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Good morning, Chairman Gilchrest, members of the Subcommittee and staff. I am David Evans, Assistant Administrator for the Office of Oceanic and Atmospheric Research within the National Oceanic and Atmospheric Administration (NOAA). On behalf of Secretary of Commerce Don Evans, I am pleased to speak to you today about the National Sea Grant College Program (Sea Grant), a partnership between the Nation's universities and NOAA that began in 1966 pursuant to the National Sea Grant College and Program Act (P.L. 89-688). The Sea Grant program is made up of thirty Sea Grant college programs located in coastal and Great Lakes states and Puerto Rico that use the skills and resources of several hundred U.S. universities and scientific institutions to conduct marine research, education, and outreach activities.

Specifically, I have been asked to provide NOAA's views on two pieces of legislation: H.R. 1071, the National Sea Grant College Program Authorization Enhancement Act, and a draft reauthorization bill entitled the National Sea Grant College Program Act Amendments of 2001. H.R. 1071, introduced by Congressman Eni F. H. Faleomavaega and Rep. Abercrombie, would increase the authorization levels for the Sea Grant program to \$100 million annually starting in Fiscal Year 2002. The draft bill, in contrast, would increase authorization levels for Sea Grant to \$110 million in Fiscal Year 2004 and make other organizational changes. The current Sea Grant Program Act (P.L. 105-160), which expires in Fiscal Year 2003, authorizes \$67.8 million for Sea Grant in Fiscal Year 2002 and \$68.8 million in Fiscal Year 2003. The Administration has requested \$62.4 million for Sea Grant in Fiscal Year 2002, an increase over the Fiscal Year 2001 appropriation for this program.

The Administration has not yet undertaken a formal review of either H.R. 1071 or the draft reauthorization bill. We do, however, look forward to working with Congress on a reauthorization of the Sea Grant program that is consistent with the Administration's budgetary and policy goals. The Administration is interested in seeking reforms that will further promote merit-based competition and improve the effectiveness of the program.

The National Sea Grant College Program—History and Organization

Today, I would like to highlight some of the history and accomplishments of the Sea Grant Program and emphasize the critical role that Sea Grant plays in fostering a federal-state partnership for marine research and resource management. As I noted previously, the National Sea Grant Program was created in 1966 and was based on the concept of establishing a marine version of land grant colleges, which, through a combination of research and outreach activities, have played a key role in the development of modern agriculture. The Nation's experience with land grant colleges demonstrated that research, education and the ability to rapidly transfer new knowledge into public policy and economic gains are the keys to sustainable development and prosperity. Similarly, the thirty Sea Grant college programs bring research, outreach and educational expertise to promote the sustainable development of the Nation's marine and coastal resources. Sea Grant is also responsible for providing information to coastal and marine users on relevant research results that may have beneficial applications for coastal and marine enterprises. One recent example, among many, makes the point. A protective mesh for clams developed by Sea Grant research in the early 1990's has resulted, in less than a decade, in an increased yield valued today at almost \$40 million per year to the New England clam industry.

After NOAA was created in 1970, the Sea Grant program was transferred from the National Science Foundation to the new agency. University partnerships such as Sea Grant allow NOAA to respond to new problems without the costly maintenance of permanent Federal infrastructure. Sea Grant is NOAA's principal point of engagement with the university community on coastal and Great Lakes issues. NOAA's Sea Grant is a true federal-state partnership in which states are required to contribute matching funds on a 2:1 federal-state ratio before they can leverage federal appropriations for their Sea Grant program. This matching requirement allows NOAA's Sea Grant program to expand the reach of its efforts considerably. In addition, other federal and state agencies contribute funding to Sea Grant through cooperative partnerships.

In 1979 the Sea Grant Intern Program, renamed the Dean John A. Knauss Marine Policy Fellowship program in 1987, began. This program, also known as the Sea Grant Fellow program, provided a select group of graduate students with the opportunity to work for Congress or a federal agency on marine issues for one year. The Sea Grant Fellow program now has over 400 alumni, several of whom have gone on to serve Congress, including this Subcommittee, in key staff positions on both sides of the aisle.

In Fiscal Year 1997, the new Sea Grant Director, Dr. Ronald Baird, introduced a number of major management changes in Sea Grant that were designed to improve performance, responsiveness, and programmatic relevance. Dr. Baird's innovations included increasing local responsibility for decision making, institutionalizing a system of rigorous peer review of programs with an emphasis on research outcomes and streamlining the management infrastructure. These reforms have substantially strengthened the administration, responsiveness and relevance to management issues of Sea Grant programs nationwide. A recent example of Sea Grant's improved ability to respond with a multi-coordinated effort is its creation, along with NOAA's Coastal Services Center, of the HazNet web site at www.haznet.org. This site puts coastal hazard information at the fingertips of coastal managers and the public. It provides information about natural hazards and the current planning and research efforts of Sea Grant programs nationwide, NOAA, FEMA, and state and local community sources. The site provides

one-stop shopping for information on hurricanes, tomadoes, floods, coastal erosion, earthquakes, tsunamis, and volcanoes.

Another recent management reform is the introduction of national strategic investments, which have allowed NOAA to engage universities through nationwide focus on critical issues, yet maintain local and regional implementation. Sea Grant's programs in non-indigenous species, fish habitat, marine biotechnology, oyster disease, and mariculture are examples. This year (FY 2002) Sea Grant will establish a national effort to engage local decision makers in coastal areas on the topics of community development, land use planning, and hazard mitigation. Sea Grant's 1999 Hammer Award-winning program in seafood safety training and the national marina management effort are examples of other successful national programs.

Several studies of Sea Grant have noted its effectiveness. In 1994, the National Research Council found that Sea Grant has played a significant role in U.S. marine science, education and outreach. This study also pointed out some concerns and provided recommendations for improving program effectiveness. In a November 2000 study, entitled "A Mandate to Engage Coastal Users," a committee led by John Byrne of Oregon State University and the Kellogg Commission indicated Sea Grant has been effective in facilitating the Nation's sustainable development of coastal resources by helping citizens make better informed and wiser decisions. Twenty-two of the thirty Sea Grant Programs have undergone performance evaluations by teams of outside reviewers and Sea Grant peers, and sixteen were graded "excellent" in achieving significant results. A program was graded "excellent" if it produced significant results, connected Sea Grant with users, and was not found to need improvement in areas such as long-range planning and management.

Sea Grant educators work with NOAA's Marine Sanctuaries staff to deliver educational programs on key issues such as marine protected areas. Sea Grant conducts a major research effort focused on the importance of fish habitat to the productivity of U.S. marine fisheries, in support of the new habitat conservation provisions of the Magnuson-Stevens Act. NMFS and Sea Grant jointly fund a graduate fellowship program in population dynamics and marine resource economics, areas of critical shortage in the agency. Sea Grant and NMFS recently joined with other partners to conduct state-of-the-science symposiums on critical issues such as "Managing Recreational Fisheries," "Essential Fish Habitat," and "Fisheries in a Changing Climate." Sea Grant and NOS are working together on the innovative Nonpoint Education for Municipal Officials program that provides geographic information systems-based science information on watersheds and nonpoint source pollution to local policy makers. Sea Grant conducts with NOAA's Great Lakes Environmental Research Laboratory (GLERL) an extension program to get scientific information produced by GLERL scientists into the hands of users. NOAA's National Weather Service is teaming up with Sea Grant to help educate the public about the dangers of rip currents which account for 80 percent of beach rescues annually. Sea Grant is collaborating with NOAA's National Severe Storms Laboratory to test new advanced weather technology to deliver more accurate flood and flash flood warnings and mitigate damages.

NOAA must increasingly find creative ways to enhance its mission capability, and Sea Grant provides a unique way to engage the Nation's universities for this purpose. In short, I believe that the Sea Grant program has played and will continue to play a role in promoting research, education and outreach activities to marine and coastal users around the Nation.

The National Sea Grant College Program—Recent Accomplishments

The National Sea Grant Program has achieved considerable mission success in its thirty-five year history, and I want to highlight some examples of those accomplishments in the areas of marine aquaculture, aquatic nuisance species, coastal hazard reduction, commercial fisheries, education, marine biotechnology and seafood safety and quality.

Aquaculture

Louisiana Sea Grant researchers have designed filters used to improve water quality in recirculating aquaculture production systems, leading in turn to the development of completely automated, low energy use systems now found throughout the aquaculture industry. The latest design is a filter for use in marine systems to be patented in 2001. A Sea Grant-supported graduate student who worked in this area has now started his own company and offers several filter designs commercially. His company now generates more than \$1 million in revenues per year and is growing quickly.

As a result of Sea Grant's investment in aquaculture research and extension efforts, hybrid striped bass pond culture has expanded in just 10 years from a small demonstration project to an industry producing 10 million pounds of fish valued at \$25 million annually.

Aquatic Nuisance Species

The Great Lakes Sea Grant Network has made science-based information about zebra mussels and other aquatic nuisance species available at the web site www.sgnis.org. Developed by the Great Lakes Sea Grant network, this site contains a comprehensive collection of research publications and education materials produced by Sea Grant programs across the Nation. Originally focused on zebra mussels, the site also contains on other invaders including the Eurasian ruffe, the round goby, the sea lamprey, and the spiny waterflea. New York Sea Grant has also established a National Aquatic Nuisance Species Clearinghouse at www.aquaticinvaders.org, which houses an international library of research, public policy, and outreach education publications pertaining to invasive marine and fresh-water aquatic nuisance species in North America. These web sites are used by industrial and municipal water users, shoreland property owners, boaters, resource management agencies, students, teachers, outreach professionals, and researchers.

Coastal Hazard Reduction

Software developed by Sea Grant investigators allows builders to "plug in" specifications of their structure to assess the building's risk from coastal storm winds and water; the software also makes recommendations to mitigate identified risks. Structural engineers for the new 8,600-unit Sun City development near Hilton Head, SC credit the program with averting millions of dollars in potential losses as well as helping to protect lives in this retirement community.

Sea Grant researchers in coastal hazard reduction have promoted new construction techniques such as hurricane clips, cross-braced pile construction, and changes in roof and window design that have saved millions in repairs. Homes built in accordance with Sea Grant models can save an estimated \$220 annually in insurance premiums, or \$15,000 over the 70-year life span of the average home.

California Sea Grant researchers have adapted two computer models to allow scientists to use an existing wave-monitoring network to estimate swell conditions at all coastal locations in Southern California, even those without instruments. This is important because instrumenting and processing data from a single site can cost tens of thousands of dollars annually. The models developed in this project are presently being used as part of the "Orange County Storm and Tidal Wave Study," which assists better planning of future coastal structures through improved prediction of coastal erosion.

Ocean sewage outfalls are major sources of contaminants to coastal ocean systems. Studies by the University of Southern California Sea Grant have produced a wealth of information about the behavior of effluents in the marine environment. Such information increases the ability of sanitation authorities to develop environmentally-sound policies for managing urban waste.

Commercial Fisheries

To revitalize the flagging oyster industry, Delaware and Maryland Sea Grant Programs are working cooperatively to identify American oysters with the most useful genetically distinct characteristics. The researchers have taken oysters from throughout the species' geographic range, the Gulf of Maine to the Gulf of Mexico, and have bred seven new lines that are now growing in the Chesapeake Bay. The next step will be to evaluate these oysters and then send the superior lines to a living repository established by the Molluscan Breeding Program at Hatfield Marine Science Center in Newport, Oregon, for the benefit of researchers across the nation.

To reduce finfish (cod, sole, and pollock) bycatch, Sea Grant scientists have studied mesh size and the optimal placement of bycatch reduction devices (BRDs) in trawl nets. After Washington Sea Grant researchers proved that the use of large meshes could reduce bycatch in the West Coast black cod and sole fisheries, regulators increased the minimum mesh size in some trawl fisheries. These studies were extended to include the North Pacific pollock fisheries, and

preliminary research results there have caused regulators to also increase the size of meshes in that fishery.

To provide the fishing industry with a new method to fight diseases that attack commercial stocks of oysters, clams and abalone, California and Connecticut Sea Grant researchers have developed a technique for adding an inheritable gene to a mollusk. Pangenix, Inc., now has a license to modify this technique for commercial use.

A Washington Sea Grant outreach specialist is testing the effect of highly visible, opaque netting in the upper portions of gillnets as a visual deterrent to birds. His research has shown that visually modifying salmon gillnets and adjusting fishing schedules can reduce entanglements of seabirds. This work, coupled with a required observer program performed by a Washington Sea Grant outreach specialist, has been credited with preventing closure of the Puget Sound sockeye salmon fishery, saving hundreds of jobs and millions of dollars in lost revenue to the region's economy.

The Alaska Sea Grant Program was instrumental in conceptualizing and starting the vital program of teaching marine safety and survival to over 4,000 fishermen in 65 Alaskan ports.

Education

In its first three decades, the National Sea Grant College Program supported more than 12,000 undergraduate and graduate students in a wide array of disciplines including oceanography, biotechnology, seafood science, ocean engineering, coastal ecology and law. In addition to providing academic and financial support, the cross-disciplinary nature of Sea Grant prepared those students to assume leadership roles in research and resource development.

Since 1979, 479 students have received an insider's look at the national policy-making process by participating in the Knauss Policy Fellowship program in Washington, D.C. About one-third of these students stay within the D.C. area, working in government offices or in the halls of Congress. The remaining two-thirds work in industry and trade associations, in state government as managers, or in academia as teachers and university researchers.

Operation Pathfinder, offered through regional Sea Grant programs, is a two-week course aimed at increasing elementary and middle school teachers' knowledge of oceanography and other marine-related topics. By 2000, the program had trained more than 700 teachers, who in turn trained an additional 14,000 educational professionals in 30 states and seven U.S. territories. Over a five-year teaching period, these nearly 15,000 teachers have the potential of reaching over 5.5 million K-12 students concerning the relevance of the world's oceans and coastlines and man's impact on these environments.

The handbook Marine Science Careers: A Sea Grant Guide to Ocean Opportunities introduces students to a wide range of marine career fields and to people working in those fields. Intended

for high school students and guidance counselors, 25,000 copies of the 40-page guide are now in circulation, 5,000 of which were sent free to high schools in non-coastal states. The public can now obtain the entire booklet via web site www.marinecareers.net.

Fourth and fifth graders, most of them from urban areas, are being made into "island explorers" under a University of Southern California Sea Grant program. So far, some 70 children have been introduced to the fundamentals of marine science through activities in the San Pedro Channel and on Catalina Island.

Marine Biotechnology

Sea Grant organized the first systematic research effort in the United States to develop new drugs from marine organisms, resulting in the discovery and description of more than 1,000 compounds that may be vitally important. Some of these Sea Grant-discovered compounds are being tested by both government agencies and commercial pharmaceutical companies as possible treatments for AIDS, inflammatory diseases such as arthritis, and prostate, lung and breast cancers.

Scientists at California Sea Grant have found that the shells and skeletons of marine organisms have unique traits such as remarkable strength and biocompatibility that could be used to design valuable, new advanced materials. For example, coral skeleton, a mineralized composite used in medical implants and construction materials, provides a useful model for the design of new high performance composites with a wide range of potential applications, from microelectronics to new medical and catalytic devices. Currently, the researchers are working with the DuPont Corporation and Amgen, Inc., to identify the biological components and properties that they expect to use for shaping crystal fibers of skeletal material into micro-thin bundles resembling the high-performance, fiber optic cables needed for advanced communications and computing devices.

"Extremophiles," organisms that exist in extreme temperature zones such as underwater thermal vents or ice floes, are being studied by Washington Sea Grant researchers. For instance, cold-loving bacteria, collected during several ice-breaking expeditions in the Greenland and Norwegian Seas, are being studied to increase the variety of cold-tolerant enzymes available to industry. One of the largest markets for these enzymes is for use in improving the effectiveness of energy-saving cold-water detergents.

Using DNA sequences, Sea Grant researchers are developing rapid field tests to identify harmful algal blooms, a growing environmental problem in coastal waters worldwide. With accurate field-testing, managers can respond more effectively to reduce health risks to both humans and animals.

Seafood Safety and Quality

To aid the seafood industry in complying with new FDA regulations, the National Sea Grant College Program spearheaded the formation of a partnership known as the "Hazard Analysis and Critical Control Point (HACCP) Alliance." The goal of this alliance was to ensure the safety and quality of seafood consumed in the United States by developing a unified training and certification program to properly train thousands of seafood inspectors, instructors, and workers. In cooperation with the FDA, the Sea Grant network developed a three-day training program that is used by both Sea Grant and the National Marine Fisheries Service to train the trainers.

A cadre of 590 trainers conducted over 350 HACCP courses, teaching 11,000 professionals – 90 percent domestic and 10 percent international, with 75 percent representing commercial interests and 17 percent regulatory interests. The Alliance's efforts influenced more than 5,000 seafood processing firms in the U.S. and 5,900 importers and their international suppliers.

In 2000, New York Sea Grant surveyed the 5,000 seafood companies who had participated in the domestic program. Seven hundred and forty-four seafood businesses from 43 states and three territories responded to the survey. Seventy-seven percent of the respondents said they would not have been able to develop a plan to comply with new U.S. Food and Drug Administration seafood processing safety regulations without the in-depth training courses conducted nationwide under the auspices of the National Sea Grant College Program and the HACCP Alliance. Over 90 percent felt that the Alliance training course provided them with the information they needed to develop a HACCP plan, understand FDA's guidance information, and comply with the FDA seafood HACCP regulation. Eighty-eight percent of the responding firms indicated that employees from the firm developed their own HACCP plan.

Sea Grant's efforts to help the U.S. seafood industry implement the new FDA-mandated processing procedures were recognized with the receipt of a federal Hammer Award for "partnerships that make a significant contribution in improving the way federal agencies accomplish their responsibilities."

Sea Grant programs are developing rapid and sensitive methods to detect contaminated seafood. Mississippi-Alabama researchers have developed fast and highly specific polymerase chain reaction techniques for detecting several specific pathogens not only in shellfish, but also in meat products, cooked sausage, and milk. In addition, Louisiana Sea Grant researchers have developed a quick test for detecting a bacterium found in food and the environment, which causes severe disease in some humans and death in those with damaged immune systems. Now that the more virulent strains of this bacterium can be easily detected and monitored, consumers can confidently buy and consume safe, wholesome shellfish.

Conclusion

Increased development, population and pollution in the Nation's coastal areas are threatening the natural resources upon which so many individuals and businesses rely on for their economic well being. NOAA's National Sea Grant College Program focuses on sustainable development of the Nation's coastal resources through an organization that is national in scope, university based, and committed to the transfer of research results to coastal and marine user groups.

Mr. Chairman, this concludes my testimony. Thank you for the opportunity to be here today. I look forward to answering any question you or members of the Subcommittee may have.