

U.S. and Canada Sign Free Trade Agreement

On 4 October 1987, trade representatives of the United States signed an historic trade agreement with Canada. The primary objective of the Free Trade Agreement (FTA) is the eventual elimination of bilateral tariffs within 10 years, beginning 1 January 1989. The FTA, also addresses specific trade issues, affecting agriculture, alcoholic beverages, energy, automobiles, services (e.g., telecommunications), financial services, investment, intellectual property, culture (e.g., printed and recorded material), customs procedures, government procurement, personnel movement, product standards, and import safeguards.

With respect to the elimination of duties, products have been assigned to one of three tariff elimination categories: 1) Immediate, 2) 5-years (20 percent/year), and 3) 10-years (10 percent/year). Most tariffs on fish and fish products fall within the 10-year schedule. Table 1 lists some of the seafood items for which U.S. tariffs are scheduled for elimination.

Under the agreement, Canada agreed to make permanent its current policy of not screening new U.S. business investments and to reduce screening of direct acquisitions. This provision should facilitate U.S. investment in fish processing

and brokerage facilities in Canada. The agreement also addresses the issue of government procurement by eliminating many "buy national" restrictions and by lowering from \$171,000 to \$25,000 the threshold at which open and competitive procedures, as specified under GATT's Government Procurement Code must be followed. This provision will not affect the purchase of fish and fish products through human feeding programs like the surplus commodity program (section 32) of the U.S. Department of Agriculture. However, stiffer competition may develop in the procurement of fish and fish products in Defense Department food acquisition programs.

The agreement also establishes special safeguards designed to protect industries from injury by import competition. If the FTA duty reductions cause injury, the preagreement duty may be reinstated. Section 201 import relief will still be available to industries injured by global imports except that each side will exclude the other from such actions unless its imports are substantial and are found to "contribute importantly" to the injury.

The treatment of subsidies and dumping (U.S. antidumping and countervailing duty laws) was one of the most sensi-

tive and contentious issues in the negotiations. Both parties have agreed to retain existing national laws and procedures dealing with subsidies and dumping. However, both parties did agree to a special binational dispute settlement panel which will replace review by the courts. The panel will apply existing judicial standards of the importing country and decision of the Commerce Department and International Trade Commission can be overturned by the panel if decisions are not supported by substantial evidence or not in accordance with U.S. law.

According to figures released by the Office of the U.S. Trade Representative, Canada exported to the United States a total of \$19 billion in dutiable goods out of a total of \$68.4 billion in exports to the U.S. Conversely, the United States exported a total of \$54 billion to Canada, of which \$13.5 billion was dutiable (1985 figures). In terms of fish and fish products, the United States exported a total of \$116 million of edible fishery products to Canada while Canada exported about \$1 billion in edible fishery products to the United States.

The United States represents a large market outlet for Canadian fishery products while Canada represents a relatively small market for U.S. fishery products. The liberalization of tariff and trade measures should increase the flow of fish and fish products across the U.S.-Canada border; however, given available markets, imports from Canada should show relatively larger increases over the 10-year tariff reduction period. The FTA may enhance the position of certain U.S. fishery brokers dealing in Canadian products as well as U.S. processing firms with investments in Canada and those U.S. processors dependent on the availability of raw product from Canada. The President notified the U.S. Congress of his intention to enter into the Free Trade Agreement on 5 October 1987. The President then had 60 days (by 5 December 1987) to transmit the full agreement to the Congress. In turn, Congress then had 60 days in which to either approve or disapprove of the FTA on an up or down vote (no amendments).

Table 1.—Some seafood items for which U.S. tariffs will be eliminated.

| Code | Description | Rate | Adval | Stage |
|---------|--|---------|-------|-------|
| 0303.71 | Sardines, sardinella | 1.1/k | 0 | 10 |
| 0304.40 | Frozen fillets cod, cusk, haddock | 4.134/k | 0 | 5 |
| 0305.41 | Smoked Pacific, Atlantic & Danube salmon | | 5% | 5 |
| 0305.49 | Smoked mackerel, including fillets | | 2.5% | 0 |
| 0306.24 | 20 crabmeat, not frozen | | 7.5% | 10 |
| 0306.14 | 20 crabmeat, frozen | | 7.5% | 10 |
| 1604.14 | 10 Tunas and skipjack, whole or in pieces, | | 35% | 10 |
| | 20 Tunas and skipjack, not in oil, in airtight containers | | 6% | 10 |
| | 30 Tunas and skipjack, not in oil, in airtight containers | | 12.5% | 10 |
| | 40 Tunas and skipjack, not in airtight containers | 1.10/k | | 10 |
| | 50 Tunas and skipjack, not in airtight containers | | 6% | 10 |
| 1604.15 | Prepared or preserved mackerel, whole or filleted | | 6% | 5 |
| 1604.19 | 50 fish sticks and like products | | 15% | 10 |
| 1605.20 | 05 Shrimp and prawn product containing fish meat; prepared meals of shrimp and prawn | | 10% | 10 |

Multispecies Plan Is Extended in New England

Richard B. Roe, Regional Director of the National Marine Fisheries Service (NMFS), announced the approval of the New England Fishery Council's Amendment 1 to the Northeast Multispecies Plan which took effect 1 October 1987 and extended the Plan indefinitely. Revisions to conservation measures in the Amendment will provide greater protection to multispecies stocks. Roe said that this decision implements the foundation of measures which the Council and NMFS can use to rebuild stocks and revitalize the fisheries.

The Regional Director stated that restrictions endured now may reward us someday with a return to the abundant stocks of the past. Over time, as changes and other improvements to the Plan occur, the best of science, knowledgeable fishery advisors, and experienced fishery managers will be embodied. The changes are as follows:

Amendment 1 revisions to the Multispecies regulations.

1) Permits: Permits now expire each year on 31 December. It is the vessel owner's responsibility to renew the permit each year; however, vessel owners will be informed by the National Marine Fisheries Service (NMFS) when it is time to renew.

2) Relationship to state laws: Provisions have been included that preserve the states' rights to establish management measures which are more restrictive than Federal measures. This means that when state or local regulations differ from Federal regulations, the permitted vessel must comply with the more restrictive requirement.

3) Import prohibitions: It is unlawful to import regulated species (cod, haddock, pollock, witch flounder, yellowtail flounder, American plaice, and winter flounder) which do not meet the minimum length requirements (see no. 8).

4) Southern extension of the large mesh area: The regulated large-mesh area southern boundary is adjusted as follows: Between long. 69°40'W. and 69°00'W., the boundary runs along Loran C 43400;

between long. 69°00'W. and 68°00'W., the boundary runs along Loran C 43450; the remainder of the boundary remains unchanged and runs along Loran C 43500.

5) Mesh: The regulated mesh size of 5½ inches for mobile gear now must extend at least 75 continuous meshes forward of the aft end of the cod end. The one-mesh-on-deck provision is interpreted to mean that small mesh stowed and lashed down, or stored on net reels covered and secured, or nets on vessels which have towing wires detached from the gear, are deemed not available for immediate use, and is in compliance with the regulation. The Council and NMFS in consultation with the Atlantic States Marine Fisheries Commission may permit the use of certain selective shrimp fishing gear, with the intention that the gear may reduce juvenile finfish mortality that occurs in that fishery.

6) Closed areas: The dimensions of haddock spawning closed area 1 are changed by eliminating the portion west of long. 69°00'W. and north of lat. 41°30'N. The area is likely to be adjusted further in the future, by covering more ground to the south and east where spawning haddock are located. Scallop dredge gear is prohibited in the southern New England closed area. Hook-and-line gear is allowed, but yellowtail flounder may not be retained.

7) Exempted (small mesh) fishery program: The December/January whiting fishery is limited to the portion of the exempted fishery area which is west of long. 69°00'W. The June through November period no longer allows the 10 percent limit of multispecies to be based on all landed species. The percentage now is based on dogfish, herring, mackerel, ocean pout, red hake, silver hake, and squid. The December through May herring and mackerel exempted fishery is eliminated. Midwater trawling is possible for these species during this period, but under a special permit and with only 1 percent multispecies by-catch.

8) Minimum fish size: Effective 1 October 1987 the minimum fish size for commercially caught cod, haddock, and pollock is 19 inches; for recreationally caught cod and haddock it is 17 inches.

Minimum sizes for American dab, witch, and winter and yellowtail flounders remain unchanged. For further information, contact Peter D. Colosi at (617) 281-3600 or Guy Marchesseault at (617) 835-8457.

Penguin Bank Target of Oceanographic Survey

Understanding how an underwater feature, such as Hawaii's Penguin Bank, might influence the physical and chemical properties of seawater was the goal of scientists from the National Marine Fisheries Service's Honolulu Laboratory and University of Hawaii (UH) Department of Oceanography during a late 1987 oceanographic survey aboard the NOAA ship *Townsend Cromwell*. Such information may ultimately lead to a better understanding of how this bank sustains an environment for bottom fisheries, according to Richard S. Shomura, Laboratory director. These bottom fisheries, particularly those for opakapaka and other deep-sea bottom fishes, are of considerable local importance.

Penguin Bank is an elevated, flattop rise extending some 30 n.mi. off the west side of Molokai. The bank's summit lies 150-180 feet below the sea surface, encompassing an area of some 450 n.mi.² During the survey, scientists tracked a current drifter to ascertain the direction and intensity of subsurface current flow over the bank. While following the movement of the current drifter, they collected water samples from various depths for later analyses to determine whether chemical properties of seawater change as a water mass passes over the bank. An example of a possible change in seawater may involve an increase in nutrients over the bank due to upwelling tidal currents.

Scientists also deployed and retrieved sediment traps moored to the northern slope of Penguin Bank. Sediment traps collect particulate matter which slowly sink down through the water column from the overlying water layers. This particulate matter may consist of live planktonic organisms, remnants of dead organisms, or by-products from live organisms. The array moored at Penguin

Bank had a series of 12 sediment traps at each of seven depth layers sampled. Typically sediment traps are used in the open ocean and allowed to drift freely. The anchored sediment trap array at Penguin Bank represented one of only a few instances in which a bank environment was examined in this manner. Data obtained from these sediment traps will provide information on both surface productivity over the bank and the rate at which organic matter is descending to the bottom. Other operations conducted by the scientists involved measurements of seawater temperature and salinity by depth and the collection of bottom samples along the bank for analysis of mineral content.

Shrimp Situation and Outlook Reported

U.S. and Japanese supplies of shrimp reached record levels in 1987. Except for the largest and smallest sizes, prices of shrimp averaged lower than in 1986. Southeastern U.S. landings were 147 million pounds (heads-off) in January-October 1987, 17 percent less than a year earlier, according to preliminary data. They were off 16 percent in the Gulf, and 23 percent in the South Atlantic. Gulf landings could total 160 million pounds, making 1987 an above average year. South Atlantic landings were very low in the normally peak months of July and August, and could total 12.5 million pounds, making 1987 a low year.

Landings in New England could reach 11 million pounds (heads-on) in 1987, up from 10.3 million pounds in 1986. Abundance is reported to be down significantly in the current season (December 1987-May 1988). Pacific landings could reach 83 million pounds (heads-on) in 1987 compared with 62.7 million pounds in 1986, based on strong increases in Oregon and Washington, and assuming no change in California and Alaska. U.S. imports were 327 million pounds in January-September 1987, up 16 percent from a year earlier. Large gains for Ecuador and China changed the ranking of leading suppliers (data in million pounds): Ecuador (73), Mexico (42), China (32), Taiwan (23.3), India (22.9),

and Thailand (19.6). Most of the increase of 45 million pounds was for raw headless and raw peeled shrimp (20 million pounds each).

U.S. cold-storage holdings were 7-12 million pounds greater during February-October 1987 than respective monthly holdings in 1986. In part, the increase represents a return to normal levels, since holdings in April-August 1986 were the lowest for these months in twenty years. Holdings in September-October 1987 were the highest for these months since the late 1970's, but the market has grown considerably. Japan imported 365 million pounds of frozen shrimp in January-September 1987, 47 million pounds or 15 percent more than a year earlier. In part, this led to an inventory buildup (+24.5 million pounds through September), the highest since 1981 (+42 million pounds). Japan's inventories have tended to grow faster than the market. In 1987, they averaged 3.5 months of imports versus about two months in the late 1970's.

New York wholesale prices of raw headless Gulf browns reached peaks in mid-1986. Since then, 26-30's to 41-50's trended down, while smaller and larger sizes moved upward to early 1987 and then trended downward (data through November 1987). Dollar equivalents of Tokyo prices of Indian whites behaved similarly, except that prices of some sizes continued upward in 1987 (under-16's and 16-20's) or remained flat (21-25's, 26-30's and 61-70's). Japan's domestic prices (in yen) of these shrimp have trended downward since mid-1985, except for upturns since mid-1987 in the largest two sizes. New York prices of peeled Gulf shrimp moved strongly upward from mid-1986 to early 1987, apparently because of reduced supplies and higher prices for cold-water shrimp.

It is estimated that U.S. consumption of shrimp could be 740 million pounds (heads-off) in 1987, up 4 percent from 708 million pounds in 1986. Increases in 1980-86 averaged 8.5 percent. The underlying 1987 estimates are as follows (data in million pounds, heads-off): landings, 226 (244 in 1986); imports, 560 (492 in 1986); ending holdings, 74 (59 in 1986); and exports, 34 (30 in 1986). This report was prepared by John Vondruska,

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NOAA Launches Undersea Station

The National Oceanic and Atmospheric Administration (NOAA) launched in late 1987 the most advanced habitat ever developed for research under the sea. Named "Aquarius," the state-of-the-art, 81-ton habitat, which can sustain six scientists at a time indefinitely, has been placed on the Salt River Canyon seafloor off St. Croix, the U.S. Virgin Islands, the Commerce Department agency said.

For the next 2 years, the huge, moveable undersea research station missions will include fisheries studies, physical oceanography, marine engineering research, and studies of the cause of coral bleaching in the Caribbean. Aquarius makes it possible for scientists to live and work on the ocean floor for virtually unlimited time, allowing a 9-hour day of research before returning to the habitat. In contrast, scuba divers working at the Aquarius' present 50-foot depth would be able to remain on bottom for only 70 minutes.

The 43- × 12- × 16.5-foot station succeeds NOAA's smaller, less sophisticated habitat Hydrolab, which accomplished nearly 200 missions between 1966 and 1985. It was retired and presented to the Smithsonian Institution. Aquarius is divided into three compartments—a wet porch, main lock, and entrance lock. The main chamber houses the sleeping area, laboratory equipment, computers, environmental conditioning, and a modern galley. From the living compartment, scientists can view sea life through observation ports. A video system allows monitoring of seabottom and surface conditions.

Connected by an umbilical system to an unmanned surface support boat, the habitat functions independently of shore support. During any interruption of power or air, it can operate under an emergency system for up to 72 hours, allowing its occupants time to decompress and swim to the surface. The habi-

tat was towed on its separate launch, recovery, and transport (LRT) vehicle in September to Salt River Canyon, and lowered to the bottom from between the LRT's catamaran hulls to a moveable, 118-ton baseplate equipped with leveling legs. Built for NOAA at a cost of \$5.5 million, Aquarius is being operated for its first one- to two-year deployment off St. Croix by the National Underseas Research Program of Fairleigh Dickinson University's West Indies Laboratory.

NOAA Unveils High-Tech Tsunami Warning System

The National Oceanic and Atmospheric Administration (NOAA) has announced the development of a high-tech tsunami warning system that could inexpensively safeguard millions of now-unprotected coastal dwellers. Tsunamis are walls of water pushed ashore by undersea earthquakes or volcanic eruptions. In the past 100 years, they have killed more than 51,000 people around the Pacific basin. A team led by the Commerce Department agency, using readily available technology and a NOAA weather satellite, has devised a system that protects Valparaiso, Chile, a Pacific coast city which has lost more than 1,500 persons to tsunamis since 1900.

Certain Pacific coastal areas are protected by a basin-wide network designed to warn nations of major, destructive events; five regional systems serve Hawaii, Alaska, Japan, French Polynesia, and the U.S.S.R. Pacific coast, according to Eddie N. Bernard of NOAA's Pacific Marine Environmental Laboratory (PMEL), who led the team. However, vast areas of Pacific coastline are not protected by the regional systems, which cost about \$1 million to install and \$500,000 a year to operate. The local-area Valparaiso system, in contrast, could be installed elsewhere for as little as \$20,000. Bernard said coastal cities in Peru, Mexico, and the Caribbean are appropriate locations for similar systems.

Under sponsorship of the Agency for International Development's Office of Foreign Disaster Assistance, Bernard assembled a group of experts on seismology, oceanography, numerical mod-

elling, and other specialties, to design, develop and evaluate a system that small nations could afford. Valparaiso was chosen for the pilot system because it already has a tsunami warning center, access to NOAA's GOES satellite, and was committed to improving its warning capabilities. The system had to be readily integrated into local warning capabilities, assembled mostly from existing technology, reliable, and capable of warning within 10 minutes. The system is designed to detect 7.0-scale undersea earthquakes 50 miles from shore, and 6.2-scale earthquakes 21 miles out. Most of the Valparaiso fatalities have been from tsunamis within 60 miles off the coast.

Key elements of the tsunami warning system are an accelerometer, a water level sensor, satellite communications, and pre-programmed computers. When an earthquake of 7.0 or more on the Richter scale occurs within 60 miles of the Valparaiso coast, the accelerometer is tripped, transmitting an alert through the GOES satellite. A computer simultaneously sends emergency messages to a warning center in Valparaiso, to the Pacific Tsunami Warning Center in Honolulu, and to water level sensors in Valparaiso Harbor. A computer in the city automatically warns public safety offices and begins monitoring the water level sensors. They, in turn, transmit tsunami wave information back through the satellite system. The warning system has yet to be tried under real conditions, when evacuation would occur, but in more than 5,000 tests done in the past year it has proved to be 98 percent reliable in warning transmission, and the equipment has performed with 94 percent reliability, Bernard said.

Five-Month Cruise Tabulates Dolphins

Two NOAA research vessels, the *David Starr Jordan* and the *McArthur*, returned to San Diego, Calif., on 10 December after spending almost 5 months at sea counting dolphins over a 5 million-square-mile area of the eastern tropical Pacific. The expedition was part of a 5-year dolphin study mandated by the U.S. Congress as a result of an amendment to the Marine Mammal Protection Act in

1984 to monitor the relative abundance of dolphin stocks in the eastern tropical Pacific. The NMFS Southwest Fisheries Center in La Jolla, Calif., is responsible for carrying out the program.

Logged into the computers aboard the ships during the long cruises is information obtained by a dozen scientific observers on numbers and kinds of whales and dolphins sighted, the species of sea birds seen such as sooty terns and brown-footed boobies that often accompany groups of dolphins and tuna schools, oceanographic measurements of currents, salinity, temperature, oxygen, weather observations, and other environmental data. This time, the NOAA Ship *Jordan* was also equipped with a helicopter and a helipad. The activity of the dolphin schools, which could number anywhere from 50 to 6,000 animals, was photographed from the helicopter with a special U.S. Navy camera designed for filming from high-speed, low-flying aircraft to provide better estimates of dolphin school size and composition.

The eastern tropical Pacific is the only area in the world where some schools of yellowfin tuna swim beneath dolphin herds. Tuna fishermen search for schools of dolphins with speedboats and encircle dolphins and tuna with huge nets. Although most of the dolphins escape or are released by fishermen over the nets, some animals unavoidably become entangled and drown. Last year more than 126,000 dolphins were accidentally killed in the eastern tropical Pacific by tuna fishermen from Ecuador, Mexico, Panama, the United States, Vanuatu, and Venezuela. Under Federal law, U.S. fishermen are limited to the accidental take of 20,500 of the mammals annually.

By the end of the 5 years, scientists will be able to compare data from each cruise and determine if stocks of dolphins in the eastern tropical Pacific are increasing or decreasing. If it is found that the mortality due to the tuna fishery has adversely affected the population of one or more dolphin stocks, the Secretary of Commerce is then responsible for taking action, as necessary, to modify the existing dolphin quotas for the U.S. tuna fishery to ensure that the dolphin populations are able to recover.

In addition to gathering information

about the numbers of dolphins in the eastern tropical Pacific, scientists from other agencies in NOAA and from the Tropical Ocean and Global Atmosphere (TOGA) Programme, an international program of which the United States is a member, are actively cooperating in this program.

Honolulu Lab Surveys Fish, Marine Mammals

Scientists of the NMFS Southwest Fisheries Center's, Honolulu Laboratory, aboard the NOAA ship *Townsend Cromwell*, completed a 9-day survey of marine mammals and deep-sea bottom fishes at Penguin Bank in the main Hawaiian Islands in November, according to Richard S. Shomura, Laboratory Director. Marine mammals, including porpoises and whales, are protected by Federal laws, and their occurrence and interaction with man is of considerable interest to scientists and local fishermen. Deep-sea bottom fishes, such as opakapaka, ehū, kalekale, and onaga, are of considerable importance to the local fishing industry and are heavily exploited.

Surveys were conducted by marine mammal scientists to determine occurrence, local distribution, and species composition of marine mammals at Penguin Bank, while bottom longline gear and deep-sea handline gear were fished in depths of 240-870 feet at four selected sites to determine the distribution, abundance, diet, and diel shifts of deepwater bottom fishes, according to Paul M. Shiota, Chief Scientist on the survey.

The marine mammal survey is part of a program at the Honolulu Laboratory to better manage and protect marine mammals in Hawaii. The deep-sea bottom fish survey is part of a cooperative study between the Honolulu Laboratory and the University of Hawaii. The information collected will prove useful in providing a better understanding of the diet, distribution, and abundance of commercially important bottom fishes at Penguin Bank.

Fish Export Data and Publications

The U.S. Department of Commerce has a new agency, totally separate from

the International Trade Administration, which handles export licensing and control functions, the Department has announced. The Export Administration now is responsible for technology analysis, export enforcement, intelligence review, and anti-boycott compliance. The new Export Administration is located at the U.S. Department of Commerce/EA, Room 1099 HCHB, 14th and Constitution Avenue, N.W., Washington, DC 20230.

Also, if you are an exporter or broker and routinely file Shipper's Export Declarations, you may file these documents electronically, on a monthly basis, instead of filing a hard copy for every shipment. The Commerce Department's Census Bureau now has a National Clearinghouse for Exporter Data Processing. The Bureau can provide a brochure listing the service agencies in your city that have already registered with the Census Bureau. These agencies provide current listings of all commodity classifications, and transmit electronic data to the Bureau as part of their services to exporters. For more information, contact the U.S. Census Bureau's Automated Export Reporting Office at (301) 763-7774 or (301) 763-4040.

A marketing reference manual called "A Guide to Selling Your Service Overseas," which includes computer software products, is a clear and concise guidebook to selecting foreign markets. Copies of the 1987 issue of the Guide, are available from NORCALDEC (Northern California District Export Council) at \$17.00 per copy (postage and handling included). Address orders to Service Guidebook, 450 Golden Gate Avenue, P.O. Box 36013, San Francisco, CA 94102.

The Census Bureau has also announced the availability of a new edition of Schedule B Statistical Classification of Domestic and Foreign Commodities exported from the United States, in which the export commodity classification system is converted to the nomenclature structure of the Harmonized Commodity Description and Coding System (Harmonized System). The commodity numbers contained in this revised Schedule B contain ten digits plus a check digit. They are to be reported on Shipper's Export Decla-

rations beginning 1 January 1988. The metric system of weights and measures is used throughout the publication.

The 6-digit Harmonized System was developed from the Customs Cooperation Council Nomenclature and is intended for multinational use in classifying commodities in international trade. In Schedule B, it was expanded to ten digits plus a check digit for U.S. statistical needs. The structure and detail of this new system are significantly different from those previously in use.

The alphabetical index is contained in a separate volume and shows the first six digits of the applicable Schedule B code(s) for each commodity listed. This volume also contains correlations between 1987 and 1988 Schedule B numbers. The index and correlations are included in the price of the basic publication. You may order your 1988 edition of Schedule B (ask for order number 903-009-00000-4) from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402 (telephone 202-783-3238). The price is \$46 (\$11.50 additional for foreign mailing), and includes supplemental changes issued irregularly for an indefinite period.

Commercial Scallop Dredging Observed With Submersible

Commercial sea scallop fishing operations appear to: 1) Capture with high efficiency those scallops which are within the path of the scallop dredge, 2) cause very low mortality among those scallops which are within the path of the dredge but which are not captured by it, and 3) result in low mortality (i.e., less than 10 percent) of those scallops which are captured, but which are subsequently discarded.

These observations came from the NMFS Northeast Fisheries Center's 15-17 July 1987 study of commercial scalloping by the fishing vessels *Carolina Breeze* and *Mary Anne* in 175-220 feet of water in the Hudson Canyon area of the Middle Atlantic shelf. Center scientists used the two-man research submersible *Delta* to observe fishing operations directly.