

NOAA Employees Awarded Gold and Silver Medals

Twenty-six U.S. Department of Commerce Gold and Silver Medals were awarded to NOAA employees at the Department's annual honor awards ceremony in Washington, D.C., 18 October 1988. The Gold Medals are given "for rare and distinguished contributions of major significance to the Department, the Nation, or the world." Earning them were: William E. Carter, NOS, Rockville, Md., for contributions to the conception, founding, and operation of the International Earth Rotation Service. Kikuro Miyakoda, William F. Stern, Joseph J. Sirutis, and M. Daniel Schwarzkopf, Environmental Research Laboratories, Princeton, N.J., for research to improve components of atmospheric models and cooperative efforts to implement them in operational weather forecasts. Melvyn A. Shapiro, Environmental Research Laboratories, Boulder, Colo., for contributions to the understanding of complex meteorological phenomena. And, W. David Rust and Vladislav Mazur, Environmental Research Laboratories, Norman, Okla., for contributions to the understanding of atmospheric electrification and contributions to the nation's space program.

Silver Medals "for meritorious contributions of unusual value to the Department or the Nation" were awarded to: Michael L. Tucker, Office of Administration, Kansas City, Mo., for leadership in organizing and developing a combined Department of Commerce/Department of Agriculture National Logistics Supply Center. Lt. (j.g.) Edward R. Cassano, NOAA Corps, and Daniel Granstrom, NOS, for skill and courage in fighting a fire on the NOAA Ship Miller Freeman. Lloyd D. Huff, NOS, Rockville, Md.,

for developing an advanced water vapor radiometer under the Department's Small Business Innovation Research Program leading to a very successful business activity.

NMFS Silver Medalists were Daniel D. Huppert, La Jolla, Calif., for his innovative concepts in the application of economic principles to the management of marine fisheries, and Dennis M. Weidner, Washington, D.C., for furthering the long-term U.S. policy of developing a cooperative fisheries relationship with Mexico.

Other NOAA recipients were Kenneth C. Crawford, NWS, Norman, Okla., for pioneering efforts in transferring new technologies into operational meteorology. Alan R. Moller, NWS, Fort Worth, Tex., for implementing public preparedness programs and developing and conducting training sessions on severe weather. Gerald

Stansby Honored; Burton, Tillman, Angelovic Named

The National Oceanic and Atmospheric Administration (NOAA) dedicated its new Fish Oil Biomedical Test Materials Laboratory in South Carolina in honor of Maurice E. Stansby in September 1988. The new facility, a part of the Charleston Laboratory of the National Marine Fisheries Service's Southeast Fisheries Center, is located at 217 Fort Johnson Road, P.O. Box 12607, Charleston, SC 29412-0607.

Stansby is a recent recipient of the President's Award for Distinguished Federal Civilian Service for his many years of pioneering research on the chemistry and biochemistry of fish oils

S. French, NWS, Portland, Maine, for timely and accurate forecasts preventing great loss of life and property in Maine during flooding in April 1987. Joseph P. Gerrity, Jr., NWS, Camp Springs, Md., for leadership and achievement in atmospheric global numerical modeling. Johnny S. Smith, NWS, Kansas City, Mo., for successful completion of the Computerized Marine Weather Data System on the Great Lakes. D. Gregory Harmon, NWS, Salt Lake City, and Christopher E. Fontana, NWS, Reading, Calif., for developing the concept of an air transportable mobile fire weather unit. Robert C. Kilpatrick and Timothy E. Scrom, NWS, Albany, N.Y., for their outstanding weather forecasts and warnings during New York flooding in April 1987. Michael J. Nestlebusch, NESDIS, Camp Springs, Md., for leadership, management, and technical guidance in improving NOAA's Geostationary Environmental Satellite Data Collection System. Michael Crowe, NESDIS, Asheville, N.C., for leadership in development of automated climatological data processing systems. And, National Oceanographic Data Center, NESDIS, Washington, D.C., for excellence in ocean data management through quality improvement and increased productivity.

which has aided in the understanding of the health benefits of fish oil in the human diet. The new Fish Oil Biomedical Test Materials Laboratory was built to insure that standardized, quality-assured test materials would be available for use in biochemical and clinical studies over a multi-year time frame.

Also in September, B. Kent Burton was sworn into office as Assistant Secretary of Commerce for Oceans and Atmosphere at the National Oceanic and Atmospheric Administration, succeeding J. Curtis Mack II, who resigned to return to California. Burton had been director of the Office of Legislative Affairs for the Commerce Department agency since 1984.

In addition, Michael F. Tillman was

chosen to fill the NMFS Senior Scientist position. He is charged with preserving and enhancing the scientific vitality of NOAA's fisheries-related

activities. And, Joseph W. Angelovic was appointed to the position of Science and Research Director, NMFS Southeast Region, effective 25 Sep-

tember 1988. Angelovic also continued as Acting Director of the Region until a new Regional Director is named.

NOAA Aids Rescue of Gray, Beluga Whales

Late last fall, while NOAA scientists and others struggled to save two gray whales trapped in ice off Point Barrow, Alaska, another rescue operation saved 27 beluga whales off Anchorage, Alaska. The Anchorage incident at Cook Inlet occurred on Sunday, 23 October, according to the National Marine Fisheries Service. The small white whales were a part of an isolated population of the species in that area numbering an estimated 500-1,000 animals.

The belugas were believed to have stranded as the tide went out during the late morning or early afternoon. Notified by an environmental group, two NOAA scientists and a veterinarian quickly helicoptered to the area, which is surrounded by quicksand-like mudflats. Two local kayakers had already begun the process of keeping the animals wet with blankets and buckets of water.

When the tide finally reached the whales, they became excited and, as soon as the water covered them, swam away. When last seen, all 27 animals (three calves, four yearlings, and twenty adults) were swimming in a normal manner. None of the whales was believed to have died. There are about 30 whale strandings yearly in Alaska and the NMFS has established a statewide stranding network to respond.

But it was "Operation Breakthrough" that caught the world's attention off Point Barrow where, initially, three gray whales had become trapped in the ice. The episode began in early October with the discovery of the three whales by a hunter. By 14 October, the two breathing holes used by the whales had shrunk from "basketball court" size to about 15×30 feet, and the nearest open water was almost 5

miles away. Efforts to secure a hovercraft barge to cut a channel for the whales were stymied by technical problems and an impregnable 30-foot-high pressure ridge. Ron Morris, with the NMFS office in Anchorage, and Eskimos began using chain saws on 15 October to enlarge the shrinking breathing holes.

On 19 October workers began to cut new holes, hoping to lead the whales toward open water; two volunteers from Lakeland, Minn., arrived with six water circulation pumps which proved vital in keeping the breathing holes open. On 21 October, Under Secretary William Evans learned of two Soviet icebreakers in the vicinity and with State Department help, requested their assistance. Two vessels, the 443-foot *Admiral Makarov* and the 518-foot *Vladimir Arseniev* were volunteered. By then, though, the smallest of the whales was no longer surfacing and was presumed dead.

By the 22nd, a string of 55 holes had been opened, but the whales refused to cross a shallow, 12-foot deep area. The same day, Rear Admiral Sigmund Petersen, Director of NOAA's Pacific Marine Center and aide LCDR Terry Jackson arrived in Barrow to coordinate rescue logistics, and an Air Force C-5XA cargo plane brought in an Archimedean Screw Tractor to the site for ice cutting. On the 24th, the ice crew in Barrow connected a series of holes to create a single open channel about 600 yards long which allowed the whales to roll and breathe more normally.

On the 25th the Soviet icebreakers began attacking the pressure ridge, new holes were cut by the ice crew to bypass the shallow area, and by nightfall, the *Arseniev* was within ¼-mile of the whales. On the 26th, the *Arseniev* came within 200 yards of the whales. On the 27th, the Soviets made their last passes through the ice, and

lights and pumps were shut off at nightfall to eliminate any stimulus that might hold the whales. On Friday the 28th, Eskimos at the breathing hole watched the whales surface at 8:45 a.m. and head toward the open water—the last time they are seen; favorable weather and ice conditions continued for the next several days. Finally, on 5 January 1989, 17 groups and individuals that played key roles in the rescue were honored at a Washington, D.C., ceremony by Commerce Secretary C. William Verity and Under Secretary William E. Evans.

Summer Flounder FMP Approved

Richard B. Roe, Northeast Regional Director of the National Marine Fisheries Service (NMFS), announced in September 1988 that the Fishery Management Plan for the Summer Flounder Fishery (Plan) had been approved. The Mid-Atlantic Fishery Management Council developed the Plan which has objectives of reducing fishing mortality on immature summer flounder, increasing long-term yield from the fishery, improving uniformity of management between state and Federal waters, and minimizing regulations to achieve these goals. Final regulations were to become effective on 3 November 1988, implementing the following management measures:

1) It will be illegal for those issued a Federal fisheries permit to fish for summer flounder, or to possess or land summer flounder or flounder parts which are smaller than 13 inches in length.

2) If a state has established a minimum size for summer flounder which is larger than 13 inches, the state's size limit will prevail.

3) Foreign fishermen will not be able to take summer flounder.

4) Both commercial vessels and recreational vessels landing more than 100 pounds (party and charter boats) fishing for summer flounder in Federal waters will have to obtain an annual permit.

5) Those states with more restrictive regulations pertaining to net mesh sizes and minimum summer flounder sizes will be encouraged to maintain them.

6) Three years after the Plan goes into effect, the Council will determine whether it is working to reduce fishing mortality. If it is not working, a 14 inch minimum fish size may be established.

"All measures, including the Permit requirement, will be enforced beginning 3 November 1988," Roe said.

Shellfish Raids, Arrests Made in U.S. Southeast

Culminating a year long undercover investigation by National Marine Fisheries Service, U.S. Food and Drug Administration, and state conservation agencies, 16 Federal warrants and 9 state warrants were served in Louisiana, Florida, and South Carolina in

September 1988. The tri-state raid teams consisted of 20 NMFS agents, 9 FDA investigators, and 58 officers from the Florida Department of Natural Resources, Florida Marine Patrol, South Carolina Wildlife and Marine Resources Division, South Carolina Department of Health and Environmental Control, and the Louisiana State Police.

The NMFS, FDA, and state law enforcement agencies initiated the multistate investigation as a result of numerous complaints and information that illegal shellfish products were being harvested and sold in interstate commerce. Harvesters and dealers allegedly handled oysters and clams taken from polluted waters and were buying and selling products without regard to state tagging requirements. The harvesting of oysters and clams from polluted areas, improper temperature storage, or the purchase and sale of untagged shellstock is tantamount to a potential catastrophe.

Suzanne Montero, Special Agent In Charge, NMFS, St. Petersburg, Fla., and Robert Bartz, District Director, FDA, New Orleans, La., announced that the joint law enforcement effort was mandated by considerations of

safety to the public health. The size and nature of the problem led the government officials to believe the investigation could not be handled through regular law enforcement means, but required the cooperative efforts of state and Federal agencies in a major undercover investigation. Operations PEARL (La.), STOP (Fla.), and SPONGE (S.C.) allowed undercover state and Federal agents to enter the world of black-market oyster and clam dealers to document their illegal activities.

Ten search warrants were served on oyster dealers in Louisiana and Florida, while nine arrest warrants were served on clam dealers in South Carolina. In addition to thousands of anticipated state charges, the alleged Federal violation is the Lacey Act, 16 U.S.C. 3371-3378. The statute states, in part, that it is illegal to import, export, transport, sell, receive, acquire, or purchase in interstate commerce any fish or wildlife taken, possessed, transported or sold in violation of any law or regulation of any state. The maximum felony penalty for knowingly violating the law, if convicted, is up to \$20,000 or 5 years incarceration or both per count.

Atlantic Billfish FMP Approved, Challenged

The Fishery Management Plan for the Atlantic Billfishes (FMP) was approved in September 1988 by the Secretary of Commerce, according to Joseph W. Angelovic, Acting Director, Southeast Region Office, National Marine Fisheries Service. The FMP was developed by the South Atlantic Fishery Management Council in cooperation with the New England, Mid-Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils. The principal objective of the FMP is to maintain the highest availability of billfishes to the traditional recreational fishery by reducing commercial and recreational fishing mortality on billfishes. The final rule implementing the FMP was published in

the *Federal Register* on 28 September 1988 and was scheduled to become effective on 28 October 1988.

The regulated species are blue marlin, white marlin, sailfish, and longbill spearfish. The rule regulates: 1) Fishing for and possession of billfish aboard a vessel of the United States shoreward of the outer boundary of the exclusive economic zone (i.e., in Federal and state waters from 0-200 n. mi.) in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea, and 2) possession and sale in any state of a billfish harvested from its management unit. Management units are defined as follows: 1) Blue marlin and white marlin—North Atlantic Ocean north of lat. 5°N; 2) Sailfish—North and South

Atlantic Oceans west of long. 30°W; and 3) longbill spearfish—the entire North and South Atlantic Oceans. The Gulf of Mexico and Caribbean Sea are included in all management units.

The major provisions of the rule include:

1) Prohibition of sale in the United States of a billfish harvested from its management unit. Seafood dealers possessing billfishes harvested prior to 28 October 1988 would be given until 27 December 1988 to sell or dispose of those fish. A requirement that any billfish possessed by a seafood dealer or processor must be accompanied by documentation that it was harvested from an area other than its manage-

ment unit was scheduled to become effective on 27 December 1988, pending approval by the Office of Management and Budget.

2) Minimum size limit (expressed in terms of length from the tip of the lower jaw to the fork of the tail) for blue marlin is 86 inches; white marlin, 62 inches; sailfish, 57 inches.

3) Prohibition of possession of billfishes by pelagic longline and drift net vessels.

4) Restriction of possession or retention of billfishes to those caught by rod and reel.

5) Mandatory reporting of catch and effort information from selected billfish tournaments.

For copies of the rule or for further information, contact Rodney C. Dalton, NMFS Southeast Regional Office, St. Petersburg, Fla., or phone 813-893-3722.

(On 26 October 1988 the billfish regulations were challenged in Federal district court by the National Fisheries Institute and the Southeast Fisheries Association, contending that the measures were in violation of the Magnuson Fishery Conservation and Management Act and the Administrative Procedures Act.)

Major Pacific Current May Be Key to El Niño

The eastward flow of a major equatorial current in the Pacific Ocean was interrupted and reversed for about a month in late 1987, and may have signalled the end of the 1986-87 El Niño event, according to National Oceanic and Atmospheric Administration (NOAA) oceanographers. During September and October 1987, the Equatorial Undercurrent was observed in the western Pacific to be flowing west at speeds of about half a mile an hour, Michael McPhaden of NOAA's Pacific Marine Fisheries Environmental Laboratory in Seattle said. Normally the current, about 150-800 feet below the ocean surface, about 275 miles wide, and spanning the breadth of the Pacific along the Equator, flows east-

ward at about 1 mile an hour.

The Undercurrent, McPhaden explained, is created when the trade-winds, which usually blow from east to west, pile up surface waters in the western Pacific. The weight of the piled up water causes pressure on sub-surface waters to be higher in the western Pacific than in the eastern Pacific. This pressure difference forces water to flow eastward a few hundred feet below the surface. When the trade-winds weaken, as happens during an El Niño event, the warm surface waters migrate eastward, reducing the amount of piled up water in the western Pacific, therefore the pressure difference between east and west. When this occurs, the Undercurrent flow may reverse.

The westward flow of the Undercurrent, McPhaden speculated, may have been an indicator that the El Niño was ending. It began in the summer of 1986 and was over by the end of 1987. El Niños occur irregularly every 2-7 years, last for 1-2 years, and are involved in global climate fluctuations. During an El Niño, warm surface waters from the western tropical Pacific migrate eastward along the equator towards the International Dateline.

"Perhaps," McPhaden noted, "the origin of El Niño's demise may be found in the weak winds which typify it at its peak." This was the first clear documentation of an El Niño-related major disruption of the Undercurrent in the western Pacific, McPhaden said. During the 1982-83 El Niño, the Undercurrent disappeared in the eastern and central equatorial Pacific, but it is not known whether the western Pacific was similarly affected. The latest findings are based on moored current meter measurements collected since January 1986 as part of a joint effort between the United States and the People's Republic of China to study air-sea interaction in the western Pacific.

"The magnitude of this event can be appreciated by noting that the volume transport of the Undercurrent—about 800 million gallons per second—is comparable to that in the Florida cur-

rent which feeds the Atlantic Ocean's Gulf Stream," McPhaden said. The event suggests potentially important implications for understanding climate disturbances associated with El Niño, he added, noting that the global climate system is particularly sensitive to variations in the warm, western tropical Pacific surface layer.

Yellowfin Tuna Embargo

The United States embargoed all yellowfin tuna from Ecuador, Panama, Venezuela, and the Pacific Island nation of Vanuatu in October 1988 because those countries failed to provide evidence that they were catching tuna in accordance with U.S. regulations aimed at reducing the accidental killing of porpoises. The embargo went into effect 16 October according to the National Marine Fisheries Service, which is responsible for protecting marine mammals.

NMFS said the value of yellowfin tuna imported from those countries in 1987 was almost \$30 million. However, economists with the agency said they could not assess the economic impact of the embargo on the United States because other sources of tuna may become available. Mexico, which is complying with the U.S. standards and will be unaffected by the embargo, sent 19 percent of its yellowfin tuna to the United States last year, NMFS reported. Total imports of all tuna to the United States were worth \$457 million last year. An estimated 20 percent of that was yellowfin.

The yellowfin tuna, found in the eastern tropical Pacific, tend to swim with porpoises. When tuna fishermen enclose both porpoises and tuna in their huge seine nets, the porpoises can become trapped and drown. Since 1981 the United States has set a limit of 20,500 porpoises that could be accidentally killed each year by the domestic tuna fleet. Last March, NOAA issued regulations that require foreign countries to provide evidence that their tuna fisheries have programs to protect porpoises comparable to that of the United States.

Mortality Very High for Georges Bank Cod

Fishing pressure for Atlantic cod, *Gadus morhua*, on Georges Bank significantly intensified in 1987 resulting in the highest fishing mortality rate ever recorded for this fish stock, according to a Northeast Fisheries Center stock assessment evaluation in fall 1988. Fredric M. Serchuk, the Center scientist who conducted the evaluation, notes that, "High fishing effort is keeping cod numbers at record-low levels and minimizing the number of fish available to spawn."

The Northeast Fisheries Center is the research arm of NOAA's National Marine Fisheries Service for the northeastern United States. Serchuk is Chief of the Center's New England Offshore Fishery Resources Investigation which monitors and evaluates the status and condition of finfish and shellfish resources in the Georges Bank and Gulf of Maine regions.

Serchuk emphasizes that, "Fishing mortality in 1987 was so high that only about 30 percent of the Georges Bank cod that were alive at the beginning of 1987 survived to the beginning of 1988. Where such high fishing mortality has been maintained on cod stocks in other areas of the world, stock collapses have occurred." Serchuk characterized the status of the Georges Bank cod stock as "precarious."

Cod is important in both commercial and recreational fisheries in New England. Of the 26.6 thousand metric tons (58.6 million pounds) of cod landed by New England commercial fishermen in 1987, 19.0 thousand metric tons (42.0 million pounds) came from Georges Bank, with a landed value of about \$32 million. Recreational catches in 1987 from the Georges Bank stock exceeded 2,900 metric tons (6.4 million pounds).

Recently completed analyses indicate that the spawning stock (mature fish) of Georges Bank cod is depressed and at an all-time low. For the fifth consecutive year, spawning stock size declined. At the beginning of 1988, spawning stock biomass (the aggregate weight of all spawners in the popula-

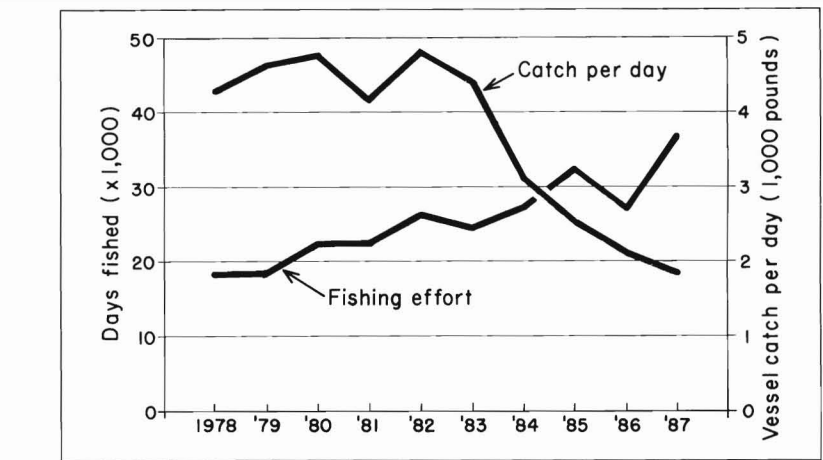


Figure 1.—Trends during 1978-87 in fishing effort for, and average catch per day per vessel of, Georges Bank cod.

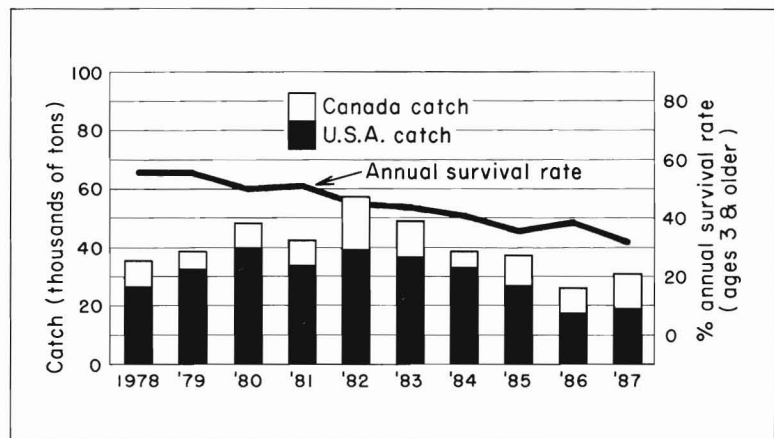


Figure 2.—Trends during 1978-87 in both the annual survival rate and the annual catch of Georges Bank cod. Survival rate is depicted for fish that are 3 years old or older (the ages that are fully vulnerable to commercial fishing operations) and is measured on the righthand percent scale. Annual catch is partitioned into U.S. and Canadian catches, and is measured on the lefthand scale in thousands of metric tons (one metric ton equals 2,205 pounds).

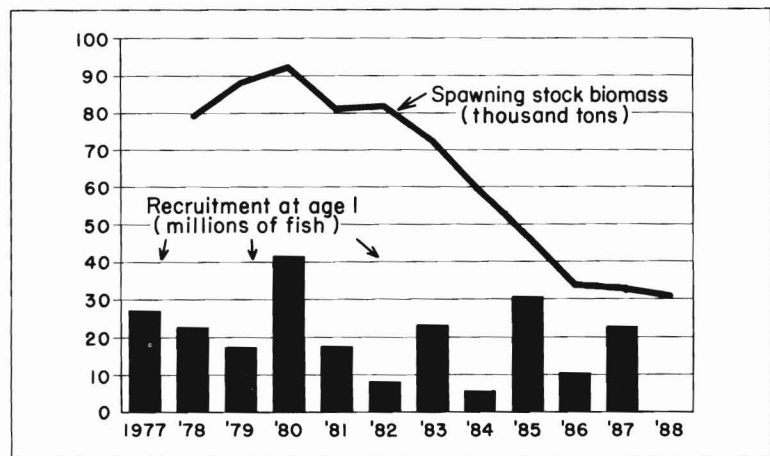
tion) was only 30.9 thousand metric tons (68.1 million pounds), the lowest value in the 11 years that such statistics have been computed. The present spawning stock size is only one-third of that observed in 1980.

Northeast Fisheries Center staff estimated that the 1988 U.S. commercial catch of Georges Bank cod would be about 23.8 thousand metric tons (52.5

million pounds), about 25 percent higher than in 1987. The increased 1988 catch would result from continued record high fishing effort and from the above-average number of cod hatched in 1985 (the 1985 year class) which have/will reach a size at which they are fully vulnerable to commercial fishing operations.

At the current fishing mortality rate,

Figure 3.—Trends during 1978-87 in spawning stock biomass and recruitment at age 1 for Georges Bank cod. Spawning stock biomass is measured in thousands of metric tons. For the bars representing recruitment at age 1, the year underneath each bar is the year that the cod were hatched; the height of the bar depicts how many millions of those fish survived to age 1 in the following year.



however, the 1985 year class will be quickly depleted. The 1989 fishery will then primarily depend on fish hatched in 1986 and those fish hatched in 1987 that have grown large enough to be caught by commercial fishing gear. Catches in 1989 are likely to drop dramatically since the 1986 year class is a poor one. Although the 1987 year class presently appears strong,

continued high fishing mortality and dependence by the fishery on young, mostly immature fish (ages 2 and 3) will prevent any rebuilding of the spawning stock from the current record-low levels.

Serchuk adds that "Cod is the predominant species landed in the U.S.

Atlantic coast groundfish fishery, generally accounting for more catch, by weight, than any other species. The sharp decline in the size of the Georges Bank stock to a level well below its normal historical range is a cause for major concern with regard to the future of this valuable resource."

Juvenile Snapper Habitat

Determining where juvenile deepwater snappers reside off Hawaii may not be one of life's great mysteries. But it is a question that has stumped scientists for years, according to George W. Boehlert, Director of the Honolulu Laboratory of the NMFS Southwest Fisheries Center.

The habitat of juvenile deepwater snappers was recently documented by Jeffrey J. Polovina, a fishery scientist with the Honolulu Laboratory. In October 1988, scientists caught three species of juvenile deepwater snappers—lehi, uku, and opakapaka—by hook and line outside Kaneohe Bay, Oahu, in the Hawaiian Islands. This study site was selected based on information obtained from a recreational fisherman who reported catching juvenile snappers occasionally while fishing there for wrasse. "Knowing the habitat type where juvenile snappers can be found fills a major gap in the

life history of the deepwater snappers," said Polovina.

The habitat of juvenile deepwater snappers is hard, flat coral covered by a thin veneer of sand and is in relatively shallow (40-70 m) water. Conversely, adult snappers prefer steep, rocky sites in deeper water (about 200 m) and with lots of vertical relief.

Ironically, a few years ago, this same juvenile habitat site was one of the sites considered by Honolulu Laboratory scientists for placing an artificial reef to provide habitat for adult deepwater snappers. Initial fishing and visual censuses had suggested this flat, sandy habitat was devoid of fish larvae. However, using a different sampling method (hook and line) resulted in finding an abundance of juvenile snappers.

"This is an interesting ecological lesson," said Polovina. "When you sample an area and don't catch fish, don't immediately assume that there are no fish. Nature has a way of taking

care of things . . . something will move into that niche."

"An artificial reef could have provided additional habitat for taape, a predator of juvenile snappers, thereby increasing the predators while decreasing habitat for juvenile deepwater snappers," said Polovina.

Documenting the juvenile habitat of these valuable commercial snappers is an important step in completing our knowledge of their life history. Now that scientists know the type of habitat juvenile snappers prefer, they can begin to determine when and where the juvenile deepwater snappers are located, thereby gaining insight into the recruitment patterns to the fishery. Such information ultimately will be extremely useful in managing the snapper fishery. The deepwater snapper fishery is one of Hawaii's most valuable fisheries, said Polovina. Commercial fishermen in 1987 landed 1.8 million pounds of deepwater snappers valued at \$5.3 million.

Drift-net Problems Hit South Pacific

Like video games and hamburgers, drift gill-net fishing (drift-netting) is becoming commonplace throughout the world. Its latest emergence is in the relatively unfished waters of the South Pacific by Taiwanese and Japanese drift-net fleets targeting surface schools of albacore. Concerned fishery officials of several South Pacific island countries met in Suva, Fiji, on 3-4 November 1988 to discuss ways to discourage the use of drift nets on the high seas of the South Pacific, according to George W. Boehlert, Director of the NMFS Southwest Fisheries Center's Honolulu Laboratory.

"This highly effective fishing technology brings with it considerable controversy and a host of knotty problems for fishermen, marine scientists and government fishery managers," said Jerry A. Wetherall, an albacore expert and Chief of the Honolulu Laboratory's Pelagic Resources Investigation, who attended the meeting. "One of the main problems is that drift nets entangle and kill other marine life occurring in the same area as the target fish species."

"Drift-net fishing occurs legally on the high seas, so the South Pacific fishery officials considered means to discourage drift-netting in the region by reducing economic incentives," said Wetherall. Albacore are the premium species of tuna for canning and a

resource of considerable interest to South Pacific islanders.

Albacore gill-netting on the high seas is economically attractive to its proponents because nets 15 miles or more in length, reaching from the sea surface down to 30 feet, can be set in the water, left to drift in the current overnight and hauled in at relatively low cost. The nets are made from multifilament nylon and have meshes about 7-8 inches wide.

Large albacore have been harvested for 30 years in deep waters of the South Pacific by fleets of longline fishing vessels from Japan, Taiwan, and Korea operating out of ports in Asia or the South Pacific. Recently it was discovered that smaller albacore could be caught in a narrow zone of the South Pacific stretching from New Zealand to Chile near lat. 40°S. In this area, water of the temperature preferred by albacore occurs at the sea surface, coincident with a zone relatively rich in forage. Albacore aggregate here to feed and are vulnerable to surface trolling and drift-netting as well as longlining.

Two trollers from the United States began a fishery in the area in 1986, followed by 7 trollers in 1987. In the 1988 fishing season, a fleet of 41 U.S. vessels was joined by trollers from Canada, Fiji, and French Polynesia. The troll fishery was so successful that several South Pacific island countries consider it a promising avenue for local economic development.

In 1988 drift-net fishing began on a small scale in the same area fished by the trollers. However, during the upcoming 1989 fishing season, January through April, the fleet of drift-net boats is expected to grow to as many as 80 vessels, each with a capacity of 200-300 tons of albacore. There is some concern that the increased catch of albacore by drift-net vessels, when combined with the catch already taken by longline and trolling fleets, may exceed the maximum sustainable yield of the population.

This situation is complicated by the fact that the actual mortality caused by drift-net fishing may be substantially greater than the observed catch. Some of the fish and other marine life entangled in the nets drop out during fishing and retrieval of the nets, and an unknown fraction of albacore dropping out die as a result of the encounter. Others suffer cuts and abrasions that reduce their value to troll and longline fishermen who may catch them later.

Troll fishermen also report that albacore behavior is affected by encounters with drift nets, reducing the effectiveness of troll fishing. The incidental mortality associated with albacore drift-netting in the South Pacific is also a potential problem. The incidental catch may include marlin, swordfish, seabirds, sea turtles and marine mammals. Such species as the southern fur seal and beaked whale may be at risk. Other methods of catching albacore, such as trolling or longlining are not detrimental to seabirds, sea turtles or marine mammals.

Another major problem caused by drift nets is the hazard they impose to fishing vessels and fishermen at sea. The nets are operated at night and are set at the water's surface, where they can easily entangle the propellers of vessels. Trolling vessels, and even the drift-net vessels themselves, have become disabled by drift nets. Fishermen are endangered when they are forced to dive under the vessel to cut the boat free. During gill-netting trials a few years ago in waters north of Australia, two Japanese fishermen drowned in such an effort.

The Suva meeting, which was

Connecticut Earns Sea Grant College

The University of Connecticut was designated a "Sea Grant College," the 23rd institution in the nation to receive the distinction, at a ceremony in Groton on 5 October. The designation recognizes the continuing responsibility exercised by the Connecticut Sea Grant Program since 1974 to develop and maintain excellence in marine resources research, education, and advisory/outreach programs.

Connecticut Sea Grant currently supports research programs in animal and plant aquaculture, coastal processes and engineering, mollusk population ecology/dynamics, marine economics, and tourism/recreation. Advisory and outreach programs address issues related to fisheries and seafood, aquaculture, environmental quality, and coastal development. The Sea Grant Program also provides funds for graduate education and a number of programs aimed at improving marine education.

called by the South Pacific Forum Fisheries Agency, was attended by representatives from American Samoa, Cook Islands, New Zealand, Fiji, French Polynesia, Tonga, and Vanuatu, as well as officials from the South Pacific Commission, the United Nations Development Program and South Pacific island fishing companies. Wetherall provided the group with technical information about the albacore resource and fisheries.

According to Wetherall, one of the means considered by the South Pacific fishery officials to discourage albacore drift-netting was for countries in the region to deny drift-net vessels access to their exclusive economic zones or ports for any purpose, such as provisioning, refueling, or transfer or delivery of catch.

"Another measure considered was for officials to persuade the canneries and transshipment facilities in the South Pacific to deal only in albacore caught by trollers and longliners, and not drift-netters," said Wetherall. The use of drift gill nets by foreign vessels has been banned within the 200-mile exclusive economic zone around Hawaii, Guam, and American Samoa. The actions taken by the South Pacific island countries add to the growing global resistance to drift-net fishing and show that concerns about negative effects of drift-netting exist even in the remote waters of the South Pacific.

Antarctic Ozone Drop Much Less Than in 1987

A springtime "ozone hole" which has appeared in Antarctica in recent years was considerably less deep in 1988 than it was in 1987, and even shallower than in 1986, the National Oceanic and Atmospheric Administration (NOAA) reports. Measurements with balloon-borne instruments launched by NOAA personnel at the South Pole in early October 1988 show that the amount of ozone in an air column above the site averaged more than 200 Dobson units, according to Walter Komhyr of the Commerce Department agency's Environmental Research Laboratories in Boulder, Colo.

Average early October values in 1986 and 1987 were 165 and 135 Dobson units, respectively; remarkably low ozone values for anywhere on earth, Komhyr said. If present trends continue, he noted ozone values during the latter half of October would approach those last observed at South Pole prior to 1980 when values on average during mid-to-late October were in excess of 250 Dobson units.

Ozone has been decreasing in the spring in Antarctica since the mid-to-late 1970's. Typically, the decrease each year begins in early September with ozone reaching minimum values in early October. The general downward trend has exhibited slight temporary ozone recovery in alternate years, with the largest recovery prior to 1988 occurring in 1986. The 1988 recovery was even larger.

The ozone hole occurs within the Antarctic polar vortex, a belt of strong west-to-east winds that circle the Antarctic during winter and spring months. Within the vortex in 1988, stratospheric temperatures at the South Pole in September and early October were 5°-10°C warmer than they were in 1987, and 2°-5°C warmer than in 1986. The warmer temperatures, Komhyr said, did not favor the formation of polar stratospheric clouds in 1988, as did the colder temperatures in previous years.

Stratospheric clouds promote the photochemical destruction of ozone by chlorine compounds derived from man-made chlorofluorocarbons. Polar stratospheric clouds form at temperatures colder than about -78°C. The ozone readings this 1988 austral spring in the Antarctic do not mean that the threat of reduced ozone levels globally no longer exist, Komhyr emphasized, nor does it portend the end of the Antarctic ozone hole. Rather, he said, the readings indicate that large year-to-year changes in ozone can occur from natural variations in atmospheric processes. The ozone monitoring program at South Pole is conducted by NOAA in cooperation with the National Science Foundation which is the agency responsible for the United States Antarctic Program.

Sea Turtles Dying Along SE Beaches

Record numbers of Kemp's ridley turtles were washing up dead on Florida and Georgia beaches late in 1988, according to scientists at the National Oceanic and Atmospheric Administration's (NOAA) Southeast Fisheries Center in Miami. Between about 13 October and early December, according to NOAA, at least 62 of the turtles were found dead.

"This increase doesn't mean that the overall turtle population has risen," said Nancy B. Thompson, turtle biologist at the Center. "Instead, we suspect that there has been an unusual aggregation of Kemp's ridleys in this area, likely a result of the availability of crabs and scallops, their principal food." According to Thompson, the number of dead turtles had continued to grow almost daily, and represented nearly an eightfold increase over the average number found on the same beaches in past years.

NOAA scientists were examining satellite images of the area to see if unusual weather or other environmental conditions might explain the deaths. Other possibilities, including drowning in fishing gear or inside dredging equipment and deliberate injury by humans, were also being looked at. Turtles can easily become trapped and drown inside the funnel-shaped nets of shrimp boats, NOAA said.

None of the turtles found on the beaches was still alive, Thompson reported, and only a few showed any sign of external injury. Most had begun to deteriorate. In addition to the Kemp's ridleys, the leatherbacks and 15 loggerhead turtles were recovered by scientists and concerned citizens, bringing the total number of stranded turtles to almost 80. One of the leatherback turtles was reportedly entangled in fish netting.

All the species of sea turtles found in U.S. waters are protected by Federal law and are listed as either threatened or endangered. The Kemp's ridley has been the subject of considerable research at the Miami Center in

the past decade. It is the most endangered of all sea turtles and nests almost exclusively on a single beach in Rancho Nuevo, Mex. In 1980, the Center assembled a Sea Turtle Stranding and Salvage Network involving state and Federal conservation and law enforcement authorities from Maine to Texas. The network compiles reports of dead or weakened turtles found on beaches or at sea. These reports are stored in a computer at the Center where they are available to researchers.

NMFS Scientists Improve Productivity with New Analytical Method

A new and improved method of chemical analysis for organic contaminants has been developed by scientists of the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS). The new method will enhance agency efforts to monitor the quality of the marine environment while maintaining analytical precision and reducing time and costs by as much as two-thirds.

The breakthrough came from research by Margaret Krahn and Donald Brown working with their associates under the direction of William MacLeod, Jr. and Sim-Lam-Chan in the Environmental Conservation Division of the NMFS Northwest Fisheries Center located in Seattle, Washington.

Usha Varanasi, Director of the Environmental Conservation Division, said "NOAA scientists have made a valuable contribution to environmental science and management." She added, "Even more savings will be realized when other agencies and groups, both public and private, successfully implement the method."

The new method separates organic molecules according to their sizes and shapes. This is accomplished during the isolation or "clean up" phase of the process involving high-pressure liquid chromatography. The new method is more precise because fewer steps are necessary and most of the steps have

been automated. Further, the new method requires less time to complete, provides a capability to monitor the chromatographic conditions, and reduces the amount of highly pure solvent needed.

The development of the new method was partially funded by other NOAA offices particularly the National Status and Trends Program and the Outer Continental Shelf Environmental Assessment Program of the Office of Oceanography and Marine Assessment. This improved method promises substantial savings to NOAA programs. When fully implemented the annual savings to NOAA could amount to a million dollars or more, which would allow a much more comprehensive and definitive approach to monitoring the status of the environment.

New Ocean Venting Field Found in Eastern Pacific

A spectacular field of underwater hot springs, minerals, and exotic animal life at least five city blocks long has been discovered on an underwater volcanic mountain range 100 miles off the Oregon coast, the National Oceanic and Atmospheric Administration (NOAA) has announced. A team of government and academic scientists made the discovery in late October 1988 during a series of dives on the Gorda Ridge, using a U.S. Navy deep submergence vehicle, the DSV *Sea Cliff*, according to Peter Rona the team's chief scientist.

The significance of the discovery, the Commerce Department scientist said, is that the United States now has within its Exclusive Economic Zone "a natural setting providing scientists a new frontier for scientific investigation to study first-hand how seafloor hot springs form metallic mineral deposits, support exotic forms of life, and influence the ocean environment." Rona said, large plates of the earth's crust are pulling apart, allowing seawater to seep through cracks and come in contact with hot volcanic rocks in the area of the find. The heated water leaches metals from the rocks, then

rises and deposits the metallic minerals on the sea floor.

Diving to depths of 10,000 feet on the eastern wall of a valley in the submerged volcanic mountain range, the scientists observed diffuse flows of low-temperature fluids seeping up through the sea floor, as well as geyser-like flows of high temperature fluids spewing through chimney-like structures up to 10 feet high. The temperature of the water in one of the hot springs was recorded at nearly 500°F, Rona said. Within the field of hot springs, toppled chimneys resembling fallen logs are strewn about the seafloor. Thickets of tube worms several feet high, topped with bright red plumes, are growing around the springs, and scientists saw crabs, octopi, deep-sea fish, and other animals.

The discovery was made as the party was carrying out geological and biological investigations of the northern Gorda Ridge. The expedition was coordinated by the Gorda Ridge Technical Task Force, a joint Federal-state working group established in 1984 by the secretary of the Department of the Interior and the governors of Oregon and California. Members of the dive team were from NOAA, the U.S. Geological Survey, Oregon State University, the Oregon Department of Geology and Mineral Industries, and the Universities of California (Davis) and Hawaii.

Recognizing the navy's contribution to the study by making the DSV *Sea Cliff* and its support vessel, the DSVSS *Laney Chouest*, available, the scientific team has designated the area—situated high above cliffs on the wall of a valley—as the Sea Cliff Hydrothermal Field.

Science, Agencies Tell Arctic Ozone Studies

Two Federal science agencies, the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA), announced in December 1988 a cooperative investigation to

understand better the nature of potential depletion of stratospheric ozone over the Arctic. During January and February 1989, scores of scientists from the two agencies and nearly a dozen other research organizations will carry out an airborne study similar to that done last year on Antarctic ozone depletion. That study directly implicated manmade chlorofluorocarbons (CFC's) as a cause of the "ozone hole" over Antarctica in the austral spring, and raised the question whether a similar phenomenon could be occurring in the Arctic, perhaps on a reduced scale.

Earlier in 1988, in smaller, separate field investigations, NOAA and NASA found elevated levels of chlorine compounds in the atmosphere over the Arctic, giving urgency to the forthcoming joint study. NASA Headquarters has organized the expedition and is providing overall mission management and support through its Upper Atmosphere Research Program, while NOAA's Aeronomy Laboratory is providing project science management, according to NASA's Robert Watson, the chief program manager.

Daniel L. Albritton, director of NOAA's Aeronomy Laboratory, Boulder, Colo., said the investigation will search for ozone-depletion processes within the Arctic vortex and their possible influence on ozone concentrations over heavily populated northern mid-latitudes. "If even a small fraction of the Antarctic loss is occurring in the Arctic," he said, "it would more than double the predicted high-latitude ozone depletion." The planned Airborne Arctic Stratospheric Expedition will fly specially instrumented NASA ER-2 and DC-8 aircraft into the Arctic

vortex from 1 January through 15 February 1989. The timing of the flights coincides with the statistically most active period for the formation of extremely low-temperature polar stratospheric clouds there. Such clouds are involved in the complex processes that result in the destruction of stratospheric ozone in the Antarctic polar vortex. Aircraft operations and management are being provided by NASA Ames Research Center, Moffett Field, Calif.

NE Fishing Vessel Catches Are Sampled

The Northeast Fisheries Center of the National Marine Fisheries Service's Northeast Region has awarded a contract to the Manomet Bird Observatory of Manomet, Mass., to conduct an experimental program of sea sampling. Under the contract, Manomet Bird Observatory will place biological technicians (sea samplers) aboard U.S. commercial fishing vessels in the Northeast to sample vessel catches and collect detailed information on vessel operations. The contract calls for sea sampling of about 200 commercial fishing trips between 1 January and 30 September 1989, covering six major Northeast fisheries.

Fisheries to be sampled are the small-mesh and shrimp fisheries in the Gulf of Maine, the large-mesh and experimental silver hake (whiting) fisheries on Georges Bank, the Nantucket Shoals trawl fishery, and the winter trawl fishery offshore of the Mid-Atlantic Bight and Chesapeake Bay.

According to Allen E. Peterson, Jr., Science and Research Director of the

NMFS Northeast Region, the purpose of the program is to provide fisheries scientists, economists, managers, and administrators with "detailed tow-by-tow information for better characterizing fishing operations, fishermen's catches, and fish populations off the Northeast coast." Peterson adds that such information is "essential for improving fisheries management in a manner which both conserves our renewable fisheries resources and addresses the economic interests of commercial fishermen."

Fishing Vessel Seized for Unpaid Penalties

The F/V *Explorer*, a fishing vessel out of Key West, Fla., was arrested on 14 November 1988, by the U.S. Marshal, with assistance from a National Marine Fisheries Service Special Agent, officers of the Florida Marine Patrol, and a U.S. Customs Service Agent, pursuant to an arrest warrant issued by the U.S. District Court in Miami, according to John L. Pedrick, Jr., Southeast Regional Counsel for the National Oceanic and Atmospheric Administration. The vessel was arrested to satisfy a maritime lien in the amount of \$82,864.50, plus accrued interest and penalties, for unpaid civil penalties assessed against the owner and operator of the *Explorer* for violations of the Magnuson Fishery Conservation and Management Act. If the penalties remain unpaid, the vessel will be sold under court order to satisfy the Government's claim. This is the first of the vessels to be arrested to satisfy unpaid Magnuson Act penalties owed to the Government.