

U.S.-U.S.S.R. Discuss Bering Sea Fisheries

United States and Soviet fisheries delegations met in Washington, D.C., 18-22 April to discuss a broad range of fisheries issues of mutual concern. The U.S. side was headed by Ambassador Edward E. Wolfe, Deputy Assistant Secretary for Oceans and Fisheries Affairs, U.S. Department of State. The Soviet side was headed by V. K. Zilanov, U.S.S.R. Deputy Minister of Fisheries.

Both delegations characterized the talks as highly productive. Pursuant to the undertakings to improve fisheries relations contained in the Joint U.S.-Soviet Summit Statement made by President Reagan and General Secretary Gorbachev on 10 December 1987, in Washington, D.C., and the joint statement made by Secretary of State Schultz and Minister of Foreign Affairs Shevardnadze during their negotiations in February 1988, in Moscow, the two delegations considered possible ways for the two sides to act together on a wide range of issues related to conservation, rational utilization, and management of living marine resources.

Pursuant to understandings reached in

Moscow in January 1988 to form a Bering Sea fisheries working group (see article below), the two delegations discussed the conservation aspects of Bering Sea fisheries in light of the vastly increased level of fishing in the region beyond the respective economic zones of the two states. A full exchange of views was made with regard to the legal, scientific, and enforcement aspects of the Bering Sea fisheries both within and beyond the respective economic zones of both states.

It was agreed that most of the commercially fished species of the Bering Sea are common to the economic zones of the United States and the Soviet Union while stocks of walleye pollock, *Theragra chalcogramma*, range both within and beyond the economic zones of the two states. Both sides expressed strong concerns over the adverse impact of unregulated, large-scale fisheries beyond the economic zones of pollock stocks which are a part of the ecological complex of the Bering Sea.

The delegations agreed on the need to develop further cooperation between the United States and the Soviet Union

in the exercise of their rights and duties under international law to coordinate conservation and management of living marine resources of the Bering Sea. In addition, both sides agreed to convene jointly a scientific symposium in the United States in 1988, inviting scientists from all states concerned, to review the status of fishery resources in the Bering Sea, particularly pollock.

The two delegations agreed to continue coordinating the actions of both sides on fisheries of the Bering Sea. The two sides also discussed the implementation of the interim fisheries agreement, signed on 21 February by Secretary of State Schultz and Minister of Foreign Affairs Shevardnadze, regarding U.S. access to the U.S.S.R. economic zone. The two sides also considered the expeditious preparation and conclusion of a comprehensive fisheries agreement between the United States and the Soviet Union to govern their mutual relations in the field of fisheries. This agreement would, among other things, address conservation and management issues related to fishery resources of the Bering Sea, including the area beyond the respective economic zones of both states. Because of the urgency of these issues, the delegations agreed to continue bilateral discussions in Moscow in the near future. (Source: IFR-58/38.)

U.S. Ends Certification of U.S.S.R. for Whaling

U.S. Secretary of Commerce C. William Verity has announced his decision to terminate the certification of the Soviet Union under the Packwood-Magnuson and Pelly Amendments for its whaling practices. The announcement was made in Moscow on 14 April during a press briefing at the end of the Joint Commercial Council (JCC) meeting, as follows:

"In concluding my remarks, I want to announce that I have received assurances from the Soviet Ambassador to the United States confirming that the Soviet Union has ceased commercial whaling and intends to work through the International Whaling Commission (IWC) for whale research and conser-

U.S.-U.S.S.R. Fishery Talks

United States and Soviet fishery delegations met in Moscow during 26-28 January 1988, to discuss a broad range of fishery issues of mutual concern. Both delegations characterized the talks as highly productive. It was agreed that the two sides would soon conclude arrangements allowing access by U.S. fishing vessels to the Economic Zone of the U.S.S.R. on the same terms as the U.S.S.R. vessels now have in the U.S. Exclusive Economic Zone, as provided in the current U.S.-U.S.S.R. Fisheries Agreement.

The two delegations also agreed to

immediately form a bilateral U.S.-U.S.S.R. Working Group on Fisheries of the Bering Sea. This group will include legal, scientific, and technical specialists from both sides which will develop recommendations for dealing with increased fishing in the Bering Sea. The talks included finalizing plans for a March industry-to-industry meeting in the Soviet Union to discuss possible fishery commercial joint ventures, and plans to address additional scientific and other issues to improve overall bilateral fisheries cooperation on a mutually beneficial and equitable basis.

vation. The cessation of commercial whaling by whaling nations has been a major objective of global environmental groups and the IWC, supported by the United States. I welcome the Soviet decision and hope that it sets a pattern for similar decisions on the part of other whaling nations to work within the IWC for the purposes of research and conservation. We look forward to cooperating more closely with our Soviet colleagues in the IWC, our fisheries relations, and our broader bilateral agenda."

Secretary Verity sent a letter to U.S. Secretary of State George P. Shultz conveying his decision (see below). A *Federal Register* notice, required by law, explaining the reasons for his decision was also prepared for publication on 14 April (see below). The Secretary of Commerce has withdrawn the certification because the reasons for the April 1985 certification no longer prevail. The Soviet Union has confirmed that it has ceased whaling and intends to work through the IWC for whale research conservation. (Source: U.S. Embassy, Moscow).

Text of letter to Secretary George P. Shultz relating Commerce decision to terminate the certification of the Soviet Union for whaling practices:

Dear George, On April 1, 1985, Secretary of Commerce Malcolm Baldrige certified to the President that Nationals of the Soviet Union were conducting whaling operations that diminished the effectiveness of an international fishery conservation program under the Pelly Amendment to the Fishermen's Protective Act of 1967, 22 U.S.C. 1978 (1983 SUPP.) and the Packwood-Magnuson Amendment to the Magnuson Fishery Conservation and Management Act, 16 U.S.C. 1821 (1983 SUPP.). Following certification and consultations between the Departments of State and Commerce, Soviet fish allocations were reduced by 50 percent and all allocation available to the Soviet Union eliminated one year later. The Pelly Amendment requires periodic review of the basis for certification, and I have recently concluded such a review. I have determined that the conditions

that prompted the certification of the Soviet Union no longer exist, and I am terminating the certification under both the Pelly and Packwood-Magnuson Amendments. I recommend that the Department of State promptly notify the Government of the Soviet Union of the termination of the certification. In addition, the National Oceanic and Atmospheric Administration will provide recommendations for fish allocations to be made available to the Soviet Union at the appropriate time. Sincerely, Secretary of Commerce.

Federal Register notice explaining the termination of Soviet certification.

Summary: Notice is published that the Secretary of Commerce finds the reasons for the certification of the Soviet Union, under the Pelly and Packwood-Magnuson Amendments for activities that diminish the effectiveness of an International Fishery Conservation Program, no longer prevail and that the certification has been terminated.

Supplementary Information: Under the Pelly Amendment to the Fishermen's Protective Act and the Packwood-Magnuson Amendment to the Magnuson Fishery Conservation and Management Act, the Secretary is responsible for determining if nationals of a foreign country, directly or indirectly, are conducting fishing operations in a manner or under circumstances which diminish the effectiveness of an international fishery conservation program. If the Secretary of Commerce so determines, such certification is reported to the President. On April 1, 1985, Secretary Malcolm Baldrige certified to President Reagan that the Soviet take of Southern Hemisphere minke whales had diminished the effectiveness of the International Whaling Commission (IWC) conservation program. The Secretary based his determination on the following facts: 2) The Soviet harvest of Southern Hemisphere minke whales was greater than the level the United States considered the U.S.S.R.'s traditional share, 2) The 1984-85 IWC quota for Southern Hemisphere minke whales was exceeded due to Soviet harvest and 3) there had been no indication that Soviets intended to comply with IWC standards.

The Soviet Union has ended its commercial harvest for Southern Hemisphere minke whales and has indicated its intention to cooperate in the conservation of whales within the framework of the IWC. Given that the reasons for the certification of the Soviet Union no longer prevail, the Secretary has terminated the certification under both the Pelly and Packwood-Magnuson Amendments. (Source: IFR-88/31.)

U.S., U.S.S.R. Sign Fisheries Agreement

A comprehensive agreement governing fisheries relations between the United States and the U.S.S.R. was completed on 23 May after a week-long negotiating session in Moscow; it was signed at the Moscow Summit on 31 May. The agreement provides for access by each nation's fishing vessels to surplus fishery resources in the other's Exclusive Economic Zone. Fishing vessels of both nations also can purchase supplies, effect repairs, and exchange crews at specified ports: Boston, Mass., Portland and Astoria, Oreg., and Dutch Harbor, Alaska, in the United States; Murmansk, Provideniya, Korf, and Oktyabrski in the Soviet Union.

The agreement states that the two countries have a common concern for conservation of shared stocks in the Bering Sea and for Pacific salmon, *Oncorhynchus* spp., resources, and will cooperate in data collection and scientific research. The agreement also provides for the establishment of a bilateral consultative committee to meet each year, and for the appointment of a U.S. fisheries attache at the U.S. Embassy in the Soviet Union. As an adjunct to the negotiation of this agreement, the two sides agreed to hold an international scientific symposium on Bering Sea walleye pollock, *Theragra chalcogramma*, resources to be held in Sitka, Alaska, in mid-July, and agreed to coordinate efforts to achieve third-party cooperation in conserving pollock resources.

NMFS Will Enforce Lacey Act in Bahamian Waters

It is illegal to possess fish or lobster taken in Bahamian waters, or to import

them into U.S. jurisdiction, or to sell them in the United States or to a foreign interest, or to attempt to import or sell them, Joseph Angelovic, Acting Southeast Regional Director of the National Marine Fisheries Service announced early this year. The Bahamas exercises fisheries jurisdiction over all waters to the East of the Fishery Conservation Zone/Exclusive Economic Zone line between Florida and the Bahamas depicted on U.S. chart 11460, 28th Edition, Feb. 22, 1986.

To clear up any possible confusion Angelovic stated, let it be known that any U.S. fisherman found fishing in Bahamian waters will be prosecuted by the National Marine Fisheries Service to the fullest extent of the law under the Federal Lacey Act. Penalties for felony conviction are up to 5 years in prison and up to \$20,000 fine, plus loss of all fish taken, the vessel, trailer, vehicle, and equipment used to aid in the violation for most violations. Penalties for a misdemeanor conviction are up to 1 year in prison and up to a \$10,000 fine, while civil penalties of up to \$10,000 penalty per violation can be assessed. For further information or to report violations, contact Eugene Proulx at (813) 893-3145.

U.S. Fishery Export Picture Looks Good

The year 1987 was a banner year for U.S. fish exporters, with total overseas sales of fishery products a record \$1.66 billion, up 22 percent over 1986, according to the National Oceanic and Atmospheric Administration (NOAA). NOAA said American joint-venture operations also set records last year. Exports and joint ventures in 1987 together amounted to more than \$1.8 billion. Joint ventures are those in which U.S. fishermen sell their catch at sea to foreign processing boats.

According to NOAA economists, if this trend continues, fish sales to foreign buyers will top \$2 billion this year, making the United States the world's biggest fish exporter. The volume of the catch rose too, to a record 525,000 metric tons, up 13 percent from 1986, the Commerce Department agency said. And the

country's biggest foreign fish buyer, Japan, bought fish and fishery products worth a record \$1.074 billion in 1987.

Also in 1987, seafood imports rose by \$800 million to a record \$5.6 billion. If nonedible marine products are included—mostly high value-added jewelry made with coral or pearls—that import figure increases to \$7.9 billion. NOAA says it expects the 1988 balance-of-trade figures to look about the same. Part of the reason for the persistent trade deficit, says NOAA, is that the U.S. fishing industry cannot fully supply America's growing taste for high-priced products like shrimp, tuna, scallops, lobster, and farmed salmon. That demand is being met by imports.

NOAA Moves to Cut Dolphin Deaths

Foreign nations exporting yellowfin tuna to the United States caught in the eastern tropical Pacific Ocean must take steps to reduce the number of dolphins killed during purse seine fishing, the Commerce Department's National Oceanic and Atmospheric Administration (NOAA) announced early this year. Countries that do not reduce dolphin deaths will not be allowed to import yellowfin into the United States.

A new ruling by NOAA's National Marine Fisheries Service, requires foreign fleets that catch yellowfin tuna from purse seine vessels to establish regulations comparable to those required for the U.S. fleet. The ruling, which went into effect in mid-April, requires observers to monitor fishing activities and the use of gear and techniques that minimize harm to dolphins during yellowfin fishing. The ruling also requires that by 1991, the average annual rate of dolphins killed by a foreign fleet in the area is comparable to the yearly rate for the U.S. fleet.

Eight foreign nations, including Mexico, Venezuela, and Ecuador, fish for yellowfin in the eastern tropical Pacific. In 1986 they harvested almost 195,000 tons of fish. More than 46,000 tons, worth an estimated \$35 million, was exported to the United States. In the eastern tropical Pacific where schools of yellowfin tuna swim beneath dolphin

herds, fishermen search for schools of dolphins as an indication of tuna. The fishermen encircle both dolphins and tuna with huge purse seine nets. Although the vast majority of the dolphins escape or are released by fishermen, a few become entangled and drown.

NOAA Ship *Researcher* Is Renamed *Malcolm Baldrige* to Honor Late Commerce Department Secretary

The NOAA Ship *Researcher*, an oceanic research vessel operated by the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA), was renamed the NOAA Ship *Malcolm Baldrige* on 1 March in honor of the late Commerce Secretary. Mrs. Baldrige participated in the renaming ceremony, hosted by Commerce Secretary C. William Verity, which began at 11 a.m. at the Washington Navy Yard, Pier 1. The ship was renamed *Malcolm Baldrige* in recognition of the late Commerce Secretary's public service to the Nation. Secretary Baldrige died in a rodeo accident 26 July 1987.

The 2,963-ton, 278-foot *Researcher/Baldrige*, the largest east coast ship in NOAA's fleet of 23 research and survey ships, conducts climate research in the Atlantic Ocean and Caribbean Sea. The ship is based at NOAA's National Ocean Service Atlantic Marine Center in Norfolk, Va., and operates out of NOAA's ship support base in Miami, Fla. The ship can carry 82 NOAA Corps officers, civilian crew members, and visiting scientists, and is equipped with a scientific laboratory, sophisticated communications and computer systems, and the latest scientific instruments for making environmental measurements at sea.

The ship was built by the Toledo Plant of the American Shipbuilding Company and launched on 5 October 1968. It has two 1,600-horsepower, geared diesel engines that power twin controllable-pitch screws and a 450-horsepower bow thruster that can be used to move the ship at very slow speeds or hold it steady on a position. With a cruising range of 13,000 n.mi. and a cruising speed of 14.5 knots, the ship can carry

6-month's worth of provisions for extended scientific operations in remote ocean areas, and can remain at sea for more than a month at a time.

New Federal Lobster Regulations Announced

New Federal regulations governing the American lobster fishery became effective on 31 December 1987. These new regulations were developed by the New England Fishery Management Council in cooperation with the lobster-producing states in New England and the Middle Atlantic. The regulations 1) increase the minimum carapace length for lobsters, 2) prohibit the possession of V-notched lobsters throughout the range of the stock, 3) implement a nationwide prohibition on the possession of V-notched and egg-bearing female lobsters and all lobsters smaller than the minimum carapace length taken and retained in violation of the Magnuson Fishery Conservation and Management Act, and 4) revise the gear identification/marketing requirement.

The minimum carapace length is scheduled to be increased from $3\frac{3}{16}$ inches to $3\frac{5}{16}$ inches by increments of $\frac{1}{32}$ of an inch per year over a 5-year period. An escape vent size increase is scheduled to take place at the mid-point of the carapace length increases. The new vent size will be compatible with a minimum carapace length of $3\frac{3}{16}$ inches. The industry will be notified before the end of 1988 as to the exact specification of the new venting requirement. Effective dates of the scheduled increases in carapace length are as follows:

Date	Minimum carapace length
1 January 1988	$3\frac{3}{16}$ inches
1 January 1989	$3\frac{1}{4}$ inches
1 January 1990	Escape vent size to be compatible with a minimum carapace length of $3\frac{3}{16}$ inches
1 January 1991	$3\frac{5}{16}$ inches
1 January 1992	$3\frac{7}{16}$ inches

Following each length increase, dealers and wholesalers will have a 180-day grace period to dispose of lobsters purchased or received in the prior year which do not meet the new minimum carapace length.

Secondly, these new regulations prohibit nationwide the possession of egg-bearing lobsters, V-notched female lobsters, and lobsters smaller than the minimum carapace length that were taken and retained in violation of the Magnuson Act. The possession prohibition applies to all lobsters found in commerce unless it can be shown that the lobsters were 1) imported, or 2) harvested by a vessel fishing exclusively in state waters, in which case regulations of the state will prevail. Lobsters from a vessel holding a Federal fishing permit, or a state permit that is endorsed for Federal waters, will be presumed to have been harvested from the Federal waters and will be subject to these new Federal regulations.

Lastly, these regulations revise the gear identification/marketing requirement to provide increased flexibility. In addition to allowing Federal Permit Holders to use their state gear identification/marketing system, the new regulations authorize gear to be marked with a "number assigned by the Regional Director" instead of simply "the Federal Fishery Permit Number." This means that gear may be marked with the vessel's 1) Federal Fishery Permit, 2) Official or Documentation Number, or 3) any number as authorized by letter from the Regional Director. For additional information on these new Federal regulations, contact Carol Kilbride of the National Marine Fisheries Service at (617) 281-3600.

Oyster Resource Disaster Aid

A total of \$2.0 million was made available by late last year under the resource disaster provisions of the Commercial Fisheries Research and Development Act (P.L. 88-309) to the states of Delaware, Maryland, New Jersey, and Virginia, to assist in restoring the commercial oyster fisheries in Chesapeake and Delaware Bays, the NMFS Northeast Regional Office reported in December. Continuation of drought conditions experienced by the Mid-Atlantic states resulted in increased Bay salinities and, unfortunately, a favorable environment for spread of the haplo-

sporidian parasite, commonly known as MSX. As a result, high mortalities and reductions of over 40 percent in yield of marketable oysters occurred, and adverse resource conditions could continue through 1990. Activities being conducted by the four states include dredging and planting of oyster shell for propagation purposes, and field trials of disease resistant strains.

Tagged U.S. Salmon Recovered in Greenland

NMFS Northeast Fisheries Center scientists, in cooperation with their Canadian and Danish counterparts, detected 146 coded-wire-tagged Atlantic salmon, *Salmo salar*, among over 25,000 salmon examined at four West Greenland fishing ports during August and September 1987. Of the 146 tagged fish, 82 were of U.S. origin, 19 of Canadian origin, and the rest of European origin (mostly England, Wales, and Ireland). Of the U.S.-origin tagged fish, 77, or 94 percent, were from Maine rivers. These tag recoveries are particularly significant because they represent the first year in which coded-wire-tagged salmon of Maine origin have been available to the West Greenland fishery.

Scientists examined the salmon after the fish had been bought by fish processors, but before the fish had been flash frozen and glazed. Scientists used special metal detectors to identify which salmon had the magnetically coded, 1 mm wire tags imbedded in their skulls. These coded-wire tags, which are undetectable by fishermen and thus necessitate the special sampling by scientists, are now in common use by the salmon-producing countries of the North Atlantic. The United States began applying these tags to 1-year-old salmon (smolts) in 1985.

Marine Debris Conference Slated for Hawaii, 1989

The Second International Conference on Marine Debris is scheduled for 2-7 April 1989 in Honolulu, Hawaii, according to Richard S. Shomura, Chairman. Sponsors are the National Marine Fisheries Service, the Marine Mammal

Commission, and the University of Hawaii's Sea Grant College Program.

Since the first (1984) international "Workshop on the Fate and Impact of Marine Debris," also held in Honolulu, a substantial body of information on the topic has been amassed, heightening scientific, legal, and political recognition of the problem. The second conference, says Shomura, is intended to provide a forum to present and evaluate the various aspects of the problem and potential solutions. Some of the topics to be covered include: New data on the types, amounts, sources, fates, and distribution of marine debris in different ocean areas; existing and potential methods for data collection; nature and extent of impacts on living marine resources; impacts on human health and safety of ships at sea; aesthetic and other impacts on coastal environments; effectiveness and future role of programs educating the public and promoting awareness of the problem; and programs necessary to assess the effectiveness of measures addressing the problem.

Early registration fee is US\$125 (US\$150 at the conference). Further information for prospective authors and participants is available from Richard S. Shomura, Conference Chairman, NMFS Honolulu Laboratory, 2570 Dole Street, Honolulu, HI 95822-2396 U.S.A. (telephone 808-943-1229; or telegram MDEBRIS; or Telex 6503504141 MCI UW).

Mackerel Spawn Heavily North of U.S. Border

Spawning by Atlantic mackerel, *Scomber scombrus*, was more intense in Canadian waters than in U.S. waters during the 1987 spawning season. That's a preliminary observation resulting from eight egg-and-larval surveys conducted by NMFS Northeast Fisheries Center scientists during late spring and early summer as part of a cooperative U.S., Canadian, and Polish effort to estimate the spawning stock biomass of Northwest Atlantic mackerel.

Detailed analysis of the surveys' samples and data shows that spawners in Canadian waters accounted for 89 percent of the adult spawning biomass;

spawners in U.S. waters accounted for 11 percent. The Center's estimate of 1987 adult spawning biomass—based on these egg surveys—is 1.10 million metric tons (2.47 billion pounds). This estimate compares very favorably with estimates based on virtual population analysis.

Northwest Atlantic mackerel total stock biomass, as estimated by virtual population analysis, has fluctuated widely over the past 25 years. (Estimates of total stock biomass will always be somewhat larger than estimates of adult spawning biomass since the former includes all age 1 and older fish, whereas the latter includes hardly any age 1, a variable proportion of age 2, and almost all age 3 and older fish.) Total stock biomass increased from 0.30 million metric tons (0.67 billion pounds) in 1962-65 to 1.9 million metric tons (4.26 billion pounds) in 1970-71, decreased to an average of 0.49 million metric tons (1.09 billion pounds) in 1977-81, and increased to 1.50 million metric tons (3.36 billion pounds) in 1986.

Fish Processing Waste Effective as Fertilizer

NMFS Gloucester Laboratory experiments show that fish hydrolysate (a liquified fish mixture derived from the solid wastes of fish processing) is an effective plant fertilizer. This finding offers a possible solution to the recurring problem encountered by fish processors on how to dispose effectively, efficiently, and safely of the solid wastes from fish processing operations. This problem currently limits the restoration, maintenance, or growth of several commercial fishing ports in the U.S. northeast region.

Scientists compared fish hydrolysate that was made from Atlantic cod, *Gadus morhua*, "frames" (what's left after fileting) and that roughly had a 3-5-1 fertilizer value (percent content of nitrogen, phosphorous, and potassium), with a well-known commercial fertilizer with a stated 20-20-20 value. Under controlled but variable conditions of soil type, fertilizer concentration, and fertilization frequency, the fish hydrolysate increased yields in the test crop—green-

house jalapeno peppers—from 20 to 123 percent.

Cooperative Ocean Cruise Seeks Data on Armorhead

Scientists from the NMFS Southwest Fisheries Center's Honolulu Laboratory returned in February from a 30-day cruise aboard the *Townsend Cromwell* collecting biological and oceanographic information from waters over and surrounding the Southeast Hancock Seamount, which is located about 200 n.mi. northwest of the Hawaiian Archipelago and just within the U.S. 200-mile Exclusive Economic Zone (EEZ).

"From a historical standpoint, the results would hopefully provide valuable insight into what once was a viable commercial fishery for Soviet and Japanese fishing ventures," said Richard S. Shomura, Director of the NMFS Honolulu Laboratory. Shomura added that the seamounts provided habitat for large concentrations of fishes, in particular the target species of fish known as the pelagic armorhead. In the spring of 1985, when armorhead were nearly exhausted by the fishing pressure applied by foreign vessels, the NMFS closed the seamounts within the EEZ to all foreign fishing. The Honolulu Laboratory has since continued to monitor and explore the dynamics associated with abrupt topographical features such as the seamounts present. Chief Scientist Michael P. Seki reported that fishery operations on the cruise involved primarily bottom longlines and bottom trawling gear. Collection of oceanographic data involved sampling along predetermined transects with such equipment as an acoustic Doppler current profiler, a geomagnetic electrokinetograph, hydroacoustic echo sounders, various small nets, etc.

In addition to Seki, scientific personnel on the cruise were research assistants Russell Y. Ito, Frank A. Parrish, Dennis Therry, and Christopher D. Wilson. Also participating on the cruise were cooperating scientists Jed Hirota and James Finn from the University of Hawaii Department of Oceanography, and Peter Koske and Thorsten Knutz from Kiel University in the Federal Republic of Germany.

Predation Limiting Hard Clam Production

Predation substantially limits the production of hard clams in Great South and Barnegat Bays, the largest clam production areas in New York and New Jersey, respectively. These findings come from separate field studies of these areas by NMFS Northeast Fisheries Center scientists, supplemented by laboratory experiments also conducted by the Center.

The Barnegat Bay field study was conducted in conjunction with a cooperative effort to create hard clam spawning sanctuaries throughout the Bay. At each of five study sites, scientists planted paint-marked juveniles (5 mm long) clams around stakes. At four of the five sites, there was at least 62 percent mortality of marked clams within 70 days, with most of it due to crab predation, although at one of those four sites, almost half of the predation was due to oyster drills. In the most extreme case, 96 percent of the marked clams at one site were crushed after four days, indicating crab predation.

In the Great South Bay field study, a scuba-deployed hydraulic suction sampler was used to collect clams at four sites in August 1986, and at six sites in August 1987. This 2-year effort permitted scientists to follow the mortality and growth of the Bay's strong 1985 "set" of clams. Between 1986 and 1987, the average density of these clams decreased from ten to three per square yard. We attribute the mortality largely to predation, mostly by crabs. (Incidentally, in 1987, when the 1985-set clams were 5-20 mm long, we found no other abundant size classes less than 40 mm long. Consequently, clam harvests in the Bay should decrease for 2 or more years until the 1985-set clams grow to a commercial size.)

Scientists also ran a laboratory experiment to evaluate the predation potential of sand shrimp and grass shrimp—which are often abundant on clam beds—on early-stage juvenile hard clams. Individual shrimp were placed in dishes which held 50 1 mm-long clams. In every case, all clams were consumed in 24 hours. The results of the field

studies and laboratory experiments show the importance of predation in limiting hard clam production in the New York-New Jersey area.

Toxic Mackerel Liver Eyed in Whale Deaths

In response to the known deaths of 14 humpback, 4 minke, and 2 fin whales along the New England coast in December and January, the NMFS Northeast Fisheries Center began testing the toxicity of liver extracts from several fish species known to be prey—as juvenile or adults—of whales. On 18 December 1987 Center scientists found liver extracts from Atlantic mackerel to be toxic to laboratory test mice. Subsequent evidence gathered by the Center and other organizations has now implicated the consumption of mackerel containing paralytic shellfish toxins in the whale deaths.

Relatively low levels of toxicity were found in all mackerel liver extracts from samples collected within the western Atlantic range of this species (i.e., from Northumberland Strait in the Gulf of St. Lawrence to the Mid-Atlantic region). Mean toxicity levels were 185 μg of toxin per 100 g of liver, with up to 446 $\mu\text{g}/100$ g present in some samples. Interestingly, scientists found toxicity levels of 60 $\mu\text{g}/100$ g in liver extract from mackerel stomachs collected off Nantucket Island as long ago as April 1986. It is emphasized, however, that there is no danger to human consumption of mackerel as no toxicity has been detected in the muscle tissue, the edible portion.

No toxicity has been detected in the livers of other whale prey species such as Atlantic herring and silver hake (whiting), nor in the liver of goosefish (monkfish). Stomach contents of one whale—consisting mostly of bones—were tested and found to be only mildly toxic, causing delayed death of mice.

Baseline Established for 12-Mile Dumpsite

The NMFS Northeast Fisheries Center has now completed the first year and a half of sampling at the New York

Bight's 12-Mile Dumpsite. The sampling to date has been designed to establish a baseline for determining the effects—primarily biological—of ending sewage-sludge dumping at the site. (The last dumping was in December 1987.)

With a year and a half of sampling completed, scientists can now begin to compare any seasonal trends. During the November survey of three stations, chosen to represent impacted, enriched, and less polluted habitats, some trends persisted from autumn 1986 to autumn 1987. The dominant bottom fishes were little skate (75 percent of the weight tow in 1986; 50 percent in 1987) and winter flounder (19 percent in 1986; 15 percent in 1987). At the "impacted" station, the average weight per tow for all bottom fishes increased from 22 to 40 pounds. The dominant crustaceans were rock and horseshoe crabs which ranked first and second, respectively, in weight per tow for both 1986 and 1987. At all three stations though, the weight per tow decreased for both species between the two years.

These early comparisons, however, do not statistically indicate that any rapid significant shift from crustaceans to fishes has occurred. Continued sampling will be necessary to determine if any changes in the biological community in and around the site are related to the ending of sewage-sludge dumping.

Scientists Studying Seafloor Megaplumes

National Oceanic and Atmospheric Administration (NOAA) scientists are studying the origins of a geological process that sends massive amounts of hot fluids into the ocean from cracks in the seafloor. Called megaplumes, the rich, hot soup of mineral grains and dissolved minerals and gases can be miles wide and may have a major influence on ocean chemistry, according to Edward T. Baker of NOAA's Pacific Marine Environmental Laboratory in Seattle, Wash. The Commerce Department scientist said the process, caused by tectonic or volcanic activity suggests a geologic activity different from that which causes the continuous leaking of hot fluid from seafloor thermal vents.

The existence of the process was suggested a year ago when researchers aboard a NOAA ship, investigating seafloor venting along the Juan de Fuca Ridge off the Washington and Oregon coasts, discovered a huge, circular plume of hot water floating deep in the ocean. It was about 10-12 miles in diameter and more than a quarter-mile deep. Last September, again over the Ridge, investigators found a recurrence of megaplume activity.

"It closely resembled the original

megaplume, formed by the expulsion over a period of a few days of hundred of millions of tons of superheated seawater from seafloor cracks," Baker said. Since September, he and colleagues Gary Massoth and Richard Feely have analyzed samples from the megaplume, finding them rich in silica, manganese, and iron leached by hot seawater from rocks in the ocean crust. They believe the phenomenon could be common in ocean areas where the seafloor is similar to that of the Pacific ridge.

Juan de Fuca Ridge is a seafloor spreading center where lava from the earth's core rises to form a new ocean crust as the North American and Pacific crustal plates separate. This seafloor spreading creates slow, steady venting of superheated seawater at many locations in the area. The program, called Vents, has studied the phenomenon for 3 years to understand its effect on ocean chemistry. The program operates at the Hatfield-Oregon State University Marine Science Center in Newport, Oreg.

1986-1987 Warmest Years Since 1953

The years 1986 and 1987 were the warmest two years in the contiguous 48 states since 1953, with only three fractionally warmer years this century (1934, 1931, and 1921), according to scorekeepers at the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC), Asheville, N.C. Average annual temperature for the two years was 54°F. Back-to-back warm years last occurred in 1953-54, with average temperatures of 54.7 and 53.9 degrees. The spring of 1986 was warm throughout the 48 contiguous states. The warmth of 1987 was especially noteworthy during the winter of 1986-87 and the spring of 1987 in the north central portions of the country, the Commerce Department agency reports.

Following is a breakdown by regions comparing each season of the recent two-year period with NCDC's records going back to 1895. Regions consist of the following states: West (W) = California and Nevada; Northwest (NW) = Idaho, Oregon, and Washington; Southwest (SW) = Arizona, Colorado, New Mexico, and Utah; West North Central (WNC) = Montana, North Dakota, Nebraska, South Dakota, and Wyoming; and South (S) = Arkansas, Kansas, Louisiana, Mississippi, Oklahoma, and Texas; East North Central (ENC) = Iowa, Michigan, Minnesota, and Wisconsin; Central (C) = Illinois, In-

	Winter 1985-86	Spring 1986	Summer 1986	Fall 1986
W	2nd warmest	7th warmest	12th warmest	21st coldest
NW	41st coldest	11th warmest	6th warmest	41st coldest
SW	4th warmest	4th warmest	22nd warmest	24th coldest
WNC	22nd warmest	4th warmest	18th warmest	20th coldest
S	25th warmest	7th warmest	42rd warmest	42nd coldest
ENC	24th coldest	5th warmest	37th coldest	22nd coldest
C	27 coldest	9th warmest	40th warmest	39th warmest
SE	40th coldest	36th warmest	9th warmest	8th warmest
NE	37th coldest	6th warmest	15th coldest	17th coldest
	Winter 1986-87	Spring 1987	Summer 1987	Fall 1987
W	40th warmest	5th warmest	42nd warmest	3rd warmest
NW	28th warmest	4th warmest	30th warmest	2nd warmest
SW	36th warmest	28 warmest	42nd coldest	24th warmest
WNC	the warmest	3rd warmest	35th warmest	12th warmest
S	35th warmest	42rd coldest	36th coldest	27th coldest
ENC	the warmest	2nd warmest	9th warmest	45th warmest
C	25th warmest	7th warmest	13th warmest	27th coldest
SE	41st coldest	33rd coldest	7th warmest	12th coldest
NE	42nd warmest	9th warmest	25th warmest	22nd coldest

diana, Kentucky, Missouri, Tennessee, West Virginia, and Ohio; Southeast (SE) = Alabama, Georgia, Florida, North Carolina, South Carolina, and Virginia; and Northeast (NE) = Connecticut, Delaware, Massachusetts, Maryland, New Hampshire, New

York, Pennsylvania, Rhode Island, Vermont, Maine, and New Jersey.

Seasons are defined as: Winter = December, January, and February; Spring = March, April, and May; Summer = June, July, August; Fall = September, October, and November.

Crab Analog Made From Pacific Whiting Surimi

The Utilization Research Division of the NMFS Northwest and Alaska Fisheries Center reports that it has successfully processed crab analog using

Pacific whiting surimi. The surimi was produced during August and October 1987 using ocean-caught fish, and was processed into the analog in a production run at a commercial plant in January 1988. Successful production of the crab analog was made possible by the

incorporation of an inhibitor for the protease enzyme(s) present in Pacific whiting parasitized by the myxosporean *Kudoa* sp. The run of analog in the commercial plant consisted of 100 percent Pacific whiting surimi. No processing problems were encountered in any of the production steps.

Acceptability of the finished product is comparable to product prepared from Alaska pollock surimi. The product has been served to several groups familiar with the technical properties of surimi and analog products. One of these groups was the Pacific Fisheries Technologists at the annual meeting in February 1988. Without exception, everyone that tasted the product agreed that it is excellent and completely acceptable. This demonstrates the feasibility of using Pacific whiting for surimi from which crab analogs and similar type products can be fabricated.

A common method of measuring the quality of surimi for use in analog preparation is to determine gel strength of kamaboko prepared from the surimi. The gel strengths of kamaboko prepared from the two lots of surimi used in this commercial run were as follows:

Pacific whiting surimi lot	Gel strength	
	Control (no inhibitor)	Inhibitor added
August 1987	82.3	763.8
October 1987	36.0	722.3

The effect of inhibitor addition is obvious. The gel strength is increased 10 times or more. A gel strength of about 650 is needed to make a high quality analog product.

Yellowfin, Bigeye Tuna Tagging Program Underway

A forward-looking group of U.S. east coast sportfishermen, charter boat captains, and sportfishing clubs have joined leading tackle manufacturers, fishing journals, and outdoor writers in an ambitious tag-and-release program for yellowfin and bigeye tuna. This alliance has volunteered over \$50,000 worth of prizes, incentives, and awards to anglers who tag and release yellowfin or bigeye

tuna taken on rod and reel between 1 March and 1 December 1988.

The tags, which are being distributed through leading saltwater tackle stores that serve tuna fishermen, have been provided through the NMFS Cooperative Game Fish Tagging Program, with the costs underwritten by the tackle manufacturers. Named "Tag A Tuna For Tomorrow," this is an excellent example of government, industry, and the angling public cooperating to promote conservation of an important fishery resource.

Midwest Sends Less Nitrogen to Northeast Than Earlier Believed

The Midwest produces much less of the acidic nitrogen falling on the northeastern United States and Canada than is commonly believed, a computer simulation conducted by the Commerce Department's National Oceanic and Atmospheric Administration (NOAA) shows. More than half of the estimated 1.4 million tons of the material deposited annually in the Northeast comes from sources within the region, the simulation of the transport and deposition of acidic nitrogen concluded. It was conducted in two parts by Hiram Levy II and Walter J. Moxim of NOAA's Geophysical Fluid Dynamics Laboratory in Princeton, N.J.

The first portion of the study showed that 25-30 percent of known nitrogen emissions from auto exhausts and smokestacks in the United States are deposited on North America in rain and snow, as "acid rain," and between 25 and 50 percent in dry fall-out. Government monitoring networks support this finding, indicating that approximately half of the total acidic nitrogen falling on the United States and Canada comes from dry deposits.

In a second series of simulations, Levy and Moxim eliminated from the computer model all emissions of nitrogen oxides from sources outside of the northeastern U.S. and eastern Canada. They then compared the resulting wet and dry deposits in the Northeast with the earlier model. This revealed that about two-thirds of the nitrogen oxides

deposited in the Northeast in precipitation came from outside the region, while 80 percent of the nitrogen oxides deposited through dry fall-out and about half the total acidic deposits falling on the northeast were emitted from sources within the region.

Based on the model results, the NOAA investigators, in a paper published in *Nature*, concluded that current monitoring in the northeastern United States and Canada exaggerates the role of acid nitrogen transport from the Midwest, Southeast, and the Ohio Valley, and underestimates the importance of local and regional emissions. The project also showed that emissions remaining in the atmosphere, after both wet and dry deposition, are carried off the continent, principally over the North Atlantic. The model indicates that no more than 200,000 tons of acidic nitrogen from North America reach Europe annually—less than 3 percent of the estimated European emissions of nitrogen oxides.

New Data Center Helps Assess Global Climate

The University of Delaware and the National Oceanic and Atmospheric Administration (NOAA) has announced the creation of a new Joint Center for Research in the Management of Oceanographic Data to be headquartered at Lewes, Delaware. "This cooperative endeavor will help discover the answers to global climate change and related regional oceanographic problems, such as sea level rise, along the east coast," according to Thomas N. Pyke, Jr., NOAA Assistant Administrator for Satellite and Information Services.

The new center has been established at the University's College of Marine Studies at Lewes as a clearinghouse for oceanographic data. It will manage the enormous amounts of oceanographic data available for U.S. east coast areas. The center, dedicated 5 May, will process data generated from NOAA's environmental satellites, which keep a watchful eye on many of the oceans characteristics, including surface temperature and the currents that transport pollutants along the coast.