Protection Agency led the fourth leg, investigating the effects of ocean dumping off the coasts of Delaware and Maryland, looking at bottom animals, taking samples, and observing areas affected by the dumping.

Jack Hathaway of the USGS Woods Hole laboratory was principal investigator for the fifth leg of the cruise, in the Baltimore Canyon trough and part of Georges Bank. The team examined gear left previously during a long-term study of the geology and biology of the areas. Finally, Redwood Wright of the Northeast Fisheries Center, NMFS, led the final leg to recover a current meter array lost last year at the eastern tip of Georges Bank.

Foreign Fishing Vessels Off U.S. FCZ Up In June

The number of foreign fishing and fishing support vessels sighted off U.S. coasts in June more than doubled those sighted in May, according to preliminary figures released by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service.

In June, 767 vessels were sighted as compared with 374 sighted in May, reflecting the normal increase of fishing effort by all countries during this season of the year. The June number is 203 vessels, or 21 percent, less than the record-breaking 970 vessels off our coasts in June 1976. The May 1977 total was 60 percent below the 924 vessels sighted in May 1976.

The foreign vessels were sighted off the coasts of New England, the mid-Atlantic states, Gulf of Mexico, west coast, and Alaska. The ships were from 8 nations, compared with 13 nations a year ago. The largest number of foreign fishing vessels, 621, was from Japan which had 581 vessels fishing for salmon and pollock off Alaska, 39 longline vessels fishing for tuna in the Gulf of Mexico, and 1 fishing for squid off New England and mid-Atlantic.

Included in the total for Alaska are 263 ships engaged in the salmon gillnet fishery. These ships are not required to have a permit under the 200-mile law but are issued registration permits by the State Department in compliance with the regulations of the International North Pacific Fisheries Commission.

The Soviet Union had 82 vessels, 37 fishing for hake off New England and mid-Atlantic, 26 fishing for hake off the Pacific coast, and 19 catching pollock in Alaskan waters. Canada, fishing under a reciprocal agreement with the United States, had 37 vessels, 18 fishing for haddock and cod off New England and mid-Atlantic, 16 fishing for salmon off the west coast, and 3 fishing for halibut off Alaska.

Spain had 14 vessels fishing for squid off New England and mid-Atlantic. South Korea had 5 vessels fishing for sablefish off Alaska. Poland had 5 vessels fishing for hake off the west coast. Bulgaria had two vessels fishing for hake off New England and mid-Atlantic. Taiwan had one vessel fishing for pollock off Alaska. A summary of foreign fishing vessels operating off U.S. coasts during June 1977 and June 1976 follows.

Foreign vessels sighted off the coasts in 1976 were as follows: January-420, February-510, March-435, April-560, May-924, June-970, July-842, August-543, September-514, October-452, November-258, and December-240. In 1977: January-319, February-314, March-180, April-235, May-374, and June-767.

Area	Nations	Number of vessels June 1977	June 1976
New England and mid-Atlantic	Russia	37	20
	Poland	0	10
	Bulgaria	2	0
	E. Germany	0	2
	Spain	14	16
	Japan	1	6
	Italy	0	2
	S. Korea	0	1
	Ireland	0	1
	Greece	0	1
	Canada	18	0[1]
		72	59
Gulf of Mexico	Japan	39	5
	Cuba	0	31
	Panama	0	1
		39	37
West coast	Japan	0	2
	Russia	26	89
	S. Korea	0	16
	Bulgaria	0	3
	Poland	5	4
	E. Germany	0	1
	Canada	16	0[1]
		47	115
Alaska	Canada	3	0[1]
	Japan	581	616
	S. Korea	5	53
	Taiwan	1	2
	Russia	19	88
		609	759
Total		767	970

[1]Number of Canadian vessels off U.S. shores not recorded.

NMFS Seeks New Approach to Tuna Fishing Rules

The National Marine Fisheries Service, in an effort to reduce the number of porpoises killed in U.S. yellowfin tuna purse seine fishing operations, has proposed quotas of 51,930 for next year, 41,600 for 1979, and 31,140 for 1980. This year's quota is 59,050. The Commerce Department agency, in proposed regulation changes published in the Federal Register on Wednesday, 20 July, seeks not only to establish new quotas but to be able to set quotas over a 3-year period rather than year-by-year.

"These proposed changes in the regulations represent a new approach to regulation of the incidental killing of porpoise in U.S. purse seine fishing operations," says Robert W. Schoning, Director, NMFS. "We believe the changes are an improvement over the present regulations since all concerned are told what they may expect over several years and they plan accordingly. We will review the regulations constantly so that they may be adapted to take advantage of any new technology that develops."

The intent of the proposed changes to the regulations published under the Marine Mammal Protection Act of 1972, is to achieve a 50 percent reduction in the number of porpoises killed in the fishery by 1980. This proposed reduction is a straight line projection and is considered technologically possible by NMFS scientists and gear specialists as fishing gear and techniques improve. The changes set limits on individual species which will not adversely affect the status of the stocks and also con-

sider the normal historic composition of the kill. Achievement of the 50-percent reduction would require that the average rate of porpoises killed per ton of tuna caught not exceed 0.5 in 1978, and be reduced to 0.4 in 1979, and to 0.3 in 1980.

Rules and regulations would be established to permit the amendment of regulations and permits through informal rule making during the 3-year period, rather than using formal hearings by an administrative law judge each year, unless major changes were proposed. In this event, a formal hearing would be required.

Additionally, certificates of inclusion under permits to engage in yellowfin tuna purse seining operations on porpoise would be issued to vessel owners rather than to boat captains, as is done under the present regulations. The changes also propose that tunaboats be required to install a porpoise apron system—a chute-like area in the back of nets designed to permit porpoises to escape.

Public hearings on the proposed changes began 22 August in San Diego, Calif., and concluded in Washington, D.C. After a review of evidence presented during the hearing, Administrative Law Judge Frank W. Vanderheyden will make recommendations on the proposals to the Director, NMFS.

Pileggi Cited for Market News Effort

Joseph Pileggi, staff assistant to the Associate Director, National Marine Fisheries Service, NOAA, received the National Market News Association's Distinguished Service Award at its 20th annual meeting, 22-25 June in San Francisco, Calif.

With nearly 40 years in government fishery work, with a large portion in market news activities, Pileggi was honored with a plaque and a certificate, for encouragement and support for the market news reporting services.

The association is an organization of market reporters, information specialists, and analysts, whose purpose is to improve market information.

URI Starts New Fisheries Observer Training Program

The training of individuals to enforce U.S. commercial fishing regulations aboard foreign fishing vessels in the 200-mile zone will be one of several new activities the University of Rhode Island (URI) Sea Grant Program will undertake this year. Graduates of the new fisheries observer training program will be qualified to represent NOAA's National Marine Fisheries Service on foreign fishing vessels. Observers gather biological data and monitor compliance with U.S. regulations limiting foreign fishing within the 200-mile limit.

Funding for this and for a variety of other marine-oriented research, education, and advisory efforts will come from a $1,258,000 grant from the National Oceanic and Atmospheric Administration (NOAA) announced by Secretary of Commerce Juanita M. Kreps. The State of Rhode Island will provide an additional $684,000 to support the Sea Grant activities, according to Niels Rorholm, Sea Grant Program Coordinator at the University. It has received funding for marine activities from NOAA's Office of Sea Grant since 1968.

Another new activity, conducted by URI's recently created Center for Ocean Management Studies, will be promotion of effective management of marine resources, particularly those within the 200-mile limit. Conferences, workshops, and short-term research studies will be conducted, Rorholm explained.

Other projects initiated this year will be a study on improving fuel efficiency aboard fishing trawlers by changing propulsion devices, an analysis of the impact of recreational fishing, and a doctoral program in resource economics.

Continuing Sea Grant projects at URI include refining and developing aquacultural systems for salmon, developing a fast and simple method for determining seafood quality, providing technical and scientific assistance to the state's Coastal Resources Management Council, and researching the degradation of metal fiber reinforced concrete.

The new grant will also support the extension work of URI Marine Advisory Service specialists, and the operation of the URI Marine Information Center.

Planned Yellowfin Tuna Import Embargo Delayed

An embargo on the importation of yellowfin tuna caught by foreign fishermen in association with porpoise, planned earlier this year, was delayed until 1 October, the National Oceanic and Atmospheric Administration (NOAA) reports. The embargo is against imports from those countries whose regulations do not meet the U.S. standards concerning the killing of porpoises during yellowfin tuna purse seine fishing operations.

The delay follows adoption of a resolution by the Inter-American Tropical Tuna Commission (IATTC) to take steps which may lead to a reduction of the numbers of porpoises killed by its member nations while "fishing on porpoise." Robert W. Schoning, Director of NOAA's National Marine Fisheries Service, authorized the delay after members of the Commission unanimously agreed to establish an international tuna-porpoise research and observer program.

"This positive move by the IATTC is encouraging," said Schoning. "The resolution is the first significant action taken by the IATTC to actively reduce the numbers of porpoises killed by its members in the yellowfin tuna fishery." The Commission will allow nonmember nations fishing in the Commission's Yellowfin Regulatory Area to participate in the program.

Modeled after an existing observer program conducted by NOAA—a Commerce Department agency—the IATTC effort will expand the amount of information available concerning the effect upon the porpoise population of yellowfin tuna purse seine fishing. IATTC member nations—the United States, Canada, Costa Rica, Nicaragua, Panama, Japan, Mexico, and

France—will employ the technicians to serve on their own tuna boats, but the sea-going specialists will be recruited, trained, and supervised by the IATTC staff.

Data collected by the observers will be analyzed by the Commission, which will distribute an estimate of the total porpoise kill without disclosing the kill rate by vessel or country. The program will be in addition to the observer program now being conducted by the United States. Public comments received and the status of the implementation of the IATTC resolution were to be evaluated before a final decision was made regarding the possible extension of the embargo date past 7 October.

Marine Worm "Cities" Studied off New York

Underwater plateaus of mud near New York's Fire Island are worm "cities" whose residents could be regulating the effect of pollutants on the marine environment there, scientists with the National Oceanic and Atmospheric Administration (NOAA) believe.

NOAA researchers aboard the *George B. Kelez* encountered the dense concentrations of marine tube worms during a survey of the sea floor south of Long Island. The study was part of NOAA's Marine Ecosystems Analysis (MESA) project, managed by the Commerce Department agency's Environmental Research Laboratories. A major goal of MESA is to study the effect of the area's human population on the marine ecosystem of the New York Bight—the corner of the Atlantic Ocean between Long Island and the New Jersey shore.

Tube worms affect both the physical properties and chemistry of sediments which settle upon mud banks inhabited by the creatures, according to Joel O'Connor of the MESA New York Bight office at Stony Brook, N.Y. Like the earthworm, as they burrow just beneath the surface of the ocean bottom they turn over the sediments, mixing them into the upper few inches of the bottom mud. Too, they bind the sediments together, making them less subject to erosion.

Mud from the string of bays along the south shore of Long Island washes through Fire Island Inlet and settles on the sea floor. It may be "natural" mud stirred up by storms or tides, or it may come from human sources. Domestic septic tanks, polluted canals, industrial outfalls all empty into the Long Island bays. The worms could be imbedding these pollutants in the sediments. MESA researchers plan to analyze samples of the mud for pollutants, to find out.

George Freeland, a researcher at NOAA's Atlantic Oceanographic and Meterorological Laboratories in Miami, said the mud banks rise up to 8 inches (20 cm) above the otherwise smooth, sandy bottom. They are concentrated near the mouth of Fire Island Inlet, but extend up to 4 miles (7 km) to the southwest. Freeland also noted a sharp break between the edge of a mud patch and the surrounding sand: "In a space of 3 or 4 inches (7.5 to 10 cm), you go from one to the other."

Another question to be answered, Freeland said, is whether the worms are squatters or homesteaders. "We don't know whether the worms found a little mud, settled there, and accelerated the accumulation of more mud, or if they built it up themselves through feeding and elimination processes. In short, which came first, the worms or the mud?"

Such worm banks are not uncommon, according to O'Connor. The existence of the patches of mud off Fire Island had been known for some 40 years, but the actual extent and nature of the worm banks had not been realized until the NOAA survey.

The amount of mud, as well as its source, is uncertain. It ranged from 6 percent of total sediment in some areas to as much as 30 percent in one spot. Freeland hopes that divers will soon be able to descend and collect samples by hand, to find out just how much mud there is in the worm banks. Meanwhile, another MESA cruise is making additional photographic and sonar scans of the area, and collecting more sediment samples.

Aquaculture Boosts Yellow Perch Supply

Great Lakes yellow perch—long a favorite for Friday night fish fries in that region—are being grown four times faster in a Sea Grant aquaculture research project than they grow in nature. Through technology developed by the Commerce Department-supported researchers at the University of Wisconsin, the popular perch can be raised to marketable size in tanks in just 10 months. It takes perch almost 3½ years to reach this size growing in the wild, according to the scientists.

Research into yellow perch aquaculture at the University of Wisconsin began in 1973. Pollution conditions in the Great Lakes had caused the supply of yellow perch to dwindle alarmingly, creating serious problems for the commercial fishermen on the lakes as well as for the restaurant and tavern owners who were dependent upon the perch for popular Friday night fish fries. As a result of the research, an estimated 20 commercial perch fish farms have been started in Wisconsin, and at least two have marketed their first crop, university researchers who have assisted in the establishment of the private aquaculture projects said.

Much of the research carried out with perch can be applied to walleye pike, although pike take longer to grow to a marketable size, according to the scientists who have begun work with the pike. The researchers warn that perch rearing will continue to be a high risk venture until there is greater knowledge of fish handling techniques, fish diseases, water treatment systems, and the economics of aquaculture.

Future work, under grants from the National Oceanic and Atmospheric Administration's Office of Sea Grant, will concentrate primarily on genetics

and diet, the scientists reported. They also will study energy conservation methods, since energy is a key cost factor in fish farming. The scientists hope to develop a way to use solar energy to help reduce those costs.

To assist individuals interested in raising the fish, the researchers have produced a brochure answering 36 most commonly asked questions about raising fish in indoor tanks. Copies of the brochure may be obtained without charge by writing the University of Wisconsin Sea Grant Communications Office, 1800 University Avenue, Madison, WI 53706.

SOLAR ENERGY STUDIED FOR SEAFOOD INDUSTRY

The Virginia Polytechnic Institute and State University has been awarded a $70,000 Sea Grant to study energy use by the State's seafood industry and the possibility of its utilizing alternative energy sources such as solar heating. The grant from the Commerce Department's National Oceanic and Atmospheric Administration will be augmented by $47,500 from VPI&SU.

Specialists from the Blacksburg, Va., institution, along with experts from utility companies, will carry out "energy audits" at oyster and clam shucking houses and at crab and finfish processing plants to determine how much energy is required for such activities as processing, heating and cooling, and lighting. Economists also will examine the possibility of using solar energy for water and space heating, as well as for other processing operations.

Even if each of the State's seafood processors saved only $100 per year, the scientists claim, this would conservatively represent an annual saving of more than $35,000 to the Virginia seafood industry and would reduce overall energy demand.

In addition to the energy study, the grant will fund development of a business management assistance program to help stimulate seafood sales and assist processors in reducing transportation and storage costs. This year's grant will also support an education program for managers and workers employed in harvesting, processing, and marketing seafood, which could save the industry hundreds of thousands of dollars and improve the quality of seafood available to consumers.

Surf Clam Fishery Now "Conditional"

The surf clam fishery along the Atlantic Coast has been classified as a "conditional fishery," making it ineligible for some types of government financial assistance programs, according to the National Oceanic and Atmospheric Administration (NOAA).

United States landings of Atlantic surf clams, mostly in waters from New York to North Carolina, dropped sharply in 1976 because of over-harvesting and high mortality rates.

The adoption as a "conditional fishery" rules out the use of National Marine Fisheries Service (NMFS) financial programs to add more surf clam fishing vessels to the existing fleet. Funds would continue to be available, however, to assist vessel owners in the fishery to upgrade existing vessels, or to replace vessels lost or withdrawn from the fleet. Robert W. Schoning, NOAA's Director to NMFS, said the surf clam fleet is now as large as the resource can support.

One of the contributing factors that led to the decision to declare the fishery conditional was the high 1976 mortality of clams from an area that traditionally has accounted for two-thirds of domestic clam production. The loss was caused by a severe and prolonged lack of dissolved oxygen in the bottom waters of the ocean in a 3,500-square-mile area off the coast of New Jersey last summer, following development of a gigantic bloom of algae in the offshore, subsurface waters from Chesapeake Bay to Rhode Island. Decomposition of the algae bloom used up the dissolved oxygen in bottom waters, and resulted in the wholesale mortality of surf clams, and of other bottom-dwelling marine organisms.

Financial assistance programs of the Commerce Department agency help fishermen finance or refinance the cost of constructing or reconditioning fishing vessels. Under the Fishing Vessel Obligation Guarantee program, a NMFS guarantee can provide 15-year financing at reasonable interest rates for up to 75 percent of the cost of constructing or reconditioning fishing vessels.

The Capital Construction Fund program may be used to obtain deferment of Federal taxes on income derived from commercial fishing operations when such income is deposited in a special fund with the intention of using it for constructing, reconditioning, or (under limited circumstances) acquiring a commercial fishing vessel. Both of these programs will remain available for replacement or construction of vessels already operating in the fleet.

Limited Alaska Marine Mammal Take Suggested

Administrative Law Judge Malcolm P. Littlefield has recommended that the National Marine Fisheries Service and the U.S. Fish and Wildlife Service permit limited harvest of nine species of marine mammals found in Alaskan waters and that the State of Alaska be permitted to manage the animals. Six of the species are under the jurisdiction of the Department of Commerce.

Under the Marine Mammal Protection Act of 1972, the moratorium against taking marine mammals can be waived for the protected species if the stocks of marine mammals are at their optimum level, regulations for the conservation of the animals are provided, and formal rulemaking procedures are followed.

The Judge recommended that the numbers of the Commerce Department-regulated species taken annually be limited as follows: northern sea lion, 7,800; beluga whale, Cook Inlet stock, 10 and Bering-Chukchi Sea stock, 350; harbor seals, land-breeding, 8,461 and ice-breeding, 5,700; ringed seals, 20,000; ribbon seals, 500; and Pacific bearded seals, 4,000. The Judge found that an annual harvest that did not exceed these limits would maintain these stocks at a satisfactory level. The other three Alaskan species, polar bear, sea otter, and Pacific walrus, are under the jurisdic-

tion of the Department of the Interior.

Judge Littlefield also indicated that before the waiver is granted and management responsibility is returned to Alaska, the State should develop detailed regulations which incorporate sound principles of resource protection and conservation including research, enforcement, census, habitat acquisition and improvement, and public participation in the development of game regulations. A summary of the major points of the recommended decision applicable to Department of Commerce species was published in the Federal Register on 20 July.

COD, SNOW CRAB QUOTAS REACHED

The 1977 quotas were reached by July for cod that can be taken by U.S. commercial fishermen in the Gulf of Maine, and for snow crabs that can be taken by Japanese fishermen in the Bering Sea south of the Pribilof Islands, the National Oceanic and Atmospheric Administration's National Marine Fisheries Service has announced.

The cod quota of 5,000 metric tons was established for U.S. commercial fishermen by the New England Fishery Management Council under terms of the Fishery Conservation and Management Act of 1976. Foreign fishermen are not permitted to catch or retain any of three species of fish, including cod, covered by that plan. Although fishing specifically for cod is now prohibited, incidental catches are permitted if they do not exceed 5,510 pounds or 10 percent by weight of all other fish on board the commercial vessel.

Japanese crab fishermen reached their quota of 5,600 metric tons of snow crab in the eastern Bering Sea south of the Pribilof Islands on 30 June. An additional Japanese quota of 6,900 metric tons of snow crabs that may be caught in other areas of the Bering Sea is expected to be reached by the end of this month. National Marine Fisheries Service observers have been on board Japanese processing vessels monitoring the catch, the Commerce Department agency reported. U.S. fishermen are not restricted to the amount of snow crabs they may catch in the Bering Sea.

The U.S. snow crab fishery has grown steadily in the past several years, from a catch of about 50 metric tons in 1972 to more than 10,000 metric tons in 1976. As the capability of the American fleet increases, the amount allotted to foreign countries will decrease.

Fish Retail Price Index Up 0.6 Percent in June

The retail price index, seasonally unadjusted, for fish rose again in June by 0.6 percent over May and by 13.5 percent above June 1976, according to a monthly statistical analysis by the National Marine Fisheries Service. The May index was 1.3 percent over April 1977 and 13.8 percent above May 1976.

Of the 17 frozen and canned fishery products surveyed in June by the Commerce Department agency, an element of the National Oceanic and Atmospheric Administration, 7 increased, 9 declined, and 1 was unchanged. Prices increased for cod, ocean perch, whiting, and turbot fillets; canned red salmon; canned Norway sardines; and fish portions.

On the other hand, prices decreased for flounder fillets, halibut steak, king crab meat, canned solid white and chunk light tuna, canned pink salmon, canned Maine sardines, fish sticks, and breaded shrimp. The price for haddock fillets remained the same.

Meat prices rose 0.9 percent in June from May on the strength of higher pork prices. Retail poultry prices in June declined 3.6 percent from May. When compared to a year earlier levels, the price for meat increased 1.9 percent and for poultry increased 1.2 percent.

Ten cities are surveyed every month by NMFS officials who report prices of selected items of fish, meat, and poultry items for "Operation Fish Watch." They visit three different chain stores in each city and check the prices for the same representative brand names and types of products to determine any changes from the previous month.

The cities surveyed are: Atlanta, Ga.; Boston, Mass.; Little Rock, Ark.; Galveston, Tex.; San Francisco and Los Angeles, Calif.; Pascagoula, Miss.; St. Petersburg, Fla.; Seattle, Wash.; and Washington, D.C.

SHRIMP CULTURE GRANT AWARDED

A Massachusetts-based firm, Groton BioIndustries Development Company[1], has received a $29,900 grant from the National Oceanic and Atmospheric Administration's Office of Sea Grant to investigate commercial shrimp aquaculture. The Commerce Department agency grant will be augmented by $34,300 in matching funds from Groton BioIndustries and Maricultura, S.A., a Costa Rican aquaculture company associated with the U.S. firm.

Aquaculture scientists will spend a year at a shrimp farm in Central America, gathering biological data from "growout" ponds—small, earth-bottomed enclosures used for raising shrimp from the early larval stage to market size. Extensive growout habitats are by design similar to natural shrimp habitats, according to Harold H. Webber, president of Groton BioIndustries. Advocates of extensive aquaculture believe that shrimp will grow under artificial conditions if enough of the natural conditions are duplicated.

"The problem," said Webber, "is in knowing what to do if the artificial system fails or if better than natural performance is wanted. Without a theoretical understanding of how a system works, the extensive culturist can do little but try to duplicate the natural environment."

One problem that can be particularly vexing to shrimp farmers is the sometimes wide variation in productivity between neighboring growout ponds, even when the species of shrimp, feed, sunlight, and other factors are apparently identical. The researchers hope to use their findings to create an ecological model of a pond to determine how to increase productivity most economically.

[1]Mention of trade names or commercial firms does not imply endorsement by the National Marine Fisheries Service, NOAA.