

NORTHEAST FISHERIES CENTER

END-OF-YEAR REPORT



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

CALENDAR YEAR 1989

The Northeast Fisheries Center's End-of-Year Report is a synoptic report on key Center research activities during the year. It focuses on those research findings which have practical application either to fisheries resource and habitat management, or to commercial and recreational fisheries interests. Most of the findings are covered in detail in publications which are available upon request to the Information Services Section, Northeast Fisheries Center, Water St., Woods Hole, MA 02543 USA. Also included at the end of each research write-up are a name and two telephone numbers (federal and commercial) to contact for more information.

July 1, 1990

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Center

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1989 END-OF-YEAR REPORT

1. **STATUS-OF-STOCKS REPORT:** A report, "Status of the Fishery Resources off the Northeastern United States for 1989," was published which details stock status and fisheries production in relation to fisheries management activities for 33 species comprising 44 separate stock units (Dr. Vaughn C. Anthony, FTS 840-1304 or (508) 548-5123).
2. **SPRING & AUTUMN STOCK ASSESSMENT WORKSHOPS:** Proceedings were issued of our spring (eighth) and autumn (ninth) stock assessment workshops which evaluated the status of important fisheries resources and data collection programs in the Northeast (Dr. Vaughn C. Anthony, FTS 840-1304 or (508) 548-5123).
3. **FISHERMEN'S REPORTS:** Reports on the sampling locations, catches of selected species, and environmental conditions during our resource surveys were distributed to fishermen and other interested parties immediately following our spring and autumn bottom trawl surveys, summer sea scallop survey, and Atlantic surfclam - ocean quahog survey (Linda I. Despres-Patanjo, FTS 840-1346 or (508) 548-5123).
4. **REVIEW OF NORTHEAST'S TRAWL SURVEY PROGRAMS:** A report of a workshop cosponsored by us and the Atlantic States Marine Fisheries Commission to review ongoing federal and state trawl survey programs and to explore areas of potential cooperation was published (Thomas R. Azarovitz, FTS 840-1283 or (508) 548-5123).
5. **EVALUATION OF MOROCCAN TRAWL SURVEY PROGRAM:** In support of the U.S. State Department, we analyzed data gathered by the Moroccan Sea Fisheries Research Institute's trawl survey program for the country's southern Atlantic coast, and recommended changes in survey design and operations (Dr. Michael J. Fogarty, FTS 840-1255 or (508) 548-5123).
6. **SEA SAMPLING OF NORTHEAST'S DOMESTIC FISHERIES:** Through our contract with the Manomet Bird Observatory, we spent 794 sea days aboard commercial fishing vessels from Maine to Virginia collecting data on fisheries practices, catches, economics, and interactions with marine mammals (Gregory R. Power, FTS 840-1266 or (508) 548-5123).

7. **COMPLETE COVERAGE OF EAST COAST FOREIGN FISHING:** Our foreign fisheries observers covered 100 percent of East Coast foreign fishing which involved four countries (East Germany, Holland, Poland, and the Soviet Union) either catching Atlantic mackerel or engaging in at-sea transfer of U.S.-caught mackerel (Patricia Gerrior, FTS 840-1291 or (508) 548-5123).
8. **SPECIAL SAMPLING OF SWORDFISH DRIFT GILLNET FISHERY:** We specially contracted sea samplers to collect data and samples in the swordfish drift gillnet fishery on 13 trips aboard nine commercial fishing vessels during August through November (Patricia Gerrior, FTS 840-1291 or (508) 548-5123).
9. **EFFORT & CATCH OF BIG-GAME SPECIES:** Recreational effort and catch data, as well as biological data, were obtained and processed for tunas, billfishes, and sharks in Southern New England and Mid-Atlantic waters (Harold A. Foster, FTS 840-1369 or (508) 548-5123).
10. **HIGH-SEAS HARVESTS OF U.S.-ORIGIN ATLANTIC SALMON:** Based on recovery of external Carlin-type tags, we estimated the harvest of U.S.-origin Atlantic salmon off Canada to be 584 fish in 1987, 393 in 1988; based on recovery of internal coded-wire tags, we estimated the harvest off Greenland to be 5,538 fish in 1987, 4,236 in 1988 (Dr. Kevin D. Friedland, FTS 840-1369 or (508) 548-5123).
11. **HISTORY OF RARITAN BAY FISHERIES:** An illustrated book on the history of finfishing and shellfishing in Raritan Bay, which was once one of the most productive estuaries in North America, was completed (Clyde L. MacKenzie, FTS 342-3019 or (908) 872-3019).
12. **LARGEST POSSIBLE CONSTANT CATCH LEVELS:** We determined the largest possible constant catch levels that could be sustained for selected Northwest Atlantic species (given their highly variable recruitment), finding that for Mid-Atlantic surfclams, the largest possible constant catch level approximates current catch quotas, and that for Georges Bank haddock, it far exceeds current catch levels (Dr. Steven A. Murawski, FTS 840-1303).
13. **CAUSES OF LARGE-SCALE, LONG-TERM FISHERIES FLUCTUATIONS:** Proceedings were published for a symposium on the causes of long-term (decadal) fluctuations in the fish harvests of the Yellow Sea, Kuroshio Current, Oyashio Current, Gulf of Thailand, Great Barrier Reef, Barents Sea, Gulf of Mexico, Iberian Coast, and Benguela Current Ecosystems (Dr. Kenneth Sherman, FTS 838-6210 or (401) 782-3210).

14. **LONG-TERM, FISHERIES-INDUCED CHANGES IN GROUND FISH COMMUNITIES:** Research vessel survey data indicate that species diversity of Georges Bank and Southern New England groundfish communities has decreased since 1967, especially since 1977, and that the effects of fishing pressure in the mid-1960s on species composition could not be reversed in 10 years (Dr. Wendy L. Gabriel, FTS 840-1213 or (508) 548-5123).
15. **STABLE SIZE COMPOSITION OF TOTAL FINFISH COMMUNITY:** Size composition of all Georges Bank commercial finfish species combined has been fairly stable in spite of dramatic shifts--due to fisheries effects--in the size composition of individual species (Dr. Steven A. Murawski, FTS 840-1303 or (508) 548-5123).
16. **EFFECT OF FISHING ON GULF-OF-MAINE FISH POPULATIONS:** Analyses of changes in both the age/size structure and the biomass of Gulf-of-Maine fish populations in relation to fishing and environmental factors indicate that fishing has largely been responsible for the observed changes (Dr. Edward B. Cohen, FTS 840-1210 or (508) 548-5123).
17. **MODEL OF GULF-OF-MAINE DEMERSAL FISHERIES:** A computer model of the Gulf of Maine's northern shrimp, silver hake, groundfish trawl, and groundfish gill net fisheries has been developed; it treats those fisheries as a system of interacting fisheries rather than a series of independent ones, and also simulates the effects of various fisheries management actions on fisheries yields and values (Dr. Steven A. Murawski, FTS 840-1303 or (508) 548-5123).
18. **MODEL OF MID-ATLANTIC PELAGIC FISHERIES ECOSYSTEM:** A computer model of the Mid-Atlantic pelagic fisheries ecosystem has been developed; it simulates the ecological and fisheries effects of interspecific predation among Atlantic mackerel, Atlantic herring, American sand lance, small toothed whales, large baleen whales, sea birds, and some groundfish such as spiny dogfish, Atlantic cod, and silver hake (Dr. William J. Overholtz, FTS 840-1256 or (508) 548-5123).
19. **MIXED EFFECTS OF SHELLFISH DREDGING:** Shellfish dredging does little damage to sea scallops--more so to Atlantic surfclams and ocean quahogs--which are in the dredge path but not captured by it. Of those shellfish caught by dredge but later discarded, ocean quahogs and sea scallops survive much better than surfclams. Benthic communities suffer only relatively short-term disruptions due to dredging (Dr. Steven A. Murawski, FTS 840-1303 or (508) 548-5123).

20. **GOOD SURVIVAL OF ANGLER-RELEASED BLACK SEA BASS:** A collaborative study with the Massachusetts Division of Marine Fisheries shows that more than 80 percent of sublegal-sized black sea bass survive at least two days after being caught and released by anglers (Gary Shepherd, FTS 840-1368 or (508) 548-5123).
21. **BALEEN WHALE OCCURRENCE INFLUENCED BY FINFISHERIES HARVESTS:** Overfishing of Atlantic mackerel and Atlantic herring in the Gulf of Maine during the 1960s and 1970s resulted in population increases of American sand lance and the copepod Calanus finmarchicus, which in turn resulted in an increase in the occurrence of the gulf's baleen whales, especially right and sei whales (Jack W. Jossi, FTS 838-6274 or (401) 782-3274).
22. **VOLUMETRIC MEASUREMENT OF SEA SCALLOP MEATS:** Sea scallop meat counts determined volumetrically (with a one-pound coffee can) are highly reliable and as accurate as measurements obtained with traditional weight-based procedures (Dr. Fredric M. Serchuk, FTS 840-1245 or (508) 548-5123).
23. **COMMERCIAL TESTING OF ATLANTIC SURFCLAM REARING METHODS:** Private aquaculturists in the Northeast have received grants to test the commercial feasibility of rearing Atlantic surfclams using methods established by the Center (Ronald Goldberg, FTS 642-5246 or (203) 783-4246).
24. **CHOLESTEROL-LIKE STEROLS BOOST EASTERN OYSTER GROWTH:** Of 16 microalgae strains tested, we found that those containing sterols most closely related to cholesterol promoted the most rapid growth in post-set eastern oysters (Gary H. Wikfors, FTS 642-5225 or (203) 783-4225).
25. **NORTHERN QUAHOG GROWTH LINKED TO ALGAL NUTRITIONAL CONTENT:** The nutritional value of two diatom algal species for supporting growth of post-set northern quahogs was shown to depend upon the protein, carbohydrate, and fat content of the diatoms, which in turn depends upon seawater levels of the inorganic nutrients silicate and nitrate (Gary H. Wikfors, FTS 642-5225 or (203) 783-4225).
26. **UNEXPECTED ALGAL RESPONSE TO INORGANIC NUTRIENT STARVATION:** It's widely accepted--based on rather limited studies--that when diatom algae are starved for the inorganic nutrient silicate, they produce fat as an energy storage product, and when starved for nitrate, they produce carbohydrate; but when we starved 12 diatom species of silicate or nitrate, the diatoms produced either fat or carbohydrate without respect to which nutrient they lacked (Gary H. Wikfors, FTS 642-5225 or (203) 783-4225).

27. **BACTERIA IN PLANTED BEDS OF NORTHERN QUAHOGS:** Disease-causing bacteria were occasionally found at all sites in a study of planted beds of northern quahogs, but these pathogens appear to be a minor part of the bacterial community of such beds (Dr. Walter J. Blogoslawski, FTS 642-5235 or (203) 783-4235).
28. **BACTERIAL & VIRAL INFECTIONS OF IMPOUNDED BLUE CRABS:** A report was prepared on the incidence of putative bacterial and viral infections of blue crabs held in flow-through and recirculating shedding systems (Gretchen A. Messick, (301) 226-5193).
29. **BLUE CRAB SHEDDING DEATHS LINKED TO WATER QUALITY:** A cooperative effort with State of Maryland personnel determined that poor water quality, probably heavy metal contamination, was the cause of major die-offs of blue crabs from a shedding system in upper Chesapeake Bay (Gretchen A. Messick, (301) 226-5193).
30. **SPECIES IDENTIFICATION IN COOKED SEAFOOD PRODUCTS:** Monoclonal antibodies were developed which can determine the presence of sea scallops, Iceland scallops, Pacific oysters, and blue mussels (as well as various combinations of shellfish and finfish) in cooked seafood products (Ronald C. Lundstrom, FTS 837-9277 or (508) 281-9277).
31. **EDIBILITY CHARACTERISTICS OF NORTHEAST SPECIES:** Flavor and texture characteristics, which also account for seasonal differences, have been established for 22 of the Northeast's 24 common seafood species (Barbara L. Jobe, FTS 837-9217 or (508) 281-9217).
32. **NUTRITIONAL CONTENTS OF NORTHWEST ATLANTIC FINFISH:** A report was published listing the fat, moisture, ash, fatty acid (including Omega-3), and cholesterol content of raw and cooked portions of 22 species of Northwest Atlantic finfish, and containing analyses--including seasonal variation--of these nutritional contents (Judith Krzynowek, FTS 837-9226 or (508) 281-9226).
33. **ATLANTIC MACKEREL FILLET COLOR INDICATES FAT CONTENT:** We have found that the lighter the color of the flesh in Atlantic mackerel fillets, the higher the concentration of fat (Daniel S. Uljua, FTS 837-9321 or (508) 281-9321).
34. **CHOLESTEROL CONTENT OF AMERICAN LOBSTER:** Cholesterol content of American lobster varies by sex and maturity stage, and may also vary by season (Judith Krzynowek, FTS 837-9226 or (508) 281-9226).

35. **METHODS FOR CLEANSING SHELLFISH OF BACTERIA:** A technical review and evaluation of the available methods for cleansing bacterial pathogens from the digestive systems of shellfish was prepared (Dr. Walter J. Blogoslawski, FTS 642-4235 or (203) 783-4235).
36. **IONIZING RADIATION FOR MICROBIAL DECONTAMINATION OF SHELLFISH:** Guidelines were developed for designing an ionizing-radiation treatment system for the microbial decontamination of shellfish (Dr. Joseph J. Licciardello, FTS 837-9236 or (508) 281-9236).
37. **PARALYTIC TOXINS REDUCED BY PROCESSING & CANNING:** Processing and canning significantly reduce the paralytic toxin levels in Atlantic surfclams (Kurt A. Wilhelm, FTS 837-9308 or (508) 281-9308).
38. **WEIGHT LOSS IN FROZEN SEA SCALLOPS:** Fresh sea scallops stored under good frozen conditions will lose less than two percent of their weight to drip and dehydration after one month; under poor frozen conditions, they'll lose about six percent (Kurt A. Wilhelm, FTS 837-9308 or (508) 281-9308).
39. **SALT ABSORPTION BY BRINE-DIPPED FILLETS:** Since fresh fillets are often brine dipped to enhance appearance, we've studied the factors affecting salt absorption by brine dipping, finding that salt uptake depends: (1) significantly on brine concentration, dipping time, and fillet thickness; (2) less so on brining temperature and season of catch; and (3) not at all on freezing or post-mortem age of the fillet (Elinor M. Ravesi, FTS 837-9287 or (508) 281-9287).
40. **THAWED FILLETS OUTLAST FRESH FILLETS:** Thawed Atlantic cod fillets have as long or a slightly longer iced storage life than fresh fillets (Dr. Joseph J. Licciardello, FTS 837-9236 or (508) 281-9236).
41. **FISH WASTES AS CRANBERRY FERTILIZER:** Cooperative experiments at the University of Massachusetts Cranberry Experiment Station show that fish hydrolysate (liquified fish waste) is a suitable fertilizer for commercial cranberry production, and will be recommended as an alternative to inorganic fertilizers in the station's 1990 fertilizer chart (Robert J. Learson, FTS 837-9313 or (508) 281-9313).
42. **BIOLOGY & EXPLOITATION OF POLLOCK:** A comprehensive report on the biology and exploitation of Northwest Atlantic pollock was published, summarizing stock structure, growth, maturation, mortality, and fisheries effects on stock size (Ralph K. Mayo, FTS 840-1310 or (508) 548-5123).

43. **RECOVERY UNDERWAY FOR ATLANTIC HERRING ON GEORGES BANK:** Recently hatched Atlantic herring larvae were caught for the second consecutive year in early to mid-October on the eastern part of Nantucket Shoals and along the northern edge of Georges Bank as far east as 68°W, a situation last seen during the early 1970s when herring population levels were high and recently hatched herring larvae routinely occurred near the historical spawning beds on the northeast part of Georges Bank (Wallace G. Smith, FTS 342-3060 or (908) 872-3060).
44. **WORKSHOP ON WINTER FLOUNDER BIOLOGY:** We sponsored a workshop on winter flounder biology which covered habitat, migrations, reproduction, growth & development, physiology, and pollutant effects. Copies of the abstracts are available (Dr. Anthony Calabrese, FTS 642-5209 or (203) 783-4209).
45. **LIMITED MIXING OF COASTAL WINTER FLOUNDER POPULATIONS:** There is some limited mixing of winter flounder between New Jersey and Southern Long Island populations, indicating that the flounder fishery in either area would only have a limited effect on the other (Beth A. Valdes, FTS 342-3079 or (908) 872-3079).
46. **LIMITED MIXING OF BLACK SEA BASS POPULATIONS:** A study of the physical features of black sea bass throughout their range and life history implies that this species may mix regionally, but not coastwide (Gary Shepherd, FTS 840-1368 or (508) 548-5123).
47. **GROWTH-MATURITY INTERACTIONS IN EXPLOITED FINFISH:** A computer model was constructed for evaluating interaction of size and age in the maturation process of seven exploited finfish species (Ralph K. Mayo, FTS 840-1310 or (508) 548-5123).
48. **GUIDE TO CLASSIFICATION OF SEXUAL MATURITY STAGES:** Our approach to classifying sexual maturity stages of finfish captured during our bottom trawl surveys have been documented for the use of others (John M. Burnett, FTS 840-1286 or (508) 548-5123).
49. **LATE SPAWNING LINKED TO POOR LARVAL SURVIVAL:** In laboratory experiments, small, late-spawning, female winter flounder produced eggs and larvae with low viability (Lawrence J. Buckley, FTS 838-6368 or (401) 782-3368).
50. **HIGHER EGG INCUBATION TEMPERATURES LOWER LARVAL CONDITION:** Winter flounder eggs incubated at lower temperatures (2°C) yielded larger and better conditioned (more protein and RNA) larvae than eggs incubated at higher temperatures (7°C) (Lawrence J. Buckley, FTS 838-6368 or (401) 782-3368).

51. **NEW METHOD TO MEASURE LARVAL CONDITION:** We developed an automated method for estimating the DNA and RNA content of individual fish larvae, enabling us to measure recent growth, condition, and health of the larvae (Elaine M. Caldarone, FTS 838-6353 or (401) 782-3353).
52. **LARVAE SEPARATED INTO PARENT STOCKS BY OTOLITH DIFFERENCES:** In a cooperative study with the Polish Sea Fisheries Institute, we separated Atlantic herring larvae into their parent stocks by image processing of the daily growth rings in the larvae's otoliths (Dr. George R. Bolz, FTS 840-1342 or (508) 548-5123).
53. **GROWTH & LONGEVITY OF FINFISHES & SHELLFISHES:** Growth and longevity information for 18 Northwest Atlantic finfish and shellfish species has been prepared (John M. Burnett, FTS 840-1286 or (508) 548-5123).
54. **GROWTH RATES DETERMINED FOR LARVAL SILVER HAKE:** Based on laboratory experiments, we estimated the weekly growth rates of silver hake throughout the larval stage (Dr. Lawrence J. Buckley, FTS 838-6368 or (401) 782-3368).
55. **SLOW GROWTH IN SANDBAR SHARKS:** Recapture of a sandbar shark on 15 August 1989 off Pensacola, Florida, set a record for time at liberty in the NMFS Cooperative Shark Tagging Program and confirmed the slow growth of this species--it grew 20 inches in 24 years (John G. Casey, FTS 838-6320 or (401) 782-3320).
56. **NORTHERN QUAHOGS LONG LIVED IN LONG ISLAND SOUND:** Many of the northern quahogs in Long Island Sound have been found to be over 50 years old, and, as expected, those quahogs from densely populated beds are smaller at any given age than those from less densely populated beds (Ronald Goldberg, FTS 642-5246 or (203) 783-4246).
57. **POPULATION DYNAMICS TECHNIQUE FOR AMERICAN LOBSTER:** Because American lobsters grow by infrequent shell molts just as insects do, we adapted a technique ("time-varying distributed delays") first used on insect populations for use in determining vital statistics (survival, growth, maturity, etc.) of American lobster populations (Joseph S. Idoine, FTS 840-1217 or (508) 548-5123).
58. **NEW WAY TO AGE NORTHERN SHRIMP:** A new method to estimate age composition from length composition shows promise for the Gulf of Maine's northern shrimp population (Dr. Mark Terceiro, FTS 840-1203 or (508) 548-5123).

59. **FIRST FINDING ON AGE CLASSES OF ADULT ANTARCTIC KRILL:** Two different aging methods have both found that adult populations of Antarctic krill are composed of six age classes (Mark S. Berman, FTS 838-6243 or (401) 782-3243).
60. **MUD CRABS PREY ON JUVENILE NORTHERN QUAHOGS:** As part of our research into the limiting factors to northern quahog production, the first experimental evidence was obtained that juvenile mud crabs eat northern quahogs during the first week after the quahogs settle out of the water column. Shell stocking is now being tested to reduce such predation (Clyde L. MacKenzie, Jr., FTS 342-3019 or (908) 872-3019).
61. **DENSITY-DEPENDENCE IN ATLANTIC MACKEREL:** We have established density-dependent relationships among population size and individual growth, maturation, and predation rates within the Northwest Atlantic mackerel stock (Dr. William J. Overholtz, FTS 840-1256 or (508) 548-5123).
62. **DESCRIPTION OF INSHORE DEMERSAL FISH COMMUNITY:** A "numerical classification" technique was used to describe the demersal fish community of waters less than 20 meters in depth from Cape Ann, Massachusetts, to Cape Fear, North Carolina (Dr. William C. Phoel, FTS 342-3015 or (908) 872-3015).
63. **INFORMATION ON EELS & GULPER EELS OF WESTERN NORTH ATLANTIC:** Part 9 of the Sears Foundation Memoir, Fishes of the Western North Atlantic, has been published, covering 180 species of eels and gulper eels of the western North Atlantic, including detailed coverage of leptocephali larvae of 157 species (Dr. Bruce B. Collette, FTS/(202) 357-2524).
64. **NEW FAMILY TREE FOR LOUVAR:** New research on the louvar (Louvaris imperialis), a fish of the upper layers of the ocean which had been thought to be most closely related to the scombroids (mackerels, tunas, etc.) or carangoids (jacks, scads, etc.), shows it to be a highly-specialized member of the normally reef-associated acanthuroids (surgeonfishes and their allies) (Dr. Bruce B. Collette, FTS/(202) 357-2524).
65. **GUIDE TO NORTHEAST SQUIDS & OCTOPODS:** A guide to the 13 species of squids and octopods of the Northeast Continental Shelf Ecosystem has been published; it includes an identification key with diagnostic illustrations, information on species that occur regularly on the Northeast shelf, and a checklist of 107 other species that might occur there occasionally (Dr. Michael Vecchione, FTS/(202) 357-4990).

66. **NEW LIST OF NAMES OF DECAPOD CRUSTACEANS:** A list of scientific and common names of the 1,614 known species of decapod crustaceans (shrimps, crabs, lobsters) of the United States and Canada has been issued--with guidance and assistance by Center personnel--by the American Fisheries Society. Copies must be ordered from the American Fisheries Society, 5410 Grosvenor Lane, Suite 110, Bethesda, Maryland 20814 (Dr. Austin B. Williams, FTS/(202) 357-2639).
67. **NEW GENUS, TWO NEW SPECIES OF BOX CRABS:** Recent study of historical collections of specimens captured during exploratory trawling has produced one genus (Cyclozodion) and two species of box crabs (family Calappidae) in the Northwest Atlantic new to science (Dr. Austin B. Williams, FTS/(202) 357-2639).
68. **IMPROVED SYSTEM FOR ZOOPLANKTON ANALYSIS:** In cooperation with the University of Rhode Island, we developed an improved image-processing system which can identify, measure, and count zooplankton in seawater samples being continuously pumped through the imaging chamber (Mark S. Berman, FTS 838-6243 or (401) 782-3243).
69. **LONG-TERM, BROADSCALE TEMPERATURE TRENDS ON NORTHEAST SHELF:** Based on water temperature data obtained on the Center's spring and autumn bottom trawl surveys during 1963-87, it appears that temperatures in the 1960s were quite cold, in the early to mid-1970s were warm, in the late 1970s to early 1980s were intermediate between the two previous extremes, and in the mid-1980s were warm again (Dr. David G. Mountain, FTS 840-1271 or (508) 548-5123).
70. **COOLING OF WATERS OFF NEW JERSEY:** Five periods of cooling (as large as 6°C) of waters off New Jersey, each of which likely affected fish distribution and catchability, occurred during summer 1988. Cooling was caused by wind-driven upwelling of cooler subsurface water (Lt. Margaret Sano, FTS 838-6290 or (401) 782-3290).
71. **TURTLE STRANDINGS UNRELATED TO WATER TEMPERATURE:** Neither patterns nor irregularities in sea-surface temperatures were found along the East Coast which would explain the large strandings of dead sea turtles, including Kemp's ridley turtles, along Georgia and northeastern Florida in autumn 1988 (Lt. Margaret Sano, FTS 838-6290 or (401) 782 -3290).

72. **TEMPERATURE AFFECTS ZOOPLANKTON DISTRIBUTION & ABUNDANCE:** For the copepod Calanus finmarchicus, a dominant member of the zooplankton community in the Northeast Continental Shelf Ecosystem and a major prey for larval Atlantic cod and haddock, we found that temperature influences geographic distribution, and that stability of temperature cycles from year to year is associated with relative abundance. (John R. Green, FTS 838-6240 or (401) 782-3240).
73. **SATELLITES MONITOR GEORGES BANK THERMOCLINE:** Sea-surface temperature changes measured by infrared sensors on NOAA satellites can reveal changes in the spring thermocline on Georges Bank. Thermocline depth and duration is thought to be linked to survival of young Atlantic cod and haddock (James J. Bisagni, FTS 838-6313 or (401) 782-3313).
74. **WARM-CORE RINGS ABUNDANT OFF NORTHEAST:** Warm-core rings, which can disrupt fish distribution and fishing activity, occurred 15 times in the Northeast during 1988, the most we have seen in our 15 years of monitoring these cutoff Gulf Stream meanders (Reed S. Armstrong, FTS 838-6280 or (401) 782-3280).
75. **SLOPE WATER RECEIVES BULK OF OFFSHORE SLUDGE DUMPING:** Of the more than two billion gallons of sewage sludge dumped at the 106-Mile Site during October 1987 - December 1988, 64 percent was dumped in slope water, 20 percent in Gulf Stream warm-core rings, and 16 percent in shelf water. Slope water dominates submarine canyon habitats where offshore lobstering and crabbing takes place (Lt. Margaret Sano, FTS 838-6290 or (401) 782-3290).
76. **RIVER DISCHARGES DOMINATE MID-ATLANTIC SALINITY:** Sixty-two percent of year-to-year variation in the Middle Atlantic Bight's shelf water salinity--which affects distribution and productivity of fishery resources--is due to river discharges in the region. The figure increases to 70 percent when local precipitation and St. Lawrence River discharge are considered (James P. Manning, FTS 840-1211 or (508) 548-5123).
77. **HYPOXIA STALLS AMERICAN LOBSTER GROWTH:** Chronic exposure to hypoxic conditions (less than three milligrams of dissolved oxygen per liter of seawater), which occur in some inshore waters of the Northeast during the warmer months, reduces feeding and stalls molting (growth) in the American lobster (Allen J. Bejda, FTS 342-3080 or (908) 872-3080).

78. **FEW LONG-TERM EFFECTS OF 1976 NEW JERSEY HYPOXIA:** Our study of long-term fisheries effects of the devastating low-oxygen condition ("hypoxia") off New Jersey during summer 1976 showed no noticeable long-term effects on finfisheries, but some increased recruitment into the Atlantic surfclam fishery, likely due to hypoxia-induced reduction of predators of young surfclams (Dr. Steven A. Murawski, FTS 840-1303 or (508) 548-5123).
79. **PHYTOPLANKTON BIOMASS DETERMINED FOR NEW YORK BIGHT:** Estimates were developed of the fine-scale biomass of phytoplankton in the surface waters of the New York Bight and Raritan Bay. Such estimates serve as a biological benchmark/indicator of chemical water quality (Christine A. Zetlin, FTS 342-3095 or (908) 872-3095).
80. **HARMFUL BIOLOGICAL EFFECTS OF PHYTOPLANKTON BLOOMS:** A report was prepared on harmful biological effects of phytoplankton blooms (Dr. John B. Mahoney, FTS 342-3055 or (908) 872-3055).
81. **NITROGEN IS LIMITING FACTOR FOR NORTHEAST'S PHYTOPLANKTON:** Nitrogen appears to be chemical component of Northeast marine waters that is most growth limiting to phytoplankton, but phosphorus and contaminants also probably play some role in growth limitation (Dr. John B. Mahoney, FTS 342-3055 or (908) 872-3055).
82. **SUITABLE SITES FOR RED TIDE OCCURRENCE:** The chemical water quality needed for growth of the red-tide-causing dinoflagellate Gonyaulax tamarensis occurs sporadically, both geographically and seasonally, along the New York and New Jersey coast (Dr. John B. Mahoney, FTS 342-3055 or (908) 872-3055).
83. **PARALYTIC TOXINS FOUND IN GEORGES BANK SHELLFISH:** Paralytic toxins were found in Atlantic surfclams (resulting in an emergency closing of the fishery), ocean quahogs, and sea scallop roe (but not adductor muscle) harvested from Georges Bank (Dr. Christopher Martin, FTS 837-9297 or (508) 281-9297).
84. **PARALYTIC TOXINS AGAIN OCCUR IN ATLANTIC MACKEREL LIVERS:** Although no edible portion (muscle or roe) of Atlantic mackerel has been found to be toxic, mackerel livers continued for a second year to contain significant levels of paralytic toxins, indicating that the livers aren't detoxifying or that they're accumulating toxins as fast as they're eliminating them (Dr. Christopher Martin, FTS 837-9297 or (508) 281-9297).

85. **NEW BOOK ON FINFISH & SHELLFISH DISEASES:** A two-volume book on "Principal Diseases of Marine Fish and Shellfish" was published (Dr. Carl J. Sindermann, (301) 226-5193).
86. **UPDATED CATALOG OF MARINE DISEASES:** The third edition of the catalog of histologic slides in the Registry of Marine Pathology was issued. It includes information on diseases of mollusks, crustaceans, and finfishes caused by parasites, stress, dietary deficiency, and neoplasia (Sharon A. MacLean, FTS 838-6258 or (401) 782-3258).
87. **UPDATE ON SARCOMA IN CHESAPEAKE BAY SOFTSHELLS:** An article on effects of salinity, temperature, and pH on softshell (clam) sarcoma cells was published, and a report on the sarcoma epizootic in Chesapeake Bay softshells during 1983-88 was prepared (C. Austin Farley, (301) 226-5193).
88. **QUICKER DIAGNOSIS OF EASTERN OYSTER DISEASES:** We demonstrated, with the cooperation of the Maryland Department of Natural Resources, the practicality of three types of blood/gill analysis for quickly and accurately diagnosing MSX and Dermo diseases in eastern oysters (C. Austin Farley, (301) 226-5193).
89. **SHELL DISEASE IN MID-ATLANTIC CRUSTACEANS:** A joint NOAA/EPA working group on chitonoclasia (shell disease) of crustaceans--particularly of American lobster, red deepsea crab, Atlantic rock crab, Jonah crab, and blue crab in the Middle Atlantic Bight--found that such disease naturally occurs, but that it may be aggravated by pollution although no such cause-and-effect relationship can yet be established (Dr. Carl J. Sindermann, (301) 226-5193).
90. **SHELL DISEASE RARE IN BALTIMORE HARBOR BLUE CRABS:** A survey of waters near Baltimore Harbor showed no significant prevalence of shell disease in blue crabs (Gretchen A. Messick or Dr. Carl J. Sindermann, (301) 226-5193).
91. **IDENTIFICATION GUIDE TO CRUSTACEAN SHELL DISEASE:** To answer questions raised by the increasingly noticed occurrence of shell disease in American lobsters and various crabs, a guide was prepared for identification and clarification of the disease and its symptoms (Anthony L. Pacheco, FTS 342-3090 or (908) 872-3090).
92. **POLLUTION-ASSOCIATED DISEASES OF FINFISH & SHELLFISH:** Our analysis of newly published data supports a relationship between pollution-degraded habitats and certain diseases of coastal/estuarine finfish and shellfish (Dr. Carl J. Sindermann, (301) 226-5193).

93. **NORTHERN QUAHOG EGGS EASILY DAMAGED BY POLLUTION:** The spawned eggs of northern quahogs, and likely other shellfish, have been found to be easily damaged by pollution, indicating that bioassays of early egg development can easily detect changes in water quality (Sheila Stiles, FTS 642-5224 or (203) 783-4224).
94. **NARRAGANSETT BAY OIL SPILL KILLS YOUNG FISH:** The oil spill in Narragansett Bay by the tanker World Prodigy caused significant mortality in larval American lobsters and fish embryos located within the slick, but no harm outside the slick (Wallace G. Smith, FTS 342-3060 or (908) 872-3060).
95. **DISPERSAL OF GENETIC MATERIAL INTO MARINE ECOSYSTEMS:** An international symposium on "Human Influences on the Dispersal of Genetic Material into Aquatic Ecosystems" was organized and convened; a volume of the contributed papers will soon be published (Dr. Aaron Rosenfield, (301) 226-5193).
96. **SOME ESTUARINE SEA SCALLOPS TOLERATE COPPER:** Sea scallops from the Damariscotta (Maine) Estuary, which are environmentally exposed to heavy metals, have apparently developed some tolerance to copper--the highly inhibitory effects of copper on gamete (eggs and sperm) maturation were not seen in these animals after laboratory exposure to this metal (Edith Gould, FTS 642-5222 or (203) 783-4222).
97. **CADMIUM HARMS WINTER FLOUNDER EGG PRODUCTION:** Laboratory tests show that exposing winter flounder females to cadmium lowers the female's production of serum vitellogenin, an important egg protein, and jeopardizes the survival of flounder eggs and embryos (Jose J. Pereira, FTS 642-5238 or (203) 783-4238).
98. **CADMIUM UPTAKE VARIES GREATLY IN CULTURED ALGAE:** Cadmium-tolerant cultures of four algal species showed concentration rates of this contaminant ranging from 138 to 12,000 times the seawater concentration, indicating the potential for large contaminant loads being passed from algae to filter-feeding shellfish (Gary H. Wikfors, FTS 642-5225 or (203) 783-4225).
99. **CONTAMINANT-LINKED LIVER DAMAGE IN WINTER FLOUNDER:** Three types of contaminant-related cell death have been found in the livers of Boston Harbor winter flounder; one type often being associated with malignant and benign liver tumors (Dr. Joel E. Bodammer, (301) 226-5193).

100. **PESTICIDES EXCRETED BY WINTER FLOUNDER KIDNEYS:** Using winter flounder kidney tissue cultures (a new technique), we showed that several highly toxic pesticides can be excreted by the flounder kidney, thus reducing pesticide toxicity to this species (Margaret A. Dawson, FTS 642-5242 or (203) 783-4242).
101. **CONTAMINANT EFFECTS ON WINTER FLOUNDER REPRODUCTION:** A three-year study of winter flounder reproduction at six sites in Long Island Sound and two sites in Boston Harbor found that general site contamination may be associated with biological effects throughout the flounder's life cycle (Dr. Anthony Calabrese, FTS 642-5209 or (203) 783-4209).
102. **LETHALITY OF FIN EROSION IN WINTER FLOUNDER:** The more severe forms of fin erosion disease in winter flounder--particularly in two-year-old females--collected from New Haven Harbor are likely lethal (John J. Ziskowski, FTS 642-5256 or (203) 783-4256).
103. **MALFORMED GILLS AS POSSIBLE POLLUTION INDICATOR:** Two-year-old winter flounder from a polluted area have 2.3 times more gill bifurcations than one-year-old fish taken from the same area, suggesting that environment, not genetics, causes or enhances this malformation (Jose J. Pereira, FTS 642-5238 or (203) 783-4283, or Earl J. Lewis, Jr., (301) 226-5193).
104. **COMPONENTS OF AMERICAN LOBSTER BLOOD ENUMERATED:** The various components of American lobster blood present throughout the lobster's molt cycle were carefully measured for the first time, providing a valuable baseline for future research on disease and pollutant effects in this species (Renee Mercaldo-Allen or Dr. Frederick P. Thurberg, FTS 642-5244 or (203) 783-4244).
105. **STATUS OF THE WORLD OCEAN:** Center personnel contributed to the development of the second annual United Nations report on the health of the World Ocean and its living resources (Dr. John B. Pearce, FTS 840-1261 or (508) 548-5123).
106. **STATUS OF THE GULF OF MAINE:** Center personnel participated in a working group which developed a report on the status of the Gulf of Maine, including principal resources, natural and human-induced stress, needs for long-term monitoring, and future prospects (Dr. John B. Pearce, FTS 840-1261 or (508) 548-5123).

107. **SLIGHT ENVIRONMENTAL DEGRADATION OF NEW YORK BIGHT:** Monitoring of bottom-living invertebrates in the New York Bight during 1979-87 has shown subtle though not gross signs of increasing degradation of environmental quality in parts of the bight, especially the area between the sewage sludge (12-Mile) and dredged materials dumpsites (Robert N. Reid, FTS 342-3020 or (908) 872-3020).
108. **EFFECTS OF COASTAL DEVELOPMENT ON SHELLFISH RESOURCES:** Our Ninth Annual Shellfish Biology Seminar--for which abstracts of all presentations are available--highlighted adverse effects of coastal development on shellfish resources in Long Island Sound and other Atlantic coastal areas (Dr. Walter J. Blogoslawski, FTS 642-5235 or (203) 783-4235).
109. **RARITAN ESTUARY NOT DEAD YET:** The status of bottom-dwelling invertebrates in the Raritan Estuary counters the common perception of the estuary being a severely degraded habitat; the fauna of the estuary are still largely typical of a "normal" Northeast estuary (Frank W. Steimle, Jr., FTS 342-3059 or (908) 872-3059).
110. **INITIAL RESPONSE OF INSHORE DUMPSITE TO PHASE-OUT:** A second annual progress report was prepared on the Center's study of the 12-Mile Dumpsite; the report covers the first 18 months during which dumping of sewage sludge was phased out (Anne L. Studholme, FTS 342-3001 or (908) 872-3001).
111. **INSHORE DUMPSITE ANIMALS WITH MORE PCBs:** PCB concentrations were higher in the livers of American lobsters and winter flounder collected in the vicinity of the 12-Mile Dumpsite during 1987-88 (just before and after sewage sludge dumping ceased in December 1987), than in the livers of the same species collected at the same time but 10 kilometers away (Andrew F. J. Draxler, FTS 342-3054 or (908) 872-3054).
112. **SEWAGE INDICATOR IS NOW LOWER AT INSHORE DUMPSITE:** Oxygen consumption by sediments and sediment-dwelling animals (which is directly related to sewage contamination) remains less at the 12-Mile Dumpsite since sewage sludge dumping ceased there in December 1987 (Dr. William C. Phoel, FTS 342-3015 or (908) 872-3015).
113. **SEDIMENT RECOVERY AFTER INSHORE DUMPING CEASES:** Sediment quality improved (decreased heavy metal concentration, increased redox potential) in the vicinity of the 12-Mile Dumpsite 18 months after sewage sludge dumping ceased (Andrew F. J. Draxler, FTS 342-3054 or (908) 872-3054).

- 114. WINTER FLOUNDER DISEASES LESSEN AT INSHORE DUMPSITE:** Incidence of finrot and cysts in winter flounder has significantly decreased since sewage sludge began to be phased out at the 12-Mile Dumpsite; there has been a lesser reduction in the incidence of lymphocystis and Glugea infections (Anthony L. Pacheco, FTS 342-3090 or (908) 872-3090).
- 115. HEAVY METALS ELEVATED IN OFFSHORE DUMPSITE FISHES:** Analysis of lanternfishes collected since sewage sludge dumping began at the 106-Mile Dumpsite show heavy metal concentrations to be higher in those fish collected inside the dumping area than in those collected outside the dumping area (Vincent S. Zdanowicz, FTS 342-3032 or (908) 872-3032).
- 116. CONTAMINATION OF OFFSHORE FISH:** Tilefish collected from what are considered to be relatively clean habitats--deep waters at the edge of the continental shelf off New Jersey and deep waters in Lydonia Canyon on the southern edge of Georges Bank--were found to contain both pesticides and PCBs, with the highest levels in the canyon fish (Frank W. Steimle, Jr., FTS 342-3059 or (908) 872-3059).

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