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NORTHEAST FISHERIES CENTER

BIMONTHLY REPORT



United States Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Center
Woods Hole, Massachusetts 02543

JULY-AUGUST 1984

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The Northeast Fisheries Center's "Bimonthly Report" is an unedited compilation of reports by the Chiefs/Directors of the Center's nine major research programs, summarizing key research activities and publications/reports during the bimonthly period. This "Bimonthly Report" does not constitute a publication and is for information only. All data should be considered provisional. Reference to trade names does not imply endorsement.

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CENTER DIRECTORATE

DIRECTORSHIP CHANGE AT MILFORD LABORATORY

After nearly 22 years at the helm of the Center's Milford Laboratory, Dr. James E. Hanks stepped down as Laboratory Director as of August 31. Jim will continue to deal with the shellfish industry, the academic community, and state and local government agencies on molluscan aquaculture matters and technology transfer from a new Center position as a Liaison Scientist and remain based at Milford for that purpose. He extends his thanks and appreciation to all of his associates and colleagues over the years and looks forward to seeing them in his new role sometime in 1985. Dr. Anthony Calabrese has been detailed to the position of Acting Laboratory Director for the remainder of 1984, while Center plans are formulated to recruit another permanent Director at Milford.

NEARSS DEMONSTRATIONS

The Center's Atlantic Environmental Group and Sandy Hook Laboratory will participate in a demonstration of the Northeast Area Remote Sensing System's (NEARSS) Communications Network to begin in September. Other participants are the Air Force Geophysics Laboratory (AFGL), Massachusetts Institute of Technology (MIT), Graduate School of Oceanography/University of Rhode Island (URI), Naval Underwater Systems Center (NUSC)/Navy, Bigelow Laboratory for Ocean Sciences, Norwich University, and Woods Hole Oceanographic Institution.

A sector of GOES digital data will be transmitted in real-time from AFGL to MIT every half-hour where these data will be used by the Meteorological Department, and certain scenes will be forwarded instantly to URI where they, along with processed and calibrated AVHRR data, will be stored on disc for dial-in access by NEARSS terminals or VAX computers. Other data in the region or charts of interest to NEARSS members may be added to the archive at any time. URI will also serve as a message center for the participants. Through NEFC and NUSC agreements with the General Services Administration (GSA), the GSA is implementing the necessary communications equipment, telephone lines, and a billing system which it will maintain for the duration of the demonstration period, approximately eight months.

Since computer disc space at URI is limited, other near-term plans for the NEARSS Association include the implementation of a NEARSS VAX archive for digital satellite-derived oceanographic data for the NEARSS Network. A proposal for the archive, endorsed by the NEARSS Association, was submitted to the National Science Foundation by URI in June. Contact Helen Mustafa, FTS 840-1244 or (617) 548-5123.

3-D MODEL OF GULF OF MAINE PRESENTED TO CENTER BY STATE DEPARTMENT

The Department of State presented to the Center a model of the bathymetry of the Gulf of Maine area, as well as graphics concerning the ecology of the area, prepared for use in the US/Canada maritime boundary delimitation case in the Gulf of Maine area. The model, now on display in the Aquarium of the Center's Woods Hole Laboratory, was commissioned by the State Department, and prepared by the Defense Mapping Agency's (DMA) Hydrographic/Topographic Center in Washington, D.C., during March 1984. Made of epoxy, its dimensions are

approximately 5 feet by 6 1/2 feet; the horizontal scale is 1:500,000; and the vertical exaggeration is 75:1.

All formal presentations by the United States and Canada on the case were concluded in May with oral presentations to the International Court of Justice at The Hague. A decision is expected this fall. Contact Helen Mustafa, FTS 840-1244 or (617) 548-5123.

AQUACULTURE DIVISION

FURTHER EVALUATION OF A RAPID BACTERIAL IDENTIFICATION SYSTEM

The effectiveness of a miniaturized, rapid, biochemical system was compared with a standard, test-tube system for identifying marine bacterial pathogens. Bacterial samples were taken from a New England shellfish hatchery during a disease outbreak. Results from both systems were examined by a numerical method termed "Adansonian analysis" to determine whether each would recognize identical bacteria reappearing in different samples. Although both systems recognized some isolates as identical, others were judged identical by only one of the systems. In attempting to determine which system was correct, isolates were subjected to susceptibility testing with 27 antibiotics. The results did not clearly favor either system. Isolation and comparison of DNA in structures called plasmids within the strains in question may clarify the results. Nevertheless, the miniaturized, rapid system proved useful in differentiating two *Vibrio* pathogens isolated from diseased flounder during separate disease incidents in laboratory held fish and in showing pathogenicity of a *Vibrio anguillarum* strain from a diseased eel (when injected into eels the latter bacterium caused characteristic disease and then could be re-isolated and identified using the miniaturized, rapid system). Contact Dr. Richard Robohm (203-783-4237 or FTS 642-5237).

OZONE GAS KILLS DISEASE PRODUCING BACTERIA

A collection of five bacterial pathogens of shellfish larvae were used in ozone experiments to determine a dose response curve. Eight ozone experiments were conducted using different concentrations of ozone at varying times. Ozone residuals in seawater were monitored by iodometric titration. Results indicated that values of $0.17 \pm .05$ mg/liter dissolved ozone-oxidant dose inactivated the tested pathogens. Additional experiments are required to determine whether these experimental values will harm shellfish larvae. Contact Dr. Walter Blogoslawski (203-783-4235 or FTS 642-5235).

CLAM KILLER AND CONTROL METHODS

A shellfish pathogen which affects development of fertilized eggs of hard shell clams also affects embryonic development of the American oyster. This bacterium was thought to be a nonmotile *Vibrio sp.* originally isolated from a New York shellfish hatchery. Manipulation of this microbe yielded a motile form which is identical to that of the nonmotile form, except for motility and the presence of an attached flagellum. Concomitant with the appearance of motility was a partial loss of virulence. This suggests that this bacterium may have originated elsewhere and was possibly introduced with the transfer of shellfish stocks to New York.

To control this pathogen numerous studies have been conducted to determine the efficacy of specific antibiotics (i.e., erythromycin, streptomycin, kanamycin, and neomycin) and of ultraviolet (UV) irradiation. Of the antibiotics tested, neomycin appeared to have the greatest therapeutic value, while kanamycin appeared to have no value. Contact Dr. Carolyn Brown (203-783-4239 or FTS 642-5239).

CYTOGENETIC TECHNIQUE APPLIED SUCCESSFULLY TO MOLLUSK LARVAE

Larvae of commercial bivalve mollusks sampled from cultures for breeding and directly from plankton in Long Island Sound were examined at the cellular level using a cytogenetic technique. Successful application of the technique that elucidates nuclei and mitotic groups in bivalve larvae means that now this critical and sensitive stage, as well as the other early life history stages already so studied, can be assessed cytologically. Food and bacteria also were discerned. The technique has potential application for use in culture, bioassay, pathology, monitoring and recruitment, as well as genetic studies (even from samples preserved for a considerable length of time). In addition, the relatively rapid and simple procedure can be used as an aid in cytotaxonomic and plankton identification research. Results from preliminary experiments employing the technique were presented by Sheila Stiles at the joint annual meeting of the Genetic Society of America and the Genetics Society of Canada, Univ. of British Columbia, Vancouver, August 12-15, 1984. (Contact Ms. Sheila Stiles (203-783-4224 or FTS 642-5224).

OYSTER NUTRITION EXPERIMENTS PROGRESS

An oyster feeding study is currently in progress utilizing algae cultured in medium from which vitamins have been removed (ENV) as compared with the same algal species cultured in our standard growth medium which contains thiamine and vitamin B₁₂ (E). Large volumes of axenic cultures with high cell densities are being produced in the carboy mass culture system for feeding juvenile oysters in experimental molluscan rearing chambers. Removal of trace amounts of vitamins from glassware and water used in ENV growth medium preparation is being accomplished by wet or dry heat, and treatment with powdered activated charcoal which must then be removed from the water by filtration. Carboy cultures are harvested daily and monitored semi-weekly for contaminants; a refinement of experimental carboy containers has allowed us to meter the CO₂ enriched air input into each culture to insure that this is equal in all cases. Similarly, the seawater system supplying the molluscan growth chambers has been refined by the addition of an in-line activated charcoal filter cartridge to remove vitamins that may persist through ultraviolet irradiation.

Growth of juvenile oysters reared on each of four algal species cultured in E or ENV is being compared by weighing pooled sub-groups from each chamber weekly. During 7 weeks of observation, oyster growth has been slow, but consistent, and mortality has been low (<10%). Unfed oysters have not increased in weight, indicating that nutritional input from the seawater supplying the chambers is being effectively eliminated by the filtration system. Growth of oysters being fed *Tetraselmis maculata* has been greater than all other feeding regimes, corroborating our earlier findings of the excellent nutritional value of this alga. Moreover, *T. maculata* cultured in ENV is stimulating more rapid oyster growth than is this species cultured in the standard E medium. Thus far, for the other algal species under investigation - *Dunaliella tertiolecta*, *Pyramimonas grossi*, and diatom strain D-828 - there are no clear differences in nutritional value between E and ENV cultures, but we are continuing the experiment, expecting that further information will emerge with time. Additional data will need to be collected before analysis of these observations will be attempted.

PUBLICATIONS AND REPORTS

Stiles, S. and J. Choromanski, 1984. Rapid Cytological examination of bivalve larvae of commercial marine mollusks: Potential for genetic toxicology and aquatic bioassays. Genetics Suppl., 107(3): s103 (abstract).

ATLANTIC ENVIRONMENTAL GROUP

SHIP-OF-OPPORTUNITY TEMPERATURE AND PLANKTON TRANSECTS

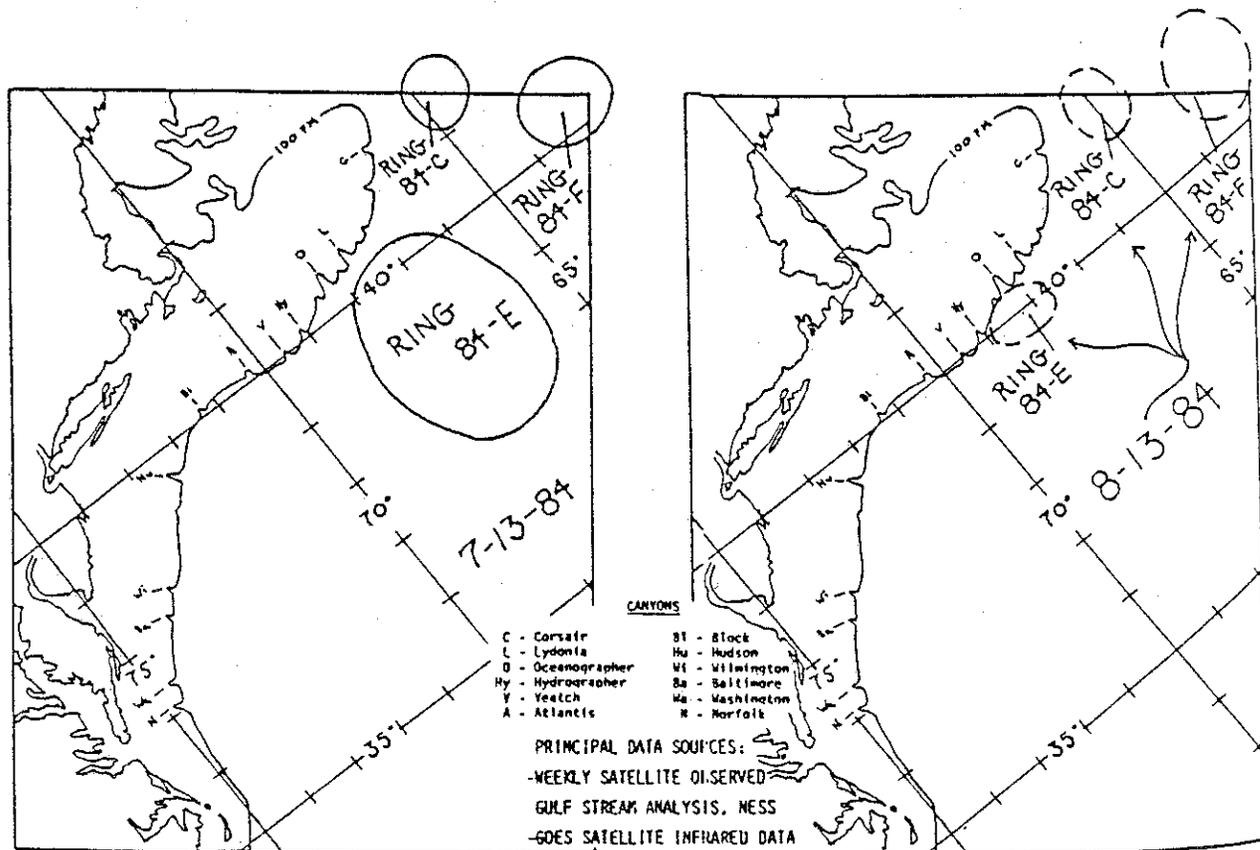
A total of 10 XBT (Expendable Bathythermograph) and 4 CPR (Continuous Plankton Recorder) Transects were occupied during July - August as follows: Gulf of Maine - 2 CPR and 2 XBT, Middle Atlantic Bight - 2 CPR and 4 XBT, Gulf of Mexico - 4 XBT, Contact: Steven Cook FTS 838-7142.

SQUID DISTRIBUTION STUDY USES SATELLITE DATA

A joint study of the distribution of short-finned squid (Illex illecebrosus) off the middle Atlantic states relative to an oceanographic feature, the shelf-slope front, is being pursued by members of the Atlantic Environmental Group and the Resource Assessment Division. Analysis of catch rates and positions from over 1,500 observer logs from 1980, 1981 and 1982 compared with satellite infrared imagery has shown that even though only about 50-60% of the trawling effort was within 10 nautical miles of the front, 80-100% of the high catch rates were found there. A report describing these early results will be presented to a Northwest Atlantic Fisheries Organization symposium in Halifax early in September. Contact: Mert Ingham, FTS 838-7142. Anne Lange, FTS 840-1301.

GULF STREAM RING LOCATIONS

Announcements of Gulf Stream ring locations in mid-July and mid-August were sent to Commander, Atlantic Area, U.S. Coast Guard for publication in the August and September issues of the Atlantic Notice to Fishermen. Contact: Reed Armstrong, FTS 838-7142.



ENVIRONMENTAL ASSESSMENT DIVISION

THREE-YEAR FLOUNDER HEMATOLOGICAL STUDY COMPLETED

A combination of field sampling and laboratory exposures was used in an attempt to distinguish between normal seasonal variations and pollutant-related changes in the hematology of the windowpane flounder, *Scophthalmus aquosus*. Three stations in Long Island Sound were chosen to provide a pollutant gradient. Windowpane flounder were collected from the three stations monthly, when possible, over a period of three years. In addition, the same species was subjected to 60-day laboratory exposures to mercury, cadmium, and copper. Seasonal variations were noted in hematocrit, plasma osmolality, sodium, potassium, and calcium. Station-related differences were demonstrated in osmolality, hematocrit, and hemoglobin. Exposure to copper or cadmium produced no significant change in any variable measured. Following exposure to mercury, there were significant differences between controls and exposed animals in plasma sodium and plasma calcium. Contact: M. Dawson (FTS 642-5242).

UNUSUAL PLANKTON BLOOMS

During the month of August, several instances of plankton blooms occurred along stretches of the northern New Jersey coastline. These blooms involved the dinoflagellate *Olisthodiscus*, and the chain forming diatom *Skeletonema*. These blooms resulted in turbid waters and were reported regularly in the local newspapers. Personnel from the Division and the New Jersey Department of Environmental Protection cooperated in monitoring the blooms.

Associated with the blooms were numerous instances of hypoxia. Reports were made to the Division by divers associated with the American Littoral Society, that low dissolved oxygen existed at several diving sites in or near the areas experiencing plankton blooms. Regular bi-weekly Ocean Pulse Monitoring cruises reported moderately high levels of dissolved oxygen and one or two areas had near zero oxygen readings. No major fish kills were reported.

These regular rize monitoring measurements are important in the development and use of predictive models concerned with hypoxia in the New York Bight. Contact: J. O'Reilly (FTS 342-8251).

MONITORING FOR RED TIDES CONTINUES

The Biological Oceanography Investigation and the New Jersey Department of Environmental Protection, are continuing a cooperative survey in New Jersey waters for *Gonyaulax excavata*, the dinoflagellate that causes toxic red tides in New England. Increased incidence of the red tides from Maine to Rhode Island in recent years, has raised suspicion that the organism is moving southward. Paralytic shellfish poisoning (PSP) has not yet been a problem in New York or New Jersey.

The organism is present, however, in certain New York waters; *G. excavata* has still not been confirmed in New Jersey waters.

Bioassay of the growth potential of *G. excavata* in the extremely productive Hudson/Raritan Bay system is likewise continuing and this work is being expanded to include comparison of Long Island waters and prime New Jersey shellfish areas. Contact: J. Thomas (FTS 342-8246 or 201-872-0200).

MEASURING BIOLOGICAL STRESSES IN CLAMS

We are monitoring the Adenylate Energy Charge (AEC) and other biochemical parameters of the tissues of the bivalve *Mya arenaria* in natural populations and in cages at three locations. The control population is located in Long Island Sound; the other two groups are located in the Raritan Bay and in the Arthur Kill.

The data that have been generated thus far indicate that the AEC values are not significantly different among any of the populations through the end of March 1984. However, the values obtained in April and May indicate differences between some of the populations. There are no differences in the AEC values for the natural population and the caged population at the control site (Station 1). Animals from Station 1 caged in Raritan Bay (Station 2) have lower AEC values than those at Station 1; they also have lower values than the natural population at Station 2. Control animals from Station 1 caged in Arthur Kill (Station 3) also have lower AEC values than clams at Station 1. These data indicate that conditions present in the environment can alter biochemical parameters such as AEC in this species. The data may also suggest a tolerance in animals preconditioned to the Raritan Bay environment. Contact: Angela Cristini (201-825-2800).

MEASURING RESPONSES OF FISH TO BACTERIA

Immunological responses in fish were measured between April and July on cruises in the New York Bight and Chesapeake Bay. Fish serum collected from these locations were tested against sludge disposal isolates and foreign erythrocytes.

On April 21st, winter flounder were collected from three locations: Sandy Hook Bay, North Beach and Ambrose Tower. A high percentage of fish showed antibody to the test bacteria and erythrocytes. At the Ambrose location, 80% of fish had antibody to *Aeromonas hydrophila* vs. 50% in Sandy Hook Bay and 40% in Ambrose had antibody to *E. coli* vs. 25% in Sandy Hook Bay.

A high percentage of bluefish caught in Chesapeake Bay (May 15th) had titers to *Aeromonas hydrophila* (77%) and *E. coli* (84%).

On July 12, 1984, 100% of summer and windowpane flounders collected had antibody to *Vibrio* sp., a fish pathogen and 100% of the windowpane flounders had antibody to *Aeromonas hydrophila*. Two hundred seventy samples were collected on the NEMP cruise AL-84-06. These samples are still being tested. Contact: Joanne Stolen (201-872-0200).

MARINE ECOSYSTEMS DIVISION

SUMMER MARMAP PLANKTON SURVEY ACTIVITY INCREASES

Five MARMAP surveys were completed from mid-May through mid-August. Emphasis was on coastal waters from Cape Hatteras to Cape Cod to sample bluefish eggs and larvae. This level of survey activity is more than twice that normally conducted during the three-month time period, an accomplishment credited in part to cooperating investigations in NEFC and SEFC who provided us with the opportunity to piggyback on their at-sea research in the Middle Atlantic Bight. The time series will provide estimates of adult spawning biomass for that part of the bluefish population that spawns north of Cape Hatteras. Preliminary observations indicated that spawning peaks from late June to July with larvae concentrated over mid-shelf areas from New Jersey to Chesapeake Bay. Contact Wallace Smith (201-872-0200 or FTS 342-8260).

SECOND JUVENILE FISH SURVEY COMPLETED ON GEORGES BANK

A second juvenile fish cruise (*Delaware II* 84-07) was conducted on Georges Bank from 6-16 August, in order to assess mortality and growth rates of the young fish and to look for evidence of predation by larger fish. The first part of the cruise surveyed the Bank for juvenile cod, haddock, and yellowtail with both pelagic and demersal gear. The young gadids were concentrated on the Northeast Peak of Georges Bank in about 40 fathoms of water, and a 48-hour study of diel variability and food habits was carried out in this aggregation. Predators feeding on juvenile fish included spiny dogfish, silver hake, fourspot flounder, windowpane, bluefish and winter skates. Young-of-the-year were the most abundant juvenile fish in the catches and larger windowpane were feeding heavily on their own young. Contact Ed Cohen (617-548-5123 or FTS 840-1210).

IN-SITU SUBMERSIBLE STUDIES OF ZOOPLANKTON

A cruise was conducted the *Johnson-Sea-Link* from 9-19 August, as part of a cooperative water column ecology program with the Harbor Branch Foundation and the Naval Ocean Systems Center. Submersible dives were made in the Gulf of Maine, Great South Channel, and several canyons along the southern flank of Georges Bank. Observations, videotapes, photographs, and collections were made of gelatinous zooplankton, euphausiids, and marine snow. Vertical measurements of bioluminescence strength were also made. Distribution and abundance of organisms and bioluminescence will be correlated with depth, temperature, conductivity and adjacent zooplankton communities. Stomach analysis of siphonophores will also be made to determine predator-prey relationships. Contact Carolyn Griswold (401-789-9326 or FTS 838-7138).

MOVEMENTS AND DIET OF LARGE PELAGICS

Approximately 300 sharks were examined or tagged during July and August at six shark tournaments in New Jersey, New York, and Massachusetts. In the same period, tags were recovered from 30 sharks representing six species. The most dramatic returns came from a sandbar shark that travelled from Long Island into the Gulf of Mexico, a tiger shark that was recaptured after nine years at liberty, and a swordfish that was recaptured in the Straits of Florida three years after having been tagged on the Grand Banks.

In mid-August a 654 pound white shark was harpooned off Barnstable, Massachusetts, the second white shark harpooned in Cape Cod Bay this summer. The shark was an immature female that contained dogfish, bluefish, and goosefish in its stomach. Contact Jack Casey (401-789-9326 or FTS 838-7142).

PUBLICATIONS AND REPORTS

- Auditore, P. J. 1984. Stomach content analysis processing methods for larval gadids. Woods Hole Lab. Ref. Doc. No. 84-14 (MARMAP Contribution MED/NEFC 84-16) 48 p.
- Berrien, P. 1984. Silver hake, *Merluccius bilinearis*, egg census and adult spawning population estimates for 1979 and 1980 in waters off eastern United States. ICES C.M. 1984/G:29. 32 p.
- Bowman, R. 1984. Examination of some factors which cause variability in catchability and stomach content data of marine fishes. Woods Hole Lab. Ref. Doc. No. 84-20 (Prepared for "Gutshop '84").
- Bowman, R., R. Eppi, and M. Grosslein. 1984. Diet and consumption of spiny dogfish in the Northwest Atlantic. ICES C.M. 1984/G:27.
- Bowman, R. and W. Michaels. 1984. Food of seventeen species of Northwest Atlantic fish. NOAA Tech. Mem. NMFS-F/NEC-28.
- Bowman, R., J. Warzocha, and T. Morris. 1984. Trophic relationships between Atlantic mackerel and American sand lance. ICES C.M. 1984/H:27.
- Buckley, L. J. 1984. RNA-DNA ratio: an index of larval fish growth in the sea. Mar. Biol. 80:291-298.
- Cohen, E. G. Laurence, and W. Smith. 1984. The Role of Starvation and predation in regulating year-class strength in several fish stocks on Georges Bank. ICES C.M. 1984/G:32.
- Maurer, R. and R. Bowman. Food of Northwest Atlantic squids, *Illex* and *Loligo*. NAFO Res. Doc. 84/IX/114.
- Morris, T. 1984. Food of bluefish. Woods Hole Lab. Ref. Doc. No. 84-22.
- Pennington, M. 1984. Estimating the average food consumption by fish in the field from stomach contents data. ICES C.M. 1984/H:28.
- Sherman, K., W. Smith, W. Morse, M. Berman, J. Green, and L. Ejsymont. 1984. Spawning strategies of fishes in relation to circulation, phytoplankton production, and pulses in zooplankton production, and pulses in zooplankton off the northeastern United States. Mar. Ecol. Prog. Ser. 18:1-19.
- Smith, W., and W. Morse. 1984. Monthly distribution patterns of larval haddock, *Melanogrammus aeglefinus*, off northeastern United States 1977-1982, with observations on transport in the Georges Bank region. ICES C.M. 1984/G:30. 22 p.

NATIONAL SYSTEMATICS LABORATORY

NEW SPECIES OF GAMBA PRAWN

Study of type-specimens of gamba prawns (*Pseudaristeus*) at the British Museum and the Zoological Museum of the University of Amsterdam confirmed preliminary conclusions that the Albatross had collected an undescribed species in the waters of the Philippine Islands in 1910. Description of this species will be part of the generic revision now under way. Contact Isabel Canet (202-357-1417).

BERMUDA BIOLOGICAL STATION

Dr. Bruce B. Collette taught a three-week course "Biology of Fishes" at the Bermuda Biological Station in August. The class included fishery students from Brazil, Chile, Ecuador, Great Britain, and the U.S., high school and college teachers from the United States and Bermuda, and a Washington employee of the Food and Drug Administration. Contact Bruce B. Collette (202-357-2524).

FOSSIL LOBSTERS

Dr. A. B. Williams collaborated during annual leave with Dr. Gale A. Bishop, Department of Geology and Geography, Georgia Southern College, Statesboro, Ga., and a field party in collecting fossil species of the spiny lobster genus *Limulus*, with associated decapod crustaceans, from shale formations of the Late Cretaceous in South Dakota, Wyoming and Montana. *Limulus* is a genus that still exists today in Indo-Pacific waters where it is represented by three living species, at least one of which is marketed commercially in Japan. From a base of operations in Rapid City, S.D., the group collected several hundred specimens from a series of outcrops. The objective of the effort is to compare these ancient animals and the community in which they lived to the modern counterparts. Contact Austin Williams (202-357-2639).

PUBLICATIONS

Van Dover, C.L., A.B. Williams and J.R. Factor. 1984 The first zoeal stage of a hydrothermal vent crab (Decapoda: Brachyura: Bythograeidae). Proc. Biol. Soc. Wash. 97(2):413-418.

PATHOBIOLOGY DIVISION

STATUS AND TRENDS START-UP

Within the last 2 months the initial sampling for the NOAA Status and Trends Program was initiated in NEFC. On July 19 and 20, staff of the Environmental Management and Pathobiology Divisions sampled fish (croaker, spot) and sediments from upper and lower Chesapeake Bay. Sampling activities were conducted from the *Orion*, a research vessel operated by the Center for Environmental & Estuarine Studies at the University of Maryland. On July 25-27, fish (winter flounder) and sediments were sampled from Boston and Salem Harbors, Massachusetts. Sampling was accomplished using the *Mya*, a research vessel operated by Battelle Laboratories in Duxbury, Massachusetts. As expected, a number of problems developed in the course of the sampling activities. Most of these were directly related to the adequacy of the vessel and method of deployment of trawls and other sampling gear. Hopefully, subsequent cruises will be conducted using vessels which will permit biologists and chemists to spend their time working up the animals and sediments rather than acquiring them. Future plans also call for collecting fish from the Gulf Coast sites during September, with collection from the Southeastern States being completed in October. Histological evaluation of the tissues collected will occupy the remainder of the fall and winter months.

HISTOLOGICAL SERVICES

Since the last reporting period, the histology laboratory has processed and stained 130 oyster tissue slides, 1,231 clam tissue slides, 1,580 clam blood smear slides, 113 crab tissue slides, 1,336 fish slides, and 60 scallop slides. Most work consisted of processing winter flounder livers from specific sampling sites in New England from the Status and Trend Program and from an ongoing study on neoplastic clams.

GULF-ATLANTIC SURVEY

Austin Farley and Gretchen Roe participated in a cooperative cruise from Charleston, South Carolina, to the New York Bight aboard the *Delaware II* with the Southeast Fisheries Center (GAS cruise). Blood preparations were made from several species of mackerel for parasites and pathologic conditions. Flounder were necropsied from inshore sites and liver tissues fixed for histology and chemical analysis.

STUDIES OF NEOPLASMS IN CLAMS CONTINUES

Collections of soft clams from monitoring sites in Chesapeake Bay previously shown to have epizootic sarcomas were made in cooperation with biologists from the State of Maryland. The disease evidently decreased in prevalence in the summer due to the probable mortality of affected clams. Experimental studies of soft clams held in laboratory aquaria confirmed the mortality patterns associated with sarcomas in the field. A manuscript was prepared on the new occurrence of epizootic sarcomas in soft clams and is now under peer review.

CRUSTACEAN DISEASES BEING STUDIED

A manuscript on the dinoflagellate parasites of benthic amphipods collected on Ocean Pulse cruises has been completed and entered into laboratory review.

John Hochheimer of the University of Maryland Horn Point Laboratory, Cambridge, Maryland, has been developing systems for production of soft crabs in confinement. Groups of crabs held in his recirculating system have showed various abnormalities and excess mortality this summer. Problems of a similar nature have occurred in commercial contained shedding systems at Crisfield. Six blue crabs that were part of a group undergoing mortality in Hochheimer's recirculating system were examined histologically, using the light microscope. A Baculovirus (Baculo-B) was present in hemocytes and hemopoietic tissue of three of the six crabs dissected. Probably two others were infected with other, unidentified viruses. We plan to examine more crabs that have been held under similar conditions, using electron microscopy, in order to determine whether other viruses are present.

COPEPOD PARASITES FOUND ON LARVAL AND JUVENILE FISH FROM GEORGES BANK

For a number of years studies by NEFC personnel on larval fish survival and recruitment have focused on starvation as a limiting factor during the early life history of several fish species on Georges Bank. Recently, the scope of these studies has been expanded to include predation and disease as possible influences on larval fish mortality. During a recent cruise (June 1984) a number of late-larval or early-juvenile fish were captured that exhibited copepod parasites attached mainly in the buccal region or to various fins. The parasites were observed on all of the predominant fish species collected (i.e., yellowtail flounder, cod, and haddock) and are believed to be members of the family Lernaeoceridae. Although the physiological effect of these parasites on fish larvae is not well understood, Rosenthal (1967) has observed them to kill herring larvae within several hours under experimental conditions. Presently, an attempt to identify the parasitic organisms is being made in conjunction with Dr. R. F. Cressey of the Smithsonian Institution, Washington, D.C.

PUBLICATION

Johnson, P. T. 1984. A rickettsia of the blue king crab, *Paralithodes platypus*. J. Invertebr. Pathol. 44: 112-113.

RESOURCE ASSESSMENT DIVISION

CENTER SCIENTIST PARTICIPATES IN FAO RESEARCH

During mid-July Michael Fogarty of the Woods Hole Laboratory participated in joint fisheries research projects with Italian scientists and staff at the Fano Laboratory on the Italian Adriatic Coast and the Laboratory of Mazzara del Vallo in Sicily at the request of the Food and Agriculture Organization of the United Nations (FAO). Activities included work to develop improved research vessel survey procedures and investigations into the more theoretical aspects of survey sampling and data analysis, particularly with regard to size frequency data. Contact Michael Fogarty (FTS 840-1255 or 617-548-5123).

SUMMER RESEARCH ON HORSESHOE CRABS

Fishery Biology Investigation staff members are currently studying the biology and distribution of horseshoe crabs (Limulus polyphemus) with Dr. Mark L. Botton of Fordham University. There is reason to believe that fisheries for bait and biomedical purposes may be over-exploiting this species in some areas, and accordingly work is being directed primarily towards developing the necessary biological basis for management. Much of this work involves analysis of NEFC survey data, which constitute the most extensive listing of the occurrence of Limulus on the continental shelf. Other projects include attempts to age slipper limpets (Crepidula fornicata) attached to the shells of adult Limulus as an indirect approach for determining longevity and examination of gut contents of crabs collected during NEFC surveys to evaluate the potential impact of this species as a bivalve predator. Contact John Ropes (FTS 840-1287 or 617-548-5123).

POLLOCK STOCK REMAINS HEALTHY

Recent assessment results for the Northwest Atlantic pollock stock indicate this resource to be in good condition. Stock biomass increased substantially during the mid-to-late 1970's and currently remains at a relatively high level; the 1979 year class was one of the strongest on record and the recruiting 1982 year class also appears to be a good one. Fishing mortality has been relatively low in recent years and catches have remained at or below sustainable levels. Recent declines in commercial harvests (from 59,000 tons in 1981 to 49,000 tons in 1983) appear to be attributable primarily to market conditions. Contact Ralph K. Mayo (FTS 840-1310 or 617-548-5123).

AGING TECHNIQUES BEING DEVELOPED FOR BLACK SEA BASS

Fishery Biology Investigation staff have completed the second phase of a study on age and growth of black sea bass. During this

phase studies were made of growth patterns on hard structures, including scales, otoliths and spines from samples collected in the New York Bight area. Growth patterns were found to be considerably different from those observed for samples from the Nantucket Shoals area, but satisfactory aging methods were developed. Precision of age interpretation was also compared for the three structures studied and otoliths were found to be most reliable. Contact Louise Dery (FTS 840-1237 or 617-548-5123).

WORKSHOP ON ATLANTIC SALMON STOCK IDENTIFICATION

A workshop on stock identification of Atlantic salmon was sponsored by NEFC and held in Woods Hole on August 28-29. This workshop examined the results of three 1984 studies on stock identification methods for Atlantic salmon caught in the open ocean. These studies were designed to review: 1) techniques associated with scales and otoliths, including analyses of shape, circuli patterns and microelemental composition; 2) techniques based on genetic characteristics, and 3) other techniques, including the use of dyes or tracers, meristics, and morphometrics. Assessment data deficiencies were also defined and research programs outlined to meet the future needs of the North Atlantic Salmon Conservation Organization. Contact Vaughn Anthony (FTS 840-1304 or 617-548-5123).

AGING STUDY ON LARVAL WINTER FLOUNDER

Fishery Biology Investigation staff are currently studying growth patterns and aging techniques for larval winter flounder. Work includes examination of larvae reared in the laboratory and larvae and juveniles collected at various field stations. Primary emphasis is being placed on microscopic examination of otoliths to determine whether daily growth increments or other structural features can be used to indicate age. Some samples are being prepared for scanning electron microscopy work and will be used to corroborate data obtained from light microscope studies. Contact Ambrose Jearld (FTS 840-1318 or 617-548-5123).

SECOND ANNUAL NORTHERN SHRIMP SURVEY COMPLETED

Center scientists and personnel from the Maine Department of Marine Resources, the New Hampshire Fish and Game Department, and the Massachusetts Division of Marine Fisheries completed the 1984 Northern Shrimp Survey in the western Gulf of Maine during early August aboard the R/V GLORIA MICHELLE. Gear and procedures for this survey have been developed through a cooperative effort by the Center and personnel from the above states, supported by the Northeast Region of NMFS and the Atlantic States Marine Fisheries Commission (ASMFC). Highest catches were made off the southwestern Maine coast in the Jeffreys Ledge and Platts Bank regions, although abundance also appeared to be relatively

high further east. Catches in 1984 were on average higher than in 1983 for survey strata sampled in both years, suggesting a continued recovery of this resource from the rock-bottom levels of the late 1970's. Contact Steve Clark (FTS 840-1243 or 617-548-5123).

PUBLICATIONS AND REPORTS

Mayo, R.K. and S.H. Clark. MS 1984. An assessment of the pollock (Pollachius virens L.) in the Scotian Shelf, Gulf of Maine and Georges Bank region, 1984. NMFS, NEFC, Woods Hole Laboratory Reference Document No. 84-13.

Sissenwine, M.P., B.E. Brown, M.D. Grosslein, and R.C. Hennemuth. 1984. The multispecies fishery problem: a case study of Georges Bank. Lecture Notes in Biomathematics, 54:286-309.

RESOURCE UTILIZATION DIVISION

SUBJECTIVE VS. OBJECTIVE MEASUREMENTS

The frozen storage stability experiment of flounder (dab) is continuing. After 2 months frozen storage at +10°, 0°, and -10°F following iced storage for 1, 5, and 9 days, all the samples were judged as fair to good by the laboratory taste test panel. Hunter L color and Instron texture measurements are being taken on the samples that are taste tested to determine if there is a correlation between instrument measurements and the sensory panel.

ANOTHER USE FOR SALTS OF ALGIN

A preliminary study using sodium alginate to produce a minced red hake product with a flaked or layered structure has been completed. The alginate was applied in 3 ways - to layers of mince, mixed into the mince, a combination of mixing and layering. Product was stored one month at 12°F. Although the treated samples had the appearance of easily separated layers, no significant difference between control and treated samples was observed by chemical, sensory, or Instron measurements. Alternative methods for the next trial are being considered.

FROM GULF OF MAINE TO DRYDOCK

M/V GLORIA MICHELLE participated in a lobster tagging cruise in the Gulf of Maine in cooperation with the MURT group of Woods Hole and another Gulf of Maine shrimp survey in cooperation with the Atlantic States Marine Fisheries Commission and Northern Shrimp Technical Committee.

The GLORIA MICHELLE is now undergoing an unscheduled rebuilding of her main propulsion engine and a biannual haulout for painting bottom and topsides in addition to blasting and coating the potable water tank and shaft alley.

A LESSON IN COOPERATION

In collaboration with the USDC Inspection Service's Northeast Regional Office, we have been examining commercial fish blocks (several species and several countries of origin) using the three draft Standards for Grades of Fish Blocks. A computer program to store the data has been developed, and the data (about 24,000 data points) have been entered. A program to analyze the data is being developed.