



National Sea Grant Advisory Board  
June 2018

# THE STATE OF SEA GRANT 2018 BIENNIAL REPORT TO CONGRESS



The National Sea Grant Advisory Board is the National Sea Grant College Program's Federal Advisory Committee (FAC). The Board advises NOAA and the National Sea Grant College Program on strategies to address the Nation's highest priorities in terms of the understanding, assessment, development, management, utilization and conservation of ocean, coastal and Great Lakes resources.

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On the cover (clockwise from upper left):

Texas Sea Grant helps fishermen recover vessels that were damaged or displaced by Hurricane Harvey

Delaware Sea Grant trains teachers while aboard a research vessel during a summer professional development program

California Sea Grant monitors water as part of a restoration project on a tributary of the Russian River

Wisconsin Sea Grant trains professionals on salmon spawning, part of technical advice to the world's largest aquaponics facility

# THE STATE OF SEA GRANT

Dear members of the United States Congress,

On behalf of the National Sea Grant Advisory Board (the Board), I am pleased to present to you The State of Sea Grant 2018 Biennial Report to Congress, developed by the Board in accordance with authorizing legislation in 2008. The National Sea Grant College Program (Sea Grant) continues to provide relevant, useful, valuable, and timely science, extension, and education to coastal and Great Lakes regions that result in more jobs and safer and more productive communities. Almost half of the U.S. population lives within 50 miles of the coast, and these numbers are growing. The challenges this nation will face along our coasts in the next 50 years will differ from those of the last 50 years, owing largely to the effects of a changing climate including more extreme storms, sea-level rise, changing ocean and Great Lakes temperatures, and ocean acidification.

Sea Grant continues to be well-positioned to address these challenges. The Sea Grant model of organizational effectiveness through research, extension, and education activities leads to expert driven and stakeholder engaged action that is economical, socially equitable, and ecologically sound—all of which are necessary to tackle these thorny issues. Sea Grant is founded on strong partnerships with academia, private industry, local communities, and state and federal agencies that leverage additional expertise and funding to achieve Sea Grant’s mission “to enhance the practical use and conservation of coastal, marine, and Great Lakes resources in order to create a sustainable economy and environment.” The recommendations in this report will advance this important work.

Sea Grant’s recognized leadership in aquaculture development and research is a great example of how investments in cutting edge research, partnerships, and local engagement through Sea Grant lead to job creation, growing the U.S. economy, and reducing the significant U.S. trade deficit in seafood. Sea Grant is also actively involved in implementing the Weather Forecast Research and Innovation Act of 2017 by playing a substantial role in coastal disaster and emergency preparedness to help reduce impacts from extreme weather events and plan for future events.

We are grateful for the strong support that Congress continues to provide to Sea Grant through restoring administrative budget cuts as well as the excellent partnership between Congress and Sea Grant through the impactful John A. Knauss Marine Policy Fellowships. Now is the time to reaffirm this critical support by reauthorizing the Sea Grant program so it can continue to enhance the economic and environmental vitality of our nation’s ocean, coast, and Great Lakes resources and communities.

Sincerely,



Amber Mace Ph.D.  
Chair, National Sea Grant Advisory Board

# SEA GRANT PROGRAMS

Sea Grant is made up of 33 university-based programs in every coastal and Great Lakes state as well as in Guam and Puerto Rico. Additionally, the National Sea Grant Law Center and National Sea Grant Library serve as a resource to the entire Sea Grant network. The National Sea Grant Office is based at headquarters for the National Oceanic and Atmospheric Administration (NOAA) in Silver Spring, Maryland.



Alaska Sea Grant  
California Sea Grant  
Connecticut Sea Grant  
Delaware Sea Grant  
Florida Sea Grant  
Georgia Sea Grant  
Guam Sea Grant  
Hawai'i Sea Grant  
Illinois-Indiana Sea Grant  
Lake Champlain Sea Grant  
Louisiana Sea Grant  
Maine Sea Grant  
Maryland Sea Grant  
Massachusetts Institute of Technology (MIT) Sea Grant

Michigan Sea Grant  
Minnesota Sea Grant  
Mississippi-Alabama Sea Grant  
New Hampshire Sea Grant  
New Jersey Sea Grant  
New York Sea Grant  
North Carolina Sea Grant  
Ohio Sea Grant  
Oregon Sea Grant  
Pennsylvania Sea Grant  
Puerto Rico Sea Grant  
Rhode Island Sea Grant

South Carolina Sea Grant Consortium  
Texas Sea Grant  
University of Southern California (USC) Sea Grant  
Virginia Sea Grant  
Washington Sea Grant  
Wisconsin Sea Grant  
Woods Hole Sea Grant  
  
National Sea Grant Law Center  
National Sea Grant Library

# EXECUTIVE SUMMARY

The State of Sea Grant 2018 is the Biennial Report to Congress from the Board as mandated by reauthorization of Sea Grant in 2008 [PL 110-394]. This report introduces what Sea Grant accomplished in 2016-17 with federal and matching investments.

In the past, this printed report was designed to stand alone as a comprehensive summary of Sea Grant's activities and plans. For 2018, this shorter report is designed to be a gateway to the excellent resources currently available both in print and online.

All recommendations made in the 2016 Biennial Report have been met by Sea Grant. In response, Sea Grant (1) completed a Network Partnership Analysis; (2) developed a framework to set boundaries, goals, and a path for growth of the NOAA/Sea Grant Liaisons program; (3) established a Diversity, Equity, and Inclusion Working Group and is assessing Sea Grant's investment in diversity; (4) developed a strategy through the Sea Grant Education Network to advance environmental literacy for the next ten years and is testing new impact metrics; and (5) conducted visioning efforts that have enabled 10 topical groups to construct visions for the future based on input from within and outside of Sea Grant.

Within the Sea Grant organization, as of this writing, 19 national office staff, 33 university-based state programs, 881 extension staff and educators, 1,471 scientists, and at least 2,958 partners are funded/leveraged to work together cooperatively to reach program goals. Sea Grant focused its work in the past two years on sustainable fisheries and aquaculture, resilient communities and economies, healthy coastal ecosystems, and workforce development. These Focus Areas were addressed in creative and efficient ways, using a full catalog of science and communication skills. Sea Grant advanced national priorities while solving problems locally and regionally, emphasizing partnerships, meeting stakeholder needs, and using feedback from end-users to inform research.

Sea Grant continues to evolve through a rigorous evaluation process. As a result of the last quadrennial review, Lake Champlain Sea Grant was advanced to Institutional Program status. This report includes the following recommendations for Sea Grant to undertake as it continues to grow and strive toward excellence. Sea Grant should expand its capacity in and continue to (1) support implementation of its Network Visioning; (2) continue efforts to enhance diversity, equity and inclusion throughout the network; (3) add an assessment of the National Sea Grant Office and the Sea Grant program overall to its program review process; and (4, 5) build greater awareness of Sea Grant's substantial roles in aquaculture and coastal disaster and emergency preparedness.

Sea Grant should take advantage of emerging opportunities and address both current and future challenges.

# RESPONSES TO 2016 RECOMMENDATIONS

In the 2016 biennial report on The State of Sea Grant, the Board made several recommendations to the Sea Grant. Sea Grant's efforts to implement the recommendations of the Board are below.

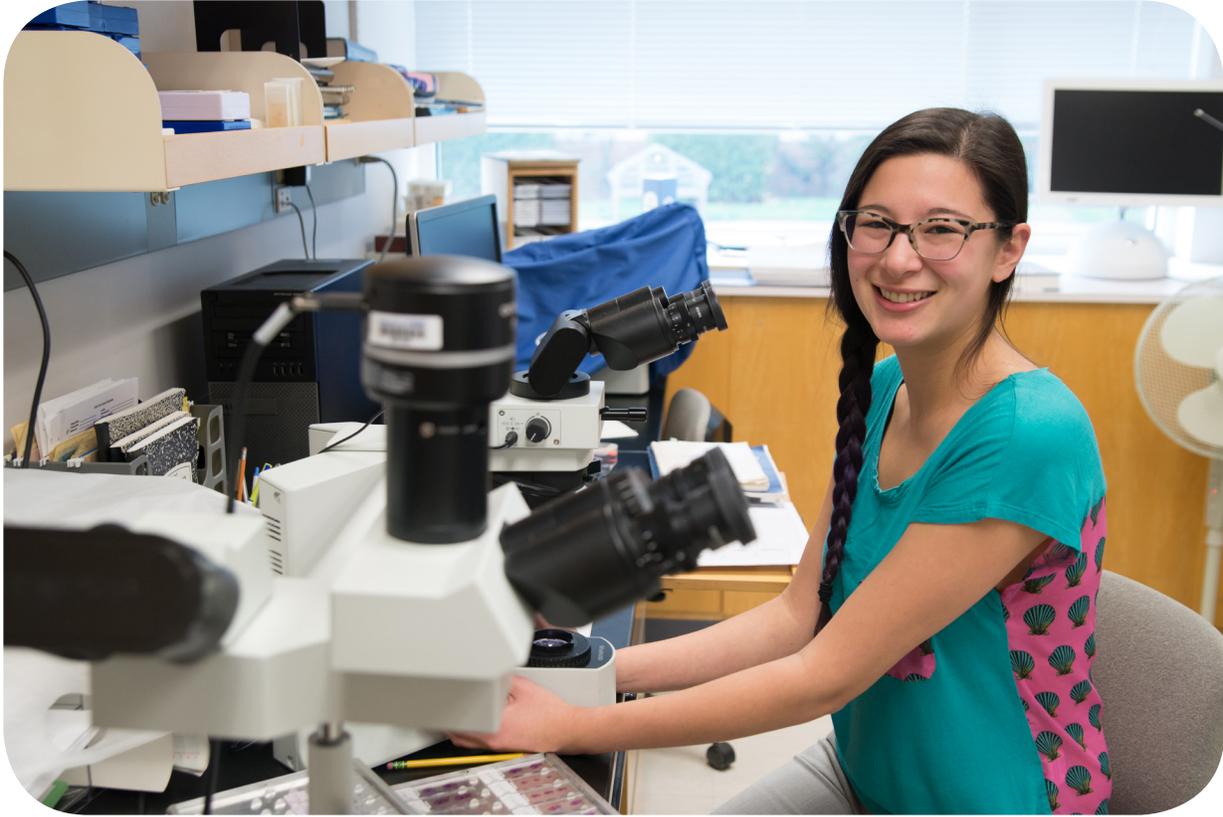


Photo: Virginia Sea Grant

**Recommendation One:** Sea Grant should seek partnerships with more programs in NOAA to build on the existing investments and reputation of the Sea Grant Program.

**RESPONSE:** In early FY17, the National Sea Grant Office (NSGO) completed a Network Partnership Analysis and identified existing Sea Grant network partners and opportunities for new or more effective partnerships within and beyond NOAA. The analysis showed that Sea Grant has nearly 3,000 unique partners, including over 1,000 partnerships with private industries, state and federal agencies, every NOAA line office, and over 330 projects with individual NOAA programs outside of Sea Grant. These partnerships bring additional expertise and leveraged funding to help Sea Grant and its NOAA partners reach their goals. Identifying and building more high-value, high-return partnerships is a priority for the NSGO.

**Recommendation Two:** The NSGO should support the expansion of the Sea Grant Liaison Program in NOAA offices, laboratories, and programs, based on the recommendations of the Board in their 2016 Liaison Subcommittee Report.

**RESPONSE:** Sea Grant and its NOAA partners jointly fund 13 NOAA/Sea Grant Liaison positions that facilitate integration of NOAA research and end-user needs through the Sea Grant network. This significant investment shows confidence and support of Sea Grant's unique role in the application of research through extension and the feedback from end-users to researchers. Based on the recommendations from the Board, the NSGO has been developing a framework for existing and future NOAA/Sea Grant Liaisons. An Implementation Committee has provided input for a framework that sets boundaries and goals and a path for the program's continued growth.

**Recommendation Three:** Sea Grant should continue to enhance diversity and inclusion throughout the network so that its workforce, programming, and materials are more representative of the nation as well as the audiences it serves.

RESPONSE: Sea Grant’s current strategies to embrace Diversity, Equity and Inclusion (DEI) include staff professional development, recruitment, and retention of professionals with diverse backgrounds, life experiences, and perspectives. Research, extension, and education programming are being designed to serve the needs of all coastal communities. For example, an Undergraduate Population and Ecosystem Dynamics Workshop competition will be funded in 2018-19 by Sea Grant and the National Marine Fisheries Service (NMFS), with cooperation of NOAA’s Living Marine Resources Cooperative Science Center (LMRCSC - <https://www.umes.edu/lmrcsc/>), an educational partnership program for minority-serving institutions. Sea Grant recognizes DEI as a “cross-cutting principle” in the program’s 2018-2021 strategic plan. A 10-year network-wide vision and implementation plan is being developed in conjunction with other priority national visioning efforts, to set outcomes and milestones for Sea Grant’s commitment to DEI.

**Recommendation Four:** Sea Grant needs to demonstrate how its K-12 and informal education programs collectively respond to national priorities and result in evidence-based accomplishments and impacts. To accomplish this, Sea Grant should enable collaboration through consistent programmatic and travel support at state and national levels so the Education Network can work together.

RESPONSE: The Sea Grant Education Network is testing metrics from NOAA that more fully demonstrate the scope of program outreach and impacts. Sea Grant educators reported 12 new professional publications in books and journals in 2017. A visioning group, established as part of a national visioning effort by Sea Grant for 10 priority subjects, is working on strategies to advance environmental literacy for the next ten years. The group seeks input from research, communication and extension personnel and will need to identify new funding opportunities to implement these strategies. Sea Grant continues to value education as one of its three pillars, together with research and extension.

**Recommendation Five:** Sea Grant should enhance efforts toward gathering and sharing the wisdom and experience of experts in subject matter relevant to Sea Grant’s mission. Previous theme/focus teams began this productive process and offer a mechanism moving forward.

RESPONSE: Visioning efforts funded by the NSGO are enabling 10 topical groups to construct visions for the future based on input from within and outside of Sea Grant. This effort will build on and enhance the work of new or existing Sea Grant networks, teams, working groups, or other Sea Grant-led communities of practice to formulate and document their vision for a national topic, and build Sea Grant’s role in addressing that topic.



Photo: Woods Hole Sea Grant

# THE SEA GRANT MODEL

In 1966, Congress passed the National Sea Grant College and Program Act which charged the federal government to develop a network of Sea Grant Colleges modeled after the Land Grant College system. This model combines research and engagement through its extension services and education programs. Sea Grant extension can be defined as the delivery of scientific research and knowledge to fishermen, community leaders, and other Sea Grant stakeholders. From the beginning, it was anticipated that these three pillars and the network of cooperating universities would be mutually supporting. Time has shown that Sea Grant has benefited the vitality of coastal communities, their habitats and ecosystems together with the marine resources upon which they depend far more profoundly than even Sea Grant's founders could have imagined.

Central to the power of the Sea Grant model is the synergistic interplay of goal-directed research conducted by many of our nation's finest scholars with the rapid and sustained delivery of that knowledge toward solving problems and making better informed choices. Sea Grant's research agenda is informed through stakeholder input and is directed toward solving both local and national coastal issues. The education and development of new generations of human resources in diverse fields is intimately integrated into both Sea Grant's research and extension activities.

A balanced investment in research, extension, and education is the commitment of an outstanding number of individuals in academia, government, and industry. Their contributions support the economic and environmental vitality of our nation's ocean, coast, and Great Lakes and the communities that depend on them.



Photo: Washington Sea Grant

# SEA GRANT BY THE NUMBERS

**33**

University-based programs

**4,634**

Resource managers used ecosystem-based approaches

**302**

Sea Grant educators

**366,108**

Volunteer hours

**1,099**

Training events provided to communities

**781,164**

K-12 students reached

For over 50 years, Sea Grant research, extension, and education have substantively engaged coastal and Great Lakes communities. 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.

**1,300**  
BUSINESSES  
CREATED OR SUSTAINED



**7,100**  
JOBS  
CREATED OR SUSTAINED

In 2016, a federal investment in Sea Grant of \$74 million resulted in

**\$611M**  
ECONOMIC  
BENEFIT

Research  
Extension  
Education

over  
**500**

SEA GRANT EXTENSION AGENTS



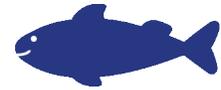
are stationed in communities across the country to advance understanding of ocean, coastal and Great Lakes science for increasing resilience of communities and economies



All metrics listed in this report are direct results of Sea Grant work between February 1, 2016 and January 31, 2017 as reported by Sea Grant programs in June 2017. Economic benefit = market and non-market value of Sea Grant's work; value of jobs and businesses (\$475M) as well as total leveraged funds (\$136M). Total number of partners (2,958) was calculated in September 2016 from a Social Network Analysis with several known missing data sources, thus underestimating Sea Grant's partners. Sea Grant professionals include individuals who are funded by Sea Grant for all or part of their salary.

# FOCUS AREAS

## SUSTAINABLE FISHERIES AND AQUACULTURE



19,900

FISHERS ADOPT SAFE AND  
SUSTAINABLE FISHING  
PRACTICES



Photo: Oregon Sea Grant

Wild harvest from marine fisheries reached its maximum decades ago, both in the U.S. and worldwide. Modest harvest, economic, and conservation gains may still be made from better management and more efficient and effective harvest techniques and new fishery products, but the vast majority of the gains in terms of production will come from aquaculture. Although fishery product consumption is rising significantly in the U.S., that rise in demand is being fulfilled primarily by imported fishery products. In 2011, 90 percent of the seafood consumed in the U.S. was imported. This foreign competition, along with other factors such as the ‘gentrification’ of many of our coasts, ports, and harbors—which has effectively pushed out commercial fishing facilities—rising fuel costs, and other factors has put significant pressure on our U.S. commercial fishing industry.

Sea Grant has been heavily involved in both commercial and recreational fisheries research and extension services since its inception, and virtually all of the state Sea Grant programs have fisheries as a significant portion of their portfolio. As with the Sea Grant program overall, the dual strengths of the Sea Grant Sustainable Fisheries and Aquaculture program have been its national and international stature in fisheries and aquaculture research combined with the local application of that research to specific fishery and aquaculture challenges through Sea Grant extension. When the issue of threatened and endangered sea turtle bycatch in shrimp trawls in the Southeast U.S. arose, Sea Grant researchers and extension agents in the Southeast states worked together with fishermen and government agencies to develop Turtle Excluder Devices (TEDs) that significantly reduced that bycatch, effectively saving the shrimp trawl industry in the Southeast. When hypoxia (low oxygen), invasive species, and other issues affected the Great Lakes fishing industry, the Great Lakes Sea Grant programs were instrumental in helping industry and government address those issues. Sea Grant helped develop and share technology leading to seaweed aquaculture as a novel product with both economic and environmental benefits. Now that climate change-related effects are occurring in the shellfish growing and harvesting industries, Sea Grant is intimately involved in helping those industries adapt to the changing climate and environment. One way Sea Grant is doing this is through new product development.

At the same time the commercial fishing industry faces significant challenges, the recreational fishing sector is becoming a more prominent component of marine fishing and industry. Sea Grant programs nationwide are integrally involved in assisting with the management of both commercial and recreational fishing as well as sustaining both the commercial and recreational fishing industries.

# FOCUS AREAS

## HEALTHY COASTAL ECOSYSTEMS



**1,400,000**

ACRES OF HABITAT  
RESTORED

.....

Photo: Texas Sea Grant



The health, well-being, and economic prosperity of coastal communities are critically dependent on the presence of healthy coastal ecosystems. Not only do coastal environments provide direct benefits such as opportunities for recreation and maintenance of fisheries, but they also provide indirect services such as improving water quality by filtering sediments and pollutants, and reducing shoreline erosion. For example, salt marshes are among the most productive ecosystems on the planet, and acre by acre are comparable in their productivity to an Iowa cornfield. Marshes serve as nurseries for fish, habitat for wildlife such as birds, and reduce storm surge and flood risk. By one estimate, the dollar value of services provided by coastal wetlands worldwide is almost \$200,000/ha/yr (de Groot et al. 2012). The same study estimated that coral reefs provide an impressive \$353,000/ha/yr. Yet negative human pressures continue to increase on these critical ecosystems. Increasing temperatures, sea level rise, ocean acidification, and more intense storms are already impacting coastal ecosystems and the human communities that depend upon them. The run-off of nutrients continues to strip coastal waters of oxygen creating hypoxic “dead zones”; last year the dead zone in the Gulf of Mexico was the largest ever, affecting marine life in an area the size of New Jersey. A recent study (Gittman et al. 2015) found that over 14% of the entire coastline of the US is now armored in concrete, leading to the decline of ecosystems and the services that they provide.

Yet these threats also offer significant opportunities to rethink the way coastal residents meet these expanding challenges, enhancing societal resilience through mechanisms that capitalize upon and protect the services that healthy coastal ecosystems provide. To do so requires both a better understanding of how these “human-natural” systems work, and knowledge of how this information can be translated in to better management practices.

Sea Grant continues to be at the leading edge of these efforts, working hand-in-hand with coastal residents, municipalities, and businesses to find solutions that are economically feasible, socially equitable, and ecologically sound. For example, working with local residents and community groups, Sea Grant in the Northeast region provided education and assistance to local land use officials on how to accommodate growth while protecting natural resources using innovative green solutions to minimize pollutant loading in to Long Island Sound. Sea Grant programs in the Southeast assisted in the creation of artificial reefs, which generate an estimated \$3.1 Billion in economic activity and support over 39,000 jobs; similar efforts are focused on the restoration of marshes and oyster reefs in the region.

# FOCUS AREAS

## RESILIENT COMMUNITIES AND ECONOMIES



494

COMMUNITIES IMPROVE  
RESILIENCE



Photo: USC Sea Grant

In 2010, 123.3 million people, or 39 percent of the nation's population lived in counties directly on the shoreline (<https://oceanservice.noaa.gov/facts/population.html>). The expansion of America's coastal communities has increased vulnerability to extreme weather, tsunamis, and events such as the Deepwater Horizon disaster. Moreover, traditional patterns of development and construction have not accounted for the risk of coastal flooding or the resulting impacts to the natural environment and the quality of life of our citizens.

The coastal economy has changed dramatically in the last 100 years. After petroleum extraction, tourism and marine shipping-associated industries are the dominant contributors to our coastal economy with tourism as the largest employer by an order of magnitude. Like their host communities, these industries and their employees are especially vulnerable to coastal disasters and to the ongoing rise in sea level.

Year by year, collisions of the human enterprise with nature have produced an increasingly tragic cost to nature and to human life and property. The 2017 hurricane season was the costliest on record. Sea Grant worked with coastal communities before and after the storms to plan, prepare, and rebuild in safer, smarter ways.

Sea Grant enhances the safety, economies, and social inclusion of coastal communities so that they thrive within the capacity and circumstances of their habitats and ecosystems. Sea Grant accomplishes this by linking its research and knowledge resources with that of the larger university and government enterprise to address community needs through the activities of its engagement specialists who live and work within the coastal zone. On the West coast, Sea Grant convened partners and municipal leaders for a regional effort to use scientific models, local knowledge, and community needs to develop community plans and update local regulations that allow communities to thrive in changing conditions.

## FOCUS AREAS

# ENVIRONMENTAL LITERACY AND WORKFORCE DEVELOPMENT



2,313

GRADUATE AND UNDERGRADUATE  
STUDENTS SUPPORTED



Photo: Florida Sea Grant

Education is a critical component of the Sea Grant Model, and all Sea Grant enterprises have complementary, collaborative objectives and roles for fostering environmental literacy. Sea Grant builds environmental literacy through a continuum of lifelong formal and informal engagement opportunities. Sea Grant education also includes preparation for careers, building a future workforce with knowledge and skills critical to local, regional, and national needs.

Sea Grant educators promote environmental literacy with first-hand experiences and classroom curricula to enhance ocean and Great Lakes science. Their innovative media and methods promote use of marine and coastal topics in pre-Kindergarten through undergraduate classrooms and in informal education programs through aquaria, community events, and family programs. Many Sea Grant educators are leaders in Science, Technology, Engineering and Mathematics (STEM) education through their universities and through organizations such as the National Marine Educators Association (NMEA) and the National Science Teachers Association (NSTA). They develop and implement public programs, publish research, share best practices, and coordinate specific efforts for standards-based STEM, social studies and language arts, all with ocean, coastal, and Great Lakes focuses.

Workforce development in Sea Grant begins with an understanding of local employment needs and development of specific skills suitable and necessary for current and future career paths. Sea Grant teacher and student training focuses on state-of-the-art science and technology, communications and information systems, natural resource systems, and human adaptation, which produces graduates who can readily move into jobs related to maritime commerce, seafood production, recreation and tourism, water systems, governance and planning, and resource management.

Perhaps most important to the future of the ocean, coastal, and Great Lakes workforce are the undergraduate and graduate students supported through Sea Grant research projects. Students working on Sea Grant projects apply their knowledge, hone their talents, and develop outreach skills while they contribute to their projects.

Fellowships offer special opportunities for young professionals. Their training for the professional workforce enables many Fellows to continue impacting Sea Grant focus areas and Congressional priorities long after their fellowships end.

# SEA GRANT FELLOWSHIPS

On Capitol Hill and among Federal agencies, Sea Grant's national fellowship programs are well known and appreciated. In addition to these national fellowship programs, individual Sea Grant programs provide opportunities through over 20 fellowships. Sea Grant selects excellent students for three national fellowship programs:

- The John A. Knauss Marine Policy Fellowship program provides opportunities for students with advanced degrees to work at the forefront of marine science and policy.
- The collaborative National Marine Fisheries Service (NMFS)-Sea Grant fellowship program places individuals in research positions focused on either population and ecosystem dynamics or marine resource economics as a step towards workforce leadership.
- Two-year Coastal Management Fellowships fostered by Sea Grant for NOAA's Office for Coastal Management within the National Ocean Service enable postgraduate students to work on projects identified by the individual states.

## John A. Knauss Fellowship

Since it began in 1979, the John A. Knauss Marine Policy Fellowship has become among the top and best known fellowships in the field. Through a highly selective and competitive process, Sea Grant places promising individuals in positions with high visibility and impact in offices of the Executive and Legislative branches of the Federal government. Over the Fellowship program's 39 year history, Sea Grant has placed over 1,200 Knauss fellows, and including 61 current fellows. Some have been highlighted at <https://seagrant.noaa.gov/Knauss>.

## NMFS-Sea Grant Joint Fellowship Program

The NMFS-Sea Grant Joint Fellowships in Population and Ecosystem Dynamics and Marine Resource Economics are designed to increase the number of scientists working in these two critical areas, help Sea Grant fulfill its broad educational responsibilities, and strengthen the collaboration between Sea Grant and NMFS. Since 1999, 113 Fellows have graduated and 40% are working in these specialized fields.

## Coastal Management Fellowship

Sea Grant provides the means by which candidates are identified and nominated for placement in the NOAA Office of Coastal Management Fellows Program. This program matches graduate students with state coastal zone management programs on specific projects for a two-year term. Individual state programs and regional Sea Grant consortia provide fellowship opportunities specific to their local priorities and talent pool.



Photo: NOAA Sea Grant

# ORGANIZATIONAL EXCELLENCE

In order to achieve its research, extension, and education goals, Sea Grant continues to seek organizational excellence by investing in the following elements critical to the program's success.

## **Economic Impact**

Because of Sea Grant's matching requirement, there is at least one dollar of state and local funds for every two federal dollars spent. The work Sea Grant does has a significant impact, creating jobs and ensuring Americans can live near, vacation at, and earn a living from our oceans, coasts, and Great Lakes for generations to come. Sea Grant is currently engaged in an effort to develop consistent methodology for measuring economic benefit across programs with the goals of more complete reporting across the Sea Grant network and more robust economic data.

## **Evaluative Program Reviews**

Sea Grant is committed to careful planning and rigorous evaluation at both the state and national level to ensure that the program has local, state, and national impacts. Quadrennial review of the state programs is based on the goals and objectives established in their approved strategic plans. Led by the Board in coordination with the NSGO, the review consists of site visits to assess Sea Grant programs' approach to management; scope and success of engagement with stakeholders; and degree of collaboration with other Sea Grant and NOAA programs as well as other relevant partners. The results of the site visits along with an effort to ensure consistency in evaluating across the Sea Grant network by an Independent Review Panel are used by the NSGO to determine whether each Sea Grant program is: 1) qualified for recertification as a Sea Grant program, and 2) eligible for merit funding.

## **Sea Grant Law and Policy Expertise**

In addition to its robust network of 33 Sea Grant programs, Sea Grant supports a national project for law and policy to assist programs in clearing potential legal barriers in order to promote innovative management and collaborative work across regions. The National Sea Grant Law Center is a nationally recognized and respected resource on ocean, coastal, and Great Lakes law. The Sea Grant Legal Network has programs in five states (LA, MS-AL, NC, and RI), and attorneys working with Sea Grant throughout the country who provide technical assistance, develop model ordinances, and facilitate community-planning initiatives. In 2017, the Sea Grant Legal Network successfully competed for NOAA Sea Grant funding to examine impediments to shellfish aquaculture across the United States. The project partners are developing case studies and outreach materials to equip regulators, industry members, and Sea Grant extension agents with the knowledge needed to anticipate and overcome common regulatory barriers.

## **Visioning**

In FY17, the NSGO provided funding to increase the capacity of Sea Grant programs to work and plan together to address topics of national interest. The goals of the funding are to enhance visioning and activities consistent with state and national strategic plans across the network; increase the capacity for Sea Grant programs to work and plan together to address priority issues of national interest; and to develop and document visions for Sea Grant on these topics to serve as a basis for network-wide discussions. The funds are supporting the work of new or existing Sea Grant networks, teams, working groups, or other types of Sea Grant-led communities of practice to formulate and document their vision and Sea Grant's role in addressing each topic.

# 2018 RECOMMENDATIONS

Based on its review of Sea Grant activities and programs in the past biennium, and looking toward the needs of our oceans, coasts, and Great Lakes in the coming years, the Board offers several recommendations for Sea Grant.



Photo: Louisiana Sea Grant

**Recommendation One:** Sea Grant should further support the development, integration, and implementation of emerging visions generated by interdisciplinary teams begun with the 2017 Network Visioning effort.

**JUSTIFICATION:** Sea Grant’s visioning exercise represents considerable investment. Support for implementing the vision outcomes will optimize the investment; Sea Grant needs to consider additional opportunities that focus on the program’s future. This will enhance Sea Grant’s future program initiatives with aspirations, ideas, innovations, and expertise from both within and outside the network.

**Recommendation Two:** Sea Grant should continue efforts to enhance diversity, equity, and inclusion (DEI) throughout the network so that its workforce, audiences served, programming conducted, and materials produced are more representative of the nation.

**JUSTIFICATION:** DEI is an increasingly important consideration across all Federal agencies. A working group has examined current status of diversity within Sea Grant, and the Board is looking for continuous progress toward goals for DEI in the coming biennium.

**Recommendation Three:** The Sea Grant evaluation process should include an assessment of the NSGO and the Sea Grant program overall.

**JUSTIFICATION:** Bringing review of the NSGO into a broader program assessment will lead to consistency with how all program elements of Sea Grant, including the NSGO, are reviewed.

**Recommendation Four:** Sea Grant should expand its capacity and continue to build greater awareness of the network’s substantial role in coastal disaster and emergency preparedness, including its ability and resources at the local level. Sea Grant can help communities become more sustainable and resilient through enhanced planning, recovery, and adaptation programs.

**JUSTIFICATION:** Sea Grant has the local perspective and a national talent pool to assist communities to preemptively adapt to change or mitigate its impacts. Sea Grant has a reputation for assisting communities in adapting to coastal changes quickly, e.g., in natural and human-caused disasters such as oil spills, hurricanes, harmful algal blooms, storm surges, tsunamis, and flooding. Important government investments in resilience, adaptation, and community planning over the next 50 years will affect all Sea Grant constituencies, including what has become a rapidly changing coastal economy.

**Recommendation Five:** Sea Grant is a recognized leader in aquaculture research and development. Consistent with the Department of Commerce strategic goals of increasing American jobs and reducing the seafood trade deficit, Sea Grant should expand its capacity and build greater awareness of the Sea Grant network’s substantial role in aquaculture.

**JUSTIFICATION:** Sea Grant has been NOAA’s primary resource for the development of aquaculture in order to lower the United States’ seafood trade deficit by boosting domestic production of seafood. Sea Grant has the local perspective and the expertise to assist the nation’s continued development of aquaculture. Important government investments in the coming years will be made to reduce the nation’s imports of foreign seafood, in particular, aquaculture imports. Through its locally based research and extension programs, its national perspective, and its longstanding history in developing aquaculture, Sea Grant is ideally positioned to play an expanded role in helping the DOC and other departments achieve their goals.



Photo: NOAA Sea Grant

## EMERGING OPPORTUNITIES AND CHALLENGES

The challenges we will face in ocean, coastal, and Great Lakes science and policy in the next 50 years will differ from those of the last 50 years of Sea Grant, owing largely to the effects of expanding populations, changes in transportation and communications, technological advancements, and a changing climate all interacting with changing socioeconomics.

- Sea level rise is already affecting billions of people and trillions of dollars of infrastructure worldwide.
- Changing ocean and Great Lakes water temperatures are already causing shifts in commercial and recreational fish and shellfish populations.
- Ocean acidification is already affecting a wide range of ecosystem components in the ocean including shellfish and corals.
- Timing and intensity of extreme weather events are having negative impacts on coastal communities and businesses.

The effects of all of these phenomena—and many others—will become more pronounced in the next decades. Current issues such as nutrient pollution of the oceans, inadequate land-use planning, overfishing, and others will be exacerbated by climate change effects. Sea Grant will have to adapt its research, extension, and education capacities, not only in the biogeochemical and social sciences but in particular in the fields of policy and planning, to assist human populations in adapting to these changing circumstances.

The next 50 years offer Sea Grant opportunities to:

1. Significantly expand strategic partnerships with other federal, state and local offices, agencies, and private sector partners to achieve mutual goals across all issue and topic areas.
2. Expand its role in the future of our oceans, coasts, and Great Lakes through such activities as the Sea Grant Network Visioning process described earlier in this report. Having visions for the specific topics in the Sea Grant Network Visioning process can be a prelude to an expanded vision for the National Sea Grant College Program as a whole over the next several decades.
3. Support the Weather Forecast Research and Innovation Act of 2017 by informing observations and minimizing the impacts of extreme weather and water events. Utilize research, extension, and education capacities of Sea Grant to increase the economic contributions of our domestic fisheries and ocean resources. These are two of the strategic objectives identified in the U.S. Department of Commerce 2018 Strategic Plan.

In the near term the primary challenge for the Sea Grant program is to raise its visibility with the federal government, the states, and our nation so that Sea Grant is once again authorized by Congress and recognized in the President's budget.



Photo: Lake Champlain Sea Grant

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## Sea Grant Programs

Alaska Sea Grant

California Sea Grant

Connecticut Sea Grant

Delaware Sea Grant

Florida Sea Grant

Georgia Sea Grant

Guam Sea Grant

Hawai'i Sea Grant

Illinois-Indiana Sea Grant

Lake Champlain Sea Grant

Louisiana Sea Grant

Maine Sea Grant

Maryland Sea Grant

Massachusetts Institute of Technology (MIT) Sea Grant

Michigan Sea Grant

Minnesota Sea Grant

Mississippi-Alabama Sea Grant

New Hampshire Sea Grant

New Jersey Sea Grant

New York Sea Grant

North Carolina Sea Grant

Ohio Sea Grant

Oregon Sea Grant

Pennsylvania Sea Grant

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