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National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

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Woods Hole, MA 02543

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TO: Marine Fisheries Interests
FROM: Allen E. Peterson, Jr., Center Director
SUBJECT: 1984 End-of-Year Report

Four issues influenced the Northeast Fisheries Center's activities during 1984: (1) the need for better organization and management of our research; (2) the scarcity of some popular fisheries resources; (3) the degradation of many important fisheries habitats; and (4) concerns with Canada over fisheries jurisdiction.

In organization and management, we began to reorganize our research based on the 1983 review of our activities by federal and state agencies, academic institutions, and the regional fishery management councils. The reorganization, to be completed in 1985, will create four research Divisions-- Conservation & Utilization, Fisheries Ecology, Environmental Processes, and and the National Systematics Laboratory--and two management Staffs--Research Planning & Coordination and Program Support. We also adopted a Department-wide management-by-objective (MBO) system which more closely links our research activities and the Northeast Regional Office's management activities. The MBO's are concerned with: surf clams and ocean quahogs; endangered and threatened species; coastal, estuarine, and Great Lakes fisheries; Atlantic bluefin tuna; Atlantic salmon; American shad, river herring, and striped bass; Atlantic demersal finfish; sea scallops; squid, Atlantic mackerel, and butterfish; and American lobster. Both the reorganization and the MBO system will improve the accountability of our research and the delivery of our information to constituents.

In resource research, we found--in cooperation with other federal and state agencies--that although habitat degradation is an important limiting factor for Atlantic Coast striped bass, fishing pressure would need to be cut before the stripers could recover to the levels of only a decade ago. Our analysis of Atlantic salmon catches showed that the high-seas fishery off West Greenland and the Canadian fishery in Newfoundland must be reduced for us to restore and maintain U.S. spawning stocks. We also conducted a special research vessel survey and stock assessment of the new surf clam fishery on Georges Bank, finding that this stock can add 250-300 thousand bushels per year for several years to the harvest of this intensively fished species.

In habitat research, the Center and the Regional Office developed a Regional Action Plan which creates a series of water management units (e.g., Middle Atlantic shelf) for habitat management, identifies major threats to habitats in those management units, and comes up with strategies for countering those habitat threats. Our ongoing monitoring--through the Northeast Monitoring Program--of the effects of environmental quality on fisheries production on the Northeast continental shelf has been expanded by NOAA into its new nationwide Status & Trends Program. Benchmarks for such



effects on the Northeast shelf have now been established, showing relatively minor effects offshore but major effects inshore. Along these lines, the federal government has begun a program which will lead to the cleanup of the nation's estuaries, with the Center being charged to develop a plan for assessing the effects of environmental quality on fisheries production in the nation's biggest estuary--Chesapeake Bay.

With few exceptions, fisheries resources of the Northeast continental shelf remain highly nutritious and absolutely safe for consumers. However, the growing number of Northeast coastal states that have restricted or advised their citizens on eating certain species because of environmental contaminants (e.g., PCB's in striped bass and bluefish) indicate some problems. Accordingly, the Center has strengthened that portion of its environmental monitoring which measures contaminants in seafood species.

In U.S.-Canadian fisheries issues, our new fishery economics staff was quickly tested under fire; they developed information for the International Trade Commission concerning the effects of Canadian government subsidies to the Canadian fishing industry, and assisted in a study of the economic well-being of the American fishing industry. Many of our staff collected and analyzed data and prepared and delivered timely information on the ecological, environmental, and economic significance of Georges Bank to American fisheries. This effort contributed to the U.S. State Department's case before The World Court on the East Coast maritime boundary between the United States and Canada. Following the Court's decision, we assessed the fisheries impact of the new boundary.

Following are short descriptions of those Center research activities during 1984 which produced information directly and immediately usable by one or more of our constituent groups. At the end of each description is the name and telephone number of a Center scientist to contact for more information. We continue to work on improving our communications with you, our constituents. If you have any suggestions in this regard, please let me know.

NORTHEAST FISHERIES CENTER

END-OF-YEAR REPORT



United States Department of Commerce
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STOCK ASSESSMENT REPORTS: Prepared Woods Hole Laboratory Reference Documents assessing (in several cases with more advanced methods and more detailed results) the status of 40 fish and invertebrate stocks, and issued a Status of the Fishery Resources off the Northeastern United States for 1983 which summarized the individual stock assessments and provided an economic overview of several major fisheries. (Dr. Michael P. Sissenwine, FTS 840-1239 or (617) 548-5123)

NEW FISHERMEN'S REPORTS: Began issuing a Fishermen's Report, a series designed to give information to fishermen and others on the locations, catches, and environmental conditions during the Center's research vessel surveys within 2-3 weeks of the end of each survey. (Thomas R. Azarovitz, FTS 840-1283 or (617) 548-5123)

SQUID-FRONT LINK: Used satellite and foreign fisheries observer data for autumn 1980 and 1981 to show that Illex squid concentrate within 10 nautical miles of the shelfwater-stopewater front. (Dr. Merton C. Ingham, FTS 838-7142 or (401) 789-9326)

SURFACE TEMPERATURE INFORMATION: Concluded a one-and-a-half-year project with the University of Rhode Island to provide fishermen with real-time computer-enhanced pictures of satellite infrared data showing the sea-surface temperatures off Southern New England and on Georges Bank. (Dr. Merton C. Ingham, FTS 838-7142 or (401) 789-9326)

SEA SAMPLING PROGRAM: Expanded sea sampling by Center scientists to 31 trips on 26 commercial fishing vessels covering ports from Rockland, Maine, to Hampton, Virginia, and yielding 31,000 measurements, 500 samples, and discard estimates for most tows. (Thurston S. Burns, FTS 840-1309 or (617) 548-5123)

"GHOST" GILLNET PROBLEM: Studied 100 acres of Jeffreys Ledge and Stellwagen Bank in the Gulf of Maine with a research submersible for "ghost" gillnets, locating five sections (1,800 feet total) of lost gillnets and documenting on videotape their fishing behavior and entrapment of fish and crustaceans. (Joseph R. Uzmann, FTS 840-1280 or (617) 548-5123)

PARTY BOAT FISHERIES: Prepared a report on the joint Center-Interstate Party Boat Association pilot study of a voluntary party boat logbook program. (Dr. Fredric M. Serchuk, FTS 840-1245 or (617) 548-5123)

RECREATIONAL BLUEFISH DATA: Received data on 800 fishing days from New York-New Jersey surf fishing clubs during the second year of a voluntary cooperative bluefish catch-per-unit-of-effort survey, and provided the participating clubs with colored graphic representations of the data we received. (Stuart J. Wilk, FTS 342-8236 or (201) 872-0200)

RESEARCH VESSEL SURVEYS: Monitored continental shelf fisheries resources at 2,296 sampling stations between Nova Scotia and Cape Fear, North Carolina, including 1,194 fish and squid stations, 654 sea scallop stations, and 448 surf clam and ocean quahog stations, as well as conducted survey gear evaluations with 310 additional bottom trawl hauls. (Thomas R. Azarovitz, FTS 840-1283 or (617) 548-5123)

TRAWL SURVEY DESIGN: Prepared a report for the U.N.'s Food and Agricultural Organization on "Statistical Considerations in the Design of Trawl Surveys." (Michael J. Fogarty, FTS 840-1255 or (617) 548-5123)

FISH & INVERTEBRATE AGE DETERMINATIONS: Aged 46,000 commercially caught fish samples comprising 15 species, and 1,300 sea scallop shells, and implemented a quality control system for aging Atlantic cod, haddock, and pollock. (Dr. Ambrose Jearld, Jr., FTS 840-1318 or (617) 548-5123)

HADDOCK POPULATION DYNAMICS: Modeled long-term trends in abundance and age structure of Georges Bank haddock, evaluated recovery potential under different management regimes, and also evaluated age-specific distributions by season as a basis for reducing discard of sublegal fish. (Dr. William J. Overholtz, FTS 840-1256 or (617) 548-5123)

HADDOCK STOCK IDENTIFICATION: Determined that mathematical expressions of the geometry of haddock scales can be used for stock identification. (Dr. Ambrose Jearld, Jr., FTS 840-1318 or (617) 548-5123)

YELLOWTAIL ABUNDANCE ESTIMATION: Completed studies of variation in commercial catch per unit of effort for the New England yellowtail flounder fishery in order to improve our relative abundance estimates based on such data. (Ralph K. Mayo, FTS 840-1310 or (617) 548-5123)

SILVER HAKE STOCK IDENTIFICATION: Completed an analysis of the stock structure of silver hake off the U.S. northeast coast. (Frank P. Almeida, FTS 840-1308 or (617) 548-5123)

STRIPED BASS STATUS: Prepared a report on the status of striped bass and their reproductive capacity under various management regimes. (Dr. John G. Boreman, Jr., FTS 840-1225 or (617) 548-5123)

BLUEFISH-TEMPERATURE RESPONSES: Demonstrated that juvenile bluefish in the lab move into colder water at the same time (fall) that fish in the wild do, that their choice of water temperature is influenced by food availability, and that they can feed successfully at potentially harmful temperatures. (Anne L. Studholme, FTS 342-8277 or (201) 872-0200)

- SALMON TAGGING & EXPLOITATION:** Provided support for tagging 100,000 Atlantic salmon smolts to evaluate exploitation of U.S.-origin salmon in ocean fisheries, and analyzed existing tagging data to determine where, when, and how many U.S.-origin salmon are caught in ocean fisheries. (Dr. Vaughn C. Anthony, FTS 840-1304 or (617) 548-5123)
- ATLANTIC MACKEREL RESEARCH FISHERY:** Completed the fourth year of a cooperative research fishery with Poland for Atlantic mackerel from Georges Bank to Cape Hatteras to monitor age structure of the overwintering stock, define winter distribution, and measure environmental conditions related to distribution and migration. (Dr. Emory D. Anderson, FTS 840-1251 or (617) 548-5123)
- APEX PREDATOR ECOLOGY:** Published information on: age and growth of mako and sandbar sharks; food habits and daily consumption of sandbar sharks and swordfish; biomass of and prey consumption by sharks, tunas, and swordfish on Georges Bank; and distribution and abundance of white sharks in the Northwest Atlantic. (John G. Casey, FTS 838-7142 or (401) 789-9326)
- SHARK TAGGING PROGRAM:** Tagged--through the voluntary efforts of 2,500 cooperating sportsmen and a number of commercial fishermen and fisheries scientists--over 4,000 sharks comprising two dozen species. (John G. Casey, FTS 838-7142 or (401) 789-9326)
- SQUID CATCH PROJECTIONS:** Assessed the status of Loligo squid off the U.S. northeast coast, projecting--for the first time--catches at various fishing mortality rates. (Anne. M. T. Lange, FTS 840-1301 or (617) 548-5123)
- INVERTEBRATE STOCK MODELLING:** Developed mathematical approaches for modelling lobster/shrimp/crab production which account for time-delayed recruitment, and a model for maximizing bivalve yield per recruited individual which accounts for density-dependent growth and mortality. (Michael J. Fogarty, FTS 840-1255 or (617) 548-5123)
- GEORGES BANK SURF CLAMS:** Completed the first intensive survey of Georges Bank surf clams, and combined data from the survey with data from sea sampling trips and commercial fisheries logbooks in order to conduct a preliminary assessment of that resource. (Dr. Steven A. Murawski, FTS 840-1303 or (617) 548-5123)
- SCALLOP GEAR EVALUATION:** Conducted field experiments to assess the relative effectiveness of sea scallop dredges equipped with rock chains, and cooperated with the New England Fisheries Development Foundation in design and analysis of experiments on board a commercial scalloper to evaluate size selectivity of different-sized rings. (Dr. Fredric M. Serchuk, FTS 840-1245 or (617) 548-5123)
- OYSTER SHELL PATHOGENS:** Determined that some oyster shells on natural beds harbor several species of bacteria that can cause significant mortality in oyster larvae under experimental conditions, but pose no threat to human health. (Dr. Walter J. Blogoslawski, FTS 642-5235 or (203) 783-4235)

- CHESAPEAKE CLAM CANCER:** Documented, in cooperation with the Maryland Department of Natural Resources and Tufts University, the new occurrence of infectious sarcoma in Chesapeake Bay softshell clams in prevalences up to 50 percent. (Austin C. Farley, (301) 226-5193)
- GULF OF MAINE LOBSTERS:** Found a high rate of fishing mortality and general autumn movements of American lobsters from northern release sites (Jordan Basin) to coastal Maine, and from southern release sites (Crowell Basin) to Georges Bank and Nantucket Shoals. (Joseph R. Uzman, FTS 840-1280 or (617) 548-5123)
- AMERICAN LOBSTER MODELLING:** Developed mathematical models to evaluate trends in American lobster landings, particularly the relationship between water temperature to lobster yields. (Michael J. Fogarty, FTS 840-1255 or (617) 548-5123)
- FISH FOOD HABITS:** Completed reports on consumption and diet of more than 20 species, including spiny dogfish, silver hake, Atlantic cod, short- and long-finned squids, bluefish, and weakfish, and developed a method to estimate consumption based on gut content. (Ray E. Bowman, FTS 840-1324 or (617) 548-5123; Dr. Michael R. Pennington, FTS 840-1285 or (617) 548-5123)
- CLAM-CRAB-FISH FOOD CHAIN:** Identified a major food chain on the shoreward portion of the continental shelf in which rock crabs and lady crabs consume nearly all available juvenile surf clams each fall and winter, and in turn are heavily preyed upon by smooth dogfish. (Clyde L. MacKenzie, Jr., FTS 342-8258 or (201) 872-0200)
- BLUEFISH CONSUMPTION RATES:** Determined that age 2+ bluefish consume from seven percent of their body weight per day in summer to one percent of their body weight per day in winter, when held in the lab under simulated seasonal changes in water temperature and photoperiod. (Anne L. Studholme, FTS 342-8277 or (201) 872-0200)
- TUNA-LIKE FISHES DEVELOPMENT:** Published information on development and relationships of tuna-like fishes (Scombroidei) and of halfbeaks and their relatives (Beloniformes), including diagrams of relationships and drawings of representative eggs and larvae. (Dr. Bruce B. Collette, FTS 357-2524 or (202) 357-2524)
- SHRIMP/LOBSTER/CRAB BOOK:** Published a book, Shrimps, Lobsters, and Crabs of the Eastern United States, presenting identification keys, illustrations, and remarks on life history and ecology for 342 species of decapod crustaceans. (Dr. Austin B. Williams, FTS 357-2639 or (202) 357-2639)
- MUD SHRIMP REVISION:** Completed revising the systematics of the eastern Pacific's 19 species of filter-feeding, tube-dwelling mud shrimps (Upogebia). (Dr. Austin B. Williams, FTS 357-2639 or (202) 357-2639)

LOBSTER TAIL KEY: Examined tails of spiny and slipper lobsters from commercial sources, made color photographs, and prepared an illustrated key to the species being sold in the United States--one third of the world catch is imported into the United States, frequently mislabeled as to origin. (Dr. Austin B. Williams, FTS 357-2639 or (202) 357-2639)

BLUE CRAB BIOLOGY: Published a synopsis of biological data on the blue crab, reviewing information from 300 published papers on taxonomy, morphology, distribution, ecology, life history, diseases, and fisheries. (Dr. Austin B. Williams, FTS 357-2639 or (202) 357-2639)

BLUEFISH SPAWNING AREAS & TIMES: Determined that bluefish spawning peaks from late June to July with larvae centered over mid-shelf depths from New Jersey to the offing of Chesapeake Bay. (Wallace G. Smith, FTS 342-8260 or (201) 872-0200)

GROUNDFISH SPAWNING STRATEGIES: Analyzed data from four years of egg and larval surveys to show that peak spawning by Atlantic cod, haddock, and redfish synchronizes with increasing abundance of their larvae's prey, while spawning by silver hake, red hake, and sand lance is ubiquitous, allowing their larvae to increase rapidly in response to favorable conditions. (Dr. Kenneth Sherman, FTS 838-7142 or (401) 789-9326)

LARVAL PREDATION-RECRUITMENT LINK: Determined that mortality after the larval stage during the first year of life is likely to determine year-class strength, with predation, not starvation, playing the principal role. (Edward B. Cohen, FTS 840-1210 or (617) 548-5123)

LARVAL COD & HADDOCK SURVIVAL: Studied the health of Atlantic cod and haddock larvae on the southern flank of Georges Bank, finding that stratified waters favor growth, survival, and recruitment of haddock, and that cod larvae are better adapted for growth and survival in well-mixed waters at lower levels of available food than haddock larvae. (Dr. Geoffrey C. Laurence, FTS 838-7142 or (401) 789-9326)

LARVAL SAND LANCE SURVIVAL: Found that sand lance larvae are better adapted than haddock or Atlantic mackerel larvae for growth and survival at low plankton densities, consistent with sand lance spawning during the winter minimum in zooplankton abundance. (Dr. Geoffrey C. Laurence, FTS 838-7142 or (401) 789-9326)

LARVAL SAND LANCE ABUNDANCE: Found that sand lance larval abundance was nearly double the highest level recorded during the past seven years, a period when we observed a 50-fold increase in adult spawning biomass. (Wallace G. Smith, FTS 342-8260 or (201) 872-0200)

GEORGES BANK HERRING: Located Atlantic herring larvae on eastern Georges Bank for the first time since 1979, but there is insufficient evidence that the population on the Bank has undergone any significant rebuilding. (Wallace G. Smith, FTS 342-8260 or (201) 872-0200)

MARMAP PROGRAM ATLAS: Issued the first atlas of the Center's MARMAP program, summarizing measurements of primary productivity, chlorophyll a, phaeophytin a, nutrients, dissolved oxygen, temperature, salinity, phytoplankton, zooplankton, and ichthyoplankton, and censuses of sea birds and marine mammals from 47 surveys of the continental shelf from Cape Sable, Nova Scotia, to Cape Hatteras, North Carolina, during 1977-83. (Dr. Kenneth Sherman, FTS 838-7142 or (401) 789-9326)

NORTHEAST ECOSYSTEM PRODUCTIVITY: Determined that the primary productivity and zooplankton production on the Northeast's continental shelf are similar to values reported in the mid-1950's, indicating that the natural productivity at the lower end of the food chain is relatively stable, and that the major source of year-to-year variation in the abundance of fish stocks results from heavy fishing mortality and natural mortality on post-larval and juvenile stages. (Dr. Kenneth Sherman, FTS 838-7142 or (401) 789-9326)

AUTOMATED ZOOPLANKTON ANALYSIS: Developed a computerized, automated system which can analyze a 500-organism zooplankton sample with more than 90 percent classification accuracy in 15-20 minutes, approximately 1/10 the time needed for manual analysis. (Dr. Kenneth Sherman, FTS 838-7142 or (401) 789-9326)

RED HAKE FROZEN QUALITY: Identified oxygen as a potent inhibitor of the enzymatic reaction which produces the texture-toughening dimethylamine and formaldehyde in frozen red hake, and began developing a prefreezing hyperbaric oxygen treatment to inhibit up to 90 percent of these texture-toughening chemicals during subsequent frozen storage. (Robert J. Learson, FTS 837-9313 or (617) 281-3600)

POTASSIUM SORBATE-TREATED POLLOCK: Showed that dipping 2-3 day-old pollock fillets in five-percent potassium sorbate effectively doubled the fresh shelf life. (Robert J. Learson, FTS 837-9313 or (617) 281-3600)

ICE-HELD SQUID: Determined that the storage life of whole Loligo squid in ice was 11 days, with the limiting quality characteristic being flesh discoloration. (Robert J. Learson, FTS 837-9313 or (617) 281-3600)

FISH BLOCK DEFECTS: Established a computerized data base on defects in fish blocks, showing: relative frequency of physical defects by country of origin for three forms of blocks, the total number of physical defects by country of origin for blocks of all species, and a summary of grade scores for sensory and physical defects. (Robert J. Learson, FTS 837-9313 or (617) 281-3600)

MINCED FISH NUTRITIONAL COMPOSITION: Determined that mechanical separation of fish flesh from fish carcasses produces a minced fish meat with a nutritional composition the same as skinless fillets, thus smoothing the way for the use of minced fish meat in such products as sausage. (Robert J. Learson, FTS 837-9313 or (617) 281-3600)

- SEAFOOD SPECIES IDENTIFICATION:** Established an immunological method to identify the species contained in both cooked and raw seafood products, including surimi-based products. (Robert J. Learson, FTS 837-9313 or (617) 281-3600)
- SURF CLAM CAGE CULTURE:** Determined the amount of space needed per individual to grow-out juvenile surf clams to a marketable size in cages partially buried in the seabed. (Edwin W. Rhodes, Jr., FTS 642-5226 or (203) 783-4226)
- HARD CLAM CULTURE:** Determined the amount of space and food needed per individual to grow juvenile hard clams in flowing seawater systems. (Edwin W. Rhodes, Jr., FTS 642-5226 or (203) 783-4226)
- LOBSTER CULTURE CANNIBALISM:** Developed a new method, using a vertical screen as a climbing surface, for reducing cannibalism in communally held lobsters. (Dr. Frederick P. Thurberg, FTS 642-5244 or (203) 783-4244)
- SELECTIVE OYSTER BREEDING:** Demonstrated that selectively breeding American oysters to obtain better growth rates could be a worthwhile undertaking for commercial shellfish hatcheries. (Shearon Dudley, FTS 642-5230 or (203) 783-4230)
- SURF CLAM FEEDING REGIMES:** Developed energy budgets for juvenile surf clams under different feeding regimes. (Edwin W. Rhodes, Jr., FTS 642-5226 or (203) 783-4226)
- VITAMIN-FREE ALGAL CULTURE:** Demonstrated that several species of microalgae useful as molluscan foods can be cultured in the absence of vitamin enrichment, and that the growth of juvenile oysters fed with these non-vitamin-enriched algae is statistically identical to the growth of oysters fed with enriched algae. (Dr. Ravenna Ukeles, FTS 642-5223 or (203) 783-4223)
- COMPUTER-ASSISTED BACTERIAL IDENTIFICATION:** Developed a computer program to aid in bacterial disease control in bivalve mollusk culture by sorting bacteria based on their biochemical characteristics and by matching an unknown bacterium with its nearest relative. (Dr. Richard A. Robohm, FTS 642-5237 or (203) 783-4237)
- OZONE BACTERIAL TREATMENT:** Reduced significantly the number of shellfish-disease-producing bacteria by using ozone gas in the culture water at doses of 0.09-0.20 milligrams per liter. (Dr. Walter J. Blogoslawski, FTS 642-5235 or (203) 783-4235)
- LOBSTER HABITAT ECOLOGY:** Conducted submersible dives in the offshore Gulf of Maine, finding lobster shelters rare and implying that commercial concentrations of lobsters there are not a resident stock, but migrating individuals that are attracted to the shelter and food in the large number of traps on an otherwise featureless bottom. (Joseph R. Uzmann, FTS 840-1280 or (617) 548-5123)

WARM-CORE RING EPISODE: Reported on an episode of resident water and plankton loss from the continental shelf due to entrainment by warm-core rings (cut-off meanders) of the Gulf Stream, a potentially important source of mortality for the shelf's fish larvae in some years. (Dr. David G. Mountain, FTS 840-1271 or (617) 548-5123)

WARM-CORE RING HISTORY: Reanalyzed hydrographic measurements made on Georges Bank in 1914, discovering that those measurements were unknowingly affected by a warm-core Gulf Stream ring located south of the Bank, and that the classic diagram of Georges Bank circulation developed early in this century mistakenly showed a major flow of water off the southeastern side of the Bank. (Dr. David G. Mountain, FTS 840-1271 or (617) 548-5123)

GEORGES BANK CIRCULATION: Determined that our oceanographic measurements of the flow of continental-slope water and plankton through the Great South Channel onto Georges Bank can indicate the nature, and changes in the nature, of recirculation of water around the Bank, which may in turn affect the retention and survival of Atlantic cod and haddock larvae on the Bank. (Dr. David G. Mountain, FTS 840-1271 or (617) 548-5123)

GEORGES BANK WATER RESIDENCE: Issued a report on the effect of the residence time of water on Georges Bank on the population levels of plankton. (Dr. David G. Mountain, FTS 840-1271 or (617) 548-5123)

RARITAN BAY OYSTER HISTORY: Compiled a history of Raritan Bay's oyster industry, including a description of the death of that industry by 1925 due to increased pollution and typhoid outbreaks, and the effects of siltation, dredging, and increasing salinities. (Clyde L. MacKenzie, Jr., FTS 342-8258 or (201) 872-0200)

FLATFISH LIVER TUMORS: Found, in cooperation with the State of Massachusetts, a relatively high prevalence of liver tumors in Boston Harbor flatfish, with environmental carcinogens appearing to be the cause--however, there is no evidence that cancer in fish can be transmitted to man. (Dr. Robert A. Murchelano, (301) 226-5193)

POLLUTANT-ASSOCIATED CHROMOSOME DAMAGE: Found higher incidences of chromosome damage in embryos of Atlantic mackerel and in circulating red blood cells of winter flounder, windowpane flounder, and Atlantic mackerel collected in the more polluted regions of the coastal Mid-Atlantic than in the less polluted regions of the coastal Mid-Atlantic, Georges Bank, and the outer Scotian shelf. (Dr. Arlene Longwell, FTS 642-5207 or (203) 783-4207)

CLOSED DUMPSITE RESTORATION: Completed a study with EPA and FDA on the distribution and abundance of disease-causing amoeba from the previously active Camden-Philadelphia ocean dumpsite, showing that this area, formerly closed to shellfish harvesting, now meets sanitary standards and can be opened to harvesting. (Dr. Thomas K. Sawyer, (301) 226-5193)

POLLUTED BENTHOS BIOMASS: Determined that there was generally no difference in the biomass of benthic organisms in those areas of the New York Bight apex seriously contaminated by waste dumping and in nearby clean areas. (Frank W. Steimle, Jr., FTS 342-8259 or (201) 872-0200)

- NEW YORK BIGHT WASTE BREAKDOWN:** Showed, by studying the bacterial breakdown of wastes dumped in the New York Bight apex, that the rate of such breakdown does not keep pace with the rate of dumping, but if dumping is stopped altogether, the breakdown can ultimately restore an area to a natural condition. (William C. Phoel, FTS 342-8215 or (201) 872-0200)
- NEW JERSEY OXYGEN DEPLETION:** Completed a second summer of study with NOAA's Ocean Assessments Division indicating that the plume from the Hudson-Raritan estuary causes the low dissolved oxygen in this area in the summer. (John E. O'Reilly, FTS 342-8251 or (201) 872-0200)
- PHYTOPLANKTON LIMITING FACTOR:** Identified nitrogen as the most important growth-limiting nutrient in the Gulf of Maine to Chesapeake Bay region. (John B. Mahoney, FTS 342-8255 or (201) 872-0200)
- DREDGE SPOILS TRACER:** Demonstrated that the distribution of the anaerobic bacterium Clostridium perfringens can be used as a rapid and reliable tracer of the dispersion of polluted dredge spoils. (John T. Graikoski, FTS 642-5238 or (203) 783-4238)
- ABNORMAL OYSTER DEVELOPMENT:** Found that dumping of dredge spoils at the central Long Island Sound dumpsite significantly increased the percentage of abnormally developed oyster larvae. (David A. Nelson, FTS 642-5221 or (203) 783-4221)
- BLOODWORM OIL VULNERABILITY:** Demonstrated that bloodworms, a major prey for some fishes, exhibit abnormal burrowing behavior and emerge from the bottom when placed in sediment containing oil at levels found in chronically polluted habitats, likely leading to decreased survival due to greatly increased predation. (Anne L. Studholme, FTS 342-8277 or (201) 872-0200)
- MASSACHUSETTS SEA-BOTTOM CONTAMINATION:** Completed a comprehensive survey of toxic organic contaminants (PCB's and PAH's) in sediments and animals of Boston Harbor, Massachusetts Bay, and Cape Cod Bay, finding elevated levels of both contaminants in sediments but no apparent contamination problems in the fish and invertebrates. (Robert N. Reid, FTS 342-8220 or (201) 872-0200)
- FLOUNDER PCB CONTAMINATION:** Compared the levels of PCB's in livers of windowpane flounder collected in Long Island Sound in 1984 with livers collected in 1980-82, finding that PCB levels were extremely low and may be declining. (Richard A. Greig, FTS 642-5231 or (203) 783-4231)
- MACKEREL EGG HEALTH:** Determined that heavy metals, aromatic hydrocarbons, and PCB's in the New York Bight were associated with the abnormal development and mortality of Atlantic mackerel eggs. (Dr. Arlene Longwell, FTS 642-5207 or (203) 783-4207; Dr. Sukwoo Chang, FTS 342-8267 or (201) 872-0200)

OCEAN QUAHOG CONTAMINANTS: Completed a survey of trace metals, PCB's, PAH's, and total petroleum hydrocarbons in the ocean quahog from Nova Scotia to Virginia, detecting organic and trace metal residues at low levels in all samples, with the highest levels in quahogs from the inner New York Bight and Rhode Island Sound. (Frank W. Steimle, Jr., FTS 342-8259 or (201) 872-0200)

FLOUNDER COPPER & MERCURY EFFECTS: Found, through scanning electron microscopy, that low levels of copper or mercury caused localized uncontrolled growth of surface cells in gills of windowpane flounder. (Jose J. Pereira, FTS 642-5248 or (203) 783-4248)

SCALLOP COPPER & CADMIUM EFFECTS: Determined that low levels of copper strongly inhibit sea scallop reproduction, but recovery is possible; however, if similarly low levels of cadmium are also in the water, then recovery is not possible. (Edith Gould, FTS 642-5222 or (203) 783-4222)