

Brownlow



NORTHEAST FISHERIES CENTER

NEWSLETTER

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



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"NORTHEAST FISHERIES CENTER NEWSLETTER"

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AQUACULTURE DIVISION

WINTER CULTURE OF SURF CLAMS IN SOUTHERN STATES

Cooperative culture experiments being conducted with the state of South Carolina, Marine Resources Center, Charleston, to develop aquaculture methods for the surf clam, *S. solidissima*, during the winter months in the southeast United States. Previous efforts have identified a southern winter-growing season similar to that of the summer in northern waters. Potentially marketable 50-mm clams have been reared in both areas during one growing season using land-based systems. Research has defined the carrying capacity of biomass which can be supported at given rates of seawater flow in relation to ambient levels of primary productivity and temperature. Efforts are now aimed at exploring field grow-out methods and determining strategies for using both regions to produce two clam crops annually. Preliminary data indicate that intensive, subtidal cage culture may be the most practical and effective method.

SELECTIVE BREEDING OF OYSTERS

As many as 100,000 progeny from the fourth generation of laboratory-bred American oysters, *C. virginica*, are being successfully grown-out at the Milford Laboratory to obtain information on the amount, duration and limits of response to genetic selection for growth rate. Even after three generations of selection for fast and slow growth, spat held under uniform conditions show extremely large within-line variation, the largest being roughly six times the size of the smallest.

MUTAGENIC STUDIES WITH FISH EMBRYOS

Development of the red blood series in fish embryos has been followed and photographed from the time of the first appearance of hematocytoblasts about the yolk-sac membrane shortly after gastrulation to the time of hatching. Techniques have been developed which enable the rapid removal of the blood-filled heart and associated vessels from larval fish as small as 3 mm. As the most sensitive of all developing organ systems in fish, the hematopoietic system is of particular interest as an indicator of pollution stress in either short-term laboratory studies or in field samples of ichthyoplankton.

ALGAL PHYSIOLOGY

A carbohydrate-rich freshwater cryptomonad flagellate that has been slowly adapted to tolerate a small percentage of seawater in its growth medium has been cultured in a growth medium with 30% seawater. Tolerance has now increased so that good growth is achieved in 31% and 32% seawater. Experiments are in progress to

determine if a variation in the inorganic components of the growth medium will affect the tolerance to seawater of this species.

NUTRITION OF JUVENILE OYSTERS STUDIES

An experiment was terminated in which three different daily rations of a relatively good food source, *Tetraselmis maculata*, cultured in reduced-nutrient media, were fed to juvenile oysters, *C. virginica*, held in rearing chambers. Observations indicated that oyster growth was most rapid in the highest algal ration.

Chemical analyses on axenic carboy cultures of two algal species used in feeding studies, *Dunaliella euchlora* and *T. maculata*, were completed. The algae had been cultured in the basic enriched seawater formulation, as well as in two reduced-nutrient media. Protein, total carbohydrate, total lipids, dry weights and size determinations were made on both species. The size determinations and chemical composition of both algae species varied in each of the three culture media. The different media formulations affected both species of algae in a similar manner. Statistical analyses of the data are in progress.

ATLANTIC ENVIRONMENTAL GROUP

EXPERIMENTAL SEA-SURFACE TEMPERATURE CHART

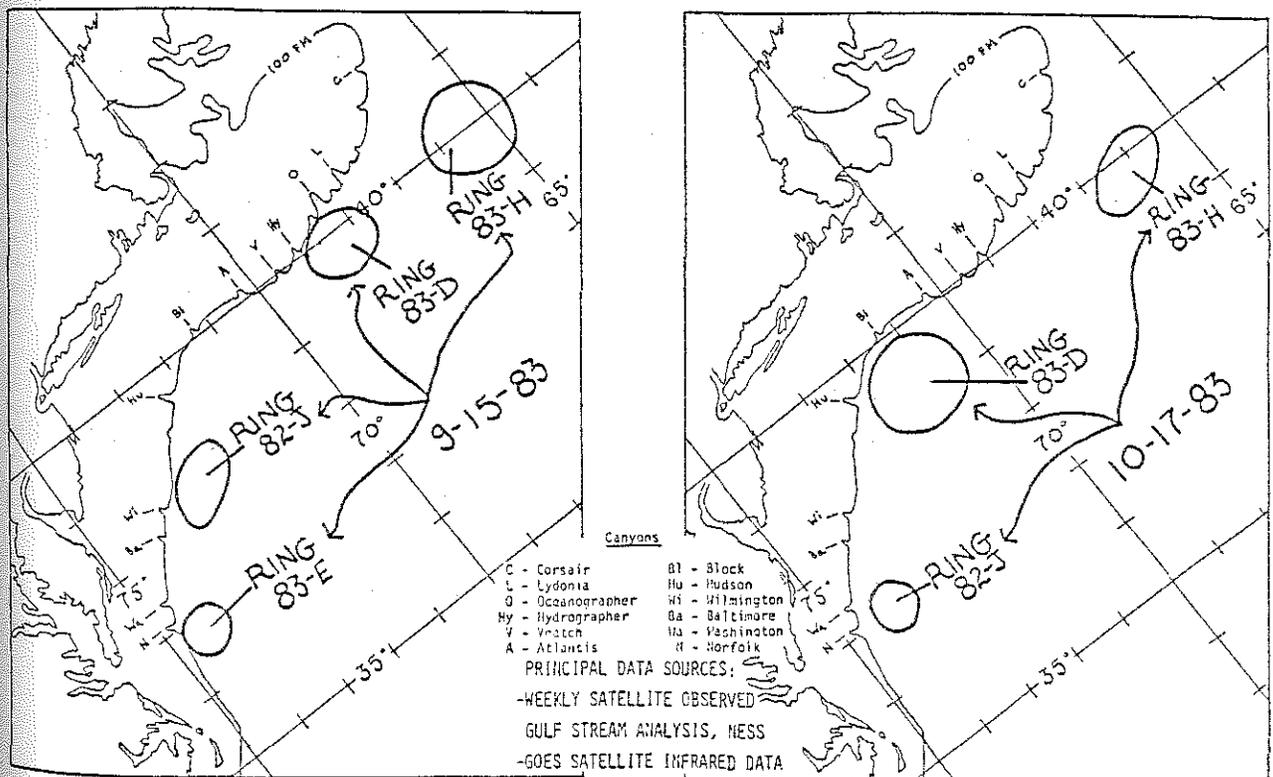
Through a cooperative effort involving AEG and the Remote Sensing Laboratory and Marine Advisory Service, both of the University of Rhode Island, a series of eight charts showing the sea surface temperature field off southern New England were prepared during August 16 - September 19, 1983. The charts depicted sea surface temperature with about 21km resolution and were prepared from computer enhancements of digital, infrared satellite data. The Marine Advisory Service mailed the charts to about 600 fishers and other marine users and, with the last chart, sent a questionnaire asking for views concerning the utility of the charts and improvements that might be made. Based on these comments, the chart format will be revised and a further series of experimental charts will be prepared and distributed to about 100 respondents through March, 1984.

SHIP OF OPPORTUNITY RESULTS

A total of 10 XBT (expendable bathythermograph) and 4 CPR (continuous plankton recorder) transects were occupied through shelf water and beyond during September and October as follows: Gulf of Maine - 2 CPR and 3 XBT, Southern New England - 2 XBT, Middle Atlantic Bight - 2 CPR and 3 XBT, Gulf of Mexico - 2 XBT.

GULF STREAM RING LOCATIONS

Announcements of Gulf Stream ring locations in mid-September and mid-October (see charts below) were sent to Commander, Atlantic Area, U.S. Coast Guard for publication in the October and November issues of the Atlantic Notice to Fishermen.



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ENVIRONMENTAL ASSESSMENT DIVISION

PHYSIOLOGICAL EFFECTS OF POLLUTANT STRESS

Latest analyses of metal-exposed (20 ppb Cd or Cu, 7 wk) sea scallops, *Placopecten magellanicus*, provide strong evidence that overloads of essential trace-metal copper produce highly toxic effects in the reproductive system and lethal effects in the kidney. Overloads of toxic-metal cadmium, on the other hand, are almost entirely sequestered and immobilized in the kidney, and produce little observable effect other than stimulating a precocious gamete maturation.

Kidneys of controls and of Cd-exposed scallops were brown and plump. In the Cu-exposed scallops they were pale yellow or transparent, having apparently excreted the calcium-phosphate concretions normally used in these animals for the detoxification and elimination of heavy metals. Metals analysis confirmed this observation: kidneys of Cu-exposed scallops had copper levels no higher than controls and only one-third of the controls' cadmium levels. Kidneys of the Cd-exposed scallops, in contrast, continued to accumulate that metal to more than 12 times control levels after the 7-wk exposure. Kidney biochemistry indicated mitochondrial damage in the Cu-exposed scallops only. Gill-tissue respiration rates corroborated the differences in toxicity of the two metals.

Muscle biochemistry shows that glycogen reserves are prematurely transferred to the gonad in the cadmium-exposed scallops, whereas the same parameter in copper-exposed scallops indicates gamete resorption. Gonad weights corroborated these observations. Metal uptake in the gonads of scallops in both metal-exposure studies showed Cd and Cu concentrations 8 and 7 times control values, respectively, in gonads of Cd-exposed and Cu-exposed scallops.

When the paired study was repeated with scallops having fully-differentiated gonads, cadmium's stimulatory effect on the gonad was not significant, whereas copper's inhibitory effect was even more striking, with only 11% ripe gametes found in gonads of Cu-exposed scallops, as opposed to 80% in controls and 87% in Cd-exposed scallops. The latter data were provided by R. J. Thompson (Canadian marine biochemist) in the collaborative study.

EFFECTS OF PETROLEUM HYDROCARBONS ON BEHAVIOR OF POLYCHAETES

Completed studies on effects of oil-contaminated sediment on burrowing behavior and emergence of sand worms, *Nereis virens* has shown that at hydrocarbon levels ranging from 75 to 5000 ppm worms emerged from the sediment, with the extent of the effect dependent on both concentration and length of time oil was weathered. When

removed from oiled sediment after 12-h exposure and placed on unoiled sediment, the worms were debilitated and initially unable to reburrow. Following 12-h in unoiled sediment, recovery was apparent as it also was for worms held continuously in oiled sediment for 96-h. Sublethal effects such as these suggest that oil-induced changes in relation to habitat may increase the vulnerability of this important benthic species to predation - an effect which could not have been determined on the basis of standardized bioassay procedures.

ALGAL ASSAY: PARALYTIC SHELLFISH POISONING

Assays of the ability of paralytic shellfish poison-associated dinoflagellate, *Gonyaulax excavata*, to grow in Lower New York Bay indicate suitability of these waters throughout the bay system and a summer season.

OBSERVATIONS IN THE NEW YORK BIGHT APEX

Levels of dissolved oxygen in bottom water in the Christiaensen Basin (adjacent to the 12-mile sludge dumpsite) and near the coast off Long Branch, New Jersey, remained low from September through early October. Values measured in early October were about 30% of oxygen saturation. These two areas experienced depressed bottom dissolved oxygen during the entire summer. We continued to find significant concentrations of hydrogen sulfide immediately above the seabed at the sewage sludge settling site in the Christiaensen Basin, but not at surrounding shallower stations outside the basin.

REMOTE SENSING OF MIDDLE ATLANTIC BIGHT ESTUARINE AND COASTAL WATERS

NOAA-7 satellite thermal imagery was used to examine estuarine and adjacent continental shelf waters in the Middle Atlantic Bight for the period October 1982 to September 1983. A regional synoptic picture of sea surface temperature patterns and changes over an annual cycle has been described to aid in establishing appropriate water management units and to relate these units to the overall problem of sources, fates and effects of contaminants in the Middle Atlantic Bight.

ENVIRONMENTAL STATISTICS

As part of the synchronization process of NEMP data bases, benthic organisms, sediment and sediment heavy metal files are being integrated and analyzed. Preliminary results based on selected Ocean Pulse cruises indicate that the spatial and temporal variabilities of benthic samples together with grain sizes, total organic matters and sediment heavy metals as covariates can be demonstrated.

PUBLICATIONS AND REPORTS

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Pearce, J.B. 1983. Reviews of water quality and transport of materials in coastal and estuarine waters. Pages 1-3 in J. P. Pearce, ed. Review of water quality and transport of materials in coastal and estuarine waters. Int. Counc. Explor. Sea Coop. Res. Rep. No. 118.

MANNED UNDERSEA RESEARCH AND TECHNOLOGY PROGRAM

OIL VERSUS FISHERIES ON GEORGES BANK AND CANYONS

The NEFC completed its fourth consecutive summer of establishing pre-production drilling benchmarks of (1) fish and crustacean abundance on the ocean floor, (2) habitat types, and (3) contaminant loads (heavy metals, PCB's, and petroleum hydrocarbons) in the bottom sediments and certain "key indicator" species (lobster, crab, scallop, and tilefish). The reading of some 10,000 ocean floor photographs is nearing completion. These data suggest that the exploratory drilling in 1981/1982 has had no obvious impact on the commercially important ocean floor fauna (lobster, crab, shrimp, scallop, flounder, hake, tilefish, cusk, etc.), their habitats or associated contaminant loads. Several more years of benchmark determinations are required, given the observed magnitudes of annual variations in species abundance etc., to be able to identify impacts from a production level of operations.

BIOLOGY AND GEOLOGY OF GEORGES BANK CANYONS

MURT personnel have completed a detailed treatise on the Biology and Geology of the Georges Bank Submarine Canyons, dealing with the role of the canyons as nursery grounds, important habitats for adults of some 25 species, refugia from mobile catch gear and repositories for bottom carried and entrained sediments, contaminants, etc. We have recently defined the physiographic limits of 12 of these canyons, based on depth contouring, bottom habitats, and associated ocean floor fauna characteristic of submarine canyons. These "defined" canyons will be the basis on which MMS (Minerals Management Service)-DOI determines which OCS areas are available to industry for exploratory drilling and which areas (i.e.-important canyon environments) will not be made available by DOI for leasing.

ASSESSMENT OF GHOST GILL NETS ON INSHORE RESOURCES

A comprehensive proposal for undersea research, using a manned submersible, was prepared and submitted to NOAA's Office of Undersea Research for funding support in the spring-summer 1984. We propose to thoroughly search "problem areas" on Jeffreys Ledge and Stellwagen Bank for the presence of lost gill nets and, along with controlled studies of recently lost nets, make a cursory assessment of the impact of "ghost" nets on the inshore resources (lobster, crab, hake, cod, etc.).

OFFSHORE GULF OF MAINE LOBSTER MIGRATIONS AND ECOLOGY

Over 200 of the 1,000 tagged lobsters released in the offshore Gulf of Maine (June 1983) have been recaptured. Some have been recaptured two and three times. The observed migratory behavior suggests a strongly nomadic population with some individuals moving 50 to 100 miles N, NW, and W into the coastal fishing areas of Maine, New Hampshire, and Massachusetts. This is a cooperative program with the State of Maine and several elements of the lobster industry.

Extensive submersible diving was conducted in several of the offshore basins in July 1983. We were very surprised to find the lobsters very dispersed, nomadic in behavior and no evidence of temporary or permanent shelters. These observations support and explain the highly nomadic nature of the offshore Gulf of Maine lobster. These studies will continue through 1984 and 1985; a comprehensive proposal was submitted recently for funding support for NOAA's Office of Undersea Research.

PUBLICATIONS AND REPORTS

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- Warne, J., R. A. Cooper, R. Slater. 1978. Bioerosion in Submarine Canyons. In: Submarine Canyon, Fan and Trench Sedimentation. Dowden, Hutchinson, and Ross, Inc., Stroudsburg, Penn. D. J. Stanley and G. Kelling (Eds.), pp. 65-70.

MARINE ECOSYSTEMS DIVISION

PRELIMINARY RESULTS OF A STUDY OF LARVAL HADDOCK DRIFT ON GEORGES BANK SHOW NO EVIDENCE OF SIGNIFICANT TRANSPORT OFF THE BANK IN ANY DIRECTION

Within the 260,000 km² MARMAP survey area, haddock eggs and larvae occur off Southern New England, on Georges Bank, along the western Gulf of Maine, and over the western end of the Scotian Shelf. The major spawning grounds are located on the eastern half of Georges Bank. Some intermixing takes place between spawning products originating on Georges Bank and Southern New England but there is no evidence in our 6-year data base that eggs and/or larvae from the Gulf of Maine and Scotian Shelf mix with each other, nor with those spawned on Georges Bank, nor those off Southern New England. Larvae on Georges Bank move in a westerly direction as far as Nantucket Shoals but the anticyclonic gyre that dominates circulation on the Bank in spring and summer seems to hold them on that part of the Bank east of Great South Channel. Contrary to recent speculation suggesting that significant losses of fish eggs and larvae occur through advection off the southern edge of Georges Bank, our survey data show that young haddock grouped into three size categories move toward shallow water with time, i.e. increasing size.

ANALYSES REVEAL DIFFERENCES IN 1983 LARVAL COD AND HADDOCK GROWTH

Analysis of spring 1983 larval cod and haddock growth based on otolith increments and RNA/DNA indicates better growth of larvae found above the southern flanks of Georges Bank in the stratified waters (60-100 m bottom depth) than those larvae collected in the shoal, well-mixed waters atop the bank (<60 m). The higher growth rate of larvae in the stratified waters is consistent with the relatively higher concentration of zooplanktonic food organisms found in the area.

SHARK MIGRATIONS

Approximately 800 sharks of eight species were tagged during the past 2 mo. Over 400 sharks were tagged by fishery observers aboard Japanese longline vessels. Tags were returned from seven species, primarily from blue and sandbar sharks. The maximum time at liberty (9 yr) and maximum distance travelled (1,962 miles between New England and Mexico) was by a sandbar shark.

PREDATION EFFECTS UPON RECRUITMENT

An analysis of predator-prey relationships and recruitment mechanisms for major fish stocks on Georges Bank has been summarized in several chapters for the forthcoming book on Georges Bank. Estimates of total annual consumption of fish by all natural predators

including apex predators (but excluding man) indicate that only a few species of finfish and squid (silver hake, short-fin squid, long-fin squid, spiny dogfish) probably account for the bulk of predation on fish stocks. The predation on fish by squid alone may be comparable to that of all the apex predators (birds, mammals, large pelagic sharks and fishes) combined. Consumption of fish by all natural predators is shown to be very high relative to the total growth production of the finfish biomass much of which is production in juvenile stages, and this is further evidence of the probable critical importance of predation in controlling recruitment.

BIOMASS OF APEX PREDATORS ON GEORGES BANK

Estimates of the biomass of swordfish, tunas and sharks on Georges Bank and their annual consumption of prey were completed. Analysis of longline catch data gave a minimum estimate of 6,000 metric tons of apex predators on Georges Bank during the warmer months, which consume a minimum of 8,500 metric tons of prey. Because of the limitations of available data the actual biomass of apex predators on Georges Bank may exceed these estimates by 5 to 10 times.

FOOD HABITS

Analysis of food habits data collected from sandbar pups in June at Chincoteague Bay, VA, shows that the primary (73%) food consists of soft blue crabs, other crustaceans (>0.05%), and a variety of juvenile fish (>0.05%). The overall average stomach content volume for 99 stomachs is 26 ml. This is equivalent to 1.46% of the average body weight of 1.77 kg. Analysis of the relationship of liver weight to body weight (Liver Index) for this sample of pups shows that the indices for two age classes of pups <5 days and >5 days from birth are 13.0% and 6.4%, respectively. The larger livers found in newly born pups (<5 days) may be an indication that larger livers in embryos function to lower the density of pregnant females.

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NATIONAL SYSTEMATICS LABORATORY

SYSTEMATICS OF FISHES

Contributions to the Ahlstrom Symposium on Ontogeny and Systematics of Fishes on the Scombroidei and the Beloniformes with a number of co-authors were revised and sent to the section editors. A manuscript showing that the louvar is more closely related to the surgeon fishes than to the scombroids was prepared with two co-authors. Work on revising the monograph on the 18 species of Spanish mackerels was begun.

SYSTEMATICS OF CRUSTACEANS

The final draft of a manuscript on the systematics of the rock shrimps of the genus *Sicyonia* in the Eastern Pacific was completed. A co-authored manuscript describing the first zoeal stage of a hydrothermal vent crab from the East Pacific Rise was completed and submitted for publication. Preparation continued on a revision of the mudshrimps of the Eastern Pacific.

ESTUARINE RESEARCH FEDERATION

Dr. Austin B. Williams was elected President of the Estuarine Research Federation for the 1983-85 biennium at their biennial meeting in Virginia Beach, October 22-26. The Federation has 1,800 members and is composed of five regional estuarine research societies in the U.S.: Northeast, Atlantic, Southeast, Gulf, and Pacific.

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PATHOBIOLOGY DIVISION

FISH TUMORS

Recently (September 21), a congressional subcommittee (Merchant Marine and Fisheries) held a hearing on the subject of "cancer" in fish. The hearing was chaired by Congressman John Breaux of Louisiana and brought together a diverse group of experts in the field of fish health research and microscopic and experimental pathology. The hearing was prompted by a one-half-hour Cable News Network (CNN) television program describing tumors found in fishes (sauger, bullhead) from Torch Lake, Michigan.

Presently in the United States, epizootic tumors are rare in marine fishes and occur only in flatfishes (English sole, starry flounder) from several estuaries in Puget Sound, a gadoid fish (tomcod) from the Hudson River, and a reef fish (bicolor damselfish) from the Florida Keys. The flatfish and tomcod tumors (hepatoma) are found in the liver and the damselfish tumors are found throughout the fish since they affect the connective tissue covering of peripheral nerves (neurofibroma). The flatfish and tomcod tumors have been associated with organic carcinogens in the fish's environment; the damselfish tumors have not been associated with any specific environmental factor. None of the tumor-bearing fishes support a significant fishery either commercially or recreationally; therefore, there is little immediate concern for public health.

There are several estuaries in the northeastern United States which have been substantially polluted by industrial wastes during the past century. Some of the resident fishes in these areas may have neoplastic lesions which are induced by specific substances in the water and/or sediments. A survey has been initiated utilizing bottom-dwelling flatfishes, particularly winter flounder and windowpane flounder, to determine whether or not these fishes have hepatic or other neoplastic lesions which resemble those in other freshwater and marine fishes.

Relatively few fishes (~ 100) have been examined to date; however, one collection (New Haven Harbor, Long Island Sound) has yielded information suggesting more intensive study is desirable. Two of eight fishes collected during the first week of October had hepatic neoplasms. A 30-cm windowpane flounder had several hepatic basophilic nodules, lesions which are presumed to be pre-malignant (eventually becoming hepatomas) in other animal species. A 25-cm winter flounder had an aggressive neoplasm in the hepatic parenchyma extending to the liver surface. The identity of this tumor presently has not been determined. It does not resemble either hepatocellular or cholangiocellular carcinoma of the liver. It is possible that the lesion represents a metastasis from another organ.

In view of these findings, more intensive sampling will be implemented immediately in New Haven Harbor as well as in several other areas where industrial pollution is extensive.

INFECTIOUS PANCREATIC NECROSIS VIRUS OF ESTUARINE FISHES

IPN virus disease of salmonid fishes has been known for over two decades. With the discovery of an IPN-like virus in menhaden and more recently in southern flounder, this agent has assumed increased significance as a factor in natural mortalities of estuarine fishes. Our early studies focused on understanding the nature of the disease in individual fish and its epizootiology. While these studies continue, we have presently embarked on research to discover the virulence of the virus strains isolated from diverse estuarine species and their relationships to one another and to the several known strains from salmonid fishes. This has been done by bioassays utilizing the newly isolated strain to infect susceptible salmonids and clupeids and by serological cross-neutralization studies. The results were recently presented in absentia at the International Helgoland Symposium on Diseases of Marine Animals.

Our studies have shown that the southern flounder isolate (also isolated from spot, hogchoker, and silversides) has antigenic affinities with the European strains of IPN, whereas the menhaden strain has close affinities with North Atlantic strains of the virus. The isolates also differ greatly in virulence. The menhaden isolate has proved to be extremely virulent to salmonids and clupeids which have been challenged in the laboratory. The southern flounder isolate is virtually avirulent. Adding to the confusion regarding the latter isolate and its relation to observed natural mortalities is the fact that the histologic lesions noted have been similar in mass mortalities of the flounder and menhaden.

A NEW MICROBIAL DISEASE OF WINTER FLOUNDER

Gills from winter flounder collected during the April 1982 Ocean Pulse cruise were found to have peculiar lesions resembling those originally described from freshwater fish. In the original description of the disease, the associated organisms were found to belong to the chlamydia-rickettsia group and lesions were confined to the epithelial tissues of infected gills. The term "epitheliocystis" was proposed to provide a specific name for the disease. We have been unable to find any previous reports of similar lesions in winter flounder and consider this fish species to be a new host for the chlamydia-like parasites. The organisms are microscopic in size and may be studied only in tissues processed for study with the electron microscope. Until winter flounder tissues are examined with the electron microscope, we describe the gill lesions as being "epitheliocystis-like."

Preliminary ocean surveys have shown an incidence of 25% in fish collected near New Hampshire, 12% in fish from Raritan Bay, New Jersey, and 14% in the New York Bight apex. One collection provided by Stuart Sherburne, Maine Department of Marine Resources, showed an incidence of 6%. A new sampling program has been initiated to study three aspects of the ecology of the disease: 1) is there a seasonal variation in its intensity? 2) is the incidence of the disease the same in nearshore and offshore waters? and 3) is there a difference in the incidence and intensity of the disease between commercially exploitable and pre-recruit fish?

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RESOURCE ASSESSMENT DIVISION

CENTER SCIENTIST NAMED HEAD OF INTERNATIONAL WORKING GROUP

E. Anderson was recently named chairman of the ICES Mackerel Working Group. Anderson replaces Geuguen of France. The group is responsible for assessing the status of two Atl. mackerel stocks and the horse mackerel.

LONG ISLAND MESH STUDY COMPLETED

Analysis of data from a mesh selectivity study conducted off L.I. during the May-June 1983 mixed species haul fishery has just been completed. The study was performed by the N.Y. Div. of Mar. Resources and the NEFC using four commercial vessels. Selectivity data obtained on summer flounder was quite consistent with results from other studies, and indicated that a codend mesh size of about $5\frac{1}{2}$ in is appropriate for use in conjunction with a proposed 14 in minimum size limit. The study also indicated that over a 50% (by weight) loss in total catch resulted from using a $5\frac{1}{2}$ in mesh codend instead of $2\frac{1}{2}$ - $2\frac{1}{2}$ in codends. Of particular concern was the very high loss (80-99%) of marketable species such as *Loligo* squid, butterfish, scup, and black sea bass caught in association with summer flounder.

NATIONAL PANEL OF SCIENTISTS REVIEW ATLANTIC BLUEFIN TUNA

W. Gabriel, M. Sissenwine and B. Brown have participated with other scientists of internationally recognized expertise in assessment on a panel on assessment of Atlantic bluefin tuna. There are particularly critical features in this case, where a highly valuable resource is heavily exploited by more than 25 countries, at least eight gear types and by recreational and commercial fishermen. The panel defined appropriate analyses and methodologies, reviewed and realigned intermediate approaches and examined preliminary results which will be presented to ICAT this fall.

YELLOWTAIL FLOUNDER FISHERY REVIVED

The 1983 assessment of yellowtail flounder indicates a substantial increase in abundance since the late 1970's; reported landings have increased steadily since 1978. Landings through June of 1983 substantially exceed corresponding levels for 1981 and 1982. The upward trend has been most evident in the So. N.E. fishery, although landings for Geo. Bk have also increased considerably. The 1982 increase was attributed to strong recruitment of the 1980 year class which comprised over 50% (by number) of landings in both areas, and to removal of quotas. Reported discard levels also increased substantially in 1982 with trip rates ranging from 0-80% (by weight). Recent fishing pressure exceeds the level where yield can be expected to remain at a maximum, thus implying a potential for losses in yield and continued heavy dependence on recruiting year classes to support the fishery.

NORTHERN SHRIMP SUMMER SURVEY

Since Oct. of 1981, RAD personnel collaborated with the NEFC Engineering Group and with scientists from Me., N.H., and Ma. to develop a new survey for the Gulf of Me. northern shrimp stock. This work, performed under the ASMFC's Interstate Fisheries Mgt. Program with support from NEF has included gear development studies in 1982 and a stratified random survey during the summer of 1983. The survey was completed in Aug. and resulting data were analyzed and reported at the ASMFC October meeting.

SEA SCALLOPS AND GEORGES BANK HADDOCK CONTINUE DECLINE

Results of the 1983 NEFC sea scallop survey (completed during the summer), coupled with a pronounced decline in 1983 commercial catch per effort, suggest that annual landings in 1984 will again decline as they have done in each year since 1978. The 1983 survey abundance indices for both the Geo. Bk and Mid-Atl. sea scallops were the lowest observed during the past nine years. Declines in survey abundance values have now been recorded for the past three years on Geo. Bk and for the past four years in the Mid-Atl. Recruitment in almost all fishing regions remains at low levels.

The haddock stock has declined again after a brief period of recovery during the mid-to-late 1970's. Recruitment from the 1979, '80, and '81 year classes has been poor and the strong 1974 and 1980 year classes have now passed through the fishery.

BLUEFISH ABUNDANT, OUTLOOK HOPEFUL

The 1983 bluefish assessment indicates that the future looks bright. Bluefish are abundant, catches are high and recent spawning years indicate that the situation should hold true for the next two to four years. Future catches, however, remain dependent on continuing recruitment of young fish. If bluefish suffer a bad spawning year and fishing pressure remains high, the bluefish population could rapidly decline.

REDFISH STILL DECLINING

A redfish stock assessment has been completed and released. This assessment shows the redfish stock in the Gulf of Me.-Geo. Bk region at record low abundance and continuing to decline. One large year class is fully recruited to the fishery, but is being heavily fished at a younger-than-usual age. All other year classes within the fishery are very low in abundance.

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RESOURCE UTILIZATION DIVISION

FISHERIES TECHNOLOGY AND ENGINEERING TASK

Processing and Preservation Research

Fish fillets cut from fish stored in ice 1, 6 and 9 days and stored at +10°F after being frozen at -20°F were found to be unacceptable after two months of storage. Samples stored at lower temperatures (0°F and -10°F) were unacceptable after four months of storage.

We are reviewing a NOAA Technology Brief prepared by the Office of Research and Technology Applications. This brief was prepared from our recent publication "Recovery of Waste Energy in a New England Fishing Vessel." The purpose of the Technology Brief is to make information more widespread and to make potential users aware of the "know how" that exists in NOAA.

An additional waste heat recovery method is the joint University of Massachusetts-Gloucester Laboratory project on energy recovery on fishing vessels. Under investigation is a study on using absorption refrigeration produced from vessel diesel engine stack heat. We are exploring the feasibility of producing ice using the method.

NMFS/URI Cooperative Fisheries Engineering Unit

The Microlog Data Logging System has been expanded to include an 8 channel analog to digital converter, a real time clock, and a new simplified keyboard entry/control station. These additions will permit the inclusion of engine thrust, temperature, oil pressure, and warp tension measurements to the system.

The Vessel Gloria Michelle has made three cruises each with a different objective and area. One was an Inshore Bottom Trawl Survey of Massachusetts territorial waters from New Hampshire to Rhode Island. The second was a Gelatinous Plankton Survey conducted in the Western Gulf of Maine. The third was a Sediment Recovery Survey in Narragansett Bay.

Product Standards and Specifications Research

We have distributed proposed U. S. Standards for Grades and draft Instructions to relevant industry Technical Working Groups. The proposed standards concern fresh or frozen fish steaks, fresh or frozen fillets, fillet blocks, mixed fillet-minced blocks, minced fish blocks, frozen fish portions and fish sticks, frozen freshwater catfish, and frozen shrimp.

Drafts of two papers on methods of determining the amount of minced fish in a mixed mince-fillet fish block were written. The first paper reported on the preliminary screening of four methods of determining the most suitable in terms of practicality. The second paper reported on the results of the examination of laboratory-prepared 5 pound fish blocks with three levels of minced fish by three different people.

FISHERIES CHEMISTRY TASK

Product Quality Chemistry

Calcium determinations made on minced fish from various component parts of three species of fish indicated that unintentional inclusion of scales into the mince is the main factor responsible for elevation of calcium levels. Mince from cod frames had the highest level of cholesterol, about 85 mg/100 g mince.

An iced storage study, comparing the effects of various handling methods with bluefish, has been completed. No rancidity developed in any of the fish over a 22 day period. Data for other parameters monitored are being evaluated.

A preliminary study was initiated to determine the effect of ozone on the enzymatic production of dimethylamine and formaldehyde (which causes toughening) on frozen stored red hake.

Another study has been initiated to quantitate the levels of residual dimethylamine and formaldehyde in red hake cooked by different methods.

Results of Hydrocarbon Analyses of Sediments Collected from Penobscot Bay

Forty four sediment samples were analyzed for aliphatic hydrocarbons. The aliphatic hydrocarbons ranged from tridecane to pentacosane (C-13-C₂₅). Alkanes with odd numbers of carbons were present in larger amounts than even carbon number compounds. Higher than average hydrocarbon levels were found in the Belfast/Sears Island/Penobscot River area to the north. This corresponds with the high levels of polynuclear aromatic hydrocarbons found in that area.

EEO ACTIVITIES

The Gloucester Laboratory EEO Committee met and discussed FY 84 objectives, charter, and bylaws. Our representative also attended the EEO Committee meeting of the Northeast Regional EEO Committee.

PUBLICATIONS

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