



NORTHEAST FISHERIES CENTER

NEWSLETTER

NOVEMBER-DECEMBER 1983

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



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NATIONAL MARINE FISHERIES SERVICE
NORTHEAST FISHERIES CENTER

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"NORTHEAST FISHERIES CENTER NEWSLETTER"

The "Northeast Fisheries Center Newsletter" is an informal bimonthly report on Northeast Fisheries Center (NEFC) activities, primarily for NEFC employees. This 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. To cancel delivery or change mailing address, please write: Information & Publications Office, Northeast Fisheries Center, National Marine Fisheries Service, NOAA, Water St., Woods Hole, MA 02543.

ENVIRONMENTAL ASSESSMENT DIVISION

RECREATIONAL FISHERMEN VOLUNTARILY PROVIDE BLUEFISH CATCH AND EFFORT DATA

At the present time, with the expert help, continued encouragement, and total cooperation of Dr. William Muller (Managing Editor, Fishermen Magazine) and the constituency he represents, we have undertaken a strictly voluntary bluefish data collection system. Since September of 1983 we have routinely been receiving catch-per-unit-of-effort data from five Long Island surf fishing clubs on a monthly, as well as size category basis. To date, information has been received relative to almost 700 individual fishing days accounting for the capture of over 1700 bluefish ranging in size from 1 to 20 pounds. It should be noted, it is strongly felt by all cooperating individuals that over time, this endeavour will provide timely information which will prove invaluable to our present status of knowledge concerning the recreational removal of bluefish. In addition, during recent conversations with representatives of recreational user groups, it was felt this is just the beginning of what has the potential for a long-term cooperative venture which in the future can be expanded not only geographically but also to additional species (striped bass, weakfish, summer flounder, etc.).

REPORT ON 106-MILE DUMPSITE COMPLETED

The Northeast Monitoring Program has just completed a major report synthesizing fisheries and environmental data for the dumpsite in continental slope waters 106 nautical miles southeast of New York City. This "106-Mile Site Characterization Update" reviews earlier scientific studies concerning the site, and adds recent NMFS information. Topics covered include: physical oceanography; nutrients; phytoplankton; zooplankton; fish eggs and larvae; sediment characteristics; benthic fauna; fish and fisheries; demersal fish species groups; mammals, birds and turtles; and contaminant inputs, fates and effects. The area covered is not just the dumpsite itself, but all waters with a reasonable probability of being reached by wastes dumped at 106. Since Gulf Stream eddies move south through the dumpsite, the "potential area of impact" is an ellipse covering slope and outer continental shelf waters south to about the Virginia-North Carolina border and north to the latitude of northern New Jersey. The report is sponsored and authored in part by the U.S. Environmental Protection Agency; EPA will use the update in considering whether to move the present New York Bight sewage sludge and dredged materials dumpsites to 106. The report is available through Dr. John Pearce, NMFS/NEFC, Sandy Hook Laboratory, Highlands, New Jersey 07732.

ESTABLISHMENT OF STANDARDIZED INFORMATION DISTRIBUTION SYSTEM

The Division of Environmental Assessment has established a standardized distribution system so that technical memoranda, published papers, and other documents can be routinely distributed to key management personnel and other users. The list includes Regional EPA contacts, COE personnel, and State Conservation agencies. Environmental and conservation organizations receive material as appropriate. Recent materials distributed include the 106-Mile Site Characterization Update, papers on contaminants in Penobscot and Casco bays, papers on trace metals and PCB's in finfish, a paper on the relationship between ocean dumping and distribution of PCB's, and a paper on benchmark distribution of phytoplankton and possible relationships to eutrophication of coastal and estuarine waters.

IN SITU OBSERVATION OF THE NEW YORK BIGHT ACID-WASTE DUMPSITE

Visual observations, videotapes and sediment infaunal analysis at the acid-waste dumpsite and a control site 10 km to the northeast indicated no obvious differences in the health of the biota and, based on temporally and spatially limited observations, only minor differences in the abundance of animals at the two sites. About two hours after an observed dump the acid-waste site was marked by light green surface water. Just under the surface the divers observed fairly clear green water with visibility about 2 m. Visibility diminished gradually to the thermocline where it was less than 20 cm, due to a very fine, bright yellow-green floc. Under the thermocline the water became dark and clear with pea-sized yellow-orange aggregates uniformly distributed at 10-20/m³ throughout. On the bottom these aggregates were concentrated in the troughs of sand ripples in a patchy distribution. At the control site, neither the water or sediments showed any evidence of dumped material.

PHYTOPLANKTON GROWTH POTENTIAL IN MID-ATLANTIC SHELF WATERS

A total of 48 samples of northeast coastal and shelf waters were assayed for phytoplankton growth potential with the diatom, *Thalassiosira pseudonana*. The assays indicated that nitrogen was the nutrient in scarcest supply in 37 of the samples. Phosphorus was secondarily limiting in 13 of these. In seven samples, growth limitation by nitrogen and phosphorus was approximately equal. In three samples required micronutrients were in relative abundance; complete growth inhibition was detected in one sample. These and other results are being organized for the Northeast Monitoring Program Annual Report.

NOAA'S BIOLOGICAL RATE MEASUREMENTS PASS REVIEW

The Biological Rate Measurements Working Group (primary production, etc.) of NOAA's Quality Assurance (QA) program met in Miami, Florida, 5-7 December, to review responses to a NOAA-wide QA Survey and make recommendations to correct deficiencies found. The Working Group, composed to experts from academia and NOAA, found the quality of NOAA's biological rate measurements (based on responses received) to be comparable to or exceed those carried out in academia.

SUBLETHAL STRESS DETECTED IN MARINE ANIMALS FROM DUMPSITE AREA IN CENTRAL LONG ISLAND SOUND

In 1982 the U.S. Army Corps of Engineers initiated a new research program, "Long-Term Effects of Dredging Operations" (LEDO). One of the operations chosen for study was the maintenance dredging of Black Rock Harbor, Bridgeport, CT, and the subsequent dumping of these spoils at the central Long Island Sound dumpsite off New Haven, CT. These spoils are heavily contaminated with heavy metals, petroleum hydrocarbons, and bacteria. We conducted (1) studies to evaluate the effects of this activity on lobsters (*Homarus americanus*), blue mussels (*Mytilus edulis*), winter flounder (*Pseudopleuronectes americanus*), and windowpane flounder (*Scophthalmus aquosus*) and (2) a bacteriological study of the mussels, water column and sediments.

Lobsters held in cages near the dumpsite developed a much stronger and more frequent "cough rate" than did lobsters held at a control site. Respiration rates of mussels held near the dumpsite were depressed 3 months after the dumping activity, but no sooner. In both flounder species caught near the dumpsite, we found altered plasma ions and elevated hemoglobin values. These studies complement those conducted concurrently by EPA (Narragansett) scientists, and will be reported jointly.

Dispersion of the spoils material was measured by increased counts of the tracer bacterium *Clostridium perfringens* in the sediment. Within a month after dumping, contaminated sediments extended 500 m east and west of the dumpsite, following current patterns in the area. Numbers of *Vibrio* species increased in both water and sediments near the dumpsite, but the increase was related to concurrent seasonal elevated temperatures rather than to the dumping activity. Caged mussels held at several sites around the dumpsite did not accumulate significant amounts of either *C. perfringens* or *Vibrio* species.

PUBLICATIONS AND REPORTS

Northeast Monitoring Program. 1983. 106-Mile Site Characterization Update. J. Pearce, W. Miller and C. Berman (eds.). NOAA Tech. Mem. NMFS-F/NEC-26.

MANNED UNDERSEA RESEARCH AND
TECHNOLOGY PROGRAM

Undersea Research Proposals (FY 84) Pass Review

Four NEC undersea research proposals were submitted to NOAA's Office of Undersea Research to compete with proposals from other fisheries centers and Sea Grant Institutions for approximately \$1,000,000 of submersible support funds for FY 1984. The proposals represent new research initiatives of NEC and ongoing programs; all are cooperative efforts with other federal agencies, state governments and New England universities. Proposal titles are; (1) Georges Bank - Submarine Canyon - Continental Slope Undersea Study of Living Resources and Fishery Habitats in Oil and Gas Drilling Areas, (2) In-Situ Studies of the Efficiency of Sink Gill Nets and an Assessment of the Ghost Gill Net Problem, (3) Submersible Based Assessment of the Distribution, Abundance and Habitat Ecology of Lobsters in the Offshore Gulf of Maine and (4) Water Column Ecology: Properties and Processes In the Gulf of Maine and Georges Bank. Each proposal was reviewed by a ten person review panel of research scientists and given a priority ranking among twelve proposals. The four proposals from NEC ranked sufficiently high as to receive funding support for FY 84, totalling about \$450,000.

Presentation to Senator Weicker

Richard Cooper presented the results of four years of undersea research on the biology and geology of the Georges Bank submarine canyons and their importance as nursery grounds and habitats for lobsters, shrimp, crabs, hakes, tilefish, etc. to Senator Weicker on December 13 in Washington, D.C. A color videotape was shown to illustrate the major ocean floor habitat types characteristic of the Georges Bank canyons. Senator Weicker was very interested in the NEC's oil and gas production monitoring program and the apparent future of drilling in the canyon areas.

MARINE ECOSYSTEMS DIVISION

MARMAP ASSESSMENT OF HADDOCK SPAWNING BIOMASS

The MARMAP ichthyoplankton survey group completed the seventh consecutive year of surveys in coastal waters from Cape Hatteras, North Carolina to Cape Sable, Nova Scotia. During 1983 they completed six surveys, occupied 919 stations and collected 1,997 plankton samples. Fish eggs and larvae collected on these surveys are used to investigate multispecies ecosystems interactions, determine causes of interannual variability in survival/mortality of ichthyoplankton, and provide fishery-independent assessments of adult spawning biomass. A recently completed analysis of haddock larvae collected on MARMAP surveys from 1977 through 1982 revealed that 86% of the larvae originated on Georges Bank. Larval production increased from 3.6×10^{12} in 1977 to a peak of 9.3×10^{12} in 1979. A 49% decrease occurred from 1979 to 1981, and in 1982 production dropped to 0.2×10^{12} , or 5.5% of the 1981 level. Adult spawning biomass on Georges Bank for the 6-year time-series peaked at 127,522 tons in 1979. With the exception of 1982, an anomalous year, biomass estimates for the other years ranged from 49,000 to 94,000 tons.

LOW PREY DENSITY MORTALITY OF SUMMER FLOUNDER

Summer flounder were spawned in the laboratory. A three-week study of growth and survival of larvae at prey densities of 10, 50, 100, and 2,000 plankters per liter was completed at 15°C. Larval summer flounder did not survive at 10 plankters per liter in the 200 \times cultures. Daily specific growth ranged from 5% per day at 50 plankters per liter to 13% per day at 2,000 plankters per liter.

Sand lance were collected with a beach seine and held at the Narragansett Laboratory where they spawned. The larvae will be used in studies of growth and survival at low plankton densities.

FISH PRODUCTION OF THE GEORGES BANK ECOSYSTEM

A chapter on total ecosystem production for the Georges Bank book to be produced by the MIT Press has been completed. This chapter compares Georges Bank with five other shelf regions in terms of production of the various trophic levels from phytoplankton to whales. One of the most interesting findings to date is that although fish production on Georges Bank is very high compared with most other shelf ecosystems, including the Scotian Shelf and the North Sea, its secondary production appears to be about the same order of magnitude as the other areas. A partial explanation may be that a significant part of estimated fish production on Georges Bank is imported via migration of species deriving much of their energy from waters adjacent to the Bank, particularly the Mid-Atlantic Bight region.

IMAGE ANALYSIS SYSTEM DEVELOPMENT

We have overcome several of the remaining problems with the prototype system. These include electronic interference between the various hardware components that make up the system, and the incorporation of calibration factors so measurements are now reported in units of mm and square mm. We have also been notified that several grant proposals have been approved by NSF and ONR for the development of a second generation image analysis system for zooplankton identification. The new system will recognize animals to genus or species. The studies will be done at GSO and the University of Denver, with cooperation from the NMFS Narragansett Laboratory. NSF will also fund cooperative research with a Japanese group for the application of our techniques to phytoplankton analysis.

Publications

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NATIONAL SYSTEMATICS LABORATORY

ROCK SHRIMP STUDY COMPLETED

A monograph on the 12 species of rock shrimps (genus Sicyonia) occurring in the American Pacific was completed and submitted for publication to the NMFS Fishery Bulletin. Until a few years ago, rock shrimps were discarded from the large commercial catches of penaeoid shrimps made in both the eastern Pacific and western Atlantic. It was commonly thought that, because of their hard shells, they would be rejected by the consumers and the processing industry; however, increased demand for shrimp encouraged the fishermen and dealers to bring the larger of these species to market, and now the production is readily absorbed. Two species are well known: the ridgeback prawn (S. ingentis) on the west coast and the brown rock shrimp (S. brevirostris) on the east. The monograph is based on the study of over 4,000 specimens. It contains a key to the species together with descriptions and color notes - color pattern being an infallible feature for field identification. Information on reproduction, habitat, and maps of the range of each species (6 of which are extended beyond limits previously reported) are included, as well as present or potential economic value.

GEOGRAPHIC VARIATION IN SPANISH MACKERELS

Analysis of morphometric data of body parts on fork length by ANCOVA (analysis of covariance) has identified potentially discrete populations in 11 of the 18 species of Spanish mackerels (Scomberomorus). Three populations of king mackerel (S. cavalla) were indicated: United States, West Indies, and South America. For 13 regressions, there is a cline from the U.S. to the West Indies to South America. Morphometric and meristic differences were found between populations of the Spanish mackerel (S. maculatus) in the Gulf of Mexico and along the U.S. Atlantic coast. Two populations of the eastern Pacific sierra (S. sierra) were distinguished: one from Mexico and the other from Panama and Colombia.

A two-day symposium on the hydrothermal vents of the eastern Pacific was held by the Biological Society of Washington at the annual meetings of the American Society of Zoologists in Philadelphia Dec. 27-28. A paper on reproductive strategies among decapod crustaceans associated with the hydrothermal vents was co-authored by Dr. Austin B. Williams of the National Systematics Laboratory. A paper on the deep sea fishes of the vent areas was presented by former NSL Director Dr. Daniel M. Cohen. Dr. Williams presented summary remarks at the close of the Symposium. The papers presented at the Symposium will be published as a Bulletin of the Biological Society of Washington.

PUBLICATIONS

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PATHOBIOLOGY DIVISION

NEW MICROBIAL DISEASE OF WINTER FLOUNDER IDENTIFIED

Our previous bimonthly report indicated that studies were in progress to more explicitly characterize a new microbial disease observed in winter flounder collected from several areas during the April 1982 Ocean Pulse cruise. The organisms associated with the disease were described as "epitheliocystis-like." Epitheliocystis is a serious disease in several species of freshwater fish, reared in intensive culture, but has been reported in only a limited number of marine species (e.g. striped bass, American plaice) from feral environments. Typically, the disease manifests itself in the form of cysts found in the gills and its debilitating effects on wild, marine fish is unknown but under investigation in our laboratory. The cysts result from the hypertrophy of gill-epithelial cells in response to the proliferation of chlamydia-like organisms which require electron microscopic examination for their adequate identification. Through electron transmission microscopy of these cysts in a winter flounder, we have now demonstrated a chlamydia-like organism to be present. In certain biological features, chlamydia and rickettsia are intermediate between viruses and bacteria. Further study is in progress on the substructural details of these organisms in order to compare them with those reported for other species; however, we believe this to be the first confirmed report of this disease in *Pseudopleuronectes americanus*.

DISEASE DIAGNOSTIC SERVICES

As part of our cooperative histopathology programs with several coastal states and universities, we frequently receive requests to study tissue sections of fish and shellfish to determine their status of health or if any disease organisms are present in the tissues. In one such study, 70 oysters were examined for Dr. Roger Newell (Center for Environmental & Estuarine Studies, Cambridge, Maryland) in connection with the recent epizootic of *Haplosporidium nelsoni* (MSX) in Maryland, Delaware, and Virginia. The physiological responses of oysters infected with these parasites are being studied to determine what factor(s) contribute to an oyster's natural resistance to this disease. Of special interest was one oyster with an advanced sporulative MSX infection. This is the definitive diagnostic stage in the parasite's life cycle, and is seen in less than 1% of infected oysters. The overall prevalence of the disease (10%) and the stage of infection observed (remission) are consistent with other samples examined, and indicate a reduction in intensity and prevalence due to the low salinities that occurred this past spring and summer.

TUMORS IN SHELLFISH

Our initial discovery of epidemic (epizootic) levels of tumors (neoplasms) in bivalve molluscs was made approximately 15 years ago. Since then we have continued to maintain a strong interest in these complex types of proliferative cell diseases because of their possible

involvement with widespread and massive mortalities of molluscan resources, particularly in areas associated with the presence of anthropogenic substances, biotoxins, and/or in combination with environmental stresses. Epizootic neoplasias with prevalences of 10-40% were first seen in blue mussels and *Olympia* oysters from Yaquina Bay, Oregon. Subsequently, additional epizootic levels of neoplasia were discovered in duck clams in Chesapeake Bay, and in soft clams and hard clams in New England. Occasionally, neoplasms have also been observed in a number of other molluscan species from around the world. Oil contamination was initially implicated in soft clam neoplastic disorders but this relationship was not verified in follow-up studies. A viral etiology in soft clams also was reported recently by investigators at the University of Rhode Island but this information has not been definitively demonstrated.

Our studies of neoplasms in soft clams, until recently, have been confined to cooperative work with State agencies in sampling and data collection. We have also begun experimental work largely under contractual arrangements with Dr. Carol Reinisch of Tufts University to study various aspects of this disease including studies on tumor transmission and tumor induction. Dr. Reinisch just recently developed a highly specific diagnostic technique using monoclonal antibodies to detect the presence of neoplastic disease in soft clams. This procedure was developed by isolating pure suspensions of neoplastic clam cells and injecting these antigens into inbred mice to develop antibodies against them. Lymphocytes were then harvested from hyperimmune mice and fused with tumor cells from the same inbred strain of mice. Hybrid cells were cloned and tested for antibody specificity to clam tumor cells. Specific clones were grown either in tissue culture or as tumor transplants in mice to produce highly specific serum antibody against neoplastic clam cells. The monoclonal antibody which Dr. Reinisch has produced is specific enough to distinguish between normal clam blood cells and neoplastic cells. The method is now being used to compare and standardize it against the various other diagnostic methods employed for tumor detection and quantification such as fluorescent antibody, and live and fixed cell cytological and histopathological techniques. The approach also has recently been useful in detecting neoplasms in soft clams from previously neoplasm-disease-free areas and in recognizing neoplastic disorders found from differing geographic locations as having the identical disease.

PUBLICATIONS AND REPORTS

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- Brown, C. 1983. Bacterial diseases in bivalve larval cultures and their control, pp. 230-242. In C.J. Berg, Jr., ed., Culture of marine invertebrates, selected readings. Hutchinson Ross Publ. Co., Stroudsburg, Pa.

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RESOURCE ASSESSMENT DIVISION

MACKEREL STOCK REBUILDING

The recently completed 1983 mackerel assessment indicates continued recovery from the 1981 lowpoint. International catches have remained fairly stable since 1978; the 1978-83 average catch is 31,400 MT compared to a peak value of 430,400 MT in 1973 when distant-water fleet activity was greatest. Reported US commercial catch in 1982 was 3,300 MT, the highest since 1970; the projected 1983 value is slightly higher. Recent stock recovery is based largely on improved recruitment, with the 1982 year class estimated to be the strongest since 1974. The 1980 and 1981 year classes also appear to be stronger than any others since 1974. Spawning stock biomass has increased from about 300,000 MT in 1981 to a projected 563,000 MT at the beginning of 1984; however, this level remains well below the 1,600,000 MT peak value in 1971. A projected catch in 1984 of 132,000 MT (based on $F_{0.1}$ fishing mortality) will still result in a 3% increase in spawning stock biomass in 1985.

ICELAND SCALLOP BEDS SURVEYED

Since autumn 1982, a fishery for Iceland scallops has been developing on beds located southeast of Chatham, Massachusetts. Special sampling of these beds was conducted during August 1983, as part of the annual NMFS sea scallop survey, to obtain baseline biological information on this resource. Survey results indicated that major concentrations exist in an area east-southeast of Pollock Rip Channel at depths of 30-40 fm. A broad size range of individuals exist within the beds suggesting that the resource is comprised of at least ten age groups and that several strong year classes occur within a population.

DATA ENTRY IN THE PORTS

The processing of commercial fisheries landings statistics has finally entered the 20th century. The high stools, green visors, and quill pens are being replaced by computer terminals in NEFC field offices at major ports. These terminals will be directly linked to the VAX computer in Woods Hole, facilitating rapid transfer of data to and from the field. Port agents are being trained intensively in data entry, auditing and data retrieval using software assembled by Woods Hole personnel. This program is currently in operation at Boston and Cape May offices.

ILLEX SQUID ABUNDANCE DOWN

The 1983 Illex squid stock assessment was completed and released in late November. This assessment shows the Illex stock in the Gulf of Maine through Mid-Atlantic area at its lowest abundance since 1974.

Research vessel survey indices in 1982 and 1983 were well below the 1975-81 average. Sharp declines in both catch and abundance estimates for the Illex off Canada, during 1979-82, also indicate substantial reductions in this stock. Any further reduction in abundance would warrant reevaluation of the present 30,000 metric ton optimum yield.

HIGH BUTTERFISH DISCARD IN 1983

Significant quantities of young-of-year butterfish were discarded by the US trawl fishery during 1983. Based on data collected by NEFC port agents, discard averaged 50% (by weight) of the landed catch during the last half of 1983, compared to an estimated 10% in previous years. One reason for the high discard is that harvesters have found it difficult to avoid the small fish. The recently completed 1983 butterfish assessment indicates that the 1983 year class is the largest observed in the 1968-83 time series. Except for 1982, all other year classes have been strong during the last 5 years. Despite high discard, estimated total landings (US and foreign plus discard) in 1983 declined 23% from the 1982 value.

NORTHERN SHRIMP CONTINUE SLOW COMEBACK

A recent assessment by NEFC and state scientists from the Maine Department of Marine Resources, the New Hampshire Fish and Game Department and the Massachusetts Division of Marine Fisheries indicates a continued gradual recovery of the Gulf of Maine northern shrimp stock. This resource collapsed in the mid-1970's, apparently due both to adverse environmental conditions and to heavy exploitation. Abundance has since stabilized and now appears to be increasing under seasonal closures, mesh size regulations, and other management measures imposed by the Atlantic States Marine Fisheries Commission. NEFC surveys suggest a continued gradual increase since the late 1970's, although abundance remains considerably below levels observed during the late 1960's peak years. Landings during the 1983 season (December 15, 1982-May 15, 1983) are down slightly from the previous year (from 1,500 to 1,400 metric tons) apparently due, at least in part, to changes in availability associated with warmer inshore temperatures.

POTENTIALLY OUTSTANDING COD YEAR CLASS ON GEORGES BANK

The young-of-year index for Georges Bank cod from the 1983 NEFC autumn research vessel survey was the second highest in the 21-year survey time series. This suggests potentially outstanding recruitment of the 1983 year class. Only the young-of-year index for the exceptional 1975 year class was higher than the 1983 value.

PLANS UNDERWAY FOR POLISH RESEARCH FISHERY FOR MACKEREL

For the fourth consecutive year, the NEFC will cooperate with the Sea Fisheries Institute in Gdynia and the GRYF Deep Sea Fishing Company

in Szczecin in conducting a research fishery for mackerel. This program will involve two Polish factory trawlers working between Georges Bank and Cape Hatteras from mid-January to the end of April. Principal objectives will be to monitor the age structure of the overwintering mackerel and define their geographical distribution during overwintering. Final arrangements are now being made with Polish authorities. The research vessel WIECZNO will also be returning in February for survey work on herring, mackerel, and apex predators marking the 13th year of cooperative fishery research between the NEFC and the Sea Fisheries Institute.

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GLOUCESTER LABORATORY

BIMONTHLY NARRATIVE REPORT
NOVEMBER - DECEMBER 1983

RESOURCE UTILIZATION DIVISION

Ubiquitous Pollutants

"Sola dosis facit venenum" (only the dose makes the poison). It was Paracelsus, the 16th century alchemist-physician, who authored this phrase. We quote it because having just completed a study in which we found sediments from Maine waters to be high in polynuclear aromatic hydrocarbons, we are now beginning a study of polychlorinated biphenyls (PCB's). PCB's are highly toxic to man and other animals. The Bigelow Laboratory is obtaining samples of sediments for our analysis from Penobscot and Casco Bays, Portland harbor, and from other shipping lanes in the Gulf of Maine. PCB's may eventually reach humans through the food web, hence the need to obtain basic information.

Unexpected Superabundance of Hybrid Clones

We began a series of cell fusion experiments in order to derive an "anti-lobster" monoclonal antibody. As few as three separate cell fusions yielded over a thousand hybridoma clones, all of which were secreting antibodies against lobster antigens. This unexpected huge number of clones forced us to discard most of them because we are not equipped to treat such large numbers of cultures. Our desire to obtain anti-lobster monoclonal antibodies is for purposes of identification of true lobster as opposed to spiny lobsters, slipper lobsters, and Norway lobsters, Nephrops norvegicus. Our Systematics Laboratory kindly offered to supply us with authenticated samples of various species of lobster-like crustaceans, thus saving us much time and uncertainty of identity.

Seeking Acceptance by Association of Official Analytical Chemists

We have distributed one hundred 16.5 pound fish blocks containing a known amount of combined fillets and minced fish to ten industry and government laboratories. The reason for doing so is to test a proposed method of analysis to determine the amount of minced fish with a high degree of accuracy. The purpose is to gain acceptance of the method by the Association of Official Analytical Chemists. If accepted, it becomes the official method for the United States.

In a related matter we participated in a collaborative study using a slightly different method of analysis. The other collaborators are members of the West European Fisheries Technologists Working Group for Analytical Methods. The study was organized by the Federal Research Center for Fisheries, Hamburg, Germany.

Fish Waste Utilization

Present methods of making fish silage (liquified fish as a supplement for animal food) are quite costly by reason of energy requirements. Initial experimentation in producing fish silage was successful. Groundfish frames

were treated with water and acidified to a low pH and digested with stirring for 24 hours at 95-100°F. The mixture was heated to 175-185°F for two hours to stop digestion and the slurry was divided into two lots. One lot received two drops of a special anti-oxidant and the other lot was left untreated. Both lots were left at ambient temperature for five days to determine whether rancidity would develop. The treated lot developed no rancidity; whereas, the untreated lot did exhibit slight rancidity. The two lots were combined and evaporated to a final product that showed no rancidity after two weeks storage at ambient temperature. We plan to experiment with other methods.

PUBLICATIONS AND REPORTS

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