U.S., Brazil Agree on Shrimp Conservation

The Commerce Department's National Oceanic and Atmospheric Administration is now administering a law implementing an agreement with Brazil dealing with the conservation of certain shrimp resources located off Brazil. The Act, signed into law by President Nixon earlier this year, has an amendment designating the American lobster (*Homarus americanus*) as a creature of the Continental Shelf, thus affording the lobster additional protection from foreign fishing.

The legislation, known as the Offshore Shrimp Fisheries Act of 1973, formalizes an agreement with Brazil under which the Brazilian Government has, with the United States, undertaken to enforce conservation regulations, thus protecting a marine resource of great value to U.S. shrimp fishermen who operate in what the United States terms international waters along the Brazilian coast north of the Amazon River.

From 1959, when it began, through 1972, the fishery which extends from the Guianas to the mouth of the Amazon yielded about 350 million pounds of shrimp (heads off). In the first nine months of 1973 the Guianas fisheries area yielded about 9.8 million pounds of shrimp (heads off) worth close to $16 million on the U.S. market.

NOAA's National Marine Fisheries Service will administer the law as it applies to U.S. fishermen. However, under the treaty, the government of Brazil will enforce the law on behalf of the United States in the area covered by the agreement, in conjunction with the Departments of Commerce and Treasury, and the U.S. Coast Guard.

The lobster amendment to the Offshore Shrimp Fisheries Act was added by the Senate Commerce Committee, headed by Senator Warren G. Magnuson. The amendment will have the effect of reserving American lobsters found on the Continental Shelf for U.S. fishermen.

The new U.S. law now in effect prohibits taking American lobsters by vessels of other countries, and all lobsters caught by these vessels must be returned to the sea immediately regardless of condition.

The American lobster is one of several species that have been identified for cooperative management under the NMFS State-Federal Fisheries Management Program. A regional council comprising fisheries agency directors of the 11 coastal States from Maine to North Carolina and the NMFS Northeast Regional Director is currently developing a resource-wide management plan for this valuable species. Designating the American lobster a "creature of the Shelf" is considered a major step in furthering the progress of the management plan.

At a meeting in Baltimore, Md., about a year ago the council stated: "The American lobster would be managed to insure its preservation as a viable resource once ownership of this resource rests in the United States." The amendment to the Offshore Shrimp Fisheries Act of 1973 now provides for such exclusive sovereign rights and, therefore, appears to remove a major roadblock to implementation of the management principles agreed to at the Baltimore meeting.

Northeast Pacific Charts Scheduled

The National Oceanic and Atmospheric Administration has announced that it will undertake the preparation and production of nautical charts for the northeast Pacific Ocean, covering a vast area extending from the West Coast to Hawaii to Alaska. The first two charts are planned for issuance in 1975, with two more to follow in 1976, and the final chart in 1977.

The work will be done by NOAA's National Ocean Survey, the government's chart-producing agency for U.S. coastal waters. The charts will be prepared by the agency's Office of Marine Surveys and Maps, headed by Captain Robert C. Munson. One chart, covering the area from the West Coast to Hawaii, will be published at a scale of 1:10,000,000, the remainder at a scale of 1:3,500,000.

These will be the first international charts to be produced by NOAA, a Department of Commerce agency, as part of a multination program being sponsored by the Monaco-based International Hydrographic Bureau. Other nations which have agreed to produce and issue international charts are Canada, West Germany, United Kingdom, France, Brazil, Argentina, Chile, Italy, Netherlands, Japan, India, New Zealand, Australia, and possibly South Africa.

The program is designed to provide a standard series of charts for the entire world which can be used by all nations. Each member nation is authorized to reprint charts in its own language, but employing the same form of navigational information, such as depth curves, sounding spacing, aids to navigation, and nautical symbols. All data will be in metric units. Some international charts already have been issued, including a chart for the western section of the North Atlantic Ocean by the U.S. Defense Mapping Agency.

NMFS Seeks Fish Name Standardization

Common names of various species of fish have long presented problems of identification and labeling of fishery products because the same species may be known by different names in different parts of the country, or even in the next county.

On parts of the east coast "rockfish" refers to what elsewhere is known as striped bass, but on the west coast "rockfish" is the common name for more than 20 other species. Along the Atlantic coast, the fish known as alewife or bunker in Chesapeake Bay is called by its more common name, menhaden, elsewhere and as far south as the Gulf of Mexico. The problem is receiving special attention from the Commerce Department's National Oceanic and Atmospheric Administration.

NOAA's National Marine Fisheries Service points out that several thousands of marine food species have taxonomically accurate scientific names that are recognized throughout the world by fisheries scientists, but because of different common names in different locales, the situation leads to confusion in the marketplace, is not in the public interest, and defies regulatory controls. The problems are accentuated in that many nutritious products are available from species known by names that are commercially objectionable.

NMFS Director Robert W. Schoning said that confusion exists concerning naming and labeling new product forms manufactured from multiple ingredients and various species of fish. Mr. Schoning said that the regulation of matters dealing with common or unusual names of foods is the primary responsibility of the Food and Drug Administration. Decisions on permissible names for fishery products generally have been reached through formal and informal agreements on a case-by-case basis. One of the basic problems, Mr. Schoning said, is that the uncertainty with respect to product names inhibits technology and commerce in fishery products especially with species that are abundant, but not fully utilized in U.S. markets.

Mr. Schoning said that under existing statutes NMFS is responsible for grade standards and descriptions of fishery products, and among other things, conducts an extensive consumer education program. He said that a logical and necessary extension of these activities would cover matters pertaining to market nomenclature for fishery products and to providing an improved procedure for establishing or changing legally acceptable names.

As a first step, Director Schoning said he would appoint an expert in the field to coordinate development of an improved procedure to achieve the nomenclature objectives. The coordinator will contact and work with all interested parties in the private and public sectors, and maintain close liaison with the FDA.

U.S. and Russian Marine Mammal Scientists To Expand Scientific Cooperation, Research

Soviet and U.S. scientists have agreed on an enlarged program of scientific cooperation and research on marine mammals, following a meeting in Washington, D.C. late last year. Scientists of the two countries will expand cooperative studies and meet more frequently in pursuit of improved conservation and management of marine mammals.

Marine mammal experts from Soviet agencies exchanged data and opinion with their American counterparts in the U.S. Departments of Commerce and Interior on matters concerning whales, seals, sea lions, sea otters, walrus, and polar bears. Also in attendance were scientists of the U.S. Public Health Service in Alaska, the Alaska Department of Fish and Game, and several private scientific organizations.

The meeting of the Marine Mammal Subgroup—second in a series sponsored by the Commerce Department's National Oceanic and Atmospheric Administration—generated impressive results in terms of concrete plans for a series of far-reaching bilateral investigations of the life cycles and environmental conditions of several species of marine mammals.

Discussion centered on such topics as:

1. The standardization of methods and forms used by the two countries to record biological observations and sightings of pinnipeds (seals and sea lions) and cetaceans (whales and porpoises) at sea.

2. The need for attention to technological improvements in presently available methods used to mark or tag marine mammals.

3. The continuation of national research programs conducted in each country which seek to define both the population dynamics and the biological cycles of gray and bowhead whales.

4. An increased effort by both countries to acquire biological data concerning the Beluga (in Russian "Belukha") whale.

5. Additional consideration of the experimental use—so far limited to the United States—of remote sensors to monitor walrus populations on North Pacific ice packs and the possible application of similar techniques to whales at sea, on a cooperative basis.

6. Increased collaboration between Soviet and American scientists in existing and proposed studies of the physiology, morphology, distribution, and ecology of several kinds of seals and walrus, to include visits to Russia by U.S. scientists.

7. The possible contributions Soviet

scientists might make to a proposed U.S. study of the incidence and metabolism of heavy metals in marine mammals.

8. The agenda for a 1974 symposium on the biology and conservation of North Pacific walrus in Russia in which U.S. members of the Marine Mammal Subgroup will participate.

The United States also suggested that Russian scientists take part in studies of gray whales carried on under the direction of the NMFS Northwest Fisheries Center (Seattle, Wash.), tentatively planned for 1975 on the Baja California breeding and calving grounds. A Soviet scientist was invited to participate in U.S. research on the northern fur seal-northern sea lion relationship, to take place on the Pribilof Islands in 1974. (The U.S. early in 1973 declared a moratorium on seal harvests on St. George Island, in part so a protected seal population could be compared with a harvested one on nearby St. Paul Island.)

Representatives of both countries confirmed the value of regularly scheduled exchanges of scientific data and opinion on ocean mammals, and said they hoped for an expansion of the close association that has developed since the United States activated the Marine Mammal Protection Act of 1972. Within Commerce, NOAA's National Marine Fisheries Service is in charge of the implementation of the Act, in consultation with the U.S. Marine Mammal Commission.

The USSR many years ago established a conservation program that restricts the taking of marine mammals by Soviet citizens to a few exceptions granted by special permit, e.g., subsistence take by Siberian Eskimos. That program comes under the supervision of the USSR's All-Union Research Institute of Marine Fisheries and Oceanography (known familiarly by its Russian initials, "VNIRO"). VNIRO's responsibilities for marine mammals within Soviet boundaries are similar to those of NOAA's NMFS.

RUFAS II, Robot Diver, Expected To Locate Commercially Important Fishery Resources

A second generation robot diver that can inspect the seafloor at great depths is expected to aid significantly in locating commercially important stocks of fish and other undersea resources.

Named RUFAS II (for Remote Underwater Fisheries Assessment System), the instrument is towed behind a research ship, and dives on command to look at selected underwater features. Development of RUFAS II was under the sponsorship of two units of the Commerce Department's National Oceanic and Atmospheric Administration—the National Marine Fisheries Service, and the Office of Sea Grant through a grant to Mississippi State University.

RUFAS II is equipped with roving "eyes" that photograph the surrounding scene by videotape and 35 mm film, and continuously televise its observations to the mother ship. The 35 mm photo system can be activated to record interesting phenomena, then turned off to ignore barren stretches of sandy bottom.

Equipped with sonar beams, RUFAS II sends warning signals to the shipboard operators when underwater navigational hazards are detected, so the instrument's "flight pattern" can be altered electronically to avoid the obstacle, be it a rock or a change in the configuration of the sea floor.

RUFAS II came into being as a result of collaborative work by Dr. Sidney Upham, Mississippi-Alabama Sea Grant Director, and Dr. Edward F. Klima, former base director of the NMFS Pascagoula laboratory. Principal investigators on the project were Richard D. Benton, Associate Professor of Engineering Technology at Mississippi State University, and Wilber R. Seidel, Manager of the NMFS Harvesting and Technology Program based at Pascagoula.

The sophisticated electronic robot ("Looks like a monster waterbug," said one observer) underwent initial sea trials from the NOAA research vessel *Oregon II* in the Gulf of Mexico near Destin, Fla. The 12 by 7-foot, 1,000 pound sled skimmed and hovered over several miles of ocean bottom, looking up, down, and sideways to give scientists aboard the mother ship a fish-eye view of marine features from a few feet above the bottom to just beneath the surface. Tests demonstrated that RUFAS II can climb at a rate of 2.5 feet per second. It was towed at speeds up to six knots by a cable more than a mile long, to permit dives as deep as 2,400 feet.

One important feature that distinguishes RUFAS II from its predecessor, RUFAS, is an automatic flight control system, installed to obviate the need for continuous manual control of the vehicle, sometimes for as much as ten hours without interruption. The prototype for the new underwater surveyor performed excellently over the past several years in fisheries resource explorations in shallow water (up to 50 fathoms). NMFS used RUFAS repeatedly to seek out and define populations of scallops in southeastern coastal regions, covering more than 6,000 survey miles.

The first RUFAS was developed for shallow-water surveys in a cooperative effort by the General Electric Corporation of Bay St. Louis, Miss., and the NMFS Pascagoula laboratory.

Biological Tracer From Pacific Jellyfish May Assist Detection of Human Diseases

The mysterious glow of Pacific jellyfish may lead toward improved detection of certain diseases in humans.

With Sea Grant support from the Commerce Department's National Oceanic and Atmospheric Administration, University of Washington scientists have found that a substance called aequorin, which gives the jellyfish its glow, can also be used to measure minuscule changes in calcium concentrations in a person's body fluids or cells. Such changes frequently are early signals of cellular destruction in the body, and point to the onset of diseases such as metastatic carcinoma, bone dysplasia, cardiac dysrhythmias, parathyroid disorder, and others.

The scientists, Dr. Kenneth Izutsu, a physiologist, and Samuel P. Felton, a biochemist, produce a purified aequorin from the common jellyfish found in great numbers in Puget Sound at certain seasons. This jellyfish, known scientifically as *Aequorea aequorea*, can be seen to glow in the dark if held in a person's hand.

The Sea Grant scientists, who are staff members of the university's Fisheries Research Institute and Center for Research in Oral Biology, are developing two methods for using aequorin to measure the amount of calcium in such biological fluids as blood, saliva, urine, and cerebral spinal fluid. Changes in the amount of glow, or luminescence, is a measure of changes in the amount of calcium in the fluid being measured. Aequorin was first discovered in 1962 by Dr. Frank Johnson and Dr. Osamu Shimomura of Princeton University.

Four chemical companies have indicated interest in marketing aequorin on a test basis, or as a regular item in their catalogue, once the production methods are perfected. When this occurs, it is expected that all available supplies will be used by clinical chemists and physiologists.

The Sea Grantees point out that aequorin has two advantages over present methods of calcium determination: it is far more sensitive; and it does not require upsetting the balance of the system being measured. Aequorin can be used to measure calcium concentrations as low as 10^{-9} molar—approximately 40 parts per trillion. Aequorin is the only substance that can measure calcium within a single cell.

The scientists can obtain from 600 jellyfish enough aequorin for about 500 calcium measurements—about 35 milligrams of 30 percent pure aequorin. They catch the jellyfish in hand nets to prevent them from being crushed, and remove about ¼-inch of the very outside perimeter of the "umbrella", the only part that contains the bioluminescing protein. When 500-600 rings have been accumulated, they use a series of mechanical and chemical techniques to extract and purify the aequorin.

Aequorin is a protein that contains a non-protein portion. The non-protein portion is thought to be the light-emitting part of the molecule, but this has not yet been proven. The luminescence caused by the reaction of calcium and aequorin is measured by a photoelectric cell. Scientists do not yet understand the nature of the reaction that causes this release of energy in the form of light.

Physiological uses for aequorin are expected to be far-reaching, since before its discovery there was no way to test the calcium theory of cell function. This is a theory currently under investigation by many biologists, which suggests that calcium apparently acts to trigger hormone reactions in cells. To date, aequorin has been injected into the large muscle cells of the barnacle and into the giant nerve cells of the squid—both of which are convenient experimental models for human muscle and nerve cells. In both cases the importance of the calcium ion in regulating cell function has been confirmed.

The University of Washington scientists are also considering possibilities for non-medical applications of aequorin, such as studying the role of free calcium in fish spoilage and studying the role of calcium in the hatching of fish eggs.

The Sea Grant investigators have carefully observed the population of the jellyfish after several seasons of catching them for their work. To date there has been no noticeable change in the numbers of the animals in Puget Sound and San Juan waters where they are caught. Great care is being taken to ensure the continued survival of the species, and plans are being made to study more closely the habits of the animals.

Izutsu and Felton became interested in aequorin after the Princeton University team of Johnson and Shimomura suggested that the substance could be used for microdetermination of calcium. At that time no method existed for studying the effects of anesthetics on calcium ions released at nerve receptors. The Princeton scientists discovered that the aequorin luminescence requires calcium and thus is unlike the reaction of fireflies and other bioluminescent organisms, which require oxygen or a high energy source such as ATP (adenosine triphosphate) in order to take place.

The aequorin project was accepted as a part of the University of Washington Sea Grant program in 1971, and continues to receive partial support from NOAA's National Sea Grant Program. The University of Washington was one of the first four universities in the nation to receive the Secretary of Commerce's designation as "Sea Grant College".