

Testimony for the Record
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Before the
Subcommittee on Commerce, Justice, and Science, and Related Agencies
Committee on Appropriations
House of Representatives
Washington, D.C.
March 27, 2015

The National Association of Marine Laboratories (NAML) is pleased to submit testimony to the Subcommittee with a series of recommendations that we believe would strengthen the Nation's research and education enterprise. NAML is a nonprofit organization representing the ocean, coastal and Great Lakes interests of member laboratories that employ thousands of scientists, engineers and professionals nationwide. NAML labs conduct high quality research and education in the natural and social sciences and translate that science to improve decision-making on important issues facing our country. NAML's priorities are drawn from and strongly support two important reports from the National Academy of Sciences. They are: *Sea Change: 2015-2025 Decadal Survey of Ocean Sciences (DSOS)*; and *Enhancing the Value and Sustainability of Field Stations and Marine Laboratories in the 21st Century*. Specific priorities germane to NAML labs are:

- Enhance science, education and public engagement at marine labs by supporting the continued development of their unique assets and qualities that allow them to prepare the next generation of scientists, expand opportunities for active learning and collaborative research, and explore a wide range of approaches to engage the public. This includes strong sustained support for competitive merit-based ocean, coastal, and Great Lakes research provided by relevant federal agencies to address the research priorities identified in *DSOS*;
- Promote a network for discovery and innovation via Federal and non-Federal support to build and maintain a modern infrastructure for research, education, and networking including advanced internet connectivity and cyber infrastructure;
- Pursue financial sustainability by developing business plans that foster the unique value of marine labs, creating mechanisms to establish reliable based funding, and diversifying approaches to obtain supplemental support – such as a national partnership program to co-locate federal scientists and infrastructure at NAML facilities; and
- Develop metrics for demonstrating the impact of marine labs in research, education, and public engagement.

The Role of Marine Laboratories in the Nation's Research and Education Enterprise

“Field stations are national assets formed by the unique merger of natural capital, intellectual capital, social fabric, and infrastructure that leads to the important scientific endeavors required if we are to understand our rapidly changing natural world.” ***Enhancing the Value and Sustainability of Field Stations and Marine Laboratories in the 21st Century***.

Ocean, coastal and Great Lakes marine laboratories are vital, place-based "windows on the sea." They connect communities with cutting edge science, while providing students and citizens with meaningful learning experiences. The members of NAML work together to improve the quality and relevance of ocean, coastal and Great Lakes research, education and outreach. NAML seeks support for the following activities:

- The conduct of basic and applied research of the highest quality, making use of the unique capabilities of coastal laboratories in conducting education, outreach and public service;
- Balanced support of research with infrastructure with particular emphasis on cost-effective networking of capabilities;
- Encouragement of effective management and conservation of marine and coastal habitats and resources using ecosystem-based management approaches that restore ecosystem health;
- Observing systems that collect data needed to improve predictions of natural and human caused disasters and support the management of marine resources for the benefit of environmental and human health needs; and
- Education and training.

Oceans, Coasts and Great Lakes are Vital for Economic Growth and the Well-being of the Nation

More than half of the United States population lives in coastal counties that generate 58% (\$8.3 trillion) of the Nation's gross domestic product (GDP). In 2011, Americans, on average, ate 15 pounds of fish and shellfish per person – 4.7 billion pounds all together – making the U.S. second in the world in total seafood consumption. Offshore oil production in the U. S. Exclusive Economic Zone accounts for 24% of the total U.S. crude oil production. If American coastal watershed counties collectively comprised a single country, that country would have a GDP higher than that of China. The United States has jurisdiction over 3.4 million square miles of oceans – an expanse greater than the land area of all 50 states combined. This is a dynamic area that offers a mosaic of biologically diverse habitats that provide a wealth of environmental resources and economic opportunities, while at the same exposing human and biological communities to hazards such as damaging tsunamis and hurricanes, industrial accidents and outbreaks of water borne pathogens. The 2010 Gulf of Mexico *Deepwater Horizon* oil spill and Sandy in 2012 are vivid reminders that the depth of our understanding of our oceans and coastal areas, and our ability to protect them, is far from complete. Developing sufficient capabilities to sustain ocean-based economies and protect our coasts and coastal communities from natural and man-made hazards requires a sustained, balanced investment in research, infrastructure, education, and training.

The Great Lakes region boasts a massive geographic footprint, and is a major driver of the North American economy. With economic output of \$4.7 trillion in 2011, the region accounts for 28% of combined Canadian and U.S. economic activity. By comparison, the region's output ranks ahead of Germany, France, Brazil and the U.K., and it would rank as the fourth largest economy in the world if it were a country, behind only the U.S., China and Japan. The Great Lakes are responsible for nearly 1 million manufacturing jobs; 217,000 jobs in tourism and recreation; over 100,000 in shipping; over 110,000 in agriculture, fishing and food production and about 10,000 related to mining. Understanding the complexity of the Great Lakes is vital for the future health and well being of this region of the country.

Investing in Research

NAML believes America is driven by innovation — advances in ideas, products and processes that transform existing economies, create new industries and jobs, and contribute to our nation's ecological and economic health and security. It is essential that the nation reaffirms and revitalizes the unique partnership that has existed between the Federal Government, the states, business and the nation's research and education enterprise. Investing in the nation's research enterprise has contributed significantly to our long-term prosperity and technological pre-eminence through research spanning a landscape of disciplines, from physics to geology, chemistry to biology, engineering to social sciences, and observing to modeling. **NAML believes that research and education programs at the major federal science agencies with ocean and coastal responsibilities should be viewed as priority investments in the future health and well being of the Nation. Much attention has been focused**

justifiably on the need for our Nation to continue its support of premier basic research programs. It is also important to maintain strong support for mission-oriented ocean, coastal and Great Lakes research that includes long term observing programs. Research programs that enhance agency missions and support the extramural community in competitive, merit-based research provide highly cost-effective returns on investment and distribute economic and societal benefits over a broad array of communities. Further, NAML believes that developing exchange programs between federal agencies and marine laboratories will further strengthen the communication and capacity of both for the benefit of the ocean science and management enterprise.

Programs that support the extramural community via competitive, merit-based research provide highly cost-effective returns on investment, leverage additional resources to meet science and management priorities, and distribute economic and societal benefits over a broad array of communities. While NOAA has acknowledged his assertion on many occasions, its extramural support for its partners has continued to decline relative to the agency's bottom line. From background information developed for the NOAA Science Advisory Board's R&D Portfolio Review Task Force support by the Office of Oceanic and Atmospheric Research (OAR) for extramural R&D has declined by \$60M since 2005 – from \$171.6M to \$107.1M while the percentage of OAR's research activities to support extramural programs has dropped from just over 50% down to 34% of the total. In the National Ocean Service (NOS), support for extramural R&D has declined from a level of \$21.6M in 2005 to \$13.7M in 2011 while intramural support has grown from a level of \$53M in 2005 to a level of \$58M in 2011. Moreover NOAA has repeatedly proposed the termination of numerous extramural programs – such as the John H. Prescott Marine Mammal Grants program – and the consolidation of research programs – such as Ocean Exploration and Research -- which has led to the dramatic reduction in extramural research and education support.

Beyond cutting back on its extramural support, NOAA now seeks permission to “receive and expend funds made available by, any...private organization, or individual (proposed Section 108 of the General Provisions in the NOAA Section of the *Appendix to the FY 2016 Budget*, page 218).” This would enable NOAA to compete against non-federal and private entities for private sector support. Thus not only is NOAA cutting back its own support, it intends to further exacerbate the situation by competing against its partners for the limited available non-federal resources needed to fill the gaps created by NOAA's decision to scale back its extramural support. **NAML urges the Committee to restore to the maximum extent possible NOAA support for its extramural research, education, and other related programs while also limiting NOAA's ability to compete with the private sector for non-federal resources needed for research, education, and conservation programs.**

Investing in Research Infrastructure

NAML believes that a comprehensive range of ocean and coastal research infrastructure is essential to meet growing demands for scientific information and to ensure that we restore and maintain ecosystem health to support safe, efficient, and environmentally sustainable use of our ocean, coastal and Great Lakes resources. Most marine laboratories operate independently of one another. Greater networking with other marine laboratories, field stations, and other research centers would leverage resources to facilitate discovery and spark innovation. Networking would also allow institutions to share best practices, protocols, and platforms for data archiving and retrieval. Such networking has the potential to open new arenas of scientific inquiry, education, and outreach. It can capture social and intellectual capital to tackle major questions and seize opportunities as no single marine laboratory can, and it enhances creativity and innovation by attracting a wide range of scientists and promoting multidisciplinary collaboration. The most successful and sustainable networks start small and are self-defining; they encourage reciprocity among network members. Networking can facilitate the development and diffusion of knowledge and technology in a way that encourages innovations. It is also important to appreciate that marine

laboratories vary in scope, size, infrastructure requirements, and purpose; each contributes to the global portfolio in distinct ways. Internet connectivity and cyberinfrastructure are two neglected and underdeveloped elements of infrastructure. One common element, however, in need of attention is internet connectivity and cyberinfrastructure, which would facilitate data sharing and analysis. Installation of new cyberinfrastructure requires data-management and data-sharing plans and conformity of data with widely used metadata standards. Such infrastructure also requires a long-term funding commitment for repair, upgrades, and technical support.

Investing in Science, Technology, Engineering and Mathematics (STEM) Education

NAML's education mission is two-fold. First, it is to enhance ocean STEM education to ensure that all citizens recognize the reciprocal effects of the oceans, coasts and Great Lakes on their own lives and the impacts citizens have on these environments. Second, it is to provide formal research and training opportunities at K-12, college, and post-graduate levels to ensure a scientifically savvy, technically qualified, and ethnically diverse workforce capable of solving problems and answering questions related to the protection, restoration and management of coastal and ocean ecosystems, climate variability, and societal needs. An informed and engaged public is essential for the nation to address complex ocean- and coastal-related issues, balance the use and conservation of marine resources, and maximize future benefits from the ocean. Public understanding of human impacts on the marine environment should be balanced with recognition of the benefits to be derived from well-managed ocean resources. Ocean-related education is by its nature interdisciplinary, involving many of the natural sciences and the human connection to natural resources. It can increase overall science literacy and enhance the nation's health, standing, safety and security. NAML laboratories seek to expand the engagement of individuals from groups that have been historically under-represented in ocean research, education and outreach. This is particularly important in fulfilling the goal of achieving a diversified STEM pipeline to meet future science and ocean workforce needs.

NAML remains concerned with the Administration's STEM Education Consolidation proposal for FY16. A total of 20 STEM education programs at eight key R&D mission agencies (including NOAA, NSF, and NASA) will be impacted by this proposal. It is important for mission agencies to help support the next generation of scientific and technical talent – much of which will be needed by these agencies in future years. We urge the Subcommittee to reject these consolidation proposals and support the continuation of these programs within their current agencies.

NAML appreciates the opportunity to present these views to the Subcommittee as it begins work on the development of the FY 2016 appropriations bill.

Thank you.