

NEW JERSEY SEA GRANT CONSORTIUM - STRATEGIC PLAN 2018-2021

OVERVIEW

It is widely known as the “Garden State,” but with 130 miles of ocean beaches and 1,792 miles of tidal shoreline, New Jersey could just as easily been nicknamed the “Coastal State.” Seventeen of New Jersey’s 21 counties border estuarine or ocean waters, NOAA defines all but one of those counties as coastal, 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.

New Jersey is home to a number of extraordinary demographics. While it is the fourth smallest state area-wise, it is the most densely populated one in the nation. Like many coastal states, New Jersey is highly dependent upon its coastal resources. In addition to its coastal tourism, boating, and recreational fishing industries, New Jersey is home to nine commercial fishing ports and two of the nation’s largest commercial shipping ports. The value of these industries is extraordinary, with ports commerce supporting a \$50 billion industry, coastal tourism at \$28 billion, and total sales revenue in commercial (including aquaculture) and recreational fisheries accounting for nearly \$10 billion. More than 1.5 million individuals with a per capita income among the highest in the nation depend on these coastally-dependent industries for their livelihoods. The coast is also a source of recreation for New Jersey’s nearly 9 million residents and the 91 million-plus potential visitors who live within a four-hour drive.

These competing uses have created intense competition for New Jersey’s coastal lands, waters, and resources. The state’s coastal communities face enormous pressure to balance the demand for revenue and growth with protection of marine and coastal resources. In addition, because New Jersey’s coastline is heavily developed, human safety, protection of property and coastal hazard mitigation are areas of ever-increasing concern. Balancing economic growth, development, and re-development, with coastal resource quality and human safety is the critical issue for the future of New Jersey’s coastal communities. Science-based management and effective public policy are essential to ensuring human health and safety and to preserving New Jersey’s ecological services and economically essential uses.

Through this strategic plan, NJS GC renews its commitment to advance knowledge and stewardship for New Jersey’s marine and coastal environments and to provide New Jersey’s citizens, stakeholders, and policy-makers with a trusted source of sound, unbiased, and evidence-based information and technical assistance to help them make well-informed decisions and take appropriate actions affecting the future of the state’s coastal resources and all who depend on them.

ABOUT NEW JERSEY SEA GRANT CONSORTIUM

New Jersey Sea Grant Consortium (NJS GC) is a not-for-profit affiliation of colleges, universities, and other entities dedicated to advancing knowledge and well-informed, sustainable use of New Jersey’s marine and coastal resources. The organization was founded in 1969 by six state colleges to provide equal opportunity to marine and marine-related environmental education

for New Jersey's undergraduate and graduate level students. Today, NJS GC consists of a multi-institutional membership of 23 colleges, universities, and other groups that share and support the vision and mission of the organization. To achieve its goals, NJS GC engages the intellectual power of its diverse membership, along with a wide variety of other partners, to initiate and carry out interdisciplinary programs and projects that contribute towards the well-being of New Jersey's marine and coastal environment and the resilience of its coastally-dependent economy.

In 1976, NJS GC was named the host institution for the National Oceanic and Atmospheric Administration's National Sea Grant College Program in New Jersey. In recognition of its academic and scientific achievements, NJS GC was awarded full Sea Grant College Program status in 1989. Over the years, NJS GC has continually diversified itself such that it currently manages about \$3.1 million annually in federal, state, and other funds to support its Sea Grant research, education, extension, and communications programs.

VISION

The vision of NJS GC is a sustainable future for New Jersey where people live, work, and play in harmony with their marine and coastal resources. Through its research, education, and outreach programs, NJS GC endeavors to build a caring, engaged, marine and coastal-science literate citizenry that has the knowledge, skills, and tools necessary to make coastal and environmental decisions based on sound, scientific information and evidence.

MISSION

The mission of NJS GC is to advance stewardship and responsible use of New Jersey's coastal and marine resources. NJS GC works towards its mission through integrated research, education, and outreach efforts that help New Jersey's citizens and visitors balance diverse needs and interests as they pertain to New Jersey's marine and coastal environment. The NJS GC also supports like-minded organizations throughout the state, including New Jersey's pre-college and post-secondary academic institutions, to ensure the quality, availability, and accessibility of marine and coastal education programs.

CORE VALUES

NJS GC relies on the following set of **core values** to support its vision and mission. They are essential to maintain NJS GC's long-standing identity as a leader and trusted source of unbiased, science-based information as it relates to greater knowledge and wise-utilization of New Jersey's marine and coastal resources.

Integrity and accountability: We take full responsibility for our actions, decisions, and outcomes. We are honest, respectful, and fully committed to our mission and vision and that of the National Sea Grant College Program. We operate within a sense of broad possibility and believe that open and transparent communication at all levels is fundamental to our own growth and the success of the collaborations and partnerships we contribute towards.

Efficiency and effectiveness: We aim to provide services and products in a timely, thoughtful, responsive, ethical, and friendly manner that exceeds expectations. We set ambitious targets to measure the success of our work, and do our best to meet or exceed those targets. Whether we are leading an effort or contributing to one, we strive to behave in a manner that sets an example, delivers high standards, and treats others the way we want to be treated ourselves.

Stakeholder and community empowerment: Through research, education, and outreach, we seek to empower our partners, stakeholders, and the state's citizens and visitors, to work with us to solve the issues and problems they face as they relate to New Jersey's marine and coastal resources. We regard this empowerment as essential to our long-term success as a Sea Grant program.

Stewardship: We believe that stewardship for our marine and coastal resources is achieved through knowledge and engagement. We seek to cultivate and establish a citizenry of committed and well-informed stewards through the wide range of education and outreach programs and services we provide.

Sustainability: We believe that wide-spread understanding of the interdependence between humans and the natural system is essential for long-term survival. We strive to nurture, inform, encourage, and enhance those behaviors and policies that promote balance between New Jersey's economy and the environment.

CROSS CUTTING PRINCIPLES

The following **cross-cutting principles** apply across the entirety of NJSGC's 2018-2021 strategic plan. They also guide NJSGC's management and staff as they implement planned activities and respond to emerging challenges and opportunities.

Diversity: We strive for equality and the broadest possible sense of accessibility for each program and service we plan and deliver. We are fully committed to engaging people of all ages, genders, ethnicities, socio-economic backgrounds, perspectives, interests, and religions. It is our goal to work with our diverse communities to provide them with information and experiences that build capacity and establish mutual trust, respect, understanding, and sense of community. We also strive to engage diverse communities for advisement and guidance on setting priorities and goals for our research, education, and outreach programs so they will be inclusive, effective, and equitable.

Teamwork and partnerships: There is no greater force than people working together to achieve shared goals. The goals and outcomes of NJSGC's strategic plan have been determined with input from stakeholders, partners, and internal and external relationships, and are therefore desired for our state and its coastal zone. Collaboration is essential if we are to realize these mutual goals and outcomes. We are also committed to working with our stakeholders and partners to leverage existing resources and assets in order to establish a collective culture for success.

Education: Originally founded to respond to a region-wide gap in educational resources in the marine sciences, NJSGC continues to regard marine education as a leading purpose. We strive to be, as well as develop and support, the leaders necessary to realize educational excellence and equity in marine and coastal science literacy. NJSGC's education initiatives are innovative, purposeful and strategic, utilizing all available resources to bring timely, best available, scientifically-accurate information to the table to educate the public, solve stakeholder problems, produce engaging educational messages, and enrich formal and informal education programs statewide.

Commitment to Organizational Excellence: In addition to providing the best possible response to the needs of our state and our stakeholders, we are committed to contribute towards the realization of many of the goals and outcomes expressed in the 2018-2021 National Sea Grant College Program Strategic Plan. We look forward to progress made for our state also contributing towards the achievement of national performance measures and metrics.

PLANNING PROCESS AND STRATEGIC APPROACH

The process for building NJSGC's 2018-2021 Strategic Plan was part of a Sea Grant network-wide effort to produce the 2018-2012 National Sea Grant Network Strategic Plan. This collaborative effort brought the wealth of expertise and experience of all 33 state Sea Grant Programs to the task of creating the national plan. For New Jersey, participation in this process ensured that the priorities for our state and many stakeholders were reflected in the national plan.

In response to guidance from the national strategic plan steering committee, NJSGC conducted a survey administered to its stakeholder community through its website, social media platforms, and email contact lists. NJSGC's contacts include individuals from state and local government, NGO's and non-profit organizations, and NJSGC's membership and academic researchers, but also includes a diversity of stakeholders who became interested or engaged with NJSGC through its extension, communications, and/or and education efforts including classes, meetings and workshops, presentations, and public and professional outreach events. Input was also solicited from NJSGC's various boards and committees, and through NJSGC's extension staff to their stakeholder communities. The survey included questions targeted to national Sea Grant needs, but largely contained questions that were useful in collecting the information, opinions, and perspectives needed to identify important issues as they pertained to New Jersey's marine and coastal environment and the development of NJSGC's 2018-2021 Strategic Plans.

The survey was implemented during the summer of 2016. Results were applied to national strategic planning queries and, at the state level, responses were summarized and distributed to NJSGC staff and advisory groups for further analysis and comment. Final results were used by NJSGC staff, including educators and agents, in the development of their contributions to both the state and national strategic plans. Collectively, this information was vetted through the Sea Grant network, national stakeholder groups, representatives from NOAA programs,

other federal agencies, and environmental non-profit organizations. Subsequent draft national plans were reviewed through the Sea Grant network, other NOAA line office programs, and national stakeholder groups.

The survey also informed NJSGC's research priorities process. Major categories of concern for coastal issues (within Sea Grant's four focus areas) were identified in the survey and were used as the basis to develop a second survey that was implemented to define research criteria and priorities for NJSGC's 2018-2019 request for research proposals, which was released in December 2016.

NJSGC has developed its 2018-2021 strategic plan using data from the survey, guidance from the National Sea Grant Office, and reviews of drafts of the state and national plans by NJSGC management, staff, and advisory boards. NJSGC's plan includes goals and outcomes across all four focus areas of the 2018-2021 National Sea Grant Network Strategic Plan and will, in addition to providing benefit to the state of New Jersey, contribute towards the meeting the goals of the national plan and many of its metrics and performance measures. The resulting plan also continues NJSGC's on-going commitment to integrate research, extension, education, and communications to achieve stated outcomes and goals.

FOCUS AREAS

To help New Jersey and the nation understand, manage, and use its coastal resources wisely, the National Sea Grant College Program has identified four focus areas central to the needs of the nation's coast, NOAA's goals, and the National Sea Grant Network's strengths and core values. As part of a national network of 33 programs within NOAA, NJSGC has included goals and outcomes in support of each of these focus area in its 2018-2021 Strategic Plan. 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)

It should be noted that these four focus areas are not mutually exclusive. Many of the activities and programs NJSGC plans to implement over the next four years will cut across two or more of these focus areas. For example, coastal hazard resilience will be addressed across several focus areas. NJSGC plans to be an active participant in delivering resilience education, outreach, and research to its coastal constituents and will work with those communities to increase understanding of impacts and assist them in implementing adaptive strategies for risk reduction that support economies and environmental services. Water quality and quantity are also important themes that will span several focus areas.

Bringing the results of scientific research through outreach (extension, education and communications) to the people and decision makers of New Jersey is the surest way to secure NJSGC's vision of a safe, sustainable future for New Jersey's coastal communities.

The following describes our goals, outcomes, and strategies for each of the four national focus areas in relation to the needs we have determined in New Jersey in consultation with our many partners and stakeholders.

1. HEALTHY COASTAL ECOSYSTEMS (HCE)

Healthy coastal ecosystems are the foundation for life along the coast. Fish, wildlife, and plants depend on healthy coastal ecosystems for their survival. These same resources support New Jersey thriving coastal economy. New Jersey's coastal ecosystems are increasingly challenged by development, particularly in the upper reaches of the state's coastal watersheds. With the desire to live or visit near the coast continuing to grow, non-point source pollution, increased demand on freshwater supplies, and other human use activities are contributing to degraded water quality, habitat loss, declining fisheries, spreading of invasive species, and other challenges. New Jersey's coastal ecosystems are constantly experiencing change. The appropriate management, protection, and enhancement of these ecosystems must be addressed with innovative techniques that can quickly and efficiently address change. To be able to balance economic growth while maintaining ecosystem health is critical to sustaining New Jersey's coastal communities.

NJSGC plans to utilize the goals outlined for Healthy Coastal Ecosystems (HCE) in the National Sea Grant Plan as the basis for addressing the needs of New Jersey's coastal ecosystems and the stakeholders that depend on them. NJSGC stays informed of stakeholder needs through personal interaction, program related meetings, workshops, and public forums that staff hold and participate in. In addition, NJSGC's Stakeholder Advisory Board provides direct input and helps to develop the relevancy criteria that drive the research component of NJSGC.

In order for our stakeholders to make informed decisions, they must understand the importance and value of healthy ecosystems and oceans, and they must understand the connection between human activities and their effects on the 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 and inland facilities, reducing impacts from various water related activities, restoring ecological 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 and other relevant sources to coastal residents, resource managers, county and local government officials, businesses and industries, and facilitate understanding of such information so that it may be used effectively when making decisions and developing policy .

- ✓ Promote the implementation and maintenance of best management practices and innovative approaches and technologies to reduce impact and help restore function to coastal ecosystems.
- ✓ Develop innovative methods and programs to help New Jersey’s residents, resource managers, businesses, and industries understand the effects of human activities and environmental change on coastal resources.
- ✓ Facilitate access to the latest information and provide technical support to citizens, government officials, and businesses that need help with specific coastal resource related issues or problems.
- ✓ Provide life-long learning programs for people of all ages – learning that enhances understanding of marine and coastal environments and promotes the strongest possible sense of stewardship and understanding.

HCE GOALS AND OUTCOMES

Goal: Ecosystems and the services they provide are preserved and/or improved by sustaining the biodiversity and the abundance of living resources in order to support communities and economies.

(HCE National Goal #1)

Action Outcomes:

Resource managers integrate scientific information on recreationally important coastal species into resource management practices.

Watershed function to coastal estuaries and coastal water quality in New Jersey is managed using ecosystem-based approaches.

Effective implementation and maintenance of best management practices allow for enhanced ecosystem function to coastal estuaries and dune systems.

Goal: Land, water, and living resources are managed by applying sound science, tools and services to sustain ecosystems that support communities and economies.

(HCE National Goal #2)

Learning Outcomes:

Coastal managers and citizens consider scientific information obtained from Sea Grant funded research when making ecosystem and recreation related decisions.

New Jersey’s residents, visitors, and other users understand how their actions impact New Jersey’s coastal water quality and how coastal water quality impacts them.

Through Mid-Atlantic Sea Grant regional and New Jersey specific education programs, coastal residents, visitors, and other coastal users understand how their actions impact the Mid-Atlantic region and New Jersey's coastal ecosystems from beaches and dunes to estuaries and the ocean.

Action Outcomes:

Resource managers and businesses integrate scientific information into resource management practices.

**Goal: Ecosystems and their habitats are protected, enhanced or restored to support communities and economies.
(HCE National Goal #1)**

Learning Outcomes

New Jersey residents, visitors, and other coastal users, understand how their actions impact New Jersey's coastal water quality and how coastal water quality impacts them.

Community-based oyster restoration and education programs are implemented that improve understanding of ecological value of oyster reef habitats and promote environmental stewardship values among K-12 students and adult participants.

Action Outcomes:

Effective implementation and maintenance of best management practices allows for the infiltration or treatment of stormwater and wastewater thus restoring watershed function to coastal estuaries.

Community-based living shorelines projects are implemented to promote ecosystem stabilization, habitat function, and/or flood control.

Living shorelines projects are implemented to improved watershed function to coastal estuaries in New Jersey.

Community-based green infrastructure programs decrease the quantity of stormwater and non-point pollution entering local water bodies and impacting coastal waters.

Community-based oyster restoration program enhances habitat and increases abundance of depleted oysters.

Consequence Outcomes:

Improved watershed function in New Jersey's coastal estuaries.

Improved biodiversity on dune ecosystems enhances their stability and function.

Oyster populations recover and ecosystem function and productivity is restored in targeted oyster reef enhancement areas.

2. SUSTAINABLE FISHERIES AND AQUACULTURE (SFA)

New Jersey, like the nation, continues to increase its consumption of seafood despite the decline of many of its major fisheries. This trend is, of course, unsustainable unless seafood is caught or farmed responsibly with consideration given to the long-term health of the environment and the livelihoods of the people who depend on it. Even so, 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 over 90% of seafood consumed with half of that coming from aquaculture. 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 production is predicted to increase by 33% (60% growth for shellfish) over the next decade, so there is opportunity for the United States aquaculture industry to expand and innovate through sound production and marketing strategies. The wild fisheries industry will need to innovate as well. For example, the 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. The natural capital of these resources is estimated at \$32B. Commercial fisheries in New Jersey rank among the most productive on the East Coast and in the nation. The commercial fisheries sector in the state lands more than 100 varieties of finfish and shellfish at its six major ports (Atlantic City, Barnegat Light, Belford, Cape May, Point Pleasant and Port Norris) and Cape May, New Jersey is the second most valuable fishing port on the East Coast. Recent NOAA estimates (Fisheries Economics of the U.S., 2014) showed seafood industry employment at nearly 51,000, ranking New Jersey sixth in the country. In New Jersey, landings revenue was reported at nearly \$188M, and pounds landed were 181M, both the highest in the mid-Atlantic region. This resulted in total seafood sales of \$7.9B, ranking New Jersey fifth in the nation. Landings revenue was dominated by shellfish in New Jersey at \$159M (led by sea scallops and surf clams), with finfish landings at \$29M. In addition, New Jersey's recreational fisheries are a national leader in terms of catch, angler expenditures, revenue generated, and angler participation. NOAA data (Fisheries Economics of the U.S., 2014) reveals New Jersey had over 13,000 full-and part-time jobs generated by recreational fishing activities in the state, the highest in the mid-Atlantic region. Recreational economic impacts of \$1.9B were driven by approximately 5 million trips with summer flounder the largest recreational harvest.

Nationally, molluscan shellfish aquaculture sales have increased by 62% (\$329M) between 2005 and 2013. New Jersey has a long history with oyster and shellfish culture that has been supported by a century of research and industry cooperation through the Haskin Shellfish Research Laboratory. NJSGC has and does support research at Haskin through state Sea Grant funds and National Strategic Investments that continue to support NJSGC's Shellfish Aquaculture Program Coordinator. This research and extension supports a structural shellfish aquaculture industry that generates nearly \$10M annually in farm gate value (2015 survey; or

approximately \$60M in total sales based on an economic multiplier of 6) and employs nearly 200 people directly.

NJSGC will continue to support fisheries-related research that assists resource managers in the management and conservation of commercial, recreational, and aquacultured species. Through research, outreach, and education, NJSGC will continue to lead and support developments in innovative technologies and fair regulations to produce a safe and sustainable seafood supply in many sectors of the industry, and in particular, the shellfish aquaculture industry. NJSGC's overarching goal in this focus area is healthy fisheries (commercial and recreational) and mariculture industries within New Jersey that harvest seafood responsibly, ethically, efficiently, and sustainably. Furthermore, NJSGC will seek to inform stakeholders so that they will understand the importance of ecosystem health and sustainable harvesting, and support sustainable management and consumption practices to protect and increase the supply of safe and sustainable seafood. Support and guidance of SFA focus area activities is augmented by the participation of representatives of the fisheries industry on NJSGC's Stakeholder Advisory Board.

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

- ✓ Form partnerships to advance environmentally responsible and sustainable fisheries and aquaculture.
- ✓ Enhance seafood industry and public understanding of the importance of a healthy ecosystem for a vibrant seafood industry in New Jersey.
- ✓ Utilize new and traditional media platforms to make individual and group contacts, to develop meetings, workshops, forums, and trainings, and to produce written documents including manuals, articles, brochures, 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 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, ethical recreational fishing.

- ✓ Work directly with the fishing and aquaculture industry in cooperative research and outreach.

SFA GOALS AND OUTCOMES

**Goal: A safe, secure, and sustainable supply of seafood to meet current and future public needs.
(SFA National Goal #3)**

Learning Outcomes

Shellfish aquaculturists gain awareness of best management practices and approaches, seafood health and safety issues, and business strategies and models, which all can be used to promote sustainable aquaculture.

Shellfish aquaculturalists are aware and have an interest in new local aquacultured species.

Action Outcomes

Shellfish growers produce new aquaculture species that increase community economic resilience and introduce new seafood products to markets.

Shellfish aquaculturists implement best management practices, including fair and improved regulations that promote sustainable aquaculture practices including disease reduction and transportation rules.

**Goal: Fishing communities and fishing industries including aquaculture enhance their productivity and sustainability.
(SFA National Goal #4)**

Learning Outcomes

Shellfish aquaculturists increase awareness of novel technologies and approaches, seafood health and safety issues, and business strategies and models.

Youth participating in informal education activities at public outreach events will be inspired to participate in water-based recreational activities such as fin and shell fishing and boating.

Action Outcomes

Research is conducted on species vital to sustaining the recreational fishing industry.

Shellfish aquaculturists apply knowledge and adopt new techniques and approaches that enhance production in an environmentally sound and sustainable way.

New technologies and approaches developed through research that promote sustainable aquaculture practices are applied to enhance New Jersey's shellfish aquaculture industry.

Consequence Outcomes

Implementation of new aquaculture methods increases production and provides economic benefits to the industry and the region.

3. RESILIENT COMMUNITIES AND ECONOMIES (RCE)

Recent devastating events such as Hurricane Irene in 2011, Superstorm Sandy in 2012, and the January 2016 Nor'easter (Jonas), along with increased local tidal flooding, have brought the topic of coastal hazards and resiliency to the forefront of concerns among New Jersey's coastal communities. Nationally, hazard resilience has been a topic of well-deserved attention for some time now. 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, ushered in a new era in American history in which the term "resilience" became an important part of the American political, economic, and social vernacular.

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, either 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. The devastation caused by Superstorm Sandy only reinforced what coastal scientists have known for quite some time – choosing to live, work, and recreate in the coastal zone has 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 appropriate measures to reduce their vulnerability and respond quickly and effectively to events when they do arise. NJSGC will achieve its goals in the RCE focus area 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 plan for hazardous events and create vibrant and sustainable coastal communities that are ready to adapt and respond to the challenges presented by an uncertain future.

NJSGC will support cutting-edge research in the areas of coastal processes, stormwater management, living shorelines, coastal hazards and coastal hazards messaging, ocean planning, marine-related energy, climate change, and tourism. NJSGC's extension agents and specialists will engage New Jersey's diverse and ever-growing coastal population to assist them in applying the best-available scientific knowledge to address coastal resiliency. Ultimately, NJSGC will bring its unique research, education, and engagement capabilities together 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 needs to achieve well-informed management of coastal resources.
- ✓ Work with public, private, government, and academic partners to develop and deliver comprehensive research and education programs that improve public understanding of ocean related global change, climate variability, and hazardous ocean and ocean weather effects on coastal communities.
- ✓ Work with the New Jersey Coastal Protection Technical Assistance Service (NJCPATAS) to ensure that the latest information on shore protection technologies and tools are available to New Jersey's coastal communities.
- ✓ Work directly with New Jersey's coastal communities to ensure that pre-storm preparedness and post-storm reconstruction is done with hazard resiliency in mind and an eye toward an uncertain future.
- ✓ Assist marinas to adopt best management practices and realize the economic benefits associated with being recognized as responsible stewards of the environment.

RCE GOALS AND OUTCOMES

Goal: Communities utilize comprehensive planning and adaptive management strategies in order to improve resilience in a changing environment based on sound science. (RCE National Goal #5)

Learning Outcomes:

Coastal Managers and citizens consider scientific information obtained from Sea Grant funded research when making coastal resource related decisions and implementing sustainable practices.

Communities, students, and free choice learners are aware of the danger of rip currents and other coastal hazards, and are well informed on safety measures.

New Jersey's coastal citizens and policy-makers are increasing aware of the hazards they face and seek ways to reduce risk and plan accordingly.

Action Outcomes:

New Jersey's coastal communities incorporate climate adaptation planning into their policy and planning documents.

Government agencies (local, county, state, federal) utilize the results of the latest research, including Sea Grant funded research and Sea Grant's extension expertise, to make informed coastal management decisions as well as improve coastal hazard warnings and messaging.

New Jersey's coastal communities develop and adopt coastal hazard and climate adaptation strategies suited to local needs.

Residents and coastal community leaders proactively plan and take action to reduce the impacts of coastal hazards including tidal flooding, coastal storms, and sea level rise on property through the establishment of dunes and living shorelines.

Consequence Outcomes:

A culture of preparedness is promoted throughout the state.

New Jersey's communities are more resilient.

New Jersey decision-makers begin to adopt policies that move toward not permitting reconstruction in areas of repeated past loss or high vulnerability to a changing climate.

Goal: Water resources are sustained and protected to meet the emerging needs of the communities, economies, and ecosystems that depend on them.

(RCE National Goal #6)

Learning Outcomes:

Youth participating in informal education activities at public outreach events will be inspired to participate in water-based recreational activities such as fishing and boating.

Students and lifelong learners participating in NJSGC's education and outreach programs will become aware of the impact their behaviors have on water quality and supply.

Educators working in informal settings will gain tools and training to inspire youth to think and care about water.

Coastal businesses will become more aware of the information and tools that are currently available to them with regard to coastal hazards.

Action Outcomes:

New Jersey's coastal communities and leaders make efficient use of water resources.

Marinas adopt best management practices to meet the requirements of the Clean Marina Program in New Jersey.

Consequence Outcomes:

Impact on water resources is reduced by marinas implementing best management practices that meet the requirements of the Clean Marina Program in New Jersey.

Through efficient use of water, New Jersey's coastal communities sustain coastal ecosystems, quality of life, and economic well-being.

Goal: Vulnerable and at-risk coastal communities and economies are resilient to changing conditions and can improve their overall community well-being.
(RCE National Goal #5)

Learning Outcomes:

New Jersey's vulnerable and at-risk communities become more aware of natural hazards and the risks they pose.

Action Outcomes:

Vulnerable and at risk communities take steps to enhance community resilience to natural hazards.

Goal: Development of port facilities and infrastructure to support vibrant and resilient coastal economies.
(RCE State Goal #1)

Learning Outcomes:

New Jersey entities become more aware of the vulnerability of port facilities and infrastructure and its influence on the economy.

Action Outcomes:

New Jersey takes steps to improve the resilience of port facilities and supporting infrastructure.

4. ENVIRONMENTAL LITERACY AND WORKFORCE DEVELOPMENT (ELWD)

Education has been at the forefront of NJSGC's activities since the organization was founded in 1969. From those first college classes that responded to New Jersey's lack of higher education in the marine sciences to the current, multi-faceted, integrated program that each year serves tens of thousands of learners of all ages, NJSGC remains committed to 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. This is accomplished through the wide range of educational services and products that NJSGC provides and contributes towards through its partners. These include field trips, summer camp, scout programs, in-school visits, and professional development workshops for formal and informal educators, curriculum development, college coursework, and participation in professional and public outreach events from teacher conventions to boat shows, fairs, and festivals.

NJSGC's education programs also contribute towards the reform and improvement of STEM education by applying marine and coastal themes to illustrate and engage students in core STEM concepts. In addition to conducting professional development workshops and one-on-one school district consultations, these efforts are disseminated through the creation and publication of standards-based teaching tools that explicitly connect ocean, coastal, and climate science content to STEM education goals, national and state learning standards, and the recently adopted Next Generation Science Standards.

Lastly, NJSGC's educators engage tens of thousands of citizens and visitors each year through their leadership and participation in numerous public and professional outreach events that provide a showcase for the work of NJSGC's research, education, communications and extension personnel.

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

- ✓ Advance coastal and marine literacy and stewardship across generations by providing and contributing to a diversity of environmental learning, career awareness, and stewardship building tools and experiences.
- ✓ Work with Sea Grant research, extension, and communications counterparts to enrich and expand their programs and existing coastal and ocean literacy programs including those that motivate learners to pursue higher education and careers in marine sciences and STEM fields.
- ✓ Use NJSGC's university connections to advance greater understanding of best practices for creating and delivering compelling, effective and equitable marine, coastal, and STEM education.
- ✓ Foster opportunities and create tools for formal and informal educators to advance and improve 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 coastal hazard awareness and resilience, hazard preparedness, climate impacts, and conservation and protection of water resources.
- ✓ Work with NJSGC's Communications Program to increase participation in NJSGC's education programs and expand NJSGC's educational publications.
- ✓ Work with NJSGC's researchers, and other marine and coastal scientists, to develop researched-based curriculum materials and career awareness tools and programs.
- ✓ Recruit, develop, and retain a diverse education team dedicated to improved science education and life-long learning for all.
- ✓ Explore and utilize specific behaviors and teaching strategies shown by research to be effective in engaging and educating culturally diverse students.
- ✓ Provide workforce training to support growing demand for skilled employees in the aquaculture industry.

ELWD GOALS AND OUTCOMES

Goal: An environmentally literate and diverse public is informed by a continuum of lifelong formal and informal engagement opportunities and is able to adapt to changing conditions while serving as stewards.

(ELWD National Goal # 7)

Learning Outcomes:

Marine, coastal and related-environmental literacy is advanced and appreciation of New Jersey's coastal and estuarine environment is increased as a result of participation in NJS GC's education programs.

Education programs and products organized around the theme of environmental change help New Jersey's citizens better understand how physical, biological, and human factors impact New Jersey's marine and coastal systems and communities.

Environmental awareness, science literacy, and stewardship amongst schoolchildren, their teachers, and lifelong learners, is advanced through a community-based, green infrastructure program that promotes the importance of stormwater management to water resources.

Students and life-long learners increase their knowledge and understanding of the connection between ocean and upstream water quality as well as the specific impact their behaviors have on water quality and supply.

Environmental awareness, science literacy, and stewardship amongst schoolchildren, their teachers, and lifelong learners are advanced through a community-based oyster restoration program.

The region's experts on marine and coastal science and policy is made known by growing, maintaining, and disseminating a directory of professionals who can act as advisors to stakeholders including state and local leaders and the media.

Citizens and visitors are made aware of the diversity of marine and coastal recreational opportunities available to them in New Jersey through NJS GC activities and publications.

Action Outcomes:

NJS GC educators explore, adopt, and implement best practices to improve outreach and engagement with diverse and underrepresented populations.

The National Park Service and other similar partners are supported by NJS GC in their mission to educate the public about New Jersey's natural resources and how to sustain them through informed, responsible behaviors and management.

New Jersey's formal and informal educators incorporate curriculum developed by NJS GC and others to plan and deliver their own "place-based" marine and coastal science programs.

Scholarships are provided to high school students conducting outstanding research in environmental, ocean and coastal-related fields.

Using social media, formal and informal educators communicate with NJSGC to gain new information and materials that they can utilize in their teaching to improve and enhance their students knowledge of New Jersey's marine and coastal systems.

Citizens and visitors behave in safe and sustainable ways when participating in recreational activities on New Jersey's beaches and waterways.

**Goal: A diverse workforce that is skilled in science, including social science, technology, engineering, mathematics and other disciplines is engaged and enabled to address critical local, regional and national needs and decision-making.
(ELWD National Goal # 8)**

Learning Outcomes:

Awareness of STEM careers is advanced through programs and tools produced with input from NOAA and Sea Grant researchers and extension personnel.

Career awareness and STEM skills amongst schoolchildren, their teachers, and lifelong learners will be advanced through a community-based, green infrastructure program that promotes the importance of stormwater management to water resources.

Career awareness and STEM skills amongst schoolchildren, their teachers and lifelong learners will be advanced through a community-based oyster restoration program.

Training in aquaculture methods develops workforce pool for expanding aquaculture industry.

Action Outcomes:

STEM-based programs that link Sea Grant educators and scientists (and other marine/coastal educators and scientists including NOAA/NMFS researchers) are utilized by New Jersey's formal and informal education community.

Underrepresented groups receive targeted outreach and messaging that builds awareness of marine-related STEM careers.

Undergraduate and/or graduate students conduct research in fields related to understanding and managing marine and coastal resources.

Undergraduate and graduate students enhance their professional careers and develop job skills through involvement in NJSGC's K-12 programs.

Skilled workforce acquires employment in aquaculture sector.

Consequence Outcomes:

Students supported by NJSGC funded research, education programs, fellowships, and scholarships enter careers in fisheries and aquaculture, marine science, marine industries, science education, and marine policy.

Trained workforce enhances production of a profitable and sustainable aquaculture industry.

Goal: A climate literate New Jersey citizenry is informed through a variety of learning and engagement opportunities focused on the local impact of climate change and is able to take action to prepare and adapt.

(ELWD State Goal #2)

Learning Outcomes:

New Jersey's citizens, including students and their teachers at all levels, increase their climate literacy including understanding of the indicators and measurements of a changing climate through participation in NJSGC's education programs.

Formal and informal K-12 educators gain access to climate and hazard resilience curriculum materials and training focused on local impacts and implications.

Action Outcomes:

Formal and informal K-12 educators incorporate "place-based" classroom and hands-on climate and hazard resilience lessons into their teaching so it is not just a theoretical concept removed from having local impact.

Coastal stakeholders and students access data and research relevant to New Jersey's marine and coastal environments and the effects of climate change.

Educators, students, and their families are aware of behaviors and technologies that can combat the effects of climate change and begin to adopt them.

Students, educators, and life-long learners use data to understand the connection between ocean, land, and the atmosphere and to increase their resiliency to the impacts of climate change.

Consequence outcomes:

Risk from coastal flooding, shoreline erosion, and other coastal hazards are reduced and resiliency is increased through targeted outreach and education efforts.

Goal: STEM education throughout the state and the region is improved through the availability of interdisciplinary ocean, coastal, and climate science curriculum products and training for formal and informal educators directed towards meeting state and national education standards including the Next Generation Science Standards.

(ELWD State Goal #3)

Action Outcomes:

Formal educators implement ocean and climate-related goals of the Next Generation Science Standards in their classrooms using pedagogical training and curriculum materials developed and disseminated by NJSGC.

Informal educators working with K-12 groups incorporate pedagogies and concepts into their programming that supports state and national standards including the goals of the Next Generation Science Standards

New Jersey's pre-service educators are trained to include standards-based STEM education that incorporates marine and coastal topics in their future teaching and gain experience using pedagogical methods recommended by the Next Generation Science Standards.