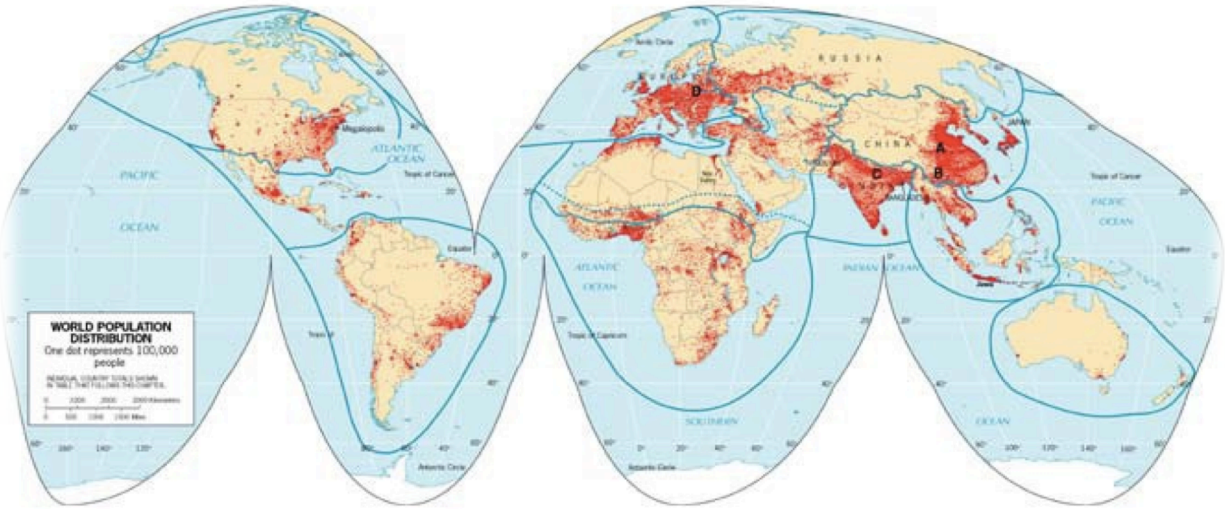
# National Sea Grant College Program

## Strategic Plan 2014- 2017

*Sustaining our nation's ocean, coastal and Great Lakes resources through university-based research, communications, education, extension and legal programs.*

Sea Grant

# World Population Density




Around the world hundreds of thousands move to the coast every year, making it increasingly important that we find adequate ways to balance human social and economic activities. Along with other coastal nations, America must use its coastal land, water, energy, and other natural resources in ways that preserve the health and productivity of coastal ecosystems.

# Introduction

Serious challenges present the greatest opportunities for change, and Sea Grant is prepared not only to respond, but to help coastal communities prepare to meet these challenges. One of Sea Grant's demonstrated strengths is its ability to quickly mobilize universities and other partners to address challenges across the country and around the world. The national Sea Grant network of university scientists and communication, education, extension and legal professionals has the ability, through the organization's coordinated state and regional infrastructure, to address local and state priorities of national importance.

At this time of great risk to the sustainability[1] of our ocean, coastal and Great Lakes resources, there is an even greater opportunity for the Sea Grant network to play a significant role, through innovation and creativity, in addressing the goals set forth in this plan. The Sea Grant programs will strive to achieve these national goals in a manner that reflects the particular needs of individual states and communities and the nation as a whole. This four-year strategic plan establishes a prioritized national direction to guide the Sea Grant network in addressing critical national needs at local, state and regional scales in ocean, coastal and Great Lakes environments. The plan capitalizes on Sea Grant's unique capacities and strengths, allows state Sea Grant programs to be flexible, and supports the Next Generation Strategic Plan of the National Oceanic and Atmospheric Administration (NOAA).

## SEA GRANT VISION AND MISSION

*The National Sea Grant College Program envisions a future where people live, work and play along our coasts in harmony with the natural resources that attract and sustain them. This is a vision of coastal America where we use our natural resources in ways that capture the economic, environmental and cultural benefits they offer, while preserving their quality and abundance for future generations.*

This vision complements the vision articulated in NOAA's Strategic Plan: "Healthy ecosystems, communities and economies that are resilient in the face of change."

*Sea Grant's mission is to provide integrated research, communication, education, extension and legal programs to coastal communities that lead to the responsible use of the nation's ocean, coastal and Great Lakes resources through informed personal, policy and management decisions.*

[1] Sustainability is defined as meeting the needs of the present generation without compromising the ability of future generations to meet their own needs. Sustainability has three equally weighted components: economic, social and environmental.

## SEA GRANT MODEL

Sea Grant was created by the U.S. Congress in 1966 to be a highly leveraged federal and state partnership to harness the intellectual capacity of the nation's universities to solve ocean, coastal, Great Lakes and island (hereby referred to as coastal) problems. The National Sea Grant College Program engages citizens, communities, scientists, organizations and governments 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 to new discoveries. Through its scientists and communications, education, extension and legal specialists (hereby referred to as engagement professionals), Sea Grant generates, translates and delivers cutting-edge, unbiased, science-based information to address complex issues.

Sea Grant is a national network. This network 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 and the nation to tap the best science, technology and expertise to balance human and environmental needs in coastal communities. Sea Grant's alliance with major research universities around the country provides access to thousands of scientists, students and engagement professionals. Sea Grant's university-based programs are fundamental to the development of the future scientists and resource managers needed to conduct research and to guide the responsible use and conservation of our nation's coastal resources. With its strong research capabilities, local knowledge and on-the-ground workforce, Sea Grant provides an effective national network of unmatched ability to rapidly identify and capitalize on opportunities and to generate timely, practical solutions to real problems in real places.

## SEA GRANT CORE VALUES

Since its inception, a strong set of core values has provided the foundation for Sea Grant's work. Sea Grant is founded on a belief in the critical importance of university-based research and constituent engagement[2]. Sea Grant invests significantly in merit-reviewed research each year. Research discoveries are then distributed to Sea Grant's constituents through sustained engagement programs. Meaningful and sustained engagement has allowed Sea Grant to form strong partnerships with leading coastal state research universities, with other NOAA programs, and with a wide range of public and private partners at federal, state and local levels. This has

[2] A Mandate to Engage Coastal Users: A Review of the National Sea Grant Extension Program and a Call for Greater National Commitment to Engagement (November 2000) and NOAA's Science Advisory Board's report on Engaging NOAA Constituents. Each report defined constituent engagement as being responsive, accessible, respecting partners, maintaining scientific neutrality, integrating diverse expertise, coordination of efforts and building resource partnerships.

proven to be a highly effective way to identify and solve the most relevant problems facing coastal communities.

Sea Grant's unique integration of research with constituent engagement is at the heart of its mission. As a pioneer in translational research (from discovery to application), Sea Grant ensures that unbiased, science-based information is accessible to all. The diverse capabilities of Sea Grant's personnel and partners enable the organization to be creative and responsive in generating policy-relevant research and disseminating scientific and technological discoveries to a wide range of audiences. Sea Grant's science-based, non-regulatory approach and its long-term history of engagement with local communities have made Sea Grant a trusted source of information. Sea Grant serves as a catalyst for decision support by increasing knowledge among decision-makers and the public as a whole. Sea Grant's commitment to these core values is vital to achieving the goals set forth in this plan.

## PLANNING PROCESS AND STRATEGIC APPROACH

The collective Sea Grant network brought its wealth of expertise and experience to the task of creating this plan. The planning process began with identification of priorities by the Sea Grant state programs (and their stakeholders and advisory committees) followed by a review of existing plans and reports that set national, regional, state and local priorities. To elicit additional input and guidance, the Sea Grant network, national stakeholder groups, representatives from NOAA programs, other federal agencies and environmental non-profit organizations were asked to provide input on three drafts of the 2014-2017 National Sea Grant Program Strategic Plan

A strategic approach to managing coastal resources in ways that balance human use with environmental health requires:

- Better science-based information about how coastal ecosystems function and how human activities affect coastal habitats and living resources;
- Citizens who understand the complexities of coastal environments and the interactions between human use and coastal ecosystem health;
- Management and decision-making processes that are based on sound information, involve citizens who have a stake in America's coastal resources and include mechanisms to evaluate trade-offs between human and environmental needs; and,
- Incorporation of social science, including quality of life and sustainable economic development, into ecosystem-based management decisions.

# FOCUS AREAS

Image Credit: Oliver Bencosme/ SeaGrantPR.org

To help the nation understand, manage and use its coastal resources wisely, Sea Grant identified four focus areas central to what Sea Grant does. The focus areas are:

1. **Healthy Coastal Ecosystems**
2. **Sustainable Fisheries and Aquaculture**
3. **Resilient Communities and Economies**
4. **Environmental Literacy and Workforce Development**

These focus areas evolved from Sea Grant's 2009-2013 Strategic Plan and reflect America's most urgent needs along our coasts, as well as NOAA goals and Sea Grant's strengths and core values. The focus areas also reflect the integration of Sea Grant's research and engagement programs. These functional areas provide the foundation for implementing a successful four-year plan.

Each focus area has goals, outcomes and performance measures. The goals describe the desired long-term direction for each focus area. The outcomes are benchmarks from which Sea Grant can track progress toward achieving each goal. Performance measures are quantitative ways of measuring outcomes with targets developed by each Sea Grant program.

*Outcomes* are commonly categorized as short-, medium- and long-term. In this plan, learning, action and consequence outcomes are synonymous to short-, medium- and long-term outcomes and have been chosen to more easily identify the transition across outcome categories. For example, progress toward a goal starts with an achievable and measurable learning outcome and is followed by a series of "what happens next" (action and consequence) questions until the goal is met. Using this approach, it is easier to demonstrate in a more or less linear process how goals are achieved.

- Learning (short-term) outcomes lead to increased awareness, knowledge, skills, and changes in attitudes, opinions, aspirations or motivations through research and/or constituent engagement.
- Action (medium-term) outcomes lead to behavior change, social action, and adoption of information, changes in practices, improved decision-making or changes in policies.
- Consequence (long-term) outcomes are long-term, and in most cases, require focused efforts over multiple strategic planning cycles. Consequence outcomes in a four-year strategic plan serve as reference points toward reaching focus area goals between the current and future strategic plans.

The outcomes identified in the 2014-2017 National Sea Grant Strategic Plan can only be realized through full utilization of Sea Grant's research and engagement programs. For example, many of the learning outcomes identified require a substantial investment in needs-based and merit-reviewed research before any actionable outcomes. Simply stated, Sea Grant-sponsored research is the "engine" that leads to new products, tools or other discoveries used by Sea Grant's engagement programs to effect change.

There are two types of performance measures identified in this plan. Performance measures that are most closely linked to a single focus area are listed at the end of each focus area section. Cross-cutting performance measures - broad measures of progress toward goals for all focus areas - are listed following the Education and Workforce Development Focus area.

Collectively, the four focus areas include 11 goals, 91 outcomes and 12 performance measures. This plan directly aligns to NOAA's goals and objectives as articulated in NOAA's Next Generation Strategic Plan: climate adaptation and mitigation, weather-ready nation, healthy oceans, and resilient coastal communities and economies. The 2014-2017 National Sea Grant Strategic Plan capitalizes on Sea Grant's unique capacities and strengths and provides state programs with the flexibility and creativity required to adapt to emerging needs.

FOCUS AREAS

# HEALTHY COASTAL ECOSYSTEMS

The United States manages millions of square miles of coastal territories that contain diverse and productive ecosystems. These ecosystems span from the tropics to the Arctic and support a variety of recreational, commercial and subsistence activities. More than four million acres of coral reefs serve as vital economic and biodiversity hotspots in the Atlantic, Caribbean, Gulf of Mexico and Pacific[3]. More than 88,569 square miles of coastal wetlands provide nurseries for more than half of our commercially harvested fish species and refuges for 75 percent of all our migratory birds and waterfowl[4]. In addition, there are the countless miles of beaches and bluffs, sea grass beds, oyster reefs and tidal flats, which have long made our coasts popular places to live and visit. Therefore, healthy coastal ecosystems, sustained by their surrounding watersheds, are the foundation of life along the coast.

Image credit: Acropora Cervicornis; Otter- Alaska Sea Grant; Algal Bloom- Ohio Sea Grant

Keeping coastal ecosystems healthy is a challenge because of the diversity of stressors each system faces. This is further complicated because ecosystems do not adhere to traditional political boundaries. Responsible management of these systems requires new kinds of thinking and actions, often termed ecosystem-based management[5]. Ecosystem-based approaches require unprecedented levels of coordination among federal, state and local jurisdictions and

[3] USGS 2002, http://pubs.usgs.gov/fs/2002/fs025-02/.

[4] NOAA 2012,http://stateofthecoast.noaa.gov/.

[5] Ecosystem-based management is an integrated approach to management that considers the entire ecosystem, including humans. The goal of ecosystem-based management is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need. Ecosystem-based management differs from current approaches that usually focus on a single species, sector, activity or concern; it considers the cumulative impacts of different sectors.

the active engagement of the people who live, work and play along our coasts. They also require understanding of the characteristics of species, landscapes and their interactions within each ecosystem.

In general, increasingly rapid coastal development, greater demands on fisheries resources, 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 a host of other environmental impacts. It is essential for decision-makers to understand the interconnectedness and interactions of these systems in order to maintain vital habitats and inform restoration efforts within ecosystems and watersheds.

Sea Grant is a leader in regional approaches to understanding and maintaining healthy ecosystems, with planning efforts across the country to identify information gaps, implement research priorities and coordinate information and technology transfer to people who need it. Sea Grant recognizes the need to determine the value of the myriad services ecosystems[6] provide that maintain the conditions for life on Earth. Sea Grant's regional consortia, nationwide networks and international contacts are particularly well-suited to helping the nation address ecosystem health at the appropriate local, state, regional, national and global levels.

[6] Ecosystem services include provisioning (food and water), regulating (flood and disease control), cultural (spiritual, recreational and cultural benefits) and supporting (nutrient cycling).

# HEALTHY COASTAL ECOSYSTEMS

## GOAL 1

**Ecosystem services are improved by enhanced health, diversity and abundance of fish, wildlife and plants.**

Learning Outcomes

- Develop and calibrate new standards, measures and indicators of ecosystem sustainability.
- Identify critical uncertainties that impede progress toward achieving sustainability of ecosystems and the goods and services they provide.

Action Outcomes

- Resource managers, policy- and decision-makers use standards and indicators to support ecosystem-based management.

Consequence Outcomes

- Dynamic ecological systems provide a wide range of ecological, economic and societal services and are more resilient to change.
- Greater public stewardship leads to participatory decision-making and collaborative ecosystem-based management decisions.

FOCUS AREAS

# HEALTHY COASTAL ECOSYSTEMS

## GOAL 2

**Ecosystem-based approaches are used to manage land, water and living resources.**

Learning Outcomes

- Stakeholders have access to data, models, policy information and training that support ecosystem-based planning, decision-making and management approaches.
- Baseline data, standards, methodologies and indicators are developed to assess the health of ecosystems and watersheds.
- Residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- Resource managers have an understanding of the policies that apply to coastal protected species.

Action Outcomes

- Methodologies are used to evaluate a range of practical ecosystem-based management approaches for planning and adapt to future management needs.
- Resource managers apply ecosystem-based management principles when making decisions.
- Resource managers incorporate laws and policies to facilitate and implement ecosystem-based management.
- Residents, resource managers and businesses integrate social, natural and physical science when managing resources and work with all sectors in the decision-making process.

Consequence Outcomes

- Land, water and living resources are managed using ecosystem-based approaches.

F O C U S A R E A S

# HEALTHY COASTAL ECOSYSTEMS

## GOAL 3

### Ecosystems and their habitats are protected[7], enhanced or restored.

Learning Outcomes

- Residents, resource managers and businesses understand the importance of the benefits provided by preserving non-degraded ecosystems.
- Residents, resource managers and businesses understand the threats to ecosystems and the consequences of degraded ecosystems.
- Scientists develop technologies and approaches to restore degraded ecosystems.

Action Outcomes

- Resource managers set realistic and prioritized goals to protect, enhance and restore habitats by incorporating scientific information and public input.
- Resource managers, businesses and residents adopt innovative approaches and technologies to maintain or improve the function of ecosystems.

Consequence Outcomes

- Habitats are protected, enhanced or restored.
- Degraded ecosystem function and productivity are restored.

[7] In the context of this goal, protected areas are those places in some form of conservation management program.

## HEALTHY ECOSYSTEMS PERFORMANCE MEASURES

1. Number of Sea Grant tools, technologies and information services that are used by our partners/customers to improve ecosystem-based management.
2. Number of ecosystem-based approaches used to manage land, water and living resources in coastal areas as a result of Sea Grant activities.
3. Number of acres of coastal habitat protected, enhanced or restored as a result of Sea Grant activities.

FOCUS AREAS

# Sustainable Fisheries and Aquaculture (SFA)[8]

Image Credit: Alaska & Oregon Sea Grant

The nation has witnessed the decline of many of its major fisheries while seafood consumption has increased and continues to be encouraged because of its health benefits. To fill the gap between seafood demand and domestic harvests, the United States imports 86 percent[9] of what is consumed leading to a seafood trade deficit of over $10 billion[10] per year. With global wild fisheries harvests at a plateau of around 185 metric tons[11], some 50 seafood species are now produced from aquaculture. There are no projected increases in wild capture fisheries, but global aquaculture is predicted to increase by 33 percent over the next decade. These projections create opportunities for an expanded U.S. aquaculture industry and for innovative marketing strategies and value-added products for the nation's wild fisheries industry.

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[8] We use a working definition of "seafood sustainability" that is based on the NOAA Fish watch concept. Sustainability involves "meeting today's needs without compromising the ability of future generations to meet their needs. In terms of seafood, this means catching or farming seafood responsibly, with consideration for the long-term health of the environment and the livelihoods of the people who depend upon the environment.

[9] Food and Agriculture Organization of the United Nations.

[10] U.S. Department of Agriculture Foreign Agricultural Service statistics.

[11] Food and Agriculture Organization of the United Nations.

The overall economic impact of the commercial, recreational, for-hire fisheries and aquaculture industries in the United States is over $276 billion. The commercial fishing industry supports approximately 1 million full- and part-time jobs and generates $116 billion in sales[12]. The recreational and for-hire fishing industry generates significant tourism revenue with $73 billion in total economic impact for saltwater fishing and an additional $6 billion annually for Great Lakes recreational and for-hire fisheries. The U.S. aquaculture industry generates an economic

impact of $1 billion, provides additional opportunities for job creation, and contributes to meeting the nation's demand for finfish and shellfish.

Sea Grant continues to play a leadership role in developing innovative technologies for all sectors of the seafood industry, including fishing, aquaculture, seafood processing and consumer safety, to ensure a safe and sustainable supply of seafood products now and for future generations. Seafood safety will continue to be a concern for consumers as foreign imports, some of which are associated with seafood contamination, continue to increase. Sea Grant's partnership with NOAA Fisheries, state fisheries managers, seafood processors, fishing associations and consumer groups will ensure safe, secure and sustainable supplies of domestic seafood and decrease our reliance on seafood imports.

Image Credit: Alaska Sea Grant; Oregon Sea Grant

[12] NOAA Fisheries, 2009 . Fisheries Economics, Sociocultural Status and Trends Series: http://www.st.nmfs.noaa.gov/st5/publication/.

FOCUS AREAS

# Sustainable Fisheries and Aquaculture (SFA)

## GOAL 4

### A safe, secure and sustainable supply of seafood to meet public demand

Learning Outcomes

- Fishery managers and fishermen understand the dynamics of wild fish populations.
- The seafood industry[13] is knowledgeable about innovative technologies, approaches and policies.
- Commercial and recreational fishermen are knowledgeable about efficient and responsible fishing techniques.
- The commercial fishing industry is aware of innovative marketing strategies to add value to its product.
- The seafood processing industry learns and understands economically viable techniques and processes to ensure the production and delivery of safe and healthy seafood.

Action Outcomes

- Fishermen employ efficient fishing techniques, including by catch reduction.
- Fishermen apply techniques to reduce negative impacts on depleted, threatened or endangered species.
- The seafood industry adopts innovative technologies and approaches to supply safe and sustainable seafood.
- The commercial fishing and aquaculture industries adopt innovative marketing strategies to add value to their products.
- The seafood industry adopts techniques and approaches to minimize the environmental impact of their sectors.
- Resource managers establish policies and regulations that achieve a better balance between economic benefit and conservation goals.

[13] The seafood industry includes all sectors of the industry, including aqua culturists, fishermen, processors, wholesalers, retailers and supporting businesses.

- The seafood processing industry implements innovative techniques and processes to create new product forms and ensure the delivery of safe and healthy seafood.

Consequence Outcomes

- The U.S. seafood[14] supply is sustainable and safe.
- There is an expansion of the sustainable domestic fishing and aquaculture industries.

[14] Seafood includes product originating from all sectors of the fishing and aquaculture industries.

FOCUS AREAS

# Sustainable Fisheries and Aquaculture (SFA)

## GOAL 5

**Informed consumers who understand the health benefits of seafood consumption and how to evaluate the safety and sustainability of the seafood they buy.**

Learning Outcomes

- The seafood industry is aware of the standards for safe seafood.
- The seafood industry is knowledgeable about consumer trends regarding seafood sustainability and safety and how to adjust operations to meet emerging demands.
- U.S. seafood consumers have the knowledge to evaluate sustainable seafood choices.
- U.S. seafood consumers have an increased knowledge of the nutritional benefits of seafood products and know how to judge seafood safety and quality.

Action Outcomes

- The seafood industry adopts standards for safe seafood.
- The seafood industry adopts technologies and techniques to ensure seafood safety.
- U.S. seafood consumers preferentially purchase sustainable seafood products.

Consequence Outcomes

- Consumers improve their health through increased consumption of safe and sustainable seafood products.
- The U.S. seafood industry operates sustainably and is economically viable.

## SUSTAINABLE FISHERIES AND AQUACULTURE PERFORMANCE MEASURES

4. Number of fishermen, seafood processors and aquaculture industry personnel who modify their practices using knowledge gained in fisheries sustainability and seafood safety as a result of Sea Grant activities.
5. Number of seafood consumers who modify their purchases using knowledge gained in fisheries sustainability, seafood safety and the health benefits of seafood as a result of Sea Grant activities.

# Resilient Communities and Economies (RCE)[15]

Photo Credits: North Carolina Sea Grant; Puerto Rico Sea Grant

Coastal communities in the United States provide vital economic, social and recreational opportunities for millions of Americans. For example, in 2010 over 13.5 million people were employed in the tourism industry in coastal communities in over 750,000 business establishments, earning combined wages of $266 billion. The total economic value generated by the U.S. coastal tourism industry in 2010 was estimated at $531 billion. However, decades of population migration have transformed many natural coastal habitats into urban landscapes and intensified the use of finite coastal resources. Between 1970 and 2010, the population of U.S. coastal watersheds has increased by 45 percent to a total of 164 million, or 52 percent of the nation's population[16]. This population increase has resulted in greater vulnerability of coastal communities and environments to natural[17] and technological[18] hazards. To accommodate more people and activity while balancing demands on coastal resources, our nation must develop innovative policies, institutional capacities and management approaches to increase community resilience.

Sea Grant will continue to support cutting-edge research in the areas of marine-related energy sources, climate change, coastal processes, energy efficiency, hazards, storm water

[15] Resilience is determined by the degree to which a community is capable of organizing itself to increase its capacity for learning from past economic, natural or technological disasters.
[16] NOAA Economic Value of Resilient Coastal Communities, Revised 3/9/2012.
[17] Natural hazards include hurricanes, Northeasters, tropical storms, extreme rainfall events, flooding, wildfires, tornadoes, droughts, tsunamis, blizzards and heat waves.
[18] Technological hazards include chemical and oil spills and nuclear reactor accidents.

management and tourism. Sea Grant programs will engage our diverse and growing coastal populations in applying the best-available scientific knowledge to address increased resource demands and vulnerability. Ultimately, Sea Grant will bring its unique research and engagement capabilities to support the development of resilient coastal communities that sustain diverse and vibrant economies, effectively respond to and mitigate natural and technological hazards and function within the limits of their ecosystem.

FOCUS AREAS

# Resilient Communities and Economies (RCE)

## GOAL 6

### Development of vibrant and resilient coastal economies

Learning Outcomes

6.1. Communities[19] are aware of the interdependence between the health of the economy and the health of the natural and cultural systems.
6.2. Communities have access to information needed to understand the value of waterfront- and tourism-related economic activities.
6.3. Communities understand the strengths and weaknesses of alternative development scenarios on resource consumption and local economies.
6.4. Communities are aware of regulatory regimes affecting economic sustainability.
6.5. Communities are knowledgeable about economic savings from energy planning and conservation.

Action Outcomes

6.6. Citizens are actively engaged in management and regulatory decisions.
6.7. Communities engage in economic development initiatives that capitalize on the value of their natural and cultural resources while balancing resource conservation and economic growth.

Consequence Outcomes

6.8. Communities have diverse, healthy economies and industries without displacing traditional working waterfronts[20].

[19] Communities are defined broadly to include governments, businesses, residents, visitors and non-governmental organizations.
[20] Working waterfront is a term broadly used in this plan to include water-dependent and water-related industries, such as energy production, tourism, ports and harbors, marine transportation, shipyards, marinas, commercial fishing, recreational fishing, aquaculture, fishing piers and public access.

FOCUS AREAS

# Resilient Communities and Economies (RCE)

## GOAL 7

**Communities use comprehensive planning to make informed strategic decisions.**

Learning Outcomes

6.9. Communities understand the connection between planning and natural resource management issues and make management decisions that minimize conflicts, improve resource conservation efforts and identify potential opportunities.

Action Outcomes

6.10. Communities make use of tools and information to explore the different patterns of coastal development, including community visioning exercises, resource inventories and coastal planning.
6.11. Communities adopt coastal plans.
6.12. The public, leaders and businesses work together to implement plans for the future and to balance multiple uses of coastal areas.

Consequence Outcomes

6.13. Quality of life in communities, as measured by economic and social well-being, improves without adversely affecting environmental conditions.

FOCUS AREAS

# Resilient Communities and Economies (RCE)

## GOAL 8

**Improvements in coastal water resources sustain human health and ecosystem services.**

Learning Outcomes

6.14. Communities are aware of the impact of human activities on water quality and supply.
6.15. Communities understand the value of clean water, adequate supplies and healthy watersheds.
6.16. Communities understand water laws and policies affecting the use and allocation of water resources.

Action Outcomes

6.17. Communities engage in planning efforts to protect water supplies and improve water quality.
6.18. Communities adopt mitigation measures, best management practices and improved site designs in local policies and ordinances to address water supplies and water quality.

Consequence Outcomes

6.19. Water supplies are sustained.
6.20. Water quality improves.

FOCUS AREAS

# Resilient Communities and Economies (RCE)

## GOAL 9

**Resilient coastal communities adapt to the impacts of hazards and climate change.**

Learning Outcomes

6.21. Residents and decision-makers are aware of and understand the processes that produce hazards and climate change and the implications of those processes for them and their communities.
6.22. Decision-makers are aware of existing and available hazard- and climate-related data and resources and have access to information and skills to assess local risk vulnerability.
6.23. Communities have access to data and innovative and adaptive tools and techniques to minimize the potential negative impact from hazards.
6.24. Decision-makers understand the legal and regulatory regimes affecting adaptation to climate change, including coastal and riparian property rights, disaster relief and insurance issues.

Action Outcomes

6.25. Communities apply best available hazards and climate change information, tools and technologies in the planning process.
6.26. Decision-makers apply data, guidance, policies and regulations to hazard planning and recovery efforts.
6.27. Communities develop and adopt comprehensive hazard mitigation and adaptation strategies suited to local needs.
6.28. Residents take action to reduce the impact of coastal hazards on their life and property.
6.29. Communities adopt a comprehensive risk communications strategy for hazardous events.

Consequence Outcomes

6.30. Communities effectively prepare hazardous events and climate change.
6.31. Communities are resilient and experience minimum disruption to life and economy following hazard events.

## RESILIENT COMMUNITIES AND ECONOMIES PERFORMANCE MEASURES

6. Number of communities that implemented sustainable economic and environmental development practices and policies (e.g., land-use planning, working waterfronts, energy efficiency, climate change planning, smart growth measures, green infrastructure) as a result of Sea Grant activities.
7. Number of communities that implemented hazard resiliency practices to prepare for, respond to or minimize coastal hazardous events as a result of Sea Grant activities.

FOCUS AREAS

# Environmental Literacy and Workforce Development (ELWD)

Image Credit: MIT Summer Interns Sampling; Water Sampling

The scientific, technical and communication skills needed to address the daunting environmental challenges confronting our nation are critical to developing a national workforce capacity. The Congressional report, *Rising Above the Gathering Storm*[21], states that building a workforce literate in science, technology, engineering and mathematics is crucial to maintaining America's competitiveness in a rapidly changing global economy. These skills are also necessary to advance cutting-edge research and to promote enhanced resource management. In recognition of these needs, the America COMPETES Act[22] mandates that NOAA build on its historic role in stimulating excellence in the advancement of ocean and atmospheric science and engineering disciplines. The Act also mandates that NOAA provide opportunities and incentives for the pursuit of academic studies in science, technology, engineering and mathematics. Workforce needs are reflected in the broader science and technology communities of both the private and public sectors with whom Sea Grant works to fulfill its mission.

[21] National Academy of Sciences, 2010: http://www.nap.edu/catalog.php?record_id=12999
[22] America COMPETES, 2010: http://www.commerce.gov/americacompetes

An environmentally literate person is someone who has a fundamental understanding of the systems of the natural world, the relationships and interactions between the living and non-living environment and the ability to understand and utilize scientific evidence to make informed decisions regarding environmental issues[23]. These issues involve uncertainty and require the consideration of economic, aesthetic, cultural and ethical values.

[23] 2009-2029 NOAA Education Strategic Plan

FOCUS AREAS

# Environmental Literacy and Workforce Development (ELWD)

## GOAL 10

**An environmentally literate public supported and informed by a continuum of lifelong formal and informal engagement opportunities.**

Learning Outcomes

- Formal and informal educators are knowledgeable of the best available science on the effectiveness of environmental science education.
- Formal and informal educators understand environmental literacy principles.
- Lifelong learners are able to engage in informal science education opportunities focused on coastal topics.

Action Outcomes

- Engagement professionals use environmental literacy principles in their programs.
- Engagement programs are developed and refined using the best available research on the effectiveness of environmental and science education.
- Formal and informal education programs incorporate environmental literacy components.
- Formal and informal education programs take advantage of the knowledge of Sea Grant-supported scientists and engagement professionals.
- Formal and informal educators, students and/or the public collect and use coastal weather data in inquiry and evidence-based activities.
- Lifelong learners make choices and decisions based on information they learned through informal science education opportunities.
- Educators work cooperatively to leverage federal, state and local investments in coastal environmental education.

Consequence Outcomes

- Members of the public incorporate broad understandings of their actions on the environment into personal decisions.

FOCUS AREAS

# Environmental Literacy and Workforce Development (ELWD)

## GOAL 11

**A future workforce reflecting the diversity of Sea Grant programs, skilled in science, technology, engineering, mathematics and other disciplines critical to local, regional and national needs.**

Learning Outcomes

- Students and teachers are aware of opportunities to participate in science, technology, engineering, mathematics and active stewardship programs.

Action Outcomes

- A diverse and qualified pool of applicants pursues professional opportunities for career development in natural, physical and social sciences and engineering.
- Graduate students are trained in research and engagement methodologies.
- Research projects support undergraduate and graduate training in fields related to understanding and managing our coastal resources.

Consequence Outcomes

- A diverse workforce trained in science, technology, engineering, mathematics, law, policy or other job related fields is employed and have high job satisfaction.

### Environmental Literacy and Workforce Development Performance Measures

8. Number of Sea Grant facilitated curricula adopted by formal and informal educators.
9. Number of people engaged in Sea Grant supported informal education programs.
10. Number of Sea Grant-supported graduates who become employed in a career related to their degree within two years of graduation.

## CROSS-CUTTING PERFORMANCE MEASURES

11. Economic (market and non-market; jobs and businesses created or retained) benefits derived from Sea Grant activities.

FOCUS AREAS

# IMPLEMENTATION STRATEGY

This plan provides a national framework for the work of the 33 Sea Grant programs. The state strategic plans align with the National Sea Grant Strategic Plan with particular focus on the specific needs and priorities of each respective state and region. The 2014-2017 National Sea Grant Strategic Plan will be implemented through each of the programs' portfolios of merit-reviewed research, communications, education, extension and legal projects. This implementation strategy utilizes Sea Grant's unique combination of research and engagement capabilities and capitalizes on its strong federal-university-state-private sector partnerships.

Progress toward meeting state programs' strategic plans will be used to assess each individual Sea Grant program's contribution toward meeting the national goals outlined in this plan. The National Sea Grant Office will track state-level performance measures, other numerical metrics and impacts to highlight Sea Grant's contributions in achieving the goals identified in the National Sea Grant Strategic Plan. The National Sea Grant Office will track and disseminate best practices applied by individual Sea Grant programs and facilitate their adoption by the entire Sea Grant network. The National Sea Grant Advisory Board will continue in its role of developing strategies to foster wider use of the National Sea Grant College Program to address the highest priorities regarding the wise utilization of the nation's coastal resources. Sea Grant will revisit this plan yearly to ensure that the organization is accomplishing its four-year goals while staying alert to new trends and opportunities.