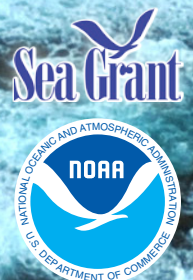




# The State of Sea Grant 2014

Impacts, Challenges and Opportunities

Biennial Report to Congress by the National Sea Grant Advisory Board, November 2014



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Photo: NOAA Sea Grant

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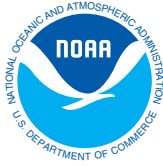
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Cover Photo: Oliver Bencosme, Puerto Rico Sea Grant





## National Sea Grant Advisory Board

*A Federal Advisory Committee*



Dear Members of the Congress of the United States of America,

On behalf of the National Sea Grant Advisory Board (the Board), I am proud to transmit this Biennial Report to Congress, The State of Sea Grant 2014, as directed by the 2008 Sea Grant Act (PL 110-394). The State of Sea Grant 2014 follows the format of previous reports and provides an update on the National Sea Grant College Program (Sea Grant) over the past two years.

The Board finds that Sea Grant continues to be effective in responding to the needs of our coastal and Great Lakes communities. Sea Grant provides the National Oceanic and Atmospheric Administration (NOAA) with the capability to address these needs in collaboration with research universities located in every coastal and Great Lakes state, and every U.S. Territory. It is a solid investment of public monies, leveraging federal dollars with a 2:1 federal: non-federal matching requirement.

Sea Grant has made great strides in addressing the allocation needs of our state programs through a rebalancing of funding based on Board and state Program recommendations. After several years of level funding and declining purchasing power, the FY2014 budget brought an increase in minimum level of base funding for several underfunded programs, while retaining existing funding for others. The Board is confident that continued increases will return Sea Grant to a level that strengthens its ability to meet the needs of our coastal communities.

Sea Grant completed a full cycle of the Planning, Implementation and Evaluation (PIE) process, including the first four-year comprehensive panel review of the state Sea Grant programs. All programs are found to meet or exceed expectations, and are undergoing their second round of Site Reviews during the FY14-15 years.

Sea Grant appreciates the Senate Committee on Commerce, Science, and Transportation, and Senators Schatz and Wicker, the prime sponsors, for passing the Sea Grant Reauthorization (S. 2030) out of Committee. The National Sea Grant Office (NSGO), the Board, and the Sea Grant Association have collaborated with Congressional staff and committees to ensure that the needs of Sea Grant are met. Key elements of the legislation that Sea Grant strongly supports are the authority of the Secretary of Commerce to conduct a Knauss Fellowship Program, the authorization of regional initiatives, and the authorization to detail personnel from Sea Grant colleges to the NSGO. While appreciative of the 0.5% increase in the administrative cap, the Board continues to support the removal of the cap.

For nearly 50 years, the National Sea Grant College Program has been a trusted source for coastal science and a valuable asset to the Nation. The Board looks forward to working with Congress, NOAA, the state Sea Grant programs, and the Sea Grant Association for the continued success of the exemplary research, education and outreach that characterize the Program.

A handwritten signature in blue ink that reads "Rollie Schmitt". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Rollie Schmitt  
Chair, National Sea Grant Advisory Board

# INTRODUCTION

Two-thirds of the Earth's surface is covered by ocean. The United States boasts 95,500 miles of coastline, and over 50% of our population lives within 50 miles of it. Forty-eight years ago, Congress established the National Sea Grant College Program (PL 89-688) to recognize the importance of the oceans, coasts and Great Lakes to the world's environment, the Nation's economy, and human wellbeing. These resources are threatened by the immediate impacts of natural hazards such as Hurricane Sandy, and longer term concerns such as climate change and the needs of resource users. States and communities that depend on these resources require research, education and communication designed to address current needs and to ensure health and vitality for future generations.

Sea Grant's network focuses the academic and research power of 33 university-based state programs. Sea Grant partners with public and private sector groups to capture and sustain the economic and social benefits of our ocean, coastal and Great Lakes resources. By marshaling these resources and providing outreach and education to public and stakeholder groups, Sea Grant consistently meets the needs of the communities that depend on our Nation's water resources.

Reauthorization of Sea Grant in 2008 (PL 110-394) included a mandate for the National Sea Grant Advisory Board to prepare a Biennial Report to Congress. The 15-member Board provides advice to NOAA and Sea Grant to address the Nation's highest priorities regarding the understanding, assessment, development, management, utilization and conservation of ocean, coastal and Great Lakes resources. The State of Sea Grant 2014 reviews Sea Grant's progress over the past two years, including its response to recommendations made in the 2012 report, and suggests ways to maximize program effectiveness and impact. The report concludes with recommendations for actions that will enhance Sea Grant's capacity to achieve national goals. Web links to all reports cited in the document are provided in Appendix B.

## The 2014 Biennial Report is organized into the following sections:

- Executive Summary
- The Sea Grant Model
- Response to State of Sea Grant 2012 Recommendations
- National Focus Areas
- Sea Grant in Action
- State of the Sea Grant Network
- Emerging Opportunities
- Recommendations for 2014

Sea Grant's mission is to "enhance the practical use and conservation of coastal, marine and Great Lakes resources in order to create a sustainable economy and environment."

Environmental stewardship, long-term economic development and responsible use of America's coastal, ocean and Great Lakes resources are at the heart of Sea Grant's mission.



# EXECUTIVE SUMMARY

## THE STATE OF SEA GRANT 2014 A BIENNIAL REPORT TO CONGRESS FROM THE NATIONAL SEA GRANT ADVISORY BOARD

The purpose of this report is to fulfill reporting responsibilities established in 2008 by the National Sea Grant Act, PL110-394. The National Sea Grant Advisory Board is charged with reporting to Congress every two years on the state of the National Sea Grant College Program. This report responds to Recommendations offered in The State of Sea Grant 2012, highlights program accomplishments and challenges, and provides updates on activities over the past two years. Finally, the report makes recommendations for the coming years.

### Sea Grant Mission and Methods

Sea Grant has a mission to “enhance the practical use and conservation of coastal, marine and Great Lakes resources to create a sustainable economy and environment.” Sea Grant advances this mission through research, education and advisory services to inform public and private decision-making. Its priorities are established on a national level based on citizens’ needs, and implemented on state, regional and national levels. University-based Sea Grant programs draw from the best personnel and support resources in the nation, and attract multiple partners with expertise, networks and innovative ideas. Interactions with its parent agency, NOAA, expand the range of what Sea Grant can accomplish. The interchange of services and information from national to regional to state to local enables Sea Grant researchers, educators and outreach personnel to access the most up-to-date technologies and methods, and combine their influence to meet demonstrated needs, support businesses, enhance environmental literacy and help policy makers make well-informed science-based decisions.

### Response to 2012 Recommendations

Sea Grant has performed admirably on meeting the recommendations of the 2012 Biennial Report. Positive and effective attention has been paid to retaining local sensitivity while focusing on national and regional priorities, and to integrating coastal programs and improving cross-agency collaboration. The National Sea Grant Office has continued to refine the Planning, Implementation and Evaluation Resource (PIER) database to provide the Sea Grant network with support and guidance on effective impacts; searchable components make reports of Sea Grant research, outreach and education partners and projects accessible to the public. Federal budget increases for FY14 provide welcome opportunities to focus on rebalancing the fiscal portfolio to assure state and regional programs a minimum level of base funding.

### National Focus Areas

National Strategic Plans developed every four years establish a framework for priority projects and a set of cross-cutting goals that are the basis for activities within those projects. Programs submit impacts and accomplishments annually to demonstrate progress toward goals.



Photo: Woods Hole Sea Grant



Photo: Susan Ferris Hill, South Carolina Sea Grant



Photo: Delaware Sea Grant

# EXECUTIVE SUMMARY

## Cross-cutting goals (These goals underpin each of Sea Grant's four focus areas.):

- Sound scientific research
- An informed, scientifically-literate public
- Inclusive decision-making involving a wide variety of stakeholders
- Relevant and timely information on climate change adaptation

## Focus areas:

- Hazard Resilience in Coastal Communities
- Healthy Coastal Ecosystems
- Safe and Sustainable Seafood Supply
- Sustainable Coastal Development

At the end of 2013, Sea Grant transitioned to its new Strategic Plan for 2014-2017. Thus the last full year of reports from the field was calendar year 2013, reflected in this report.



Photo: Oliver Bencomse, Puerto Rico Sea Grant

## Sea Grant in Action

With 140 deaths and over \$62 billion in damages, Hurricane Sandy shook the very foundation of the coastal communities in affected areas. Sea Grant programs in seven states responded quickly with coordinated information for community and individual preparedness. Since the storm, the Sea Grant network has been engaged in the assessment and recovery effort along the East Coast. Sea Grant is also helping local communities develop long-term solutions for climate change adaptation.

Sea Grant is responsive to a growing demand for efforts to increase community resilience, awareness and preparation in the face of a changing climate. Sea Grant increases community resilience to hazards by facilitating solutions to challenging issues, developing tools and techniques, and increasing awareness of climate driven challenges including extreme weather events, coastal storms, sea level rise, ocean acidification, and integration of green infrastructure. To mitigate future climate impacts and increase community resilience, Sea Grant works with communities in development and permitting of local renewable energy sources.

Education for environmental literacy is at the heart of Sea Grant's pipeline for the workforce and its fostering of science understanding and respect in future decision makers. Federal and agency budget cuts to Science, Technology, Engineering and Mathematics education (STEM) programs threaten the unique education contributions Sea Grant makes to such programs, and the Network has responded with support for enhanced education.

This year the John A. Knauss Marine Policy Fellowship program reached a milestone – the 1000th fellow was accepted into the program. The Sea Grant Knauss Fellowship trains the best and brightest graduates in marine science, conservation and policy, and is the starting point for many of the country's leaders in marine, coastal and Great Lakes-related fields.

Social Science initiatives in Sea Grant programs are providing valuable information on the human interface with resource questions. In 2012-13, 28 programs funded 67 social science projects, allowing Sea Grant to increase its efforts in economics, communication, sociology, anthropology, market research and program evaluation. Economic development impacts are featured in all of Sea Grant's Focus Areas.

Partnerships are key to leveraging resources for effective action, and Sea Grant applies partner support and expertise at local, state and national levels, as well as within NOAA. Recognition from the Department of Interior for Rhode Island and Michigan Sea Grant programs is evidence of the valuable interface provided by partnering for conservation.

## State of the Sea Grant Network

Allocation of funds within Sea Grant has been evaluated by the Advisory Board. To retain vitality and bring the Sea Grant network to a consistent level of excellence nationwide, an adjustment of policy was needed to balance stakeholder needs, represented by shoreline and population, and provide a minimum level of base funding for all programs. Based on input from the Advisory Board, state programs and National Office, an allocation balancing plan is being implemented to allow for movement toward a more equitable distribution of funding as the overall pool of base funding increases. No program will lose funding to increase another's base. The plan provides an equitable, rational, transparent and flexible allocation that promotes performance, healthy competition and partnerships.

Sea Grant continually works to reach and extend its potential through legislative support, fiscal balance and strategic planning. Legislation introduced to Congress in 2014 seeks to reauthorize the National Sea Grant College Program Act through support for the Knauss Marine Policy Fellowships, an increased funding base and an annual fund for research on priority topics. The amendments also change the frequency of the Advisory Board's reporting to Congress to every three years rather than biennially and increase the administrative funding cap by 0.5%. The Board continues to support removal of the cap.

## Emerging Opportunities

Looking toward the future, Sea Grant transitioned to a new Strategic Plan in FY2014. The program did so with a network strengthened by a rebalancing of budget allocations, continued refining of program evaluation efforts, enhanced public visibility for Sea Grant impacts and partnerships, greater integration with other NOAA programs and anticipation of reauthorization. Development of this Biennial Review has also identified opportunities emerging from current research, resource management issues, economic development and outreach/education strategies that will lay groundwork for continuing Sea Grant's productivity and service to the nation.



Photo: Maryland Sea Grant

## 2014 Recommendations

The Board finds Sea Grant to be responsive to recommendations made through Biennial Reports. To continue the progress made toward addressing the challenges and opportunities of our oceans, coasts and Great Lakes, the Board recommends the following:

1. Sea Grant should continue to focus on advancing national priorities while solving problems on a local and regional basis. This national focus must continue to emphasize partnerships and collaborative efforts within the Sea Grant network and with other federal, regional, state and local agencies and organizations, without loss of sensitivity to community stakeholders' needs.
2. Sea Grant should continue to support tracking and reporting of the cumulative, measurable impacts of Sea Grant activities toward the achievement of national goals.
3. The continued viability of Sea Grant relies on adjustment of equity in funding among programs, while maintaining program review and merit considerations. The Sea Grant network should embrace steps toward balancing the federal allocation for programs, with a goal of assuring all programs a minimum level of base funding.
4. Sea Grant should strengthen the focus area in Environmental Literacy and Workforce Development by demonstrating how Sea Grant K-12 and informal STEM education programs and targeted graduate Fellowships are mission critical, respond to national priorities, and result in evidence-based accomplishments and impacts.

# The Sea Grant Model

Sea Grant was created by the U.S. Congress in 1966 as a federal and state partnership to harness the academic power of the nation's universities to solve ocean, coastal and Great Lakes problems. Sea Grant engages public and private partners and outreach groups to sustain and enhance the vitality, value and wise use of the nation's coastal resources. Administered and supported by NOAA and implemented through leading research universities, Sea Grant provides unique access to scientific expertise and new discoveries, and delivers information and solutions for complex issues.

Sea Grant is a national network that includes the National Sea Grant Office, 33 university-based state programs, the National Sea Grant Advisory Board, the National Sea Grant Law Center, the National Sea Grant Library and hundreds of participating institutions. The Sea Grant network enables NOAA to combine science and expertise to address both human and environmental needs in coastal communities. Sea Grant's university alliances help develop future scientists and resource managers who will conduct research and guide responsible use of our nation's coastal resources. Sea Grant's partnerships, research capabilities and local workforce bring unmatched ability to identify and capitalize on opportunities and to generate timely, practical solutions to issues facing coastal communities.

## **Research, outreach and education for present and future coastal needs.**

The core of Sea Grant's mission is "science serving America's coasts." Every coastal and Great Lakes state, including Puerto Rico and Guam, uses scientific information to create tools, products and services that benefit coastal communities. Sea Grant transforms this knowledge into coastal and marine literacy at the public and policy levels by applying expertise in research, outreach, communication and education. This flow of services and information to citizens and government agencies enables Sea Grant and NOAA to help individuals and organizations make well-informed decisions.

## **The cornerstones of Sea Grant's community-empowering efforts are:**

### **Finding Solutions to Critical Questions**

Sea Grant invests in applied scientific research through a multi-disciplinary network of more than 3,000 researchers from over 300 institutions. Sea Grant-funded research explores complex marine and coastal issues while accounting for today's rapidly changing economic landscape. Researchers discover new information and apply new technology, resulting in solutions to improve coastal environments and associated economies.

### **Connecting Science to People and Policy**

Sea Grant's network of over 400 extension agents and 100 communication specialists provides the connection between Sea Grant-funded research and the people and regions that benefit from it. The critical role of Sea Grant outreach is to bring the latest scientific information to community leaders and professionals who can apply it to benefit their livelihoods and the environment and use it to solve problems facing our coastal and marine landscapes.

### **Building Knowledge for the Future**

Sea Grant works with teachers and students from kindergarten to high school to develop environmental literacy and stewardship practices. The goal of Sea Grant's engagement with K-12 is to teach about our marine and coastal environments and the interaction of society with these ecosystems, and to raise awareness of marine careers. As students prepare in college to become the new generation in research, resource management and protection, Sea Grant's educational focus shifts to critical thinking, career preparation and annual support for over 900 graduate students.

After university graduation, students may join one of Sea Grant's fellowship programs (Sea Grant Knauss Marine Policy Fellowship, NOAA Fisheries/Sea Grant Population and Ecosystem Dynamics and Resource Economics Fellowship). Both fellowships provide graduate students and recent grads with applied science or policy experience within the federal government. Sea Grant also provides education for professionals on current scientific findings and management tools.





Photo: Oliver Bencosme, Puerto Rico Sea Grant

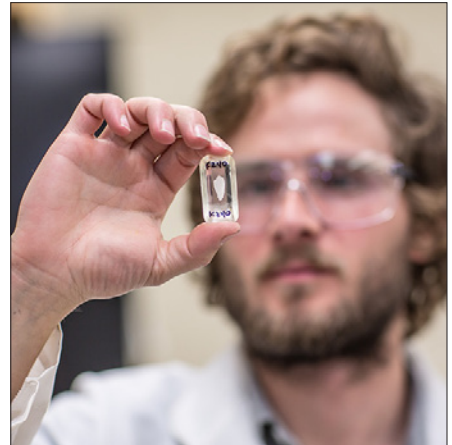


Photo: Todd Paris, University of Alaska Fairbanks



Photo: Pat Kight, Oregon Sea Grant

Photo: Mike Sullivan, Skidaway Institute of Oceanography (SIO)

# 2012 Recommendations

## 2012 Recommendations

1. Sea Grant should continue to focus on advancing national priorities and solving problems on a local and regional basis, while remaining sensitive to the needs of local communities.
2. Sea Grant should continue to support tracking and reporting of the cumulative, measurable impacts of Sea Grant activities toward the achievement of national goals.
3. Sea Grant should continue to emphasize partnerships and collaborative efforts within the Sea Grant network and with other federal, regional, state and local agencies and organizations.
4. The federal budget should allocate additional resources for Sea Grant to reverse the erosion of buying power and maintain a dynamic program.
5. The National Sea Grant Office should review the funding structure of Sea Grant, including the allocation and distribution of funds to state programs, following recommendations made in a 2011 Advisory Board report.
6. NOAA should continue the integration of its coastal programs to maximize its capability to address the nation's growing coastal challenges.

# Sea Grant Response

## Sea Grant Response

The National Sea Grant College Program Strategic Plan for 2014-2017 outlines national priorities developed through local and regional stakeholder input with state Sea Grant programs. The Strategic Plan process, with the sharing of feedback on research outcomes, economic impacts and environmental changes in state programs, demonstrates positive and effective Sea Grant attention to this recommendation.

Sea Grant is committed to careful planning and evaluation at the state and national levels. The National Sea Grant Office (NSGO) has continued to refine the Planning, Implementation and Evaluation Resource (PIER) database to provide the Sea Grant network with support and guidance on effective impacts. The NSGO has added a PIER public search capability for Sea Grant projects as well as an impacts and accomplishment search <http://seagrant.noaa.gov/News/SeaGrantAnnouncements/TabId/275/ArtMID/731/ArticleID/252/NOAA-Sea-Grant-Launches-Public-Search-to-Highlight-Program-Impacts.aspx>. This should increase the ease of use of PIER and its value for both researchers and the public. The 2014-2017 program measures and metrics have been refined to incorporate more fully the work of the network.

Partnerships are growing in number and impact. For example, Sea Grant partners with other NOAA line offices and programs to leverage existing knowledge and resources. Types of partnerships are explained in the PIER database. Within individual Sea Grant programs, partnerships with business, agencies, academia and other sponsors increase Sea Grant's scope of influence and leverage support for wider efforts.

The federal budget is moving toward greater support for Sea Grant efforts. In FY 2014 Sea Grant received an increase of nearly \$5M in the Conference Appropriations Report. While these additional revenues do not yet recoup losses to inflation, they are certainly welcome recognition of the value of the services rendered by Sea Grant.

A third Allocation Committee was assigned to review funding distribution among the national office, individual programs, and the essential elements of research, education and outreach. Committee representatives from the Board, Sea Grant Association, and NSGO challenged many long-held traditions of Sea Grant funding. They provided balanced and specific recommendations for future allocations and a timeline for implementation. After considering comments from the SGA, the NSGO decided to use FY14 budget increments to begin re-balancing programs to achieve a minimum funding level of \$1M in all programs.

NOAA has made progress in integrating coastal programs and improving cross-agency collaboration. For example, NOAA has realigned the National Ocean Service budget structure and is merging the Coastal Services Center and the Office of Ocean and Coastal Resource Management. The agency also realigned and refocused the National Centers for Coastal and Ocean Service to better target research on agency coastal missions and priorities. These changes are enabling NOAA to make progress on NOS priorities (coastal resiliency, coastal intelligence and place-based conservation), which align well with Sea Grant and other NOAA coastal interests. These changes are improving delivery of services to NOAA partners and customers and creating opportunities for further coordination and collaboration across NOAA. Such integration should result in increased cooperation between Sea Grant and NOS coastal programs.

# National Focus Areas

Sea Grant activities concentrate effort in a set of Focus Areas, which are established through the national and state program strategic plans. These interrelated Focus Areas are of critical importance to the health and vitality of the Nation's coastal resources and communities, respond to issues of major importance to NOAA, and are topical areas in which Sea Grant is making significant contributions.

## Focus Area Impact: Hazard Resilience in Coastal Communities

Sea Grant combines research and communication efforts with stakeholder education opportunities to inform the public about the risks of living and working in coastal communities, and to help those communities respond effectively to environmental needs and hazardous events. (See multiple examples from Hurricane Sandy in Sea Grant in Action p. 16.)

- Texas and Virginia Sea Grant programs reduce insurance costs through the National Flood Insurance Program's Community Rating System.
- Oregon Sea Grant's wave prediction tool aids assessment of local conditions to improve safety for commercial and recreational boaters and may show how local waves affect coastal vulnerability. The tool is also used in creating global and regional weather models. The Eastern North Pacific forecast system is used by the National Weather Service (NWS).
- Maryland Sea Grant researchers developed the Nutrient Loading Model that shows nitrogen amounts in coastal lagoons in the Delmarva Peninsula, and predicts changes and environmental response from land use, population size and agricultural activity.
- Lake Champlain Sea Grant has focused work on research and public education about storm water management, sedimentation and erosion control, including homeowner rain barrel projects, phosphorus educational campaigns and studies on bioretention systems at the University of Vermont.
- Puerto Rico Sea Grant has been collecting and analyzing drowning incident statistics at the beaches of Puerto Rico to inform the resource managers and decision makers of the need for improved aquatic safety services on the island.

Photo: Mississippi-Alabama Sea Grant

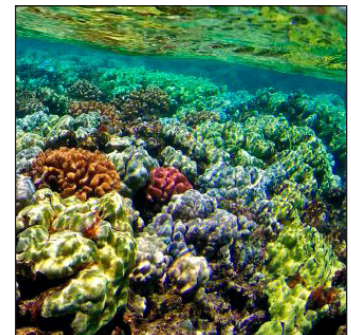


Mississippi-Alabama Sea Grant developed and Texas Sea Grant implemented the Coastal Resilience Index. The self-assessment tool, deployed in six coastal TX counties, allows communities to address vulnerabilities.



MIT Sea Grant supported use of Vulnerability and Consequences Adaptation Planning Scenarios (VCAPS) modeling, which was used by the City of Boston to draft a new hazard mitigation plan. The program also helped create a compelling use case for Google's Project Ara modular phone by incorporating unique sensors to collect and transmit environmental data.

Photo: Keoki Stender, Marine Life Photography



Hawaii Sea Grant educates and prepares for climate change impacts: Provided a coastal protection education program in the Marshall Islands, and endorsed 2013 Landowner's Guide publication as guidance to adapt to and prepare for climate change impacts.

## Focus Area Impact: Healthy Coastal Ecosystems

Sea Grant professionals are leaders in understanding and maintaining healthy ecosystems. Sea Grant works to support ecosystem-based approaches to managing the coastal environment, including restoring the function and productivity of degraded ecosystems and promoting stewardship of healthy ones through research, education and innovation.

- University of Southern California Sea Grant improves methods for detecting and removing neurotoxins from harmful algal blooms in intake waters of desalination systems used by municipal water systems.
- Sea Grant assesses invasive species impacts and control methods:
  - Wisconsin Sea Grant led a multi-state survey of Lake Michigan food web structure as impacted by invasive species.
  - New York Sea Grant helped develop and patent a safe, effective method for biocontrol of zebra and quagga mussels.
  - Mississippi-Alabama Sea Grant developed a testing method to identify and raise awareness of invasive jellyfish.
  - Florida Sea Grant's Cooperative Invasive Species Management Area program treated 5,000 acres distressed with non-native vegetation.
  - Alaska Sea Grant helped tourism companies incorporate invasive species monitoring into their offerings, providing significant gains in knowledge about these species.
  - Guam Sea Grant has identified native algae species to inform the Micronesian Biosecurity Plan and help respond to invasive algae species in the Western Pacific.
- Sea Grant is working to help communities properly dispose of used pharmaceutical products which, if not handled properly, could become a significant environmental crisis. Pennsylvania and New York Sea Grant coordinated education and collection events, and Illinois-Indiana Sea Grant supported 17 permanent pharmaceutical product collection programs and six events that collected 12,000 pounds of material.



Photo: Chris J. Benson, Minnesota Sea Grant

Sea Grant programs are working to provide safe and effective methods to reuse dredge material, a byproduct of the need to create clear navigation channels and ports. Ohio Sea Grant designed a program for beneficial reuse of Toledo Harbor dredge material to create blended soil products that are used by the City of Toledo. Minnesota Sea Grant supported development of a project to use 20 years of dredge material to create 74 acres of new wetland and public recreation space. Wisconsin Sea Grant's coastal engineer contributed to projects in two states that found new uses for 2.4 million cubic yards of dredged material.



Photo: Deborah Mercy, Alaska Sea Grant

Alaska Sea Grant Marine Advisory Agent identifies a marine invasive.

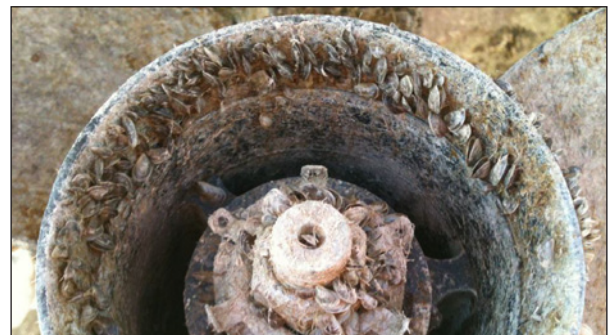


Photo: Stephanie Showalter Otis, National Sea Grant Law Center

Quagga mussels on boat propeller. The National Sea Grant Law Center provides wide-reaching education and research. They helped reform regulations for the movement of trailered watercraft in Oregon and Utah and conducted research leading to the change of septic system financing in Virginia.

# National Focus Areas

## Focus Area Impact: Safe and Sustainable Seafood Supply

Sea Grant works to support seafood sustainability and supply, as well as the health of the U.S. domestic seafood industry. Sea Grant's research, development and education provide significant local impact for the domestic aquaculture industry and wild fisheries, and can be used to launch far-reaching programs that will benefit seafood safety and quality, keeping the domestic seafood industry financially competitive and environmentally responsible.

- Georgia Sea Grant research on oyster age at maturation allows Georgia Department of Natural Resources to reduce the minimum size for commercial oyster harvest, enabling a significant increase in production.
- Wisconsin and New York Sea Grant programs developed new procedures for nonlethal Viral Hemorrhagic Septicemia Virus (VHSV) testing and pathogen removal. VHSV can cause serious fish mortalities that may result in significant economic losses.
- Maryland Sea Grant developed an oyster spatfall model to predict which locations have the greatest likelihood of receiving above-average settling of larvae, potentially maximizing restoration efforts and benefitting commercial aquaculture operations. To date, application of the model has led to production of 900 million oyster "spat on shell" that helped seed new oyster beds and restore sanctuary reefs around the Chesapeake Bay.
- Woods Hole Sea Grant and Barnstable County MA administer a Municipal Shellfish Propagation Program benefitting 17,000+ recreational and 1,000 commercial fishermen in the county.

Photo: Courtesy N.C. Seafood Festival



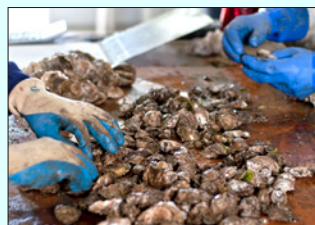
North Carolina Sea Grant provided expertise for "North Carolina's Local Catch" documentary to heighten awareness of locally caught seafood.

- Sea Grant investigates, develops and refines aquaculture products and procedures:
  - New Hampshire Sea Grant developed multi-trophic aquaculture technologies (shellfish with finfish).
  - Connecticut and New Hampshire Sea Grant produced a written technical manual and training video for the culture of four species of seaweed for human consumption.
  - California Sea Grant research on Pacific oysters led to a new oyster hybrid that has the potential to increase the value of West Coast oyster farms by millions of dollars annually.
- Sea Grant creates significant local impacts with research, development and education:
  - Louisiana Sea Grant assisted with researcher personnel, data compilation and cleanup efforts leading to the Louisiana blue crab fishery being recognized with the seal of sustainability by the Marine Stewardship Council.
  - Washington Sea Grant organized and taught commercial vessel safety procedures which are credited with saving the lives of Makah fisherman during a night time boating accident.
  - Mississippi-Alabama Sea Grant organized and implemented 12-hour Commercial Fishing Vessel Drill Conductor courses for Vietnamese-American fisherman in their native language.

Photo: Catherine Schmitt, Maine Sea Grant



Maine Sea Grant adapted sea vegetable species for commercial production.



Virginia Sea Grant facilitated discussions between the state's shellfish hatchery members to discuss ocean acidification and water quality.

Photo: Janet Kream, Virginia Sea Grant

## Focus Area Impact: Sustainable Coastal Development

Coastal communities in the U.S. provide vital economic, social and recreational opportunities for millions of Americans, but decades of population migration have transformed our coastal landscapes and intensified demand on finite resources. Sea Grant uses its technology and resources to educate and engage the public on important issues such as water conservation, land use and habitat protection.

- North Carolina Sea Grant researchers used novel fish tagging techniques to provide data for protecting saltmarsh habitats that are strategic to fish production. Since responses to development are most discernible among the assemblages of smaller fish that use the marsh for foraging and refuge, tagging these fish can provide insights for managers about the impacts of development.
- Water availability and quality is becoming an increasing concern for officials in many parts of the country. Sea Grant provides education and programs with a direct impact on the improvement of water quality:
  - South Carolina Sea Grant organized and conducted workshops to educate residents about water quality impacts in the home, including replacement or repair of septic systems. As a result the state reported water quality improvements to the USEPA and re-opened 883 acres of shellfish beds to harvest.
  - Illinois-Indiana Sea Grant led a Lawn to Lake program to reduce water use in lawn and landscape care that resulted in over 88 million gallons of water saved.
  - Maryland Sea Grant supported a program that provided nearly 800,000 feet of “rainscaping,” green design projects that helped restore local water quality.
- Sea Grant develops and uses technology to enhance public participation and education on coastal development issues (See images at right).
- North Carolina Sea Grant assisted in forming Saltwater Connections, a regional initiative aimed at sustaining livelihoods, cultural heritage and natural resources along the state’s coast through economic development and leadership programs.



Photo: Peg Van Patten, Connecticut Sea Grant

Connecticut Sea Grant and CT NEMO rain garden installations result in diversion of over 600,000 gallons of stormwater annually, increasing water quality.



Photo: Texas Sea Grant

Texas Sea Grant Coastal Planning Specialist leads state officials through a resilience workshop using the weTable. Pictured are Aransas County Road and Bridge Engineer, Director of Building and Development for the City of Rockport, and Rockport Mayor.



Photo: Narayan Mahon

Wisconsin Sea Grant provides access to coastal spatial data through the Wisconsin Coastal Atlas, which is being used to facilitate better understanding of coastal issues and inform decision making about sustainable use of the Great Lakes. Pictured above is Ozaukee County, WI which is featured in the Wisconsin Coastal Atlas as an example of bluff erosion. Sea Grant has helped this community come to terms with the beauty, and risks, associated with fickle topography.

# Sea Grant in Action

## Sea Grant's Response to Hurricane Sandy

With 140 deaths and over \$62 billion in damages, Hurricane Sandy shook the very foundation of the coastal communities in the areas it hit.

Even before the storm made landfall on October 29, 2012, NOAA's Sea Grant network, with more than 400 extension agents nationwide, was working to get coastal residents information they needed to prepare for Sandy. With strong community relationships, Sea Grant extension agents can reach isolated populations, such as rural fishing communities, even in the aftermath of a disaster. Their community trust allows agents to serve as effective liaisons between communities, local and state governments and federal agencies.

Since the storm, the Sea Grant network has been engaged in the assessment and recovery effort along the East Coast. Sea Grant is also helping local communities develop long-term solutions for climate change adaptation.

## Coordination

Connecticut Sea Grant, with the University of Connecticut, sponsored a meeting for coastal entities with state and federal agencies, to address concerns about impacts to beaches and dunes.

Rhode Island Sea Grant coordinated creation of the Rhode Island Shoreline Change Special Area Management Plan, known as the Beach SAMP. Rhode Island sea levels are expected to rise 3 to 5 feet within 100 years. The plan helps communities prepare for and rebound from coastal hazards of erosion and flooding.



Photo: National Park Service

## Assessment

Connecticut Sea Grant helped the U.S. Fish and Wildlife Service assess severe dune and shoreline erosion and evaluate new potential piping plover habitats created by the storm.

Delaware Sea Grant supported a satellite and remote-sensing monitoring system used to follow the storm's progress. After the storm, University of Delaware scientists identified raw sewage entering the ocean from damaged treatment plants. Such rapid assessments help keep the public safe.

New Jersey Sea Grant worked with tourism officials to renew public interest and confidence in the New Jersey Shore as a desirable destination for vacations and day trips. With the New Jersey Division of Travel and Tourism, Sea Grant produced a special Making More Shore Memories calendar highlighting shore area events and attractions beyond conventional summer fare.

Coastal erosion after Hurricane Sandy.

Post-Sandy rebuilding efforts in the Rockaways.



Photo: Rhode Island Sea Grant



Photo: Jay Tanski, New York Sea Grant



New York Sea Grant provided real-time information on the track, intensity and aftermath of Hurricane Sandy via social media, when other outlets lost power. New York Sea Grant researchers have provided information and analysis to The New York Times, The Wall Street Journal, NBC News, ABC News, the Associated Press and Newsday, among others.

New York Sea Grant researchers measured the rate of Long Island estuaries' recovery after Sandy's storm surge caused a Wastewater Treatment Plant to release raw sewage from 1/2 million homes into the waterways. This research will provide emergency managers and municipalities with needed scientific data about seasonal nitrogen levels near the plant while upgrades to the facility are underway.



Photo: New Jersey Sea Grant

Destruction from Sandy in Mantoloking.

### Technical Assistance & Outreach

Delaware Sea Grant is developing a “Natural Hazards and Climate Adaptation Tool Kit for Delaware Communities” to assist municipal planning efforts. The Delaware Homeowners Handbook to Prepare for Natural Hazards helps Delaware residents brace for the next big storm.

Delaware Sea Grant extension staff captured footage of the storm tide flooding over three days and created a time-lapse video, illustrating the importance of homeowners being prepared, especially with regard to flood risk, as well as evacuation planning and procedures.

Maryland Sea Grant is conducting research and offers planning assistance to help coastal communities prepare for sea level rise and coastal flooding.

New Jersey Sea Grant's data from beach surveys after the storm showed that communities with wide beaches or a mature dune system suffered less damage than those with narrow beaches or no dune system. The information led to county workshops with community representatives, one-on-one meetings with coastal communities and the development of a manual to assist communities in their beach and dune nourishment planning.

New York Sea Grant's expert on barrier beaches helped the National Park Service (NPS) save \$6 million by providing information that led to the NPS deciding it was not wise to undertake a major beach restoration effort immediately after the storm.

### New Research

The National Sea Grant Office delivered rapid-response research funds to New York, New Jersey and Connecticut Sea Grant programs. To address more long-term issues, a collaborative partnership between FEMA Recovery Directorate and Sea Grant is underway to facilitate a connection between FEMA regional recovery coordinators and respective Sea Grant Extension agents and specialists.

To improve public understanding and awareness of natural hazards and associated risks, NOAA Sea Grant awarded a \$1.8 million grant to Sea Grant programs in Connecticut, New Jersey and New York to support the Coastal Storm Awareness Program. The funding is part of the Disaster Relief Appropriations of 2013, commonly referred to as the Sandy Supplemental. The research will enhance the Nation's ability to respond to disasters.

# Sea Grant in Action

## Climate Adaptation and Renewable Energy

Improving our ability to understand, plan for and respond to climate-driven challenges is one of Sea Grant's main priorities. Sea Grant is responsive to a growing demand for efforts to increase community resilience, awareness and preparation in the face of a changing climate. Sea Grant's continued support of Community Climate Adaptation Initiatives helps communities access the most current climate adaptation science and prepare for the long-term consequences of climate variability and change, demonstrating practical examples for other communities to follow.

Sea Grant increases community resilience to hazards by finding new solutions to challenging issues, developing tools and techniques, and increasing awareness of climate driven challenges, including extreme weather events, coastal storms, sea level rise, ocean acidification and integration of green infrastructure. Sea Grant specialists connect local stakeholders to the best science available and assist decision-makers in leading their communities through informed choices.

Sea Grant works to mitigate future climate impacts and increase community resilience using local renewable energy sources. Sea Grant's trusted reputation allows specialists to bring local community and stakeholder interest together, and to educate the public on the technology, opportunities and challenges of renewable energy research and deployment. Sea Grant's extensive legal network has clarified permit issues surrounding renewable energy projects.

- Ocean acidification is detrimental to shellfish and zooplankton, with both food web and economic implications. Based on a Washington Sea Grant research symposium, the governor established the Nation's first Blue Ribbon Panel on Ocean Acidification. Sea Grant staff coordinated working groups on science, adaptation and remediation, and education and outreach, spurring state agency action and addition of \$3.3M for acidification research in the state.
- Florida Sea Grant supported development of a new science-based prediction tool that can help the insurance industry more accurately assess hurricane damage risk. The research resulted in significant enhancements to the Florida Public Hurricane Loss Model, and also led Miami to establish new building codes to strengthen the exterior of residential structures.

Oregon Sea Grant assists development of renewable energy from the ocean waves and wind, while minimizing conflicts with other ocean uses. A partnership with Oregon State University researchers is working to enhance understanding of the social and environmental ramifications of wave energy. Oregon Sea Grant has also partnered with the Northwest National Marine Renewable Energy Center. Sea Grant outreach and extension activities aim to help the public understand the technology and issues surrounding marine renewable energy, focusing on the complex issues involved in wave energy siting and production.

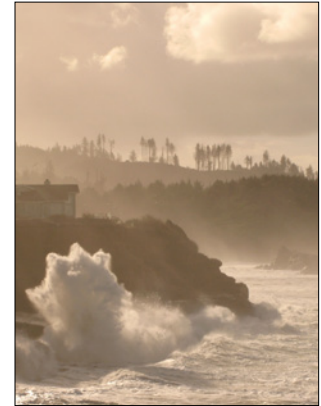
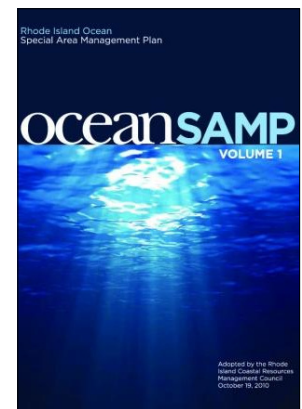


Photo: Joe Cone, Oregon Sea Grant

Rhode Island Sea Grant, with the National Oceanographic Partnership Program (NOPP) has developed the Ocean Special Area Management Plan (Ocean SAMP) project. A team of University of Rhode Island researchers collects data and establishes standards for use with existing and newly developed tools to evaluate the impacts of potential projects on the ocean environment. Ocean SAMP is a means of assessing the impacts of a broad range of offshore renewable energy resources projects on marine ecosystems and human activities.



## STEM consolidation response

Science, Technology, Engineering and Mathematics (STEM) education is a national goal which Sea Grant fosters at multiple levels, including the prestigious Sea Grant John A. Knauss Fellowships in marine policy, the NOAA Fisheries/Sea Grant Fellowships, graduate and undergraduate research support on Sea Grant projects, K-12 education programs and informal education for the public.

When the federal Committee on STEM education (CoSTEM) proposed its national strategy for all levels of education (NSTC 2013), the federal administration's budgets responded in both FY14 and FY15 with consolidation strategies (and

accompanying budgets) that would have effectively removed Sea Grant from its legislated role in education. In FY14, all education funds in Sea Grant were proposed for reassignment to the National Science Foundation (graduate and undergraduate education), the Department of Education (K-12 education) or the Smithsonian Institution (informal education). Resounding support from the Sea Grant network, Knauss Fellows and alumni, the education community and other stakeholders, and finally Congress, rescued STEM education in Sea Grant for the year. The FY15 federal budget did not remove education funding (Office of Science and Technology Policy, 2014), but NOAA's agency plan states that K-12 education and the NOAA Fisheries/Sea Grant Fellowships in Sea Grant will not be supported.

The Sea Grant model of integrating research, education and outreach excels in bringing ocean, coastal and Great Lakes science to the U.S. population. The “three-legged stool” on which Sea Grant is founded would topple without education. Sea Grant recognizes that in the 21st century environmental literacy is a fundamental component of an informed public, and STEM education enables people to understand scientific evidence and make knowledgeable decisions about environmental and resource issues.

Sea Grant continues to support programs in K-12 education. Sea Grant Educators work in coastal communities across the United States promoting ocean, coastal and Great Lakes science to children and lifelong learners through K-12 and informal education.

These professionals are uniquely qualified to facilitate the translation of science to all citizens, with expertise in both science (natural and/or social) and education (formal and/or informal). As Sea Grant invests resources in K-12 STEM education, Sea Grant Education professionals leverage additional resources through partnerships at local, state and national levels. Sea Grant's goal is to engage and excite young people, their families and teachers to learn more about the ocean, coasts and Great Lakes. These students will become the next generation of experts committed to the wise use of our Nation's coastal resources, and well-informed decision making citizens in their community.

Sea Grant will continue to build evidence of success and strengthen evaluation methods to provide significant indicators of K-12 and informal education impact. Sea Grant STEM impacts include these examples, showing the scope of audiences and methods for Sea Grant education:

- In 2012, Florida Sea Grant instructed 519 people in Master Naturalist Program courses. Graduates of this program included 52 business owners, 132 teachers, 15 resource managers and 4 local elected officials. A statewide survey of program graduates revealed the program helped 7% acquire jobs, 13% obtain volunteer positions, and 3% obtain pay raises.
- The University of Southern California Sea Grant's Parent Child Education Program (PCEP) was developed to address parents' concerns that they had very little understanding of the connection inland communities have through the watershed to the coastal ocean. In 2012 the PCEP served 15 families who all reported increased knowledge about their connection to the ocean and made commitments to reduce their impact (validated through post-program surveys).
- The Oregon Coast Aquatic and Marine Partnership (OCAMP) delivers high-quality, current ocean sciences content to teachers. In 2011 this Oregon Sea Grant partnership connected teachers with 44 working ocean scientists to deliver classroom- and field-based science education to almost 1,000 K- through 10th-grade students. Students of OCAMP teachers are benefiting: 81 percent of them meet or exceed state test scores in science and math, compared to 64 percent of students

Photo: Florida Sea Grant



Students analyze water quality using math and chemistry principles learned in the aquaculture curriculum from Florida Sea Grant.



Students from Murray La Saine Elementary School participate in South Carolina Sea Grant's *Seeds To Shoreline* program.

Photo: Susan Ferris Hill, South Carolina Sea Grant

# Sea Grant in Action

in the same district whose teachers are not in the program. Meanwhile, 15 OCAMP teachers have submitted portfolios for National Board Certification--half of them reporting that they would not have done so without their OCAMP experience. All 32 teachers showed improved abilities to design appropriate science lessons, to create conditions for communicating science content and concepts, and to make explicit connections across content areas.

- Illinois-Indiana Sea Grant helped foster a grant that educated people from 40 states, as well as Egypt, Greece, Brazil and Canada about proper disposal of unwanted medications. This education effort has resulted in 1 million people educated on the topic of unwanted medicine disposal and over 2.2 million pills collected.
- South Carolina Sea Grant's From Seeds to Shoreline (S2S) program engages students in growing salt marsh plants to vegetate areas along the coastline. Classroom lessons, field trips and presentations about the salt marsh ecosystem supplement the restoration process. The program has expanded to three inland and seven coastal schools. Participating teachers indicated that their knowledge increased, and schools were empowered to seek additional funds to support the effort.

## Sea Grant's Social Science Initiative

Sea Grant's Social Science Initiative aims to improve the interactions among social, economic and environmental systems in U.S. coastal areas. Social science research is the process of describing, explaining and predicting human behavior. With ties to over 300 U.S. universities, Sea Grant is able to bring social science research to coastal communities. To help foster informed decisions, Sea Grant provides information on the value of coastlines and coastal amenities and cash flow through communities. Sea Grant's social science research shows how people perceive and value coastal amenities, and how to help existing coastal businesses, increase community resilience, and encourage sustainable coastal development.

The number of Sea Grant social science research projects increased by nearly 50% between 2010 and 2012. This initiative allowed Sea Grant to increase its efforts in coastal economics, public perceptions, planning, sociology, administration, anthropology,



Photo: Connecticut Sea Grant

Connecticut Sea Grant research on kelp culture techniques, support for product testing, and extension assistance with permitting resulted in the first permitted kelp farm and harvest in Long Island Sound, with over 120 pounds of kelp sold to restaurants in New York City.

market research, program evaluation, geography, law and leadership development.

## Economic Impacts

Michigan Catch & Cook promotes Great Lakes sport fishing and dining through partnerships between charter boat operators and restaurants, where fishers can have their catch prepared by professional chefs. A website ([www.micatchandcook.com](http://www.micatchandcook.com)) lists local partners so charter fishing clients can enjoy a unique dining experience that supports the local coastal community.

Florida Sea Grant worked with a private company to create a coupled fish aquaculture-wetland plant production system. Over 100,000 plants were produced by the system and used to restore six acres of coastal wetlands. In just the first year the system was also effective in producing more than 2,500 Florida Pompano, a recreationally important fish.

Education and training are important to economic development:

- Hawaii Sea Grant helped provide job training in marine resource science to retain local workforces.
- Florida Sea Grant worked with state government and local fishing clubs to train anglers how to minimize barotrauma mortality among bycatch.
- Minnesota and Wisconsin Sea Grants used science, history and handheld game apps in an interactive program to communicate the value of healthy estuaries, focusing on the newest National Estuarine Research Reserve on Lake Superior.

### Partnerships

Partnerships at all levels are important for NOAA and Sea Grant's mission within academia, government, non-profit and private sectors.

In 2014, two NOAA Sea Grant Programs were awarded prestigious Department of Interior Partners in Conservation awards for their work. Rhode Island Sea Grant helped develop national environmental monitoring tools for offshore renewable energy development. These tools were delivered to the U.S.

Bureau of Ocean Energy Management in 2012, and help inform national standards development for the industry. Michigan Sea Grant led a multi-partner project to construct fish spawning habitat in the Detroit River, leading to the creation of the Huron-Erie Corridor Initiative. The initiative used research suggesting that water flow, depth and temperature are important in the placement of spawning reefs. The plan increased habitat for lake whitefish, lake sturgeon, walleye and more than 14 other native fish populations. By collaborating across institutional and geographic boundaries, Sea Grant is able to leverage its talents, capabilities and resources and expand the scope of their efforts.

Sea Grant partners with other NOAA line offices and programs to leverage existing knowledge and resources:

- NMFS: NOAA Fisheries/Sea Grant Fellowships, Aquaculture National Strategic Initiative, and Fisheries Training
- NOS: Sea Grant contributes to Coastal Storms Program
- NWS: Weather-Ready Nation (WRN): Sea Grant multimedia preparedness messages

Photo: Michigan Sea Grant



Huron-Erie Corridor Initiative.



Photo: Laura Oremland, NMFS

A Washington Sea Grant coastal hazard specialist, in collaboration with the Natural Resources Department for the Lower Elwah Klallam Tribe and the U.S. National Park Service, leads a tour of Elwah Dam removal and restoration sites for the NOAA NMFS /Sea Grant Graduate Fellowship Program in Population and Ecosystem Dynamics.

# State of the Sea Grant Network

The Board supports rebalancing of budget allocations, Sea Grant reauthorization, the Planning, Implementation and Evaluation process (PIE) and the new 2014-2017 Strategic plan focus areas.

## Rebalancing the National Sea Grant College Program

In 2010 the Board was asked to take a fresh look at Sea Grant's budget allocation policy with the objective "To develop policies and criteria for allocating Sea Grant funding resources that will be consistent with Sea Grant's legislative authority and will maximize the effectiveness, efficiency, and impact of the National Sea Grant College Program." Two joint subcommittees, including members from the Board, the SGA, and the NSGO, addressed this issue. The first subcommittee reported back to the Board in September 2011 with a framework for allocation, and the second subcommittee developed that framework into recommendations for implementation in 2013.

The most significant recommended policy change was to shift the primary determinant of base funding to coastal shoreline and population. The concept of a minimum level of base funding was reaffirmed and it was also recommended that 75% of the Sea Grant appropriation should be dedicated to base, merit and regional funding with the remainder to be set aside to support national activities. The report was transmitted to the Sea Grant Network and followed by an extensive dialogue on whether and how to implement the recommendations. Based on that discussion, the implementation plan was modified to ensure that no Program would lose base funding in order to increase another Program's base. Instead, movement toward coastal shoreline- and population-based funding would only occur as the overall pool of base funding increased. The significant increase in the FY 2014 appropriation for Sea Grant provided just that opportunity, and the process of rebalancing the allocation of funds across the Sea Grant Network was initiated.

Thus, the goals and objectives for the distribution of funds in the National Sea Grant College Program for FY 2014 and beyond are as follows:

### Goals

- Bring the Sea Grant network to a consistent level of excellence nationwide.
- Foster a high level of innovation, educational and scientific quality, and program impact.
- Support Sea Grant's legislative mandate to promote the wise use and conservation of coastal and marine resources.
- Support NOAA's mission priorities.

### Objectives

- Provide an equitable, rational, transparent and flexible allocation plan that promotes performance, healthy competition and partnerships.
- Provide a stable national infrastructure of university-based programs that accomplish Sea Grant's mission effectively and efficiently.



Students from the 'Fundamentals of Shellfish Farming' class hike out to the tidal flats to tour a shellfish aquaculture operation at Crowe's Pasture in Dennis, Cape Cod, Massachusetts.

Photo: Woods Hole Sea Grant

## Reauthorization

The National Sea Grant College Program Act was passed by Congress in 1966 and was last reauthorized in 2008. Legislation was introduced in the 113th Congress to strengthen and amend the program. Significantly, the recommended authorization of appropriations includes exactly the same five-year amounts from 2015-2020 as were recommended in 2008 for the years 2009-2014. Appropriated Program funds have lagged behind projected sustainable levels of support, with nearly level funding until FY14's roughly \$5 million increment. In addition to base support, the proposed legislation establishes an annual fund of \$6 million for priority topics: research on aquatic invasive species, oyster diseases and human health risks, harmful algal blooms, aquaculture, fishery extension activities and activities focused on coastal resilience and U.S. working waterfronts.

To manage the Program, the reauthorization bill recommends an increase in support for the National Sea Grant Office, to 5.5% of the appropriation; plus authorization for the NSGO to use the Inter-government Personnel Act to take on short-term appointees from the Sea Grant Colleges. Despite the efforts of the small National Sea Grant Office, the current 5% cap has limited the staff's ability to effectively administer and represent the Program. No other NOAA division has an administrative cap mandated by Congress. The Advisory Board maintains that removal of the administrative cap would facilitate the greater range of support services needed at the national level.

The reauthorizing legislation seeks to solidify the John A. Knauss Marine Policy Fellowship. The amendments also change the frequency of the Advisory Board's reporting to Congress to every three years rather than biennially. Additionally, the language requires the Board to indicate progress made towards meeting the priorities identified in the strategic plan currently in effect. At this writing Sea Grant Reauthorization S 2030 has been passed out of Committee for full Senate consideration, with several steps remaining to be accomplished before passage.

### New Focus Areas, Strategic Plan and Site Reviews

Implementation of the 2014-2017 Sea Grant Strategic Plan has begun through state Sea Grant Program projects. The Sea Grant network plan aligns with the Department of Commerce, NOAA Next Generation, and the NOAA Office of Oceanic and Atmospheric Research Strategic Plans. The 2014-2017 Sea Grant focus areas are: Healthy Coastal Ecosystems, Sustainable Fisheries and Aquaculture, Resilient Communities and Economies, and Environmental Literacy and Workforce Development.

In 2014-2015 Sea Grant programs will again be evaluated during Program Site Reviews and Performance Review Panels. During the site reviews in 2010-2011, all Sea Grant Programs were found to be "Successful" with all recommendations formally addressed.

### Sea Grant John A. Knauss Fellowship

In 2014 the Sea Grant John A. Knauss Fellowship hit an important milestone selecting its 1000th Fellow. The fellowship seeks qualified candidates from all U.S. accredited institutions of higher education in the U.S. and U.S. Territories including students from minority serving institutions and those that are economically disadvantaged. The fellowship, established in 1979, matches highly qualified graduate students with "hosts" in the legislative and executive branch of government located in the Washington, D.C. area, for a one year paid fellowship. Learn more about the current fellows and alumni at: <http://seagrants.noaa.gov/FundingFellowships/KnaussFellowship.aspx>



2013 Sea Grant Knauss Class with NOAA Administrator, Kathy Sullivan

Photo: Derek Parks

# Emerging Opportunities for Sea Grant

Sea Grant has identified emerging needs in research, education and outreach for the 2014-2017 Focus Areas, with accompanying opportunities to increase knowledge and understanding of these areas.

## Healthy Coastal Ecosystems

**Emerging Contaminants:** Pharmaceuticals and personal care products (PPCPs) help people and animals live healthier lives, but their use comes with consequences for aquatic systems. There is growing evidence that PPCPs act as endocrine disruptors or human carcinogens, and contribute to antibiotic resistance.

**Aquatic Invasive Species:** Aquatic invasive species are among the most pervasive problems in the marine and Great Lakes environments. Since it is practically impossible to eradicate a species once it has become established, efforts are ongoing to reduce numbers, develop early detection tools and educate the public on control measures and practices.

**Restoration of Coastal Ecosystems:** Evidence is mounting that intact ecosystems help increase long term resilience of coastal environments and provide a buffer to the impacts of coastal storms. Restoration of ecosystems such as wetlands not only buffers communities from destructive coastal storms, but also contributes to the overall reduction of greenhouse gases.

**Water Resources:** Rapid development, climate change and other human activities are leading to water quality degradation, increased demands on water supplies, changes to fisheries stocks, wetlands loss, proliferation of invasive species and other impacts. It is essential for decision-makers to understand the interconnectedness of these systems to maintain vital habitats and restore ecosystems.

## Resilient Communities and Economies

**Climate Change Adaptation and Coastal Resiliency:** Resiliency applies to many topics within Sea Grant's portfolio, including resilient coastal economies and community resilience to hazards such as coastal storms, coastal inundation and erosion. Sea Grant can determine areas of vulnerability and need, develop adaptation plans, conduct climate change monitoring and provide legal advice on sea level adaptation policies. Sea Grant can also help build the capacity of small, rural communities to deal with climate change.

**Tourism:** Tourism brings income, tax revenues and jobs. It is important to guide the industry towards providing a benefit to the environment as well. Tourism can provide financial return for those in commercial fishing and aquaculture, and can also play a role in connecting seafood consumers with producers, resulting in an economic engine that also pays benefits in educating citizens about the important environmental issues.

**Coastal Development:** Coastal population growth has led to increasing development, recreation, business activities and use of waterfronts along with increased pressure on coastal environments to retain the functions to support these communities. Sea Grant supports diverse and vibrant economies, while maintaining ecosystems resilient to coastal hazards and climate change.

## Sustainable Fisheries and Aquaculture

**Seafood Traceability:** In the U.S., food-borne diseases are estimated to cause 76 million illnesses, 325,000 hospitalizations and 5,000 deaths each year. Developing effective traceability tools will help ensure a safe seafood supply and promote the development of profitable local markets by helping consumers connect to their food sources.



## Environmental Literacy and Workforce Development

**Education Research:** Developing the most effective means of delivering ocean literacy content in marine education and outreach requires expanding and utilizing the educational research base. Educational research can illuminate effective instructional techniques, student and public misconceptions and gaps in knowledge. Research adds to what is known about a field, helps to improve education practice, and can influence policy.

**Environmental Literacy Impacts:** K-12 STEM education in Sea Grant is strong and diverse, with a national scope and elements addressing all levels of CoSTEM education fostered by the Administration. Evidence-based support documenting impacts of existing program components is needed, and long-term tracking of program participants can demonstrate how Sea Grant education opportunities are used to achieve workforce development and larger Sea Grant program goals.

## Cross-Cutting Opportunities

**Social Science:** Sea Grant's social science initiative improves our understanding of integrated social, economic and environmental systems in our coastal areas. Describing, explaining and predicting human behavior enables Sea Grant to make a difference in coastal communities.



Photo: Amanda Cording, Lake Champlain Sea Grant



Photo: Phyllis Grifman, USC Sea Grant



Photo: Ohio Sea Grant



Photo: Louisiana Sea Grant

# 2014 Recommendations

To continue the progress made toward addressing the challenges and opportunities of our oceans, coasts and Great Lakes, the Board recommends the following.

Recommendation	Rationale
<p>1. Sea Grant should continue to focus on advancing national priorities while solving problems on a local and regional basis. This national focus must continue to emphasize partnerships and collaborative efforts within the Sea Grant network and with other federal, regional, state and local agencies and organizations, without loss of sensitivity to community stakeholders' needs.</p>	<p>There is ample evidence of how state initiatives contribute to the development and enhancement of national priorities and progress.</p> <ul style="list-style-type: none"> <li>• The Clean Marinas program is a well-known example of a national priority implemented locally. It provides marinas and boaters the opportunity to protect natural resources, and is currently active in 16 states.</li> <li>• Connecticut, New Jersey and New York programs support social science research to improve community understanding and response to coastal storm hazard information as part of Sea Grant's Coastal Storm Awareness Program.</li> <li>• The Ocean Special Area Management Plan (Ocean SAMP), developed by Rhode Island Sea Grant along with the State and the University of Rhode Island, proactively plans for the wise use of Rhode Island's offshore waters. The planning process developed and analyzed scientific data, mapped ocean uses, and incorporated oral histories from the Narragansett Indian tribe to ensure a beneficial plan for all stakeholders.</li> </ul> <p>These and other efforts demonstrate the value of continuing state-national projects for meeting Sea Grant goals.</p>
<p>2. Sea Grant should continue to support tracking and reporting of the cumulative, measurable impacts of Sea Grant activities toward the achievement of national goals.</p>	<p>Sea Grant is based on a federal legislative mandate for research, education and outreach, all of which require ongoing demonstrations of effectiveness, responsiveness to local, state, regional and national needs, and awareness of additional opportunity for growth. The Planning, Implementation and Evaluation (PIE) process documents program impacts and is the public's view of Sea Grant functionality (See Appendix C). Accountability demands continued work toward enhancing impacts and then adequately measuring and reporting them. Modifications in the external evaluation process and its components will be tested in the next biennium.</p>
<p>3. The continued viability of Sea Grant relies on adjustment of budget equity among programs, while maintaining program review and merit considerations. The Sea Grant network should embrace steps toward balancing the federal funding among programs, with a goal of assuring all programs a minimum level of base funding.</p>	<p>Sea Grant has received level funding in the past but increments in funding in 2014 will allow the program to make adjustments in internal allocation of funds. This is necessary for collective success of the national network and state partnerships, and allows for enhanced merit funding. Increments in Sea Grant funding in the future will support further adjustments for program preservation. Balancing funding toward equity within the program is based on strengthening research funding to allocate ~40% of federal funds for research, instituting a more equitable distribution of federal dollars, and enabling the NSGO to effectively administer the program.</p>
<p>4. Sea Grant should strengthen the focus area in Environmental Literacy and Workforce Development by demonstrating how Sea Grant K-12 and informal STEM education programs and targeted graduate Fellowships are mission critical, respond to national priorities, and result in evidence-based accomplishments and impacts.</p>	<p>The Sea Grant model of integrating research, education and outreach excels in bringing ocean, coastal and Great Lakes science literacy to the U.S. population. The administration's proposed budget for FY2015 recommends eliminating K-12 STEM education efforts, including teacher professional development, from Sea Grant. This recommendation does not recognize either the critical links between the development of environmental literacy from a young age and a robustly educated workforce and informed citizen decision makers or the past success of the program. With a new Focus Area in Environmental Literacy and Workforce Development, Sea Grant should strategically strengthen its role in education, with special emphasis on the impact of Sea Grant K-12 and informal STEM education.</p>

# Appendix A: Sea Grant Programs

## Sea Grant College Programs

Alaska Sea Grant  
California Sea Grant  
Connecticut Sea Grant  
Delaware Sea Grant  
Florida Sea Grant  
Georgia Sea Grant  
Hawai'i Sea Grant  
Illinois-Indiana Sea Grant  
Louisiana Sea Grant  
Maryland Sea Grant  
Maine Sea Grant  
Michigan Sea Grant  
MIT Sea Grant  
Minnesota Sea Grant  
Mississippi-Alabama Sea Grant Consortium  
North Carolina Sea Grant  
New Hampshire Sea Grant  
New Jersey Sea Grant Consortium  
New York Sea Grant  
Ohio Sea Grant

Oregon Sea Grant  
Puerto Rico Sea Grant  
Rhode Island Sea Grant  
South Carolina Sea Grant Consortium  
Texas Sea Grant  
Virginia Sea Grant  
Washington Sea Grant  
Wisconsin Sea Grant

## Sea Grant Institutional Programs

University of Southern California Sea Grant  
Woods Hole Sea Grant  
Pennsylvania Sea Grant

## Sea Grant Coherent Area Programs

Guam Sea Grant  
Lake Champlain Sea Grant

## Sea Grant Projects

National Sea Grant Law Center  
National Sea Grant Library



- We are pleased to report that Virginia Sea Grant has met the requirements for formal designation as a Sea Grant College Program, the highest level obtainable.

# Appendix B: References and Reports

National Sea Grant Allocation Committee #3

[http://seagrant.noaa.gov/Portals/0/Documents/who\\_we\\_are/leadership/board/reports/2013/Allocation%20Committee%203%20Recommendations.pdf](http://seagrant.noaa.gov/Portals/0/Documents/who_we_are/leadership/board/reports/2013/Allocation%20Committee%203%20Recommendations.pdf)

National Science and Technology Council. (2013). Federal STEM Education 5-year strategic plan.

[http://www.whitehouse.gov/sites/default/files/microsites/ostp/stem\\_stratplan\\_2013.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/stem_stratplan_2013.pdf)

NOAA Budget Estimates Fiscal Year 2015. STEM proposal on page 569 (OAR 147)

[http://www.corporateservices.noaa.gov/~nbo/docs/NOAA\\_FY15\\_CJ\\_508%20compliant.pdf](http://www.corporateservices.noaa.gov/~nbo/docs/NOAA_FY15_CJ_508%20compliant.pdf)

NOAA Sea Grant Planning, Implementation and Evaluation Process Documents

[http://seagrant.noaa.gov/Portals/0/Documents/network\\_resources/reporting\\_evaluation/Sea%20Grant%20Planning,%20Implementation,%20and%20Evaluation%20System%20-%20April%202014%20Revision.pdf](http://seagrant.noaa.gov/Portals/0/Documents/network_resources/reporting_evaluation/Sea%20Grant%20Planning,%20Implementation,%20and%20Evaluation%20System%20-%20April%202014%20Revision.pdf)

Office of Science and Technology Policy (2014). Preparing Americans with 21st Century Skills Science, Technology, Engineering, and Mathematics: (STEM) Education in the 2015 Budget.

[http://www.whitehouse.gov/sites/default/files/microsites/ostp/STEM-ED\\_FY15\\_Final.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/STEM-ED_FY15_Final.pdf)

Rebalancing Sea Grant's Base Funding Resources – FY2014 and Beyond

[http://seagrant.noaa.gov/Portals/0/Documents/who\\_we\\_are/legislation/SeaGrantAllocationPolicyFY2014andBeyond\\_9\\_23\\_14.pdf](http://seagrant.noaa.gov/Portals/0/Documents/who_we_are/legislation/SeaGrantAllocationPolicyFY2014andBeyond_9_23_14.pdf)

Sea Grant Laws, Regulations and Policies

<http://seagrant.noaa.gov/WhoWeAre/Laws,RegulationsandPolicies>



Photo: Michael Chambers, N.H. Sea Grant/UNH Cooperative Extension



Photo: Washington Sea Grant



Photo: April Turner, South Carolina Sea Grant

# APPENDIX C: SEA GRANT PROGRAM IMPACTS

The Sea Grant network enables NOAA and the Nation to tap the best science, technology and expertise to balance human and environmental needs in coastal communities. The NOAA Sea Grant website includes a searchable database of Sea Grant impacts and accomplishment to learn more about our work.

<http://seagrant.noaa.gov/WhatWeDo/ImpactsandAccomplishments.aspx>

The screenshot displays the NOAA Sea Grant website's 'Impacts and Accomplishments' page. At the top, there is a navigation menu with options: Home, Who We Are, What We Do (selected), Where We Work, How We Work, Funding & Fellowships, News, and Network Resources. Below the menu is a search bar labeled 'SEARCH SEA GRANT WEBSITE'. The main content area is titled 'Sea Grant Impacts and Accomplishments' and includes a brief description of the network's mission and a link to search instructions. A search section titled 'Search Sea Grant Impacts & Accomplishments' features several dropdown menus for 'Region / State' (set to '- ALL -'), 'Year' (set to '- All Years -'), 'Focus Area / Cross Cutting Goal' (set to '- All -'), and 'Impact/Accomplishment' (set to '- Both -'). Below these are input fields for search terms, an 'Add Search Term' button, and 'Search' and 'Clear Search' buttons. A note at the bottom of the search section states: 'We are continually working to improve our search. If you have any questions or suggestions please fill out this form.' The footer contains the text 'SCIENCE SERVING AMERICA'S COASTS', 'National Sea Grant College Program', the address '1315 East-West Highway | Silver Spring, MD 20910 | 301-734-1066', a 'CONTACT US' link, and social media icons for Facebook, Twitter, YouTube, and LinkedIn. At the very bottom, there is a footer with links for 'Office of Oceanic and Atmospheric Research | NOAA | Department of Commerce | Disclaimer | Privacy Policy | Freedom of Information Act (FOIA) Information Quality USA.gov | Content Additions'.

# Appendix D – 2014 Performance Measures and Metrics

**National Sea Grant College Program  
FY2014 Performance Measures and Metrics  
As a result of Sea Grant activities, the Nation achieved...**

Economic Impacts		Research	
\$450M	In economic impact	576	Peer-reviewed publications
6,500	Businesses created or sustained	<b>Safe and Sustainable Seafood Supply</b>	
17,500	Jobs created or sustained	23,000	Fishers adopt responsible harvesting techniques
5	Patents	53,000	Stakeholders modify practices based on increased knowledge of safety, sustainability, and health.
<b>Healthy Coastal Ecosystems</b>		1,750	Hazard analysis & critical control points (HACCP) certifications
460	Ecosystem-based management (EBM) tools, technologies, and information services	<b>Sustainable Coastal Development</b>	
521	EBM tools used by Sea Grant customers	220	Communities implemented sustainable development practices/policies
4,000	Resource managers use EBM	<b>Education, Outreach and Extension</b>	
21,700	Acres of degraded ecosystems restored	290,000	Volunteer hours
<b>Hazard Resilience in Coastal Communities</b>		760	Undergraduate students supported
1,050	Trainings to improve resilience	910	Graduate students supported
300	Communities improved resilience	8,200	Workshops, trainings, and presentations

[pier.seagrant.noaa.gov](http://pier.seagrant.noaa.gov)



Photo: Rebecca Zerber, N.H. Sea Grant



Photo: Louisiana Sea Grant



Photo: Anna McCarmey, Pennsylvania Sea Grant



Photo: Delaware Sea Grant



Photo: Cindie Powell, Texas Sea Grant



Photo: California Sea Grant

**The State of Sea Grant 2014: Impacts, Challenges, Opportunities**  
Biennial Report to Congress by the National Sea Grant Advisory Board

November 2014



Photo: Illinois-Indiana Sea Grant

Sea Grant

