

THE 200-MILE LIMIT LAW TAKES EFFECT

The National Oceanic and Atmospheric Administration, on 1 March, put into effect an historic new law that for the first time gave the United States the opportunity to manage fishing off its coasts and to restore its fishery resources, Secretary of Commerce Juanita M. Kreps has announced.

NOAA's National Marine Fisheries Service is administering the Fishery Conservation and Management Act, which gives the United States authority to conserve and manage marine fisheries, except tuna, 200 miles out from our shores. This encompasses more than 10 percent of the world's marine fish.

"An immediate effect of the law will be a reduction in the amount of fish to be harvested by foreign fishermen within 200 miles of our coasts," said Secretary Kreps. In 1974, the last year for which there are complete records, the foreign harvest was 3.3 million metric tons; this year it should be reduced to two-thirds of that level.

No foreign fishing is permitted for several important species groups previously caught by foreign vessels, but now reserved exclu-

sively for U.S. fishermen. These include, on the east coast, cod, haddock, and yellowtail flounder. (Lobsters have traditionally been barred from foreign fishing.) In the Pacific, king crab and shrimp are reserved for U.S. fishermen. In addition, foreign vessels are not to be permitted to fish for certain other species or stocks but will be permitted to keep incidental catch.

"The new law, by far the most significant marine fishery legislation in our history, represents an unparalleled opportunity to revitalize a resource of major importance to our country and the rest of the world," Secretary Kreps said.

The Act, signed into law 13 April 1976, not only represents a major conservation achievement, but brings to government a totally fresh approach to natural resource management by the United States, she added. Under the Act, fishery management plans are developed by eight Regional Fishery Management Councils. They include representatives of the Federal Government, State fishery administrators, and groups of private citizens. They have 108

voting members, 63 of them appointed by the Secretary of Commerce from nominations submitted by State Governors.

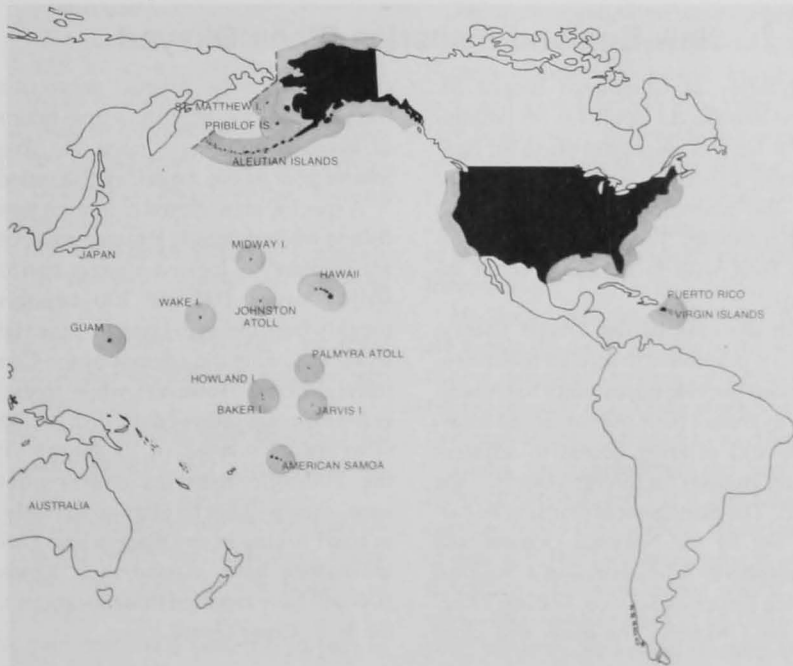
The Councils came into being in August 1976, and since then have held nearly 60 meetings, named chairmen and executive directors, selected headquarters locations, and begun work on their management plans. Public comment and participation is sought for all Council activities.

Since it was not possible for these newly formed Councils to develop detailed plans for each fishery in time for the 1 March deadline, NOAA's National Marine Fisheries Service developed preliminary management plans to govern foreign fishing. Sixteen preliminary plans, covering nearly 30 species of fish, have been developed. They remain in effect until the Regional Councils have developed permanent plans, which will then supersede the present regulations and will control both foreign and domestic fishing. Eventually, management plans are expected to be in operation for some 75 fisheries. Each plan, made on the basis of sound conservation practices, specifies the surplus—if any—which foreigners will be permitted to take, beyond the catch of U.S. commercial and recreational fishermen.

"The 10 months since the passage of the Act have required a tremendous effort in planning and organization," Secretary Kreps said. "Complex negotiations with many other nations have been carried out by the Department of State. Plans have been made by the Department of Transportation (U.S. Coast Guard) and the National Marine Fisheries Service for enforcing the new regulations.

"Setting up the machinery for this extensive and entirely new kind of resource management has been an unprecedented challenge, which is now being met," she said. In order for foreign vessels to fish off U.S. coasts by 1 March, a complex series of steps was required by the new law. As a first step, Governing International Fisheries Agreements (GIFA) had to be negotiated by the Department of State and signed by each foreign nation desiring to fish inside the 200-mile zone.

The U.S. 200-mile fishery conservation zone. This map is not an official map of the U.S. Fishery Conservation Zone (FCZ). The latest official description of the FCZ is printed in the Federal Register of 7 March 1977 (42 FR 12937).



The Department of State has informed Commerce that GIFA's have been signed with Japan, the USSR, Bulgaria, Spain, Poland, East Germany, Korea, Romania, the Republic of China (Taiwan), and the European Economic Community (France, Italy, West Germany, Denmark, the Netherlands, Luxembourg, Belgium, Ireland, and the United Kingdom). The U.S. Congress as of 23 February approved six of the agreements, with Bulgaria, Romania, the Republic of China, the German Democratic Republic, the USSR, and Poland.

Following signing of the GIFA's, applications are filed and permits issued based on allocations of the foreign surplus made by the State Department. Allocations of surplus fish to foreign nations began retroactively to 1 January and cover the calendar year. Fish caught during January and February are subtracted from the total allocation. The following 1977 allocations (in metric tons) have been set: Japan, 1,190,960; USSR, 648,700; Poland, 64,460; East German Republic, 20,225; Korea, 78,700; Spain, 14,400; Bulgaria, 8,070; Taiwan, 5,200; Federal Republic of Germany, 6,525; Italy, 4,220; Romania, 1,400; and France, 1,200.

All applications for permits to fish for the allocations must be reviewed by the appropriate Regional Councils. By late February, Secretary Kreps said, foreign nations had submitted applications for 1,041 ships—both fishing and support vessels—to operate within the 200-mile zone. They are: from the USSR, 468; Japan, 376; Korea, 73; Taiwan, 45; Poland, 33; East German Republic, 27; Romania, 13; Bulgaria, 6.

No permits had been issued to foreign nations by late February and NMFS was in the process of approving foreign applications. Permits were to be issued when a foreign nation accepted the conditions and restrictions imposed on it and promised to pay applicable fees before 1 May 1977. U.S. observers were to be stationed on some foreign vessels.

Secretary Kreps said it would not have been possible to complete this intricate process without continuing cooperation by the Congress. The Senate and House of Representatives acted speedily to extend critical deadlines by passing a Joint Resolution that was signed into law by President Carter on 21 February.

West Coast Trawl, Sablefish Fisheries Preliminary Management Plans Approved

Preliminary Management Plans regulating foreign fishermen in two fisheries have been approved by Secretary of Commerce Juanita M. Kreps. These plans, for the trawl fishery off the coasts of Washington, Oregon, and California and the sablefish fishery in the Gulf of Alaska, Bering Sea, the Aleutian Region, and off the coasts of Washington, Oregon, and California, are required by the Fishery Conservation and Management Act of 1976.

The Preliminary Management Plan for the trawl fishery off the Washington, Oregon and California coasts establishes control over foreign fishing for Pacific hake, Pacific ocean perch, rockfishes, Dover sole, flounders, jack mackerel, Pacific cod, lingcod, grenadiers, sharks, skates, sablefish, and sculpins. Although foreign fishermen have taken all of these species in the past, they now will be allowed to take only Pacific hake and jack mackerel. Furthermore, foreign vessels will be permitted to retain only an insignificant amount of other species that are taken incidentally when fishing for hake.

In 1974, the foreign catch for all species in this fishery was estimated to be 238,000 metric tons (t). The U.S. catch was about

54,000 t, for a total harvest of 292,000 t. The total allowable catch for 1977 has been reduced to about 266,000 t, of which foreign vessels may take 123,200 t of Pacific hake and 4,000 t of jack mackerel.

Major aspects of the regulations implementing the plan are: 1) Fishing for Pacific hake and jack mackerel will be permitted only in areas over the Continental Shelf where fishing is authorized; 2) foreign fishermen can use only trawls that do not reach the bottom; 3) foreigners will not be permitted to keep any salmon, Pacific halibut, or creatures of the Continental Shelf such as crabs unless authorized; 4) minimum mesh size for trawls landward of longitude 125°40'W will be 4.33 inches, stretched measure, and no liners will be permitted in the cod end of the trawls; 5) no foreign fishing will be permitted within 12 miles of the U.S. coast; and 6) foreign fishing is prohibited in the following areas:

- a) Latitude 47°30'N north to the U.S.—Canadian border;
- b) U.S.—Mexican border north to latitude 39°N;
- c) Columbia River Pot Recreational Fishery Sanctuary;
- d) Klamath River Pot Sanctuary; and

New England Fisheries Plans Okayed

Secretary of Commerce Juanita M. Kreps announced approval of preliminary fishery management plans for New England fisheries on 9 February. She said the plans, which regulate only foreign fishing, "deal in a spirit of fairness both with U.S. and foreign interests."

"In the case of the lobster fishery, which is prohibited to foreign fishermen, the plans provide opportunity for Americans to protect their gear in closed areas, while still offering access to adjacent fishing grounds for foreign vessels," she noted. The management plans, to be carried out by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service, became effective on 1 March. The plans will close

certain Northwest Atlantic areas from foreign trawler fishing from time to time to avoid infringement upon the fixed lobster gear of the American fishermen.

A specific area, closed to foreign trawl fishing while domestic lobstermen's pots are in place, is located along a narrow strip between 100 and 200 fathoms, roughly from Georges Bank to Cape Hatteras, following the contour of the Continental Shelf. However, while foreign fishermen are allowed to fish within other specified areas, or "windows" in the 200-mile fisheries conservation zone, they will not be allowed to engage in trawl fishing in any place where U.S. lobstermen have planted their lobster pots and have reported those locations to the U.S. Coast Guard.

e) Latitude 39°N to latitude 47°30'N landward to longitude 125°40'W prior to 1 June 1977, and after 31 October 1977.

Major aspects of the regulations implementing the other Plan regulating foreign fishing for sablefish are as follows: 1) Foreign fishermen will not be permitted to keep any salmon, Pacific halibut (except Canadian fishermen), or creatures of the Continental Shelf such as crabs unless authorized; 2) no foreign fishing within 12 miles of the U.S. coast except for certain areas in the western Aleutian Islands; and 3) foreign fishing is permitted in the following areas at the times indicated:

- a) Bering Sea or the Aleutian Islands,
 - Between longitude 169° and 170°W, dragnet fishing from May 16 through November 30 and longline fishing year-round.
 - Between longitude 170° and 172°W, dragnet and longline fishing year-round,
 - Between longitude 172° and 176°W, longline fishing from April 1 through October 31 and
 - West of longitude 176°W, dragnet fishing from May 1 through December 31 and longline fishing year-round.
- b) Waters off the Pacific coast of the Aleutian Islands,
 - Between longitude 169° and 172°W, dragnet and longline fishing year-round,
 - Between longitude 172° and 178°30'W, longline fishing from 1 April through 31 October, and
 - West of longitude 178°30'W, dragnet fishing from 1 May through 31 December and longline fishing year-round.
- c) Gulf of Alaska (east of longitude 170°W and north of latitude 54°30'N),
 - Catch limited to 4,000 t by trawl gear and 15,500 t by longline/trap gear,
 - Foreign fishing must be conducted seaward of the 500 m depth contour, and
 - No foreign fishing in the International North Pacific Fishery Commission southeastern statistical zone.

The plan declares a sablefish surplus of

5,000 t in the Bering Sea, 2,400 t in the Aleutian area, and 19,500 t in the Gulf of Alaska. There is no surplus off the Washington, Oregon, and California coasts. U.S. fishermen are expected to harvest 2,500 t in the Gulf of Alaska and 7,000 t off the U.S. west coast.

For both of the preliminary management plans foreign fleet commanders must report when they enter and leave the authorized fishing areas and make monthly catch and effort reports, and all foreign vessels must accept a U.S. observer, if requested, and pay all expenses of the observer. These preliminary plans, effective 1 March, remain in effect until Fishery Management Plans are developed by the geographically responsible Regional Fishery Management Council.

New England Cod, Haddock, and Flounder Quotas Set

United States fishermen in New England will be permitted to catch more cod and haddock in 1977 than they did last year, but fewer yellowtail flounder, under regulations developed by the New England Fishery Management Council and approved by Secretary of Commerce Juanita M. Kreps. Foreign fishermen will not be permitted to catch any of the three species. Last year foreign fishermen caught greater amounts of haddock, but less cod and yellowtail flounder, than did U.S. fishermen in the New England fishery conservation zone.

The new regulations were instituted 14 March under emergency provisions of the Fishery Conservation and Management Act, and were effective for 45 days. Secretary Kreps may, if conditions warrant, extend the regulations for a second 45-day period. The quotas apply to both commercial and recreational fishing; the remainder of the regulations apply only to commercial fishermen.

Haddock, cod, and yellowtail flounder are highly desirable species to the domestic fishing industry. They are subject to intense fishing pressure that, in the absence of effective regulations, can lead to overfishing.

Under the regulations, the permissible haddock catch in 1977 is 6,200 tons, compared to 6,684 tons actually taken last year, of which 5,169 tons were caught by U.S. fishermen. The quota for cod is set at 37,300 tons, compared to a catch of 34,023 tons last year; while the yellowtail flounder quota is

Comparative catch figures in tons, New England Fisheries.

	1976 Actual	1977 Quota	
Haddock			
Foreign	1,515	0	
U.S.	5,169	6,200	
	6,684	6,200	
Cod			
Foreign	9,103	0	
U.S.	24,920	5,000	Commercial, Gulf of Maine
		2,300	Recreational, Gulf of Maine
		20,000	Commercial, other
		10,000	Recreational, other
	34,023	37,300	
Yellowtail Flounder			
Foreign	97	0	
U.S.	19,529	10,000	East of 69°W
		4,000	West of 69°W
	19,626	14,000	

14,000 tons, 10,000 tons of which must be taken east of 69 degrees west longitude. The 1976 catch of yellowtail flounder was 19,626 tons, almost all taken by U.S. fishermen.

In 1977 there may be no directed fishery for haddock or for yellowtail flounder west of 69°W longitude. The quotas established are for by-catch only.

The regulations were issued under emergency procedures because an emergency exists in the cod, haddock, and yellowtail flounder fisheries of the Northwest Atlantic Ocean. During January 1977, the U.S. fleet increased landings of haddock, a severely depressed stock, by 41 percent over the same period in 1976. Moreover, as of 1 March 1977, the Northwest Atlantic Fisheries Act of 1950 that previously provided the authority for domestic regulation of these fisheries was repealed.

Both yellowtail flounder and haddock stocks have been seriously over-fished in recent years, and conservation measures applying to both species include trip limitations and landing restrictions. These are designed to prevent further depletion of these valuable fisheries.

In addition, the Director of the National Marine Fisheries Service may close the season for any of the three species. The closure will be determined by monitoring catch records to determine the cumulative and estimated prospective catch, making allowance for incidental catch for the remainder of the year.

Regional Fishery Management Councils Form Committees

Three of the Nation's eight Regional Fishery Management Councils established scientific and statistical committees authorized by the Fishery Conservation and Management Act of 1976 (FCMA), according to the National Oceanic and Atmospheric Administration. Administered by the Department of Commerce, through NOAA's National Marine Fisheries Service, this new law gives American fishermen first choice at fishery resources under its jurisdiction. Excess stock that is not harvested domestically may be provided for foreign fishermen through the councils organized to control the fisheries off all U.S. shores.

A scientific and statistical committee assists in the development, collection, and evaluation of statistical, biological, economic, social, and other scientific information pertaining to the development and amendment of any fishery management plan.



Scientific and statistical committees (SSC) have been chartered in accordance with the Federal Advisory Committee Act by the Pacific, North Pacific, and Western Pacific Fishery Management Councils. Additional committees are being established by the Gulf of Mexico and Caribbean Councils.

As required by the FCMA, each council will ultimately have a SSC. The size and number of subcommittees of the SSC's depend on the number of fisheries to be man-

aged and the complexity of the fishery problems. Approximately 75 "management units" (fishery management plans) will be identified for fishery plan preparation. Plans for some species might be prepared in 6 months; others for which extensive research and data collection are necessary may require two to three years. Periodically, the council's SSC's will hold public meetings to provide an opportunity for the public to participate in the decision-making process.

Regional Fishery Management Councils Funded

Nearly one million dollars had been granted to six of the nation's eight Regional Fishery Management Councils for administration and management plan development by late February, according to the National Oceanic and Atmospheric Administration (NOAA). The North Pacific, Mid-Atlantic, and New England Regional Fishery Management Councils were allotted \$182,800, \$178,800, and \$171,300, respectively, the second series of such grants under the Fishery Conservation and Management Act of 1976.

Commonly referred to as the "200-mile limit," the landmark legislation established Regional Fishery Management Councils, and gives American fishermen preference over foreign fishermen who want to use U.S. fishery resources. Previously, the Pacific, Western Pacific, and South Atlantic Councils were allotted \$141,200, \$160,400, and \$141,500, respectively, bringing the total to

\$976,000. Grants for the Gulf of Mexico and Caribbean Councils were expected soon.

Secretary of Commerce responsibilities have been delegated to NOAA's National Marine Fisheries Service which will fund Council operations through annual grants. The first grants covered October 1976 through March 1977; the second, April through September 1977.

Every Council is required to prepare and submit to the Secretary a fishery management plan on each fishery in its geographical area, prepare comments on any application for foreign fishing, conduct public hearings, and make periodic reports. The extension of U.S. fisheries jurisdiction to 200 nautical miles adds an estimated 2.2 million square miles to current fisheries jurisdiction, the management of which is critically important to the future of America's fishing industry.

Rules, Catch Limits Set for Foreign Fishing

Regulations controlling foreign fishing within 200 miles of the U.S. coasts and enumerating the quantities of various species foreign fishermen can catch have been published by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service.

Effective 1 March, the regulations required every foreign fishing vessel to have an annual permit to fish in waters within the 200-mile Conservation and Management Zone, and to keep U.S. authorities advised of activities within the zone. In the event any of the regulations are ignored, the permit can be revoked or suspended, or other restrictions can be imposed on the violators.

The regulations issued by the Commerce Department agency require each foreign vessel to submit to inspections when requested by the Coast Guard or NMFS agents, and agree to have NMFS observers aboard if requested. Foreign vessels are required to display identification numbers visible to monitoring ships or aircraft, and also

FISHING FEES SET FOR FOREIGN SHIPS

A schedule of fees to be charged foreign vessels and foreign nations to fish within 200 nautical miles of the U.S. coasts has been announced by the National Oceanic and Atmospheric Administration, a Commerce Department agency. The fees are authorized by the Fishery Conservation and Management Act of 1976.

Fees to be charged each foreign nation permitted to fish within the conservation zone from 1 March through 31 December 1977, are permit fees, poundage fees, and observer fees.

The permit fee is a fixed annual fee of \$1 per gross registered ton for each vessel engaged in fishing; a fixed annual fee of 50 cents per gross registered ton for any vessel engaged in processing fish, not to exceed \$2,500 per vessel; and, a fixed annual fee of \$200 for vessels assisting other ships in harvesting or processing.

The poundage fee, for 1977, is a fee of 3.5 percent of the dockside price of fish that are allocated to each foreign nation. The value of the fish will be determined by the dockside price received by U.S. fishermen in 1975 as published in "Fisheries of the United States." For species not landed in the United States, appropriate foreign dockside prices will be used.

For observer fees, foreign nations will be required to reimburse the United States on an annual basis for all costs of placing observers on board the foreign vessels, including salary, per diem, transportation, and overhead.

NOAA's National Marine Fisheries Service expected about 1,100 foreign fishing vessels to apply for fishing privileges off the United States.

Revenues from the fees in 1977 are expected to amount to \$1.4 million from the permit fees, \$10.4 million from the

dockside value of the fish taken, and \$750,000 from observer fees, for a total of \$12.5 million, assuming that the projected number of foreign vessels will be permitted to fish and the projected allocations are made.

The Fishery Conservation and Management Act of 1976 requires that fees charged to foreign nations and vessels be reasonable and apply nondiscriminatorily to each foreign nation. The fees may take into account the cost of administering the Act with respect to foreign fishing and may include, but not be limited to, the cost of fishery conservation and management, fishery research, administration, and enforcement.

As of 1 March the Act prohibited foreign fishing without payment of the requisite fee. The fee schedule was published in the Federal Register on 9 February 1977.

must maintain logs of "catch and effort" information.

Under the Fishery Conservation and Management Act of 1976, U.S. fishing vessels are given the first opportunity to harvest a species of fish. That portion of the optimum yield which it is expected will not be caught by U.S. fishermen is declared surplus, and foreign vessels may apply to fish for it.

The surpluses for foreign fishing in the Atlantic Ocean for 1977 by species are: silver hake, 85,500 metric tons (t); Atlantic herring, 22,000 t; Atlantic mackerel, 69,000 t; short-finned squid, 23,500 t; long-finned squid, 19,000 t; red hake, 34,900 t; butterfish, 5,500 t; river herring, 500 t; and all other finfish, 60,000 t.

The surpluses in the Pacific Ocean are: rockfish, 54,500 t; sablefish, 26,900 t; flounders (except halibut), 231,500 t; Pacific cod, 60,300 t; Alaska pollock, 1,099,000 t; Atka mackerel, 22,000 t; Pacific hake, 123,200 t; jack mackerel, 4,000 t; squid, 10,000 t; other groundfish, 109,800 t; herring, 20,000 t; snails (meat), 3,000 t; tanner crab, 12,500 t; and seamount groundfish, 2,000 t.

The regulations will continue in effect until either amended by NMFS or superseded by regulations implementing fishery management plans developed by the nation's eight Regional Fishery Management Councils. The regulations were published in the Federal Register on 11 February.

Growth, Mortality Rates of Ocean Quahog Sought

Word of the existence of 100-year-old ocean quahogs, also known as mahogany clams, comes from Princeton University. There, Ida Thompson, assistant professor in the Department of Geological and Geophysical Sciences, is studying the growth rates and natural mortality of ocean quahogs and surf clams, both commercially important species on the east coast of the United States.

Supported by a Sea Grant from the National Oceanic and Atmospheric Administration (NOAA), a Commerce Department agency, Thompson is trying to establish a relationship between the growth rings found on the quahog's "hinge plate" and its age.

"The ocean quahog has a little tooth,

called a hinge plate, where its upper shell is hinged to its lower shell," Thompson explained. "By cutting a vertical section of this tooth and then polishing it, we can see distinct growth rings under magnification, just like the rings on a tree."

Thompson theorizes that these rings are caused by checks in the clam's growth, probably due to cooler temperatures or decreased food supplies in the winter months. As such, she said, there should be one ring for each year of the clam's life.

To check her theory, some of the clams are being independently aged, using carbon-14 and radium-228 dating techniques. In addition, Thompson has had about 150 quahogs planted in the sand off Point Pleasant, N.J., in a mark-and-recovery experiment. Some of the shellfish will be harvested this October to determine how much they have grown.

Preliminary results of clam samples indicate that about 25 percent are almost 100 years old. Thompson's chief concern, however, is not just with how long the ocean quahog lives, but with how rapidly it grows and develops. According to preliminary studies, it would appear the quahog grows

very slowly indeed. "The evidence so far," Thompson said, "indicates that after 18 to 20 years the typical animal has reached only about 6 cm in height. That's less than 2½ inches." Such slow growth, according to Thompson, suggests that these shellfish may take much longer to reach sexual maturity than do other clams found on the Atlantic continental shelf.

"Our best guess right now," she said, "is that the ocean quahog doesn't reach sexual maturity until it's about 8 or 10 years old." By contrast, the typical surf clam found in adjacent areas is capable of reproducing at about one year of age and seldom lives to be more than 15 or 20.

Recent events have made information on the age of ocean quahogs of more than academic interest. Massive fish kills off the New Jersey coast last summer apparently were caused by anoxia—the total depletion of dissolved oxygen—in the bottom waters. One result of this environmental catastrophe is just now becoming known: vast numbers of surf clams in the affected areas were killed, perhaps as many as half the existing stocks.

According to Thompson, a problem may arise if the ocean quahog is viewed as a ready substitute for depleted stocks of surf clams. "This is particularly true if our age estimates of the quahog, especially age at maturity, are correct," she said. The ocean quahog may take so long to reach reproductive size, she believes, that any major unmanaged harvesting efforts could quickly reduce the stocks of the shellfish.

Thompson hopes the results of her work will lead to better management of New Jersey's surf clam and ocean quahog resources. "There hasn't been a great exploitation of the ocean quahog off New Jersey yet," she said, "and the more we know about the ocean quahog, the better our chances are of undertaking sound management techniques."

Endangered Status Asked for Caribbean Monk Seal

The Caribbean monk seal has been proposed for listing as an endangered species by the National Marine Fisheries Service and the U.S. Fish and Wildlife Service, under the authority of the Endangered Species Act of 1973. While it is feared the animal may already be extinct, NMFS believes it should be listed as endangered in

case remnant members of the species still exist. This would provide survivors protection under the Act upon discovery.

Karl W. Kenyon, a noted marine mammalogist, conducted an extensive aerial survey of the Caribbean monk seal's former habitat in the Gulf of Mexico and Caribbean Sea in 1973, and the assumption that the species is extinct is based upon this survey. However, two other species—the Guadalupe fur seal (*Arctocephalus townsendi*) and Juan Fernandez fur seal (*Arctocephalus philippi*)—were once thought to be extinct but later were found still to be in existence.

The former distribution of the Caribbean monk seal included the shores and islands of the Caribbean Sea and Gulf of Mexico from the Bahamas west (including the Florida Keys and Cuba) to the Yucatan Peninsula, south along the east coast of Central America and through the western Caribbean Sea, and eastward in the northern Caribbean to the northern Lesser Antilles.

With needs similar to those of the Hawaiian monk seal, placed on the endangered species list last year, the Caribbean monk seal seeks shallow lagoons and reefs for feeding areas; sandy beaches for hauling-out grounds; and permanent islets or beaches above high tide, and adjacent to shallows, for pupping areas.

Although Caribbean monk seals seemingly are tame and allow a close approach, they historically have abandoned habitat used by man for fishing or other purposes. Reports indicate that this species was indiscriminately killed for hides and oil since early Spanish exploration of the western hemisphere.

Puerto Rico University Receives First Sea Grant

A program of marine advisory services will be started in Puerto Rico under a National Sea Grant Program grant awarded early this year by the National Oceanic and Atmospheric Administration (NOAA). The grant of \$39,900 to the University of Puerto Rico, marks the first time Sea Grant funds have been awarded in Puerto Rico, according to Ned A. Ostenson, Director of the National Sea Grant Program.

"We are happy to be able to assist the University of Puerto Rico in its efforts to establish an advisory program that will provide assistance to fishermen and others in

Puerto Rico," Ostenson said during ceremonies in Washington at which the Commerce Department agency award was presented to Arturo Morales-Carrion, President of the University of Puerto Rico.

Morales-Carrion said this year's Sea Grant program in Puerto Rico "represents only the beginning of what we contemplate in terms of a substantial participation of the University of Puerto Rico in Sea Grant activities.

"The experience the first year," he said, "will serve as a point of departure for future Sea Grant planning and involvement, not only at the University but in Puerto Rico as a whole."

The grant-funded program will provide technical training to marine extension agents who will serve as a nucleus for a corps of marine advisory service specialists. The program will provide fishing skill training for about 250 commercial fishermen on the east and southeast coasts of the island, including the Vieques and Culebra coastal municipalities. Matching funds of \$20,132 from non-Federal sources will augment the Sea Grant. The program further is designed to increase public awareness, concern, and appreciation for Puerto Rico's marine and coastal resources, as well as the need for proper conservation measures to preserve those resources.

The Sea Grant activities will be coordinated through a program at Humacao University College, on the east coast of Puerto Rico, in collaboration with the University's Mayaguez campus, which has a marine graduate program.

The east and southeast coasts of the island are characterized, Morales-Carrion explained, by a diversity of marine and coastal environments and ecosystems. In addition to edible fish and shellfish, the area is endowed with innumerable estuaries, rookeries, mangroves, offshore keys, coral reefs, and other living marine systems, he said. The island of Vieques has a spectacular bioluminescent bay, and the coastal waters of Culebra island bear the best coral reefs in Puerto Rico.

Because commercial fishing in Puerto Rico depends largely on bottom fish, Morales-Carrion explained, the conservation of the estuaries, mangroves, coral reefs, and other living marine systems is of great importance to the island's economy.

NMFS Employees Awarded Commerce Medals

Three National Marine Fisheries Service employees were among 28 individual NOAA recipients of Gold and Silver Medals presented by the Secretary of Commerce at a ceremony in Washington, D.C., late last year.

Dayton L. Alverson, Director of the Northwest and Alaska Fisheries Center, Seattle, Wash., was awarded the Gold Medal, and Edmund S. Hobson and Susumu Kato, research biologists at the NMFS Tiburon Laboratory, Tiburon, Calif., were honored with Silver Medal Awards.

David H. Wallace, Associate Administrator for Marine Resources of NOAA, also was presented a Gold Medal for his outstanding technical leadership in international cooperative fisheries management. He is recognized as the chief architect of a management approach for North Atlantic

Fisheries. As the leader of the U.S. delegation to the International Commission for the Northwest Atlantic Fisheries (ICNAF), he helped obtain international agreement on reduced fish catches in North Atlantic, and at the same time increased the catch permitted U.S. fishermen.

Alverson was awarded the Gold Medal for his outstanding performance, abilities, and contributions as an administrator and scientist. Among his notable achievements cited were publication of over 100 articles on fisheries science, and acting as advisor, delegate, or organizer of many important national and international meetings on fisheries.

Under Alverson's leadership, the Northwest and Alaska Fisheries Center is recognized throughout the world for its contributions in international fisheries and Law of

the Sea activities; fisheries development and conservation; studies on the Columbia River Basin, environmental conservation, resource assessment, and marine mammals; aquaculture research; and publication of quality research results.

Hobson received the Silver Award for pioneering in-depth studies of the ecology of coastal marine fish communities while Kato received his Silver Award for his efforts as the prime mover in the development of new and underutilized fisheries in California.

The highest honor that the Department of Commerce can bestow, the Gold Medal is awarded for: Rare and outstanding contributions of major significance to the Department, the Nation, or the world in science, technology, or administration; highly distinguished authorship; heroic action involving jeopardy of life; and outstanding leadership in the administration of a major program.

Silver Medals are awarded for contributions of unusual value to the Department in science, technology, or administration; outstanding skill or ability in the performance of duties which have resulted in program advancement; meritorious authorship; or unusual courage and competency in an emergency.



Alverson



Hobson



Kato

Twohig Named Outstanding NMFS Employee for 1975

Daniel J. Twohig, an electronics technician at the Northwest and Alaska Fisheries Center, National Marine Fisheries Service, in Seattle, Wash., was selected last year as the 1975 Outstanding NMFS Employee of the Year. He is the first recipient of this new award which annually recognizes one NMFS employee for significant contributions to agency programs, and exceptional and sustained efforts toward accomplishing NMFS missions.

Twohig's work on a hydroacoustic system development project in the Northwest and Alaska Fisheries Center's Resource Assessment Program served as the basis for his selection. Twohig played a lead role in converting an entire computer system with its associated acoustic and data recording sys-

tems into a self-contained, portable, and weatherized container. His contribution provides a safer and more efficient operation at sea for hydroacoustic data collection and processing. Twohig was also cited for the exceptional quantity and quality of his work which is producing a major impact on the Center's success in developing advanced technology for monitoring the condition of U.S. Fishery resources.

Calibration Center Contract Extended

The Oceanographic Institute of Washington, in Seattle, has been awarded a \$134,051 contract extension by the National Oceanic and Atmospheric Administration (NOAA), a component of the U.S. Department of Commerce, to continue the operation and management through this Septem-

ber of the Northwest Regional Calibration Center in Bellevue, Wash.

The Center, which services the northwest and some of the Canadian oceanographic scientific and environmental agencies, also performs calibration work for NOAA's National Ocean Survey and other Federal agencies, universities, and commercial firms.

The Center services all of the National Ocean Survey's instrument calibration, such as its deep-sea reversing thermometers which are attached to water sampling devices and used to compute water temperature at various depths. Other scientific equipment calibrated on national standards by the Center are ocean current meters, and temperature, salinity, and pressure instruments.

The Oceanographic Institute has been managing the Calibration Center since the

facility began operations in 1972. The basic contract runs until 30 September 1982, with annual cost negotiations.

Pollution-Bearing Matter Studied in Puget Sound

Outflow from rivers helps cleanse Washington State's Puget Sound of pollutants, but tiny particles washed into the Sound by those same rivers may be the vehicles for driving at least one pollutant, oil, deeper into the ecosystem.

Scientists with the National Oceanic and Atmospheric Administration (NOAA) in Seattle are studying the types and distributions of suspended matter—floating particles—in the waters of northern Puget Sound, and testing sediments from rivers to learn whether these particles play a role in enhancing or minimizing the impact of pollutants.

With funds from the Interagency Energy Environment Program, managed by the Environmental Protection Agency, Edward Baker, Joel Cline, and Richard Feely of NOAA's Pacific Marine Environmental Laboratory have begun a year-long program of measuring the amount of suspended matter in the Sound and collecting water samples to be tested for the presence of hydrocarbons, chemical constituents of oil. The study is managed by NOAA's Marine Ecosystems Analysis Program, which, like the Seattle marine laboratory, is part of the Commerce Department Agency's Environmental Research Laboratories.

Much of the oil that will be coming southward from Alaska's north slope will be brought to refineries along Puget Sound. It has been estimated that the capacity of Puget Sound refineries may double by the 1980's and triple by the year 2000. More and more tankers will be traversing the Sound and the San Juan Islands, transporting crude oil to the refineries and petroleum products away again, and causing a corresponding increase in the chances for accidents producing major spills. Of almost as much concern and greater certainty, however, are the chronic, small-scale inputs—minor spills, seepage during transfer operations—that could have a greater impact over the long term than a single large spill.

Evaporation, photooxidation, and other physical processes, explained Jerry Larrance, head of the Seattle team, remove oil

from the marine ecosystem. But oil that adheres to some particles enters the food chain and ultimately becomes part of the bottom sediments. Oil-bearing particles may be eaten by marine organisms such as plankton. But the chain doesn't stop there. Remains of dead organisms and fecal material from the upper water sink to the bottom where they form a major source of food for bottom dwellers. Shrimp, clams, oysters, and crabs may thus ingest hydrocarbon-contaminated material. Oil sedimented on the bottom may also be mixed back into the water column as waves or storm surges disturb the floor of the Sound. So the NOAA scientists are trying to learn the concentrations and distributions of suspended matter in the Sound, and what role different types may play in transporting hydrocarbons through the ecosystem.

Suspended material comes from a variety of sources, according to Larrance. In the Sound, much of it is sediment outflow from rivers, particularly British Columbia's Fraser River whose plume flows southward through the San Juan Islands, along the very routes tankers will take. Other suspended materials are biological—organisms like plankton and their remains.

The first expedition in the NOAA project was completed in mid-November. On the MESA chartered vessel, *Snow Goose*, the researchers made measurements at 34 sites in Puget Sound, around the San Juan Islands, and in the eastern Strait of Juan de Fuca. Using a unique instrument designed by scientists at the University of Washington, the NOAA oceanographers measured the light scattering properties, an indirect measure of the amount of particulate matter, of the water at each site. The device, a nephelometer, provided a continuous vertical profile of light scattering at different depths as it was lowered into the water. At some of the sites, the researchers collected water samples to see how actual concentrations of suspended matter compared with the nephelometer readings, and measured standard physical characteristics such as salinity and temperature of the water.

At five sites, the team anchored for 16- to 24-hour experiments in which nephelometer measurements were made every hour, and water samples collected every four hours. The water samples will be analyzed for type of suspended matter.

The researchers also are collecting samples of the suspended material itself for analysis. A submersible pump is lowered over the side of the vessel, and a centrifuge on deck extracts the suspended matter. With a gas chromatograph on shipboard, the samples can be analyzed immediately for the lighter weight hydrocarbons, such as butane, methane, and propane. Later, the NOAA National Analytical Facility in Seattle, part of the National Marine Fisheries Service, will analyze these samples for heavy hydrocarbons, a process requiring more complicated equipment than can be carried on the *Snow Goose*. Two more such transits of the study area are planned later this year.

Meanwhile, samples of Prudhoe Bay crude oil will be tested in the laboratory with suspended material from the Fraser and Skagit Rivers under a variety of simulated natural conditions. Hydrocarbons will also be tested with filtered "clean" sea water from the Strait. This is not an isolated study, Larrance explained, but part of a continuing effort to look at the ability of suspended matter to hold hydrocarbons, especially petroleum hydrocarbons, and its role as an agent for the transport of hydrocarbons through the ecosystem. In the future, he added, the group will be studying other locations, other pollutants. "Our interest is the transport of pollutants in general."

SKIPJACK TUNA TAG MYSTERY SOLVED

Identification of a mysterious tag found on a skipjack tuna near Hawaii last December, announced by Richard S. Shimura, Director, Honolulu Laboratory, Southwest Fisheries Center, National Marine Fisheries Service, NOAA, has added another bit of knowledge about the long-range west-to-east movement of the species in the Pacific Ocean.

The particular skipjack tuna was captured on 9 December 1976 about 45 miles south of the Waianae coast by a local aku sampan, the *Bluefin*, and bore a plastic tag used by fishery scientists to trace the migration of fish. However, the tag had no legend identifying the research agency that tagged the fish. The inner core of the tag carrying the legend had somehow fallen off and what remained was only the outer tubing.

In an attempt to solve the mystery, the nameless tag was sent to a scientist at the Inter-American Tropical Tuna Commission (IATTC), William Bayliff, whom it was thought may have a clue as to its origin. Scientists at the IATTC have tagged thousands of skipjack tuna in the eastern Pacific. However, the tag was not the type used by IATTC and Bayliff in turn sent it to the Far Seas Fisheries Research Laboratory (FSFRL) in Shimizu, Japan for possible identification. Japanese scientists have also been tagging skipjack tuna in the western Pacific. The FSFRL scientists soon identified the tag as one of their own. The identification was positive because the tag was part of a batch made with a new type of silicone tubing which had been used only on

two occasions by FSFRL scientists, on 17 and 18 May 1976.

The FSFRL scientists believe the skipjack tuna in question was tagged on 17 May in the western Pacific at lat. 31°57'N, long. 159°12'E. The fish probably measured between 42 and 59 cm (16.5 and 23.2 inches) and was among 186 skipjack tuna that were tagged that day by Japanese scientists on board the *Fuji-maru*. The fish was then recaptured 206 days after release, by the *Bluefin*, 45 miles south of the Waianae coast. The fish was 68 cm (26.8 inches) long and weighed 7 kg (15.5 pounds) when recaptured. It had traveled a straight-line distance of over 2,200 nautical miles, or about 11 nautical miles per day, from the point of release to the point of recapture.

Recapture of this particular skipjack tuna represents the first record of a long-term, long-range west to east movement of skipjack tuna in the Pacific Ocean, Shomura noted. The fact that a segment of the population of skipjack tuna in the eastern Pacific migrate to Hawaiian waters has been known to scientists at the Honolulu Laboratory for a number of years. A number of skipjack tuna tagged in the eastern Pacific Ocean have been recaptured in the central Pacific in and around the Hawaiian Islands. Shomura noted that this recapture of a skipjack tuna tagged in the western Pacific and recaptured in Hawaii will probably revise some of the thinking of fishery scientists on the population structure of skipjack tuna in the Pacific Ocean.

NOAA Spacecraft Monitors Gulf of Mexico Currents, Assists Fishermen and Mariners

Pictures from space are helping mariners sailing the eastern Gulf of Mexico conserve fuel and improve transit times last winter by showing them where Gulf currents are flowing through that body of water. Additionally, commercial fishermen in the area have used the information to locate potentially more productive fishing grounds.

The information on the Gulf Loop Current, a circulation of water that moves roughly clockwise through the eastern portion of the Gulf of Mexico, comes from a geostationary satellite operated by the National Oceanic and Atmospheric Administration (NOAA), an element of the Department of Commerce. The satellite, GOES-1, is in an orbit which permits it to remain in about the same spot over the equator at an altitude of about 22,200 miles (35,720 km).

An infrared sensor aboard the spacecraft senses the warmer waters of the current. This information is relayed to NOAA computers near Washington, D.C., and converted into pictures which are in turn transmitted to a NOAA Satellite Field Services Station at Miami, Fla. There, analysts de-

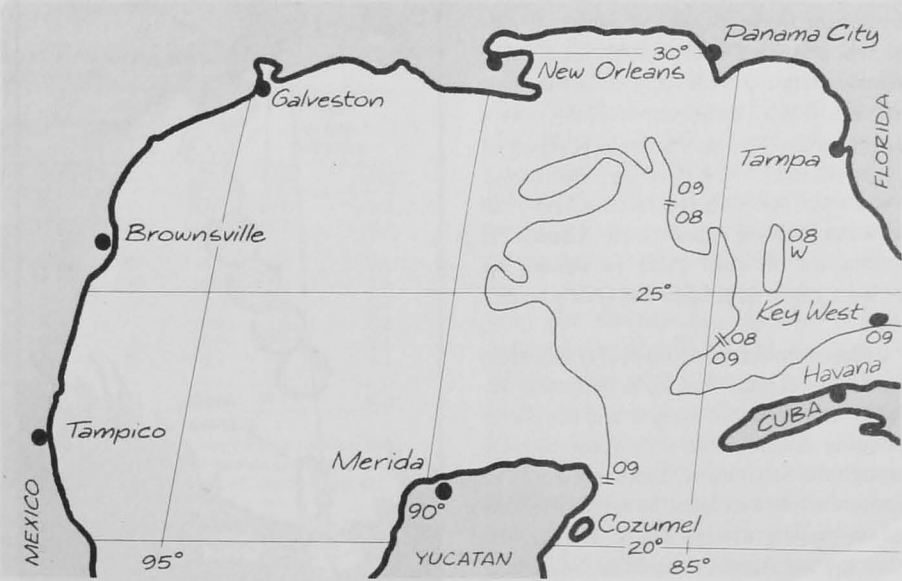
termine and plot the location of the Loop Current's coastward edge by latitude and longitude. The material, now in a form mariners can use, is sent three times a week to National Weather Service Offices along the Gulf Coast.

Donald C. Gaby, Manager of the Satellite Field Services Station maintained by NOAA's National Environmental Satellite Service, said the maximum Loop Currents—which can flow up to a speed of about 3½ knots—are found about 9 miles (15 km) inside the coastward edge of the Loop.

The Loop analysis was provided until May, Gaby said. Then, as Gulf waters warm up to about the same temperature as the waters of the Loop Current, the temperature differential is difficult to see on the infrared imagery. Next November, as the general water temperature declines once more, the analysis will be resumed.

Last winter, in a pilot program, a number of mariners used the Loop Current information in plotting navigation courses, sailing in the current when headed in the direction it was flowing, and avoiding it when headed in the opposite direction. Improved transit times and fuel savings were experienced, Gaby said.

Since certain species of fish sought by



A typical circulation pattern of the Gulf of Mexico Loop Current is seen in this chart, developed by NOAA from satellite pictures of the Gulf. Numerals 08 and 09 refer to the dates (January 8 and 9) on which the features were seen in satellite imagery. The elongated circle northwest of Key West, Fla., identifies a warm eddy that had separated from the current. Since current positions constantly change, NOAA provides an analysis three times a week.

commercial fishermen in the Gulf prefer water temperatures close to those found along the edge of the Loop Current, the location of the current at any given time is of value to the fishermen.

The GOES-1 satellite, launched for NOAA by NASA in October 1975, is one of

several operational environmental spacecraft the air and ocean agency operates. In addition to those in geostationary orbit, NOAA also receives environmental data from a spacecraft in polar orbit which monitors all parts of the earth twice every 24 hours.

Ocean Current Measured Under Bering Sea Ice

National Oceanic and Atmospheric Administration (NOAA) scientists are taking the first systematic look at how ocean water moves beneath the Bering Sea ice pack. The unique measurements being made by submerged current meters are part of a sub-Arctic study by oceanographers with the Pacific Marine Environmental Laboratory in Seattle, one of NOAA's Environmental Research Laboratories, and with the University of Washington.

What they learn will be applied in a major environmental study managed by the Environmental Research Laboratories for the Interior Department's Bureau of Land Management, in an effort to establish environmental baselines, and to predict the primary marine impact of petroleum development off Alaska.

According to Robert Charnell, the NOAA oceanographer leading the current study, little is known of water movement beneath the northern ice pack—or how water would transport oil spilled into the sub-Arctic marine environment. "We know the water is driven by a large pressure gradient from the Bering Sea northward through the Bering Strait and into the Chukchi Sea, and there's been quite a lot of work on understanding what happens in the summertime. But up there, summer lasts only a month or two. That leaves the largest part of a year for which we have no information as to current speeds and direction, and what the water is doing under the ice. Clearly, if we had an oil spill there in winter we couldn't begin to predict the spill's trajectory."

Charnell points up two aspects of the Bering Strait currents that hold particular interest. One is the focusing—and the corresponding acceleration—of water moving through the Strait itself; another is a split in the current when it clears the Strait, with one stream turning toward Arctic Russia, the other toward Alaska's Beaufort Sea coast.

Very little is known about how these properties of Bering Sea water motion change with time and season, or the masses and velocities involved.

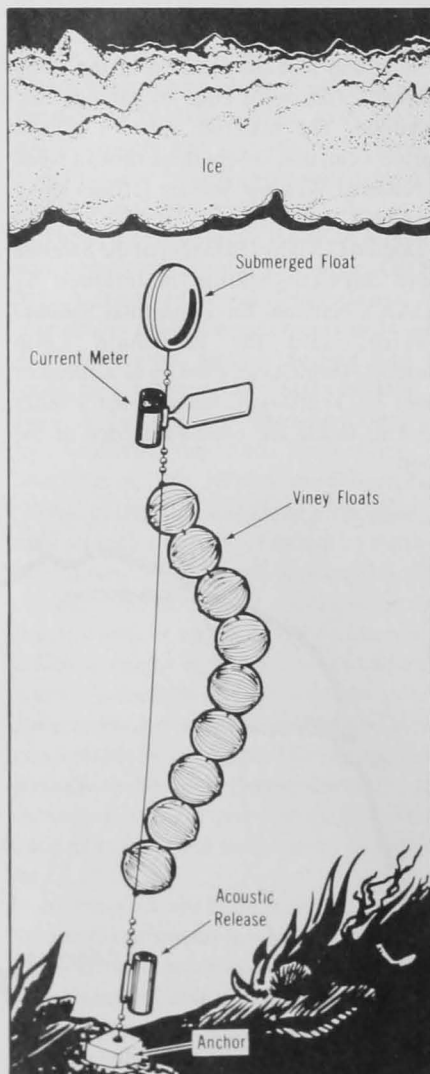
The current meters are suspended about 20 feet (seven meters) above the sea floor, in water about 150 feet (50 meters) deep. "We have the meters deep because of the ice,"

Charnell explained. "The problem is that while you have relatively thin new ice in the pack, some large chunks of old ice get caught. So you have a thin layer over the whole surface, with these big ice blocks extending in some cases almost to the bottom. The Canadians put out nearly 20 current meter stations in the Beaufort Sea a while back and when they tried to recover them they were able to find pieces of only three, they were ground up so badly."

The present set of current-meter stations was deployed from the NOAA ship *Discoverer* last summer, to form an array of 19 submerged meters. Each mooring consists of a cylindrical meter—about the size of a loaf of bread—attached to a swivelled vane that senses the direction of water motion. The meter is suspended on a cable held taut by a buoyant, streamlined float, and anchored at the bottom by a heavy concrete weight. The cable is connected to the anchor by a coupling that can be acoustically triggered, permitting a string of floats to raise the apparatus to the surface for retrieval.

Four current meters are set west of Cape Prince of Wales, on the American side of the Bering Strait. Seven more are moored in the Chukchi Sea, in a shallow arc westward from Cape Lisburne, almost the northwest corner of Alaska. Two meters are installed at the mouth of Kotzebue Sound, and two more are in a line south of Nome in Norton Sound. Three are set along a southeastward line from St. Lawrence Island in the Bering Sea to the Yukon River delta, with a fourth meter northwest of St. Lawrence Island.

Charnell and his colleagues planned to visit the harsh, ice-dominated environment in which their current meters were wintering. They were to cut holes in the ice near the positions of the submerged meters and take ocean density measurements with portable conductivity-temperature-depth sensors. These soundings below the ice will tell them whether water movement near the current meter is representative of water motion near the surface. The meters will be recovered this summer, and their data record removed for subsequent analysis by the Seattle oceanographers.



Current meters are suspended about 20 feet above the sea floor in about 150 feet of water.