TESTIMONY SUBMITTED
TO THE
SUBCOMMITTEE ON OCEANOGRAPHY
MERCHANT MARINE AND FISHERIES COMMITTEE
U.S. HOUSE OF REPRESENTATIVES

MARCH 30, 1981

These Materials were Assembled and Prepared
On Behalf of
Sea Grant Task Force
in Cooperation with the
Marine Affairs Committee
of
The National Association of State Universities and Land-Grant Colleges
and with
The Sea Grant Association

Washington, D.C.

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U.S. House of Representatives
Committee on
Merchant Marine and Fisheries
Room 1334, Longworth House Office Building
Washington, D.C. 20515

WITNESS LIST

Subcommittee on Oceanography

National Sea Grant Program

Monday, March 30, 1981

- James P. Walsh, Acting Administrator, National Oceanic and Atmospheric Administration

- Panel of Sea Grant Service Users

  Joseph Swift, Owner, Clearwater Tackle Corp. and Upstate Sports Service, Inc., Ontario, New York

  James Hudlow, President, Specialty Seafood, Chattanooga, Tennessee

  Roy Martin, National Fisheries Institute, Washington, D.C.

  Jon M. Lindbergh, Domsea Farms, Bremerton, Washington

  Robert C. Byrd, Vice-President, Brian Watt Assoc., Consulting Engineers, Houston, Texas

- Panel of Sea Grant College Program Directors

  Dean A. Horn, Massachusetts Institute of Technology

  Stanley R. Murphy, University of Washington

  Dr. B.J. Copeland, North Carolina State University

  Dr. Jack R. Van Lopik, Louisiana State University

  Dr. James J. Sullivan, University of California

- Dr. Robert Corell, University of New Hampshire

OPENING STATEMENT OF HONORABLE NORMAN E. D'AMOURS, CHAIRMAN, SUBCOMMITTEE ON OCEANOGRAPHY ON PROPOSED BUDGET CUTS FOR THE NATIONAL SEA GRANT PROGRAM.

TODAY'S HEARING OF THE SUBCOMMITTEE ON OCEANOGRAPHY CONCERNS THE ADMINISTRATION'S PROPOSED BUDGET FOR THE NATIONAL SEA GRANT PROGRAM. THE WITNESSES INCLUDE REPRESENTATIVES FROM THE ADMINISTRATION, A PANEL OF SEA GRANT COLLEGE PROGRAM DIRECTORS, AND A PANEL OF BUSINESS REPRESENTATIVES THAT HAVE USED THE SERVICES OF SEA GRANT.

THE SEA GRANT PROGRAM WAS CREATED IN 1966 TO EXPAND OUR BASE OF MARINE SCIENTISTS, TECHNICIANS AND SPECIALISTS. THE PROGRAM MEETS ITS GOAL AND OBJECTIVES WITH A TRIPARTITE PROGRAM OF RESEARCH, EDUCATION AND ADVISORY SERVICES.

GRANTS TO STATE UNIVERSITIES HAVE FUNDED RESEARCH ON IMPROVED OFFSHORE CONSTRUCTION TECHNIQUES, DEVELOPMENT OF NON-LIVING MARINE RESOURCES, COASTAL POLLUTION AND MORE EFFICIENT FISHING GEAR AND METHODS.

EDUCATIONAL PROGRAMS HAVE BEEN DEVELOPED FOR GRADE SCHOOL THROUGH HIGH SCHOOL-AGE STUDENTS. PROGRAMS HAVE BEEN DEVELOPED TO TRAIN TECHNICAL PERSONNEL FOR INDUSTRY. FUNDS HAVE ALSO BEEN USED TO DEVELOP AND STRENGTHEN COLLEGE AND GRADUATE PROGRAMS IN THE MARINE AREA.

THE ADVISORY PROGRAM HAS A DUAL ROLE. RESEARCH RESULTS ARE DISSEMINATED TO LOCAL USERS TO RESOLVE THEIR PROBLEMS, AND IN TURN, LOCAL NEEDS AND PROBLEMS ARE COMMUNICATED TO PROGRAM MANAGERS AND RESEARCHERS SO WORK CAN BEGIN ON WAYS TO SOLVE THESE PROBLEMS.

I SUPPORT THE PRESIDENT'S CALL TO REDUCE EXPENDITURES, BUT FRANKLY, I AM CONFOUNDED BY THE LOGIC OF THE ADMINISTRATION. THE PRESIDENT HAS CALLED FOR EQUITABLE REDUCTIONS ACROSS THE BOARD AND FOR THE ELIMINATION OF WASTE, FRAUD AND FAT. THE ADMINISTRATION'S SEA GRANT PROPOSAL, HOWEVER, IS NOT AN EQUITABLE REDUCTION FOR SEA GRANT. INSTEAD IT CALLS FOR THE ELIMINATION OF SEA GRANT. SEA GRANT IS NOT FULL OF WASTE AND FRAUD. IT HAS RETURNED POSITIVE BENEFITS TO OUR NATION.

AS A MATTER OF REFERENCE, THE HERITAGE FOUNDATION (THE CONSERVATIVE THINK TANK THAT PROVIDED MANY RECOMMENDATIONS TO PRESIDENT REAGAN) STRONGLY SUPPORTS SEA GRANT.

> "SEA GRANT HAS AN IMPRESSIVE RECORD OF SUCCESS, PRIMARILY BECAUSE IT IS BASED LARGELY ON LOCAL PRIORITIES AND NEEDS...
>
> SEA GRANT FUNDING SHOULD BE INCREASED BY 10 PERCENT PER YEAR IN REAL TERMS FOR THE NEXT FIVE YEARS."

OUR COMMITTEE HAS RECOMMENDED TO THE BUDGET COMMITTEE THAT SEA GRANT BE LEVEL FUNDED AT $38.8 MILLION FOR FY 1982. WHEN INFLATION IS TAKEN INTO ACCOUNT, THIS AMOUNTS TO A BUDGET DECREASE.

THE MEMBERS WILL BE INTERESTED IN TESTIMONY BY DR. ROBERT CORELL OF THE UNIVERSITY OF NEW HAMPSHIRE. DR. CORELL CHAIRED A TASK FORCE THAT EVALUATED THE IMPACT OF SEA GRANT ACTIVITIES ON THE U.S. ECONOMY. THE TASK FORCE PROVIDED SEVERAL SPECIFIC EXAMPLES OF HOW SEA GRANT HAS MET LOCAL, STATE, REGIONAL AND NATIONAL NEEDS. THE MOST IMPRESSIVE FINDING TO ME WAS THAT SEA GRANT PROVIDES $217 MILLION PER YEAR IN ECONOMIC RETURNS TO THE UNITED STATES. THIS IS AN IMPRESSIVE FIGURE, ESPECIALLY SINCE FEDERAL EXPENDITURES TO SEA GRANT HAVE ONLY BEEN $270 MILLION OVER THE ENTIRE HISTORY OF SEA GRANT.

IN CLOSING, I AM DEEPLY CONCERNED THAT THE ADMINISTRATION HAS PROPOSED THE ELIMINATION OF A RESOURCE DEVELOPMENT PROGRAM. SEA GRANT IS A VALUABLE PROGRAM THAT RETURNS POSITIVE BENEFITS TO OUR INDUSTRIES, OUR ECONOMY, OUR NEXT GENERATION OF MARINE SCIENTISTS AND MARINE RESOURCE MANAGERS, AND THE MANY PEOPLE THAT USE AND ENJOY OUR COASTAL RESOURCES.

STATEMENT OF JAMES P. WALSH
ACTING ADMINISTRATOR
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
DEPARTMENT OF COMMERCE
ON
SEA GRANT ACTIVITIES AND BUDGET
BEFORE THE
SUBCOMMITTEE ON OCEANOGRAPHY
COMMITTEE ON MERCHANT MARINE AND FISHERIES
UNITED STATES HOUSE OF REPRESENTATIVES

MARCH 30, 1981

Mr. Chairman and Members of the Subcommittee:

Thank you for the opportunity to discuss the National Sea Grant College Program.

The National Sea Grant College Program, created by the Sea Grant College and Program Act of 1966, was established as a matching-fund grant program. Its goals were to develop and protect the Nation's coastal and marine resources through the establishment and operation of a network of Sea Grant Colleges and a university-based research program designed to meet local, regional and national needs.

Under the Sea Grant College Program, a total of 16 Sea Grant Colleges have been designated by NOAA since the program's inception. An award of Sea Grant college

status has expressed NOAA's confidence in the demonstrated dedication and competence of the institution in the areas of marine research and education. Colleges which achieve this status have received priority in obtaining support, within the limits of overall Federal policy and fiscal considerations. To be eligible for such designation, an institution was required to demonstrate a record of superior performance for a minimum of three years in Sea Grant Programs that encompassed research, development of the marine environment, education and training of marine scientists and technicians, and an effective marine extension or advisory program. At present, Sea Grant colleges have been designated in a total of 17 coastal states: Alaska, Georgia, Hawaii, Washington, Oregon, California, Texas, Louisiana, Florida, North Carolina, Delaware, New York, Rhode Island, Massachusetts, Wisconsin, Maine and New Hampshire.

Under the Sea Grant Program, grants have been provided to public and private universities, institutes, laboratories and agencies engaged in or concerned with the development of marine resources. The major project areas supported by these grants have included:

- marine resources development, including aquaculture, fisheries biology and ecology, marine pathology and mineral resource development;
- marine technology development;
- marine environmental research;
- marine socio-economic and legal research;
- marine education and training; and
- marine advisory services.

Federal grants for projects in these areas have comprised 62.5% of total project costs (the maximum allowable Federal level is 66 and 2/3%), while 37.5% has been provided by the grant recipients themselves. During the fiscal year ending September 30, 1981, grants were given to 46 organizations and provided partial support for 810 projects. In all 4,071 individuals were involved in sea grant-sponsored activities, including 1,994 professionals and 760 graduate students.

Sea Grant's marine advisory services programs are a representative example of how this program has provided diverse benefits to a variety of user groups in the coastal states. Sea Grant's 300 marine advisors have participated in informal education for general public audiences, technical advice and instruction in marine areas, identification and communication of local marine community needs, and the dissemination of research findings aimed at user problems through seminars, workshops, publications and personal contacts. The marine advisors have worked in coordination with Sea Grant communicators to reach the general public through press, radio, television and other media. Major subject areas addressed by marine agents and specialists have included fisheries management, sea food processing and marketing, gear technology, marine recreation, coastal and wetland management, taxes, health and safety. Several thousand persons have been contacted each month by the agents who provided direct assistance to users of marine resources. NOAA has entered into cooperative agreements with the Department of Agriculture's Cooperative Extension Service and the United States Fish and Wildlife Service, and has helped train agents and develop the Energy Extension program of the Department of Energy.

The Sea Grant National Projects Program was established by the Sea Grant Program Improvement Act of 1976. National projects have been designed to involve researchers from several universities and disciplines in addressing a problem identified as a "national need". Fifteen "national needs" have since been identified. The first of these to be addressed became the Near Shore Sediment Transport Study. A second national project on marine corrosion involving researchers from six universities was initiated in the fall of 1980.

The final major category of sea grant activity which bears specific mention is the Sea Grant International Program, also established by the 1976 Sea Grant Program Improvement Act. The goals of the cooperative projects in this program are to enhance the marine research and development capabilities of developing countries and to promote the international exchange of marine data and information.

The Sea Grant Program was designed to be the moving force in the creation of a network of colleges and universities with strong programs in marine education and research. This goal has been largely realized as evidenced by the involvement of over 4000 people in Sea Grant-sponsored activities and the 16 institutes which have received Sea Grant college

status. Sea Grant College Programs have been directed toward the development of expertise and the satisfaction of needs on local, state and regional needs. Sea Grant matching funds have always exceeded the required minimum, and state legislatures in 14 states already appropriate funds as an explicit item in their state budgets.

The Fiscal Year 1981 appropriation includes $39 million for the Sea Grant Program. Most of the funding is devoted to R&D activities with 23% and 10% devoted to Marine Advisory services and education training, respectively. Federal funding in 1982 for the Sea Grant Program will be eliminated for a total savings of $222 million through 1986.

This concludes my written statement on the proposed fiscal year 1982 Sea Grant Budget, and I will be happy to answer any questions you may have.

FORMAL TESTIMONY

of

Mr. Joseph Swift

Before the
Sub-Committee on Oceanography
of the U.S. House of Representatives
Committee on Merchant Marine & Fisheries

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March 30, 1981
Washington, D. C.

Mr. Chairman, Honorable Congressmen.

My name is Joseph Swift and I reside in the Town of Ontario, New York within the Congressional District represented by Congressman Frank Horton. I am employed as a United States Coast Guard licensed commercial charter fishing boat captain on Lake Ontario; and as co-owner of a fishing tackle manufacturing business, Clearwater Tackle. I am also a member of the Rochester Trout and Salmon Anglers Club, the Sodus Deep Trollers Club, the Eastern Lake Ontario Trout and Salmon Anglers Association, and New York Sea Grant's Coastal Recreation Extension Program Advisory Committee. Moreover, I serve as chairman of the Wayne County, New York Fishery Advisory Committee, as established by the Wayne County Board of Supervisors. Lastly, I am employed as a chemist with the Xerox Corporation, but do not represent that corporation in this testimony.

I come before you today in wholehearted support for the Sea Grant Program. In my dealings with Sea Grant over the last 5 years, I have found the program to be a unique, invaluable program and I feel it must not be shortchanged in your ultimate budget decision.

In lieu of simply offering a litany of praise about Sea Grant, I thought I would explain and describe the positive experiences I've had or seen as a user of, and advisor to Sea Grant. These anecdotes will only scratch the surface of illustrating the economic and social impact of this program in my locality, my state and in other states across the nation.

Example #1

Five years ago, prompted by a developing sportfishing and tourism industry on Lake Ontario, I was seriously debating the decision to plunge into the charter fishing business. Fortunately, I was able to identify and talk with a New York Sea Grant extension specialist. The specialist was able to discuss my decision, lay out options and provide insurance tips. But, perhaps, most importantly, he was able to provide a research report on the charter fishing business of Lake Michigan funded and conducted through the Wisconsin Sea Grant Program. Having this up-to-date, objective and pertinent information available allowed for an easier, wiser decision to go into business and to avoid some early pitfalls. Today, I run a successful, heavily-booked charter business on the lake, and as I run it, I do not forget or belittle the assistance and information rendered by Sea Grant in New York and Wisconsin.

Example #2

Four months ago, a few of the 40 or so charter fishing operators that have sprung up on Lake Ontario over the last five years wanted to consider the formation of a professional trade association so as to benefit from group insurance discounts and cooperative advertising. Our first turn was

to Sea Grant, through its local extension specialist. Sea Grant arranged and walked us through our first meetings and was able to provide extremely useful materials on the constitution and organization of charter fishing associations in the Upper Great Lakes, again by linking with Sea Grant folk in Michigan. Today, the Lake Ontario Charter Boat Association is established and will soon offer its 36 members reduced insurance savings and regional joint advertising advantages.

Example #3

Boat access to Lake Ontario is severely limited. Sea Grant, through its research and extension effort, has been able to facilitate local and state government in addressing this problem. Economic research on the value of the fishery, access supply and demand, and thorough knowledge of successful community efforts elsewhere have made it easier for communities to decide on resolving this access problem. In fact, information provided by Sea Grant on boat launch design helped save Wayne County some $45,000 in developing its newest launch facility and helped Monroe County save approximately $10,000 in engineering costs on its own planned boat ramp.

Example #4

Toxic chemical contamination problems on the Great Lakes can impose and have imposed economic hardship on the tourism and commercial fishing economy. For the last six years, perhaps the best sources of information on toxic chemical contamination of our fishery resources have been Sea Grant researchers and extension specialists in New York, Wisconsin and other coastal states. This information has been critical in making intelligent health and economic decisions under risk situations.

Example #5

Difficulty in locating salmon during summer months annually supresses sportfishing activity and its economic spin-offs on Lake Ontario. I had the very positive experience of suggesting a research study to Sea Grant researchers in New York that would track the movements of salmon and trout via electronic gear. This project has just recently been funded and started, and the impact of the information it will provide could benefit innumerable fishing-related businesses in New York and probably even other Great Lakes states.

Example #6

A number of groups, businesses, communities and agencies on Lake Ontario are becoming interested in developing artificial fishing reefs in the lake to attract anglers and develop tourism. Once again, Sea Grant, through its extension and research role, has information available or underway that will aid in making reef-related decisions. In New York, we've been able to benefit from information generated by Sea Grant in Michigan, Wisconsin, Florida and Virginia. And some day we hope to repay the compliment.

Time and time again, Sea Grant has proven to be the best source of objective coastal resource use information. Whether it involves businesses, clubs, individuals, or communities, the coastal resource user has come to know that Sea Grant provides good, solid information. The information may have been developed locally or anywhere across the continent, but it seems to always prove useful, understandable and relevant.

As a lay person, I won't pretend to understand the federal budget process, but I'd like to leave the sub-committee with these thoughts, if

I may:

1. My sentiments, and I believe the sentiments of all coastal resource users familiar with Sea Grant across the country, are that one of the most effective, efficient, economically-stimulating cooperative programs around--Sea Grant--should not be crippled by inadequate federal support, or support that is withdrawn too severely, too quickly, or too impetuously.
2. There must be continuance of the national commitment to Sea Grant as a cooperative state/federal partnership in the same way that the national commitment to Land Grant has been continued since 1862. Federal involvement insures national guidance, highlights national priorities and encourages state and interstate cooperation.
3. Sea Grant is real--it's human, responsive, helpful and accepted within coastal states and communities. Why gut the only responsive, cooperative, popular decentralized program within NOAA? It just doesn't make sense!
4. Sea Grant is obviously an economically attractive investment. Senator Weicker's own computations indicated at least a 7 to 1 return on the federal investment in over 13 years.
5. Sea Grant has national impact and benefits. Whether it's through education of graduate scientists, through research conducted in one state yet applicable to all, or extension people putting out the call for information across the country, it's still rightfully called the National Sea Grant College Program.

And lastly, I'd ask that Congress not be involved in destroying or even obstructing the open, proven linkage between the coastal resource user -- be they boater, fisherman, marine contractor, homeowner -- and the university system across the country. Our great natural resource -- that is, the coasts, oceans and Great Lakes -- critically needs our great national resource -- that is, reliable, unbiased information.

Thank you very much.

March 23, 1981

TO: Merchant Marine and Fisheries Committee
Oceanography Subcommittee

FROM: James Hudlow, P. O. Box 4278, Chattanooga, Tennessee 37405

SUBJECT: National Sea Grant College Program

My name is James Hudlow. I was born and raised in Chattanooga, Tennessee. I still live in Chattanooga where I own and operate a seafood packing and distributing business. My major outlets are in Tennessee, but my distribution pattern extends into Alabama, Georgia, North Carolina, and Florida. My being in the seafood business is partly due to my experiences with the Sea Grant Program, and I am here to offer my comments on the merits of the Administration's proposal to terminate the National Sea Grant College Program.

In its effort to reduce federal spending the administration has apparently lumped the National Sea Grant Program with activities that simply provide assistance to the states. It has obviously failed to recognize that when the Congress of the United States established this program, it called for the development of a working partnership between federal and state governments, universities, and industry, and it called for a longterm commitment of resources from the non-federal sector.

In response to this challenge, universities, state governments, and industry committed funds and mobilized an impressive network of researchers, extension agents, and specialists to work towards the common goal of developing the best ways to use our nation's marine resources. With all of these forces in place and functioning, this is not the time for the federal government to withdraw from a partnership that it was primarily responsible for creating. If the Program was not fulfilling the mission that Congress had intended, I would agree that it ought to be terminated. In my opinion, however, the Program is working, and it is working efficiently and effectively.

My first experience with the Sea Grant Program came about six years ago. At that time I was just getting started in the seafood business, and I called on the National Marine Fisheries Service in St. Petersburg, Florida, for advice and assistance on how to smoke fish that would pass the newly established guidelines of the Food and Drug Administration. They referred me to the Georgia Sea Grant Program based at the University of Georgia which had carried out research in this area. Using the methods that had been developed, I was able to process and distribute successfully 30,000 lbs of fish for which there had been no demand at that time in the existing fresh fish markets.

About two years ago, I started to handle fresh product from the west coast, mainly Washington State. Soon thereafter, I began to receive complaints from my customers about live parasites in the fish, and the market I had developed was

in jeopardy. My supplier was skeptical about these complaints and did not take the problem seriously. When I asked the Director of the Georgia Sea Grant Program for advice, he arranged for me to meet with specialists in the Washington Sea Grant Program. They confirmed the existence of the parasite, provided me and my supplier with information about its life cycle, and suggested techniques to detect and eliminate the parasite from the product. The handling and resolution of this problem is a superb example of how effectively the National Sea Grant Program network operates.

I have been developing in the southeast a market for seafood that continues to grow. With this expanding market, it became necessary to obtain an extended shelf life for my products in order to maintain product quality. Research carried out earlier by the Texas A&M Sea Grant Program had indicated the potential of using modified atmosphere to increase the shelf life of seafood products. Once again I requested assistance from the Georgia Sea Grant Program to see if this technique was applicable to my problem. Since there were questions about the usefulness of this method, the Georgia Sea Grant Program initiated and is currently undertaking a joint research project with the Wisconsin Sea Grant Program to address this problem. The Wisconsin Sea Grant Program was brought into the project because of its special experience with preservation techniques. The results will not only help me and other seafood distributors, but provide consumers throughout the country with better products.

The reason why I bring out the details of my experience with the Sea Grant Program is to dispel the myth that it is mainly a local program responding to local needs. My business is in Tennessee, and I handle no products from either Wisconsin or Georgia. The research assistance that I have received from the Sea Grant Programs in both states will not result in any benefit to either state. These two programs have helped me because of their commitment to the goals and objectives of the National Program.

Being in a state which does not have a Sea Grant program, I am most appreciative of its existence because I have had access to useful information from the entire network of Sea Grant institutions in the nation. If the federal government withdraws from this national effort, it will result in dismantling of an effective network that has been put together through the dedicated efforts of many individuals and organizations. If the federal government abdicates its responsibility by turning over current Sea Grant activities to the states, we will lose the central direction and unity of purpose that federal leadership provides. Such an action is not in the national interest.

When you consider that nonfederal funds provide more than one-half the cost of the program, and when so few federal programs provide any tangible benefits to anyone, it is disappointing to see the administration recommending termination of a program which can clearly demonstrate economic gains. To discard the program on the presumption that it is mainly local in orientation is a naive and shortsighted view. It is true that many of the activities of the Sea Grant Programs in the different states have local implications, but they also have national and even international significance.

When the activities of Sea Grant Programs in Georgia and Wisconsin help my business which involves more than a million pounds of fish being harvested and processed each year by the seafood industry in Washington, do they not have national significance?

When a Program in one state develops a more fuel efficient system of fishing, the results benefit local fishermen, but when that system is adopted by fishermen in other parts of the country, and in other countries, does the activity not have national and international significance?

Under the terms of the Fishery Conservation and Management Act which established the 200 mile limit for our bottom fisheries, the U.S. must make available to foreign fleets fishery resources that U.S. fishermen do not harvest up to the allowable limits. In the southeast, the fishery is based almost exclusively on shrimp and few fishermen are trained to work offshore. If Sea Grant Programs in the southeast train and encourage shrimp fishermen to harvest these offshore stocks which have been virtually unexploited, the results will benefit local economies, but do the activities not have national significance? . . . . And when these fish are shipped to other parts of the country to meet the needs of consumers there, is there not further national significance? We all know that resources are not limited by state boundaries, but few realize that markets also are not limited by state lines.

When a Sea Grant Program in one state provides its special expertise to address problems identified by a Sea Grant Program in another state, does this activity not reflect a national responsibility?

When a Sea Grant Program promotes the development of seafood products for export, the benefits to the local economies are obvious, but does the action not take on national significance in view of the relief it affords to our problem with trade deficits?

The Administration has proposed that the National Sea Grant Program be terminated on the basis that it is oriented towards local problems, provides benefits to local people, and should, therefore, be supported by local funds. As I have indicated, this view is completely without basis. If the administration insists on terminating the National Sea Grant Program, let it look for other grounds.

STATEMENT

of the

NATIONAL FISHERIES INSTITUTE

on

THE SEA GRANT COLLEGE PROGRAM

before the

HOUSE COMMITTEE ON MERCHANT MARINE AND FISHERIES

SUBCOMMITTEE ON OCEANOGRAPHY

MARCH 30, 1981

NATIONAL FISHERIES INSTITUTE
1101 Connecticut Avenue, N.W.
Washington, D.C. 20036

Mr. Chairman my name is Roy Martin and I am Director of Science and Technology for the National Fisheries Institute.

Mr. Chariman the National Fisheries Institute is pleased to offer its comments regarding the exceptional NOAA program called Sea Grnat. The National Fisheries Institute is composed of more than 1000 member companies engaged in all the facets of processing, distributing and marketing the majority of this country's fresh and frozen seafoods.

During the past several years we have had the privilege of appearing before this committee to offer support for the Sea Grant Program. We appreciate the invitation to again state our views.

We, as an industry, have been a prime recipient of the benefits from the Sea Grant Program. To us that seafood specialist and extension agent have added a dimension to the industry, that along with the Congressionally supported 200 mile economic zone legislation, is enabling this industry to recover and grow again.

We cannot allow this forward growth to stop. The Sea Grant program must continue as a viable entity just as the university land grant program in agriculture continues to be an important supporting arm of their efforts.

We offer as prime examples of this assistance some of Sea Grant's major contributions to us:

(1) Studies that compare the Protein Quality of underutilized minced fish to that of whole fillets of popular species of fish. We documented that the protein from minced fish was equal to that of traditionally caught fish. From this base we know that we can use minced fish to build whole new families of seafood products engineered as convenience foods for U.S. consumers.

Mr. Chairman my name is Roy Martin and I am Director of Science and Technology for the National Fisheries Institute.

Mr. Chariman the National Fisheries Institute is pleased to offer its comments regarding the exceptional NOAA program called Sea Grnat. The National Fisheries Institute is composed of more than 1000 member companies engaged in all the facets of processing, distributing and marketing the majority of this country's fresh and frozen seafoods.

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In addition let me cite a few other examples of how those extension service people in the field have served as a conduit to educate, bring forward new technology and present it to industry user groups.

(1) A Waste Utilization Conference and the implications of future EPA overregulation of the processing industry - University of Florida extension agent, Steve Otwell, Organizer.

(2) New Advances and an examination of the safety of Modified Atmosphere Packaging - Texas A & M University - Ranzell Nickelson, Extension Specialist, Organizer.

(3) Seafood Nutrition - "Train the Trainer". A conference designed to send back with various user groups such as school dietitians, home economists, and food editors enough information about seafood and health to help them "out-reach" to their audiences. University of South Carolina - John Armstrong, Organizer.

These projects and the applied work done by Sea Grant constitute one prime basic need - Food for Man, an additional source of protein.

We therefore urge that funding support be maintained for this unique national resource. People already trained to assist the seafood industry in a period of anticipated growth constitute the wealth and heritage of this nation's oldest commercial industry.

Our prime support for these program components does not indicate a lack of support for other Sea Grant services. I believe other Sea Grant user groups can more properly address their issues.

Mr. Chairman, it has been a pleasure to appear before your committee today and I am ready to answer any questions you or members of the committee may wish to ask.

TESTIMONY ON THE NATIONAL SEA GRANT PROGRAM
TO THE SUBCOMMITTEE FOR OCEANOGRAPHY
COMMITTEE FOR MERCHANT MARINE AND FISHERIES
HOUSE OF REPRESENTATIVES

Jon M. Lindbergh
6789 Bergman Road
Bainbridge Island, Washington 98110

The Sea Grant Office was established more than ten years ago with an objective to encourage and support the development of aquatic resources. I have personally participated in two significant Sea Grant-supported projects.

The first project was a pilot program in salmon culture in 1971. Sea Grant matching funds in that first year and NMFS technical assistance were key factors in the successful beginnings of a company which now has sales of several million dollars annually.

The second project, which is still continuing, involves the development of a genetically selected net pen salmon brood stock. In other words, our objective is a domesticated salmon analogous to domesticated cattle or chickens. Sea Grant, through the University of Washington, has provided the fish geneticists who have achieved striking success in just three years.

I am in strong support of the president's budget strategy and understand the need for every agency to accept their share of fund reduction. This will mean the loss, for all of us, of some assistance in areas dear to us.

The loss of all Sea Grant support, though, would be a grave setback for the new aquaculture industry. Matching Sea Grant support for our pilot program meant a new industry in salmon culture. Sea Grant support of fish genetics will allow aquaculture to begin to duplicate in the sea what agriculture has done on land.

The results of judicious Sea Grant funding can, in our experience, pay off many times over in the development of our aquatic economy. I think it most important that the Sea Grant office, leaner if necessary, be able to provide the kind of support in the future which I have seen it provide so effectively in the past.

Thank you for your consideration.

March 23, 1981

TESTIMONY

ROBERT C. BYRD
Vice President
Brian Watt Associates, Inc.
Houston, Texas

Before The
UNITED STATES HOUSE OF REPRESENTATIVES
Committee on Merchant Marine and Fisheries
SUBCOMMITTEE ON OCEANOGRAPHY

March 30, 1981
Washington, D.C.

Testimony of Robert C. Byrd
before the
Subcommittee on Oceanography
of the
Committee on Merchant Marine and Fisheries

Mr. Chairman and members of the Committee, my name is Robert C. Bryd, and I am Vice President of Brian Watt Associates, Inc., of Houston, Texas. Ours is a consulting engineering firm that specializes in offshore engineering for the oil and gas industry.

My experience with the National Sea Grant Program has spanned the past six years and has been very positive indeed with respect to the impact of this program on applied ocean engineering research and graduate education in general in this field. I have been invited here today to relate these experiences to you as a personal testimonial to the significance of the Sea Grant Program in the marine industry. However, before I proceed with my own experiences I would like to offer three points for your consideration while reviewing my testimony:

- The technology associated with offshore development is demanding more and better qualified engineers.

- Graduate education in engineering is becoming progressively less attractive to American engineering students because of increasing starting salaries for bachelors level graduates.

- The National Sea Grant Program is a major source of funding for ocean engineering graduate education.

It is my intention to provide support for the last point in the following discussion.

I would like to briefly summarize my own educational experience to emphasize the role that Sea Grant has played. I received my undergraduate degree in marine engineering from the U. S. Coast Guard Academy at New London, Connecticut, followed by four

years in the Naval Engineering branch of the Coast Guard. I then acquired a masters degree in Ocean Engineering from the University of Alaska at Fairbanks. My education and the research work which allowed me to complete it were funded by the Office of Naval Research (ONR) as part of their effort to develop a high-speed surface effects vehicle for use in the Arctic. It was my original intention to pursue a Ph.D. degree in Ocean Engineering at that time, but this changed when ONR cancelled this portion of their research program. I left the University of Alaska to spend the next two years working in the offshore industry in Norway developing floating platform systems for use in the North Sea. I returned from this very interesting experience to continue pursuit of a doctoral degree at the University of California at Berkeley. It was my intention when entering Berkeley to solicit funds from within the offshore industry to pursue research on dynamic problems associated with wave-structure interaction on floating systems. However, I soon discovered that the particular problems that I pursued were of a nature that the solutions were required in less time than could be managed in the context of a graduate research program. The work was eventually performed by a consulting engineering firm. This I now know is not an unusual circumstance, and I would like to return to this point in a moment.

Shortly after my unsuccessful attempts to secure research funding from private industry, I became aware of the National Sea Grant Program and its mandate to sponsor research in areas of direct application to current problems. I was subsequently able, with the assistance of my sponsoring professors within the Civil Engineering Department at Berkeley, to find a research topic applicable to this program. This work involved the measurement of hydrodynamic forces on large offshore structures under earthquake excitation using scale models on an earthquake simulator. This research resulted in the verification of analytic procedures for calculating forces on such structures as offshore oil storage tanks and LNG facilities in the presence of earthquakes. This effort along with that of other engineers who followed in the same program stands alone today as the only physical verification of these analyses techniques, to my knowledge. It represents a very comforting landmark for engineers who are charged with the design of such structures for environments subjected to earthquakes.

My personal experiences with Sea Grant did not end upon leaving Berkeley, and I would like to continue that discussion in a moment. However, I think it is interesting to

consider at this point why the research work mentioned above would not have been funded from private industry sources, if it is as significant as I have stated. As a matter of fact, a substantial amount of this type of research is indeed funded by the offshore industry, but their ability to support this type effort at a college or university is restricted by two important considerations. The first is the fact that a great deal of the available resources are consumed by the practical necessity to concentrate on problems that are of immediate application to specific development programs. This means that the results are generally required in a shorter period of time than is usually possible in academic institutions. The second is the fact that most universities require that research work performed in pursuit of a graduate degree be made public in the form of a published dissertation or thesis. Most sectors of private industry feel that if they pay for the research, the results should belong to them exclusively, particularly if it is a topic of significant commercial interest. While this is an issue that can generally be side-stepped by some compromise on both sides, it is a complicating factor that discourages private industry from funding graduate research in universities. In the case of my own dissertation research, most people familiar with this area of technology agreed that it should be in the public domain to allow free access by all parties concerned with the safe design for offshore structures of the type considered. Public funding would seem to be very appropriate for this type of research.

It might be tempting to dismiss my experiences with Sea Grant as a singular example of little significance in the broader picture of offshore technology. Therefore, I would like to continue the discussion. As I was completing my research at Berkeley, I was offered the opportunity to join Brian Watt, our company President, and seven other engineers in forming a team to work with a major oil company to develop the technology required to operate in the offshore regions of the Alaskan Arctic. The team was chosen to provide a broad spectrum of engineering experience to augment that already available within the oil company itself. Six of the original nine engineers had Ph.D's in various aspects of civil engineering; three of the six received major portion of their doctoral research funding from the National Sea Grant Program. The two other than myself had both graduated from the Massachusetts Institute of Technology.

From this beginning, our firm has evolved into a leader among consulting engineering firms in the devlopment of arctic offshore technology. We now have 15 graduate

engineers, four of whom received the major portion of their funding from the Sea Grant Program. This amounts to nearly 30% of the total.

Once again we should return to the question of the particular significance of this single example. It is my contention that it is very significant. The concentration of graduate engineers who have been strongly influenced by the National Sea Grant Program in our firm is not that far out of line with the general offshore industry, if one considers the high technology sector. Sea Grants institutions like the University of California, MIT, Texas A & M, and many others are supplying a substantial portion of the better talent going into frontier development in the marine industry today.In preparing this testimony, I managed to find another half dozen engineers in companies scattered around the Houston area who had received some portion of their funding from Sea Grant. The impact of this support will be felt for many years to come in offshore development in the U. S., and the commercial value of this human resource will be very great.

Returning to the points raised at the beginning of this testimony, the engineering community today is being faced with tremendous challenges in carrying offshore development into the frontier areas such as the Arctic and the deep-water regions of the outer continental shelf. These challenges are being met by application of the substantial body of experience accumulated by the industry in its operations in other areas, together with the use of the highly motivated and well trained young engineers graduating from U.S. universities with substantial backgrounds in marine technology. As I have stated, Sea Grant is a major contributor to this talent pool. However, the general need for engineers today is forcing stiffer and stiffer competition among the groups who compete for the available talent. We are finding it increasingly difficult to hire young engineers with graduate degrees and experience directly applicable to the offshore industry. If one excludes foreign engineers graduating without permanent U.S. residence status, I would say it is almost impossible to hire Ph.D. level engineers. If we examine the reasons for this situation we can identify two major causes. On the one hand starting salaries for engineers are higher than anyone would have imagined a few years ago. On the other hand, education is more expensive, and it is getting more and more difficult to find funding for the type of research which leads to the higher degrees. This is a very alarming trend at a time when this sector of the marine industry is in a major period of growth.

The experiences which I have related apply to a particular sector of marine technology. However, I believe that similar situations can be found in other sectors as well. We are facing a situation where, if the current trend in graduate education continues, we will be forced to seek a major portion of our manpower or technical expertise from outside the U.S. In the offshore industry, we are already seeing a substantial portion of the high quality and innovative engineering efforts coming from Europe, Canada, and Japan. We welcome these efforts, but at the same time it would be a most unwelcome step backward to see this nation lose its leadership position in the development of marine technology. In reviewing the budget cuts proposed for the coming years in the Sea Grant Program, it is difficult for me to see how these funds can be replaced from state and private industry sources. It is my understanding that the states are being pressed from all sides to replace similar federal funds in other programs. General marine research and education considerations cannot possibly outrank more immediate and pressing concerns. Private industry has not traditionally borne the burden of funding these type programs directly, and it is highly unlikely that they will assume this responsibility in the near future.

I believe that most enlightened citizens accept the necessity to reassess the national spending priorities. It is apparent that we have entered an era of more severe limitations on our ability to fund programs from public monies. However, it is my view that when the priorities are established, programs which contribute directly to the development of our technical human resources must be ranked on the same level as other pressing concerns, such as the national defense. If this is not done we stand a great chance of losing our technical leadership in all areas other than defense technology. This would be a very sad state of affairs indeed.

I am quite sure that there are areas in which the Sea Grant Program can be trimmed and improved in its effectiveness and use of available funds. I'm sure that can be said for all government programs. Nevertheless, the importance of this program in marine research and graduate education must be recognized and the human resources that it produces must continue to be available if we are to meet the technical challenges that face us as a nation in the continuing development of our offshore resources.

I thank you for the opportunity to present my view, and I will be happy to address your questions.

TESTIMONY SUBMITTED TO THE

SUBCOMMITTEE ON OCEANOGRAPHY

COMMITTEE ON MERCHANT MARINE AND FISHERIES

U.S. HOUSE OF REPRESENTATIVES

BY

PETER ORAHOVATS

VICE PRESIDENT AND SCIENTIFIC DIRECTOR

BRISTOL MEYERS PRODUCTS

WASHINGTON, D.C. MARCH 30, 1981

THE SIGNIFICANCE AND NATIONAL IMPORTANCE OF SEA GRANT-SPONSORED BIOMEDICAL RESEARCH

I wish to submit the following testimony for your consideration in reviewing the funding of the Department of Commerce-Sea Grant program. My comments are in particular reference to the very innovative and highly productive marine biomedical research which Sea Grant supports at several major universities. Considering the obvious benefits to our pharmaceutical industries, and the inherent virtues in the development of our National marine resources, I strongly recommend continued funding for the Sea Grant Program. The following brief synopsis should provide a clear picture of the many rewards received in comparison to the modest funding of this worthwhile research program.

For several years the Sea Grant Program has provided grant support for the exploration and development of marine biomedical resources. Being part of the Department of Commerce, this program has emphasized the development of nonutilized marine resources through the close collaboration of university researchers with industrial scientists. While several areas of medical importance have been investigated in this program, a major emphasis has been placed upon the investigation of marine plants and animals for the isolation of new medicinal agents useful in the treatment of human disease. As ailments such as cancer, cardiovascular disease, and resistant bacterial and viral infections increase in importance, the necessity to explore new sources for safe and effective drugs cannot be over-emphasized.

The Sea Grant Program has evolved as a unique blending of academic and industrial collaboration not equaled in other U.S. granting institutions. Biomedical Sea Grants currently exist at the Universities of California,

Rhode Island, Oklahoma, Washington, Delaware, Maine, New Hampshire, and South Carolina, as well as Texas A & M University and the Massachusetts Institute of Technology. Each of these projects is based upon interaction with an industrial counterpart involving such companies as Merck, Sharpe and Dohme Laboratories, E. I. Dupont Company, Syntex Research, G.D. Searle Company, and Eli Lilly Laboratories.

I am most acquainted with the University of California project at the Santa Barbara campus. As I am familiar with this program, I can summarize some of their notable achievements. An unusually large number of new drug candidates has been isolated by the California group, and their productivity perhaps illistrates the biomedical potential of marine organisms. Among their discoveries is a novel new analgesic/anti-inflammatory substance which is more potent than Indomethacin, and which could be highly useful in treating arthritis. An exceptionally active and selective antiviral drug was also isolated by the California group, which shows potent activity against Herpes Simplex infections. This compound could be the first step toward a successful cure of this now incurable and dreaded disease.

A new toxin is also under current investigation in California as a Neurophysiological probe in studying neurotransmission. This compound blocks nerve transmission by a new mechanism which is, as yet, unknown. In the California program, fourteen new compounds have been isolated which show impressive levels of cancer cell growth inhibition. These new compounds are being studies at several U.C. campuses for their efficacy in the treatment of solid tumors and in the control of leukemia. The California group is interacting with the National Cancer Institute to assess the application of these compounds in anticancer chemotherapy.

Nationwide, I have been informed of significant findings in several Sea Grant projects. Researchers at the University of Oklahoma, for example, have reported the isolation of a new marine polyether which inhibits cancer cell growth and which also may be useful as an antibiotic agent. The Oklahoma program has also been responsible for the isolation of fifteen cancer cell inhibitors as well as a potent substance which prolongs the effects of existing pharmaceuticals.

A group of researchers at the University of Rhode Island have been instrumental in providing a sound understanding of numerous marine toxins, and in exploring marine-derived polymers also for anticancer drug development. Likewise, scientists at the University of Washington have discovered that chitosan, a derivative from shellfish waste, may be useful as a commercial fungicide. These findings represent only a few of the more notable discoveries made through Sea Grant funding, and they clearly attest to the future potential of the marine environment in biomedical research.

Support through Sea Grant for the educational aspects of this program should also be emphasized. Students with experience in collaborative Sea Grant-Industry projects are ideally suited for employment in the pharmaceutical industry, and numerous former graduates now hold important industrial research positions as a result of the program.

It is for these reasons that I strongly support the Sea Grant Program and feel so committed to its continuation. The merits and current benefits are considerable, and the potential for significant commercial development, as supported by the close collaboration with industry, is clearly very great. Considering the quality of this program and the modest investment involved, I strongly urge your positive review.

Statement of Mr. Dean A. Horn

Director

Sea Grant College Program

Massachusetts Institute of Technology

Cambridge, Massachusetts

on March 30, 1981

to

The Subcommittee on Oceanography

of the

Committee on

Merchant Marine and Fisheries

U.S. House of Representatives

Introduction

Mr. Chairman, members of the Subcommittee: Thank you for this opportunity to appear before the House Oceanographic Sub-Committee to testify in support of the National Sea Grant College Program and to urge action by the Congress to assure the continuance of this vital Program. My name is Dean A. Horn: I am Director of the Massachusetts Institute of Technology Sea Grant College Program. The following remarks are my opinions and recommendations based on over 10 years experience with Sea Grant operations and activities, locally and nationwide.

Established by Congress in 1966, the National Sea Grant College Program has been an effective mechanism through which the federal government has provided the necessary and essential leadership of a "continuing partnership with State and local governments, private industry, universities, and citizen organizations." The objective of the Sea Grant Program is "to increase the understanding, assessment, development, utilization, and conservation of the Nation's ocean and coastal resources." This mandate is set forth in the Sea Grant Act "Declaration of Policy".

This Administration has proposed bold, aggressive actions in both federal spending and tax reforms to halt the Nation's economic decline and to regain our world leadership position. The Department of Commerce is providing Administration leadership by carrying out its primary mission of expanding industrial output, improving productivity, stimulating innovation, and creating new jobs. For the marine field, Sea Grant is already dedicated to serving these objectives. It is, I believe, the desire and intent of every Sea Grant Program director to strengthen and expand each Program's efforts in furthering the Commerce Department's mission.

In the Sea Grant Act, the intent of the Congress was clearly to utilize the expertise of our Nation's universities to aid industry and business in the development and utilization of our marine resources for our economic gain and common good. In this context, Sea Grant is a national program, not limited by region or state, but structured to have broad interaction and interchange of ideas and results.

The heart of the National Sea Grant Program is its mutually supporting and continuing partnership concept. This relationship unites the interests, responsibilities, and special contributions of government, industry and

university, into a working program that is more effective in concert than just the sum of the individual partner's capabilities. The balance, interdependence, and complementary characteristics of the partners is such that all must participate, or the system will collapse.

The government's interest and responsibility seem clear. It has jurisdiction over all ocean areas and the utilization of the resources contained therein. The government's partnership contribution is absolutely essential in providing the basic long-term investment and support that forms the thread of continuity linking all efforts together. In addition, the government's central management, focus, and guidance assure the nationwide application of the Program's results.

The industrial, private sector is concerned with the generation of income and benefits. This partner brings the ability to help identify those problems, needs, and opportunities requiring priority attention and resolution; and to underwrite those project activities with the greatest potential to create new wealth.

The university's special contribution to this vital partnership is its capacity for objective, credible inquiry; the education and training of personnel required; and the special capability to provide fundamental research from a multi-disciplinary reservoir of expertise needed to address contemporary problems. The Sea Grant advisory service within the institutional network of Sea Grant Programs assures the prompt delivery of the Program results and the early identification and feedback of problems, needs and opportunities in the marine field.

National Characteristics of Sea Grant

To better appreciate the nationwide impact and importance of the National Sea Grant Program in assisting private industry to expand its productivity, permit me to identify what I consider to be the Program's special features:

- Sea Grant is a nationwide university-based program with the responsibility of responding, not only to local and regional needs, but also to marine-related problems of national significance,
- The program supports high risk research projects that no single industry or government agency can be expected to fund,

- It is a program that, because of the non-federal matching requirement, leverages the federal investment,
- The Sea Grant network pulls together the research talent from many disciplines to solve practical problems.
- The advisory staff in contact with industry and government helps to identify research problems and to disseminate results to those who need them.

The National Sea Grant network is unique; no other such marine oriented, federally-sponsored, R & D program exists. The network links the participating Sea Grant colleges and universities of all coastal and Great Lake states, commonwealths, and island territories into a national entity. This network of experts and information, through which research results are being exchanged, provides all local and regional activities with a national perspective and benefit. The network can only exist if individual university programs continue to operate. Without federal support, the National Sea Grant College Program cannot, in my opinion, be expected to survive. The Sea Grant network would be destroyed and the economy of the nation suffer serious loss.

I will cite one example to illustrate the benefits the network provides. I have chosen an MIT project in which four mathematical models describing the movement of water and pollutants in Massachusetts Bay were developed. Some might think of this as a purely local problem, of interest and benefit to only one state; but this is not so. Massachusetts Bay was, on the contrary, the field laboratory chosen to examine the general problem of how to predict the transport and dispersion patterns of matter introduced into the ocean environment.

The specific need for these mathematical models originated as part of an investigation in which the effects of dredging ocean sand and gravel were to be studied. Several government agencies, universities and industries were involved in this National Ocean Mining Environmental Study (NOMES). The researchers developing the models had planned, and succeeded, to produce an analytic tool that could be used in virtually any definable body of water. Successful application of the models has been made by Sea Grant researchers in the Universities of Florida, New Hampshire, and Maine. The models have been used to study power plant sites in Narragansett Bay, Rhode Island, and Great Egg Harbor, New Jersey; the impact of the pollution in Great Bay and the

Piscataqua River in New Hampshire; and other studies in San Francisco Bay, in Biscayne Bay, Florida, and in harbor areas of Alaska, to name just a few.

To date the models have been used by over 35 contractors, consultants, government agencies and researchers, both in the US and overseas. Engineers from one company who recently used the models to assess the impact of sewer outfalls in a major metropolitan district reported that their work "could not have been done without the models." They consider these the best models of coastal processes in existence today. In one application alone, these models demonstrated the environmental acceptability of an existing power plant cooling water channel to carry the heat load of a second generator. This resulted in an estimated cost avoidance of $29 to $54 million.

This "local" project has thus had clear national impact and benefit that could not have been achieved without the existence of the Sea Grant network.

There are many other examples of how marine studies and research in one locality have benefited other areas, even the whole nation. Such a multiplier effect operates because the Sea Grant network guarantees an active, aggressive exchange of ideas, information and results. Other members of this panel will, I am sure, cite other examples. I am aware, for instance, of the University of Rhode Island's pioneering efforts to develop and introduce fishing gear which has resulted in an annual net increase in income of $431,000 to 18 vessels; that same Sea Grant Program's successful efforts to develop a deep sea red crab fishery on the East Coast should also be mentioned here; aquaculture research and development results are being exchanged through the network among East coast, West Coast, and Great Lake operations.

It should be emphasized here also that the advisory service element of the Sea Grant Program plays a major role in the successful operation of this network. It is my opinion that advisory services achieve full effectiveness when they function as an integral part of a balanced Sea Grant Program, organized to focus the needed scientific and technological resources of the university on important marine problems, needs, and opportunities -- be they local, regional, or national.

In summary, the Sea Grant university network represents a unique and powerful organization capable of translating marine interests, efforts and results into national application and benefit. The network can only exist if there is a National Sea Grant College Program to provide central motivation, support, cohesion and cooperation.

Distinctive Features of Sea Grant Research Capabilities

The wise provision of the Sea Grant Act that requires matching funds and the provision for advisory services by the Sea Grant College Program combine to foster unusual, if not unique, research capabilities. The integration of advisory service capabilities with the research efforts and matching fund requirements enable us to identify and to work on highly controversial, multi-interest research problems that require objective approaches to ensure the research is credible and unbiased.

Multidisciplinary, applied marine research at a university has an advantage that, I believe, is unavailable from any other source in our society. The advantage is the general acceptance and credibility of the results as being objective and trustworthy. Research by university faculty can provide an arena in which competing and conflicting needs can be fairly assessed and judged by a publicly acceptable process. I will discuss a current example of MIT Sea Grant work to illustrate this point.

Oil spills are a problem which represent a research topic laden with potential emotional and economic biases. Through workshops sponsored by our Sea Grant/Marine Industry Advisory Service Program oil spill clean-up was identified as an issue of concern to several government agencies, to oil companies, and to manufacturers of oil spill clean-up equipment. In addition, of course, oil spills are recognized as a serious problem to coastal citizens, fishermen, and environmentalists.

Although a national contingency plan exists, there is no overall legal, technical and economic analysis of the problems involved in cleaning up oil spills to fill a need acknowledged by all cognizant groups. Primarily due to the problems of credibility, I believe no government agency, no oil company, no manufacturer of clean-up equipment could singly carry out, or sponsor, the required research. Conflicts of interest, excessive costs and accusations of bias could be expected, independent of the quality of the results. Clearly, this was an opportunity for Sea Grant to help. Through our Advisory Service and the Sea Grant network, MIT Sea Grant brought together representatives of all interested parties and undertook a research program that is currently being supported by Sea Grant, by the U.S. Navy, the U.S. Coast Guard, the Spill Control Association of America, a manufacturer of oil spill clean-up equipment, an oil company, the Commonwealth of Massachusetts, and the Henry L. and Grace Doherty Charitable Foundation Incorporated.

Participation in this study is not limited to financial support but includes important direct participation, i.e. "in-kind" support. The research team includes industry professionals as well as faculty and students from several MIT departments. An advisory committee comprised of oil company representatives, manufacturers of oil spill clean-up equipment, environmentalists, and interested government agencies meets bimonthly to review, critique, challenge the work in progress.

The results of this research will, we believe, be an important contribution to improving control of oil spills in the most economical manner. Equally important, since many of the interested parties have worked together on gathering information and data for an analytical computer model which is being developed, the integrity or bias of the research results is not likely to be challenged. The important technical contributions and practical experience offered by industry representatives and representatives of government agencies assure that the research results are practical as well as being academically sound.

One of the components of MIT's advisory service is the Marine Industry Advisory Service Collegium, consisting of 100 large and small U.S. companies and eight government agencies. These are routinely surveyed to identify priority marine research needs of a broad spectrum of the industry. One such survey identified a major concern for new mechanisms and techniques for safely carrying out work beneath the sea. In response to this need we now have an ocean engineering theme on unmanned underwater work systems. The project efforts at MIT include work on new techniques for underwater communications and design of semi-autonomous, "semi-intelligent" underwater work systems that can be controlled by operators working on the surface.

The interdisciplinary nature of this problem is reflected in the composition of the MIT research team which includes members of the Ocean Engineering and Naval Architecture Department (vehicle design), the Mechanical Engineering Department (computer control of manipulator systems), the Astro and Aeronautics Department (vehicle control systems), and the Electrical Engineering and Computer Science Department (communication systems). One of the special features of Sea Grant, is its ability to bring together such interdisciplinary teams within universities to work on problems identified by diverse industry and government groups.

Work on unmanned underwater work systems is being pursued independently and cooperatively by the Sea Grant Programs at MIT and the University of New Hampshire. Each has funding from several government agencies, Sea Grant, and industry partners. This work is truly pushing the frontiers of technical knowledge, in high risk areas that no one company is willing to invest in alone until certain fundamentals have been proven.

In addition to the research at MIT, our Industry Advisory Service hosts annual meetings which provide for exchange of ideas and needs among academic researchers, manufacturers of manned and unmanned submersibles, offshore oil industry operators, and cognizant government agency representatives. The level and diversity of interest in this work is indicated by the attendance of 75 people at a recent workshop jointly sponsored by MIT and the Naval Oceans Systems Center at San Diego. The 75 attendees represented 26 companies, 5 universities, 5 government organizations, and 3 not-for-profit research groups.

Without a doubt, one of the most important benefits of projects such as those mentioned above is that the student researchers are actively working on practical, "real world" problems. The students see their education in action and gain experience that will be invaluable in their future industry, government or academic careers.

Sea Grant Education Benefits

While the networking facet of Sea Grant and the Program's advisory services speed the delivery of research to an ever growing array of marine industries and government groups, there is an even more important vehicle of information dissemination and technology transfer that may not be fully recognized. It is the force of students leaving Sea Grant universities every year to work in fisheries, marine sciences, coastal and offshore engineering, urban and port planning, ship design, government and communications. Last year 739 graduate students were directly supported by Sea Grant funds, and another 918 were involved with Sea Grant research and program activities nationwide. Thus a total of 1657 graduate students benefited from the Sea Grant experience in 1980. Of these, 375 finished their studies and entered professional life.

With the help of Sea Grant, these young men and women participated in applied research in which they were able to combine youthful energy and classroom knowledge with realities of business and hard decision making, realities such as cost, safety and regulation. Time and time again the members of MIT's Sea Grant Marine Industry Collegium have pointed to the great value of Sea Grant's support for student involvement in applied research projects. From an employer's point of view, there are two significant benefits in hiring "Sea Grant graduates"--their past experience in "real world research" helps them to contribute quickly; and because they have been involved in high risk, long-term projects that push the state-of-the-art, they bring to their jobs new ideas and innovative technology.

During the past ten years, MIT Sea Grant has supported over 250 graduate students, many of whom have kept in touch with us. In preparing for our upcoming Program Review and Site Visit by the NOAA Office of Sea Grant, I recently contacted some of them. Some are still in the marine field; some are not. However, all credit their Sea Grant experience with giving special meaning to their education and a special sense of understanding the importance of marine issues.

Here is part of a letter from a young man who was a Sea Grant graduate student, then a faculty member and Sea Grant researcher who helped prepare the MIT Georges Bank Petroleum Study. This study has been an important instrument in helping to resolve some of the conflicts of New England offshore oil development. He is now in private industry.

> "The Sea Grant Program brings a healthy breath of reality to the university. It lets problems, conflicts, and controversies come to a neutral corner for definition, analysis, and debate. In doing so, it brings a vitality to the education of students and a focus to the research of faculty. Very few academic problems have the mix of theoretical, experimental, judgmental, and political issues found in ocean mining, offshore petroleum development, fisheries management, waste disposal and marine transportation. Conflicts between economic interests and environmental interests abound. Opportunities for innovation as well as pragmatic design exist in every problem.
>
> Sea Grant provides an objective source of funds. The proposal review process ensures both the quality and the applicability of the work

that is done. In the areas where I was supported by Sea Grant--offshore petroleum development, ocean mining, and marine transportation--the traditional funding souces were either proponents or opponents. Sea Grant was the only funding source that valued analysis more than rhetoric. Sea Grant research and forums provided a common ground where proponents and opponents of a particular ocean use could meet.

In my own experience, Sea Grant funded research provided much of the employment that let me pay for my PhD. Sea Grant funded courses exposed me to a diversity of technologies and people. Today, as a Vice President and Division Manager of a New York Stock Exchange company, I know that my Sea Grant exposure was valuable preparation for any career."

Another ex-student, now a professor in a Massachusetts college, told us:

"Sea Grant provided me with an intellectual home where none other existed. The effect of Sea Grant on my life was more than beneficial; it was instrumental in my career choice. As a member of the Interdisciplinary Systems Design Course, I changed from electrical engineering to environmental research and policy. Sea Grant helped deepen that commitment with support for writing the research results from that course into the MIT Press book, Shoreline for the Public: A Handbook of Social, Economic and Legal Considerations Regarding Public Recreational Use of the Nation's Coastal Shoreline.

Sea Grant's support helped many students; the program was a constructive force that helped to build bridges within the Institute and to transcend the boundaries of departments and disciplines. More than you probably know, that force has a multiplier effect. Today, I am trying to stimulate the same process that allowed me the flexibility and initiative to enter a new field using a multiciplity of resources in the community and at MIT. I am hoping the tree you helped to plant will sprout new branches to support some of my own students."

An outstanding example of another facet of education has been our efforts to develop and introduce new marine related materials into pre-college, kindergarten to twelfth grade, curricula. The objective of this work is to help create a more "marine literate" society through a better

understanding of the role of water and the oceans in our lives. Working with the public school teachers of the New Bedford School System and their very successful summer "Sea Lab" operation, MIT Sea Grant has aided the production of five special leading modules. These are now being independently evaluated for final approval and general distribution.

It would be almost impossible for me to emphasize enough my strong belief that today's young people are the most important resource we have in the world, and Sea Grant graduates are the Program's most important product. I would argue strenuously that government support for training and education through the Sea Grant research will help the U.S. to develop critical resources with innovative technology and a sound respect for the environment. Graduate student research is the biggest economic bargain and the best long term investment available today. It is, I believe, a sound and necessary investment in the education of our nation's future leaders in the marine field: the developers, the researchers, the regulators and the administrators.

Summary

In summary Mr. Chairman, I note that it has taken almost 15 years to build this Program into the effective, productive national organization that exists today. I believe there is no federal program except Sea Grant that operates with as little federal bureaucracy, that so leverages the federal dollars through matching funds, or that has the reserve of scientific and technological expertise readily available to respond to marine research needs. If the momentum of building this program is lost, or even significantly reduced, it will take years to recover. The valuable research and services that now increase the earnings of businesses, industries and individuals working in the marine field will be lost with radical reductions in the Program.

By every measure I can think of, the National Sea Grant Program is a positive force toward regaining, our Nation's economic strength. In the light of Sea Grant's record of performance, the stated goals of the Sea Grant Act, and the increasing need for the United States to develop and utilize our marine resources, it is essential that the Sea Grant Program, the working partnership of government, industry and university, be continued. The weight

of evidence clearly speaks in support of such action because the National Sea Grant Program:

- helps industry and business,
- creates jobs through economic development of marine resources,
- addresses national issues of national importance,
- provides a civil focus to ocean engineeing,
- leverages the federal investment through matching funds
- educates and trains future leaders in the marine field,
- directs applied research toward identified needs, and
- disseminates research results to users through the National Sea Grant network.

Mr. Chairman and members of the Sub-Committee this has been a rather lengthy overview. I could go on with many more examples and in much more detail. I have tried to describe some of the unique or special features of the National Sea Grant College Program, in an effort to demonstrate the value of Sea Grant to the Nation.

I want to thank each of you and the entire Congress for the creation of the National Sea Grant College Program and for sustaining this national asset to date. I am pleading now for your continued support so that the Program can achieve its full potential for success.

Mr. Chairman, I thank you for your time and this opportunity. I will be pleased to respond to the Committee's questions.

TESTIMONY ON THE NATIONAL SEA GRANT PROGRAM TO THE SUBCOMMITTEE ON OCEANOGRAPHY HOUSE MERCHANT MARINE AND FISHERIES COMMITTEE

Stanley R. Murphy, Director, Applied Physics Laboratory
and Washington Sea Grant, University of Washington

It is my pleasure to testify on behalf of the national Sea Grant program before the Subcommittee on Oceanography, House Committee on Merchant Marine and Fisheries.

I have been Director of the Sea Grant program at the University of Washington since 1968. However, for the past year, my principal job has been Director of the Applied Physics Laboratory at the University. This laboratory, established in 1943, has been highly effective in the development of innovative marine systems for naval underwater weapon applications. We also do research and development in the application of undersea technology to marine resource development for a diverse set of additional sponsors, both public and private. The current laboratory budget exceeds $12 million per year.

In its relatively brief existence, Sea Grant has a great many accomplishments to its credit, but rather than recite accomplishments I would like to direct my remarks to one outstanding aspect of the program. One of my major concerns as director of an R&D laboratory and as director of a local Sea Grant program has been nurturing the innovative process. How do we stimulate new and worthy ideas? What are the most effective ways to evaluate new techniques? How do we enhance the probability that the sponsor (i.e., the customer) can fully utilize our new products?

In my work with the Navy and other sponsors, I am impressed with how well Sea Grant has addressed these questions. Through its advisory services and because of the one-third matching requirement, the customer has become an active partner in the development of effective research and education activities. This user-university partnership has not only spawned new ideas that are the product of academic theory and marketplace practicality, but also has facilitated the evaluation of these ideas in the field. The effectiveness of this partnership is amply demonstrated by the numerous documented examples from local Sea Grant programs in the coastal and Great Lakes states.

Although it is clear that Sea Grant has been effective within each state, its national contribution is seldom understood. The network of Sea Grant institutions is a national resource. Through the sharing of information and direct assistance among the state programs, many techniques that have been developed and demonstrated in one state have been shown to apply in other states. Evidence of this process is substantial in recent years as more local projects have reached appropriate maturity. The importance of this process of local innovation as an efficient means for the field trial of solutions to nation-wide

problems cannot be over emphasized. Too frequently, large-scale national programs fail to achieve intended results, but failure is only evident after large commitments of time and money to establish administrative offices throughout the country.

In order to illustrate the foregoing statements, I would like to describe two examples from the Washington program. The first of these is the development of acoustic techniques to determine the size of fish stocks. The problem is simple. The more accurate the estimation of the size of a fish stock, the greater the current harvest can be without risk of endangering reproduction. Traditional methods, using nets, are subject to high uncertainty and are inefficient.

In 1968 we began research, funded by Sea Grant, on the use of underwater sound to determine the number of fish in a volume of the ocean. Faculty and students from Fisheries, Engineering and Oceanography developed special equipment based on Navy sonar techniques available at the Applied Physics Laboratory. It is interesting to note that these techniques have recently led to an improvement of Navy sonar systems using the knowledge gained by Sea Grant. As research progressed, cooperative projects were developed with many users, including the National Marine Fisheries Service, the state fisheries agencies in Washington and Alaska, power companies in California, utility districts in Washington, and several Indian tribes in Washington.

Today these hydroacoustic techniques are used as the primary means of assessing stocks of pollock in the Gulf of Alaska and the Bering Sea, whiting and widow rockfish in Washington and Oregon, and herring in southeast Alaska and Puget Sound. The ex-vessel value of these stocks is $278 million annually. The total federal Sea Grant investment in the development of these techniques over the past 12 years is about $1 million. Application of these techniques to herring alone has resulted in an increase of $0.5 million to $2.5 million annually in the allowable harvest.

The successful development of hydroacoustic techniques and their application to fish stock assessment demonstrates the importance of core federal Sea Grant support. There is no way in which this work could have been accomplished without the core support needed to identify the opportunity, develop equipment, demonstrate its utility, and train people to conduct surveys and interpret the results.

As the second example, in December 1975 Washington Sea Grant was asked by the Pacific Seafood Processors Association to review the technical and economic analyses underlying proposed regulations for the treatment of waste water in the seafood processing industry. A cursory examination of the statistical confidence limits of the regulations indicated an inconsistency which we were able to identify as an error in one of the Environmental Protection Agency's mathematical formulae.

Concurrently, reviews of the EPA's economic documents revealed numerous, significant flaws in their economic analyses. These were examined in detail and submitted to the EPA in August, 1976. On February 17, 1977, the EPA withdrew the proposed 1983 regulations for the Alaskan seafood processing industry.

Our review of the EPA methodology was also submitted in a brief filed by the seafood processors and heard by the Ninth Circuit Court of Appeals in April, 1977. The Court's opinion, dated February 4, 1980, was that "the petitioner's objections to the Agency's methodology are sufficiently well taken so that the agency should reconsider such matters..."

In October, 1980 the regulations coordinator for Marine Fisheries Service asked our office to coordinate a review of the economic impact of technology proposed for the U.S. seafood industry. This effort, which examined northwest salmon, Gulf shrimp, mechanically-processed blue crab, and Maine sardines, found significant deficiencies in the EPA analytical methodology.

At the present time our office, in conjunction with the National Fisheries Institute, Pennsylvania State University and the National Marine Fisheries Service, is proposing to develop an appropriate methodology for economic impact studies with the objective of assisting the EPA to improve the quality of their analyses. Without the kind of talent traditionally attracted by Sea Grant programs, it would have been impossible to initiate this important effort. Without the Sea Grant network, the benefits could not have been extended nationally.

The two examples also illustrate the time it takes to reduce a good idea to practical use. Hydroacoustics, involving the development of complex hardware and software systems, took 10 years before routine applications by fishery management agencies were possible. The economic analysis of fishery waste disposal, although technically simpler, has taken more than five years to achieve national application.

Given this kind of time scale, it is surprising that Sea Grant, after only 12 years, has made significant national impacts.

In my new role as Applied Physics Laboratory director, I have been struck by this fact: in the system of federally supported research laboratories, the Applied Physics Laboratory is relatively small, yet its annual budget is 30% of the National Sea Grant budget. Under the circumstances the recognized successes of the Sea Grant program can only be the result of efficiency in innovation and the dedication of those associated with it.

If the Sea Grant budget is cut, the loss will far exceed the modest savings. Further, such action would be counter to the need to support the development of the nation's marine resources.

March 25, 1981

Statement of

B. J. Copeland

Director, Sea Grant Program

North Carolina State University

Before the

Oceanography Subcommittee

of the

House Merchant Marine and Fisheries Committee

March 30, 1981

SUMMARY

The following testimony is in support of the request that Federal funding for the National Sea Grant Program be continued in 1982 and beyond, and that our commitment to invest in our future through marine-related research, teaching and advisory services in the universities be maintained.

Several generations ago, our land grant colleges began to lay the foundation of modern American agriculture. Now, with the National Sea Grant program, we are building the same powerful initiative for the development of our marine and coastal resources. We are still young, but our successes are great. And, in this generation and the next, as the world turns to the sea for food, energy and minerals, Sea Grant will nurture our growth in the same way land grant universities have nurtured, through research and extension, the flowering of agriculture.

Fortunately, Sea Grant is essentially free of bureaucratic waste. Practically all of the manpower is devoted to research and to the direct delivery of services to people and industry. For this reason, the relationship of costs to benefits in our program is superb. In fact, partial gross revenues and savings on an annual basis Sea Grant work matched the entire federal expenditure for Sea Grant over the whole thirteen-year span of our existence.

As we have experienced in North Carolina, examples of economic pay-offs are abundant: A $125,000 investment in Sea Grant research and advisory activities has produced an improved septic system for coastal homes. The new systems allowed made possible $4 million in new buildings in North Carolina in one year, and the new systems are already solving similar problems in Georgia and Texas. Even the stubborn problems of water pollution and coastal erosion are diminishing, thanks to Sea Grant research. Applying the results of a Sea Grant project, one subdivision planted grasses along its shoreline and saved their homes and $80,000 a year in property losses to erosion.

Many times, Sea Grant has provided the know-how that enabled the creation of whole industries. The North Carolina Division of Marine Fisheries credits us with starting a $1 million-a-year eel-fishing industry in the state. Dune-grass nurseries and boat-insulation makers are two more examples of the new industries made possible by technology discovered and extended by Sea Grant.

But most importantly, this economic growth has occurred in one of our most economically depressed regions. Traditionally, coastal communities have been ridden with outmoded industries and menial or unreliable employment. Since 1972, North Carolina Sea Grant has helped 83 seafood handlers and processors expand their plants and improve sanitation and working conditions. The expansion is valued at $6 million and untold jobs have been saved or created. Members of minority groups and women have especially benefitted from these improved conditions.

Without such support from research and advisory services, many of these coastal industries could not remain competitive in world and national markets. This is especially true among the commercial fisheries. Fisheries harvest a wild resource, and are not governed by the same economic principles that affect the health and productivity of other industries. This is one clear case in which the private sector cannot be expected to step in and fill the breach. These wild fish are a common-property resource, and businesses cannot own their supplies. There is little or no incentive to invest in research.

The importance of government support for fisheries is taken for granted in other industrialized nations, especially in the Soviet Union and Japan. These nations back their fleets with research, education and on-the-job training, with

expenditures that long ago outstripped our own. If our fisheries are to survive in the marketplace, we must offer them the same kind of support. Sea Grant is the one organization in this country that provides all three components of that support, and it does so very successfully.

Sea Grant research, education and advisory services have introduced new gear--hydraulic net and pot-pullers, for example--which has increased fishing efficiency, safety and incomes. We estimate that about $25,000 in Sea Grant investment has made possible a $6.5 million-per-year gross increase in fishing income. A Sea Grant log book pinpointing underwater obstructions along the East Coast has saved fishermen and the government at least $600,000 a year in damages to fishing nets and gear. This is the sort of research and extension that works for entire regions and nationwide.

There is little way industries like commercial fisheries can provide this kind of comprehensive support for themselves. Sea Grant efforts have opened up diverse new markets for regional products, improved business practices and strengthened the entire economic base of all coastal regions. Through education, workshops and publications, Sea Grant extends the facts that protect coastal properties from storms, conserve wildlife and promote safe recreation along the beaches. The cost of providing this information is very small compared to the demonstrated improvements in the quality of coastal life.

Certainly, state and local agencies and institutions are sources of help for building on our coastal resources. But these groups frequently have a scope that is local. Sea Grant is designed to bring to bear the strengths of the university, the state, the region and the nation--even the world. In this, we are

unique. This is crucial, since the biggest tasks before us will demand a unity of effort transcending any one level of endeavor. We are just beginning to develop our offshore oil, gas and mineral reserves. Energy, especially, will focus our attention on the sea. And aquaculture, the farming of aquatic fish and underwater plants, could become a primary source of excellent food in this country. Sea Grant research in aquaculture is already underway, education has begun, and a world-class industry is poised and ready for the right guidance to begin.

Sea Grant has proven it can provide that guidance. We avoid many of the problems that have plagued research efforts in the past. Because of our unique objectivity, we can provide facts without creating polarization between government and industry. And, because we embrace all three components at once--research, education and advisory service--we also avoid the long delays between the findings of research and their application to real problems.

President Reagan said in his address to you that it is his desire to cut from our government the things that government does not do well, and to leave things it <u>does</u> do well. Clearly, the research, advisory service and education that Sea Grant provides is done exceedingly well. Indeed, there is no better way to get the job done.

STATEMENT
by
DR. JACK R. VAN LOPIK
DEAN
CENTER FOR WETLAND RESOURCES
LOUISIANA STATE UNIVERSITY
and
DIRECTOR
LOUISIANA SEA GRANT COLLEGE PROGRAM

before the
SUBCOMMITTEE ON OCEANOGRAPHY
of the
COMMITTEE ON MERCHANT MARINE AND FISHERIES
U.S. HOUSE OF REPRESENTATIVES

HEARINGS
on the
NATIONAL SEA GRANT PROGRAM

March 30, 1981

Mr. Chairman, members of the subcommittee, my name is Jack R. Van Lopik. I am Dean of the Center for Wetland Resources at Louisiana State University and also serve as Director of the Louisiana Sea Grant College Program. I have directed the Louisiana program since its inception in 1968 and appreciate the opportunity to appear before this Subcommittee to comment on Sea Grant activities. Prior to my affiliation with LSU I was employed by the U.S. Army Corps of Engineers for 7 years and subsequently by a private industrial firm for a similar period of time. My comments do not solely express an academic viewpoint, but reflect experience in the federal government and appreciation of the needs and motivations of private industry.

This brief statement focusses on the national significance of the Sea Grant Program. Although prepared primarily from a Louisiana perspective, the material typifies that which could be developed for each of the states fringing the Gulf of Mexico.

First of all, I must express full concurrence with and support of Senator Pell's statements in the March 10, 1981, issue of the Congressional Record. Senator Pell stressed that the Sea Grant Program is a partnership between the federal government and state and local interests--with each paying a share of the costs. Such a partnership was clearly intended by the Congress and fully comprehended by the states in developing Sea Grant activities. In testimony given before this subcommittee on October 4, 1977, I indicated that the concept was a key attribute of the program and stated, "The cooperative or partnership arrangement of the federal government with the states and

universities is another important consideration in the Sea Grant activities. This partnership cannot be maintained or enhanced if decisions are made at the federal level and forced upon the state and local programs. The partnership concept must be implicit throughout program development and implementation phases." Such action is necessary to assure that the program fulfills its clear mandate to address state and national issues of critical concern. Many individual marine-related problems facing a state are inherently national problems. In other cases, aggregation of problems occurring in several states clearly define a national issue. In still other instances a national need may be identified at the federal level and expertise and resources provided by parts of the Sea Grant network to address the subject. Most state Sea Grant programs include a mixture of activities that address various elements in this spectrum of national issues. The need for, and vital nature of, the state/federal partnership is obvious to anyone involved in or familiar with the Sea Grant Program.

For example, it is evident that the development of the only deep water facility in the United States capable of handling supertankers is an essential part of a national energy program. The fact that it is being built off Louisiana does not make it less of a national asset and Sea Grant played a major role in assuring its expeditious and environmentally safe development. Our early and continuing involvement with Louisiana Offshore Oil Port Inc. (LOOP), The Louisiana Offshore Terminal Authority (LOTA) and the Louisiana Department of Wildlife and Fisheries in conducting environmental assessments and developing monitoring programs has demonstrated a commitment to environmental protection during all phases of project construction and operation. As a result, there have been no court dictated delays in project schedules because of environmental concerns or perceived impacts. This 700-million-dollar terminal and pipeline system should handle a minimum of 200,000 barrels of crude oil per day in May--and capacity should increase to more than 600,000 barrels per day by September.

The recent tremendous increase in interest in the Lower Mississippi River between Baton Rouge and the Gulf is directly related to the river's potential for transporting large volumes of coal. The possibility of significantly reducing the U.S. balance of trade deficit through increased coal export will depend to a large measure on having adequate port facilities and channel depths on our Atlantic and Gulf coasts. Large bulk carriers drawing 50' of water must be accommodated. Maintaining a 55' channel from Baton Rouge to the Gulf of Mexico will require continued dredging at the mouth and at a dozen upstream river crossings. This activity will present environmental problems in areas such as dredged spoil disposal, ocean dumping, upriver salinity intrusion and wetland rejuvenation through freshwater diversion. We are exploring these problems with administrators of the Port of New Orleans and would hope to identify trade-offs, important mitigation options and operational procedures that would allow channel deepening if the national interest so dictates. We believe these issues must be addressed even if the so-called "fast track" legislation called for in the Senate port bill is adopted. In a related activity we are presently completing a comprehensive study

of the New Orleans Vessel Traffic System. This work is being financed by the U.S. Coast Guard and is handled as a grant through the Sea Grant Program. Increasing coal transport on the Lower Mississippi River would exacerbate existing vessel traffic problems. Obviously, careful attention must be given both environmental and vessel traffic problems on the river if the goal of greatly increasing coal export is to be achieved. Here again a national need is being addressed and federal support and involvement is essential.

Fish and fish products imported into this country account for a 2-billion-dollar annual trade deficit. It is a recognized national goal to increase the efficiency and productivity of the U.S. fishery industry --and in so doing reduce trade deficits and increase employment. Relevant scientific and technical knowledge, and effective employment of this knowledge, is required to address these issues. Louisiana ranks number one in tonnage of annual fish landings. Each year more than a billion pounds of fish are landed in Louisiana. The state also contains more acreage of coastal wetlands than the entire Atlantic seaboard. This wetland and estuarine area is a vital nursery zone and habitat for the production of many of the commercially important fisheries species. In view of these facts, it is natural that Sea Grant in Louisiana should respond very positively to the fishery needs of the state and the nation. We have worked closely with the Gulf of Mexico Fisheries Management Council in developing a shrimp management plan. Our economists, attorneys and extension agents have worked with shrimpers and other fishermen in the state to address many of the economic problems presently confronting them. All of this effort is aimed at maintaining a viable fishery industry with associated economic benefit to the nation.

One or two activities of more local interest should also be mentioned. Sea Grant played a major role in salvaging the baby green turtle industry in Louisiana. Problems associated with salmonella contamination of these turtles--and resulting FDA regulations--prevented their sale as pets in the U.S. market. A million-dollar state industry was almost destroyed. Sea Grant development of egg processing techniques that effectively eliminate salmonella contamination permitted re-establishment of the industry. It now provides more than 2-million-dollars a year in income for turtle farmers in Louisiana.

Sea Grant support of research and extension service in crawfish aquaculture has significantly aided the growth of this industry. Pond acreage in the state has increased from 12,000 acres in 1969 to 62,000 acres in 1980 with associated increased income to crawfish farmers of $8,500,000 per year.

The purpose of the preceding examples is to provide appreciation of the national interest inherent in most Sea Grant programs and the need for a continued partnership between the federal government, states and universities in developing Sea Grant activities. Federal support and involvement also facilitates more effective communication among Sea Grant network participants. Such communication is often essential in effectively addressing national and local problems. For example, we at LSU are working with researchers at Oregon State University and the University of Maryland in addressing problems related to Vibrio cholerae

in seafoods. We have cooperated with Texas A&M University in developing "hang" charts, i.e., charts locating bottom obstructions that can destroy fishing gear. This work has been utilized in developing both state and federal legislation to provide compensation for such gear loss. We are working with the University of Hawaii in examining the economic feasibility of raising bull frogs in that state. We have cooperated with MIT in holding industrial research collegia. All of these activities are aimed at providing the technical knowledge required for developing or increasing productivity of selected industries.

The proposed federal budget cuts would severely impact and reduce our ability to conduct programs of this type in Louisiana. The program presently receives approximately 1.2 million dollars annually in federal funds and, as required by law, one-half of this amount in additional state matching funds. In the past, the Louisiana Legislature has provided "hard cash" appropriations to meet matching requirements. Assuming retention of all state monies for program support, the loss of federal funds would have a major and disproportionate impact on research activities. This is true because most advisory/extension agents and specialists receive full-position support from Sea Grant; whereas, most principal investigators directing research projects are appointed on a more vulnerable percentage basis--ranging from 25 to 75 per cent. Furthermore, most of our research activities have been designed to address national issues and needs identified by extension agents through contact with resource managers, businessmen and other citizens with marine interests. Without the research efforts required to feed the system, it would become increasingly difficult to provide effective advisory and extension services. Research funds that might be sought from other federal or state agencies--which will apparently be under similar budgetary constraints--cannot meet this need because of the mission-oriented nature and goals of such research. It is also doubtful that the State of Louisiana would opt to provide full support for the program because (1) there is reluctance to expend state funds to solve problems that are primarily of national concern, (2) the concept of a federal/state partnership is fundamental to the existing program, (3) there is growing resistance to finance operational expenses with funds from non-recurring or decreasing revenue sources, e.g., oil and gas. Ironically, the termination of Sea Grant--and the associated loss of a cadre of marine-oriented researchers--is being proposed at a time when the need for coastal and estuarine research--in Louisiana and the nation--has never been greater.

During the past decade there has been increasing awareness of coastal and marine affairs. This is reflected in national concern with such issues as Law of the Sea, deep seabed mining, marine and estuarine sanctuaries, Outer Continental Shelf energy development, deepwater port licensing, coastal zone management, fisheries conservation and management, marine pollution and marine mammal protection. Legislation relating to these issues has had and will have major impact on individuals, industries and governments at the state and local level. It is, however, apparent that the present capabilities of marine science and technology are inadequate to effectively address many of the marine related problems facing Louisiana and the nation. Furthermore, it is obvious that citizens must become better informed regarding marine concepts and problems. The

National Sea Grant College Program addresses vital aspects of relevant research, advisory and educational needs. In such efforts, appropriate recognition must be given the undergirding nature of basic research in the solution of practical problems as well as the roles of industry and government in defining and conducting research and educational programs. This is especially critical in creating a marine-literate citizenry through educational activities involving state agencies, universities, school boards and individual schools. In truth, increasing the knowledge base, the effective utilization of this knowledge and public comprehension are key elements in maintaining and increasing the productivity and economic viability of our marine and coastal industries. It is clearly in the national interest to nurture and effectively develop the federal/state partnership embodied in the National Sea Grant Program.

PROPOSED TESTIMONY BEFORE
THE SUBCOMMITTEE ON OCEANOGRAPHY
COMMITTEE ON MERCHANT MARINE AND FISHERIES
U.S. HOUSE OF REPRESENTATIVES

BY

JAMES J. SULLIVAN
DIRECTOR, CALIFORNIA SEA GRANT COLLEGE PROGRAM

Washington, D. C. March 30, 1981

Mr. Chairman and Members of the Committee:

I am Dr. James J. Sullivan, director of the California Sea Grant College Program which is administered by the University of California Institute of Marine Resources. I appreciate this opportunity to speak on behalf of the National Sea Grant College Program, which the Administration has recommended be eliminated during the coming fiscal year, and to be of assistance to the Committee.

Mr. Chairman, I would like to say at the outset that to eliminate the National Sea Grant College Program now would not only have immediate serious negative economic and social impacts but would also be counter to the national interest in the strategically important area of marine resource development. This is a strong statement but one that can be defended on the record of success Sea Grant has generated across the country over its short but highly productive life.

Before proceeding to this extensive record I believe it will be helpful if I provide some background for my comments.

The National Sea Grant College Program, as I understand it, has as its primary goal the accelerated development and wise use of the Nation's ocean and coastal resources. It is an action-oriented, interdisciplinary program, which seeks to link the nationwide efforts of universities, industries, and government in a new and cooperative fashion through application-oriented research activities, the professional and vocational training of man power, and the effective, prompt dissemination of research results. And, this approach to federal investment in marine research and development is unique among federal ocean programs.

When Congress enacted the Program in 1966, it initiated this experimental partnership among government, industry, and the nation's universities to develop marine resources for the benefit of society. This experiment was partly based on earlier and still successful experience with the Morrill Act of 1868, that created a network of Land Grant Colleges throughout the United States to develop the nation's agricultural resources.

It is now clear from the record that the Sea Grant experiment works and works well in coastal and Great Lakes states throughout the United States. We regularly see federal and state government, local and nationwide industries, and public as well as private universities cooperatively finding solutions to the pressing and complex problems confronting wise development and use of our nation's valuable and varied marine resources. For example, a recent survey of the Sea Grant coast-to-coast network identified quantifiable economic impacts to the nation, in terms of savings or earnings to local and nationwide industries, totalling $227 million in one year alone.

Several specific examples of the success of this partnership follow.

- The University of Alaska Sea Grant Program designed and conducted a program to improve effectiveness of native Alaskan fishermen in the commercial herring fishery. In the first year after the program started, fishermen's earnings increased by $1,055,000 from exporting this new product.

- The Oregon State University Sea Grant Program introduced to the shrimp processing industry improved techniques for handling and processing shrimp that reduces waste by increasing yield and saving energy. Shrimp processors nationally are adopting these new techniques and are realizing a direct annual return of $5,600,000.

• The University of Hawaii Sea Grant Program promoted research on and application of undersea technologies to develop a precious coral industry while husbanding rare stocks of coral. The industry grew from 50 employees and gross sales of $500,000 to 214 employees and gross sales of $7,800,000 - of which a large portion are to foreign tourist.

• The California Sea Grant College Program conducted research to design new fishing traps to increase the efficiency of the black cod fishery. In the year immediately following introduction of the new traps through the advisory service, commercial fishermen realized a ten-fold increase in earnings from domestic and foreign sales, from $70,000 to $700,000.

Mr. Chairman: now let me turn to some of the nuts and bolts of this impressive record of success. Sea Grant has built a nationwide network of University based programs to take advantage of the three-fold purpose of a university: to conduct research, to provide education, and to perform public service. Through Sea Grant the federal government provides the incentive for state and local government as well as industry to contribute matching funds for research and advisory services that have local and regional impacts. But it also and very importantly, provides the means by which state based university researchers can work on marine resource development problems of national, even international, significance in cooperation with colleagues at other universities, thus avoiding costly duplication of effort. It has, as direct testimony today from a few of Sea Grant's beneficiaries demonstrates, supports meaningful research whose results find relatively rapid application in the larger community -- by industry, by consumers, and by the public at large.

And, perhaps Sea Grant's greatest strength lies in its decentralized administrative structure in which program direction and day-to-day administration are carried out by small administrative units in contrast to large federal bureaucracies. Yet, because the Sea Grant Program is an element of the federal government, the opportunity and responsibility exist for national networking among university researchers throughout the U.S. to address national needs.

For example, in California, Sea Grant is supporting research, in cooperation with the seafood processing industry, to extend the storagability of fresh seafood products through the use of modified atmospheres. The TransFresh Corporation realized savings of $454,000 by using modified atmospheres in a refrigerated (not frozen) shipment of two million pounds of salmon from Anchorage, Alaska, to Seattle, Washington. This technology, as you have heard today in other testimony, can be applied by seafood distributors throughout the United States. And, as you have heard here today, this technology is also now used in Tennessee.

- Another specific use is the University of Washington's successful application of accoustic techniques for more accurately estimating fish populations for the Pacific herring industry. The data gathered have been used by the Pacific Regional Fishery Management Council to increase harvesting productivity while guarding against overfishing. This led to an increase in the allowable harvest of Pacific herring, resulting in an annual landed value of $1,500,000. The techniques can be adapted for application to other fisheries in other regions to realize the same benefits.

• Another solid case in point is the interdisciplinary research effort in marine pharmacology involving researchers from three different University of California campuses,other universities across the country, and several industrial collaborators. The testimony submitted by Dr. Peter Orahovats of Bristol Meyers Products reveals the wide geographic network and the benefits that are accruing nationally because of this program.

Mr. Chairman: often national needs are met by working on aspects of those problems that have direct local impacts such as the port developments like Los Angeles, and Long Beach. More examples of the variety of positive impacts Sea Grant makes are contained in the document "Economic Effects of Sea Grant."

In addition to the national role played by the Sea Grant programs, regional marine resource needs are also directly addressed. For the Sea Grant sponsored programs in Hawaii, Alaska, Oregon, Washington and California, this means addressing marine resource needs in the region of the northern Pacific Ocean basin.

With federal support we have organized the Pacific Area Sea Grant Advisory Program (PASGAP) to identify regional needs, to coordinate planning acitivities and to stimulate application of new knowledge and research results into new products, new markets and a better understanding of the resources and their interaction.

A recent example is the Pacific Seaweed Aquaculture symposium under the leadership of Drs. Isabella Abbott (Stanford University), John West (University of California, Berkeley), and Roy Tsuda (University of Guam). The aim of the symposium was to draw together workers from universities and corporations who could pool information on growing and using seaweeds, particularly in the Pacific basin. It is in these tropical and subtropical geographic areas that many of the world's most useful seaweeds grow (e.g., various speices of Eucneuma). where local unemployment is high and new industry is desperately needed.

At the same time, this information has great potential value to US-based industry, as evidenced by the active participation in the symposium of researchers from Kelco Division of Merck, Marine Colloids Division of FMC, Research Division of Stauffer Chemical Co., Canadian Benthic Co., Ltd. and others. Needless to say, the commercial value, to say nothing of the recreational value, of Pacific seaweeds is significant. Follow-up activities to this symposium are in progress by local agencies and industries.

This year we will be holding a workshop on salmon smoltification in June. Sea Grant has sponsored research on smoltification, the process by which salmon adapt from freshwater to seawater. Recent research breakthroughs, a major one funded by Sea Grant at the University of California, Berkeley, have set the stage for an imminent possible two-fold increase in survival of salmon released from hatcheries. If this occurs, it could be of great recreational and commercial value internationally. Researchers from universities, federal, state government agencies and the new private salmon ranching industry from the USA, Canada, Japan, Norway, and elsewhere will attend this symposium.

Mr. Chairman: I think it will be good at this time to reiterate the opinion of many experts that we are just beginning to appreciate and realize the enormous resource potential of the sea and the importance of developing that potential. For example, by the year 2000, the following commodity deficiencies are indicated for the United States:

aluminum	copper	flourine	lead	niobium (columbium)
antimony	tungsten	uranium	magnesium	platinum
asbestos	cesium	germanium	tantalum	quartz crystal
barium	chromium	gold	mercury	tin
bismuth	cobalt	graphite	mica	sand and gravel
cadmium	dismond	indium	nickel	silver
				sulfur

In 1975, the National Academy of Science had this to say in its report "Mining in the Outer Continental Shelf and in the Deep Ocean":

"The development of marine resourses is important to the maintenance of the international economic and political balance and to support the standard of living in the United States. While it is probably not feasible or desirable for the United States to become self-sufficient for the basic mineral commodities, the Panel considers it prudent to develop adequate alternate sources of supply from the sea.

Estimates of apparent marine mineral resources have been developed by M. Cruickshank for dissolved, unconsolidated, and consolitated deposits. With the exception of asbestos, graphite, and quartz crystals, where data are available and deficiences have been predicted, alternative marine sources for the minerals exist and may exceed existing land resources (emphasis added). While few of these reserves have been positively identified at the present time, certain specific commodities have been found along the outer continental shelf and on the deep seabed. As marine mining and extractive technology are developed, it is believed that these apparent resources will become viable mineral sources."

Marine resources include vital minerals, energy sources, food sources, transportation means, and military aspects not to mention recreational and aesthetic values. All are of national interest and if Sea Grant did not exist we would have to create it to ensure the wise development of these strategic marine resources.

Mr. Chairman: I would now like to turn to the matter of federal investment in people. In addition to the technology transfer function performed by the network of marine advisors and specialists, formal education and training is another way this function is performed.

It is in the area of professional and technical education and training that Sea Grant prepares for the future ocean uses and decisions that will become increasing important and difficult. And, it is precisely in this area that the universities make what is, perhaps, a unique contribution. The Committee has heard testimony from Dr. Robert Byrd, Vice President of Watt and Associates (Houston) regarding the value of this type of education to the development of competent U.S. human resources. Let me point out at this time, that many of our national leaders have recognized with concern the diminishing availability of highly competent professional engineers and scientists in the United States. This situation is of concern in marine resouce development as well as other areas. May I add that the California Sea Grant Program has supplied crucial support for the education and training of leaders through more than 400 graduate traineeships over the past eleven years. Dr. Byrd is a former Sea Grant trainee.

In conclusion Mr. Chairman I would like to quote from my program recent summary report "Using California's Marine Resources" which I am submitting for the record.

> In a time of declining terrestrial resources and of a growing national interest in development of domestic natural resources, Sea Grant's contribution has been significant. Its success thus far, during a relatively brief existence, can be attributed to the strong partnership it has forged among universities, industry

and government.

Sea Grant's contribution will continue to depend upon people with innovative ideas working together to convert those ideas into practical application in industry and government.

I would be happy to answer your questions.

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TESTIMONY SUBMITTED
TO THE
SUBCOMMITTEE ON OCEANOGRAPHY
MERCHANT MARINE AND FISHERIES COMMITTEE
U.S. HOUSE OF REPRESENTATIVES

MARCH 30, 1981

By
Robert W. Corell
Chairman of the Sea Grant Task Force
and
Director of Sea Grant and Marine Programs
University of New Hampshire

On Behalf of
The Marine Affairs Committee
of
The National Association of State Universities and Land-Grant Colleges
in conjunction with
The Sea Grant Association

Washington, D.C.

THE NATIONAL SEA GRANT COLLEGE PROGRAM

-A National Program For Solving Marine Resource Problems-

The National Sea Grant College Program is the only comprehensive research and development partnership linking the Federal Government, industry and universities which is designed to foster the development of our nation's marine resources. In twelve years, Sea Grant has effectively blended the capabilities of universities with the needs of our nation's industries and citizens. In so doing, it has become a significant National asset by focusing on:

- Economic development in the marine industrial sector.
- Methods and technologies to improve productivity and profits.
- Technology transfer to enhance industry, business and commerce.
- Objective clarification of government regulations and procedures.
- Industry's needs and demands for personnel trained and educated in marine related fields.

Today witnesses from several industries have outlined specific achievements in various aspects of marine resource development and utilization. Several Sea Grant Program Directors have outlined the character and substance of the Sea Grant Program after twelve years of careful development. My purpose in appearing before you today is to (1) describe the economic context within which Sea Grant functions in the United States; (2) to provide an overview of specific accomplishments and impacts the Sea Grant College Program has had on this country; and (3) to outline the projected impacts of the Administration's budget recommendation to eliminate Federal support of Sea Grant.

The Industrial Context Within Which Sea Grant Functions

The economic development potential of the marine and coastal resources of the United States has attracted much attention in recent years. However, the magnitude of this economic activity within the coastal and ocean sectors only recently has been assessed (Science, Vol. 208, 30 May 1980). This analysis of the ocean economic sector in the National Income Accounting System (NIAS) places the ocean sector value at $30.6 billion in 1972 dollars which is comparable to agriculture ($35.4 billion), mining ($18.9 billion), construction ($58 billion), transportation ($46.2 billion), and communications ($29.4 billion). This NIAS assessment is based upon nine major industrial subsectors:

1. Commercial Fishing
   (Harvesting, processing, and aquaculture)
2. Marine Mining
   (Oil and gas, sand and gravel, and limestone)
3. Marine Construction
4. Manufacturing
   (Ship and boat building)
5. Marine transportation and communication
   (Shipping, cargo handling and warehousing, transportation services, and marine-related communications)
6. Marine-related Retail Trade
   (Marine-related merchandising and retailing)

7. Marine Financing, Insurance, and Real Estate
8. Marine Services
   (Hotels, marine recreation, educational services, museums, and marine organizations)
9. Public Administration--State and Local
   (Federal Government, ocean-related activities)

These data provided the first major overview of the oceans' economic importance. A more recent assessment of the magnitude of the private marine sector has been conducted by an ad hoc Sea Grant Task Force. Considering all aspects of fishing, marine-related manufacturing, marine transportation and marine-related tourism, industries of primary concern to Sea Grant, it was found that total sales exceeded $56 billion in 1978, employing over 1.4 million people (representing a payroll of over $11 billion. Further, Department of Commerce figures indicate that sales within these industries increased 21.4% from 1977 to 1978, with an increase of 8% in employment, for a productivity increase of 14% in sales or shipment per person.

It is important to understand the structure and characteristics of the industrial, business and commerce components of the ocean sector. A preliminary analysis suggests that most of the industries within the private marine sector are discrete, often small evolving units. (This does not include the oil and gas industry.) The commercial fishing industry, for example, is comprised mainly of small independent businesses.

The National Sea Grant Program functions within that context. Our marine resources development activities are focused within these industrial sectors.

Most observers agree that the commitment of universities and industry to research and extension was the key to Federal policy that so effectively encouraged the agricultural industry. In 1966, the Federal Government established a similar policy and structure for encouraging development of the ocean sector through the National Sea Grant College Program Act. Its intent is "to accelerate national development of marine resources, including their conservation, proper management, and maximum social and economic utilization." More specifically, the program was directed to "achieve the gainful use of marine resources" (Sec 202(d)) through a partnership between the Federal and State Governments, universities, and the private sector. The term "Sea Grant" was chosen to emphasize the agricultural parallel in meeting comtemporary national needs by developing the economic potential of our marine resources.

The importance of agricultural research and extension efforts is well recognized by the current administration who reversed cuts proposed by the previous administration. The Secretary of Agriculture cited the relationship between university research investment and agricultural productivity as the reason for such increases. The parallels in marine resource development conducted through Sea Grant are so obvious as to cause one to wonder why an administration so oriented toward increased productivity and private industrial development would seek to eliminate a program that in a few years has made such dramatic contributions to the enhancement and utilization of our nation's marine resources.

An Overview of Sea Grant's Accomplishments and Impacts

The testimony of other witnesses provides a broad range of Sea Grant accomplishments and impacts. I intend to summarize two recent analyses. One provides an overview of economic effects derived from Sea Grant; the other provides a statistical overview of the program. A National Sea Grant survey has provided data on research and extension activities that have had direct economic impacts on industry, business and commerce. This analysis is summarized in a report entitled "Economic Effects of Sea Grant" which is appended to this testimony. The report outlines the economic impacts from fifty-seven Sea Grant projects and documents their effects on industry, business, and commerce, using the major marine categories of the National Income Accounting System. The annual gross revenues and savings stimulated by those 57 efforts amounted to $227 million, divided as follows:

A.	Fish Harvesting	$ 36,552,000
B.	Seafood Processing and Marketing	16,500,000
C.	Aquaculture	21,752,000
D.	Marine Construction	126,896,000
E.	Marine Transportation	2,890,000
F.	Marine-Related Retail Trade	19,400,000
G.	Marine-Related Real Estate	2,196,000
H.	Marine Service Industry	813,000
	TOTAL	$226,999,000

Sixteen projects considered in the fish harvesting sector each provided an average annual effect of over $2 million, while projects in marine construction section had an average annual effect of over $30 million each. For example, one of the projects discussed in the report describes the development of new fisheries as a winter supplement for the seasonal Gulf coast shrimp fishery which now provides year-round employment and capital utilization for these fishermen. This single activity has had an identified economic impact of $2.6 million in one region alone.

All examples in the report have been documented, and are the direct result of federal-university partnerships, and the Federal contribution is the keystone. Because the majority of marine resources are in the public domain, and because many marine industries are independent and not closely connected, industry and state government funding is virtually impossible. This need for federal support through universities is even greater in view of the fact that the average total annual sales of these marine firms is about $900,000.

A second study entitled "Survey Data for the Assessment of the Institutional and Program impacts of the National Sea Grant College Program" contains the essential data and statistical information of the character of the Sea Grant College Program. A small part of the results of that survey is summarized below, providing actual figures for 1980 from 27 Sea Grant Programs:

I.	EDUCATION AND TRAINING ASPECTS OF SEA GRANT FOR 1980		
	A. Graduate students		
	1. supported	739	
	2. involved or directly impacted	918	
			1,657
	3. entering the workforce	795	
	B. Undergraduate students		
	1. supported	365	
	2. involved or directly impacted	2,889	
			3,254
	3. entering the workforce	142	
	C. K-12		
	1. children served	371,400	
	2. teachers served	44,172	
II.	INDUSTRIAL PEOPLE SERVED BY SEA GRANT IN 1980		
	A. Commercial fish harvesting	87,207	
	B. Commercial fish processing	61,250	
	C. Aquaculture	27,085	
	D. Marine mining	1,414	
	E. Marine construction	23,575	
	F. Marine manufacturing	3,446	
	G. Marine transportation	4,048	
	H. Marine retail trade	43,598	
	I. Marine financing	113,885	
	J. Marine services	195,637	
			562,145
III.	TECHNICAL INFORMATION PROVIDED BY SEA GRANT IN 1980		
	A. Research journal articles	497	
	B. Technical reports and pamphlets	960	
			1,457
	C. Requests for Sea Grant Publications	291,118	
	D. Regular recipients of publications	445,415	
	E. Patents, awarded or pending	16	

Impacts of the Proposed Elimination of Federal Support of Sea Grant

The critical question is whether the Sea Grant College Program as we know it now can continue without federal support. Based upon a survey of all Sea Grant Programs, the concensus is that Sea Grant as we know it today would disappear. A survey of 27 Programs indicates that only 8% of the Programs would probably survive without Federal support, while 68% indicated their Programs would not. These Programs also reviewed the prospects of obtaining immediate, alternative funding to maintain the Programs. Only 8% indicated it was "probable" that other funding sources could be found. The other programs indicated it is "remotely possible (29%), "highly unlikely (50%), and "no" (12%), that alternative funding would be available.

The impact on personnel within the Sea Grant Programs has been assessed, and the essential facts are summarized below:

- Number of Graduate Student Research Assistantships in Jeopardy.....725 (90% of those supported in FY 81 are in jeopardy)

- Number of Faculty Positions in Jeopardy.....200 (14% of all those involved in FY 81 are in jeopardy)

- Number of Professional and other Sea Grant Positions in Jeopardy...802 (45% of all those involved in FY 81 are in jeopardy)

Ultimately, the most important impact is that the hundreds of thousands of individuals, industries, and agencies now served by Sea Grant would not continue to benefit from the nationally important contributions of the Sea Grant Programs.

From another perspective, the federal-university partnership provides economic leverage within the program itself. For example, in 1980, the $37.5 million budget for the Sea Grant College Program generated a total of 61.0 million worth of research (50%), technology transfer (27%), and manpower training (11%). Using standard and acceptable economic multipliers, these activities themselves generated $68.3 million in personal income and 6,283 jobs. Obviously, these are in jeopardy with the proposed elimination of Federal support.

Conclusion

The federal-university partnership works, and documentation is available to prove that fact. The Sea Grant College Program is the most cost-effective marine resource program in the Nation, representing a public investment in technological innovation and increased productivity.

The value of the program to the nation has been well documented. The program has led to increases in annual business gross revenues and savings totalling $227 million. Sea Grant annually impacts some 376,000 students, 44,200 pre-college teachers and 562,000 individuals in industry and business. The program nationally answers some 290,000 individual requests for publications each year and distributes its publications on a regular basis to some 445,000 individuals and businesses.

The Federal Government's participation in this partnership is critical. The common property nature of the majority of the nation's marine resources and the structure of the United States industry involved in their development mandates that the Federal Government support the long-term research which is essential to the wise use, development, and conservation of those resources. Additionally, the Federal role insures research application on a nationwide basis and is a check against unwarranted duplication. It represents the basic thread linking the program into a nationwide network.

Twelve years of effort has resulted in the effective blending of the individual capabilities of the partners. The strength of this partnership is greater than the sum of its parts making the Sea Grant College Program a national asset to be fully utilized for national benfit.

Note: The Economic Effects of Sea Grant report is available by contacting:

Dr. John Kermond
NASULGC Room 710
1 Dupont Circle
Washington, D.C. 20036
202/293-7120