

NSGO-Q-77-001

Sea Grant

Annual Report

October 1, 1976 to September 30, 1977

U.S. DEPARTMENT OF COMMERCE
National Oceanic and
Atmospheric Administration



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U. S. DEPARTMENT OF COMMERCE
Juanita M. Kreps, Secretary

National Oceanic and Atmospheric Administration
Richard A. Frank, Administrator





THE SECRETARY OF COMMERCE
Washington, D.C. 20230


MAY 03 1978

Dear Sirs:

In accordance with Public Law 94-461, October 8, 1976, I am pleased to submit the 1977 Annual Report of the National Sea Grant Program.

Also enclosed are comments from the Director of the Office of Management and Budget and the Director of the Office of Science and Technology Policy. These comments are submitted in accordance with Section 211(b) of Public Law 94-461.

Sincerely,


Juanita M. Kreps

Enclosures

The President
President of the Senate
Speaker of the House of Representatives

A Message From the Director:

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This Annual Report of the National Sea Grant Program, describes the maturation of an exciting and successful experiment in Federal government relationships with State and local communities in the advancement of marine science, commerce, education and public service. Considering that the program has just completed its eleventh year, one must be impressed with the caliber of the Sea Grant scientists, with the scope and diversity of the Sea Grant research, and with the acceptance of the program by the scientific community and the public.

During Fiscal Year 1977, the program launched several new and exciting efforts to broaden its stimulation of oceanic education for youngsters, not only through the development of improved marine curricula for grades kindergarten

through twelve, but also in the encouragement of better training for the teachers who must bring the beauty and bounty of the ocean to the youngsters of all school systems.

Sea Grant accelerated its plans to expand its program of fellowships for deserving undergraduate and graduate students. It searched the horizons for projects of national priority, and it began looking abroad to find ways of working cooperatively with both developed and underdeveloped nations in

the creation of a better understanding and appreciation of the oceans which are the common heritage of all mankind.

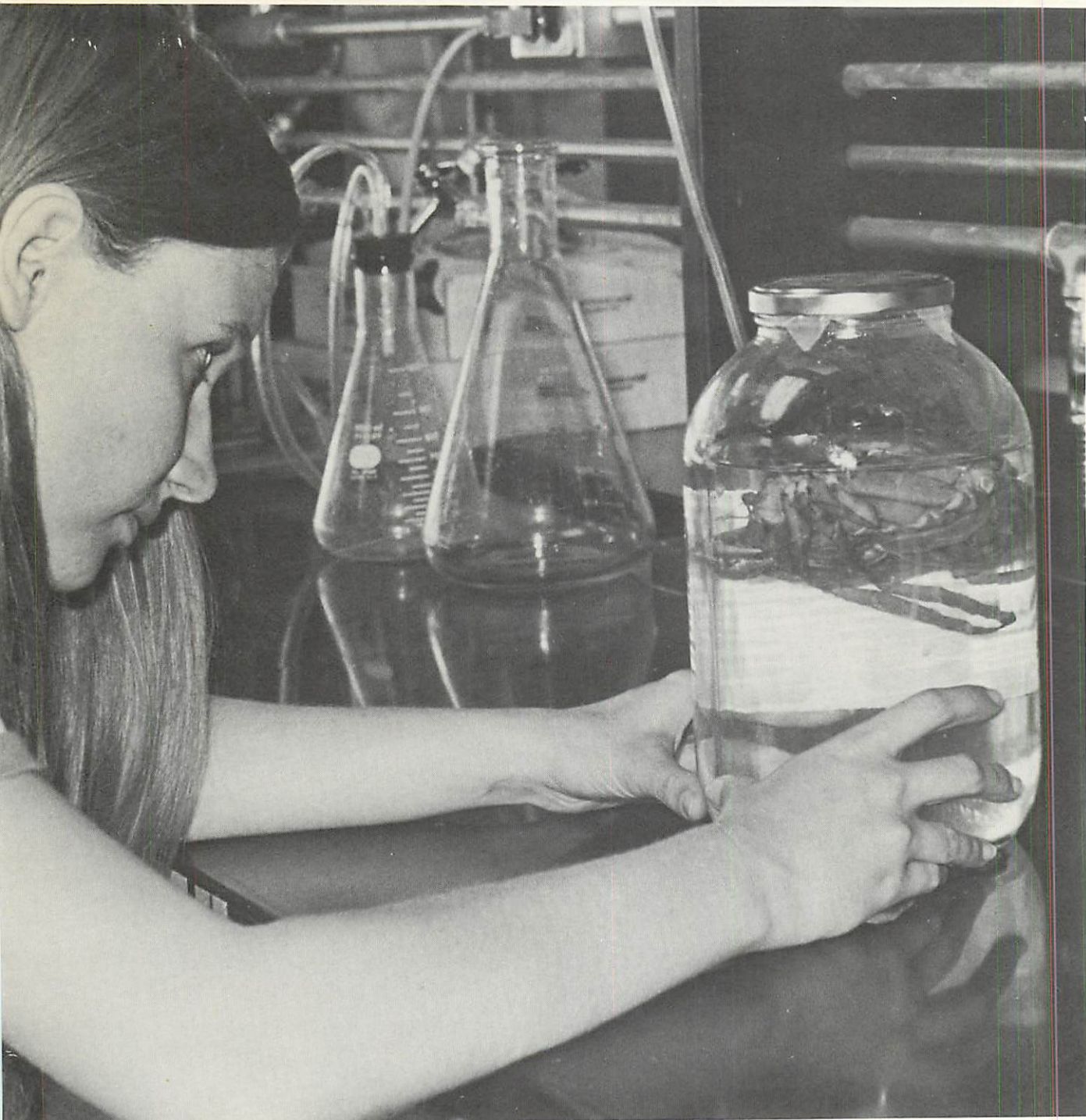
As a result of the Sea Grant Program Improvement Act of 1976, this past year has been one of transition for Sea Grant, legislatively, as well as philosophically. In my estimation, this report gives clear indication that faced with this new impetus and challenge, our sails will continue full, our direction will hold steady, and our destination will remain as promising as ever.



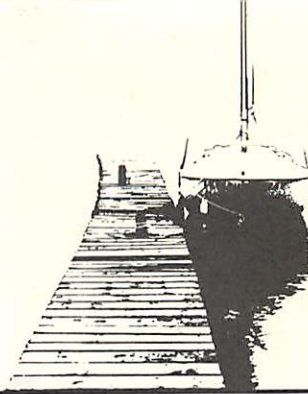
Dr. Ned A. Ostenso
Director
National Sea Grant Program

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Introduction



Much of the research carried out in the Sea Grant program is done at sea. Here, crewmen aboard the University of Delaware's Research Vessel Henlopen prepare for an experiment on the continental shelf.

University of Delaware Photo

With an eye toward increasing the understanding, assessment, development, utilization and conservation of the Nation's ocean and coastal resources, the 94th Congress passed and the President signed into law the Sea Grant Program Improvement Act of 1976. The Act, Public Law 94-461, was signed October 8, 1976, and it suggested some significant changes in emphasis for the National Sea Grant Program.

Basically, the Act focused on Sea Grant's involvement in three new programs: fellowships, designed to assist students in their pursuit of marine and oceanic related activities; national projects, aimed at meeting needs and helping solve problems that affect the Nation as a whole; and international programs, created to enhance the ability of developing nations to use and manage wisely their marine resources.

The legislation has served as the basis of a concerted effort by the Office of Sea Grant to pursue the mandate vested with it.

Program Preparation

Although none of the programs was specifically funded during Fiscal Year 1977, considerable effort was devoted to preparing to carry out the programs when funds become available. Working closely with Congressional staff members, the Sea Grant Directors, the State Department, Office of Education, and others who will be affected by these new programs, the Sea Grant staff was able to resolve a number of critical questions involving the new programs and to prepare regulations and guidelines.

Significantly, the new programs have generated indications of interest, both formally and informally, from a number of parties concerning their possible participation.

While the three programs themselves will be new to Sea Grant, they are not expected to bring about any major change in the system used to assess or manage any grants that may be forthcoming. The standard process of proposal preparation and review will continue to be used.

New Programs

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A few specifics about the new programs as planned are:

Fellowships

Support of fellowship grants to academic institutions and associations will be based on specific proposals. Of particular importance will be the proposer's plans for selection of the fellows, the fields of activity, the persons eligible, the divisions of funds between the fellow and the institution, and the tenure of the fellowship. The program is designed to provide assistance to both undergraduate and graduate students to increase the national supply of individuals educated and trained in marine and oceanic related activities. Selection of the Sea Grant fellows and the administration and supervision of their education will be done by the institution to which the grant has been made. It is hoped that this new fellowship program not only will broaden the marine field by developing new specialists and interdisciplinary workers, but will enrich the field by attracting those not now widely associated with marine activities, such as women, minorities and the handicapped.

National Projects

Awards from the Office of Sea Grant relating to national projects will be in the fields identified by the Secretary of Commerce as being national needs or major problems relative to ocean and coastal resources which are appropriate to Sea Grant involvement.

The objectives of the national projects program are to initiate or



Preceding the award of any Sea Grant, institutional and other proposals receive a complete and thorough review, including an on-the-site visit from a team of experts. This site review was conducted at the University of Delaware.

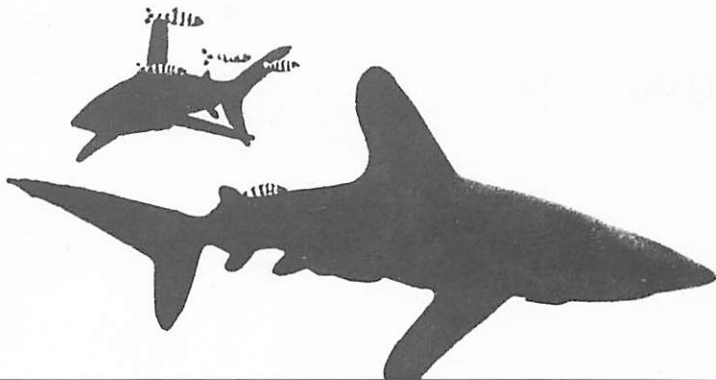
Office of Sea Grant Photo

accelerate effort in those areas of high national priority which are now receiving inadequate or no attention and, further, to support programs that are of national interest but lack specific relevance to any geographic region and thus cannot reasonably attract matching funds. For national projects there is no requirement for a minimum of 33 1/3 percent of matching funds from non-Federal sources. Additionally, under the legislation, the total amount which may be provided for such grants during any fiscal year shall not exceed 10 percent of the total funds appropriated for that year's base program.

International Programs

The purpose of the international programs is to enhance the research and development capabilities of developing countries with respect to oceans and coastal resources and to promote international exchange of information and scientific data about such resources. As planned, the grants will be made for programs dealing with marine-related education, training, research experience, and exchange of data. Strong emphasis will be placed on cooperation with a clear commitment on the part of the foreign participant. Because the Sea Grant Program does not have the benefit of prior experience in the international arena, initial grants will be provided primarily for projects with goals that can be attained within a limited time and that do not make or imply long-term commitments to limited and uncertain funds.

As directed by the Act, funds will be awarded only to U.S. institutions. There is no requirement for matching funds from non-Federal sources for these programs. On all international programs, consultation will be maintained with the Department of State.



The Congress, both in the philosophical support evidenced in the 1976 legislation and in the financial support demonstrated in the Sea Grant appropriations for Fiscal Year 1977, provided guidance and foundation for Sea Grant to expand its marine education activities. As a result, there has been a measurable change in the size and in the emphasis of the Sea Grant education grants.

This support and direction was enhanced by submissions of increasingly worthy proposals from the Sea Grant institutions during the year, including activities aimed at minority and inner-city youngsters, persons who through accidents of geography have largely been ignored. Among Sea Grant-supported programs carried out specifically for inner city youths were efforts at the State University of New York/Cornell University, Stevens Institute, University of Michigan, University of Southern California, and the University of Wisconsin. Additionally, programs for Pacific Island youths were conducted by the University of Hawaii, programs for Alaskan natives by the University of Alaska, and programs for Guamanians by the University of Guam.

Expanded fellowship in the Sea Grant program will benefit undergraduate and graduate students in pursuit of marine/oceanic studies. In this photo, a researcher at the Hawaii Institute of Marine Biology studies some topminnows in an effort to find alternative supplies of live bait-fish for use in the skipjack tuna fishery.

University of Hawaii Photo

Education Agreement

Another milestone was achieved during the year when Sea Grant was instrumental in bringing about an agreement between the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Office of Education. The interagency agreement, signed August 25, stipulates that the Office of Education will encourage State departments of education and other educational organizations to work closely with Sea Grant institutions in marine education.

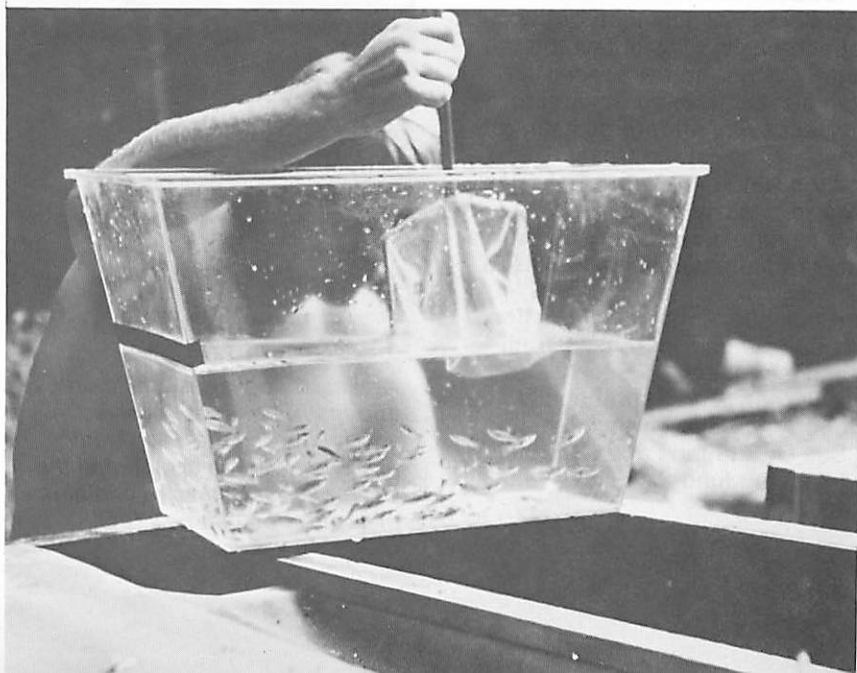
Because of the Office of Education's position of leadership in the educational communities across the Nation, this cooperative arrangement is expected to have a major impact on the expansion of marine education in the U.S.

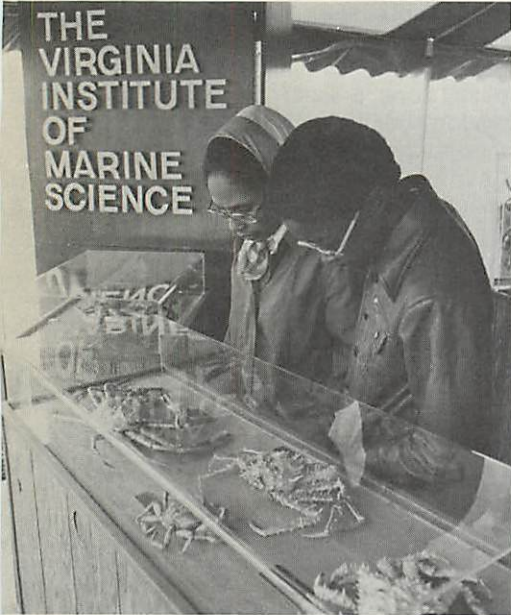
During the fiscal year, funding for marine education was increased by almost \$1,200,000 (about 50 percent) over the previous year, including a large number of special or "supplemental" grants.

Among these "supplemental" grants were three projects to increase public awareness of the oceans and coastal zone, a dozen projects to develop specific marine curricula tuned to the needs and geography of particular areas and aimed especially at public school teachers of kindergarten through the twelfth grade, and one project to develop a national policy on marine education in the U.S. The last item, administered through the University of Delaware Sea Grant College Program, involved a series of workshops for teachers and school administrators, primarily in the public schools. Workshops were conducted throughout the Nation, many of them in non-coastal areas.

Technician Training

Sea Grant continued to support technician training with emphasis on activities related to energy and extended fisheries jurisdiction. Projects included the technical training of boat operators in Louisiana and Texas, the training





A number of projects were launched to increase public understanding of the oceans. Here, some youngsters take a look at an exhibit of crabs.

Office of Sea Grant Photo

of towboat and tanker barge operators in anticipation of the impact Alaska oil will have on Puget Sound, and a special program for training observers who will serve on foreign fishing vessels to assist the Coast Guard and the National Marine Fisheries Service in carrying out the provisions of the Fishery Conservation and Management Act of 1976.

The number of marine education projects funded increased from 84 in Fiscal Year 1976 to 100 in Fiscal Year 1977. The financial support increased from \$2 million in Sea Grant funds and \$2.1 million in matching funds in Fiscal Year

1976 to \$3.2 million in Sea Grant funds and \$2.7 million in matching funds in Fiscal Year 1977.

Sea Grant views the expansion of its educational efforts as a major challenge, as well as a compelling opportunity. The challenge is to create a greater awareness among Americans of the true stake they have in the oceans—to turn people's minds seaward so they might be more responsive to the maritime potential of the oceanic frontier. The educational process provides the opportunity to develop

greater and wiser use of the oceans through the combined and collective talents of Americans from all walks of life—the researcher, the educator, the artist, the journalist, the musician, the economist, the social scientist, the lawyer, and many others. Sea Grant recognizes the significance of developing a greater public appreciation of the oceans through education and is hopeful that it can generate even greater effort toward bringing the entire American school system within an orchestration of oceanic education in the future.



At least 29 colleges, universities, and institutions are involved in aquaculture in the Sea Grant program. Here, a scientist at the University of Delaware explains the operation of a new facility.

Office of Sea Grant Photo

Marine Advisory Services



Closely related to Sea Grant education activities, and, in some cases materially inseparable from them, is the work of the Sea Grant Marine Advisory Service. The equivalent of 50 full-time additional positions were approved during the year, bringing the number of full time equivalent positions to an all-time record high of 254.

The Marine Advisory Service (MAS), working in cooperation with two other NOAA offices, the Office of Coastal Zone Management and Environmental Data Service, opened during the year the first two of what is to become a network of Regional Coastal Information Centers. The first center was opened at the University of Rhode Island and the other in the Northwest, with technical and other services available out of Seattle, Washington, and Newport, Oregon. Tentative plans call for these highly specialized facilities to be located in as many as seven other locations on the Great Lakes, and along the

Atlantic, Pacific and Gulf Coasts. Administered by the Sea Grant Program, the centers serve as information centers for planners, marine resource managers, scientists, and the public.

Referral Sources

In addition to providing information on coastal zone activities to these specialized groups, the centers will act as referral sources for the exchange of information and as a repository of publications for State and local governmental agencies, citizen groups, special interest groups, and the public on a wide range of subjects dealing with coastal resource technology, resource planning, and management.

A third regional marine advisory service cooperative effort was started during the fiscal year. Joining the New England Marine Advisory Service (NEMAS) and the

Pacific Sea Grant Advisory Program (PASGAP) was the Great Lakes Sea Grant network, which involved the advisory service programs in Michigan, Minnesota, New York, and Wisconsin.

Another new development during the period was the establishment for the first time of a marine advisory service internship program at the State University of New York/Cornell University Sea Grant Program. The program is designed to offer special training to four individuals per year who are interested in becoming marine advisory service agents.

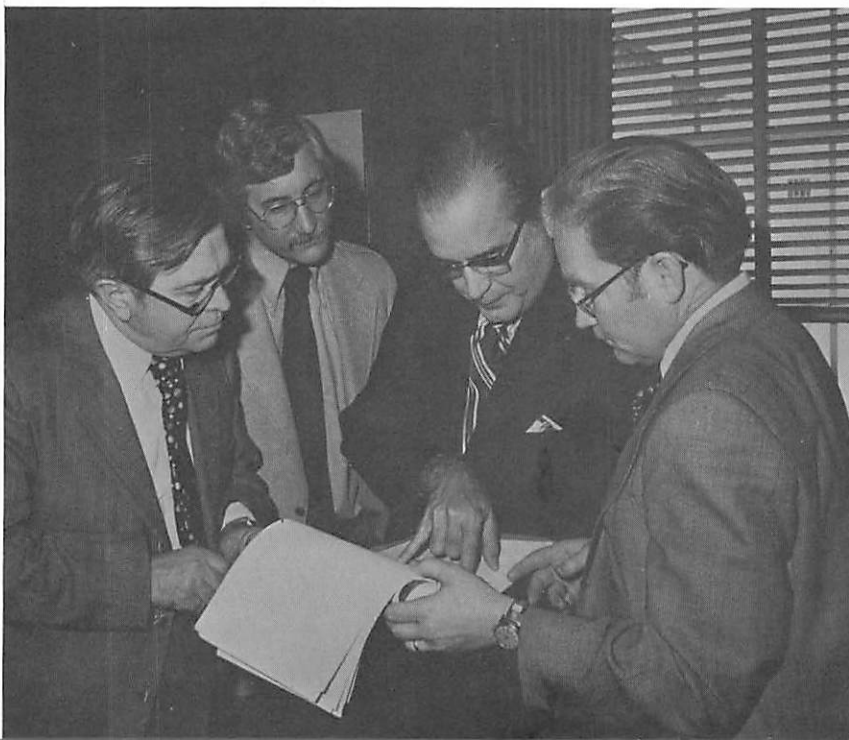
Caribbean Program

The initiation of an advisory service program in Puerto Rico introduced Sea Grant to that Caribbean island for the first time. During the first year, this program will provide in-service technical training to marine extension agents who will serve as the nucleus for an expanded program in the future.

Goals for the first year included providing fishing skill training to

Sea Grant was Introduced to the Caribbean during Fiscal Year 1977 with the first grant in that area being made to the University of Puerto Rico. Here, NOAA, Sea Grant, and University officials review the grant document, signed in formal ceremonies in Washington.

Office of Sea Grant Photo



approximately 250 commercial fishermen and to increase public awareness, concern, and appreciation for Puerto Rico's marine and coastal resources. The Sea Grant activities were coordinated through Humacao University College on the east coast of Puerto Rico, in collaboration with the University's Mayaguez campus-based Cooperative Extension Service at the Western end of the island. A program director and four agents were assigned to the project during the year. Expansion of the program into other areas of Puerto Rico, as well as the islands of Culebra, Vieques, St. Croix, and St. Thomas

is planned for the future.

Sea Grant MAS staff personnel in Washington made significant contributions to and served on the Technical Evaluation Committee which organized the newly-formed Department of Energy's Energy Extension Service.

Interagency Cooperation

With still another interagency agreement, Sea Grant has been instrumental in establishing a closer working relationship with the Fish and Wildlife Service (FWS) of the Department of Interior. The purpose of the agreement is to provide more effective procedures for planning, coordinating, and developing fish and wildlife extension services of mutual interest for the benefit of the Nation.

Although the development is not so much within the marine advisory service as it is because of it, the University of Minnesota, after three years of supporting an MAS program alone, has moved to broaden its Sea Grant activities into the research field.

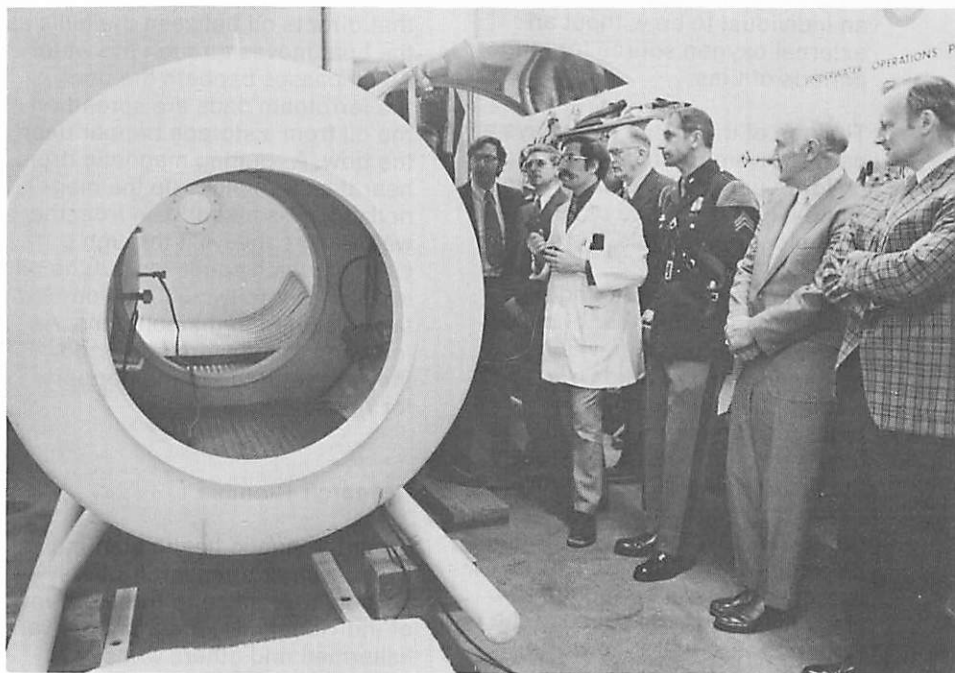
As in the past, the marine advisory services produced a number of publications, including safety bulletins, advisory notices, booklets, and pamphlets for the public. In addition, through its network of Sea Grant Communicators, the program continued to support radio and other public service efforts throughout the Sea Grant system.



Sea Grant research captured more public attention in Fiscal Year 1977 than probably any previous year of its existence. Either because of the impact of the scientific findings or the widespread interest in the subject matter, a number of Sea Grant projects won the attention of the media which focused national and international attention on the research.

Attracting the greatest audience was the work of Dr. Martin J. Nemiroff, physician-scientist at the University of Michigan. Dr. Nemiroff studied cases of "near drowning" with Sea Grant support and determined that if a victim is submerged in cold water (under 70 degrees Fahrenheit), the chances of survival are much greater than they are in warm water—if resuscitation is started immediately upon recovery. As a specialist on diving medicines and lung disease, Dr. Nemiroff determined that in 15 cases where victims had been submerged in cold water, nine were revived successfully without brain damage or other ill effects. All had gone beyond the traditional 4-minute oxygen deprivation limit after which irreversible brain damage was thought to occur.

The most spectacular case was one in which an 18-year-old had been trapped in his submerged car in a frozen pond for 38 minutes.



With Sea Grant research funds, Dr. Martin J. Nemiroff, in white coat, has focused attention on the fact that people can survive drowning in cold water even after prolonged submersion. Here, he shows some visitors at the University of Michigan how the hyperbaric chamber is used to save lives in diving accidents.

Michigan Sea Grant Program Photo

Following 2 hours of resuscitation and 13 hours of respiratory support, the victim regained consciousness. Two weeks later, he left the hospital to return to college where he was an A student. In another case, a physician had been underwater for 15 minutes. He, too, recovered without brain damage.

Diving Reflex

What saved the victims, Dr. Nemiroff suggests, was the activation of an automatic response common in mammals, called the "mammalian diving reflex", combined with the coldness of the water, and the rapid and determined action of the rescuers. The reflex slows the heartbeat and constricts the flow of blood to the skin, muscles and other tissues that are more resistant to oxygen-loss damage. At the same time, the remaining blood oxygen is directed to the heart and brain, permitting

an individual to be without an external oxygen source for longer periods of time.

The age of the victim also plays a part. Dr. Nemiroff has found that children under 3½ years of age stand a better chance of survival than older individuals.

Since the report of the findings was released, a number of cases have been reported in which rescuers who had read Dr. Nemiroff's findings pursued resuscitation efforts beyond what they would have done previously, the result being that lives were saved that might not have otherwise have been. With broader dissemination of this Sea Grant research, there is no telling how many lives might be saved in the United States—and the world—in the future.

Oilspill Recovery

Another Sea Grant project that received widespread attention was an oil spill recovery boat, designed by University of South Florida physicist Joe Turbeville. The 24-foot prototype craft, built with the support of Gulf Tampa Drydocks, uses a thick blanket of patented magnetic ferrofoam in the form of small pads, to sop up the oil. The pads are picked up magnetically and squeezed through a wringer that directs the oil into storage tanks. The pads are then available for immediate re-use.

The boat has twin pontoons and is equipped with deflectors on the bow which create a funnel effect

that directs oil between the hulls as the boat moves through the water. As oil passes beneath the boat, the ferrofoam pads are spread on the oil from a storage hopper near the bow. A rotating magnetic drum near the stern picks up the magnetized, oil-soaked foam from the water and conveys it through a wringer which squeezes out the oil and sends it to two 500-gallon tanks located in the pontoons. As the pads of foam are squeezed, they are returned to the hopper for re-use.

Research Promise

From the public health standpoint, Dr Hessinger's research offers particular promise to three groups of individuals: (1) lifeguards, divers, fishermen and others whose occupations might force them to work in waters where these organisms might be present; (2) tourists and beachgoers who might be relatively ignorant about the seriousness of a sting and blunder into them while swimming; and (3) individuals who might have a high sensitivity to a sting, such as a person with a heart condition or high blood pressure, or an individual with allergy problems.

Because of the Man-of-War's annual cycle migration movement, they represent danger along the coasts of North and South America, Europe, and Africa.

More than 600 individual projects at more than 125 colleges, universities, and laboratories across the United States were undertaken by Sea Grant researchers during Fiscal Year 1977. Those projects are categorized under four major areas of interest: (1) marine resources development; (2) socio-

economic and legal studies; (3) marine technology research and development; and (4) marine environmental research.

Although structured in the original Sea Grant legislation to uncover local and regional problems and to find solutions for those problems, Sea Grant has, to a large extent, maintained a national focus in its research.

Many projects, such as the cold water drowning, the oil spill recovery boat, and the jellyfish research, offer national, indeed, international promise. This has been as true in the past as it is at present.

Cost Estimate

Professor Turbeville estimates that a more sophisticated model of the prototype could recover oil at a cost of a penny a gallon. As envisioned by the University of South Florida scientist, a fleet of small boats, capable of being shipped, could be made available as a result of this research. Such a fleet, he suggests, would be able to clear the seas of oil spills anywhere in the world.

Another Sea Grant project holding international possibilities is being carried out by Dr. David Hessinger, also at the University of South Florida. Dr. Hessinger is carrying out research into the toxins contained in the venom of the Portuguese Man-of-War, a jellyfish which has an excruciatingly painful sting that, under some circumstances, can be fatal.



Purpose of the research is to develop both an anti-serum to assist persons who have been stung and an immune serum to protect those likely to be stung, because their work is in the water. The Portuguese Man-of-War stings with a microscopic syringe-like organ at the end of the tentacle which releases the venom. The venom is every bit as strong as that of a cobra, but not as dangerous because the sting of the jellyfish does not penetrate as far as the fangs of the snake. The Portuguese Men-of-War are known to have grown tentacles 90 feet in length, which adds to the danger they pose to unsuspecting divers or swimmers who might not see anything on the surface near them.

Shellfish Wastes

Sea Grant research stemming from a challenge to find a suitable means for disposing of shellfish wastes, for example, now offers a promise of creating whole new industries—businesses whose products will benefit all of mankind. That's because research showed that the shells from shellfish contain chitin (pronounced kite-in), a cellulose-like material which studies have indicated will be the source of materials to wrap food, heal wounds, strengthen paper and

Chesapeake Bay watermen are shown catching crabs and tonging oysters. Research into shellfish wastes is being conducted at several Sea Grant institutions in an effort to find new industrial uses.

Office of Sea Grant Photo

cloth, and bond paper, wood, and leather. The material also can be used to remove radioactive heavy elements from nuclear power plant wastes and metal contamination from drinking water. Sea Grant scientists also are studying the potential of chitosan (pronounced kite-osan), a chitin derivative. Because of its absorptive qualities, chitosan can be used to treat

industrial waste streams which contain heavy metals and in kidney dialysis machines where the chitosan membranes remove waste materials from the blood.

Another example of national focus can be found in the Sea Grant research that has been carried out on biomedicinals and marine extracts—medicines from the sea. These studies, being carried out at several Sea Grant institutions, show great promise for finding substances active against cancer, cardiovascular diseases, herpes simplex, and others.

Among the goals of the Sea Grant Program is to supply the knowledge and experience, as well as the experts, to see to fruition socially and economically important projects for which the impact is truly national.

Institutional Network

The fact that there is a network of Sea Grant-supported institutions throughout the United States, each with a director who knows his or her counterparts at other institutions and who meets with those colleagues for scientific and managerial discussions several times a year, contributes to the national focus of the program as well. The close working relationship between the institutions on the Atlantic, Pacific, Gulf, and Great Lakes coasts allows many projects to broaden their scope substan-

Medicines from the sea offer great promise for fighting cancer and cardiovascular diseases. Here a scuba diver is shown surfacing with a branch of marine coral.

University of Hawaii Photo



tially without the risk—and without the cost—of embarrassing duplicative efforts.

Take aquaculture, for example. At least 29 colleges, universities, and institutions are working on projects to artificially rear through at least part of their life cycles—lobster, salmon, shrimp, prawn, oysters, clams, marine plants, mussels, perch, and pike. Experience and results at one institution, because of the close interaction within the Sea Grant system, are shared with the other institutions so that research which might appear to be an investigation into a local or regional problem can contribute to a solution somewhere else in the Nation.

Shoreline Preservation

One project started during Fiscal Year 1977 was directed toward the national problem of shoreline preservation. Under three grants, plus an experimental management system being used by Sea Grant for the first time, scientists and engineers at the Universities of California, Delaware, and Washington began an investigation into the movement of sand along selected coastal areas with the hope of developing a better understanding

A national problem of shoreline preservation has been taken under study by the Sea Grant program in a long-term, coordinated research effort. Results of the study are expected to prevent scenes like this along the shores of Lake Michigan in which erosion has swept under the foundation of this home.

Wisconsin Sea Grant College Program Photo

of what is now an unpredictable phenomenon.

The significance of this project is that a number of diverse scientific groups, composed of individuals from a wide variety of disciplines, will be carrying out coordinated research over a 4-to-5-year period with heavy emphasis on field experiments.

Sediment forming the beaches and nearshore ocean bottoms is in almost constant motion under the combined forces of wind, waves, and currents. At the present time, these complex and irregular motions are poorly understood and highly unpredictable. To date, there has been no effective technique or device for accurately measuring the volume of sediment in motion.



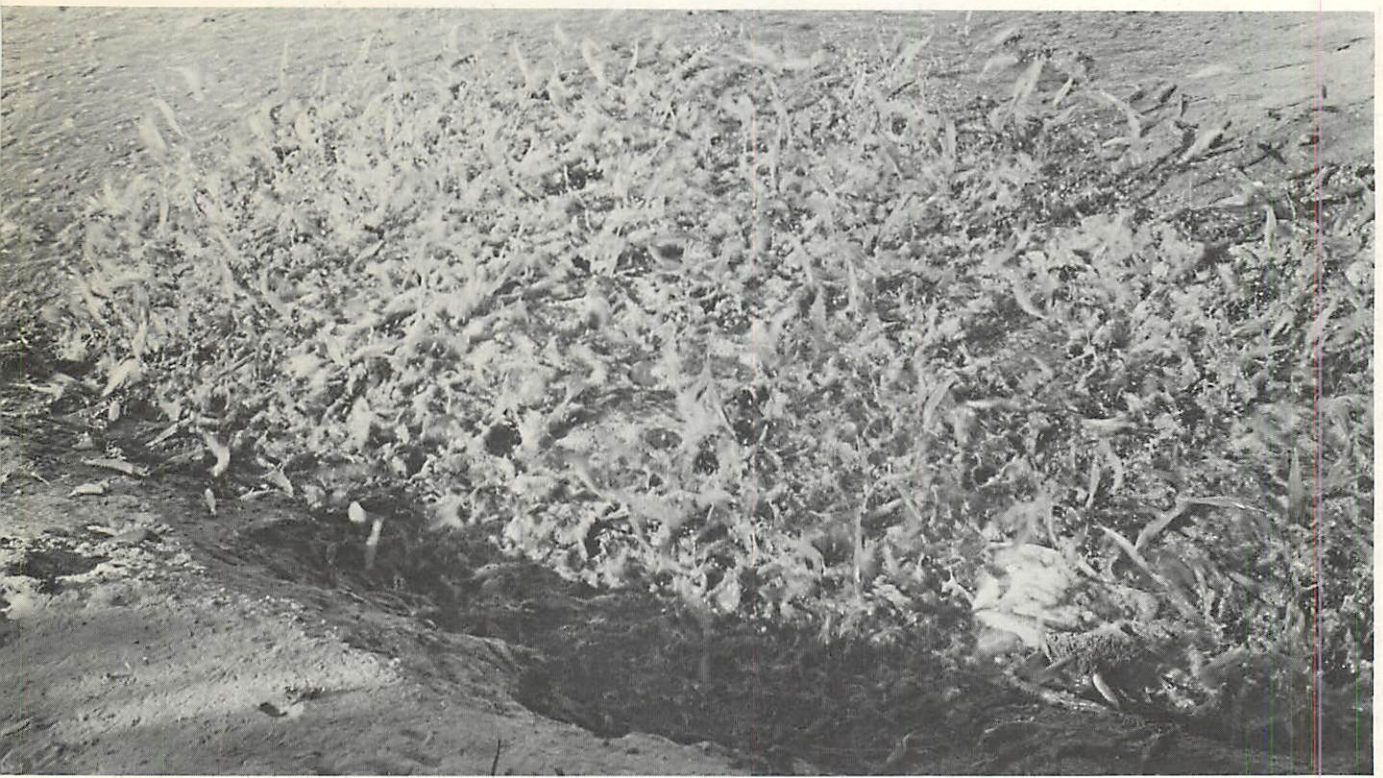
Cooperative Project

The project has the cooperation of the Army Corps of Engineers' Coastal Engineering Research Center at Fort Belvoir, Virginia; the Naval Postgraduate School in Monterey, California; and the California Department of Navigation and Ocean Development, and other agencies and universities are expected to join the effort as it progresses.

Under the project, scientists from the University of California will concentrate on assessing the relative importance of sand size and its movement in a suspended state on the ocean bottom, measurements of onshore/offshore movement of the sand, and measurements of the wave and turbulence field.

University of Delaware researchers will develop a recommendation for six candidate test sites for field measurements. The scientists are to nominate at least one site each from the Atlantic Coast, Pacific Coast, Gulf Coast and the Great Lakes areas.

The University of Washington scientists will devote their studies to an evaluation of sediment-sensing and sampling instrumentation and methodology so that prototype measuring equipment



and mounting devices can be constructed for the conduct of laboratory, field, and calibration tests. The results of this research are expected to have national impact, also, as engineers, biologists, and others grope with the problems of coastal urbanization.

Other Projects

Salient among other projects being carried out by Sea Grant scientists during the year were studies into:

- Planting depleted areas of the 2000-square mile Chesapeake Bay with oysters to combat natural threats to the threatened Maryland oyster industry.

Pond-raised shrimp leap in a frenzy of excitement as they are drawn into a flume drain during harvest.

Texas A&M University Photo

- The production of seaweeds with an eye toward increased production for use in the chemical industry.
- Freeze-drying salmon sperm and oyster seed so aquacultural experiments might have a wider range of potential mates. The freezing could permit salmon

embryos, for example, to be activated at regular intervals, utilizing the full potential of a hatchery year-round.

- Economic possibilities of commercial fishing and seafood marketing in Florida, particularly for red snapper, grouper, king mackerel, and spiny lobster.
- Efficient feed rations for fishes raised in hatcheries that can reduce the cost of feed while speeding the growth of the animals.
- Vaccines against pathogens that strike salmon and trout and the incidence and effect of shrimp and clam parasites.
- New methods for designing

breakwaters, pile-supported harbor structures, and jetties.

- Development of sonar techniques to detect the depth and composition of offshore sand and gravel deposits to lower the cost of exploration and accurately determine if exploitation is feasible.

- The design and construction of floating dock systems to reduce ice damage inflicted by winter weather in the Great Lakes and elsewhere.

- New diving equipment, including a stabilized underwater platform for working underwater, an automated escape capsule for rescuing an injured diver, a computer-controlled life support system to bring a diver to the surface safely, and an artificial gill system.

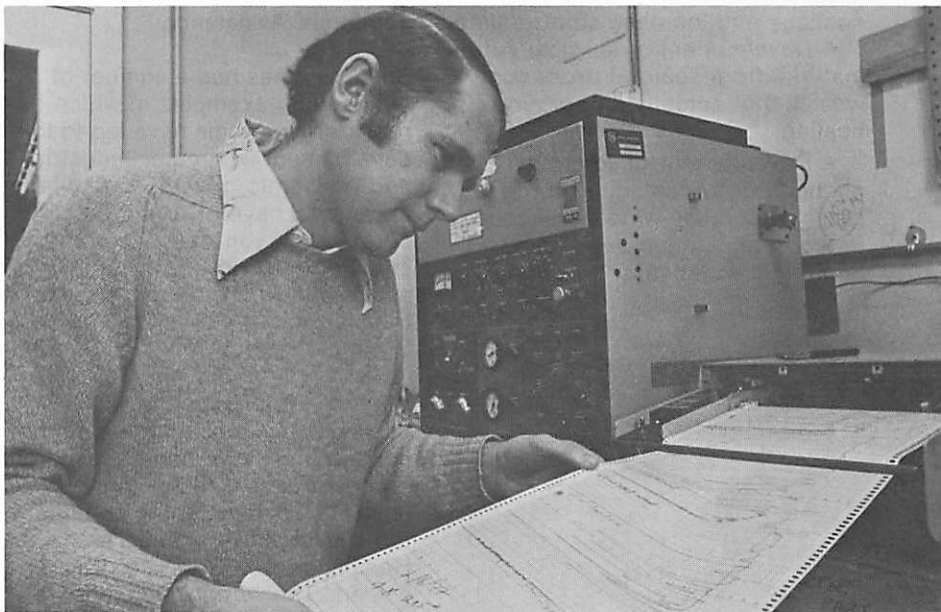
- An alternative energy source for seafood processors.

- Cheaper and more efficient techniques for capturing shrimp and other fish in the Gulf of Mexico.

- How chemical, microbiological, and other properties of the minced flesh of underutilized Gulf fish can best be used to develop new and marketable seafood products.

- Feasibility of commercial shrimp farming to offset the reliance on foreign imports.

- Economic and biological analysis of what makes successful "growout" ponds—small, earth-bottomed enclosures—to raise shrimp from the early stage to market size.



A University of Wisconsin water chemist checks a printout of PCB (Polychlorinated biphenyl) levels in Lake Michigan fish. Research into the effects of PCBs has been a major project in the program at this Sea Grant College.

Wisconsin Sea Grant College Program Photo

- The effects of artificial diets on the growth of post-larval lobsters.

- Solar heat from a pond of brine solution and fresh water which traps heat from sunlight. The two-layered system already has developed temperatures near 195 degrees Fahrenheit, providing enough heat to warm a 10 to 25-foot greenhouse all winter.

- Improved diagnosis and treatment of diseases in artificially-reared finfish.

- The slipper lobster, found in the Gulf of Mexico, as a possible new commercial fishery.

- Use of chitin, a waste product from shrimp and crab processing, to remove certain contaminants from drinking water.

- A test for ciguatoxin, a substance frequently found in food fish in tropical reef areas and which can cause poisoning in humans.

- Effects of the industrial chemical PCB (polychlorinated biphenyl) on the reproductive rates of salmon and other important food-fish in the Great Lakes.

- The use of purse seines, now used primarily by tuna fishermen in the Pacific and menhaden fishermen in the Atlantic, on the Great Lakes.

- New technology for handling fish, both on vessels and at processing plants, to reduce

spoilage and increase storage time.

- Development of surgical suture material from seafood processing wastes that actually aids wound healing.

- Development of improved methods of transplanting turtle grass, which has wide significance in the rehabilitation of pollution-destroyed waterways.

Economic Assistance

Sea Grant has had a number of outstanding examples in which its research programs have led to the development of greater industrial and economic growth. Particularly successful have been the precious coral industry in Hawaii and the eel industry in North Carolina, now successful and productive industries largely as a result of Sea Grant research.

Another project dealing with mussels now appears to be on the horizon of a major boom. Research into natural as well as cultured mussels has been going on under the University of Maine/New Hampshire Sea Grant Program for 5 years. The work has included surveys of natural stocks, estuarine studies, investigations into deter-

mining the age of mussels, and predation studies. Additionally, efforts have been devoted to the economic feasibility of raising mussels, marketing and promoting them. As a result of the work, new markets have been developed in such widely dispersed areas as Boston, New York, Seattle, Monterey, and San Francisco, and there are strong indications of a major market growth in the near future.

Special Projects



Three projects of the past year deserve special mention. First, under a cooperative effort sponsored by Sea Grant at five universities and research laboratories in three States, a program was launched to train highly specialized aquatic veterinarians. Administered by the New York Sea Grant Institute at the State University of New York, the program will involve faculty members from two schools responsible for veterinary education in the Northeastern United States—the university of Pennsylvania School of Veterinary Medicine and the New York State College of Veterinary Medicine at Cornell University. Both will be working closely with three research facilities, all in Woods Hole, Massachusetts: the Marine Biological Laboratory, Woods Hole Oceanographic Institution, and the Northeast Fisheries Center of NOAA's National Marine Fisheries Service. Under the grant, graduate level courses are being developed so that unique research experience in the marine and aquatic fields can be established for veterinary students.

Desalination Engineering

Second, the nation's first academic program to train technicians in the specialty of desalination engineering was started at Fairleigh Dickinson University's College of

Science and Engineering. The Sea Grant was made to meet the need for persons trained in the installation, use, and maintenance of desalination systems, which now number more than 1,000 throughout the world and produce upwards of 526 million gallons of water a day.

It is anticipated that in the Middle East alone expenditures for desalting equipment will rise from \$3 to \$5 billion annually over the next 10 years. However, because U.S. manufacturers do not have trained plant operators who can stay in the foreign countries for the several years necessary to teach local personnel to be their replacements, U.S. companies are failing to win much of the business.

Third, a study conducted by the

Developing energy by solar radiation is of key interest to all Americans. By using a unique system developed through Sea Grant at the Woods Hole Oceanographic Institution, this small pond was able to heat a large greenhouse throughout the winter.

Office of Sea Grant Photo

Center of Policy Alternatives at the Massachusetts Institute of Technology into the potential commercial and foreign trade impacts of the National Sea Grant Program showed that Sea Grant-supported projects not only have produced significant commercial potential, but also that one-half of the projects analyzed have sales potential estimated to be about \$122 million by 1980. Additionally, about one third of the projects examined had either import substitution or export potential of approximately \$93 million a year by 1980.

Extended Jurisdiction

Sea Grant was heavily involved in a wide variety of research, training programs, and advisory activities related to the implementation of the new Fishery Conservation and Management Act of 1976. Some of the activities are research programs in the general area of fisheries management; however, many others are aimed specifically toward provisions of the Act itself.

Among the more significant



programs being carried out in extended jurisdiction within the Sea Grant system include a project at the University of Washington, known as Norfish; an effort at Oregon State University to refine calculations in fishery management plans, as they relate to capacity and optimum yield; and a study at the Universities of Maine/New Hampshire which is investigating the social and cultural aspects of fishing communities along the Maine coast.

All of the work being carried out is designed to assist the Regional Fishery Management Councils in facing up to the imposing task with which they are faced under the new legislation. Successful development of a methodology for measuring optimum yield, for example, should help keep fishery planning in the

open and consistent with generally accepted economic and social criteria. Expanded knowledge in this area should lead to better estimates of the catch which should or should not be allotted to foreign fishermen, more efficient loan programs to build up domestic fleets, and a more complete understanding of the consequences of domestic fishery management options, such as limited entry.



Dr. Ned A. Ostenso is the new director of the National Sea Grant Program.

NOAA Photo

Administratively, Fiscal Year 1977 marked a change in command for Sea Grant. Dr. Ned A. Ostenso, formerly Deputy Director and Senior Oceanographer of the Ocean Science and Technology Division, Office of Naval Research, became the Director of the National Sea Grant Program in January. He replaced Dr. Robert B. Abel, who had been Sea Grant's Director since its inception in 1967. Dr. Abel moved to a position in the Office of the Administrator, National Oceanic and Atmospheric Administration and later became Assistant Vice President for Marine Programs, Center for Marine Resources at Texas A&M University.

In his former position, Dr. Ostenso had managed a U.S. Navy contract research program in the fields of physical oceanography, air-sea interaction, marine geology and geophysics, and ocean technology. In addition, he had administered bilateral agreements in oceanography with the USSR, West Germany, New Zealand, and Australia.

In 1975 and 1976, he participated in a Foreign Affairs Fellowship Program and a Congressional Fellowship Program sponsored by the Civil Service Commission and the Congress and administered by the American Political Science Association.

Dr. Ostenso came to Sea Grant with broad experience in solid-earth and marine geophysics in North America, Africa, Europe, and Antarctica. His research activities have resulted in more than 50 published scientific papers and invitations to contribute to McGraw-Hill Yearbook of Science and

Technology and the Encyclopedia Britannica. He has accumulated numerous honors, including having a major mountain in Antarctica and a seamount in the Arctic Ocean named after him.

Review Panel

In another administrative change, the makeup of the 19-member Sea Grant Advisory Panel was changed through legislation providing for a 15-member panel and a change in name to Sea Grant Review Panel. In accordance with the 1976 Act, one third of the members were named for 1-year terms, one-third for 2-year terms, and one-third for 3 year terms. The membership is composed of especially qualified specialists drawn from a variety of academic, business, scientific, and legislative backgrounds. The panel serves to advise the Secretary of Commerce and NOAA on marine-related research, education, and advisory service activities supported by Sea Grant.

As is the custom, Sea Grant staff members were called upon to participate in a large number of specialized panels and meetings covering a wide spectrum of scientific endeavors.

Among those in which staff personnel contributed were: World Mariculture (Costa Rica); Aquacultural Panel, U.S.-Japanese

Cooperative Program in Natural Resources (Santa Barbara, California); National Shellfisheries Association and the Shellfish Institute of North America (Fort Hunt, Maryland); Food and Drugs from the Sea (Norman, Oklahoma); Interagency Committee on Aquaculture (Washington, D.C.); National Academy of Sciences Panel on Aquaculture (Washington, D.C.); International Seaweed Symposium (Santa Barbara, California); Training, Education, and Mutual Assistance of Inter-governmental Oceanographic Commission (United Nations, New York, N.Y.); International Conference on Transfer of Water Resources Knowledge (Fort Collins, Colorado); and the National Conference on Tire Breakwater Structures (Annapolis, Maryland).



College Recognition

The ranks of Sea Grant Colleges increased to 12 institutions during the year when that recognition was accorded to the Massachusetts Institute of Technology. To achieve Sea Grant College status, an institution must have exercised leadership in its region for a period of not less than 3 years in the quality, quantity, and productivity of research, education, and

advisory services. Other Sea Grant Colleges and the dates they received recognition are Oregon State University (1971), Texas A&M University (1971), University of Washington (1971), University of Rhode Island (1971), University of Hawaii (1972), University of Wisconsin (1972), University of California (1973), New York Sea Grant Institute, which includes the State University of New York and Cornell University, (1975), University of Delaware (1976), State University System of Florida (1976), and the University of North Carolina (1976).

Sea Grant Review Panel listens to a presentation during one of its Washington meetings. The 15-member review panel, composed of experts from many professional fields, assists the National Sea Grant Office in making policy and other decisions.

Office of Sea Grant Photo

Office of Sea Grant Staff

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Robert D. Wildman	Associate Director, Operations
Hugh J. McLellan	Director, Grants Management
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Sea Grant Review Panel
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Atlanta, Georgia

Dr. Werner A. Baum, Chancellor
University of Wisconsin
Milwaukee, Wisconsin

Mr. Phillip Eisenberg, Chairman
of the Executive Committee
Hydronautics, Inc.
Washington, D.C.

Mr. Harold E. Lokken, Manager
Fishing Vessel Owners Association,
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Mr. Harvey Weil, Senior Partner
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Meteorology
Dept. of Earth & Planetary Sciences
Johns Hopkins University
Baltimore, Maryland

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Vice-Pres.
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Pasadena, California

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Louisiana Wild Life &
Fisheries Commission
New Orleans, Louisiana

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Dept. of Political Science
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Duke University Marine Laboratory
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Honorable Charles A. Mosher
Washington, D.C.

Ms. Marjorie Lass Vesley
Williamsville, New York

Program Directors for Sea Grant Institutional Support

Dr. Edward Chin
Director, Sea Grant Program
University of Georgia
Athens, Georgia

Dr. B. J. Copeland
Director, North Carolina Sea Grant Program
North Carolina State University
Raleigh, North Carolina

Dr. Robert W. Corell
Deputy Director, Sea Grant Program
University of Maine/University of
New Hampshire Joint Program
Durham, New Hampshire

Dr. Jack R. Davidson
Director, Sea Grant Program
University of Hawaii
Honolulu, Hawaii

Dr. William S. Gaither
Dean, College of Marine Studies
University of Delaware
Newark, Delaware

Mr. Dean A. Horn
Director, Sea Grant Program
Massachusetts Institute of
Technology
Cambridge, Massachusetts

Dr. Frederick Hutchinson
Director, Sea Grant Program
University of Maine/University of
New Hampshire Joint Program
Orono, Maine

Mr. Donald Keach
Director, Sea Grant Program
University of Southern California
Los Angeles, California

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Director, Center for Wetland
Resources
Louisiana State University
Baton Rouge, Louisiana

Dr. Stanley R. Murphy
Director, Sea Grant Program
University of Washington
Seattle, Washington

Dr. Worth D. Nowlin, Jr.
Director, Sea Grant Program
Texas A&M University
College Station, Texas

Dr. Hugh L. Popenoe
Director, State University System
of Florida Sea Grant Program
University of Florida
Gainesville, Florida

Dr. Robert A. Ragotzkie
Sea Grant College Program
Director
University of Wisconsin
Madison, Wisconsin

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Coordinator, Sea Grant Program
University of Rhode Island
Kingston, Rhode Island

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Director, Sea Grant Program
University of Alaska
Fairbanks, Alaska

Dr. Donald F. Squires
Director, SUNY/Cornell Sea Grant
Program
State University of New York
Albany, New York

Dr. James J. Sullivan
Program Manager, Sea Grant
College Program
University of California, San Diego
La Jolla, California

Prof. William Q. Wick
Director, Sea Grant College
Program
Oregon State University
Corvallis, Oregon

Program Directors for Sea Grant Coherent Support

Dr. Alfred M. Beeton
Director, Sea Grant Program
University of Michigan
Ann Arbor, Michigan

Dr. Rita R. Colwell
Director, Sea Grant Program
University of Maryland
College Park, Maryland

Dr. L. G. Eldredge
Director, Sea Grant Program
University of Guam
Agana, Guam

Dr. James Jones
Director, Mississippi-Alabama
Sea Grant Consortium
Ocean Spring, Mississippi

Dr. Edwin B. Joseph
Director, Marine Resources Center
Charleston, South Carolina

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Director, Sea Grant Program
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Dr. David Ross
Sea Grant Coordinator
Woods Hole Oceanographic
Institution
Woods Hole, Massachusetts

Dr. Lionel A. Walford
Director, Sea Grant Program
New Jersey Marine Sciences
Consortium
Fort Hancock, New Jersey

Appendices

Summary

Sea Grant Awards

Fiscal Year 1977

	No. of Projects	Sea Grant Dollars	Percent	Matching Funds
Research	469	\$14,425,981	51.9	\$ 9,296,634
Education and Training	83	\$ 3,147,603	11.3	\$ 2,615,330
Advisory Services	97	\$ 7,262,515	26.1	\$ 4,227,636
Program Management	45	\$ 2,975,901	10.7	\$ 2,372,671
Totals	694	\$27,812,000	100.0	\$18,512,271

Sea Grant Awards

Fiscal Year 1977

by Major Categories

	No. of Projects	Sea Grant Dollars	Percent	Matching Dollars
I. Marine Resources Development				
A. Aquaculture	68	\$3,165,586	11.4	\$2,617,480
B. Living Resources Other Than Aquaculture	46	1,406,165	5.1	690,847
C. Mineral Resources	13	278,746	1.0	266,312
D. Marine Biomedicinals and Extracts	20	525,761	1.9	340,678
Subtotal	147	5,376,258	19.3	3,915,317
II. Marine Socio-Economics and Legal Research				
A. Marine Socio-Economics and Legal Research	59	1,483,868	5.3	1,208,935
Subtotal	59	1,483,868	5.3	1,208,935
III. Marine Technology Research and Development				
A. Ocean Engineering	62	1,614,624	5.8	1,062,625

	No. of Projects	Sea Grant Dollars	Percent	Matching Dollars
B. Resource Recovery and Utilization	49	1,390,409	5.0	876,076
C. Transportation Systems ...	3	70,747	.3	56,861
Subtotal	114	3,075,780	11.1	1,995,562
IV. Marine Environmental Research				
A. Research and Studies in Direct Support of Coastal Management Decisions ...	53	1,599,064	5.7	792,229
B. Ecosystems Research	23	680,250	2.4	320,389
C. Pollution Studies	49	1,073,164	3.9	547,814
D. Environmental Models	16	826,279	3.0	392,941
E. Applied Oceanography	8	311,318	1.1	123,447
Subtotal	149	4,490,075	16.1	2,176,820
V. Marine Education and Training				
A. College Level	29	621,587	2.2	626,224
B. Vocational Marine Technician Training	14	420,735	1.5	949,529
C. Retraining Program	0		.0	
D. Other Education	40	2,105,281	7.6	1,039,577
Subtotal	83	3,147,603	11.3	2,615,330
VI. Advisory Services				
A. Extension Programs	52	4,485,924	16.1	2,500,034
B. Other Advisory Services ..	45	2,776,591	10.0	1,727,602
Subtotal	97	7,262,515	26.1	4,227,636
VII. Program Management and Development				
A. Program Administration ..	31	2,194,443	7.9	2,012,279
B. Program Development ...	14	781,458	2.8	360,392
Subtotal	45	2,975,901	10.7	2,372,671
Totals	694	\$27,812,000	100.0	\$18,512,271

**Sea Grant Awards
Fiscal Year 1977
by Institution**

Institution	Sea Grant Dollars	Matching Dollars
Alaska		
University of Alaska	\$ 783,200	\$ 690,800
State Total	\$ 783,200	\$ 690,800
Arizona		
University of Arizona	\$ 32,900	\$ 44,848
State Total	\$ 32,900	\$ 44,848
California		
University of California, San Diego	\$ 153,900	\$ 26,696
University of Southern California	10,000	3,079
California Institute of Technology	105,000	52,500
Frederic Burk Foundation, San Francisco State University	32,100	31,230
Stanford University, California	141,800	72,316
University of Southern California	550,000	479,677
University of California, San Diego	2,380,000	1,705,401
Stanford University, California	100,000	50,000
State Total	\$3,472,800	\$2,420,899
Colorado		
American Cancer Research Center And Hospital of Colorado	\$ 25,000	\$ 67,000
State Total	\$ 25,000	\$ 67,000
Connecticut		
University of Connecticut	\$ 138,700	\$ 76,648
University of Connecticut	77,000	38,500
State Total	\$ 215,700	\$ 115,148
Delaware		
University of Delaware	\$ 511,800	\$ 258,627
University of Delaware	34,500	
University of Delaware	770,000	774,800
State Total	\$1,316,300	\$1,003,427
District of Columbia		
National Fisheries Institute, District of Columbia	\$ 16,000	\$ 8,000
State Total	\$ 16,000	\$ 8,000
Florida		
State University System of Florida	\$1,180,400	\$1,460,300
University of Miami	291,200	156,000
State Total	\$1,471,600	\$1,616,300
Georgia		
State Total	\$ 630,000	\$ 545,100
State Total	\$ 630,000	\$ 545,100

Institution	Sea Grant Dollars	Matching Dollars
Hawaii		
Oceanic Institute, Hawaii	\$ 10,000	\$ 6,000
University of Hawaii	90,000	45,000
University of Hawaii,	47,900	24,343
Oceanic Institute, Hawaii	60,000	30,120
University of Hawaii	1,362,400	864,910
State Total	\$1,570,300	\$ 970,373
Louisiana		
Louisiana State University	\$ 840,000	\$ 685,679
State Total	\$ 840,000	\$ 685,679
Maine		
University of Maine/University of New Hampshire	\$ 25,000	
Maine Department of Marine Resources	75,000	37,500
University of Maine	1,036,400	600,849
State Total	\$1,136,400	\$ 638,349
Maryland		
University of Maryland	\$ 447,400	\$ 296,100
State Total	\$ 447,400	\$ 296,100
Massachusetts		
Massachusetts Institute of Technology	\$ 3,000	
Massachusetts Institute of Technology	109,100	27,890
Groton Bioindustries Development Company	29,900	34,344
Massachusetts Institute of Technology	1,115,000	787,306
Woods Hole Oceanographic Institution, Massachusetts	425,000	525,082
State Total	\$1,682,000	\$1,374,622
Michigan		
University of Michigan	\$ 103,300	
University of Michigan	721,000	363,300
State Total	\$ 824,300	\$ 363,300
Minnesota		
University of Minnesota	\$ 107,500	\$ 54,000
State Total	\$ 107,500	\$ 54,000
Mississippi		
Mississippi-Alabama Sea Grant Consortium .	\$ 500,000	\$ 330,980
State Total	\$ 500,000	\$ 330,980
New Hampshire		
University of New Hampshire	\$ 46,700	\$ 28,000
State Total	\$ 46,700	\$ 28,000

Institution	Sea Grant Dollars	Matching Dollars
New Jersey		
New Jersey Marine Sciences Consortium ..	\$ 299,200	\$ 234,300
Fairleigh Dickinson University	46,500	28,900
State Total	\$ 345,700	\$ 263,200
New York		
State University of New York, Cornell	\$ 114,100	\$ 52,232
State University of New York, Cornell	1,496,100	792,917
Society of Naval Architects and Marine Engineers, New York	24,000	42,000
State Total	\$1,634,200	\$ 887,149
North Carolina		
University of North Carolina	\$ 431,000	\$ 215,500
North Carolina State Department of Administration	16,660	8,330
State Total	\$ 447,660	\$ 223,830
Ohio		
Ohio State University Research Foundation ..	\$ 16,200	\$ 8,118
Ohio State University Research Foundation ..	31,700	16,070
State Total	\$ 47,900	\$ 24,188
Oklahoma		
University of Oklahoma	\$ 100,000	\$ 50,000
State Total	\$ 100,000	\$ 50,000
Oregon		
Oregon State University	\$ 35,840	\$ 21,400
Oregon State University	1,968,400	1,255,700
Oregon State University	50,000	25,400
State Total	\$2,054,240	\$1,302,500
Rhode Island		
University of Rhode Island	\$ 45,400	
University of Rhode Island	25,800	13,374
University of Rhode Island	50,000	25,000
University of Rhode Island Sea Grant Depository	34,500	
University of Rhode Island	1,310,000	684,000
State Total	\$1,465,700	\$ 722,374
South Carolina		
South Carolina Marine Resources Center ..	\$ 419,500	\$ 242,500
State Total	\$ 419,500	\$ 242,500

Institution	Sea Grant Dollars	Matching Dollars
Texas		
Texas A&M University	\$ 456,000	
Texas A&M University—Sea Grant 70's	77,500	
Texas A&M University	1,376,700	1,113,876
University of Texas at Austin	314,800	157,429
State Total	\$2,225,000	\$1,271,305
Virginia		
Virginia Institute of Marine Science	\$ 508,400	\$ 315,100
Virginia Polytechnic Institute	70,000	47,500
Virginia Polytechnic Institute	61,000	30,500
Virginia Polytechnic Institute	38,900	20,500
State Total	\$ 678,300	\$ 413,600
Washington		
University of Washington	\$ 26,000	
University of Washington	1,901,300	1,058,396
University of Washington	46,700	25,204
State Total	\$1,974,000	\$1,083,600
Wisconsin		
University of Wisconsin	\$1,400,000	\$ 725,000
State Total	\$1,400,000	\$ 725,000
Guam		
University of Guam	\$ 53,700	\$ 30,000
State Total	\$ 53,700	\$ 30,000
Puerto Rico		
University of Puerto Rico	\$ 39,900	\$ 20,100
State Total	\$ 39,900	\$ 20,100

Sea Grant Awards Fiscal Year 1977 by Classification

	No. of Individual Projects	Sea Grant Dollars	Matching Funds
I. Marine Resources Development			
A. Aquaculture			
01. Aquaculture—Crustaceans	22	\$ 792,931	\$ 918,710
02. Aquaculture—Finfish	13	648,067	436,386
03. Aquaculture—Mollusks	18	776,126	635,677
04. Aquaculture—Other animals	6	506,675	368,371
05. Aquaculture—Plants	9	441,787	258,336
B. Living Resources Other Than Aquaculture			
06. Commercial Fisheries—Biology	23	814,643	397,597
07. Biological Oceanography	5	157,208	55,721
08. Pathology of Marine Organisms	18	434,314	237,529
C. Mineral Resources			
09. Geological Oceanography	2	42,302	58,131
10. Mineral Resources—Other	11	236,444	208,181
D. Marine Biomedicinals and Extracts			
11. Enzymes	2	25,800	11,200
12. Biomedicinals	11	299,279	212,198
13. Marine Extracts—Other	7	200,682	117,280
II. Marine Socio-Economics and Legal Research			
A. Marine Socio-Economics and Legal Research			
14. Marine Economics	21	610,934	410,996
15. Ocean Law—Coastal	7	139,301	99,886
16. Ocean Law—International	1	52,500	83,502
17. Ocean Law—Other	2	98,200	51,200
18. Recreation—Sports Fisheries	5	145,247	52,876
19. Recreation—Other	9	81,792	59,956
20. Socio-Political Studies	14	355,894	450,519
III. Marine Technology Research and Development			
A. Ocean Engineering			
21. Life Support Systems	1	19,151	11,376
22. Seafloor Engineering	3	132,988	51,604
23. Vehicles, Vessels, and Platforms	3	57,194	31,242
24. Materials and Structures	13	288,604	182,094
25. Coastal Engineering	20	548,138	424,997
26. Engineering—Aquaculture	5	147,047	100,752
27. Dredging	3	76,442	37,438
28. Ocean Engineering—Other	14	345,060	223,122
B. Resources Recovery and Utilization			
29. Behavioral Sciences	1	22,000	15,721
30. Commercial Fisheries—Technology	14	388,985	245,574
31. Diver Engineering	1	68,866	37,479
32. Diver Physiology	2	121,837	69,714

	No. of Projects	Sea Grant Dollars	Matching Dollars
33. Manned Submersibles	0		
34. Man-in-the-Sea	2	92,100	61,032
35. Seafood Science and Technology	29	696,621	446,556
C. Transportation Systems			
36. Ports, Harbors and Offshore Terminals	2	14,847	21,261
37. Transportation Systems—Others	1	55,900	35,600
IV. Marine Environmental Research			
A. Research and Studies in Direct Support of Coastal Mgt Decisions			
38. Coastal Zone Mgt Social Sciences	19	387,141	216,820
39. Coastal Zone Mgt—Natural Sciences and Engineering	34	1,211,923	575,409
B. Ecosystems Research			
40. Ecosystems Research	23	680,250	320,389
C. Pollution Studies			
41. Pollution—Oil Spills	10	222,807	61,768
42. Pollution—Pesticides	3	33,179	11,500
43. Pollution—Thermal and Radioactive	1	53,524	26,373
44. Pollution—Metals	7	87,788	67,316
45. Pollution—Other	28	675,866	380,857
D. Environmental Models			
46. Environmental Models—Physical Processes	12	368,017	189,418
47. Environmental Models—Biological Processes	2	255,620	87,676
48. Environmental Models—Other	2	202,642	115,847
E. Applied Oceanography			
49. Applied Chemical Oceanography	2	34,200	28,800
50. Applied Physical Oceanography	6	277,118	94,647
V. Marine Education and Training			
A. College Level			
51. Course Development—Chemical Oceanography	0	0	
52. Course Development—Geological Oceanography	0	0	
53. Course Development—Physical Oceanography	0	0	
54. Course Development—Economics	12	40,000	98,920
55. Course Development—Law	85	52,461	64,685
56. Course Development—Biology	0	0	
57. Course Development—Pathology	0	59,800	45,690
58. Course Development—Seafood Technology	0	0	
59. Course Development—Fisheries	95	28,100	38,500
60. Course Development—Aquaculture	5	36,084	17,126
61. Course Development—Ocean Engineering	112	90,475	129,290
62. Course Development—Other	250	314,667	232,013

	Number of Students Enrolled	No. of Individual Projects	Sea Grant Dollars	Matching Funds
B. Vocational Marine Technician Training				
63. Commercial Diver Training	150	1	85,700	616,900
64. Oceanographic Technician Training	52	1	10,000	6,200
65. Aquaculture Technician Training	20	1	57,500	64,800
66. Commercial Fisheries Training	300	6	173,035	198,267
67. Technician Training—Other	128	5	94,500	63,362
C. Retraining Program				
68. Engineering Retraining	0	0		
69. Technician Retraining	0	0		
D. Other Education				
70. Education—Other	2244	40	2,105,281	1,039,577
Total Number of Students	3453			

VI. Advisory Services

A. Extension Programs				
71. Extension Agent Services		45	3,782,677	2,137,407
72. Extension Course Programs		1	22,957	22,707
73. Extension Programs—Other		6	680,290	339,920
B. Other Advisory Services				
74. Conferences, Institutions, Etc.		5	72,204	105,334
75. Public Education Programs		8	226,966	236,525
76. Publications, Audio Visuals, Etc.		12	755,391	337,515
77. Advisory Services—Other		20	1,722,030	1,048,228

VII. Program Management and Development

A. Program Administration				
78. Program Planning		4	174,964	159,391
79. Program Administration		27	2,019,479	1,852,888
B. Program Development				
80. Program Logistic Support		3	121,184	127,358
81. New Applications Development		11	660,274	233,034
Totals		694	\$27,812,000	\$18,512,271



EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

MAR 20 1978

Honorable Juanita M. Kreps
Secretary of Commerce
Washington, D.C. 20230

Dear Juanita:

This is in response to your recent letter requesting our comments on the Department's proposed 1977 Sea Grant Annual Report, as required by the Sea Grant Program Improvement Act of 1976 (P.L. 94-461).

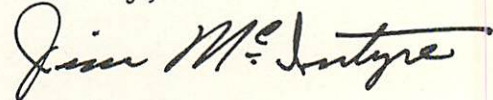
We have reviewed the proposed draft report and have no specific comments or independent evaluations of the Sea Grant Program to provide for inclusion in the 1977 report.

I would point out, however, that while a report on the types of activities supported through the Sea Grant Program and the significant projects undertaken during the year is informative, it does not address the broader goals and objectives of the program or how well these are being met overall. We believe that consideration should be given to having this report, in the future, address some of the following questions concerning the effectiveness of the Sea Grant Program:

- What is the current status of marine related research, education, and advisory capability and how well does the Sea Grant Program contribute to the development of that capability?
- Are Sea Grant resources, especially those directed toward research, being utilized effectively to help states and localities address critical short and long term coastal and off-shore resource management, environment protection, and economic development issues?
- Are Sea Grant institutions effectively seeking increased financial support from State and local governments and private institutions now that the Federal Government has helped develop and maintain such institutions?
- Are the Sea Grant institutions more or less effective in achieving their stated objectives with different mixes of advisory, education, and research services?

I am certain that you have other assessments of the Sea Grant Program in mind, and I look forward to reading about your findings in next year's report.

Sincerely,

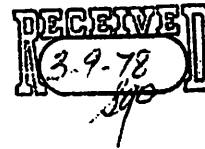


James T. McIntyre, Jr.
Acting Director

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY

WASHINGTON, D.C. 20500

MAR 2 1978



Dear Juanita:

I have reviewed the Sea Grant Annual Report to the President and Congress as required by Section 211 of the Sea Grant Program Improvement Act of 1976 (P.L. 94-461). I am pleased to commend you for the Program and for its record of accomplishment.

The Sea Grant Program represents a successful partnership between the Federal government and the States for addressing important local research needs and interests, as well as scientific and engineering problems of national importance. As recounted in this year's report, Sea Grant supported research, such as research on "near drowning" and on an oil-spill recovery boat, has proven productive and has received justified public attention.

Perhaps in the coming year it is appropriate to take careful stock of the Sea Grant Program and possibly to alter its course slightly. I am mindful in making this suggestion that the program has now been established for a decade. Such an evaluation is particularly timely in light of the Administration's efforts to review ocean-related programs, policies and organizations. Further, it would come at a time when there is new leadership within your Department, the National Oceanic and Atmospheric Administration, and the Program itself. Questions that might be addressed could include the following:

- Is there an opportunity to change the Sea Grant Program from its traditional emphasis on institution building to an emphasis on the marine and coastal issues that will face the Nation in the 1980's?
- Does the program initiate sufficient long-term and fundamental research to contribute to the solution of the major marine-related issues that lie ahead?
- How can the Sea Grant Program research be made a more effective input in the formulation of policy concerning the coastal-zone and the extended resources zone?
- How can the quality of Sea Grant institutions be strengthened?
- Is there a proper mix of research, advisory services, and education/training programs?
- What should be the long-term Federal/state/local funding commitment to Sea Grant institutions?

An evaluation that provides answers to these questions will not be completed immediately, nor are the questions the only ones worthy of attention. Nonetheless, they indicate areas that warrant consideration over the coming year. I will look forward to learning of the results of your review in the months ahead.

With warm regards,

Yours sincerely,



Frank Press
Director

Honorable Juanita Kreps
Secretary of Commerce
Washington, D. C. 20230