

## U.S. Commercial Fish Catch and Value Jump in 1976

United States commercial fishermen had a successful year in 1976, landing more fish than in any year since 1962 and more edible fish than in any year since 1952, Robert W. Schoning, Director, National Marine Fisheries Service, has announced.

The near-record total landings came to 5.4 billion pounds of fish, for a total value of \$1.4 billion, he said. This was up 39 percent from the value of commercial fish landed in 1975, \$971 million. The quantity landed was 11 percent more than in 1975 and only 4 million pounds less than the 1962 record.

Record landings of two important shrimp, 404 million pounds—and improved landings of crabs, 345 million pounds; salmon, 309 million pounds; flounders, 165 million pounds; and cod and other groundfish, 157 million pounds, accounted for a large share of the increase.

“Commercial landings in the United States of edible species,” Schoning said, “were 2.8 billion pounds, valued at \$1.3 billion, up 14 percent in quan-

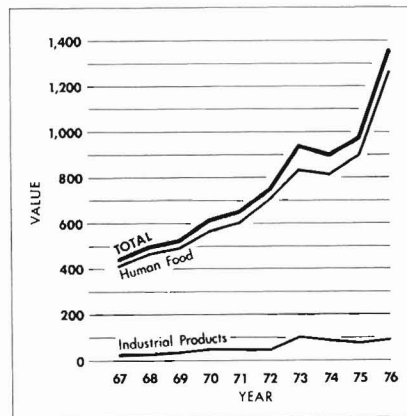
tity and 40 percent in value.” The quantity landed was considerably above the average for the previous 5 years.

Landings at U.S. ports of species used for reduction to fish meal and for other industrial purposes were 2.6 billion pounds valued at \$89 million in 1976. This quantity, 7 percent greater than in 1975 and 5 percent above the average for the previous 5 years, was short of the record amount landed in 1962. The increase in quantity was due to heavy landings of menhaden.

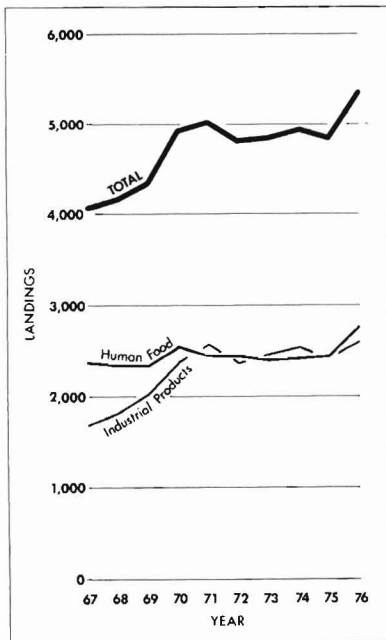
The total value of domestic production of processed fishery products (edible and industrial) was \$3.2 billion in 1976, up 22 percent over 1975. The value of edible products, which comprise almost 90 percent of the total, was nearly \$2.9 billion, up 23 percent in 1976. The value of industrial products in 1976 was \$377 million, up 16 percent over 1975.

World landings in 1975 were 69.7 million metric tons (153.7 billion pounds) down 1 percent from the 1974 production of 70.5 million metric tons (155.4 billion pounds). Japan, with 15 percent of the total landings, continues to be the world leader in fishery landings, followed by the U.S.S.R. with 14 percent, the Peoples Republic of China was third with 10 percent, followed by Peru, 5 percent, and the United States, 4 percent. The United States was in fifth place for the third consecutive year.

Value of U.S. commercial landings of fish and shellfish, 1967-76, in millions of dollars.



United States commercial landings of fish and shellfish, 1967-76, in millions of pounds.



Catch and value of several important marine species, 1975-76, by U.S. commercial fishermen.

Species	Thousand pounds		Thousand dollars	
	1975	1976	1975	1976
Tuna	391,149	485,506	108,377	149,765
Shrimp	343,586	403,577	226,240	331,375
Crabs	300,950	344,810	84,135	136,955
Salmon	201,591	309,242	116,298	196,496
Flounders	156,324	164,682	43,233	52,007

Source: Fisheries of the United States, 1976.

During 1976, U.S. ex-vessel prices (prices received by fishermen for their landings) moved upward in most months and were at, or near, record levels by the end of the year. The largest gains were for shellfish. The same upward movement was apparent in prices quoted at the wholesale level for fresh, frozen, and canned fishery products.

Per capita consumption for the United States in 1976 reached 12.9 pounds of edible meat per person, tying the record set in 1973. This was 0.7 pound more than the 12.2 pounds eaten in 1975.

## New Weather Services Designed for Mariners

New types of environmental services tailored to the needs of mariners are being developed by National Oceanic and Atmospheric Administration (NOAA) meteorologist-oceanographers in Seattle. The experimental effort by the Commerce Department agency's National Weather Service combines computer predictions of winds, waves, ocean swell, and weather with "handmade" analyses of satellite data, Arctic ice-cover data, ship observations, and other weather information.

Its products include forecasts for tug and barge traffic based in Puget Sound and en route to Alaska, ice advisories for the Bering and Chukchi seas, and special forecasts for NOAA research vessels and for people caught in

weather-connected emergencies at sea. Developed by the Seattle Ocean Services Unit of the Weather Service Forecast Office, these products give the mariner a degree of specialized weather information similar to that given aviators for cross-country flights. The difference is that ocean forecasters have a limited picture of actual weather conditions at sea, and so have less information upon which to base a prediction.

The Seattle unit is led by Robert Anderson, formerly with the Naval Oceanographic Office in Maryland, and ocean forecaster Bill Burton. NOAA Lieutenant Commander Kenneth Lilly, and Captain Graham Britton, Royal Navy (ret.), a noted British meteorologist associated with the Sea Use Council, pioneered the present set of experimental services. (The Sea Use Council is a private, regional organization concerned with the long-term scientific and economic development of the northeastern Pacific area.) Two additional forecasters are joining the unit this year.

"We've been developing a family of special services for NOAA vessels," Lilly said, "to give them a better meteorological context for their operations, especially in Alaskan waters, where weather changes quickly. At present, the forecasts provided extend to only 24 hours. Last fall, we began providing 24- and 48-hour forecasts, and outlooks that extend to 3-7 days, depending on how fast the weather systems are moving. We also issue summaries of Navy ice charts and bulletins and NOAA ice information tailored to the particular needs of our ships."

Because their products are experimental, the Seattle forecasters are free to try innovative approaches and formats, unconstrained by the usual stringent requirements of Weather Service Forecast Offices. Thus far, the Ocean Services Unit has been trying to evaluate how well the services fit the needs of particular users, and whether the products should be considered as possible additions to the regular run of Weather Service data.

"There's quite a variety," according to Lilly who this spring returned to sea duty on the NOAA Ship *Discoverer*.

"We've been responding to tug and barge companies, giving their dispatchers weather data and general outlooks. This can be valuable to them, in the sense it helps them decide whether to keep to the coastal passages along southeastern Alaska, or to cut across the Gulf, which saves time and money."

When the occasion arises, Lilly noted, the experimental service is used to help someone in trouble. "We had one sailboater coming up from Hawaii who radioed that he had a broken spreader bar, which means he couldn't tack into the wind. His wife would call daily and we'd tell her how he could avoid tradewinds and strong westerlies, where fog was predicted, and the outlook for waves and swell."

Alyeska Pipeline called last spring, Lilly said, wanting a forecast out to 6 or 7 days because they were shipping a critical cargo to Alaska. "We could

### NMFS WILL INSPECT ARMED FORCES FISH

The inspection of certain fish products for the Armed Forces has been transferred from the Department of Defense to the Department of Commerce. Inspectors from the Commerce Department's National Marine Fisheries Service (NMFS)—the agency charged with setting quality standards and inspecting and certifying fishery products—will assume the responsibility from the Defense Logistics Agency.

The NMFS currently inspects over 800 million pounds of fisheries products annually under its voluntary, fee-for-service program. "Under our contract inspection service, special attention is given to plant sanitation, product safety and wholesomeness, quality, species identification, and proper labeling for either fresh or processed fish products," Thomas J. Billy, Chief of NMFS' Seafood Quality and Inspection Division, said.

give them a 5-day forecast, and the forecast turned out to be an accurate one." Other special forecasts have been made for area sailboaters, for NOAA's data-buoy developers, and for the Bicentennial sailing vessel *Explorer* on the Pacific coastal leg of her voyage to New York.

According to Lilly, the trend in Ocean Services Unit is toward developing improved marine weather forecasts for the general boating public. "We're looking now at whether the marine weather forecasts can be made more detailed, and perhaps upgraded with some special forecasts of the type we're doing now."

The ocean weathermen, with research assistance from NOAA's Pacific Marine Environmental Laboratory, also are bringing more "wet" data into their meteorological work, to develop new products for people who use the sea. For example, they expect to develop regional sea-surface temperature maps, based on data from ships and the infrared sensors aboard NOAA satellites. These maps will show where the boundaries are between thermal regimes in the sea—boundaries that generally mean good fishing. They also are refining their forecasts of conditions over the Columbia River bar, where combinations of bar structure and wind fields can produce extremely hazardous conditions.

Another aspect of the work is to get out and talk to the people who use marine weather information, to see what that public—a very large public in the Northwest—feels it needs. A handbook on hazardous weather for small boat operators in Washington is in the works, as part of a related public education effort.

The experimental ocean weather information takes several forms. One is a surface weather chart similar to those prepared for the continent, but analyzed in extensive detail for the coastal waters of the Northwest.

Weather advisories for NOAA ships and tug and barge traffic between Seattle and the Bering Strait use a map with 14 letter-designated locations—location W, for example, is about 90 miles (144 kilometers) northwest of

Cape Flattery. These messages include outlooks for gales and predicted wave-heights at those locations for the ensuing 24 and 48 hours, and third-day outlooks for the Gulf of Alaska and Bering Sea. They bring together in one package forecasts which have originated in Weather Service Forecast offices in Anchorage and Seattle.

## Tuna-Porpoise Rules Listed For 1977

Regulations that will further reduce the number of porpoises killed by U.S. tuna fishermen have been published by the National Marine Fisheries Service, an agency of the Commerce Department's National Oceanic and Atmospheric Administration. A quota of 59,050 porpoises has been established for 1977, a 24 percent reduction from the 1976 quota of 78,000. Except for a short period of time, fishermen have been prohibited from encircling porpoise with their nets since November 1976, pending issuance of the new regulations.

Following issuance of the regulations, fishermen can apply to NMFS for permits to take marine mammals incidental to their fishing operations. Prior to issuance of a permit, the National Marine Fisheries Service must forward the evidence developed from the application and its recommended disposition of the permit application to the District of Columbia Circuit Court of Appeals for its approval. Normally, the American Tunaboat Association applies for a general permit and individual fishermen later apply for certificates of inclusion to operate under the general permit. The association's general permit was issued in April (see following article).

The regulations and quota apply to U.S. fishermen conducting yellowfin tuna purse seine fishing operations. They forbid setting nets around mixed schools containing eastern spinner (which is considered depleted), coastal spotted, and Costa Rican spinner dolphins (for which no population estimates are available). Sets are also prohibited on "pure" schools (schools of

one species only) except offshore spotted and common porpoise.

Porpoises frequently are found in association with schools of yellowfin tuna and thus are used by fishermen to locate the tuna. In the course of fishing operations porpoises may become entangled in the fishing nets and suffocate.

Detailed quotas established by the regulations are as follows: 1) 43,090 offshore spotted dolphin; 2) 7,840 whitebelly spinner dolphin; and 3) 8,120 of 10 other incidental species of dolphin.

The quotas are based on the recommendation of an Administrative Law Judge, who heard information presented during hearings last fall, and on the requirements of the Marine Mammal Protection Act of 1972 which directs that incidental mortality be reduced to an insignificant level approaching a zero rate.

All fishermen who operate under the

permit to take marine mammals must also agree to take an NMFS observer aboard their vessels, upon request, to conduct research and observe operations. It was expected that observers would be placed on approximately 40 percent of all tuna vessel trips after mid-April, if supplemental appropriations were approved.

Other provisions of the regulations provide that marine mammals taken incidentally to fishing be immediately returned to the ocean; that fishermen take steps to minimize incidental kill and serious injury to marine mammals; that they maintain daily logs on all sets in which marine mammals are taken; and that certain types of gear and fishing procedures be used, including a large area of small-mesh porpoise safety panel. The regulations also forbid importation of any fish that were caught in a manner which is prohibited by the regulations.

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## Permit Issued to U.S. Tunaboat Group for 1977

The Commerce Department's National Oceanic and Atmospheric Administration announced on 15 April that a general permit, for the taking of marine mammals incidental to yellowfin tuna purse seine fishing operations, had been issued to the American Tunaboat Association, San Diego, Calif., on behalf of all U.S. yellowfin tuna fishermen.

The general permit was issued by NOAA's National Marine Fisheries Service under previously established regulations relating to encircling gear used during yellowfin tuna purse seining operations in the eastern tropical Pacific. It is valid until 31 December 1977, unless amended, suspended, or revoked by the Director of the National Marine Fisheries Service (NMFS). Under the permit, no more than 59,050 porpoises may be killed in 1977, a 24 percent reduction from the 1976 quota of 78,000.

After 14 March, yellowfin tuna fishermen had been allowed to fish on porpoise under a court order which permitted them to kill up to 9,972 porpoises until a new permit was issued.

However, they were prohibited from taking any whitebelly and eastern spinner porpoise. Under the 1977 permit, they will be permitted to kill up to 7,800 whitebelly, but the prohibition on eastern spinner remains. Those already taken this year will be counted as part of the total allowable kill for 1977.

Regulations and the permit forbid U.S. fishermen conducting yellowfin tuna purse seine fishing operations from setting nets around mixed schools containing eastern spinner (considered depleted), coastal spotted, and Costa Rican spinner dolphins. Sets are also prohibited on "pure" schools (schools of one species only) except offshore spotted and common porpoise.

The general permit was issued in compliance with regulations issued on 1 March (see previous article), under the Marine Mammal Protection Act of 1972. The Act was passed to protect, maintain, and if necessary, rebuild the populations of marine mammals and, among other things, restricts the taking and importing of marine mammals and marine mammal products.

As there are times when fishermen

might unavoidably take marine mammals during their normal fishing operations, the Act and regulations provide for the issuance of general permits and certificates of inclusion that allow fishermen to take marine mammals incidental to their commercial fishing operations.

Other conditions of the general permit and the certificates of inclusion under the permit require, among other things, that U.S. commercial fishermen take special measures and use special fishing gear to avoid seriously injuring or killing marine mammals in their fishing operations.

In order to ensure that the quota is not exceeded, NMFS observers will be used to obtain scientific and biological information and monitor the number of porpoises that are killed by the fishermen.

### **NOAA-U.S. Navy Start Ice Forecasting Center**

The U.S. Navy and the National Oceanic and Atmospheric Administration (NOAA) are establishing a Joint Ice Center for the forecasting and reporting of ice formations in the waters of the Northern Hemisphere, the agencies have announced.

Moving to meet an expected increase in need for ice information as resources of the Alaskan area are further developed, the two agencies will pool existing activities, to be located at the Navy's Fleet Weather Facility in Suitland, Md.

The Joint Ice Center will provide ice forecasts and advisories to support activities of the Department of Defense, and also will provide advisories and guidance to NOAA's National Weather Service. The guidance will be used by the NWS forecast office in Fairbanks, Alaska, to prepare ice forecasts for Alaskan area waters.

Two other elements of NOAA—a Commerce Department agency—will contribute to the Center; the National Environmental Satellite Service and the Environmental Research Laboratories.

The satellite arm of NOAA will make available ice pictures and interpretation from its polar-orbiting satel-

### **Skamania Salmon Hatchery Gets Anti-Pollution Funds**

A \$475,000 contract for the State of Washington Department of Game to construct pollution abatement facilities at its Skamania Hatchery has been awarded by the National Oceanic and Atmospheric Administration (NOAA). In operation since 1957, the Skamania Hatchery is located in the Lower Columbia area in the western foothills of the Cascade Range, and produces between 90,000 and 130,000 pounds of summer steelhead trout juvenile fish each year.

Construction at the Skamania Hatchery will include two 6 × 22.5 × 60-foot sedimentation ponds, relocation of spawning ponds, extensive replumbing of the water supply, and pond cleaning lines throughout the hatchery.

Some of the sludge collected in the sedimentation ponds will be used for fertilizer on state hatcheries and forest grounds. The re-

mainder of the sludge will be deposited in sanitary land fills.

The hatchery at Skamania is one of 21 State and Federal hatcheries funded by the Commerce Department's NOAA and its National Marine Fisheries Service under the Columbia River Fisheries Development Program. Undertaken in 1948, the program aims to reduce the losses of salmon and steelhead trout caused by Federal Water Development Projects. Construction at Cascade is part of a continuing effort to provide pollution abatement facilities at all Columbia Basin Fish Hatcheries funded by NOAA.

Other Columbia Basin hatcheries funded by NOAA where abatement facilities have already been constructed are Kalama State Hatchery in Washington, and Eagle Creek National Fish Hatchery and Gnat Creek State Hatchery in Oregon.

lite system, while the Pacific Marine Environmental Laboratory in Seattle, Wash., will develop improved short-range (3- to 5-day) forecasts through numerical modeling, and longer-range ice "foreshadowing" through climatological studies.

Supporting studies of ice dynamics will be done under contract to the Seattle laboratory by AIDJEX, the National Science Foundation-Office of Naval Research Arctic Ice Dynamics Joint Experiment.

The Navy, which has conducted research into ice formation and movements for several decades, will perform aerial ice reconnaissance from both Navy and civil aircraft flying over the Arctic ice fields.

Research and development activities in the past by the Navy have established a solid foundation of knowledge about ocean ice phenomena, contributing significantly to the quality and reliability of ice forecasting.

### **USSR Fishing Fleet Told to Conserve Butterfish**

The Soviet fishing fleet off the Atlantic Coast of the United States has been instructed by the Russian Deputy Minister of Fisheries to conserve butterfish stocks in those waters. Additionally, Soviet fishing captains have been told to adopt all reasonable measures to insure the safe transfer at sea of U.S. personnel boarding Russian vessels for inspection purposes.

These were among matters discussed between Soviet and United States officials in early March in New York. Representing the U.S. Commerce Department was Carmen Blondin, Assistant Director of the Office of International Fisheries, National Marine Fisheries Service, while Iurii A. Znamensky, Fisheries Attache with the Soviet Embassy in Washington, represented the USSR. Also attending were members of the U.S. Coast

Guard, NMFS personnel, and three Soviet fleet managers in charge of fishing operations off the U.S. coast.

The fleet managers stressed that Russian fishermen had been advised that when fishing for Atlantic hake, after the first trawl resulting in incidental take of butterfish, they must release the trawl in its entirety. If butterfish are caught on the second haul, the vessels must leave the area and fish for hake elsewhere.

The meeting included discussion of the new 200-mile limit regulations which became effective 1 March, and which already apparently have affected the number of Soviet vessels fishing off the Atlantic coast. Last year in March, 91 USSR fishing vessels were sighted off the coast from Maine to Cap Hatteras, while this year, as of 4 March, there were only 11 stern factory trawlers and four support vessels in these waters.

## February Drop in Foreign Fishing off U.S. Coasts "Probably Due" to FCMA

The 314 foreign fishing and fisheries support vessels sighted off the U.S. coast in February reflected a decrease from February 1976, when 510 vessels were sighted, according to preliminary reports of the National Oceanic and Atmospheric Administration. The decrease was probably due to the impending start of the new "200-mile limit" that became effective 1 March 1977. February was the last month foreign fishermen could fish without a permit issued under the Fishery Conservation and Management Act (FCMA) of 1976.

The total number of sightings represented a decrease of 196 from the number of vessels seen off the U.S. coasts in February of 1976. The counts were made by representatives of the Commerce Department agency's National Marine Fisheries Service and by personnel of the U.S. Coast Guard, conducting joint fisheries enforcement patrols from Coast Guard aircraft and cutters. The ships included in the total were within 200 miles of the U.S. coast and came from 13 foreign nations.

The largest number of foreign fisheries vessels, 148, were from the

Soviet Union, which had 94 ships off Alaska, 50 off New England, and 4 off the Mid-Atlantic. Second was Japan with 77, of which 57 were off Alaska, 10 off New England, 5 off the Mid-Atlantic, and 5 off the southeast coast. Third was Spain with 21, of which 11 were off the Mid-Atlantic and 10 off New England. Poland was fourth with 16 off the Mid-Atlantic.

In addition, Coast Guard and NMFS personnel sighted vessels from the German Democratic Republic (East Germany), the Republic of China (Taiwan), Bulgaria, Nigeria, Cuba, South Korea, Ireland, Italy, and Panama.

A summary of foreign fishing vessels operating off the U.S. coasts during February 1977 is given in the accompanying table.

Area	Nation	No. of vessels
Off New England	Soviet Union	50
	Japan	10
	Spain	10
	Cuba	4
	Italy	2
		<hr/> 76
In the Middle Atlantic	Poland	16
	Spain	11
	Italy	8
	East Germany	6
	Japan	5
	Soviet Union	4
	Bulgaria	3
	South Korea	2
	Ireland	1
	Nigeria	1
		<hr/> 57
Off the SE coast	Japan	5
Off the West Coast	South Korea	11
	Panama	7
	Taiwan	7
		<hr/> 25
Off Alaska	Soviet Union	94
	Japan	57
		<hr/> 151
	Total	314

Note: Foreign vessels sighted off the coasts in 1976 were as follows: January, 420; February, 510; March, 435; April, 610; May, 928; June, 970; July, 842; August, 543; September, 514; October, 452; November, 258; December, 240. In January 1977, 319 foreign vessels were sighted off U.S. coasts.

## NOAA Grant Aids Culebra Restoration

Bombarded by Navy ships and aircraft for nearly 40 years, the tiny Puerto Rican island of Culebra will be a step closer to restoration as a natural scenic



area with a grant of \$295,000 made on 15 April in San Juan by the Commerce Department's National Oceanic and Atmospheric Administration (NOAA). The grant is for administration of the Culebra segment of Puerto Rico's coastal zone management plan. A Certificate of Approval for the Culebra segment was also awarded to Governor Carlos Romero Barcelo of Puerto Rico by Robert W. Knecht, NOAA's Acting Associate Administrator for Coastal Zone Management.

Culebra is about 7 miles long by 3½ miles wide, and has a population of nearly 1,000. It lies about 17 miles east of Puerto Rico. The U.S. Navy established a target range on part of the island in 1936, and used the range continuously until 1975.

Little water is available on Culebra, restricting possible population increases, but a great deal of natural beauty makes limited tourism a possibility. In addition, Culebra provides nesting sites for two species of turtles that are listed as endangered, the hawksbill and leatherback, and two that have been proposed for threatened status, the loggerhead and the green sea turtle.

The Culebra segment is the first part of the Commonwealth of Puerto Rico's coastal zone management plan to win approval as meeting the requirements of the Coastal Zone Management Act of 1972. The Culebra program will be integrated into the Commonwealth's overall program in the formal submission of the Puerto Rico document to NOAA in December 1977.

The NOAA grant will be used to rehabilitate disrupted areas and to protect the island's unique natural resources. A portion of the funds will be used to survey the target areas to locate unexploded shells and bombs, and to post and patrol the hazardous areas.

Provisions for conserving and preserving Culebra's wildlife and other natural resources also are included in the management plan. In addition, procedures are set forth for meeting the problem of relocation housing for permanent and temporary residents who, in certain areas, have constructed dwellings on Federal lands or land that may be in dispute.

## Wolfe Chosen for OCSEAP Program

Douglas Wolfe, a marine pollution ecologist and specialist on trace elements in marine shellfish, has been appointed deputy director for the Outer Continental Shelf Environmental Assessment Program (OCSEAP) of the National Oceanic and Atmospheric Administration, in Boulder, Colo.

Wolfe formerly represented NOAA's National Marine Fisheries Service in the management of research for OCSEAP, which is a major environmental study directed by the Commerce Department agency's Environmental Research Laboratories for the Interior Department's Bureau of Land Management. The comprehensive OCSEAP study seeks to determine the probable ecological impacts of oil exploration and development activities on Alaska's outer continental shelf.

Previously, Wolfe was Division of Ecology Director for NOAA's Atlantic Estuarine Fisheries Center on Pivers Island, N.C., and an adjunct associate professor of zoology at North Carolina State University in Raleigh. He joined the Commerce Department in 1964 after completing work for his Ph.D. in physiological chemistry at Ohio State University, where he also received a B.S. in zoology and an M.S. in physiological chemistry. He has authored more than 50 scientific publications.

## Vessel Economics Studied in Major U.S. Fisheries

Profits and losses of commercial fishing vessel operations in major U.S. fisheries during periods of rising costs of fuel and oil products are analyzed in a report just issued by the National Oceanic and Atmospheric Administration (NOAA). Prepared by the Commerce Department agency's National Marine Fisheries Service, the analysis evaluates the earning potential of vessel operations in specific U.S. fisheries of

the Atlantic, Pacific, and the Gulf of Mexico.

These fisheries accounted for 65 percent by quantity and 68 percent by value of total U.S. food fish landings in 1974. A total of 297 vessel-years of operation was analyzed by fishery: groundfish, 54; salmon, 124; tuna, 29; shrimp, 61; and crab (king and tanner), 29 vessel-years.

The report, **Revenues, Costs, and Returns From Vessel Operation in Major U.S. Fisheries**, covers the following fisheries: groundfish, New En-

Summary of vessel earnings, by fishery, region, gear type, and vessel size.

Fishery	Region	Gear type	Average values			Fuel costs relative to gross revenue (%)
			Vessel size (GRT)	Gross revenue (\$)	ROI (%)	
Groundfish—Atlantic	New England	Otter trawl	32	56,397	6.3	11.0
Groundfish—Atlantic	New England	Otter trawl	52	137,584	6.5	7.3
Groundfish—Atlantic (industrial fish)	New England	Otter trawl	87	231,015	9.6	4.9
Groundfish—Atlantic	New England	Otter trawl	176	227,548	0.8	9.2
Groundfish—Pacific	California	Otter trawl	42	80,833	6.2	7.4
Groundfish—Pacific	California	Otter trawl	79	138,164	5.6	7.5
Groundfish—Pacific	Oreg., Wash.	Otter trawl	55	100,989	8.3	6.5
Groundfish—halibut	Calif., Wash.	Longlines	51	173,892	0.7	8.6
Salmon	Oreg., Wash., Alaska	Purse seine	28	80,396	22.2	1.1
Salmon	Oreg., Wash., Alaska	Purse seine	46	113,524	21.3	1.8
Salmon	Oreg., Wash., Alaska	Troll lines	14	15,146	4.3	6.2
Salmon	Oreg., Wash., Alaska	Troll lines	17	32,547	20.8	4.5
Salmon	Oreg., Wash.	Gill net	11	20,785	21.0	4.8
Salmon	Alaska	Gill net	11	23,093	30.2	4.6
Salmon (halibut)	Oreg., Wash.	Troll lines, gill net, longlines	25	41,912	13.4	3.6
Salmon (dungeness crab)	Oreg., Wash.	Troll lines, gill net, pots	21	46,879	23.9	3.4
Salmon (albacore)	Oreg., Wash., Alaska	Troll lines	17	18,908	9.5	5.3
Salmon (albacore)	Same	Troll lines	31	31,746	10.6	4.3
Salmon (albacore, dung. crab)	California	Troll lines, pots	21	26,154	12.3	6.1
Salmon (albacore, dung. crab)	California	Troll lines, pots	44	47,043	8.2	7.1
Salmon (albacore, dung. crab)	Oreg., Wash.	Troll lines, pots	26	36,648	11.4	5.3
Salmon (albacore, dung. crab, shrimp, groundfish)	Oreg., Wash.	Otter trawl, pots, salmon gear	50	82,295	5.2	3.3
Salmon (albacore, dung. crab, shrimp, groundfish)	Oreg., Wash.	Otter trawl, pots, salmon gear	100	160,156	11.7	4.8
Salmon (albacore, dung. crab, shrimp, groundfish)	Oreg., Wash., Alaska	Otter trawl, pots, salmon gear	24	27,553	2.8	4.8
Tuna—albacore	Calif., Oreg.	Troll lines	34	48,692	5.0	9.0
Tuna—tropical	California	Pole and line	102	239,687	13.5	7.3
Tuna—tropical	California	Purse seine	319	599,910	2.6	6.8
Tuna—tropical	California	Purse seine	721	980,362	2.5	12.7
Tuna—tropical	California	Purse seine	1,039	1,554,434	7.2	11.7
Crab—king & tanner	Alaska	Pots	140	339,276	14.9	5.0
Crab—king & tanner	Alaska	Pots	198	493,305	19.8	6.3
Crab—king & tanner (salmon)	Alaska	Pots, purse seine	51	142,834	11.0	5.0
Shrimp	Gulf of Mex.	Otter trawl	60	43,482	-9.6	16.7
Shrimp	Gulf of Mex.	Otter trawl	108	98,014	-0.3	17.7

Note: In parentheses—other species fished for.

gland and the entire Pacific coast, including halibut fishing; Pacific salmon; tuna, albacore and tropical; shrimp, Gulf of Mexico; and crab, northeast Pacific and Bering Sea. Data for the report were provided by vessel operators participating in various programs of the National Marine Fisheries Service.

The rate of return on investment varies greatly among groups of vessels operating in these fisheries, depending upon many factors such as size of vessels, type of fishing gear, target species, and location of the fishery. The rate ranges from a low of minus 9.6 percent for a group of shrimp trawlers in the Gulf of Mexico to a high of 30.2 percent for a group of salmon gillnetters in Alaska.

Vessels in a particular fishery demonstrate the average rates of return on investment (ROI) and relative fuel costs in the table at right.

Generally, low rates of return on investment for a vessel group are as-

sociated with high fuel costs. Groundfish trawlers in New England, shrimp trawlers in the Gulf of Mexico, some tuna vessels (trollers and purse seiners), and halibut longliners are known to have high fuel consumption because of their fishing systems, or because of long distances to the fishing grounds.

Although there are a few exceptions, salmon vessels that operate close to their home ports reflect the highest rate of return on investment and the lowest relative cost of fuel.

Fishery	ROI	Fuel Cost Relative to Gross Revenue
Shrimp, Gulf <sup>1</sup> (61)	-0.8%	17.6%
Halibut, Pac. (7)	0.7	8.6
Groundfish, Atl. (29)	1.2	7.8
Tuna (29)	5.6	10.7
Groundfish, Pac. (18)	6.7	7.2
Salmon, combination vessels (85)	10.6	5.0
Crab, king and tanner (20)	16.5	5.4
Salmon (48)	19.9	2.8
All fisheries (297)	7.0	9.3

<sup>1</sup>Figures in parentheses indicate the number of vessel-years in the sample.

### Commerce Department Cites McDonald's for Fish Effort

A national restaurant chain has received a certificate of recognition from the Department of Commerce for participation in a nationwide consumer education effort on behalf of the Department's Voluntary Fishery Products Inspection Program.

In early March the McDonald's<sup>1</sup> restaurant chain started a program to inform consumers that it uses USDC inspected, Grade A fish portions exclusively in the fish sandwiches sold throughout its 3,700 U.S. fast-food outlets. McDonald's restaurants serve more than 42 million pounds of USDC Grade A fish portions each year.

This is the first time that a restaurant or restaurant chain has helped the Department of Commerce educate consumers about the availability and significance of USDC-inspected products. The Voluntary Fishery Products Inspection Program is carried out by the

National Marine Fisheries Service, an agency of the Department's National Oceanic and Atmospheric Administration.

McDonald's Director of Quality Assurance, Victor Wortman, said the restaurant chain strongly supports the program, which encourages the fishing industry to assure the safety and improve and maintain the quality of its products through inspection and standardization procedures, usually carried out by Federal inspectors.

The certificate was presented by Under Secretary of Commerce designate Sidney Harman. Other Commerce officials at the presentation included Robert M. White, NOAA Administrator, David H. Wallace, Associate Administrator for Marine Resources, NOAA; Robert W. Schoning, Director, National Marine Fisheries Service, NOAA; Joseph W. Slavin, Assistant Director for Fisheries Development, NMFS; and Thomas J. Billy, Chief, Seafood Quality and Inspection Division, NMFS.

<sup>1</sup>Mention of trade names or commercial firms does not imply endorsement by the National Marine Fisheries Service, NOAA.

### "Floatables" Surveyed in New York Bight

You get out of an ocean what you put into it, according to National Oceanic and Atmospheric Administration (NOAA) scientists reporting on the massive June 1976 contamination of Long Island ocean beaches.

Citing many probable sources of the materials which littered area beaches a year ago, the NOAA researchers conclude that such incidents will continue, given present techniques for handling wastes and their associated "floatables"—the unsinkable, resilient artifacts of modern civilization. The Commerce Department agency scientists also point out that, although affected beaches were closed as a precautionary measure, water tests showed no serious degradation of water quality during the incident. And they found only a slight contribution to the pollution episode by sewage sludge dumping in the ocean south of New York.

The NOAA report, "Long Island Beach Pollution: June 1976," was prepared by NOAA's Marine Ecosystems Analysis (MESA) New York Bight project; the U.S. Environmental Protection Agency, Region II; and the U.S. Coast Guard, Third District, Marine Environmental Protection Branch. A kind of environmental detective story, it links seemingly unrelated pollution events across the New York metropolitan area, and unusual atmospheric conditions, with the floatables incident.

The pollution of Long Island's south shore was greatest from 14 to 21 June 1976, when beaches were heavily contaminated by a wide variety of floating litter. Floatables were dispersed over some 7,500 square nautical miles (25,700 square kilometers) of the New York Bight, a 15,000-square mile (39,000 km<sup>2</sup>) area reaching from an apex off New York City to the edge of the continental shelf. This seaborne litter was driven ashore by unusually persistent winds from the south. Any materials that entered the Bight just before and during the 12-day period of these winds could have been washed onto the beaches.

Many types of floatable material

were found on the beaches, including garbage, trash, charred wood, oil, plastics, rubber, and grease. The last three types of floatable are usually associated with sewage treatment facilities, according to the NOAA report. There was no confirmation of early claims that raw sewage had washed up on the beaches. Analysis of tar and grease balls found among the litter generally did suggest a sewage origin for at least part of the substances included in them, but the report notes, water quality at the beaches was tested and remained well within established standards for swimming.

A major source of the grease and sewage found in the pollution incident appears to have been chronic release of material into the Bight. The report notes that untreated sewage is routinely discharged from some areas during repair or construction. In May and June 1976, an estimated 428 million gallons (1.6 billion liters) of raw sewage were discharged this way. The researchers also estimate some 300,000 to 400,000 pounds (136,000 to 181,000 kilograms) per day of oil and grease enter the Bight from the discharge of the Hudson-Raritan estuarine system.

New York, like most large cities, combines its storm runoff and sewage systems. When the combined flow is too much for a treatment plant, the overflow bypasses the plant and is discharged untreated. This runoff also contains trash, grit, and oil from city streets. It is estimated that rainfall of only 0.04 of an inch or more in the metropolitan area exceeds treatment plant capacity and leads to the bypassing of the plant in the release of untreated wastes. During late May and June 1976, rainfall exceeded 0.04 inch (1.02 mm) at Central Park on 19 days.

The Hudson River flow, above normal during May, reached a peak of 719,000 cubic feet (20 million liters) per second on 20 May, a volume exceeded only once in the past 16 years. High river runoffs typically bring large quantities of pollutants into the Bight from outfalls and other sources upstream, and tend to distribute floatables over a wide area of the Bight, according to the report.

The NOAA investigators believe the June pollution incident could also have been influenced by events occurring as early as 8 May, when a medium oil spill in upper New York Bay resulted in large quantities of black tar balls washing up on beaches from Jacob Riis Park to Fire Island. Although this pollution was cleaned up by the end of May, residual oil remaining in the water could have contributed to formation of tar and grease balls later on.

On 26 May, an oil storage tank ruptured at Jersey City, N.J., spilling 3 million gallons (11.4 million liters) of number 6 oil, of which about 150,000 gallons (568,000 liters) reached the Hackensack River, with large quantities remaining in the wetlands of Hackensack Meadows. The Coast Guard cleanup of this spill was completed 2 days later; but, again, some oil could have remained in the environment to help form the tar and grease balls observed in June.

On 2 June, two sewage sludge storage tanks containing some 2.7 million gallons (10.2 million liters) of "digested" sludge exploded on Pearsalls Hassock, and an estimated 1 million gallons of sludge flowed into the water. Soon afterward, the Coast Guard observed material floating out to sea through East Rockaway Inlet. The researchers see it as a possibly important source of certain plastic artifacts and other nondegradable sewage-related objects.

Other possible contributing events included pier fires at Weehawken, N.J., and Manhattan in early June. These fires were the apparent source of charred wood that washed onto the beaches.

"We have a sequence of events that seems to have culminated in the beach pollution episode," explains NOAA Commander Lawrence Swanson, who directs the New York Bight Project from its field headquarters in Stony Brook. "Clearly, some sources were more important than others. But we really can't assess the contribution of each event except in a general way.

"The fact is that nondegradable plastic floatables are being introduced into the environment much faster than the

environment can assimilate them. This isn't just a New York problem. It's a national problem."

**Long Island Beach Pollution: June 1976** is available in limited quantities from the MESA New York Bight Project Office, Old Biology Building, SUNY, Stony Brook, NY 11794.

### **NOAA Scientists Measure Petroleum in Puget Sound**

An intensive study of petroleum found in the sediments and mussels in the Strait of Juan de Fuca and northern Puget Sound was started in March, to determine existing conditions, and to help assess any changes caused by future oil spills in the Sound. The study is being conducted by scientists with the National Oceanic and Atmospheric Administration (NOAA) in Seattle.

Four times this year a total of more than 200 samples of sediments and mussels will be collected at a score of shoreline sites for analysis at NOAA's National Analytical Facility in Seattle. The study is funded by the Environmental Protection Agency and managed by NOAA's Marine Ecosystem Analysis program office, part of the Commerce Department agency's Environmental Research Laboratories. It is part of a larger study of all aspects of the environment that might affect, or be affected by, petroleum pollution.

The waters of this region—from Neah Bay to the beaches near refineries on the Washington mainland—have remained relatively unpolluted by oil. But tanker traffic in the Sound is expected to increase substantially over the next few years, and the area may become a port for transfer of Alaskan oil from ship to cross-country pipelines. This increased traffic will bring increased risks of spills and small-scale leaks.

Sediments and mussels were chosen for study because they are good indicators of oil pollution, and are easily collected throughout the Puget Sound region, according to Howard Harris of the MESA office. Along the shore, researchers from the Analytical Facility will collect sediment and mussel sam-



ples at several intervals just above the mean lower low-water point of the tide. The mean lower low-water level is an average of the lowest points reached by the tides each day.

During each sampling, the researchers will record the existing tidal stage, wave exposure, weather conditions, and temperatures of air, water, and sediment. The sampling site will be

photographed each time, and the investigators will record a general description of the site, including nearby likely sources of petroleum, and will note whether the water has an oil-like sheen, visible floating oil, or stranded oil, and whether there are unusual numbers of dead animals.

Chemists at the analytical facility will weigh the samples, record the tex-

ture and color of the sediments, and test them for a long list of chemical constituents of oil and for organic carbon.

Another part of the study will focus on the effects of sampling methods and natural variability across the beach on the measured hydrocarbon level. Later, the researchers may look at other constituents of petroleum and at metabolic products.

## Bowhead and Beluga Whales Counted in Arctic

The first systematic count of two species of Arctic whale—the large, endangered bowhead and the smaller, white beluga—began last spring (1976) on the Arctic ice pack, was resumed in April by biologists with the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS).

The survey is part of a major environmental study being conducted by NOAA's Environmental Research Laboratories for the Interior Department's Bureau of Land Management. The study will establish environmental baselines and help Federal managers determine the probable impact of petroleum development on Alaska's outer continental shelf.

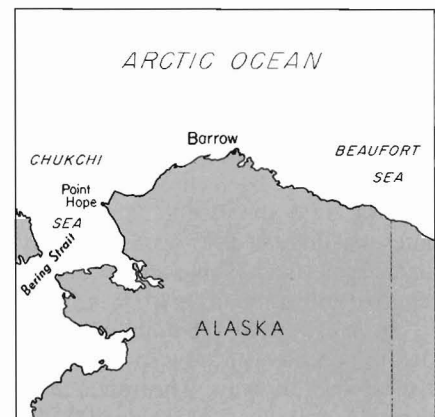
Bowhead and beluga whales are important players in the ecological drama off Alaska, but their movements cross such difficult environments that they have not been closely observed by scientists. Because they are air-breathing

mammals and migrate along leads (long openings) in the ice pack usually close to shore, they also are believed to be particularly vulnerable to the potential environmental effects of Arctic energy development activities.

The whale count is being performed by NMFS biologists with the Marine Mammal Division of the Commerce Department agency's Northwest and Alaska Fisheries Center, Seattle, Wash.

"Until now," according to Howard Braham, the biologist leading the whale study, "bowheads and belugas have been considered more or less uncountable. The count we took from April to early June of last year was the first systematic look anyone has ever taken at these species."

The 1976 spring work counted more than 1,300 belugas and more than 350 bowheads. The survey was made by biologists at camps near leads through the floating sea ice, and from aircraft



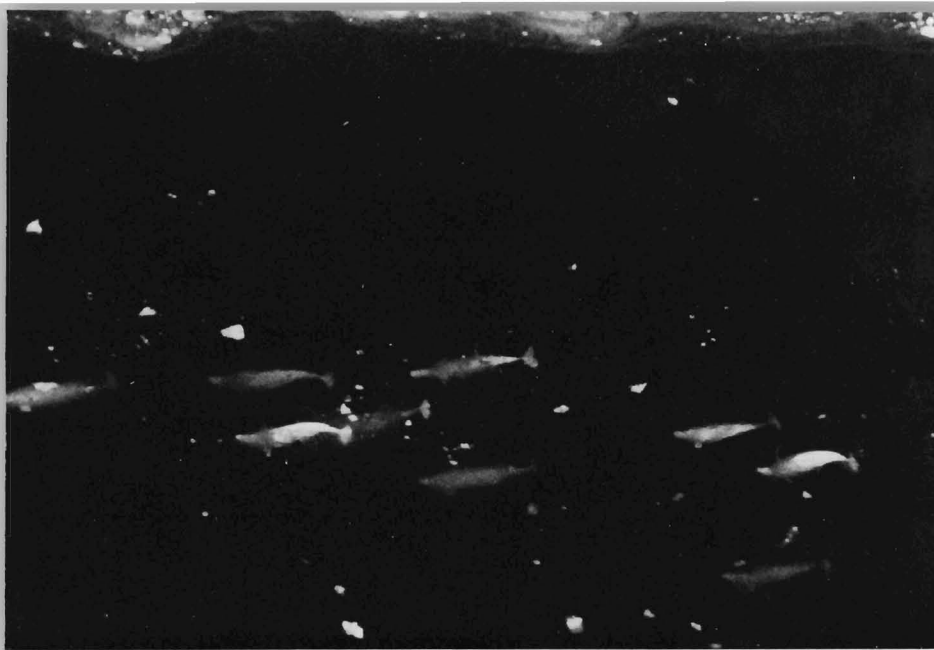
from the Naval Arctic Research Laboratory (NARL) in Barrow. The ice camps are moved according to ice conditions, and usually located near the Eskimo whale harvest camps. Aerial surveys avoid the harvest camps, but follow leads, where scientists count whales visually and photograph them.

The second spring census, which began in April, placed one ice camp seaward of Barrow and another off Point Hope, northeast of the Bering Strait. "This year," Braham said, "we'll be collecting more sighting data in an effort to see if we can estimate

Ice hummocks (left) were made by beluga whales when they surfaced to breathe under thin ice.

The bowhead whale, *Balaena mysticetus*, below.





Beluga whales, *Delphinapterus leucas*.

total beluga and bowhead abundance. But all we have to go on at present are historical whaling records and feelings." The NOAA scientists also want to refine what is known of the two whale species beyond a population count, and to assess the probable impact on them of oil and gas development off Arctic Alaska.

"We don't know, for example,"

Braham explained, "how many of these whales migrating up through the Bering Strait continue north into the Chukchi Sea, or how many turn east into the Beaufort Sea. North of the Strait, they may all migrate through the Hope Basin oil lease area. We need to know how many of them also migrate through the Beaufort lease area and what proportion of these are mothers

and calves. The ice camp at Point Hope will help us answer some of these questions."

Braham noted that even less is known about the movements of bowheads and belugas in autumn and winter. "We did some aerial work last autumn in the Beaufort Sea," he said, "but, because of poor weather, saw very few bowheads."

The bowhead whale, also called the Greenland right whale, is a large cetacean up to 60 feet (20 m) in length, and dark brown to black in color. It is distinguished by an enormous head about one-third of the whale's total length. Overhunting of Alaska bowheads had already pushed their numbers into serious decline by the late 19th century, and today they are designated as an endangered species. No longer commercially harvested, bowheads are still the subject of seasonal native harvests from small sealskin boats.

Beluga whales are white when adult, about 18 feet (6 m) in length, and are more numerous than the bowhead. More gregarious than the larger bowheads, belugas often congregate in "pods" of 20 or 30 individuals.

## FCMA Report Issued By Commerce Department

Actions taken by the eight Regional Fishery Management Councils and the Department of Commerce to implement the Fishery Conservation and Management Act (FCMA) of 1976 are summarized in a report sent to Congress earlier this year by the Department of Commerce. The report covers the period 13 April-31 December 1976, during which preparations were made to insure that the United States would be prepared to exercise its management authority of the 200-mile limit on 1 March 1977.

Members of the Councils were appointed in mid-August, began meeting in late September and early October, and by the end of the year had elected officers and, in many cases, had selected executive directors and administrative headquarters. Scientific and statistical committees were established and the Councils began evaluating the fishery resources within their

areas, and reviewed and provided comments on matters and documents associated with management of foreign fishing.

In addition to processing nominations for Council membership, conducting an orientation conference, and issuing regulations and an operations manual on Council activities, the National Marine Fisheries Service of the Commerce Department prepared 16 preliminary fishery management plans. The plans identified those portions of the optimum yields of fisheries that could be allotted to foreign fishermen.

Other major actions were undertaken with the cooperation of the Department of State and the U.S. Coast Guard. Six Governing International Fishery Agreements were signed and others were being negotiated by the end of the year. In addition, forms for foreign permits and permit applications were developed, a proposed fee schedule

prepared and published, and enforcement and surveillance requirements assessed to insure compliance with the Act.

The activity report contains detailed information on actions taken regarding the formation of the Fishery Management Councils, fishery management, and interagency activities. It also discusses the accomplishments of the eight Regional Fishery Management Councils, and lists membership of the Councils and the administrative staffs, committees, and panels. A copy of the report may be obtained from the National Marine Fisheries Service, NOAA, Washington, DC 20235.

## Fish-Kill Warning Signs Sought Off New Jersey

National Oceanic and Atmospheric Administration (NOAA) scientists are conducting a series of research cruises off the New York-New Jersey coast, to

detect any early environmental signals that could bring another fish kill this summer, as happened last year. Conducted as part of NOAA's Marine Ecosystems Analysis (MESA) New York Bight Project, the series of nine voyages by the NOAA ships *Kelez* and *Delaware II* coincide with critical seasonal points in the Bight's cycle of plant life, nutrient chemicals, and water motion. The first cruise was completed in February, with the remainder running through the fall.

Scientists aboard the Commerce Department agency's ships will be searching, in particular, for early indications that waters in the Bight are beginning to stratify—that is, become persistent, stable horizontal layers—as they tend to do during the summer.

Because stratification inhibits vertical mixing, it reduces the flow of life-giving oxygen from surface waters to the colder waters near the bottom. Last year NOAA researchers found that the demand for oxygen in these deep waters exceeded the supply, creating suffocating low-oxygen, or "anoxic," conditions for Bight creatures unable to move out of the area.

There is evidence that dissolved oxygen in Bight waters decreases annually, beginning usually in April. But in most years, new water entering the Bight from other areas, and the water-stirring storms of late summer, break up the stratified layers before the oxygen in the water has been completely consumed. In those years—and this is the usual case—no fish kill occurs.

But stratification and a decline in dissolved oxygen concentration in February or early March could signal the potential for another fish kill this year.

Whether a fish kill comes or not depends on several other key elements, according to NOAA Corps Commander Lawrence Swanson, who heads the MESA New York Bight Project from headquarters at Stony Brook, N.Y. "Early stratification and a decline in dissolved oxygen are important signals," he said, "but by themselves they don't necessarily forecast a fish kill. The *Kelez* cruises will alternately monitor chemical properties of the water column, and the other critical

elements we believe are necessary to produce such kills."

Those critical elements, Swanson explained, are a seasonal bloom of phytoplankton, and the flow of nutrients—mainly from sources up the Hudson-Raritan River systems—which feed the bloom and which, last year, apparently caused a population explosion among the marine plants.

"We believe," he said, "that the anoxic event last summer was caused primarily by an unusually large phytoplankton bloom in the Bight. As the plants died off, they sank to the bottom. Their decomposition there placed intolerable demands on the supply of dissolved oxygen.

"At the same time, intense stratification isolated the bottom waters from oxygen nearer the surface, and persistent offshore winds delayed the usual exchange of water through the Bight. These conditions led to the fish kill."

Thus, scientists aboard the *Kelez* will also be studying the phytoplankton-nutrient cycles in the Bight, with an eye to predicting such conditions.

The first two cruises, led by scientists from the Sandy Hook, N.J., laboratory of NOAA's National Marine Fisheries Service, looked for early indications that stratification then could lead to a problem later in the year. No evidence of early stratification was found.

An April-May voyage, led by scientists from the Ocean Chemistry Laboratory of the Atlantic Oceanographic and Meteorological Laboratories (like the MESA program, part of NOAA's Environmental Research Laboratories) in Miami, Fla., studied water-column chemistry in the Bight. This coincided with the seasonal point when stratification usually begins to set up, and also provided observations just before Memorial Day Weekend, when area beaches became active.

A cruise in May, led by Tom Malone of the Lamont-Doherty Observatory, focused on the phytoplankton bloom process, and the flow of nutrients—particularly nitrogen—into Bight waters. Other studies of the phytoplankton-nutrient relationship were scheduled for cruises in late July and in November.

In late May and early June, another water-column chemistry cruise was scheduled as is a third in August, when one would expect to see anoxic conditions if these developed this year. The August voyage also will add to a data base of dissolved-oxygen, temperature, and salinity values going back to 1948. This long record will permit the researchers to study historical trends of these properties in the Bight.

A fourth water-column cruise in October will observe the seasonal breakup of the stratification in Bight waters, providing insights into how rapidly this occurs, and what it means in terms of oxygen and other chemical constituents.

## U.S. Observers Put On Foreign Fishing Boats

The first U.S. observers have been placed on foreign fishing vessels that are permitted to fish within the 200-mile fishery conservation zone, according to the National Oceanic and Atmospheric Administration's National Marine Fisheries Service.

Four observers from the Commerce Department agency boarded two Japanese crab factory ships when the ships sailed from Hokkaido, Japan, earlier this year, bound for the eastern Bering Sea. They will remain on the ships until the Japanese reach their quota of 12,500 metric tons of tanner crabs, probably in July.

Under the terms of permits issued under the Fishery Conservation and Management Act of 1976, observers are placed on foreign fishing vessels to collect biological data, information on their catch, information on the types of gear used, and information on the fishing effort of the vessels. In addition, they will monitor compliance with the regulations and terms of the fishing permit.

Observer trips will cost between \$2,000 and \$10,000, including all direct and management overhead support costs of the Department of Commerce, Coast Guard, Navy, and Customs Service. These costs will be paid by the foreign nations which have observers on board their ships.