NEW JERSEY SEA GRANT CONSORTIUM
2014–2017 STRATEGIC PLAN

INTRODUCTION AND BACKGROUND

New Jersey is truly coastal-centric with 130 miles of Atlantic coastline and 1,792 miles of tidal shoreline including Delaware Bay. Seventeen of New Jersey's 21 counties border tidally-influenced estuarine or ocean waters and, under Section 6217 of the Federal 1990 Coastal Zone Management Reauthorization Act, all of New Jersey is considered coastal since all watersheds drain to the coast. Although fourth smallest in size, New Jersey is the most densely populated state in the nation. Located in the New York-New Jersey Metropolitan area, one of the most highly urbanized and industrialized regions in the nation, the health and management of New Jersey's coastal waters is coupled tightly to those demographics.

As with many other coastal states, New Jersey's economy is largely dependent upon its marine and coastal resources. In addition to the Atlantic Ocean and Delaware Bay and River shoreline which supports New Jersey's tourism, boating and recreational fishing industries, the state is home to two of the nation's largest commerce ports and nine commercial fishing ports. The value of the industries supported by these environments is extraordinary, with port commerce supporting a $50 billion industry, coastal tourism at $28 billion, and commercial fisheries and aquaculture accounting for more than $1 billion. These industries support a workforce of more than 1.5 million individuals at a per capita income among the highest in the nation. The coast is also the primary recreational outlet for New Jersey's nearly 9 million residents and the 91 million plus people who live within a four-hour drive. The coastally-dependent economy of New Jersey is closely tied to the quality and condition of the state's beaches, coastal infrastructure, accommodations, water quality, fishery health, deep-draft harbors and port facilities. Balancing economic growth, development, re-development and coastal resource quality is the critical issue for the future of New Jersey's coastal communities, ports and fisheries.

Numerous competing issues and uses have created intense competition for New Jersey's coastal lands, waters and resources. New Jersey's coastal communities face enormous pressure to balance the demand for growth with the protection of their marine and coastal resources. In addition, because New Jersey's coastline is largely developed, human safety and coastal hazard mitigation is an area of ever-increasing importance statewide. Science-based management and effective public policy are essential to ensuring human health and safety and preserving ecological services and productive uses.

HISTORY and STRUCTURE OF NEW JERSEY SEA GRANT CONSORTIUM

The New Jersey Sea Grant Consortium (NJSGC) was founded by six state colleges in 1969 as a cooperative center for the study of marine and marine-related environmental science. Today it boasts a large multi-institutional membership of colleges, universities and other groups that share and support the vision and mission of the organization, making it one of the most successful largest alliances of its kind in the state, region and the nation.

Since its inception, the Consortium has served the state and the region by developing programs designed to resolve coastal issues, develop marine technologies, improve marine science literacy

among its citizens and formulate science-based policy. NJSGC has contributed leading research in the fields of marine and coastal related environmental science since 1976 and in recognition of its academic and scientific achievements NJSGC was awarded Sea Grant College status in 1989.

VISION AND MISSION OF THE NJSGC

NJSGC continues to be focused on its vision for a sustainable future for New Jersey's coastal environment and committed to its mission to promote responsible use of New Jersey's coastal and marine resources. Throughout its forty-three year history, the organization has worked to accomplish this through innovative research, education and extension programs.

PLANNING PROCESS AND STRATEGIC APPROACH

The process for building NJSGC's 2014-2017 Strategic Plan was part of a Sea Grant network effort to produce the 2014-2017 National Sea Grant Program Strategic Plan. This collaborative effort brought the wealth of expertise and experience of the 33 state Sea Grant Programs to the task of creating the national plan. In our state, participation in this process ensured that the priorities for New Jersey were reflected in the national plan.

NJSGC stays informed of stakeholder needs through routine personal interaction, program related meetings, workshops, public forums, interaction with the Stakeholder Advisory Board and through collaborative projects with partner institutions and agencies. To build our 2014-2017 strategic plan we convened four stakeholder workshops at locations throughout the state and three meetings with municipal personnel from New Jersey's coastal communities and conducted several surveys. For the stakeholder workshops, Consortium member institutions provided venues to engage coastal stakeholders including coastal industry and nonprofit environmental groups, local and state government agency representatives, scientists, educators and other interested parties. Dialogue was initiated on the basis of a summary provided by NJSGC and through documents (current strategic plan and other NJSGC reports) made available to the stakeholders. An extensive survey evaluating previous goals, outcomes and priorities was given at end of each session. After the workshops, the survey was broadcast to our larger stakeholder community through our website. In a separate effort, the Coastal Issues Caucuses targeted select coastal counties and their communities. Invited stakeholders included local and state agency representatives from community planning boards, environmental commissions, emergency management and the like. Information from these meetings was summarized into a needs assessment document. Additionally, the shellfish aquaculture industry was targeted at a workshop that produced another needs assessment document. Finally, a short survey to rank the top ten coastal issues was implemented as part of NJSGC's Top Ten Beaches project. Input was also solicited from our various boards and committees.

All of this information was summarized in response to questions posed by the National Sea Grant Office for the development of the national plan. This information for the national plan was vetted through the Sea Grant network, national stakeholder groups, representatives from NOAA programs, other federal agencies and non-profit environmental organizations. Subsequent draft plans were reviewed through the Sea Grant network, other NOAA line office programs and national stakeholder groups.

Using the outcomes of these workshops, caucuses, and surveys, and with guidance from the National Sea Grant Office including the draft national plan, NJSGC has developed its own state strategic plan. As a result, our goals and outcomes align with the four focus areas of the 2014-2017 National Sea Grant Strategic Plan. Our plan continues a commitment to integration of research, extension, education, and communications to reach our outcomes and goals.

Marine and coastal issues that are important to our stakeholders locally and across the state are emblematic of those across the nation. As such, we have selected and modified a subset of national goals, outcomes and strategies that match the needs of New Jersey and are within our capability and capacity. These goals, outcomes and strategies will guide our research, education and outreach activities. The feedback received from our various boards and stakeholders has helped us develop a comprehensive plan that will guide the work of NJSGC over the next four years. Continued guidance will maintain the vitality of this document in order to respond to any changes in stakeholder needs over time.

Bringing the results of scientific research through outreach (extension and communications) and education to the people and decision makers of our State is the surest way to secure our vision of a sustainable future for New Jersey's coastal environment. The following narrative describes our goals and strategies for each of the four national focus areas in relation to the needs within New Jersey.

In general, our strategic approach is to support the management of the coastal resources of New Jersey in ways that balance human use with environmental health. This includes science-based information on coastal ecosystems function and the impacts of human activities; providing for an informed citizenry who understand the complexities of coastal environments; and, incorporation of social science into ecosystem-based management decisions.

FOCUS AREAS

To help New Jersey and the nation understand, manage and use its coastal resources wisely, Sea Grant has identified four focus areas central to the needs of our coast reflecting NOAA goals and Sea Grant's strength and core values. The focus areas are:

1. Healthy Coastal Ecosystems (HCE)
2. Sustainable Fisheries and Aquaculture (SFA)
3. Resilient Communities and Economies (RCE)
4. Environmental Literacy and Workforce Development (ELWD)

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. These four focus areas are not mutually exclusive. Many of the activities and programs we plan to implement over the next four years will cut across each of these focus areas. For example, climate change and sea level rise are cross cutting themes in this strategic plan that will be addressed within each focus area. NJSGC will be an active participant in delivering climate change education, outreach and research to its coastal constituents. NJSGC will work with its partners to increase awareness and understanding of

climate change and seal level rise impacts (e.g., coastal vulnerability and resilience indices) and to implement adaptation strategies, ocean planning, and response planning.

Bringing the results of scientific research through outreach (extension and communications) and education to the people and decision makers of our State is the surest way to secure our vision of a sustainable future for New Jersey's coastal environment. The following narrative describes our goals, outcomes and strategies for each of the four national focus areas in relation to the needs within New Jersey.

1. HEALTHY COASTAL ECOSYSTEMS (HCE)
Estimated Level of Effort – 26%

Healthy coastal ecosystems are the foundation for life along the coast. However, New Jersey's coastal ecosystems are increasingly challenged by development, non-point source pollution, and other human activities that contribute to degraded water quality, habitat loss, a decline in fisheries, the spread of invasive species, and a number of other challenges. The responsible management of such critical resources must be addressed through the implementation of innovative ideas and actions. The ability to balance economic growth and other human needs while maintaining ecosystem health is critical to sustaining New Jersey's coastal communities.

In order for our coastal stakeholders to make informed decisions, they must understand the importance and value of healthy coasts and oceans. In addition they must understand the connection between human activities and their effects on the coastal environment. NJSGC plans to accomplish this by conducting activities for the HCE focus area that address impacts associated with stormwater discharges, improving operation practices at waterfront facilities, reducing impacts from various water related activities, restoring function to impaired water bodies, improving the use of ecosystem based approaches among managers and educating the citizens of New Jersey on how their actions impact coastal and ocean resources.

Overall strategies for implementation of planned outcomes and objectives in HCE:

- ✓ Distribute scientific information from NJSGC funded research to coastal residents, resource managers, businesses, and industries and facilitate the understanding of such information so that it may be used effectively when making decisions and managing resources.

- ✓ Promote the implementation and maintenance of best management practices, innovative approaches, and technologies to help restore function to coastal ecosystems.

- ✓ Develop innovative methods and programs to help coastal residents, resource managers, businesses, and industries understand the effects of human activities and environmental changes on coastal resources.

- ✓ Provide technical support for citizens, government officials and businesses that need help with specific coastal resource related problems, giving them access to the latest information and techniques.

- ✓ Provide life-long learning programs for people of all ages – learning that enhances understanding of coastal ocean environments and thus promotes the strongest possible sense of stewardship and awareness.

HCE GOALS AND OUTCOMES

Goal: Ecosystem-based approaches are used to manage land, water and living resources. (HCE National Goal #2)

Learning Outcomes

1. Coastal managers and citizens consider scientific information obtained from Sea Grant funded research when making ecosystem and recreation related decisions. (HCE 2.1.L)

2. NJSGC will partner with mid-Atlantic Sea Grant Programs to deliver regional workshops that address HCE issues relevant to stakeholders. (HCE 2.1.L)

3. Researchers and coastal stakeholders reach agreement on HCE related research priorities to be included in targeted RFP. (HCE 2.2.L)

4. New Jersey's residents, visitors, and other coastal users understand how their actions impact New Jersey's coastal water quality and how coastal water quality impacts them. (HCE 2.3.L; HCE 3.2.L)

5. New Jersey's coastal communities understand the relationship between stormwater management, watersheds, and the coastal environment. (HCE 2.3.L)

Action Outcomes

6. Resource managers and businesses integrate scientific information into resource management practices. (HCE 2.8.A)

Consequence Outcomes

7. Watershed function to coastal estuaries and coastal water quality in New Jersey is managed using ecosystem-based approaches. (HCE 2.9.C)

Goal: Ecosystems and their habitats are protected, enhanced or restored. (HCE National Goal #3)

Learning Outcomes

8. Community-based oyster restoration and education programs are implemented to improve understanding of ecological value of oyster reef habitats and promote environmental stewardship among K-12 students and adult participants. (HCE 3.1.L)

Action Outcomes

9. Effective implementation and maintenance of best management practices to allow for the infiltration or treatment of storm and waste water, thus restoring watershed function to coastal estuaries. (HCE 3.5.A; HCE 2.7.A)

10. Community-based oyster restoration program enhances habitat and increases abundance of depleted oysters. (HCE 3.5.A)

Consequence Outcomes
11. Improved watershed function to coastal estuaries in New Jersey. (HCE 3.6.C)

PERFORMANCE MEASURES
1. Number of coastal managers and citizens provided with the results of Sea Grant research. (HCE 1.3.L) (Target 5000)
2. Number of HCE related workshops in the mid-Atlantic region. (HCE 2.1.L) (Target 1)
3. Number of RFPs targeting HCE Focus Area. (HCE 2.2.L) **(**Target 2)
4. Number of individuals trained in the effects of human activities on water quality and provided the resources to bring this information to increasingly larger audiences. (HCE 2.3.L; HCE 3.2.L) (Target 20)
5. Number of residents with an increased understanding of stormwater management as determined by pre and post program experience assessments. (HCE 2.3.L) (Target 250)
6. Number of live bait dealers aware of live bait vectors of AIS or adopting reasonable live bait management practices. (HCE 2.8.A) (Target 20)
7. Number of Best Management Practices (tools, technologies and information services) being implemented to improve ecosystem based management. (HCE 2.9.C) National Performance Measure #1 (Target 3) Number of stormwater best management practices, such as rain gardens, implemented and maintained. (HCE 2.9.C) National Performance Measure #2 (Target 60) Number of Clean Marinas certified or recertified. (HCE 2.9.C) National Performance Measure #2 (Target 45) Number of marinas with adding or improving pumpout facilities. (HCE 2.9.C) National Performance Measure #2 (Target 30)
8. Number of student and adult participants with increased understanding of ecological values as determined by pre and post program experience assessments. (HCE 3.1.L) National Performance Measure #9) (Target 250)
9. Number of gallons of water infiltrated or treated by a municipality, individual or business through the implementation and maintenance of best management practices such as rain gardens, pumpouts and wash wastewater capturing systems. (HCE 3.5.A; HCE 2.7.A) (Target 12,000,000)
10. Number of acres of oyster habitat enhanced. (HCE 3.5.A) (National Performance Measure #3) (Target 4)
11. Number of acres of habitat enhanced through the implementation and maintenance of stormwater best management practices such as rain gardens. (HCE 3.6.C) (National Performance Measure #3) (Target 1)

2. SUSTAINABLE FISHERIES AND AQUACULTURE (SFA)

Estimated Level of Effort – 17%

New Jersey, like the nation, continues its increase in seafood consumption in the face of the decline of many of its major fisheries. This trend is unsustainable. 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. It is unlikely that the gap between seafood demand and domestic harvest can be filled as global wild fisheries harvests have reached a plateau. As such, the United States imports 86 % of seafood consumed. With a stagnant wild catch, aquaculture is considered the best method to reduce the demand gap as well as the trade gap. In fact global aquaculture is predicted to increase by 33 % over the next decade, so there is an opportunity for U.S. aquaculture industry expansion and innovation through production and marketing strategies. The wild fisheries industry will need to innovate as well. For example, industry will need to continue to develop value-added products.

New Jersey has a long history as a major center for commercial and recreational fisheries. Its fishery and aquaculture resources contribute more than $1 billion annually to the state's economy. The natural capital of these resources is estimated at $32 billion. Commercial fisheries in New Jersey rank among the most productive on the East Coast and in the nation. Cape May, New Jersey is the second most valuable East Coast fishing port. In addition, New Jersey's recreational fisheries lead the nation in terms of catch, angler expenditures, revenue generated, and angler participation. New Jersey also has a long history with oyster culture that has been supported by a century of research and industry cooperation through the Haskin Shellfish Research Laboratory. NJSGC has supported research at Haskin through state Sea Grant funds and National Strategic Investments that currently supports our Shellfish Aquaculture Program Coordinator. This research and extension supports an oyster industry that generates nearly $30 million annually and employs nearly 200 people directly.

NJSGC continues to support fisheries-related research that assists resource managers in the management and conservation of commercial and recreational species. Through research, outreach and education NJSGC will continue to lead and support developments in innovative technologies, consumer safety, and safe and sustainable seafood supply in all sectors of the industry (commercial and recreational fishing, aquaculture, and processing) now and in the future. Our goal is a healthy fisheries (commercial and recreational) and mariculture industries within New Jersey that harvest seafood responsibly, ethically, efficiently, and sustainably. Furthermore, we seek to inform stakeholders to understand the importance of ecosystem health and sustainable harvesting, appreciate the health benefits of seafood consumption, and support sustainable management and consumption practices to protect and increase our supply of safe and sustainable seafood. Support and guidance of our activities is augmented by the participation of representatives of the fisheries industry on our Stakeholder Advisory Board.

Overall strategies for implementation of planned outcomes and objectives in SFA:

- ✓ Partner with NMFS, NJDA, state fisheries managers, seafood producers and processors, fishing associations and consumer groups to advance environmentally responsible and sustainable fisheries and aquaculture.

- ✓ Enhance the seafood industry and the public's understanding of the importance of a healthy ecosystem for a vibrant seafood industry in New Jersey.

- ✓ Utilize traditional and new media platforms to make individual and group contacts; develop meetings, workshops, forums and training; produce written documents including manuals, articles, brochures and fact sheets; and, survey and evaluation materials that increase awareness and understanding of sustainable fisheries and aquaculture in New Jersey.

- ✓ Support research that enables scientifically sound fisheries management (including ecosystem based management) or develops new technologies or products that are both environmentally responsible and contribute to a competitive and viable mariculture industry.

- ✓ Identify and transfer research results and new mariculture technologies and methodologies that are environmentally responsible, ensure seafood safety, improve production and promote ecosystem-based fisheries management to managers, fishers, aquaculturists and consumers.

- ✓ Promote sustainable water-dependent industries (marinas, boaters, charter industry) and responsible or ethical recreational fishing.

- ✓ Work directly with oystermen in cooperative research, but also in developing seafood cooperatives to help reduce costs of production (materials, insurance, and marketing) and promote sustainability.

- ✓ Develop community supported fisheries to improve the economic success of the industry and encourage consumer awareness of sustainability and health issues, and provide local product to local consumers.

- ✓ Develop future fisheries or aquaculture scientists, managers or outreach specialists through training and scholarship programs.

SFA GOALS AND OUTCOMES

Goal: A safe, secure and sustainable supply of seafood to meet public demand. (National Goal #4)

Learning Outcomes

1. NJSGC will work with NMFS Howard Lab to prepare articles that relay available ecological and ecosystem data on the dynamics of wild fish populations that can then be used by fisheries managers, industry and consumers. (SFA 4.1.L)

2. Shellfish aquaculturists increase awareness of novel technologies and approaches, seafood health and safety issues, and business strategies and models. (SFA 4.2.L)

3. Shellfish aquaculturists are aware of new local niche markets in non-traditional sectors including CSA's, food co-ops and farmers markets. (SFA 4.4.L)

4. New technologies and approaches are developed through research to promote sustainable aquaculture practices. (SFA 4.5.L)

Action Outcomes
5. Shellfish aquaculturists implement BMPs to promote sustainable aquaculture practices. (SFA 4.8.A)

6. Shellfish aquaculturists adopt new local niche markets in non-traditional sectors including CSA's, food co-ops and farmers markets. (SFA 4.9.A)

7. Shellfish aquaculturists adopt new techniques and approaches that enhance production in an environmentally sound and sustainable way. (SFA 4.10A)

Consequence Outcomes
8. Implementation of shellfish aquaculture BMPs increases production, providing economic benefits to their businesses and the region. (SFA 4.14.C)

Additional State Outcome
9. Researchers and coastal stakeholders reach agreement on SFA related research priorities to be included in a targeted RFP.

Goal: Informed consumers who understand the health benefits of seafood consumption and how to evaluate the safety and sustainability of the seafood they buy. (National Goal #5)

Learning Outcomes
10. New Jersey's citizens understand the nutritional benefits of oysters and the ecological benefits of sustainably grown aquacultured shellfish. (SFA 5.3 L)

11. Shareholders of seafood share programs available at Community Supported Agriculture Programs (CSAs) in New Jersey understand the benefits of locally and sustainably grown and harvested seafood. (SFA 5.3 L)

Action Outcomes
12. New Jersey's citizens preferentially purchase NJ aquacultured shellfish. (SFA 5.7.A)

13. Consumers have access to local and sustainable seafood at CSAs. (SFA 5.7.A)

PERFORMANCE MEASURES
1. Number of articles published on the ecological dynamics of wild fish populations. (SFA 4.1.L) (Target 4)
2. Number of shellfish aquaculturists participating in bi-monthly forums. (SFA 4.2.L) (Target 10)

3. Number of shellfish aquaculturists interested in new local niche markets. (SFA 4.4) (Target 5)
4. Number of new technologies/approaches developed and translated to shellfish aquaculture. (SFA 4.5.L) (Target 4)
5. Number of shellfish aquaculturists that implement BMPs. (SFA 4.8.A) (National Performance Measure #4) (Target 15)
6. Number of new market outlets adopted by shellfish aquaculturists. (SFA 4.9.A) National Performance Measure #4 (Target 2)
7. Number of aquaculturists and processors implementing operational changes based on information learned from forums. (SFA 4.10.A) National Performance Measure #4 (Target 5)
8. Economic value of increase in shellfish aquaculture production. (SFA 4.14.C) National Performance Measure #11 (Target $400,000)
9. Number of targeted research RFPs for the Sustainable Fisheries and Aquaculture focus area. (SFA 4.15.L) (Target 2)
10. Number of residents receiving information on the nutritional benefits of oysters and the ecological benefits of sustainably aquacultured oysters. (SFA 5.3 L) National Performance Measure #5 (Target 1000)
11. Number of CSA shareholders that understand the benefits of local and sustainable seafood. (SFA 5.3.L) National Performance Measure #5 (Target 200)
12. Number of consumers preferentially purchasing New Jersey aquacultured shellfish. (SFA 5.7.A) National Performance Measure #5 (Target 1000)
13. Number of CSAs offering local and sustainable seafood to shareholders. (SFA 5.7.A) (Target 4)

3. RESILIENT COMMUNITIES AND ECONOMIES (RCE)
Estimated Level of Effort – 27%

Hazard resilience is a topic that has received an extraordinary amount of attention in the past decade. The devastation experienced in faraway places, like Japan, Indonesia and Haiti, as well as events closer to home such as the landfall of Hurricanes Katrina and Ike along the Gulf Coast, and even the current global financial crisis, have ushered in a new era in American history in which the term "resilience," has become an important part of the American political, economic, and social vernacular. Dramatic events, such as the November 2009 "Friday the 13th" Nor'easter, and Hurricane Irene in 2011, as well as more day-to-day phenomena such as increased local tidal flooding, have highlighted the relevance of coastal hazards and coastal hazard resiliency to the State of New Jersey.

At the local level, resilience refers to a community's ability to understand, plan for, and respond to a given hazard or set of hazards, whether they are natural or man-made. In coastal communities, the concept of hazard resilience is of particular importance due to the number and assortment of hazards unique to the coastal zone and their frequent significant impacts on the local economy. The recent emphasis on climate change and sea level rise only reinforces what coastal scientists have known for quite some time – choosing to live, work, and recreate in the coastal zone is accompanied by numerous risks that must be balanced against the economic and social benefits. NJSGC's overall goal in RCE is to ensure that New Jersey's coastal communities, including residents, business owners, visitors, and others understand these risks and are prepared to take the appropriate measures to reduce their vulnerability and respond

quickly and effectively to events as they arise. The Consortium will achieve this by capitalizing on its existing infrastructure and strengths in the areas of research, education and outreach to provide information and tools designed to assist citizens, businesses and decision-makers to plan for hazardous events and optimize the ability of their communities to adapt, respond and rebuild.

NJSGC will continue to support cutting-edge research in the areas of marine-related energy sources, climate change, coastal processes, energy efficiency, hazards, stormwater management, coastal and ocean planning, and tourism. The NJSGC Extension Program will engage our diverse and ever-growing coastal population in applying the best-available scientific knowledge to address coastal resiliency. Ultimately, NJSGC will bring its unique research and engagement capabilities to support the development of resilient coastal communities that sustain diverse and vibrant economies, effectively adapt and respond to and mitigate natural and technological hazards and function within the limits of their ecosystems.

Overall strategies for implementation of planned outcomes and objectives in RCE:

- ✓ Develop and deliver a broad set of education and outreach services that address RCE issues relevant to New Jersey's citizens, visitors and coastal stakeholders.

- ✓ Through forums, surveys and other means, encourage on-going dialogue regarding stakeholder need to achieve well-informed management of coastal resources.

- ✓ Work with the NOAA Climate Change Program, the NOAA Coastal Services Center, and other public and private partners (e.g., MARCO, MARACOOS, NJDEP) to develop and deliver comprehensive research and education programs that improve public understanding of ocean related global change, climate variability and short term hazardous ocean and ocean weather effects on coastal communities.

- ✓ Work with the New Jersey Coastal Protection Technical Assistance Service to ensure that the latest information on shore protection technologies and tools are available to New Jersey's coastal communities.

- ✓ Assist marinas to adopt BMP's and realize the economic benefits associated with being recognized as responsible stewards of the environment.

Goal: Development of vibrant and resilient coastal economies. (National Goal # 6)

Learning Outcomes

1. Formal and informal educators will be provided with access to exemplary educational resources focused on the economic value of ocean and coastal commerce and its relationship and dependence on a healthy environment. (RCE 6.1.L)

2. Coastal stakeholders and communities are aware and have access to up-to-date information on the status of offshore energy development off of the New Jersey coast. (RCE 6.5.L)

Consequence Outcomes
3. Marinas will adopt best management practices to meet the requirements of the Clean Marina Program in New Jersey. (RCE 6.8.C)

Goal: Communities use comprehensive planning to make informed strategic decisions. (National Goal #7)

Learning Outcomes
4. Coastal Managers and citizens consider scientific information obtained from Sea Grant funded research when making coastal resource related decisions, and implementing sustainable practices. (RCE 7.1.L)

5. Forums to encourage stakeholder dialogue regarding the management of coastal resources will be held (RCE 7.1.L)

Action Outcomes
6. Coastal communities have access to coastal hazard information in support of hazard resilience planning activities. (RCE 7.2.A)

7. New Jersey's coastal communities and leaders will make efficient use of water resources to sustain coastal ecosystems, quality of life, and economic well-being. (RCE 7.4.A)

Goal: Improvements in coastal water resources sustain human health and ecosystems services. (National Goal # 8)

Learning Outcomes
8. Students and lifelong learners participating in NJSGC's education programs will become aware of the impact their behaviors have on water quality and supply. (RCE 8.1.L)

9. Educators working in informal settings will gain tools to inspire youth to think and care about water. (RCE 8.2.L)

10. New Jersey coastal citizens and community leaders understand the value of low-impact development. (RCE 8.1.L; RCE 8.2.L)

11. New Jersey coastal citizens and community leaders communicate and collaborate on solving New Jersey's coastal issues and will make efficient use of water resources to sustain coastal ecosystems, quality of life, and economic well-being. (RCE 8.3.L; RCE 8.4.A)

Goal: Resilient coastal communities adapt to the impacts of hazards and climate change. (National Goal #9)

Learning Outcomes
12. Individuals have access to coastal hazard information in support of hazard resilience planning activities. (RCE 9.1.L)

13. Students and free choice learners are aware of the danger of rip currents and other coastal hazards and are well informed on safety measures. (RCE 9.1.L)

14. New Jersey residents and decision-makers are aware of and understand how coastal hazards and climate change impact stormwater and water quality and the implications of those events for them and their communities. (RCE 9.1.L)

15. Residents, decision-makers, and media are aware of and understand the processes that produce hazards and climate change and the implications of those events. (RCE 9.1.L)

16. Coastal communities have access to coastal hazard information in support of hazard resilience planning activities. (RCE 9.2.L)

17. Coastal stakeholders become more aware of the information and tools that are currently available to them with regard to coastal hazards. (RCE 9.3.L)

Action Outcomes
18. Coastal stakeholders rely on the latest models, data, and tools as they plan responses to sea level rise, inundation and other coastal hazards. (RCE 9.5.A)

19. Government agencies (local, county, and state) utilize the results of the latest research including Sea Grant funded research and Sea Grant's extension expertise to make informed coastal management decisions. (RCE 9.6.A)

20. New Jersey coastal communities develop and adopt coastal hazard and climate adaptation strategies suited to local needs regarding stormwater and water quality. (RCE 9.7.A)

21. Residents and coastal communities take action to reduce impacts of coastal hazards on property. (RCE 9.8.A)

Consequence Outcomes
22. A culture of preparedness is developed throughout the state. It becomes the "in" thing. (RCE 9.10.C)

Additional State Outcomes
23. Researchers and coastal stakeholders reach agreement on RCE related research priorities to be included in a targeted RFP.

24. NJSGC will work with mid-Atlantic Sea Grant Programs to deliver regional workshops that address RCE issues relevant to stakeholders.

PERFORMANCE MEASURES
1. Number of educators using NJSGC-generated curriculum materials in their teaching. (RCE 6.1.L) (Target 120)
2. Number of people receiving electronic updates on offshore energy. (RCE 6.5.L) (Target 1200)

3. Number of marinas that adopt best management practices that result in a reduction of non-point source pollution. (RCE 6.8.C) (Target 20)
4. Number of coastal managers and citizens provided with the results of Sea Grant research. (RCE 7.1.L) (Target 5000)
5. Number of attendees at stakeholders forums on the management of coastal resources. (RCE 7.1.L) (Target 200)
6. Number of coastal communities provided with information on local hazard resiliencies. (RCE 7.2.A) (Target 20)
7. Number of communities implementing sustainable practices in the management of natural resources and infrastructure. (RCE 7.4.A) National Performance Measure #6 (Target 10)
8. Number of students and/or program participants reached through NJSGC education programs on water quality and supply. (RCE 8.1.L) (Target 48,000)
9. Number of curricula developed on aquatic themes. (RCE 8.2.L) (Target 1)
10. Number of residents with increased knowledge regarding low impact development. (RCE 8.1.L; RCE 8.2.L) (Target 250)
11. Number of community leaders attending county-wide Coastal Issues Caucuses and Coastal Solutions Caucuses. (RCE 8.3.L; RCE 8.4.A) (Target 120)
12. Number of visits to the Stevens-NJSGC coastal hazard website. (RCE 9.1.L) (Target 250)
13. Number of students and free-choice learners reached through rip current and other hazard education projects. (RCE 9.1.L) (Target 20,000)
14. Number of coastal communities with better understanding of coastal hazards and climate change impacts on stormwater and water quality. (RCE 9.1.L) (Target 10)
15. Number of residents and decision makers reached by NJSGC Communication activities through media outlets. (RCE 9.1.L) (Target 2,000,000)
16. Number of coastal communities directly provided with information on local hazard resilience. (RCE 9.2.L) (Target 40)
17. Number of stakeholders receiving the information during a presentation by a coastal processes specialist. (RCE 9.3.L) (Target 1000)
18. Number of communities making use of the latest available models, data, and tools by municipalities as they do their hazard planning. (RCE 9.5.A) (Target 5)
19. Number of coastal management decisions influenced by Sea Grant research and extension work. (RCE 9.6.A) (Target 12)
20. Number of coastal communities developing or adopting stormwater plans for coastal hazards and climate change. (RCE 9.7.A) National Performance Measure #6 (Target 10)
21. Number of acres of living shorelines implemented to reduce the impact of coastal hazards to property. (RCE 9.8.A) National Performance Measure #3 (Target 0.5)
22. Number of coastal communities incorporating hazard resilience practices into their planning. (RCE 9.10.C) National Performance Measure #7 (Target 5)
23. Number of targeted research RFPs for the RCE focus area. (Target 2)
24. Number of workshops regional workshops that address relevant RCE issues. (Target 1)

4. ENVIRONMENTAL LITERACY AND WORKFORCE DEVELOPMENT (ELWD)

Estimated Level of Effort – 30%

Education at NJSGC is focused on assuring that New Jersey's citizens and visitors understand, value, and appreciate the state's marine and coastal environment and are able to apply sound evidence and science-based information to make well-informed decisions regarding its use, management, and care. NJSGC's education programs contribute towards ocean and coastal literacy and the development of a strong and competent STEM workforce by providing compelling inquiry-based experiences to a wide range of learners and by partnering with like-minded groups to leverage available resources in ocean and coastal education.

Activities range from field trip programs that convey content and build stewardship through "hands and minds-on" investigations to internships and short and long-term professional development for pre- and in-service educators. In addition to workshops and one-on-one school district consultations, professional development activities include the creation and dissemination of standards-based teaching tools that explicitly connect ocean and coastal content to STEM education goals and national and state learning standards. The latter is especially critical since marine and coastal science is not mandated in New Jersey's core curriculum content standards. Lastly, NJSGC's educators engage tens of thousands of citizens and visitors each year through their participation in numerous public and professional outreach events which provide a showcase for NJSGC's research, education and extension personnel and programs.

Overall strategies for implementation of planned outcomes and objectives in ELWD:

- ✓ Advance coastal and marine literacy across generations by providing access to a diversity of environmental learning, career awareness and stewardship building tools for schoolchildren, teachers, and other interested parties.

- ✓ Use NJSGC's strong university, extension and K-12 partnerships to enrich existing coastal and ocean literacy programs, to motivate students to pursue marine science and related STEM careers and to advance greater understanding of best practices for compelling and effective ocean, coastal and STEM education

- ✓ Foster opportunities and create tools for formal and informal educators to advance STEM education and STEM career awareness through ocean and coastal educational content and experiences.

- ✓ Engage a wide variety of like-minded partners and supporters to build public awareness on priority coastal issues including hazard awareness and resilience, climate change impacts and conservation and protection of water resources.

- ✓ NJSGC's Communications Program will implement initiatives to increase awareness and participation in NJSGC's education programs.

GOALS AND OUTCOMES

Goal: An environmentally literate public supported and informed by a continuum of lifelong formal and informal engagement opportunities. (National Goal # 10)

Learning Outcomes

1. Environmental awareness, science literacy, and stewardship amongst schoolchildren, their teachers and lifelong learners will be advanced through a community-based oyster restoration program. (ELWD 10.2.L, 10.3.L, 11.1.L)

2. Ample opportunity for groups to interact with and learn about New Jersey's coastal and estuarine environments will be made. (ELWD 10.3.L)

3. Coastal stakeholders have a mechanism for a continuing dialogue with scientists and other professionals to gain a greater understanding of issues relevant to New Jersey's marine and coastal environments. (ELWD 10.3.L)

Action Outcomes

4. Formal and informal educators will have a set of standards with which to plan and structure education programs focused on the NY/NJ Harbor Estuary. (ELWD 10.4.A)

5. Through research findings, STEM education that incorporates marine and coastal topics will be improved. (ELWD 10.5.A)

6. New Jersey's educators will have marine and coastally-based educational curricula that support state standards as well as NOAA ocean/climate literacy standards. (ELWD 10.6.A)

7. NJSGC Educators will engage their Research and Extension counterparts to develop educational products as appropriate. (ELWD 10.7A)

8. Students and life-long learners will be provided with education programs that increase their knowledge and understanding of the connection between ocean, land and atmosphere, as well as the specific impacts climate change would have on NJ's coastal communities. (ELWD 10.8.A)

Goal: 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. (National Goal #11)

Learning Outcomes

9. STEM-based programs that link Sea Grant educators and scientists (and other marine/coastal educators and scientists including NOAA/NMFS researchers) will be made available to New Jersey's formal and informal education community. (ELWD 11.1.L)

10. Environmental awareness, science literacy, and stewardship amongst schoolchildren, their teachers and lifelong learners will be advanced through a community-based oyster restoration program. (ELWD 11.1.L)

Action Outcomes

11. Provide scholarships and future career incentives in the fields of fisheries and aquaculture. (ELWD 11.2A, ELWD 11.3A)

12. Awareness of professional opportunities for career development in natural, physical and social sciences and engineering is made through ample opportunities for the public to engage with Sea Grant scientists and extension personnel as well as other professionals working in marine, coastal and geosciences. (ELWD 11.2.A)

13. NJSGC will contribute to professional development in ocean education through internships to pre-service educators. (ELWD 11.3A)

14. All Sea Grant funded research includes support for undergraduate and/or graduate students working in fields related to understanding and managing our coastal resources. (ELWD 11.4.A)

ELWD PERFORMANCE MEASURES

1. Number of student and adult participants with increased understanding of ecological values as determined by pre and post program experience assessments (ELWD 10.2L, ELWD 10.3L) National Performance Measure #9 (Target 250)
2. Number of participants reached through NJSGC coastal and estuarine environmental education programs. (ELWD 10.3.L) NSGO Performance Measure #9 (Target 13,000)
3. Number of stakeholders who interact with Sea Grant funded scientists at NJSGC sponsored events. (ELWD 10.3.L) (Target 400)
4. Publication of learning standards for NY-NJ Harbor Estuary. (ELWD 10.4.A) (Target 1)
5. Journal articles published on STEM education research. (ELWD 10.5.A) (Target 1)
6. Number of curricula developed or updated to support state and national standards. (ELWD 10.6.A) (Target 30)
7. Number of educational products developed based on Sea Grant funded extension and research projects. (ELWD 10.7.A) (Target 2)
8. Number of students and educators receiving instruction in global science and climate change impacts. (ELWD 10.8.A) (Target 5,200) Number of climate related curricula developed. (ELWD 10.8.A) National Performance Measure #8 (Target 3)
9. Number of participants enrolled in STEM education workshops. (ELWD 11.1.L) (Target 300)
10. Number of student and adult participants with increased understanding of the ecological value of oysters as determined by pre and post program experience assessments (ELWD 11.1L) (Target 500)
11. Number of students supported by fisheries and aquaculture scholarships. (ELWD 11.2.L, ELWD 11.3.L) (Target 8)
12. Number of students and free choice learners engaged in STEM career awareness activities. (ELWD 11.2.A) National Performance Measure #9 (Target 40,000)
13. Number of pre-service internships completed. (ELWD 11.3.A) National Performance Measure #10 (Target 4)
14. Number of students graduating having been significantly supported by NJSGC funded research. (ELWD 11.4.A) National Performance Measure #10 (Target 4)

Summary of NJSGC Contribution to National Performance Measures 2014-2017

Healthy Coastal 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. (Target 3)
2. Number of ecosystem-based approaches used to manage land, water and living resources in coastal areas as a result of Sea Grant activities. (Target 135)
3. Number of acres of coastal habitat protected, enhanced or restored as a result of Sea Grant activities. (Target 5.5)

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. (Target 22)
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. (Target 2200)

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. (Target 20)
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. (Target 5)

Environmental Literacy and Workforce Development Performance Measures

8. Number of Sea Grant facilitated curricula adopted by formal and informal educators. (Target 3)
9. Number of people engaged in Sea Grant supported informal education programs. (Target 53,500)
10. Number of Sea Grant-supported graduates who become employed in a career related to their degree within two years of graduation. (Target 8)

Cross-Cutting Performance Measures

11. Economic (market and non-market; jobs and businesses created or retained) benefits derived from Sea Grant activities. (Target $400,000)
12. Number of peer-reviewed publications produced by the Sea Grant network, and number of citations for all peer-reviewed publications from the last four years. (Target 10)