



## NORTH CAROLINA SEA GRANT

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# Coastal Science Serving North Carolina

## North Carolina Sea Grant Strategic Plan 2009-2014

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### NORTH CAROLINA SEA GRANT'S VISION

*North Carolina Sea Grant will, in the 21st Century, serve as a leader in addressing the state's urgent and long-term needs in ocean and coastal resource management, and in the successful transition to ecosystem-based approaches through sound science and educational excellence.*

### NORTH CAROLINA SEA GRANT'S MISSION

*To enhance the sustainable use and conservation of ocean and coastal resources to benefit communities, the economy and the environment.*

### THE CHALLENGE

Since its inception in 1970, North Carolina Sea Grant has provided leadership in focusing the research capabilities of North Carolina's major universities to address coastal topics, including economic development, ecosystem health and human resources. Census figures place North Carolina among the fastest-growing states. Some coastal and coastal watershed counties are seeing unprecedented population growth that adds a variety of stresses — and increases hazard risks — along the state's ocean, inlet and estuarine shorelines, and riverine floodplains. The role of Sea Grant as a critical catalyst for, and investor in, North Carolina's coastal future is increasingly evident.

### THE PLAN

This strategic plan will guide North Carolina Sea Grant's efforts to respond effectively to challenges that physically and culturally reshape coastal North Carolina. The plan reaffirms Sea Grant's core values of supporting and promoting:

- The most creative ideas and best researchers through merit-based peer review of investigator-initiated proposals;

- Integrated multidisciplinary and team approaches to problem solving through combinations of research, outreach and education aimed at priority issues;
- Cutting-edge research and its application by disseminating innovative ideas and new knowledge;
- Excellence in education and development of human resources equipped to address future challenges; and
- Strong state and regional partnerships to address emerging coastal issues by sharing the best science to a variety of audiences.

North Carolina Sea Grant will consider proposals for research seeking to improve understanding, utilization and management of marine and coastal resources as related to North Carolina and the adjacent region. Special consideration will be given to proposals that address priority issues, involve an ongoing outreach program and seek to build upon Sea Grant's strong partnerships with industry, government and the general public.

Program direction and priority issues are updated through input from:

- State, regional and federal resource management agencies;
- Faculty and staff of North Carolina public and private universities;
- The North Carolina Sea Grant Advisory Board;
- Professional, industry, and community groups, as well as the public;
- Marine science panels established by the University of North Carolina system;
- The National Sea Grant Strategic Plan, based upon plans developed by the National Oceanic & Atmospheric Administration, and the NOAA Office of Oceanic and Atmospheric Research; and
- Federal reports, including the report of the U.S. Commission on Ocean Policy and subsequent documents including NOAA strategy papers on climate, weather and water, coasts, and oceans and marine life.

Although the North Carolina Sea Grant Strategic Plan has been regularly revised every two years, the program's strategic planning activities represent an ongoing and evolving process that is evaluated continually. This has allowed the program to remain flexible and adaptive in order to respond to emerging issues and challenges.

The University of North Carolina system and private universities in the state are home to some of the very best researchers in the world. Sea Grant will strive to target about 50 percent of its core and state-supported resources toward the strategies outlined by this plan. Developing an excellent human resource base is critical to promoting effective research and outreach. Thus, our research funds provide training of graduate and professional students in coastal disciplines.

Results from Sea Grant research, and data available from the scientific community at-large, will be accumulated, assimilated and transferred to user groups by the North Carolina Sea Grant Extension Program. In turn, extension specialists will identify needs of a diverse user community that includes the general public, government institutions, educators, business and industry leaders, and

interest groups — and, in turn, will share those needs with the academic communities. About one-third of the program's budget will be invested in outreach through the NCSG Extension Program.

In order to provide cutting-edge information and education to various resource users and the public, Sea Grant communicators will work with researchers and extension professionals to package and disseminate relevant and timely information to a variety of audiences, using a variety of outreach tools, including publications, Web sites and other electronic delivery modes, workshops, and media relations to reach the program's constituents. About 10 percent of the program's budget will be invested in outreach through communications.

North Carolina Sea Grant is a catalyst for partnerships among private and public users, managers of marine and coastal resources, and the academic community, thus generating innovative research and educational products. As director of an inter-institutional program within the University of North Carolina system, the Sea Grant executive director interacts with the office of the system's vice-president for research, and serves on a system-wide marine science council. Direct reporting is to North Carolina State University's vice chancellor for research and graduate studies. Effective leadership offers a vision for discovery and learning, enabling science to be the basis for addressing emerging coastal and marine issues. About 5 percent of the total core budget will be invested in program leadership and management.

To understand the complex processes and issues that dictate the best use of marine and coastal resources in North Carolina, Sea Grant's efforts need geographic diversity and integrated approaches from the systems level. The complexity of coastal North Carolina includes the interaction of the coastal ocean and estuarine systems, a large semi-lagoonal sound, as well as the contiguous wetlands and tributaries. These systems respond to events, such as storms, and long-term changes,

including climate changes and the impacts of human uses. Many issues facing marine and coastal resource users transcend jurisdictional boundaries. Thus, North Carolina Sea Grant encourages inter-institutional, multi-disciplinary and regional collaborations to identify complex system characteristics, including policy and legal systems, and resulting impacts on resource management.

### **CROSS-CUTTING GOALS**

Managing coastal and ocean resources in ways that balance human needs with environmental health requires progress in three fundamental areas:

- We need better information about how coastal and ocean ecosystems function and how human activities affect these habitats and living resources.
- We need citizens who understand the complexities of coastal environments and the interactions between human use and the health of coastal ecosystems.
- We need management and decision-making processes that are based on sound information, involve everyone who benefits from the beauty and bounty of America's coastal resources, and include mechanisms to evaluate trade-offs between human and environmental needs.

To facilitate progress in these areas and to help the nation understand, manage, and use its coastal and ocean resources wisely, Sea Grant has identified three cross-cutting goals central to all that Sea Grant does. The three goals reflect the value of Sea Grant's integrated approach to research, extension, and education. They provide the foundation of Sea Grant's work and are integral to the success of this five-year plan.

**Goal: Sound scientific information to advance understanding of the nature and value of our coastal and ocean resources; to identify new ways to conserve and use these resources; and to support evaluation of the environmental impacts and socio-economic trade-offs involved in coastal decision-making.**

Short-term economics often influence coastal decision-makers to make their decisions without understanding the long-term social, environmental, and economic consequences of their decisions. Ecosystem functioning and values, emerging economic opportunities, and the social and economic costs and benefits of various human activities need to be translated into factors understood by the general public in order for sustainable uses of coastal environments to become a reality. Sea Grant has a long history of generating cutting-edge research and supporting technological innovations related to informed conservation and use of coastal and ocean resources.

### *Strategies*

Priority research and outreach strategies for NCSG for this goal area include:

- Identify needs for, and capacity to develop or adapt, existing businesses, products, tools and technologies.
- Provide link between business and government and community agencies and university research to identify and address pressing needs regarding coastal resources.
- Identify topics for state and regional socio-economic research and outreach that best suit North Carolina Sea Grant strengths.
- Transferring information to citizens through media and communications outlets, as well as through a variety of partnerships.

**Goal: An informed public that understands the value and vulnerability of coastal and ocean resources, and demands informed science-based decisions about the conservation, use, and management of these resources, and a well-trained workforce that will make this a reality.**

The 2004 U.S. Commission on Ocean Policy Report emphasized that restoring and sustaining our coastal and ocean environments requires an informed citizenry that understands the value and vulnerability of these resources. We also need scientists, planners, developers, engineers,

and people involved in all water-related enterprises who understand the interactions between human activities and ecosystem health. NOAA has made ocean and aquatic literacy a strategic priority. Sea Grant has been a leader in K-12, undergraduate, graduate, professional, and technical education in coastal and ocean-related areas for decades. Sea Grant is committed to playing a leadership role in partnership with the NOAA Office of Education and others to advance coastal and ocean literacy. This can be done by capitalizing on Sea Grant's strong university partnerships, and by using its education and extension capacities to develop educational programs for schools, professional education, and workforce training.

### *Strategies*

Priority research and outreach strategies for NCSG in this goal area include:

- Developing methodologies and materials that support the use of marine and aquatic sciences in K-12 science and mathematics teaching with an emphasis on field-based experiences.
- Identifying the current knowledge base of students and educators in order to prioritize development of new materials.
- Developing new inquiry-driven curricula for teachers to connect students with marine and coastal concepts and to extend relevant research results to students, educators and environmental centers through publications, technology, exhibits and workshops.
- Developing life-long learning experiences that target the needs of all people, through public lectures, museum and aquarium programs, clubs and organizations.
- Increasing the number and diversity of highly qualified graduate and professional students in the marine and coastal professions, and increasing access to fellowships, internships, cooperative programs and field experiences.
- Identifying present and future workforce needs that can be met

through training in the state's universities and community colleges, and working in partnerships to initiate or expand such programs.

- Developing appropriate short courses and support materials to upgrade skills in existing coastal and marine businesses.
- Continue leadership in NOAA in the Carolinas, as well as regional and national Sea Grant efforts.

**Goal: Decision-making processes that involve the full-range of coastal interests, that integrate efforts of public and private partners at the federal, regional, state, and local levels, and provide mechanisms for establishing common understandings and generating outcomes that balance multiple interests.**

The continued migration of people to our coastal areas increases the complexity of coastal decision-making and creates greater potential conflict among users at a time when coastal decision-making remains fragmented and narrowly focused. Sea Grant's long-standing relationships with a wide variety of stakeholders in coastal communities and its reputation as a source of unbiased information enable the organization to play a leadership role in promoting effective information sharing, consensus building, and integration of efforts in the coastal arena. Sea Grant can enhance its effectiveness by working closely with other NOAA coastal programs through regional research alliances and by employing international, national, and regional ocean observation systems.

### *Strategies*

Priority research and outreach strategies for NCSG in this goal area include:

- Continue Sea Grant extension outreach to state, regional and national policy boards, commissions, and review panels.
- Work with our program Advisory Board and other partners to identify priority topics and adapt efforts to meet emerging issues.

- Continue leadership of the North Carolina Coastal Resources Law, Planning and Policy Center.

These three cross-cutting goals have been a foundation of Sea Grant's work since it was established, and they are fundamental to success in the focus areas outlined in this plan. The more specific goals and strategies outlined in the focus areas build on these cross-cutting goals, generating the knowledge and creative solutions needed to address challenges and opportunities related to healthy coastal ecosystems, sustainable coastal development, a safe and sustainable seafood supply, and hazard resilience in coastal communities.

### **FOCUS AREAS**

Over the next five years, Sea Grant will concentrate effort in four areas: healthy coastal ecosystems; sustainable coastal development; a safe and sustainable seafood supply; and hazard resilience in coastal communities. These four interrelated focus areas emerged from a national strategic planning process as areas of critical importance to the health and vitality of the nation's coastal resources and communities. They respond to issues of major importance to NOAA, are consistent with the work of the NOAA coastal program integration effort, and are topical areas in which Sea Grant has made substantial contributions in the past and is positioned to make significant contributions in the future.

In each of the four focus areas, Sea Grant has identified goals to pursue and strategies designed to take advantage of its strengths in integrated research, outreach, and education, and its established presence in coastal communities. Understanding relationships and synergies across focus areas is vital to achieving the focus area goals. Sea Grant is one of many partners working to address these complex and interrelated issues. Understanding how activities in one area can support and complement other activities, and using partnerships to accomplish shared goals, are strategies inherent to Sea Grant, and will be central to achieving the goals outlined in this plan.

### **HEALTHY COASTAL ECOSYSTEMS**

Healthy coastal ecosystems are the foundation for life along the coast. However, increasingly rapid coastal development, global overfishing, and other human activities are leading to water quality degradation, decline of fisheries, wetlands loss, proliferation of invasive species, and a host of other challenges that need to be understood in order to restore and maintain these ecosystems. Ecosystem functioning does not respect traditional political boundaries, and responsible management of ecosystems requires new kinds of thinking and actions. Sea Grant is a leader in regional approaches to understanding and maintaining healthy ecosystems, with planning efforts underway across the country to identify information gaps, set research priorities, and coordinate information and technology transfer to those who need it. Sea Grant has fostered efforts to address widespread problems such as invasive species that are found in geographically dispersed areas, and has hired staff, shared among several state programs, to tackle these problems. Sea Grant's regional consortia, nationwide networks, and international contacts are particularly well-suited to helping the nation address ecosystem health at the appropriate local, state, regional, national and global levels.

#### **Goal: Sound scientific information to support ecosystem-based approaches to managing the coastal environment.**

To realize the full potential of ecosystem-based management approaches, we need research that will lead to better understanding of present day conditions, basic ecosystem processes, the impacts of coastal and upland land uses on the health of coastal and ocean environments, and the importance of healthy ecosystems to healthy fisheries. We also need to know more about how to transform our new knowledge and understandings into sound management principles and practices. Sea Grant will continue to build the scientific foundation needed by supporting research that provides accurate information related to ecosystem health and by accelerating the transfer of this information to coastal residents, resource managers, businesses and industries.

### *Strategies*

Priority research and outreach strategies for NCSG in this goal area include:

- Identifying potentially invasive species and their pathways of introduction, and reducing intentional and accidental release of such invaders.
- Developing techniques to determine input rates, fate, effects, and/or residence time of nonpoint sources of nutrients, toxins and other contaminants and their transport and transformation in watersheds. This includes predicting hypoxic/anoxic conditions, determining effects of sedimentation and turbidity on water quality, and determining ecosystem and community responses to these inputs.
- Developing integrated, multidisciplinary approaches to assess the carrying capacity for coastal natural resources and habitats.

### **Goal: Widespread use of ecosystem-based approaches to managing land, water and living resources in coastal areas.**

Achieving widespread use of ecosystem-based management approaches will require extensive efforts to communicate the effects of ecosystem degradation on natural resources, local economies, and human health to a wide range of audiences in ways that motivate them to respond. Sea Grant's strong research and extension capabilities provide scientific information and technical assistance on ecosystem-based management approaches. At the same time, the organization's outreach and education capabilities engage citizens in stewardship activities that promote healthy ecosystems. All these programs can result in regional and other collaborative approaches to address problems that extend beyond traditional geographic or governmental boundaries.

### *Strategies*

Priority research and outreach strategies for NCSG in this goal area include:

- Developing techniques and approaches

for determining interactive effects of climatic and human perturbations on ecosystem trophic structure and transfer efficiency, and the fate of primary and secondary production in estuarine and coastal waters.

- Developing relevant information for resource managers, regulators and the general public to understand the impacts of habitat alteration and loss on ecosystem function.

### **Goal: Restored function and productivity of degraded ecosystems.**

Past activities and events have led to deterioration of nursery areas for wild fish populations, loss of wetlands, closure of beaches and shellfish beds, and proliferation of invasive species. Sea Grant will help reverse these trends by identifying and assessing impaired ecosystems, and supporting the development of new policies, technologies, and processes that promote restoration of ocean and coastal ecosystems in ways that balance the needs of the natural systems with the needs of the humans who inhabit them. Sea Grant will use its nationwide network of extension, education and communication specialists to provide the technical assistance needed, and to share new information and technologies with local, state, regional, national, and international partners.

### *Strategies*

Priority research and outreach strategies for NCSG in this goal area include:

- Developing techniques to enhance or rehabilitate degraded habitats, such as wetlands, streams, riparian buffers, oyster reefs and submerged aquatic vegetation.
- Quantifying the interrelationships among land-use activities, habitat and stream condition, hydrologic processes and the ecological response of receiving waters.
- Developing techniques to respond to the challenges associated with sewage disposal, and identifying marine pathogens.
- Determining potential economic and

biological impacts of beach nourishment, and dredging of inlets and waterways.

### **SUSTAINABLE COASTAL DEVELOPMENT**

Coastal communities in America provide vital economic, social, and recreational opportunities for millions of Americans, but decades of population migration have transformed our coastal landscapes and intensified demand on finite coastal resources. The increase in population has resulted in new housing developments and recreation facilities, a new generation of energy development activities, port expansions, and other business activities. These changes are placing tremendous pressure on coastal lands, water supplies, and traditional ways of life. To accommodate more people and activity, and to balance growing demands on coastal resources, we must develop new policies, institutional capacities, and management approaches to guide the preservation and use of coastal and ocean resources. Sea Grant will engage a diverse and growing coastal population in applying the best available scientific knowledge, and use its extension and education capabilities to support the development of healthy coastal communities that are economically and socially inclusive, are supported by diverse and vibrant economies, and function within the carrying capacity of their ecosystems.

**Goal: Healthy coastal economies that include working waterfronts, an abundance of recreation and tourism opportunities, and coastal access for all citizens.**

Marine resources and coastal amenities sustain local and national economies through fisheries and aquaculture, seafood processing, trade, energy production, tourism, and recreation enterprises. Urban ports and waterways continue to accommodate expanding international trade, staging areas for offshore industries, growth in tourism and recreational boating, and changes in fishing fleets. At the same time, changing development patterns along the coast are threatening to displace traditional water-

dependent industries and cut off water and beach access for coastal residents. Vacant industrial buildings and obsolete infrastructure facilities can be recaptured for new marine enterprises, public access, and planned mixed-use developments that bring enjoyment to residents and visitors alike. Sea Grant's long-standing relationships with coastal communities and industries make it ideally suited to provide information, tools, and techniques to support working waterfronts, responsible energy development, the development of accessible recreation and tourism activities, and adoption of sustainable development practices.

#### **Strategies**

Priority research and outreach strategies for NCSG in this goal area include:

- Helping coastal communities, state agencies and/or businesses identify and/or model the economic and cultural importance, impact and sustainability of recreational and commercial fisheries, and of nature-, heritage- and waterfront-based tourism.
- Consider alternative sources of energy and water for coastal communities, and the consequences of implementation.

**Goal: Coastal communities that make efficient use of land, energy and water resources and protect the resources needed to sustain coastal ecosystems and quality of life.**

The biggest challenge facing many coastal cities and towns today is how to manage growth in ways that do not diminish the health of the ecosystems these communities depend on. One way this is reflected nationally and internationally is in the high-level of concern about climate change and its associated effects. To respond to the challenges of growth at a local and regional level, communities are looking for ways to use land and water, generate energy, and dispose of waste that will preserve environmental health and economic vitality. Determining the amount of the land, water, and other natural resources needed to sustain healthy communities is an essential first step in establishing sustainable policies and growth

practices. Only when the dimensions of this environmental footprint are identified can coastal communities understand what their carrying capacity is and what will be needed for generations to come. Sea Grant and its university partners are in a unique position to conduct research and develop models and forecasts that will help communities with this process.

### *Strategies*

Priority research and outreach strategies for NCSG in this goal area include:

- Assisting local governments, state agencies and/or community stakeholders to understand the range and utility of socioeconomic, planning, law and policy approaches so as to enhance, preserve, conserve, and/or increase working waterfronts and other access to public trust waters.
- Collaborating with federal and state partners to better prepare coastal communities for aspects and potential impacts of climate change, sea level rise, and/or storm, drought and flooding events.

**Goal: Coastal citizens, community leaders, and industries that recognize the complex inter-relationships between social, economic and environmental values in coastal areas and work together to balance multiple uses and optimize environmental sustainability.**

According to NOAA's "Population Trends Along the Coastal United States: 1980-2008," coastal counties constitute only 17 percent of the land area of the U.S. (not including Alaska) but account for 53 percent of the population and are among the most rapidly growing areas in the country. The pressures on our oceans, coasts and resources continue to grow. Citizens and decision-makers have an urgent need for tools that will help them evaluate the implications of land-use changes, coastal development pressures, and increased resource use in approaching the policy and management decisions they face. Regional cooperation and coordinated land-use and watershed planning are

essential. Sea Grant's well-established role as a trusted broker among a wide range of interests makes it a key player in providing sound information for decision-makers, convening stakeholders to seek common ground, and facilitating the development and implementation of new coastal policies, plans, management approaches, and consensus-building strategies.

### *Strategies*

Priority research and outreach strategies for NCSG in this goal area include:

- Engaging and training government officials, non-governmental organizations, business owners, developers, and/or other coastal decision-makers to consider sustainability of coastal ecosystems and economies as they develop land- and water-use plans.
- Assessing the potential for, and impacts of, sustainable offshore industries.

### **SAFE AND SUSTAINABLE SEAFOOD SUPPLY**

The United States has witnessed the decline of many of its major fisheries while seafood consumption is on the rise, resulting in a seafood trade deficit of \$8 billion per year, according to statistics from the U.S. Department of Agriculture's Foreign Agricultural Service. At the same time, Sea Grant, through its research, extension, and education activities, and work with partners, has produced important discoveries that have aided the stabilization and recovery of many endangered fisheries. According to the NOAA Aquaculture Program, the U.S. aquaculture is in its infancy, amounting to just over \$1 billion of a \$70 billion worldwide industry. Aquaculture creates important new opportunities to meet the increased demand for seafood, but a number of questions need to be addressed for its full potential to be realized. Seafood safety is a growing concern as international trade increases and fish diseases and contamination become bigger problems. Sea Grant has key roles to play in advancing public understanding of the nature of these problems and opportunities. Through the use of its research, extension, and education capacities, Sea Grant will support the kind of informed

public and private decision-making that will lead to a sustainable supply of safe seafood long into the future.

**Goal: A sustainable supply of safe seafood to meet public demand.**

Ensuring a sustainable supply of safe seafood requires an understanding of the effects of overfishing, past management decisions, and climate change on U.S. wild fish populations as well as the role ecosystem-based fisheries management can play. It also requires better understanding of the range of complex issues related to developing the domestic aquaculture industry. Sea Grant will make major contributions by supporting research that provides the knowledge needed to understand the factors stressing fisheries and the complexities of aquaculture development. Sea Grant will also translate and transfer useful research findings through extension and education activities to ensure responsible and productive use of these resources in the future.

*Strategies*

Priority research and outreach strategies for NCSG in this goal area include:

- Identifying and quantifying underlying levels of fishery stock biological and ecological interactions, including the ecological and economic impacts of harvest, habitat loss, water quality, anthropogenic inputs, and climate change.
- Contributing to the development and application by resource managers of ecosystem-based management strategies/approaches that more fully incorporate human (i.e., economic, cultural and social) factors within the ecosystem.
- Developing tools/procedures to diagnose disease and pathology, and to define fundamental mechanisms of host-pathogen environment interactions.

**Goal: A healthy domestic seafood industry that harvests, produces,**

**processes, and markets seafood responsibly and efficiently.**

A healthy seafood industry requires harvesting techniques that minimize bycatch and damage to marine habitats. It requires development of value-added products, enhanced quality assurance, and education about how to market under-utilized species. Sea Grant will involve harvesters, recreational fishermen, producers and managers in being responsible stewards as well as successful entrepreneurs. Sea Grant will support development of new technologies and participate in collaborative efforts to increase the range of seafood products produced, enhancing American competitiveness in global markets.

*Strategies*

Priority research and outreach strategies for NCSG in this goal area include:

- Introducing new technology and gear to the fishing industry to reduce bycatch and mortality in commercial and recreational fisheries, thereby increasing both the efficiency and sustainability of harvest.
- Developing/disseminating information to help fishery users adapt to changes in the resource base and to changing fishery management strategies/approaches.
- Developing/enhancing the commercial culture and production technology, efficiency and competitiveness for existing and new aquaculture species.
- Optimizing manufacturing processes, examining functional food ingredients, and developing training programs to facilitate the production of value-added products and/or compliance with rigorous food-safety regulations. This includes improving traceability to enhance quality and safety of seafood for domestic and global distribution, and converting seafood processing discards, by-products and wastes into value-added items for new markets.

**Goal: Informed consumers who understand the importance of ecosystem health and sustainable harvesting**

**practices to the future of our domestic fisheries, who appreciate the health benefits of seafood consumption, and who understand how to evaluate the safety of the seafood products they buy.**

Increased attention to the safety of domestic and international seafood has created an urgent need for rapid assessment techniques, certification programs, and standards for domestic and international seafood products, so consumers will have reliable information to inform their buying decisions. Sea Grant will involve industry representatives in the application of seafood safety standards, train inspectors and wholesalers in how to assess seafood quality, and develop educational materials related to seafood safety, quality, and security and make these materials readily available to consumers.

*Strategies*

Priority research and outreach strategies for NCSG in this goal area include:

- Educating consumers about:
  - the characteristics and differences among bioengineered species, farm-raised species and naturally occurring species;
  - the relationship between a healthy ocean ecosystem and both the sustainable harvest of fish and the human health benefits; and
  - the health benefits and risks stemming from consumption of seafood caught in ocean, sound, estuarine, and riverine waters
- Demonstrating and evaluating strategic and niche marketing models for potential use in the North Carolina seafood and fisheries industries, and ultimately for improved understanding by consumers of the benefits/advantages of eating fresh, locally caught fish products.

**HAZARD RESILIENCE IN COASTAL COMMUNITIES**

Sea-level rise, the increased number and intensity of coastal storms, the ongoing threat of

oil spills, and other natural and human hazards are putting more people and property at risk along the nation’s coasts, with major implications for human safety and the economic and environmental health of coastal areas. It is essential that residents of coastal communities understand these risks and learn what they can do to reduce their vulnerability and respond quickly and effectively when events occur. Sea Grant will use its integrated research, training, and technical assistance capabilities, and its presence in coastal communities to play a major role in helping local citizens, decision-makers, and industries plan for hazardous events and optimize the ability of their communities to respond and rebuild.

**Goal: Widespread understanding of the risks associated with living, working, and doing business along the nation’s coasts.**

Communities and businesses are increasingly vulnerable to hazardous events brought on by climate-related changes, land-use changes, and increased economic activity in coastal waters. There is a great need for information and tools to help communities assess the risks they face and identify the options available to them to minimize those risks. Sea Grant will support the work of NOAA’s Climate Program Office and its climate impact and adaptation-related activities. Sea Grant will work with other federal, state, and local partners, the banking and insurance industries, and others to develop forecasting and risk assessment tools, economic and environmental impact models, and other mechanisms that will help families, businesses, communities, and regions understand their risks and take them into account in making personal, business, and community-related decisions.

*Strategies*

Priority research and outreach strategies for NCSG in this goal area include:

- Evaluating the implications of climate variability and change on major coastal initiatives and issues.
- Through exploration of coastal geological and hydrological processes and dynamics, as well as

engineering applications, developing or evaluating prediction methodologies and mitigation strategies that factor in coastal landform and water response to natural hazards, such as storms, floods, rip currents, climate change, sea level rise and long-term erosion.

**Goal: Community capacity to prepare for and respond to hazardous events.**

It is not enough for communities and businesses to understand their vulnerabilities, they must act on this knowledge and become more resilient or the human and economic losses will continue to mount. Individuals, businesses, and communities need to develop comprehensive emergency preparedness and response plans that increase their resiliency and enable them to respond effectively. Sea Grant will contribute to this by building a sound knowledge base to improve forecasting capabilities, by identifying development and best management practices that reduce the vulnerability of people, buildings and businesses to coastal hazards, and by advancing ways communities can manage and recover from these events when they occur.

*Strategies*

Priority research and outreach strategies for NCSG in this goal area include:

- Preparing coastal decision-makers, communities and key stakeholders for wind, wave, weather, and climate events through identification of landform and infrastructural vulnerabilities, as well as opportunities to improve human and community resiliency, preparedness and/or safety.

**Goal: Effective response to coastal catastrophes.**

Coastal and ocean catastrophes require the nation to mobilize a full-range of public and private partners and resources to mount an effective response. Sea Grant is supporting the development of linked regional, national, and international coastal observation networks,

thereby improving the availability of information needed to respond to crises as they unfold. Sea Grant’s knowledge of local contexts and communities can optimize response effectiveness by facilitating immediate links to local partners and capabilities. Sea Grant has a national network of scientists and outreach workers with broad knowledge and experience, and it will provide multi-disciplinary technical assistance to first responders, helping to minimize damage and promote recovery.

*Strategies*

Priority research and outreach strategies for NCSG in this goal area include:

- Quantifying interactions between barrier island/estuarine dynamics and increasing coastal development, then translating the results into economic and community response models.

**THE BENEFITS**

Sea Grant has the responsibility to link relevant research results to people who use coastal resources. North Carolina Sea Grant is part of a nationwide network of programs with the mission of delivering science-based information for application in the management and sustained use of coastal and marine resources. The issues described in the above focus areas are today’s highest priority. We join NOAA Sea Grant and the Sea Grant network in building links between researchers and coastal communities.

Expansion of knowledge for its own sake is not adequate reason for Sea Grant support. Our focus is to increase the public benefits resulting from coastal and marine research. Proposed efforts will be subjected to a three-tiered review process (peer review, programmatic review and user-group review) to ensure that the best efforts will go forward. No proposed project in research, education or outreach will be considered for funding unless the rationale (programmatic values), methods (project protocol) and prospective user relationships are deemed suitable. Proposed activities should have sufficient intellectual content to make them appropriate university functions.

By addressing high-priority issues through an integrated program of research, outreach and education, North Carolina Sea Grant will advance the following ends:

- Effective and sustainable stewardship efforts that utilize and manage coastal and estuarine resources for the use and enjoyment of present and future communities.
- New applications of technology to improve the efficiency of use and the economic return for existing resources.
- Enhanced understanding of the ecological relationships in marine and coastal environments, so that science-based policy can be applied to protect habitats for future generations.
- State and coastal communities' increased resilience to coastal hazards and other changing physical and economic conditions.

- Collaborative solutions to state and regional issues drawing upon the expertise of researchers, industry, government and a host of community interests.
- Increased awareness and knowledge of marine and coastal concepts and issues by producing highly trained graduates, professionals and informed citizens.

The challenges before us are great, and the issues are many. But through strong partnerships with all stakeholders — including university researchers, resource managers, coastal communities and their leaders, businesspeople, policy-makers, and individual citizens — North Carolina Sea Grant is poised to bring science-based solutions to the state over the next 5 years. We will offer relevant research and transferable results on crucial coastal topics.

**North Carolina Sea Grant**

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