely conducted for certain storage studies in progress pertaining to frozen storage stability of minced silver hake (whiting) flesh. These tests included: (1) effect of fish size; (2) effect of mincing temperature; (3) effect of antioxidants; and (4) filleted Atlantic cod blocks containing various amounts of minced cod.

Fisheries Engineering Investigation

The machine that was built to use the principles of operation of the Spanish machine at Pescanova has been completely redesigned and rebuilt. It now incorporates a series of steps, each one designed to carry out one operation of the skinning and eviscerating process. An operator feeding squid to the machine passes it through a guarded reciprocating knife to sever the head and tentacles from the mantle. The mantle then moves on through the eviscerating rolls. The tentacles are conveyed away for processing. This process reduces the length of the squid by more than one-half, with an accompanying increase in potential production. Evisceration of the squid under the pressure roll is unchanged, as this unit operation was originally effective. The mantle passes down the conveyor belt between a pair of retaining fences. Low pressure air jets adjacent to the fences open the mantle to allow a carrier bar to pick it up. The mantle is carried between a vertical pair of rotating whips and is stripped of its skin on all sides at once. The mantle

is then stripped off the carrier bar by a pair of belts running at high speed and is dropped into a water bath for final cleaning.

The newly designed fish mince extruder is finished and mounted on the machine along with a bank of atomizing nozzles for spraying a variety of solutions on the extruded ribbon of fish. It will extrude a freshly made ribbon that is 6 inches wide and 0.063-0.188 inches thick. As the ribbon leaves the extruder, it will be sprayed on both sides with chemical solutions for stabilization, flavor, texture, etc. The ribbon will then be folded back and forth into a standard-sized box automatically and frozen in a plate freezer for a variety of tests.

Gear Research Investigation

Equipment and hardware were completed for the August Albatross IV hydroacoustic assessment calibration cruise. The equipment is reported to have performed satisfactorily. Preparations for the Delaware II dredge testing cruise were completed and Mike Corbett, Al Blott, and Vern Nulk were at sea on the Delaware II from 15 August to 26 August. The results of this successful cruise will be reported in a cruise report and a future paper.

Meetings, Talks, Visitors, Publicity

On 10 August, a group from Maine visited the Gloucester Laboratory to discuss the processing of northern crabs (C. irroratus and C. borealis). The group represented the various people involved in the demonstration crab project being funded by the NEFDP. Attendees included representatives of the Stonington Coop, Ernie Grant from the Fisheries Development Corporation, Larry Dow from the Eastern Maine Development Commission, and Dr. Norman Smith from the University of Maine.

Bob Learson represented the Gloucester Laboratory at a meeting in Annapolis, Maryland, on 17 August. This meeting was called for the purpose of discussing the potential of a Middle Atlantic Fishery Development Group. Representatives from Maryland, EDA, Sea Grant, NMFS, and the seafood industry were present.

John Ryan attended a meeting with Food and Drug Administration officials at their Washington, D.C. headquarters to discuss comments on the suitability of minced fish blocks.

John Ryan participated in a meeting of the Regional Awards Committee at Woods Hole on 25 August.

John Ryan and Frederick J. King attended the Seafood Quality and Inspection Division Meeting held at the King's Grant Motor Inn in Danvers, Massachusetts, during 16-18 August 1977. The final session, a joint meeting with the industry, was held at the Gloucester Laboratory.

Donald Gadbois attended a 3-day nitrosamine workshop sponsored by the International Agency for Research and Cancer at the University of New Hampshire.

Technical Assistance

Warren Lund of North Cape May, New Jersey, on trawl plans.

Richard Sirney, a student in marine biology at the University of Minnesota, on utilization of freshwater species.

Dr. S. Hartman of Grumman Allied Industries on chemical tests for assessing quality of shrimp.

Information furnished to industry in this period covered lobsters, eel exports, flounders, hakes and whiting, sea water ice made aboard ship, river herring versus alewives, scientific names of domestic fish for export, and mussel promotion. Information furnished to non-industry covered Japanese-made fish blocks of Pacific deepwater grenadiers for labeling purposes, labeling of Caribbean and South American members of snappers (Lutjanidae), prevalence of "cod worms" (nematodes) in Icelandic-caught cod, processing of freshwater catfishes of the Amazon tributary system, and weakness of US Army purchasing regulations for "rockfish" which includes all members of the genus Sebastes when only two species are really intended for purchase.

Mr. J. Ackert for the Gorton Group and Messrs. H. Cremer, T. Freeman, and D. Fellenz from Pfizer Company for discussion on stabilizing flavor of frozen minced whiting by antioxidant treatment.

Manuscripts

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ENVIRONMENTAL ASSESSMENT DIVISION

Behavior of Marine Fishes and Invertebrates Investigation

Research has continued on the effects of environmental stresses, both natural and man-induced, on the behavior of marine finfish and shellfish. Recent information gathered on the tautog, Tautoga onitis, indicates that the seasonal movements of this species are based on temperature change. These fishes apparently have a seasonal predisposition for temperature cues. This contrasts with what this investigation has observed previously in studies on pelagic species.

Tests are continuing in order to establish thresholds of detection of naphthalene in the blue crab, Callinectes sapidus. These studies are important inasmuch as there are chronic and acute levels of pollution by petroleum products in many of the inshore waters off the northeastern coastline.

The investigation has recently completed two proposals for funding of behavioral studies by ERL and ERDA.

Biological Oceanography of Stressed Environments Investigation

During August we completed a cruise on the Delaware II to investigate the effects of the heavy metal, cadmium, on seabed respiration in the New York Bight. Three environmentally different stations were examined: the dredge spoils area; central Christiaensen Basin; and the acid disposal area. The acid area sediments contain only very low concentrations of cadmium and thus that station was used as the control to compare with the other two stations which had high concentrations of cadmium. Samples of sediment were obtained with the Pamatmat multiple corer and incubated (3 hr) at in situ temperature to measure simulated in situ rates of oxygen uptake. Following this initial incubation some of the core samples were spiked with a low, medium, or high concentration of cadmium while others continued to incubate, perturbed only by the addition of distilled water. Following the spikes the samples were again incubated for 3 hr. Rates of oxygen uptake were measured again and compared with the rates measured prior to the cadmium spike.

The rationale for this experiment was to be able to interpret what the distribution and abundance of heavy metals in the bottom sediment of the New York Bight, which are well-known, mean in terms of impact on benthic community metabolism. Also reasonably known are the effects of cadmium on macrofaunal respiration in the laboratory. Smith (1973) has demonstrated that most of the benthic metabolism is accomplished by the meio- and microfauna/flora in the sediments and not by the macrofauna. Thus we set out to determine the impact of cadmium under nearly natural conditions on benthic meio- and microfaunal/floral metabolism. We anticipate that this research will improve and confirm our more tentative results from August 1976.

The August 1976 study in which we examined the same three stations suggested that cadmium would have a major impact by inhibiting benthic metabolism if introduced at the control site. The study also suggested that the other two stations which had already been impacted upon by cadmium had genetically adapted, because their rates were high and apparently were unaffected by all but the highest levels of cadmium added to the samples. It is suggested that benthic communities can and do adapt metabolically, even though the community may have changed from so-called "more desirable" species, or may be dangerously contaminated as a food source for man or other marine organisms. In other words, it may be that this functional process within the ecosystem survives intact even though it may be carried out by different organisms.

Much of August was devoted to writing the chapter, "Maintenance of Anoxic Conditions Off the New Jersey Coast During the Summer of 1976", for the combined MESA-NEFC report on the occurrence of anoxic conditions in the New York Bight in 1976 and 1977.

Coastal Ecosystems Investigation

Personnel of this investigation have started to work up previously collected benthic samples taken from the Baltimore Canyon Trough area. Information on historical baseline benthic distributions will be of importance to BLM and other agencies responsible for monitoring the impact(s) of offshore oil development. Data on the distribution and abundance of benthic organisms will be related to other physical/chemical parameters such as sediment type, heavy metals as contaminants, and depth.

Personnel also participated during August in several cruises designed to monitor the levels of dissolved oxygen (DO) in the waters of the New York Bight. DO has declined throughout the summer months, reaching levels of <1 ml/l at some stations 3 - 15 mi off the New Jersey coast between Manasquan Inlet and Atlantic City. No large mortalities have been observed this year, however, unlike 1976 when massive mortalities of surf clams and other species occurred.

On 29 August a 1-wk cruise commenced in the New York Bight aboard the Delaware II Personnel of this investigation as well as from the Biological Oceanography of Stressed Environments and Physiological Effects of Pollutant Stress Investigations are conducting studies to try to explain the causes of reduced DO in recent summers and to measure the effects of heavy metals such as cadmium on seabed and water column respiration. The cruise is also taking measurements to monitor and plot the distribution of DO in the bight from Long Island to Cape May. Personnel from the MESA Program and Lamont-Doherty Geological Observatory were aboard the Cape Henlopen in order to make synoptic measurements of other factors in the reduced-DO areas.

During a 16-25 August investigational personnel worked with MURT divers in examining the efficiency of Delaware II's hydraulic clam dredge and in establishing a study of a dense surf clam bed off Rockaway, New York.

Coastal Monitoring, Assessment, and Prediction Investigation (COMAP)

Sampling aboard the Phalarope II for pelagic stages of larval American lobsters in Buzzards Bay continued until 1 August. On that date no lobsters were caught in the six standard neuston tows, and pelagic phases were assumed essentially to be completed in this area for 1977. In the previous week, two (stage IV) lobsters were caught. Sampling in the last 2 wk was hampered by a sudden plankton bloom which caused net clogging.

A final revision of a manuscript entitled, "Seasonal bottom-water temperature trends in the Gulf of Maine and on Georges Bank, 1963-1975," was submitted by Larry Davis for publication as a NOAA Technical Report SSRF.

A manuscript entitled, "Bottom-water temperatures in the Gulf of Maine and on Georges Bank during spring and autumn, 1976," was written by Larry Davis for inclusion in the MARMAP "Status of the Environment Report" for 1976.

Work was started describing bottom-water temperature trends since 1963 in southern New England and the Mid-Atlantic Bight based on groundfish survey data. Preliminary indications are that data from these latter areas closely resemble the temperature trends observed in the more northerly waters, but that differences between years fluctuate more dramatically, especially in the Mid-Atlantic Bight.

Recommendations for marine sanctuary sites in the Northeast Region were submitted to the Environmental Assessment Division in Washington, D.C. from the NEFC and the Northeast Regional Office in response to a request through channels that originated with President Carter. The initial submission for immediate consideration was for all of Georges Bank, an area of approximately 13,450 mi^2. A secondary list, consisting of a variety of large and small parcels, was forwarded to Washington for later review and consideration. Foremost among these parcels was one of 8,280 mi^2 of Nantucket Shoals abutting the proposed Georges Bank sanctuary.

Contributions to this compilation at the NEFC were from George Ridgway, Roland Wigley, Redwood Wright, Fred Lux, Robert Livingstone, Fred Serchuk, Jack Casey, and George Kelly. To avoid duplication of coverage, Regional Environmental Assessment Branch personnel, Bob Lippson, Stan Gorski, and Mike Ludwig (at Oxford, Maryland; Sandy Hook, New Jersey; and Milford, Connecticut; respectively) canvassed the NEFC staff at those facilities and submitted their recommendations through Ms. Ruth Rehfus who coordinated the submissions from the Regional Office.

A workshop, sponsored by the EPA laboratory at Narragansett, Rhode Island, was held on 29-31 August in Hartford, Connecticut, to assist the Regional Response Team in generating a revised emergency contingency plan for the cleanup, assessment, and study of oil spills in the Northeast Region. Invitations were extended to all persons that had performed a role in the hectic events surrounding the Argo Merchant oil spill, and a varied group of about 150 persons attended. At a plenary session chaired by Paul Lefcourt of the EPA, the group was divided into 10 panels that addressed selected topics in detail. The panels were: (1) water column biology; (2) benthic biology; (3) microbiology/biodegradation; (4) histopathology; (5) birds/marine mammals; (6) laboratory toxicity studies; (7) chemical analyses/fate studies; (8) physical processes; (9) socioeconomic/legal considerations; and (10) facilities. Although it was emphasized by US Coast Guard participants that "cleanup was always

the first priority," each panel was asked to outline any ideas for research or experimentation within its field that participants felt would be worth pursuing before, during, or following an oil spill. The contributions from each panel will be reviewed by members of Mitre Corporation who have contracted to assemble a first draft of the meeting documents in about 2 mo. Copies of this draft will be circulated to all participants for review before the final draft is printed. It was not stated clearly at the plenary sessions how this document would be used, but it appears to be intended as a nucleus for a budgetary package to be put forward by EPA.

Environmental Chemistry Investigation

Considerable progress was made by Vincent Zdanowicz in the application of the anodic stripping voltameter (ASV) to metal analyses of seawater. He was able to modify the procedures successfully to do copper measurements and several analyses were performed for the Physiological Stress Effects of Pollutant Investigation. The problem of relatively high amounts of lead occurring in the blanks has not yet been resolved. Cadmium measurements appear accurate and several determinations were made of seawater samples collected in conjunction with a depuration study involving oysters.

Arrangements were made through Anthony Pacheco of the Sandy Hook Laboratory to obtain additional samples of fish and shellfish that will be shipped to Seattle for analyses of organic compounds as part of contractual work with MESA; also, additional specimens will be analyzed for heavy metals for a report to ICES.

Several stations in Bridgeport and a few in Milford were resampled this month to determine whether or not the high levels of metal found there in last year's survey could have been accidental or not. Water samples are also being collected this year for Pb, Cd, and Cu analyses; water analyses could not be done last year.

Samples were collected at Ocean Pulse station DWD 106 and provided to the investigation for metal analyses.

Physiological Effects of Pollutant Stress Investigation (PEPS)

Physioecology

As a result of statistical analyses of a study to determine the combined effects of copper, mercury, and zinc on the embryonic development of the American oyster, Crassostrea virginica, we decided in August to redesign the experimental procedures. The redesign was to facilitate statistical analysis, using response surface techniques. The nitrate and chloride salts of the three metals were used in two tests completed to date. Further testing is required.

The results of the study to determine the effect of salinity and temperature on the toxicity of silver to embryos of the American oyster are now being analyzed using a computerized response surface technique program.

Two tests were performed this month to determine the combined effect of copper and zinc as chlorides on juvenile bay scallops, Argopecten irradians. Further testing will be performed when more animals become available to us.

A study to determine the effects of the metals arsenic, cadmium, copper, lead, mercury, nickel, silver, and zinc to embryos of the surf clam, Spisula solidissima, is continuing. Two tests were performed this month, but normal embryonic development was poor.

Physiological Effects

This subtask participated in two Ocean Pulse test phase cruises during this reporting period. The first cruise was conducted on the Albatross IV to DWD 106. A variety of respiratory and hematological experiments was conducted. A number of invertebrate species was obtained for oxygen-consumption measurements. One isopod species (unidentified at this time) was abundant at both the sewage and acid waste dumpsites and the first control site; 18 animals were tested from each location. One species of crab (also unidentified at this time) was collected at the acid dumpsite and the second control site; 14 animals from the acid site and 22 from the second control site were tested. A second crab species (to be identified) was found at the sewage and acid dumpsite and the second control site; 19 specimens from the sewage dump area, 9 from the acid dumpsite, and 15 from the second control site were examined. Control data were also collected on a number of shrimp and several other crab species. All invertebrates were very small specimens; oxygen-consumption measurements were performed with whole animals. The finfish respiratory data were not nearly so complete. The lack of live fish resulted in limited data on small numbers of a variety of fish of different sizes. No fish was large enough for a complete set of hematological tests.

The second cruise was on board the Delaware II at sampling strata in Long Island Sound and the New York Bight. Our studies included measurement of Na^+K^+ATPase (membrane enzyme) and Mg^{++} ATPase (mostly mitochondrial) activities in crab gill preparations; important indicators of the general condition of an Ocean Pulse test species.

The results obtained from these two cruises are being analyzed at present.

We are now preparing for a 1-wk cruise on the Delaware II into the New York Bight later this month (August). The objective of our participation is to examine the impact of cadmium on seabed oxygen consumption. This study will be conducted jointly with Dr. James Thomas, Sandy Hook Laboratory.

Dr. Walter Blogoslawski of the Diseases of Larval Mollusks Investigation brought back to the laboratory 100 soft-shelled clams (Mya arenaria) from Maine. The clams were contaminated with paralytic shellfish poison and then subjected to ozonated water to reduce the toxicity. We measured the oxygen consumption rates of these clams and non-ozonated controls to provide that investigation with some indication of metabolic disruption due to ozone treatment. Earlier studies with surf clams (Spisula solidissima) showed considerable disruption after such treatment.

Biochemical Effects

Biochemical examination has been completed for antennal glands from lobsters taken during the Ocean Pulse (Delaware II)-New York Bight cruise during 18-22 July 1977. Despite the relatively few data (nine samples from an impacted area, Ambrose Light, and four samples from a control area, Fire Island), we found induction of a glycolytic metalloenzyme (LdH, $P < 0.001$) in the Ambrose Light animals, as well as some loss of ligand sensitivity in a pentose shunt enzyme (G6PdH, $P < 0.020$).

We are now working on tissues from lobsters exposed to cadmium (6 ppb, 30 days) and then held for 7 days in aerated tanks containing seawater (changed daily) of either low salinity (17 ppt, challenge) or ambient salinity (28 ppt, control). All analyses have been completed on hearts from both experiments. Statistical

analysis of the data from the low-salinity experiment shows no significant difference in any of the enzyme activities examined except for a slight induction of a metalloenzyme of the Krebs cycle (MdH, $P < 0.05$) in the lobsters previously exposed to cadmium. The lack of significant differences for heart enzyme activities between cadmium-exposed and control animals may reasonably be ascribed, perhaps to the overlay of low-salinity stress in both control and experimental animals. Data for the ambient-salinity experiment have yet to be analyzed. The antennal glands, scheduled for more rigorous examination in the following weeks (heart muscle has no G6PdH activity, an enzyme particularly good for kinetic analysis of ligand affinities), should be a more sensitive index of metal stress.

Anaerobic Bacteriology/Metabolism

Efforts are continuing on workup of previous studies; two publications have appeared and the titles are indicated in a subsequent section of this report.

Previously the difficulty of isolating a gram-negative sulfate-reducing bacterium in enrichment cultures prepared from marine sediments was reported. However, by modification of the plating medium and with prolonged anaerobic incubation discrete colonies are appearing on the plates. The next step is to get isolates for characterization and pure culture study. Clostridial counts were obtained from seven bottom sediments. The sediments were obtained by Dean Perry (Aquacultural Genetics Investigation) during the recent Delaware II cruise off the New Jersey coast. Counts varied from 34 to 38,000 per gram of sediment depending on the station location. The highest count was obtained from the sludge disposal area of the New York Bight. The most predominant group observed was the perfringens type although other clostridial forms appeared on the media. Cell-free supernatants prepared from sediment enrichment cultures yielded four of seven which were toxic to mice and need further characterization.

Meetings, Talks, Visitors, Publicity

On Monday, 8 August, Dr. John Pearce met with the staff of the MESA Project and program offices as well as staff of the NEFC directorate to review: (1) the Ocean Pulse (OP) program; (2) progress made to date in planning and implementing the program; and (3) how best to develop cooperative activities and coordination between the MESA Program and NEFC to expedite the continued development of OP. Dr. Pearce provided an overview of OP with appropriate comments from Dr. Edwards and Mr. Sherman. It was agreed, initially, prior to full implementation of OP in FY 79, that MESA and NEFC would cooperate in planning and expediting field and laboratory research concerned with OP sampling strata in the New York Bight.

Dr. Pearce participated in the monthly Statistics and Scientific (S&S) meeting of the Mid-Atlantic Fisheries Management Council held in Hershey, Pennsylvania, on 8-9 August. He reviewed current progress being made by OP and the various environmental assessment activities ongoing within the several divisions of NEFC. Also discussed in depth was the current low dissolved oxygen (DO) situation in the New York Bight and the reduction in DO and consequent fish kill in 1976.

Dr. Frederick Thurberg hosted a Center IYABA meeting in Milford on 9 August.

Dr. Pearce reviewed the current status of OP with Dr. Thomas Austin, Director, EDS, on 11 August. Of particular importance in the briefing was the matter of documenting the actual intracenter and interagency cooperation which has already been developed.

James Miller hosted a visit of the Mill River Rangers at Milford Laboratory on 12, 19, and 26 August.

Participants in two recent Ocean Pulse cruises met at the Oxford Laboratory on 15-16 August for cruise debriefings. Mr. Robert Reid, Dr. Anthony Calabrese, Ms. Margaret Dawson, Dr. Austin Farley, and Ms. Sheila Stiles discussed the results of OP experimental studies at pulse strata, DWD 106, and the New York Bight. Considering the unique measurements and conditions at the deepwater dumpsite, the results obtained were good and will be important in planning future OP activities. Drs. Kilho Park and Tom O'Connor, NOAA/NOS, were present as well as the Center Director and Mr. Marvin Boussu, Ms. Ruth Rehfus, and Dr. Robert Lippson, RO/EAB. Ms. Carolyn Rogers, Narragansett Laboratory, discussed future modifications to the OP PDP. Dr. Park discussed future interactions between NOS and NEFC in relation to OP activities.

On Tuesday, 23 August, Dr. Pearce, Dr. Carl Sindermann (Sandy Hook Laboratory Director), and several staff members from Sandy Hook Laboratory traveled to Milford Laboratory to hear the presentation made by Prof. Gotthilf Hempel, University of Kiel, and concerned with fisheries and the marine ecosystem of the North Sea. Following the seminar, Dr. Hempel spoke with individual scientists attached to the division and visited their laboratories. Dr. Hempel then traveled to Sandy Hook where he visited the research facilities and heard an evening presentation on the importance of estuaries made by Dr. Pearce to a local service club.

Edith Gould attended an Awards Committee meeting at the Woods Hole Laboratory on 25 August.

On 29 August the Pollution Committee, Mid-Atlantic Fisheries Management Council, held its first meeting in the Nelson Benedict Room, Sandy Hook Laboratory. The meeting was jointly chaired by Dr. Pearce and Mr. Russell Cookingham, Director, New Jersey Department of Fish and Game. A program review was given of the research ongoing within NEFC related to habitat quality. The members of the committee considered these activities within the context of the environmental responsibilities of the committee and council.

Manuscripts

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AQUACULTURE DIVISION

Spawning and Rearing of Mollusks Investigation

An experiment was started with juvenile bay scallops, Argopecten irradians, to determine some of the constraints to their growth in our pumped-raceway system. We are exploring the relationships between stocking densities, flow rates, biomass, food consumption, and growth in order to make recommendations for the most efficient use of this system.

Before field planting of hatchery-produced bay scallops can begin in earnest, an effective method for separating our planted animals from the wild stock must be found. The rapid shell growth of scallops makes them an ideal candidate for marking with materials that are incorporated into the shell matrix. Our first attempt to mark the shells of juvenile scallops using Alizirin failed. At low concentrations the stain did not adequately mark the shells; at higher concentrations mortalities occurred. We are continuing these experiments at intermediate concentrations over a longer time span.

Results of an experiment with the surf clam, Spisula solidissima, larvae indicate that feeding in excess of 10^5 algal cells/ml can be detrimental during the early stages of growth. Larvae fed at a constant level of 0.5×10^5 cells/ml and 1×10^5 cells/ml grew at a nearly equal rate to those larvae grown under an increasing-increment feeding schedule.

Comparative growth data of various size classes of surf clams held in the tank farm this summer show that the rate of growth is dependent on the amount of food in the water. For example, clams grew from 41 mm to 46 mm at a slower rate in late July than they did in either June or August. In another instance, the growth rate dropped by nearly 90% during a 2-wk period. In both cases, the amount of food in the water, in terms of chlorophyll-a values, was comparatively low.

Aquacultural Genetics Investigation

Mass Selection

Work is nearing completion on dividing the 1976 year class oysters, C. virginica, into fast growth, slow growth, and random control selection lines. The 1976 year class consists of 10 spat groups, each group having been spawned on the same day. Six of the spat groups have been completely counted, measured, and selected. Work is under way on a seventh group.

Heritability

Measurements of juvenile oysters are being continued for the heritability studies. Juvenile measurements at 14 wk post-setting have now been collected for all three studies. Six-month measurements will begin shortly. In all cases, 100 individuals from each half-sib family were measured to produce the necessary data. It has not been feasible to start processing these data.

Family Selection

Twelve full-sib families have been spawned for this project. Eight families have produced spat; two are still in the larval stage.

Hybridization and Inbreeding

A backlog of larval samples from hybridization and inbreeding lines is being examined and analyzed for survival and growth rates. Small, young experimental spat from some of these crosses have been placed in an outdoor tank with a special UV unit to eliminate or reduce natural wild set contamination. Several wild oysters were observed to have set in some of the tanks. Experimental spat are being counted and measured. Hybrid spat from the most successful species cross number approximately 250.

Studies with UV-exposed seawater in the laboratory seem to indicate better survival and growth of oyster larvae in the UV-exposed seawater over non-UV and unfiltered seawater during certain difficult culturing periods, probably coincidental with bacterial contamination.

Additional experimentation on fertilization inhibition in the oyster indicates that a rather narrow range of EDTA concentrations will produce the desired result of sperm inhibition, then reversal, after washing of eggs and addition of fresh sperm. However, this effect is somewhat dependent on the condition of the gametes and, possibly, environmental variables.

Mutagenics Investigation

Bioassays, primarily cytogenetic, were conducted in which oyster and surf clam eggs were exposed to acid-iron waste, sewage sludge waste, and control seawater from the July Albatross IV cruise to DWD 106.

Fish eggs from that cruise totaled approximately 2,200 with the majority coming from the dumpsite area, where more neuston tows were made. These eggs were sorted by stages, most of which were late, and are now being identified.

Meetings, Talks, Visitors, Publicity

Ed Rhodes, with the help of his colleagues, organized and manned the Milford Laboratory's exhibit at the annual Milford Oyster Festival on 20 August.

Dr. Victor L. Loosanoff, former Director of Milford Laboratory, was chosen as the first member of the Oyster Hall of Fame by the Milford Oyster Festival Committee. His name and vita were submitted by Ed Rhodes and Ron Goldberg.

Mrs. Janice Harris, authoress, Madison, Connecticut; Dr. Henry Dymsza, food technologist, University of Rhode Island; Ms. Mary Gibbons, biologist, University of Delaware; Dr. Matthew Hulbert, Connecticut College; and Dr. Anibal Yelez, Universidad de Oriente, Cumana, Venezuela, visited the Milford Laboratory during August.

PATHOBIOLOGY DIVISION

Comparative Pathobiology Investigation

Samples of oysters, Crassostrea gigas, from eight areas in Japan were examined histologically. Bacterial focal necrosis was observed in 20% of the oysters from Hamana-Ko and 8% of the oysters from the Hamo-Ko area. Bacterial focal necrosis was not observed in oysters from the other six areas. Gregarine-like organisms similar to ones previously seen in Korean and Formosan oysters were present in oysters from three of the areas sampled. Writing on the guide to normal histology of the blue crab, Callinectes sapidus, has occupied most of the month. The section on the hepatopancreas and its interstitial tissues has been completed. Electron microscope evidence, while still preliminary, indicates that fixed phagocytes found in rosette-like groupings attached to the hepatic arterioles are highly specialized cells. As well as engaging in classical phagocystosis when activated by various stimuli, a granular product of ever increasing width appears around the cells. The material is bounded by an apparently interrupted layer of electron-dense material that appears to have been produced in intracytoplasmic granules of the phagocytes. Studies of these cells may be of importance in helping to understand the inducible immune system of decapods. Microscopic examination of crabs obtained in June from a Tilghman Island crab dealer showed evidence of viral infection, probably a combination of the Reo-like virus and Rhabdo-like virus. Tissues from a variety of fishes from the aquarium at the Woods Hole Laboratory have been blocked, sectioned, and stained. These tissues were obtained from moribund fishes by Mr. Robert Binder ("Aquavet" student). The slides will be forwarded to Mr. Binder at Cornell University for his examination. A sheepshead minnow, Cyprinodon variegatus, with papilloma-like lesions was obtained from the Tred Avon River, Maryland. Microscopic examination of the lesion revealed that it was caused by a myxosporidian. A large variety of tissues from fishes, crustaceans, and mollusks was processed by the histology laboratory. One thousand four hundred and twenty-one blocks were sectioned and 1,882 slides were stained.

Disease and Environmental Stress Investigation

Data on fin rot disease prevalence in flatfishes from Sandy Hook/Raritan Bay have been collected for the spring and summer quarters with the express purpose of demonstrating the apparent disappearance of this disease in the summer months. Problems in obtaining research vessels for conducting trawl surveys during July and August precluded obtaining large numbers of fishes; however, preliminary examination of the data indicates that the substantial decline in disease prevalence seen in 1976 again has occurred. Experiments on progression of fin rot lesions have been completed and the data are being evaluated. Cage experiments in the sludge and control area of the New York Bight have been suspended pending availability of research vessels. A number of experiments have been completed in which blue crabs have been exposed to copper. Preliminary results reveal the disruption of dendrites of sensory cells in crabs exposed to 1 mg/l of $CuSO_4$ for 48 hr. These results must be substantiated by examination with electron microscopy. Rock crabs, Cancer irroratus, were obtained from three diverse geographic areas for gill-fouling

Meetings, Talks, Visitors, Publicity

Dr. Rosenfield attended meetings of the Maryland Oyster Resource Expansion (MORE) Task Force on 4 August and 16 August; Dr. Rosenfield and Mr. Farley attended a workshop on haplosporidan diseases in mollusks at the Virginia Institute of Marine Science in Gloucester Point on 17-19 August; Dr. Rosenfield and Mr. Farley attended the 10th Annual Meeting of the Society for Invertebrate Pathology in East Lansing, Michigan, during 21-26 August.

Dr. Murchelano discussed present and future research of the Pathobiology Division with Dr. Robohm at the Milford Laboratory on 9 August; Dr. Murchelano attended a meeting of the "Aquavet" course advisory committee at Woods Hole on 15 August.

Dr. Bodammer attended the IYABA meeting at Milford, Connecticut, on 9 August.

Mr. Kern attended the annual meeting of the American Society of Parasitologists in Las Vegas during 14-19 August, and presented a paper entitled "Distribution and Prevalence of Larval Anasakid Nematodes in Surf Clams from the Middle Atlantic Coast.

Dr. Sawyer attended a business meeting of the American Microscopical Society in East Lansing, Michigan, on 22 August in preparation for assuming his duties as vice president of the society in 1978.

Mr. Farley attended a workshop on oil spills at Hartford, Connecticut, from 29 August to 1 September.

Dr. Blogoslawski completed a 1-yr NMFS Management Development Program by visiting the Seattle region and Center offices. While there, he assisted NWAFC personnel in day-to-day management and was able to see the Auke Bay Laboratory in Juneau, Alaska.

Mr. Jay Lewis, a contract employee with the Maryland Office of Coastal Zone Management, was assigned to work with Dr. Sawyer for a period of 1 yr. The temporary addition of Mr. Lewis to the laboratory staff will allow Dr. Sawyer to expand studies on ocean sediments and benthic crustaceans from nearshore coastal stations.

Ms. Jeannie Fairchild joined the Oxford Laboratory staff on a temporary appointment.

Ms. Sharon MacLean was awarded an outstanding performance rating for her sustained high quality of work in New York Bight-MESA crustacean studies with Dr. Sawyer.

Ms. Dorothy Howard and Ms. Ceil Sullivan were awarded special achievement awards for sustained superior performance.

Mr. William O'Connell was awarded a special achievement award for his activities in EEO.

Ms. Helen Lang was awarded an outstanding performance rating for her many contributions to the efficient operation of the Oxford Laboratory's library.

Visitors to the laboratory during August included Mr. Stanley Mayers, Pennsylvania State University, University Park; Mr. Dan Hunt, Food and Drug Administration, Washington, D.C.; Messrs. Chris Ostrom and Ed Hollis, Maryland Energy and Coastal Zone Administration, Annapolis; Mr. Edward Brown, US Department of Health, Education, and Welfare, Philadelphia; and Dr. Gotthilf Hempel, University of Kiel, Federal Republic of Germany.

Manuscripts

Blogoslawski, W. J., and M. E. Stewart. Paralytic shellfish poisoning in *Spisula solidissima*: anatomical location and ozone detoxification. Mar. Biol. (A).

MacLean, S. A., and C. L. Ruddell. Three new crustacean hosts for the parasitic dinoflagellate, *Hematodinium perezi* (Dinoflagellata: Syndinidae). J. Parasitol. (S).

Perkins, F. O., P. A. Madden, and T. K. Sawyer. Ultrastructural study of the spore surface of the haplosporidan *Urosporidium spisuli*. Trans. Amer. Microsc. Soc. 96: 376-382. (P).

NATIONAL SYSTEMATICS LABORATORY

Benthic Fishes

Research was done on: the taxonomy of North Atlantic rocklings; a collection of ophidioid fishes caught by Soviet trawlers off the coast of West Africa; a zoarcid fish caught by the DSRV Alvin in a deepsea hotspring area northeast of the Galapagos Islands.

Penaeoid Shrimps

Studies of Indo-West Pacific shrimps in the Smithsonian Institution collections continued.

Crabs

A paper was completed on tropical Western Atlantic xanthiid crabs, including the description of a new genus.

Meetings, Talks, Visitors, Publicity

Dr. Bruce Collette taught an ichthyology course at the Northeastern University Laboratory, Nahant, Massachusetts.

Manuscripts

Williams, A. *Demaea*, new genus for reception of *Micropanope distincta* Rathbun (Decapoda: Xanthiidae). Proc. Biol. Soc. Wash. (A).

ATLANTIC ENVIRONMENTAL GROUP

Ocean Monitoring and Climatology Task Group

Data Analysis Product No. 4, "Variations in the Position of the Shelf Water Front off the Atlantic Coast between Georges Bank and Cape Romain in 1976," by John T. Gunn, was transmitted to the Center Director and scientists on his staff. This article will eventually appear in the 1976 Status of the Environment Report, but since it may be several months before it appears in that form, we decided to release it as DAP No. 4 for use during the interim period.

Engine problems on the Caribou Reefer made it impossible to obtain an XBT transect from Gloucester to Cape Sable in August, but we anticipate resuming the monthly transects on this vessel in September. The M/V Bluenose transect between Portland and Yarmouth was occupied on schedule. An XBT transect across the continental shelf along the 71°W meridian, scheduled at the end of the University of Rhode Island's R/V Endeavor Cruise No. 11 in August, was not occupied because of stormy weather. One transect from New York across the continental shelf was occupied each by the USCGC Tamaroa and the USCGC Taney. The Delta Norte occupied the transect across the eastern Gulf of Mexico from New Orleans.

A magnetic tape record of the mean monthly water temperature and density values for all the NOS tide stations in the continental United States, Alaska, Hawaii, and selected island stations in the Caribbean and Pacific was received and transfered to the MARMAP Information System (MIS) for addition to the data base, in preparation for analysis and portrayal. Another tape of the wind stress, Ekman transport, and other parameters derived from the atmospheric pressure field for 40°N, 70°W and 35°N, 75°W was received from PEG. This tape, which covers the period 1946-76, will be added to the existing wind stress-transport data base held in the MIS.

Reed Armstrong and Steve Cook, in cooperation with scientists in the NMFS Galveston Laboratory, successfully conducted a field experiment to monitor the dispersion of a dye patch in the vicinity of a small producing oil field off Galveston. The experiment, which is part of an EPA-sponsored investigation of conditions around the Buccaneer Oil Field, involved time-series measurements of dye concentration using a shipboard fluorometer in conjunction with aerial photographs. At the conclusion of the dye study a group of six drifting, transponding buoys was released for tracking from the beach for 2 wk to provide data on the large scale movements of the plume. The purposes of AEG's project are to determine the characteristics of the waters for dispersing and transporting potential contaminants from OCS oil fields and to provide information for the development of a predictive model of the movement and dispersion of such discharges.

Woody Chamberlin submitted a paper, entitled "Monitoring the Effects of Gulf Stream Meanders and Eddies on the New England Fishing Grounds," for publication in the proceedings of the OCEANS '77 Conference. He is to present the paper at the conference on 16 October.

Ocean Dumping Task Group

Data from the July 1976 cruise effort to DWD 106 have been quality controlled and digitized pending further analysis. Original data and digitizations will be sent to the National Oceanographic Data Center shortly.

On 20 and 21 August 1976 a monitoring transect was run from New York harbor to DWD 106. Fluctuations in ship's power aboard the M/V Port Jefferson did not allow operation of the onboard XBT system. This problem will be corrected for future monitoring transects.

Reports are in preparation on: (1) the circulation at DWD 106; (2) observations of anticyclonic Gulf Stream eddies during 1977; and (3) movements of the shelf-slope front during 1977. The report concerning the experimental dye study aboard the USCGC Dallas is also nearing completion.

Meetings, Talks, Visitors, Publicity

Mert Ingham attended a 2-day workshop on regional fishery-climatology held at Louisiana State University on 18 and 19 August. He represented NMFS Headquarters at the meeting and made a presentation concerning the national goals of fishery climatology and activities in NOAA toward these goals.

Manuscripts

Armstrong, R. S. 1977. Climatic conditions related to the occurrence of anoxia in the waters off New Jersey during the summer of 1976. In: Compiled Reports of Workshops on the New Jersey Fish Kill. (A).

Bisagni, J. J. 1977. Physical oceanography of Deepwater Dumpsite 106 February-March 1976. In: Baseline Report of Environmental Conditions in Deepwater Dumpsite 106. (A).

Bisagni, J. J. 1977. The occurrence and some possible effects of anticyclonic Gulf Stream eddies near Deepwater Dumpsite 106 (Abstract). In: Oceanographic Study of Warm-Core Gulf Stream Rings and the Northwest Atlantic Slope Water Region - A Prospectus for Multidisciplinary Research. NFS/IDOE. (P).

Bisagni, J. J., S. W. Congdon, and K. A. Hausknecht. 1977. A summary of input of industrial waste chemicals at Deepwater Dumpsite 106 during 1974 and 1975. In: Baseline Report of Environmental Conditions in Deepwater Dumpsite 106. (A).

Chamberlin, J. L., and D. A. Mizenko. 1977. Observations of warm-core eddies in relation to the New England fishing grounds, 1974-1977 (Abstract). In: Oceanographic Study of Warm-Core Gulf Stream Rings and the Northwest Atlantic Slope Water Region - A Prospectus for Multidisciplinary Research. NFS/IDOE. (P).

Cook, Steven K. In Press. Gulf Stream interaction with shelf water in the Cape Hatteras area. Gulfstream (NOAA). (A).

Hulburt, E. M., and C. M. Jones. 1977. Phytoplankton in the vicinity of Deepwater Dumpsite 106. In: Baseline Report of Environmental Conditions in Deepwater Dumpsite 106. (A).

Ingham, M. C., S. K. Cook, and K. A. Hausknecht. 1977. Oxycline characteristics and skipjack tuna distribution in the southeastern tropical Atlantic. Fish. Bull. 75(4). (A).

Ingham, M. C., J. J. Bisagni, and D. Mizenko. 1977. The general physical oceanography of Deepwater Dumpsite 106. In: Baseline Report of Environmental Conditions in Deepwater Dumpsite 106. (A).

Jones, C. M., and Richard Haedrich. 1977. Epibenthic invertebrates. In: Baseline Report of Environmental Conditions in Deepwater Dumpsite 106. (A).