

# **Louisiana Sea Grant Strategic Plan 2014-2018**





# Introduction

## HISTORICAL OVERVIEW

Since 1968, Louisiana Sea Grant has addressed many of the complex, and often interrelated, ecological, economic and social challenges that affect coastal Louisiana – one of the largest and most dynamic coastal regions in the United States. The magnitude of these challenges in a changing – and more recently disturbed – natural and social landscape requires that limited resources available to Louisiana Sea Grant be distributed utilizing a practical and well-defined approach. Such an approach relies on partners in an extensive network of state and regional universities, federal and state resource management agencies, and private sector and citizen groups. The scope of Louisiana Sea Grant’s activities embraces four main program areas, as many as 14 academic institutions, 19 coastal zone parishes, and numerous partners in state and federal agencies and the private sector that provide matching funds and/or opportunities for collaboration.

At any given time, Louisiana Sea Grant either manages or participates in more than 50 research, extension, education and communication projects. These include Omnibus awards; other National Oceanic and Atmospheric Administration (NOAA)-funded projects; program development projects; other federal, state and privately funded projects; and informal partnerships and collaborations.

The most important research and outreach challenges that Louisiana Sea Grant faces relate to sustainability of communities and ecosystems in the hurricane-prone deltaic coast bordering the northern Gulf of Mexico. The 2005 tropical storm season with Hurricanes Katrina and Rita, and the 2008 storm season with Hurricanes Gustav and Ike, revealed much about the region’s increasing hurricane vulnerabilities and associated secondary impacts of disturbance to a degrading delta. Additional economic and environmental vulnerabilities were exposed during the 2010 Deepwater Horizon oil spill, the 2008 and 2011 Mississippi River floods, and, most recently, Hurricane Isaac. This deltaic coast, with reliance of communities on ecosystem services, will also continue to be confronted with the effects of climate change, sea level rise and land subsidence on our coastal parishes and their residents.



**Louisiana State University was designated a Sea Grant College in August 1978. The Program’s first executive director, Jack Van Lopik (right), receives a bronze plaque commemorating the event.**

## **INSTITUTIONAL SETTING**

The Office of Sea Grant Development (OSGD) is the administrative unit within Louisiana State University that was established to manage Louisiana Sea Grant. The program's basic fiscal management approach is to award most of the competitive Omnibus funding to researchers who are not employed by OSGD. Most of the non-competitive activities are based in the OSGD. As an administrative support unit for the program, OSGD does have elements that both administer and perform on specialized research and outreach activities. Although OSGD faculty and staff are discouraged from competing for Omnibus funds, they can and do compete for National Strategic Investment (NSI) funding.

Important elements of Louisiana Sea Grant's planning environment are the state's four public management systems of higher education, which, in turn, are governed by the Board of Regents. Each of the four systems has a management board. The Louisiana State University and A&M System has 10 institutions on eight campuses; the University of Louisiana System has nine institutions; the Southern University and A&M System has five units on three campuses; and the Louisiana Community and Technical College System has 14 campuses. Also governed by the Board of Regents is the Louisiana Universities Marine Consortium (LUMCON), a coastal facility and cooperative multi-institutional program that conducts research and educational activities in marine sciences. In addition, the Louisiana Association of Independent Colleges and Universities has 10 private institutions, of which Tulane University is the largest. Sea Grant-funded research has been conducted through many of these academic institutions, with Sea Grant education opportunities available to students enrolled in all of them.

## **PROJECT SOLICITATION & SELECTION**

The goals, strategies and outcomes identified in this Strategic Plan comprise the principal guidance provided to both researchers and outreach personnel concerning topics that the program will address during the next funding cycles. This guidance for goals and strategies is described in fairly general terms to provide reasonable latitude for researchers to exercise creativity in their applications, while remaining sufficiently focused to direct funding into projects that may have the greatest potential impact on objectives identified by the Strategic Plan. Louisiana Sea Grant employs a two-step, competitive process for project selection: (a) A Request for Statements of Interest, listing the program's priorities and administrative guidance, is widely circulated to researchers and academic institutions in Louisiana. Interested researchers are encouraged to submit brief statements that address issues related to both the goals and the outcomes in the Strategic Plan. Statements of Interest submitted by the required deadline are screened by a panel of experts on the basis of applicability and responsiveness to Strategic Plan objectives. (b) Principle Investigators of the highest-ranked Statements of Interest are invited to submit expanded proposals, which are widely circulated for scientific peer review. Determined efforts are made to secure at least three external reviews for each proposal to aid in the final full proposal evaluation process by a technical review panel of outside experts.

## CONNECTING WITH USERS

Guidance for Louisiana Sea Grant leadership in developing this Strategic Plan is provided by an Advisory Council and two advisory panels – the Sea Grant Law and Policy Advisory Panel and the Education Advisory Panel. All three groups have been actively involved and particularly helpful in planning and reviewing program goals and objectives. Additionally, all Sea Grant extension agents and specialists have topical and/or multi-parish advisory committees.

One of the important ways the Louisiana Sea Grant College Program connects with users is through their participation on preliminary proposal screening panels and technical review panels for full proposals. For preliminary proposal screening, Louisiana Sea Grant College Program administration engages people who have a broad knowledge of particular issues associated with various topical areas. For technical review of full proposals, program administration selects people with both a broad knowledge of issues and current scientific strength.

Louisiana Sea Grant also is focused on enhancing regional activities and collaborative projects in research, extension, communication and education.



**Louisiana Sea Grant extension personnel serve as a conduit between the state’s coastal communities and university researchers. Above, extension specialist Maurice Wolcott explains a map detailing fishing closures during the BP oil spill.**

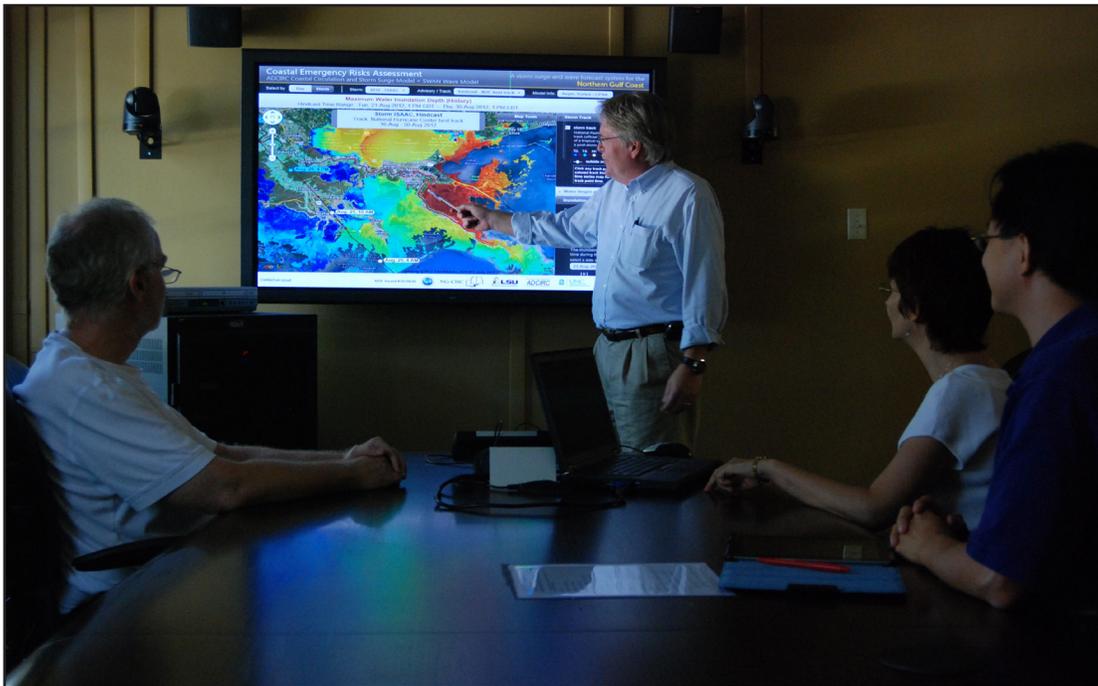
## STRATEGIC PLANNING PROCESS

The process of developing a new document to describe the Louisiana Sea Grant 2014-2018 Strategic Plan was initiated by considering the former Louisiana Sea Grant 2009-2013 Strategic Plan (available at [http://www.laseagrant.org/pdfs/StrategicPlan\\_09-13.pdf](http://www.laseagrant.org/pdfs/StrategicPlan_09-13.pdf)). Through discussions with stakeholders and various advisory groups described above, it was apparent that potential problems facing coastal communities in the near future have changed little over the past few years, reducing the need for wholesale revisions in the new strategic plan.

The Louisiana Sea Grant 2009-2013 Strategic Plan was the product of input from: (1) the Gulf of Mexico Research Planning Project, (2) a scientific telephone survey conducted by the LSU Public Policy Research Laboratory in July and August 2008 in 18 of the coastal parishes served by Louisiana Sea Grant Extension personnel, (3) Louisiana Sea Grant's Marine Extension personnel and faculty, (4) Louisiana Sea Grant's Advisory Council, (5) Louisiana Sea Grant's Academic Advisory Panel, (6) Sea Grant Law and Policy Advisory Panel and (7) Louisiana Sea Grant administrative personnel. Revisions to the new Louisiana Sea Grant 2014-2018 Strategic Plan are largely limited to minor improvements in describing Goals and Strategies and adding three levels of potential outcomes. These improvements were gleaned from discussions with the groups below.

*Louisiana Sea Grant Advisory Council.* The 15-member Louisiana Sea Grant Advisory Council (<http://www.laseagrant.org/about/council.htm>) is composed of distinguished representatives from academia, private industry, state and federal government agencies and non-governmental organizations. All Council members received the Louisiana Sea Grant 2009-2013 Strategic Plan in mid-November 2011 and were asked to submit recommendations for updating the 2014-2018 Strategic Plan. A meeting of the entire Advisory Council was convened on 1 December 2011 by the Executive Director for the purpose of discussing any necessary changes in the direction of Louisiana Sea Grant. Those in attendance shared their diverse perspectives both on future priorities for the program and on strategies for achieving program goals. Several management agencies that have members on the Council — Louisiana Department of Wildlife and Fisheries, Department of Environmental Quality and Department of Natural Resources — were particularly valuable in providing focus on updating Goals and Strategies. In addition, the Council agreed with the assessment by Louisiana Sea Grant staff that a focused approach to the future is essential, considering that available resources need to match specific needs of the state's coastal region within institutional capabilities. There was consensus among the Council and Louisiana Sea Grant staff that with a few deliberate modifications, the 2009-2013 plan could serve as the blueprint for the 2014-2018 plan.

*Louisiana Sea Grant Marine Extension Agents and Faculty Specialists.* The Marine Extension Program (MEP) is composed of 14 highly educated, personally motivated scientists with specialties including fisheries, aquaculture, watershed management, resource economics and disaster science management. While some of these personnel are located on the LSU campus, others are assigned to and reside within specifically designated communities composed of two to several coastal parishes. Each of our extension personnel was asked to coordinate and host a meeting of a diverse group of trusted, concerned stakeholders from local government and industry as advisory



**Robert Twilley (standing), Louisiana Sea Grant’s executive director, reviews storm surge predictions with the Coastal Emergency Risks (CERA) team at LSU. Twilley is a co-principal investigator on the project that is developing more accurate surge forecasts.**

committees to discuss issues of both immediate and future importance in coastal Louisiana. The opportunity to report out on these meetings was provided at a quarterly meeting of the MEP convened on 13-14 March 2012. All oral and written comments were taken under advisement and incorporated into the 2014-2018 Strategic Plan as appropriate.

*Advisory Panels:* Both the Louisiana Sea Grant Law and Policy Program and the Louisiana Sea Grant Education Program maintain Advisory Panels of dedicated, trusted colleagues drawn from their respective fields. In anticipation of providing input into the strategic planning process, both Panels were convened for one-day meetings in February and March 2012 to discuss future directions for each of the programs. As above, all oral and written comments were taken under advisement and incorporated into the 2014-2018 Strategic Plan where appropriate.

*National Sea Grant Office:* The Focus Areas and their explanatory materials and outcomes included in the Louisiana Sea Grant 2014-2018 Strategic Plan are derived from a draft document titled “NOAA National Sea Grant College Program 2014-2018 Strategic Plan.” Louisiana Sea Grant was charged by the National Sea Grant Office to modify its 2014-2018 Strategic Plan and be aligned with the national plan. These modifications have been incorporated while being mindful of the unique issues and problems facing coastal Louisiana as expressed by the advisory panels and committees participating in the process of developing the 2014-2018 Strategic Plan.

## PLANNING PROCESS CONCLUSIONS

The Louisiana Sea Grant 2014-2018 Strategic Plan continues to be shaped by several recurring themes, including continued wetland loss in the Mississippi River Delta; hurricanes of 2005, 2008 and 2012; and the BP oil spill of 2010, that emerged from the aforementioned planning process. The following list is in priority order.

- Louisianans are proud of their coastal fisheries and of the contributions these products make to the unique cuisines found in coastal communities and cities of the state and the nation. Efforts should be made to rebuild degraded fishery habitats, to responsibly and efficiently harvest our fishery resources and to ensure that our seafood continues to be safe for our consumption and enjoyment.
- Unlike coastal communities in other states that are undergoing significant change associated with growth in population, Louisiana's coastal communities are experiencing changes driven by unique social, economic and environmental factors. The issues of coastal community resiliency and sustainability, along with the preservation of distinctive coastal cultures, are critical to a working coast.
- Coastal wetlands of the Mississippi River Delta are continuing to disappear, causing problems for Louisiana's human and natural systems. The consequences of implementing Mississippi River water diversions to compensate for the negative impacts of land subsidence and rising sea levels will drive decision making in Louisiana for years to come.
- In Louisiana, water has always been perceived as a plentiful resource with no limitations. Recent circumstances, however, suggest that water availability, quality and use will need some guidelines in managing this natural resource.



**Extension agent Mark Shirley (center) talks with two students attending Marsh Maneuvers. Each summer, 60 high school students from across the state participate in the week-long, hands-on camp where participants learn about the state's coastal ecology and help with wetlands restoration.**

## CROSS-CUTTING GOALS

Managing Louisiana's coastal resources as part of the Gulf of Mexico large-scale ecosystem requires solutions to problems that balance human needs with environmental health in three fundamental areas:

- A need for synthesis and communication of information about how Louisiana's coastal and Gulf ecosystems function, and how human activities alter these habitats and living resources in a way that limit the ecosystem services they provide;
- A need for management and decision-making processes that are based on a synthesis of scientific information, together with stakeholder engagement, that defines benefits from the beauty and bounty of Louisiana's coastal resources, that include mechanisms to evaluate trade-offs between human and environmental needs;
- A need for outreach through communication, education and extension to provide Louisiana citizens with the tools to understand the complexities of coastal environments and the interactions between human use and the health of coastal ecosystems.

A series of cross-cutting goals have been recognized to facilitate progress in these fundamental areas and to assist Louisiana citizens to understand, manage and use its coastal and Gulf resources wisely. The two goals reflect the value that Louisiana Sea Grant places on an integrated approach to develop research and outreach. They provide the foundation of Louisiana Sea Grant's work and are integral to the success of this four-year plan.

**Research Goal: Credible scientific information to advance understanding of the nature and value of Louisiana's coastal and Gulf resources; to identify new ways to restore, conserve and use these resources; and to support evaluation of the environmental impacts and social/economic trade-offs involved in coastal decision-making**

Sustainable practices should influence coastal decision makers to promote continued economic development with an understanding of long-term social, environmental and economic consequences. Ecosystem functioning and values, emerging economic opportunities and the social and economic costs and benefits of various human activities need to be communicated using a language understood by the general public to achieve sustainable uses of coastal environments. Louisiana Sea Grant has a long history of generating cutting-edge research and supporting technological innovations related to informed restoration, conservation and use of coastal and ocean resources.

### Strategies

- Support research to generate the scientific, technical, economic and legal information needed to increase sustainability of Louisiana's coastal and Gulf ecosystems and communities; support the development of new businesses, products, tools and technologies

(economic development) while also addressing the most pressing questions related to Louisiana's coastal and Gulf ecosystems including restoration, conservation, use and management.

- Play a leadership role within and outside of the Louisiana Sea Grant network in increasing the amount of social/economic research available to help decision makers evaluate trade-offs of natural, social and economic systems, and assess risks to the future health and productivity of Louisiana's coastal and Gulf ecosystems and residents.
- Develop synthesis that communicates and disseminates research findings and technological discoveries to Louisiana's citizens, industries and leaders who need them to capitalize on opportunities and make wise management decisions.

**Outreach Goal: Decision-making procedures that involve the full range of Louisiana's coastal interests, that integrate efforts of public and private partners at the federal, regional, state and local levels, and that provide mechanisms for establishing common understandings that generate outcomes that focus on sustainable resources**

The continuing challenges facing Louisiana's coastal residents increase the complexity of coastal problems that create greater potential conflicts among users, which can be amplified if decision making remains fragmented and narrowly focused. Louisiana Sea Grant's long-standing relationships with a wide variety of stakeholders in Louisiana's coastal communities and its reputation as a source of credible information enable it to promote effective outreach, consensus building and collaborative efforts in coastal communities. 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 expertise.



**Since Louisiana Sea Grant was established in 1968, the program has worked closely with commercial fishermen – helping them solve real-world issues and introducing them to best practices and technologies.**

## Strategies

- Use Louisiana Sea Grant’s research, extension and outreach capabilities to encourage and support the creation of decision-making procedures that promote scientific synthesis, maximize effectiveness and provide an integrated response to coastal problems and opportunities.
- Build consensus on complex issues such as coastal land use, water policy, energy development, public access, invasive species control and climate change impacts by communicating cutting-edge research, building broader understanding among various constituency groups and convening diverse groups of stakeholders to work together to find common solutions.
- Strengthen partnerships to promote national and regional collaborations on issues that face federal and state programs and other partners in coastal Louisiana and the Gulf region to support more effective and integrated coastal decision making.

These two cross-cutting goals have been a foundation of Louisiana Sea Grant’s work since the program 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 both challenges and opportunities in the coming years.



**John Supan, Louisiana Sea Grant’s oyster specialist, is raising oysters in mesh bags suspended in the water column. Supan’s research is conducted at the program’s oyster hatchery and demonstration farm on Grand Isle.**

## FOCUS AREAS

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

1. Healthy Ecosystems and Habitats
2. Resilient Communities and Economies
3. Sustainable Fisheries and Aquaculture
4. Education and Workforce Development

These focus areas evolved from the NOAA National Sea Grant College Program 2014-2018 Strategic Plan and reflect the nation's most urgent needs along our coasts. These focus areas also define NOAA goals and Sea Grant's strengths and core values. The focus areas reflect the integration of Sea Grant's research and engagement programs on a national scale. These functional areas provide the foundation for implementing a successful four-year plan at the program level.

Each focus area has goals, strategies, outcomes and performance measures. The goals describe the desired long-term direction for each focus area. The strategies are focused actions that guide Louisiana Sea Grant toward progress and link goals with outcomes. The outcomes are benchmarks from which Sea Grant can track progress toward achieving each goal. Performance measures are quantitative ways of measuring outcomes.

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

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

The outcomes identified in the National Sea Grant 2014-2018 Strategic Plan can only be realized by utilizing Louisiana Sea Grant's research and outreach programs. For example, many of the learning outcomes identified require a substantial investment in needs-based and merit-reviewed research before any actionable outcomes can be realized. Simply stated, Louisiana Sea Grant-



**Louisiana Direct, an online direct marketing project spearheaded by Louisiana Sea Grant, is helping generate more revenue for commercial fishermen while providing consumers with premium products at a fair price.**

sponsored research is the “engine” that leads to new products, tools or other discoveries used by our outreach programs to effect change.

There are two types of performance measures identified in this plan. Performance measures linked to a specific focus area are listed at the end of each focus area section. Cross-cutting performance measures, on the other hand, are broad enough to measure progress toward goals for every focus area and are listed together at the end of the focus area sections (listed following the Education and Workforce Development focus area).

Collectively, the four focus areas include 11 goals, 29 strategies, 86 outcomes and 12 performance measures. This plan directly aligns with NOAA’s goals and objectives as articulated in the NOAA Next Generation Strategic Plan: climate adaptation and mitigation, weather-ready nation, healthy oceans and resilient coastal communities and economies. The Louisiana Sea Grant 2014-2018 Strategic Plan capitalizes on Sea Grant’s unique capacities and strengths while providing the flexibility and creativity required to nimbly adapt to emerging needs.

# Focus Area

## HEALTHY COASTAL ECOSYSTEMS AND HABITATS

The maintenance and restoration of healthy ecosystems is fundamental to life along Louisiana's Gulf coast. Coastal development, overfishing, sea level rise, coastal subsidence, loss of barrier islands and other factors have resulted in water quality degradation and hypoxia, decline of fisheries, wetlands loss, proliferation of invasive species, reduced storm and surge protection and a host of other challenges. Louisiana's invaluable coastal wetlands and forests have suffered most severely from the combined effects of man's activities and nature's whims. To restore and preserve the state's coastal ecosystems, we must promote innovative research that will increase our understanding of ecosystem function and implement appropriate designs for restoring lost function. Louisiana Sea Grant has previously identified information gaps, set research priorities and coordinated information and technology transfer as necessary; however, much remains to be accomplished. Louisiana Sea Grant, coupled with its regional consortia and nationwide networks, is ideally situated to help Louisiana address ecosystem health issues at the appropriate local, state, regional, national and international levels.

### **1. Goal: Reliable information from the physical, environmental and social sciences to support ecosystem-based approaches to managing and restoring Louisiana's coastal environment including fish, wildlife and plants**

The full potential of ecosystem-based management approaches will be realized with better understanding of current conditions, basic ecosystem processes, interactions of coastal and upland land uses on the health of coastal and Gulf environments, and the importance of healthy ecosystems to healthy fisheries. It is also necessary to develop the skills to transform new knowledge and understanding into sound management principles and practices. Louisiana Sea Grant will continue to build the necessary scientific foundation both by supporting research that produces useful information related to ecosystem health and by accelerating the transfer of this information to coastal residents, resource managers, businesses and industries.

#### **Strategies**

- Establish benchmark costs and benefits of coastal marsh restoration and protection projects, including impacts on the economies, residents and cultures of coastal communities.
- Improve Louisiana's wetlands with river diversion and sediment conveyance projects that optimally manage and allocate sediments; minimally impact local residents, native flora and fauna; and positively affect community, culture and water quality.

- Predict, detect, monitor and mitigate harmful algal blooms with both existing and newly developed methodologies and technologies.

#### Learning Outcomes

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

#### Action Outcomes

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

#### Consequence Outcomes

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

## **2. Goal: Widespread use of integrated ecosystem-based approaches to sustainably manage land, water and living resources in Louisiana's coastal areas**

The negative consequences of ecosystem degradation and tropical storms on natural resources, local economies and human health are familiar to most residents of coastal Louisiana. The motivation to apply ecosystem-based management approaches to alleviating Louisiana's coastal challenges will require additional interaction with a wide variety of audiences. Louisiana Sea Grant's strong research and outreach capabilities must provide both scientific information on and technical assistance with ecosystem-based management. Extension and education capabilities also must engage citizens in stewardship activities that promote healthy ecosystems. Such efforts should be expected to result in regional and other collaborative approaches that address problems not only in Louisiana, but also extend beyond traditional geographic or governmental boundaries.

### **Strategies**

- Reduce negative effects of climate change and development on the Louisiana coast with predictive models developed, refined and applied in partnership with NOAA entities such as the National Weather Service and Coastal Services Center.
- Model and communicate impacts of coastal restoration projects on residents and economies, considering both the potential social and economic implications of the projects themselves and the desirable social and economic alternatives of such projects, including ecosystem service value.



**In the lab, Louisiana Sea Grant-funded researchers are developing alternative, less expensive baits for the blue crab industry. Previously, LSG researchers studied the impact of oil dispersant on the development of blue crabs.**

- Educate Louisiana residents and community leaders about both their relationship with the marine and coastal environments and the critical need for conservation and restoration of these natural resources.
- Engage and empower Louisiana residents, community leaders and policy makers in processes to gather and consider their perspectives of environmental, social and cultural issues of the coast to encourage private sector/government partnerships and to use credible information in decision making.

#### Learning Outcomes

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

#### Action Outcomes

- 2.5. Methodologies are used to evaluate a range of practical ecosystem-based management approaches for planning and adapt to future management needs.
- 2.6. Resource managers apply ecosystem-based management principles when making decisions.
- 2.7. Resource managers incorporate laws and policies to facilitate and implement ecosystem-based management.

2.8. Residents, resource managers and businesses integrate social, natural and physical science when managing resources and work with all sectors in the decision-making process.

#### Consequence Outcomes

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

### **3. Goal: Protected, enhanced or restored function and productivity of Louisiana's degraded ecosystems and habitats**

Over the past few decades, Louisiana's coastal areas have experienced deterioration of nursery habitats for fish populations, loss of wetlands, closure of oyster beds and proliferation of invasive species. Louisiana 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. Louisiana Sea Grant will engage its network of extension, education and communication specialists both to provide technical assistance and to share new information and technologies with local, state, regional and national partners.

#### **Strategies**

- Restore damaged and lost wetlands to the functional equivalent of natural ecosystems based on realistic ecological metrics, hydrologic requirements and design criteria.

#### Learning Outcomes

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

#### Action Outcomes

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

#### Consequence Outcomes

- 3.6. Habitats are protected, enhanced or restored.

#### **Healthy Ecosystem and Habitats Performance Measures**

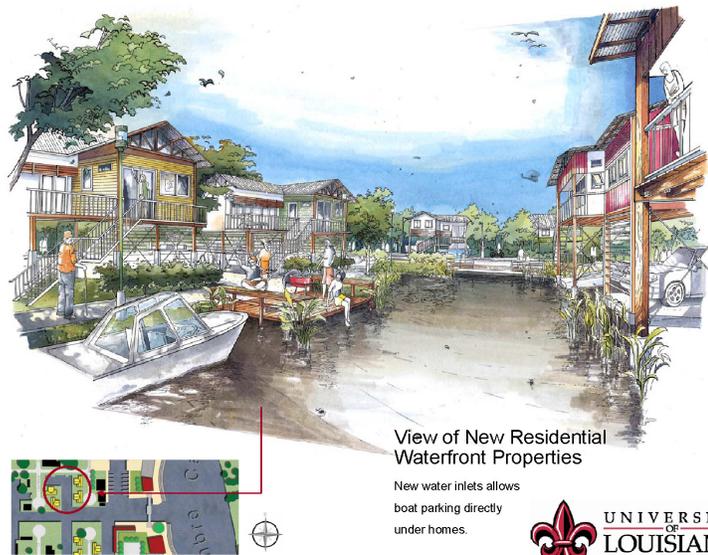
1. Number of Sea Grant-supported tools, technologies and information services that are used by our partners/stakeholders to improve ecosystem-based management.
2. Number of ecosystem-based approaches designed to manage land, water and living resources in coastal areas as a result of Sea Grant activities.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

# Focus Area

## RESILIENT COMMUNITIES AND ECONOMIES

Coastal communities provide vital economic, social and recreational opportunities for thousands of Louisianans, but human migration, especially since Hurricanes Rita and Katrina, have transformed our coastal landscapes and intensified demand on finite coastal resources. For example, the increase in population along the north shore of Lake Pontchartrain has resulted in new housing developments, recreation facilities and other business activities. These changes are placing tremendous pressure on coastal lands, water supplies and traditional ways of life. To accommodate more people, 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. Louisiana 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 are functioning within the carrying capacity of their ecosystems.

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 Louisiana's coast, 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 both to reduce their vulnerability and to respond quickly and effectively when destructive events occur. Louisiana 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.



View of New Residential Waterfront Properties

New water inlets allows boat parking directly under homes.



**A residential waterfront redevelopment concept proposed for the Town of Delcambre by University of Louisiana at Lafayette (ULL) students. With Louisiana Sea Grant funding, the ULL Design Workshop students created designs that included a public marina, open-air markets, al fresco dining, boardwalks and a possible hotel.**

#### **4. Goal: Vibrant and resilient Louisiana coastal economies that include working waterfronts, an abundance of recreation and tourism opportunities and coastal access for all citizens**

Marine resources and coastal access sustain local economies in Louisiana through fisheries and aquaculture, seafood processing, trade, energy production, tourism and recreation enterprises. The state's ports and waterways continue to accommodate trade, staging areas for off-shore industries, tourism and recreational boating and fishing fleets. At the same time, coastal land loss, the ravages of Hurricanes Katrina and Rita and a weakened economy are displacing both traditional water-dependent industries and their employees and diminishing water and beach access for all Louisiana residents. Vacant industrial buildings and obsolete infrastructure facilities can be refurbished for new marine enterprises, public access and planned mixed-use developments that bring both employment to residents and enjoyment to visitors. Louisiana 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**

- Support social and economic analyses of coastal communities that identify and communicate employment alternatives, such as transitioning to local employment opportunities, applying traditional skill and knowledge to the aquaculture of finfish and shellfish, or ecotourism.
- Engage, educate and empower residents of Louisiana's coastal communities in processes that identify and pursue sustainable economic development and community sustainability alternatives, policies and programs.

#### **Learning Outcomes**

- 4.1. Communities are aware of both the economic contributions of coastal areas and the interdependence between the health of the economy and the health of the natural and cultural systems.
- 4.2. Communities have access to information needed to understand the value of waterfront- and tourism-related economic activities.
- 4.3. Communities understand the strengths and weaknesses of alternative development scenarios on resource consumption and local economies.
- 4.4. Communities are aware of regulatory regimes affecting economic sustainability.

#### **Action Outcomes**

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

#### **Consequence Outcomes**

- 4.7. Communities have diverse, healthy economies and industries without displacing traditional working waterfronts.

## **5. Goal: Louisiana coastal communities that use comprehensive planning efforts both to ensure efficient use of land, energy and water resources and to protect the resources needed to sustain coastal ecosystems and quality of life**

Among the most difficult challenges facing Louisiana's coastal communities, most notably along the north shore of Lake Pontchartrain, is how to manage growth and development without diminishing the health of the ecosystems upon which these communities depend. This is reflected in concerns about climate change and its potential negative effects on these communities. To respond to such challenges at a local and regional level, communities are seeking ways to use land and water, generate energy and dispose of waste that will preserve environmental health and economic vigor. 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 capacities are and what will be needed for generations to come. Louisiana 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**

- Invest the citizens and businesses of coastal communities in responsible water, land, energy, resource and waste management policies and practices through the development and delivery of relevant educational and media-appropriate materials and programs.

### Learning Outcomes

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

### Action Outcomes

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

### Consequence Outcomes

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

## **6. Goal: Improvements in coastal water resources to sustain both human health and ecosystem services**

The pressures on Louisiana's ocean, coastal and inland water resources continue to grow. Our citizens and decision makers have an urgent need for tools that will help them evaluate the implications of land use changes, coastal development and increased resource use in approaching the water policy and management decisions they face. Regional cooperation and coordinated land use and watershed planning are essential. Louisiana 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 water policies, plans, management approaches and consensus-building strategies.

### **Strategies**

- Investigate the existing water policies of both state and local jurisdictions whose water management practices affect coastal resources to understand alternative water policies that might be beneficial for application in Louisiana and the wider Gulf region.
- Develop and enact model water policies that will assist Louisiana in addressing the growing demands on its water resources from various sectors, including domestic, coastal restoration, fisheries, energy and interstate transfers.
- Educate stakeholders and decision makers on water policy issues with outreach information and materials developed by Sea Grant.

### **Learning Outcomes**

- 6.1. Communities and state and local decision makers are aware of the impact of human activities on water quality and supply.
- 6.2. Communities understand the value of clean water, adequate supplies and healthy watersheds.
- 6.3. Communities and state and local decision makers understand water laws and policies affecting the use and allocation of water resources.

### **Action Outcomes**

- 6.4. Communities and state and local decision makers engage in planning efforts to protect water supplies and improve water quality.
- 6.5. State and local decision makers adopt mitigation measures, best management practices and improved site designs in local policies and ordinances to address water supplies and water quality.

### **Consequence Outcomes**

- 6.6. Water supplies are sustained.
- 6.7. Water quality improves.

**7. Goal: Louisiana coastal citizens, community leaders and industries that both recognize the complex interrelationships among social, economic and environmental values in coastal areas and work together to adapt to the impacts of hazards and climate change**



**Ocean Commotion, an annual coastal stewardship science fair sponsored by Louisiana Sea Grant, draws more than 2,000 kindergarten through eighth graders. Above, an elementary school student crawls through a fishing trawl – one of the day’s more than 60 activities.**

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. Louisiana Sea Grant will support the work of NOAA’s Climate Program Office and its climate impact and adaptation-related activities. Louisiana 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.

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. Louisiana Sea Grant will contribute to this by providing synthesis 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**

- Design and implement outreach programs on sustainable use of coastal resources for coastal community residents, community leaders and industry.
- Investigate and communicate interactions among sea level rise, subsidence and storm surge, including implications for saltwater intrusion, coastal flooding, agriculture, human health and safety and cultural changes.

- Develop and communicate models of successfully resilient communities, including contributions of community demographics, economic base, insurance coverage, building codes, education programs, health care resources, fishery infrastructure and development.
- Facilitate implementation of improved land use planning and building codes in Louisiana coastal communities by developing and distributing best practices information.
- Understand, quantify, predict and communicate impacts of both natural features (including wetlands and upland vegetation, coastal/nearshore morphology, beach dunes, barrier islands) and man-made structures in providing defense against tropical storms, storm surges and technological disasters.

#### Learning Outcomes

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

#### Action Outcomes

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

#### **Resilient Communities and Economies Performance Measures**

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

# Focus Area

## SUSTAINABLE FISHERIES AND AQUACULTURE

Louisiana has experienced a decline in the profitability of many of its major fisheries. While seafood consumption nationwide has been simultaneously on the rise, domestic harvesters have faced competition from inexpensive imported seafood products and the high cost of fuel for fishing vessels. Louisiana Sea Grant, through its research, extension and education activities and work with industry partners, has helped to stabilize and improve many sectors of our fisheries industry. According to the NOAA Aquaculture Program, mariculture (aquaculture of saltwater species) is in its infancy in the U.S., amounting to just over \$1 billion of a \$70 billion worldwide industry. This is especially so in Louisiana. Mariculture 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 of imports loom as larger problems. Louisiana 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, Louisiana 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.

### **8. Goal: A safe, secure and sustainable supply of Louisiana 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 Louisiana'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 mariculture industry. Louisiana Sea Grant will make major contributions by supporting research that provides the knowledge needed to understand the factors stressing fisheries and the complexities of mariculture development. Louisiana 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.

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

## Strategies

- Restore important native recreational and commercial finfish and shellfish populations by identifying and protecting habitats essential to their reproduction, feeding and growth to marketable size.
- Develop practices, technologies and systems designed for enhanced, more efficient operation of seafood culture facilities with minimal impact on coastal and oceanic environments and habitats, on natural fisheries and on the people who depend on natural fisheries.
- Develop new management, harvesting, handling and processing technologies, value-added products, innovative waste management practices and byproduct uses that maximize the quality, safety and utilization of Louisiana's seafood products.
- Promote seafood harvesting and marketing strategies that both maximize efficiency and profitability and minimize environmental impacts.

### Learning Outcomes

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

### Action Outcomes

- 8.6. Fishermen employ efficient fishing techniques, including bycatch reduction.
- 8.7. Fishermen apply techniques to reduce negative impacts on depleted, threatened or endangered species.
- 8.8. The seafood industry adopts innovative technologies and approaches to supply safe and sustainable seafood.
- 8.9. The commercial fishing and aquaculture industries adopt innovative marketing strategies to add value to their products.
- 8.10. The seafood industry adopts techniques and approaches to minimize the environmental impact of their sectors.
- 8.11. Resource managers establish policies and regulations that achieve a better balance between economic benefit and conservation goals.
- 8.12. The seafood processing industry implements innovative techniques and processes to create new product forms and ensure the delivery of safe and healthy seafood.

## Consequence Outcomes

8.13. The Louisiana seafood supply is sustainable and safe.

8.14. There is an expansion of sustainable domestic fishing and aquaculture industries in Louisiana.

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

Fish and shellfish contain high-quality protein and other essential nutrients and are an important part of a healthful diet. In fact, a well-balanced diet that includes a variety of fish and shellfish can contribute to heart health and aid in children's proper growth and development. The U.S. Departments of Health and Human Services and Agriculture issued dietary guidelines in 2010 that are intended to help people maintain their health. The guidelines suggest that Americans should increase their seafood consumption and eat seafood twice a week. In addition, the omega-3 fatty acids found in seafood may provide other significant health benefits. In order to maximize the health benefits of seafood, healthy preparation methods, like baking, are recommended. Major conclusions in the 2010 dietary guidelines describe the steps that can be taken to help all Americans adopt health-promoting nutrition including an increase in the amount and variety of seafood consumed by choosing seafood in place of some meat and poultry. As with any type of food, however, it is important to handle seafood safely in order to reduce the risk of foodborne illness. Following basic food safety tips for buying, preparing and storing fish and shellfish will allow consumers to safely enjoy the fine taste and good nutrition of seafood.

## Strategies

- Educate consumers of the nutritional benefits of Louisiana seafood products and how to judge seafood safety and quality.
- Develop new harvesting, handling and processing technologies that maximize the quality and safety of Louisiana's seafood products.

## Learning Outcomes

9.1. The Louisiana seafood industry is aware of the standards for safe seafood.

9.2. The Louisiana seafood industry is knowledgeable about consumer trends regarding seafood sustainability and safety and how to adjust operations to meet emerging demands.

9.3. Louisiana seafood consumers have the knowledge to evaluate sustainable seafood choices.

9.4. Louisiana seafood consumers have an increased knowledge of the nutritional benefits of seafood products and know how to judge seafood safety and quality.

## Action Outcomes

9.5. The Louisiana seafood industry adopts standards for safe seafood.

9.6. The Louisiana seafood industry adopts technologies and techniques to ensure seafood safety.

9.7. Louisiana seafood consumers preferentially purchase sustainable seafood products.

## Consequence Outcomes

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

## **Sustainable Fisheries and Aquaculture Performance Measures**

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



**Louisiana Sea Grant-funded researcher Chris Green examines larval Gulf killifish. Green and his colleagues worked to overcome the hurdles to killifish aquaculture so the species can be raised as a baitfish.**

# Focus Area

## EDUCATION AND WORKFORCE DEVELOPMENT

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

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

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

The 2004 U.S. Commission on Ocean Policy Report emphasized that restoring and sustaining Louisiana's coastal and Gulf environments requires an informed citizenry that understands the value and vulnerability of these resources. Louisiana needs 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. Louisiana Sea Grant has been a leader in K-12, undergraduate, graduate, professional and technical education in coastal and Gulf-related areas for decades and is committed to playing a leadership role, in partnership with the NOAA Office of Education and others, to advance coastal and Gulf literacy. This can be achieved both by capitalizing on Louisiana Sea Grant's strong university partnerships and by using its education and extension capacities to develop educational programs for students, professional development for teachers and workforce training.

## Strategies

- Advance Louisiana’s coastal and Gulf literacy through formal and informal learning opportunities for students, education professionals and the public in our schools, museums, aquariums and through other educational forums such as public events, online digital library collections and the National Sea Grant Library.
- Collaborate within NOAA and with other local and regional partners to build public awareness about critical coastal and Gulf issues using the integrated research, extension, education and communication capacities of the entire Sea Grant network.

### Learning Outcomes

- 10.1. Formal and informal educators are knowledgeable of the best available science on the effectiveness of environmental science education.
- 10.2. Lifelong learners are aware of and provided with informal science education opportunities focused on coastal topics.

### Action Outcomes

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

### Consequence Outcomes

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

## **11. Goal: A future workforce reflecting the diversity of the nation, skilled in science, technology, engineering, mathematics and other disciplines critical to Sea Grant’s mission and national needs**

Louisiana Sea Grant serves as a bridging organization that spans the divide between science, its applications and policy. We build innovative and effective connections and partnerships among those who generate, educate and communicate science relevant to the environment and those who seek to use science to guide decisions at local, state and national levels. By basing itself in the impartial use of science, and fostering an interconnected culture among all parties, Sea Grant has

the ability to gain the trust of communities in disagreement or conflict. We assist communities in jointly finding acceptable solutions to complex environmental challenges by using expert facilitation, problem solving processes and fostering joint implementation.

All sciences and technical areas relevant to decision making are recognized as important, especially their integration. This includes physical, biological and social sciences, as well as engineering. Also respected and utilized are basic and applied research, scientific synthesis and assessment, development of decision-making tools, formal and informal education, communication and other processes that bring communities together to understand each other and collaborate in developing science-based solutions.

Louisiana Sea Grant is a vigorous supporter of 1) expanded, integrated and science-driven education and research on environmental issues; 2) creation and application of science-based, decision making tools; 3) targeted services for stakeholder mediation; and 4) communication of science-based information to diverse public audiences. While we promote science and its use, Sea Grant does not take positions on environmental issues. Thus, we are able to provide a neutral forum for all.

### Strategies

- Advance environmental stewardship through teaching, professional development and inclusion of age-appropriate marine and coastal subject matter while addressing Louisiana's K-12 science, mathematics and social studies education standards.
- Use Louisiana Sea Grant's strong university partnerships both to create new research and education opportunities in marine and aquatic science for undergraduate and graduate students and to develop information products and training opportunities that will help build the workforce capacity for coastal-related jobs and professions.

### Learning Outcomes

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

### Action Outcomes

11.2. A diverse and qualified pool of applicants pursues professional opportunities for career development in natural, physical and social sciences and engineering.

11.3. Graduate students are trained in research and engagement methodologies.

11.4. Research projects support undergraduate and graduate training in fields related to understanding and managing our coastal resources.

### Consequence Outcomes

11.5. A diverse workforce with degrees in science, technology, engineering, mathematics, law, policy and other fields critical to Sea Grant's mission is employed and has high job satisfaction.

### **Education and Workforce Development Performance Measures**

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

### **Cross-cutting Performance Measures**

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

## **IMPLEMENTATION STRATEGY**

This plan provides a national framework for the work of the Louisiana Sea Grant Program. This strategic plan aligns with the National Sea Grant Strategic Plan with particular focus on the specific needs and priorities of Louisiana's stakeholders and coastal communities. The Louisiana Sea Grant Strategic Plan 2014-2018 will be implemented in each of the program's portfolios of merit-reviewed research, communications, education, extension and legal projects. This implementation strategy utilizes Louisiana Sea Grant's unique combination of research and engagement capabilities and capitalizes on its strong federal-university-state-private sector partnerships.

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

**NOTES:**