

# **Georgia Sea Grant College Program**

## **Strategic Plan 2014-2018**

### **GEORGIA SEA GRANT'S VISION:**

We envision a Georgia coast where healthy ecosystems and natural resources maximize the resilience and economic vitality of communities.

### **GEORGIA SEA GRANT'S MISSION:**

To support research, education and outreach activities that promote environmental and economic health in coastal Georgia by helping improve public resource policy, encouraging far-sighted economic and fisheries decisions, anticipating vulnerabilities to change and educating citizens to be wise stewards of the coastal environment.

### **INTRODUCTION**

Nothing conveys the dynamism of Georgia's coastal zone more convincingly than its tremendous tides. The difference between high and low tide in Georgia (six to eight feet) is the second greatest range on the US Eastern Seaboard. Twice a day, the tides completely submerge and expose Georgia's 378,000 acres of expansive salt marshes, which constitute more than one quarter of the remaining salt marshes on the east coast of the United States. In so doing, they nourish and sustain one of the most biologically productive ecosystems on earth.

Georgia's salt marshes vary from four to six miles in width and lie between the mainland and a series of eight barrier island complexes containing 13 barrier islands. Like all barrier islands, they protect the coastline from storm surges and tidal action. However, unlike other barrier island complexes in the U.S., Georgia's are largely undeveloped. At the end of the 19th Century, a number of wealthy northern industrial families, among them the Carnegies, Vanderbilts, and Rockefellers, purchased Georgia's "Golden Isles" as private hunting and recreation retreats. Jekyll, Cumberland, Ossabaw, Sea, Sapelo, St. Catherines and Wassaw Islands were all privately owned until the middle of the 20th century. Having these critical barrier islands in the hands of wealthy families for so long kept them from being developed, which in turn kept much of the salt marsh and estuarine waters they shelter relatively undisturbed.

Dynamism also characterizes social aspects of our coastal zone. Most of Georgia's coastal population lives on the mainland, with 69% living in just two regions – Savannah in Chatham County and Brunswick in Glynn County. Unlike most coastal regions in the East, Georgia's coast did not become a popular place to live, work, and recreate until late in the 20<sup>th</sup> Century, after the completion of Interstates 95 and 16. Population increased from about 280,000 people in 1970 to over a half a million in 2010. In the first decade of the new millennium, population increased up to 32% in some counties and averaged 22% across all 9 coastal counties. While the economic crash of 2008 slowed growth, population is projected to more than double, to about 1.3 million residents, over the next

40 years. The coastal zone is the second fastest growing region in Georgia, just behind metropolitan Atlanta.

Key economic drivers in the region include industry, U.S. government facilities, and transportation, especially that associated with the ports of Savannah and Brunswick. With the widening of the Panama Canal and the deepening of the Savannah River harbor, transportation-related activities are expected to increase substantially over the next couple of decades. Already, the Savannah Port is the fourth largest container terminal in the U.S. Commercial and recreational fisheries are also important coastal industries, generating in excess of \$100 million annually. In addition, tourism, leisure, and hospitality industries also are expected to increase greatly in the future as more and more people recreate, build second homes, and retire along the coast.

### **SITUATION STATEMENT**

As the second fastest growing region in the state, the impact of development on fragile coastal ecosystems, increased demands for water and waste treatment, and the building and maintenance of local infrastructure are pressing issues that demand careful consideration and sound decisions. The immediate and long-term challenge is to preserve the high quality of life that brings people to the Georgia coast. This includes maintaining abundant clean water, insuring the availability of clean beaches and easy access to waterways, and preserving the vast acres of tidal marsh that provide valuable nursery habitat for fish and shellfish and protect urban areas from the ravages of sea level rise and storm surge.

The ports of Savannah and Brunswick contributed \$32 billion to the state's economy in 2011, 7.8 percent of Georgia's total GDP. Three major military installations, Fort Stewart, Hunter Army Airfield, and Kings Bay Submarine Base, have a combined \$3 billion economic impact on the coastal Georgia economy. The jobs associated with these areas help support coastal economic growth, the production of goods and services, and revenue collections for government, but few of the jobs are highly skilled positions with commensurate pay. Likewise, Georgia's thriving tourist and recreational fishing industries are major economic contributors, but also do not generate high paying jobs. A balanced economy requires a more diverse commercial landscape with more manufacturing, transportation, skilled trades and well-paid labor positions.

While recreational fishing and eco-tourism are on the rise, Georgia's seafood industry struggles to maintain its presence on our coast after decades of setbacks. Continued environmental challenges include the effects of drought on shellfish populations, habitat loss due to sea level rise and coastal armoring, wetland loss from development, and the hard-to-document impacts of chronic pollution and non-point source runoff in the coastal zone. Faced with intense competition from imports and farm-raised products, the continuing fuel crisis, costly gear modifications required to satisfy conservation regulations, unaffordable insurance, and increasing overhead costs, Georgia's shrimpers, crabbers, and fishers struggle to compete in a global marketplace. According to a recent study, 80% of all seafood in the United States is imported and more than one-third of all fish are mislabeled. However, Georgia's commercial fishers harvest a high-quality product in a sustainable manner. Their current hope is to capitalize on recent demand for locally sourced seafood by forming links to local restaurants and markets throughout the state.

Another mainstay of Georgia's traditional coastal economy, the pulp and paper industry, is in a state of flux. Before the collapse of the real estate market in 2008, it was assumed these vast timber holdings were worth more as real estate than they were as a natural resource to be harvested. Paper companies appeared poised to either sell or develop key areas of their prime coastal pine forests for up-scale golf communities marketed to wealthy second-home buyers and retirees. Now, the prospect of such developments seems less likely in the near term. In the meantime, recent advances in bio-fuel technology suggest these same pine forests might be used to create energy. For now, the future of Georgia's substantial coastal pulp and paper industry is an open book. Whatever transpires, one thing is certain – demands for water will continue to increase and, whether it is to accommodate a new industry or a new community model, water resources must be carefully managed.

## **WATER**

A recent survey the UGA Carl Vincent Institute of Government conducted for Georgia Sea Grant / Marex, Georgia DNR and the Sapelo Island National Estuarine Reserve identified fresh water availability and protection and saltwater intrusion as the most important issues facing citizens, cities, and governments of the Georgia coastal zone. Unlike citizens of many states, Georgians bear primary responsibility for the condition of their waterways. Most of the water reaching the Georgia coast (groundwater and surface water) originates either within the state or just over its borders. This is both a boon and a challenge; it means Georgians are well positioned to protect their watersheds, but it also means they are to blame when unwise choices are made.

The coast is dependent on two major sources of water – surface water and groundwater – each with different contributing watersheds. A major divide between the Flint and Ocmulgee Rivers separates Georgia's rivers into those that flow into the Atlantic and those that flow into the Gulf of Mexico. The Chattahoochee and the Flint flow through western Georgia and merge to form the Apalachicola, which crosses the Florida panhandle on its way to the Gulf. The other, fifty-two percent of the state drains to the Atlantic coast via the Savannah, Ogeechee, Altamaha, Satilla, and St. Mary Rivers. Groundwater, however, violates the boundaries of riverine watersheds. The recharge area for the Floridan Aquifer, the dominant groundwater flow to the Atlantic coast, actually arises largely within the Flint River basin. Thus, water use within the Flint River basin affects not only river flow to the Gulf, but also groundwater and the contribution of groundwater to river flow in basins that drain to the Atlantic.

In recent years the acrimony between Georgia, Alabama and Florida over water rights of the Apalachicola-Flint system has reached a fever pitch. Two of Georgia's "thirstiest" consumer regions are Metro Atlanta and the agricultural southwest (e.g., Albany region). Existing groundwater withdrawal permits in the agricultural region, if implemented to the full extent allowed, could greatly exceed the recharge potential of the Floridan aquifer. Water rights litigation is sure to place limits on the amount of water that Atlanta withdraws from the Chattahoochee system. When Atlanta's demands exceed supply, the city will likely turn to other river systems, which more than likely will be the Altamaha, Ogeechee or Savannah Rivers.

Today, we have no way of knowing the extent to which Southwestern agricultural water demand and Metro Atlanta's growing water crisis will affect Georgia's coastal

ecosystems and municipalities. The Coastal Regional Water Plan of 2011 projects that the region's water supply needs will increase by 16% through 2050. The EPD groundwater availability assessment indicates that the sustainable yield for groundwater is greater than the forecasted demands. At the same time, the study cautions that increased pumping of groundwater can lead to salt water intrusion. Critical thresholds are already being reached. Because of potential saltwater intrusion, the Coastal Permitting Plan specifies no additional withdrawals be permitted in all of Chatham and parts of Effingham, Glynn, Bryan, and Liberty Counties. Given the projected growth, these limitations will certainly be a problem for these counties.

The Coastal Regional Water Plan suggests that there are sufficient surface water supplies to meet forecasted needs for many portions of the region under average water years but that in dry years demand is likely to impact instream flow. Gaps between demand and instream flow supply are forecasted for four major areas within the region. Thus, careful planning and new management practices will be required to meet water demand of a growing population and increased agricultural and economic activity through the middle of the century.

Regional water planning efforts do not appear to have considered land-use change and climate change as factors likely to affect water availability. While the jury is still out on how exactly climate will influence groundwater and surface water availability in coastal Georgia, evaporative losses may increase relative to precipitation leading to less stream flow and groundwater recharge. There is much uncertainty regarding future drought frequency, but the number of extreme precipitation events is likely to increase through the middle of the century. This suggests that variability in river flow is likely to increase, with increased frequency of extreme low flows.

Other factors likely to affect water availability are growth, urbanization, and the concomitant increase in impervious land surfaces. Rapid and complete runoff of rainwater from impervious areas also contributes to variability in river flow, greater variation in river height, flooding of low lying areas, and decreased water quality. Impervious areas also prevent groundwater recharge, which can lead to decreased instream flow during droughts and saltwater intrusion of surficial aquifers. It is important that best management practices designed to control surface water runoff are not relaxed, compromising water availability and water quality for future generations living and moving to coastal Georgia. It is also important to better understand the contribution of interior, non-tidal, freshwater wetlands make to freshwater delivery to the coastal zone and to recharge of surficial aquifers. These areas are often marginally productive for silviculture or agriculture and are, therefore, likely candidates for suburban development, thus increasing impervious stormwater runoff. These considerations aside, the Coastal Regional Water Plan is an important first step in anticipating future water demand and developing sound management options.

#### **RISING WATER LEVELS**

The Georgia coastal zone is extremely low in elevation and relief, rendering it especially vulnerable to flooding and storm surge from the ocean. More intense rainfall, coupled with increased impervious surfaces will increase the risk of river flooding in low-lying areas. Also, sea level is projected to rise 6 to 24 inches by 2050. As sea level rises, storm

surge from tropical cyclones, coastal erosion, and other extreme events will likely increase in magnitude.

For a variety of reasons, it is particularly challenging to develop adaptation plans for rising sea levels in coastal Georgia. Perhaps the greatest challenge is educating the general public and business and government officials about climate so they can make informed decisions. The threat is real and warrants careful planning based on good science. An approach that has gained some acceptance in coastal Georgia is to assemble local government officials in order to identify current vulnerabilities, such as flooding during extreme high tides or extreme rainfall, and then assess how rising sea level will increase those vulnerabilities in the future. From there, officials can begin to determine the costs and benefits of taking a variety of adaptive actions. The adaptation process is complex and must include partnerships across many community sectors, including financial, technical, governance, and social.

No one-size-fits-all prescription for adapting to sea-level rise is possible for Georgia's coastal communities. Communities have a responsibility to inform people about coastal hazards such as storm surge and sea-level rise, but they also need to encourage economic development and investment to make the community vibrant and contribute to the tax base. Each community needs to assess its own particular vulnerabilities and find the balance between the many competing interests and values of the community in order to adapt to sea-level rise and plan for continuing prosperity in general.

## **MOVING FORWARD**

Unlike thirty or even twenty years ago, most coastal citizens now readily accept the fact that Georgia's unique and expansive coastal environment is their economic and cultural golden goose and that protecting and preserving it is of paramount importance to the economic vitality of the region.

## **OUR STRATEGIC PLAN**

In drafting a long-range strategic plan that reflects the social, environmental and economic realities of our coast, Georgia Sea Grant sought fresh input from a wide and inclusive constituency. From personal visits with knowledgeable coastal managers, scientists, educators, businesses, and organizations, to broadly circulated surveys and public forums, Sea Grant gathered opinions from as many stakeholders as possible. Having gathered this input, we convened a two-and-a-half-day workshop, facilitated by professionals from NOAA's Coastal Services Center in Charleston, the result of which is the following strategic plan for our activities from 2014 through 2017. (See appendix for fuller description of the strategic planning process).

The plan describes our projected goals and strategies designed to achieve those goals in five focus areas:

1. Sustainable Coastal Development
2. Hazard Resilience in Coastal Communities
3. Healthy Coastal Ecosystems
4. Sustainable Fisheries and Aquaculture
5. Environmental Literacy and Workforce Development

# **GOALS, STRATEGIES & OUTCOMES**

**in**

## **Georgia Sea Grant's Five Focus Areas**

### **Sustainable Coastal Development**

Coastal communities depend on healthy ecosystems for their economic survival. Population growth, increasing tourism and development can compromise the health and integrity of coastal ecosystems and, in turn, the economic sustainability of coastal communities. Economic growth must complement environmental conservation in a way that meets present needs without compromising quality of life for future generations.

#### **GOAL 1: Coastal Georgia communities that understand the value and benefit of sustainable land use practices and their connection to healthy ecosystems**

By integrating land-use planning, habitat connectivity considerations, and sustainable management and development techniques, coastal Georgia communities can effectively balance necessary economic growth and land development with the preservation of valuable natural resources. Community sectors including, but not limited to, developers, consultants, contractors, local government, landscape architects/architects, natural resource managers, engineers, and public and private landowners play key roles in defining how sustainably a community grows. Thus, their understanding of the benefits of sustainable land use practices and their connection to healthy ecosystems is pivotal to the coast's well being.

**STRATEGY:** Develop tools, best practices, model ordinances and information sources that facilitate the adoption of sustainable practices at the local level

**STRATEGY:** Provide technology-based tools and educational outreach materials regarding sustainable land use concepts and practices to coastal communities

**STRATEGY:** Understanding that communities have varying levels of resources and expertise, tailor outreach to match the local capability

#### **GOAL 2: Coastal Georgia communities that make efficient use of land, energy and water in order to conserve and protect the resources needed to sustain coastal ecosystems and quality of life**

Coastal communities can control the degree to which their growth is sustainable. They can be encouraged to adopt and implement development strategies, tools, and practices that provide land, energy, and water resource protection combined with economic and social benefits.

**STRATEGY:** Make available to coastal communities the best available resources, tools, and best management practices in sustainable land use planning, development, and/or regulation

**STRATEGY:** Encourage land-use and building and design practices that promote energy and water conservation and reduce development impacts on water quality and quantity

**GOAL 3: Georgia coastal communities 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 and economic sustainability**

The environmental impacts of development directly affect coastal communities' ability to balance natural resource protection with sustainable economic growth. Recognizing the interrelationships between development and natural resource protection allows coastal communities to become more environmentally, economically, and socially sustainable. A population that recognizes these complex interactions will make better decisions for the long-term viability of their communities.

**STRATEGY:** Through education and outreach, inform coastal citizens about the inter-play between economic growth and resource protection

**STRATEGY:** Through sound science, identify the efficacy, economic and environmental benefits, social behaviors and perception, and/or application of sustainable land use practices in coastal Georgia

**Expected Outcomes**

1. Coastal communities that have increased awareness of the link between land use and ecosystem health.  
*Performance Measure: **By 2018, 2,500 individuals will increase their awareness of the link between land use and ecosystem health by attending presentations, workshops, trainings, certifications, events, volunteer/stewardship activities and/or seeking technology-based tools and/or outreach materials.***
2. Coastal communities adopt the most current science-based sustainable land use resources, tools, and best management practices in land use planning, development, and/or adoption of policies.  
*Performance Measure: **By 2018, 20 communities will adopt the best available resources, tools, and best management practices in sustainable land use planning, design, and development.***
3. Coastal communities and individuals implement sustainable land use best management practices and policies to conserve natural resources and healthy ecosystems  
*Performance Measure: **By 2018, 7 coastal communities and 50 individuals will implement sustainable land use best management***

**practices and policies to conserve natural resources and healthy ecosystems.**

4. Sound science identifies the efficacy, economic and environmental benefits, social behaviors and perceptions, and/or application of sustainable land use practices in coastal Georgia.

*Performance Measure:* **By 2018, 3 research projects will identify the efficacy, economic and environmental benefits, social behaviors and perceptions, and/or application of sustainable land use practices in coastal Georgia.**

**National Performance Measure**

1. Number of communities that implemented sustainable economic and environmental development practices and policies (e.g., land-use planning, working waterfronts, energy efficiency, smart growth measures, green infrastructure) as a result of Sea Grant activities: **20**.

**Hazard Resiliency in Coastal Communities**

Living and conducting business in the coastal zone means increased exposure to climate-related risk. Short-term hazards such as coastal storms and flooding can quickly threaten property and people. In addition, coastal citizens also must consider the longer-term effects of sea level rise and drought. To insure human safety, economic vitality and the environmental health of coastal habitats, federal, state and local governments, agencies and organizations must work together to develop plans to recover from and adapt to the challenges nature presents.

**GOAL 1: Widespread understanding of the climate-related risks associated with living, working and doing business along the Georgia coast**

New tools and more accurate models are becoming increasingly available to assist local communities in assessing their vulnerability to many types of hazardous events, such as storm surges. With modern topographic imagery, elevation accuracy has increased from within 10 feet to better than a foot. New GPS tools enable coastal erosion rates to be measured and sediment budgets to be created and monitored over time.

**STRATEGY:** Support research and accurate coastal modeling related to shoreline erosion, flooding, drought, water consumption and salt-water intrusion in order to help communities assess their vulnerability to climate-related hazards

**STRATEGY:** Increase public awareness of the consequences of climate change and sea level rise and introduce strategies for adapting to these disturbances

**GOAL 2: Increase community capacity to prepare for and effectively respond to hazardous events**

Georgia Sea Grant, in partnerships with federal, state and local agencies and other southeastern Sea Grant programs, will use its integrated research, communication and outreach capabilities to help local citizens and governments plan for



hazardous events so as to reduce their vulnerability, strengthen their resiliency and increase their ability to adapt to a changing coastline.

**STRATEGY:** Assist local governments in planning for growth and infrastructure in anticipation of storm surge and sea level rise

**STRATEGY:** Help local governments utilize existing tools (such as WelSTROM database of septic systems and wells, LIDAR, AMBUR, GIS, sustainable land use BMPs, and digital imagery) in planning and permitting

**STRATEGY:** Assist cities and counties in implementing and or maximizing rating in the FEMA Coastal Rating System

### **Expected Outcomes**

1. Coastal communities apply the best available hazards and climate information, tools, and technologies in land use planning and development of local regulations.  
*Performance Measure: **By 2018, 5 coastal counties will apply at least one tool, technology or source of information in land use planning and the development of local regulations.***
2. Coastal communities develop and adopt climate adaptation strategies.  
*Activities*  
*Performance Measure: **By 2018, 7 coastal communities will develop or adopt climate adaptation strategies.***
3. Coastal communities take action to understand and reduce the impact of coastal hazards on public safety and personal property.  
*Performance Measure: **By 2018, 8 coastal communities will take action to understand and reduce the impacts of coastal hazards on public safety and public property.***
4. Coastal communities respond to improved risk communication strategies associated with hazard events.  
*Performance Measure: **By 2018, 8 coastal communities will respond to improved risk communication strategies associated with hazard events.***
5. Support sound science to identify vulnerabilities of coastal systems to hazards.  
*Performance Measure: **By 2018, 2 research projects will provide sound science to identify the vulnerabilities of coastal ecosystems to hazards.***

### **National performance measure**

1. Number of communities that implemented hazard resiliency practices to prepare for, respond to or minimize coastal hazardous events as a result of Sea Grant activities: **20.**

## **Healthy Coastal Ecosystems**

Georgia's barrier island and salt marsh complex is one of the most productive ecosystems on earth. Its health depends on the daily mixing of freshwater from the state's rivers and

streams with the tidal pulse of saltwater from the Atlantic Ocean. The coast thrives when the timing, magnitude and quality of freshwater inputs is in balance with the needs of living resources. However, when drought, upstream water withdrawal, contamination or other conditions stress the system, fisheries and tourism decline and both economic and environmental prosperity suffers.

**GOAL 1: Increased understanding of ecosystem-based approaches to sustain healthy, diverse, and abundant populations of fish, wildlife, and plants, and provide valuable ecological services**

Increased understanding of the coastal ecosystem comes from targeted research by scientists at the state's colleges and universities. We understand much about how Georgia's coastal ecosystem functions and how it supports our way of life, but important questions remain. Recent drought conditions and increased demands by for water from the state's rivers and streams by agriculture, municipalities, and industry make it critical that we understand how much freshwater needs to reach the coast in order to maintain estuarine habitats and their productivity. We also need to be able to identify which estuarine areas are well flushed by tidal circulation and are, therefore, more appropriate sites for development and industry. The answer to those and other questions will be conveyed to decision-makers and resource managers in coastal communities.

**STRATEGY:** Support research and outreach activities to better understand the impact of remote and local watershed management activities on the timing, magnitude and quality of freshwater inputs to the Georgia coast

**STRATEGY:** Support innovative research and outreach activities to promote an understanding of the freshwater and aquifer input requirements of Georgia coastal ecosystems

**STRATEGY:** Facilitate efforts to assess and improve water quality including the development of new technologies

**GOAL 2: Increased use of ecosystem-based and ecosystem-services approaches to managing land, water, and living resources in the coastal area**

One way to understand ecosystems is to discover how they work for us.

Determining a dollar value for the services natural ecosystems provide to society enables new approaches to planning for economic growth. Ecosystem services-based management permits cost-benefit comparisons that can spur economic growth, without compromising ecosystem performance. Ecosystem services-based management is a new approach, however, and it is necessary to educate coastal residents, resource managers, elected officials, businesses and industries about its potential.

**STRATEGY:** Support research and outreach to assign and map credible values to ecosystem services and share understanding and knowledge gained with a wide variety of coastal audiences

**STRATEGY:** Provide educational programs for K-12, resource managers, planners, and the general population that promote the understanding of coastal and ocean environments and encourage stewardship

### **GOAL 3: Restored function of degraded ecosystems**

While Georgians can be proud of the overall health of their coastal ecosystem, many areas have experienced severe, negative impacts from human activities. New technologies are required to identify impaired waters and marshes and to restore their function.

**STRATEGY:** Support research and outreach activities to improve the effectiveness of remediation and restoration of impaired habitats and identify new restoration approaches and technologies

**STRATEGY:** Employ new and existing technologies to remediate and restore impaired habitats.

### **Expected Outcomes**

1. Decision-makers and coastal and ocean resource managers consider scientific information when making policy and managing coastal and ocean resources.  
*Performance Measure: **By 2018, 5 policy and decision-makers and ocean and coastal resource managers will consider scientific information when managing coastal and ocean resources.***
2. Laws, policies and/or BMPs are adopted/amended to facilitate, implement, or require ecosystem based management.  
*Performance Measure: **By 2018, 8 communities will adopt/amend laws, policies and/or BMPs to facilitate, implement, or require EBM.***
3. Resource managers, businesses, and industries adopt new approaches and technologies to improve the effectiveness of restoration of degraded ecosystems.  
*Performance Measure: **By 2018, 40 businesses and 5 land owners will restore and remediate degraded ecosystems in Georgia.***
4. Resource managers draw on both scientific information and public input to prioritize ecosystems to restore and to set realistic restoration goals.  
*Performance Measure: **By 2018, 10 resource managers will draw on scientific information and public input to prioritize ecosystems to restore and to set realistic restoration goals.***
5. Increase public awareness of link between human activity and ecosystem health.  
*Performance Measure: **By 2018, 100 events / workshops / trainings / certifications will increase public awareness of the link between human activity and ecosystem health.***

### **National Performance Measures**

1. Number of Sea Grant tools, technologies and information services that are used by our partners/customers to improve ecosystem-based management: **5**.
2. Number of ecosystem-based approaches used to manage land, water and living resources in coastal areas as a result of Sea Grant activities: **4**.

3. Number of acres of coastal habitat protected, enhanced or restored as a result of Sea Grant activities: **50,000**.

## **Sustainable Fisheries and Aquaculture**

In recent decades, the most important components of Georgia's fisheries have been shrimping, the trapping of blue crabs and recreational fishing. Although these three remain paramount, change has come. Imported seafood threatens the economic viability of shrimping and crabbing, and diminished public access to waterways constrains recreational fishing. However, developments in aquaculture and mariculture promise a brighter future for dormant shellfish fisheries, such as oysters and clams, and demand for local and sustainably harvested seafood may give new life to shrimping and crabbing fisheries.

### **GOAL 1: A sustainable supply of safe, local seafood to meet public demand**

Oystering was once a way of life for many coastal Georgians, but the once-abundant beds are now depleted. However, new methods developed by Sea Grant-funded research are bringing the oyster industry back to our coast and promoting a new shellfish industry – clam farming. In addition to these efforts, Georgia needs new strategies for distributing the seafood it produces, protections for the infrastructure that supports those fisheries, and assurances that the state's waterways remain easily accessible for recreation and commercial fishing.

**STRATEGY:** Facilitate shellfish aquaculture and mariculture

**STRATEGY:** Help develop a shared vision of Georgia and/or regional sustainable fisheries

**STRATEGY:** Protect waterfronts critical to water-related business and industry and ensure public access to waterways

**STRATEGY:** Facilitate new distribution strategies for local seafood

### **GOAL 2: A thriving Georgia seafood industry that harvests, produces, processes and markets seafood responsibly and effectively**

While many fisheries around the world must contend with depleted or collapsed fish stocks, Georgia's fisheries face a different problem – globalization. Shrimp and crabs along the Georgia coast cannot be harvested at a cost that is competitive with imports, many of which are grown or harvested in an unsustainable manner. However, demand for local, sustainably harvested seafood is growing.

Innovations in niche markets and other new marketing strategies must be explored. As always, the safety and sustainability of seafood from ocean to table are primary Sea Grant concerns. Georgia's seafood industry can thrive only if its methods of harvesting and handling keep pace with federal regulation and market trends.

**STRATEGY:** Support research on the economics of Georgia fisheries and the marketing of local seafood

**STRATEGY:** Provide federally-mandated seafood processing training to support Georgia's seafood industry and insure seafood safety

**STRATEGY:** Assist seafood harvesters in complying with regulatory and market demands for sustainable harvesting

**GOAL 3: Informed consumers who understand the importance of ecosystem health and sustainable harvesting practices to the future of Georgia fisheries, who appreciate the health benefits of seafood consumption and who understand how to evaluate the safety and sustainability of the seafood they buy**

Consumer attitudes define demand for local seafood; the health of the coastal ecosystem controls supply. To increase the value of local, sustainable fisheries, the buying public must be educated about the importance of a productive ecosystem and sustainable harvest technologies and methods, and about the health benefits of seafood. We need to build confidence among retail consumers and recreational fishermen regarding the safety of local seafood by offering reliable consumption guidelines.

**STRATEGY:** Educate fishermen, processors, packers, regulators, restaurants, markets, and consumers about the seafood they buy and sell and the manner in which it is harvested, including sustainable fisheries issues and seafood safety concerns

**STRATEGY:** Help determine the level of toxins and pathogens in Georgia seafood and assess changes in contamination levels, consumption patterns and associated risk as they occur

**Expected Outcomes**

1. Recreational and commercial fishermen and the aquaculture industry use innovative technologies and approaches to supply safe and sustainable seafood.  
*Performance Measure: By 2018, 300 commercial and recreational fishermen and shellfish harvesters will use innovative technologies and approaches to supply safe and sustainable seafood.*
2. The seafood processing industry utilizes techniques and processes to ensure the delivery of safe and healthy seafood.  
*Performance Measure: By 2018, 200 seafood processors, dealers, and inspectors will utilize/recommend techniques, processes, and/or educational resources to ensure the delivery of safe and healthy seafood.*
3. Seafood consumers preferentially purchase sustainable, local seafood products.  
*Performance Measure: By 2018, 400 Georgia seafood consumers will modify their purchases using knowledge gained in fisheries sustainability, seafood safety and the health benefits of seafood as a result of Sea Grant activities.*

**National Performance Measures**

1. 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: **550**.
2. 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: **400**.

## **Environmental Literacy and Workforce Development**

Education is a component in every state's Sea Grant program, but it is especially important in Georgia, where many people live far from the coast. Many inland citizens do not recognize how deeply intertwined their lives are with coastal resources and communities. There is further a misconception that the Georgia coast is somehow less vulnerable than those of neighboring states to climate threats, such as hurricanes and storm surge. In order to correct misunderstanding and foster stewardship, it is critical that Georgia Sea Grant and MAREX increase the basic understanding of coastal and ocean environments. Education imparts knowledge and values that lead to better choices.

### **GOAL 1: A public that has a good understanding of basic concepts of ocean and coastal literacy, supported by lifelong formal and non-formal education opportunities**

The K-12 classroom is the optimum environment to deliver the principles of ocean literacy. Georgia Sea Grant and MAREX will continue to offer ocean literacy programs for students from pre-kindergarten through high school, connecting children to the coast in school classrooms, island summer camps and in MAREX's coastal facilities. When children learn about coastal environments and how their daily actions impact them, they also learn how to be good stewards of their coastal resources.

**STRATEGY:** Teach educators to use environmental and ocean literacy principles in their classrooms

**STRATEGY:** Offer affordable and convenient ocean literacy programs to all Georgia K-12 students throughout the state

**STRATEGY:** Incorporate environmental and ocean literacy components into outreach programming whenever possible

### **GOAL 2: A future workforce, reflecting the diversity of Georgia, skilled in science, technology, engineering, mathematics and other disciplines critical to Georgia Sea Grant and MAREX's mission**

With many of Georgia's universities far removed from the coast, Sea Grant and MAREX play an important role in providing students with opportunities to participate in coastal science, technology, engineering, mathematics and other research and stewardship programs. Our funded research, extension and education activities offer training to students and those entering the workforce in fields related to understanding and managing our coastal resources.

**STRATEGY:** Support opportunities for students to become involved in Sea Grant-funded projects, gaining hands-on experience in research, outreach and education activities

**STRATEGY:** Support training and internship opportunities for professional development, especially in research and engagement methodologies

### Expected Outcomes

1. Engagement programs are developed and refined using the best available research on the effectiveness of environmental and science education.  
*Performance Measure: **By 2018, 22,500 teachers, students and the general public will be trained in the complex interactions between coastal development and healthy coastal ecosystems through informal education programs.***
2. Educators use environmental and ocean literacy principles in their programs.  
*Performance Measure: **By 2018, 1,000 educators are taught environmental and ocean literacy principles through Sea Grant-supported school programs.***  
  
*Performance Measure: **By 2018, 12 Sea Grant-facilitated education resources/activities will be used by formal and informal educators.***
3. Educators, students, and/or the public collect and/or use coastal and ocean, weather, and climate data in inquiry and evidence-based activities.  
*Performance Measure: **By 2018, 14,000 educators, students and/or the public collect and/or use coastal and ocean, weather, and climate data in inquiry and evidence-based activities.***
4. Diverse and qualified individuals pursue student and professional opportunities for career development in Sea Grant and MAREX mission-critical disciplines.  
*Performance Measure: **By 2018, 14 Sea Grant - supported graduates, as well as post-graduate interns, will become employed in a career related to their degree.***

### National Performance Measures

1. Number of Sea Grant facilitated curricula adopted by formal and informal educators: **12.**
2. Participation in Sea Grant supported informal education programs: **23,500.**
3. Number of Sea Grant-supported graduates who become employed in a career related to their degree: **14.**

## **THE GEORGIA SEA GRANT & MARINE EXTENSION APPROACH**

Georgia Sea Grant and the University of Georgia's Marine Extension Service (MAREX) allow coastal stakeholders to focus academic expertise on coastal issues and problems. Funded by the NOAA's National Sea Grant program and the State of Georgia, researchers at the state's colleges and universities focus on coastal resources issues identified by Georgia stakeholders. Some problems are best addressed at the regional level in collaboration, and Sea Grant's network of programs in all coastal states efficiently matches expertise and resources to problems at all scales.

In Georgia, the process begins with citizen input. This “on the ground” identification of the state’s most pressing issues forms the basis of a formal Request for Proposals (RFP) delivered to the state’s colleges and universities. Proposals submitted in response to the RFP are peer-reviewed and selected by an independent panel.

At Georgia Sea Grant / Marine Extension, research is not done for its own sake. Finding real world solutions is as important as answering scientific questions. Grant proposals must include a plan for translating research results into outreach programs that address issues and problems. The resulting outreach can take the form of extension, communications or education. Methods and audiences vary but the goal is to make the vast knowledge of the state’s colleges and universities available to coastal stakeholders.

### **Extension**

Maintaining rapport with diverse stakeholders is important when dealing with coastal issues. MAREX, Sea Grant’s partner, has been working with coastal citizens since the 1970s and has a strong history of collaboration, especially with fishing and mariculture communities. MAREX faculty and staff offer unbiased information tailored to specific audiences. In addition to local connections, collaborative networks have been built along the Atlantic and Gulf coasts. The trust embodied in these long-term relationships makes extension agents particularly valuable when dealing with controversial issues. Their knowledge, networks, experience and reputation will continue to be a key asset as Sea Grant helps envision a healthy future for Georgia’s coastal resources.

MAREX has three facilities on the Georgia coast: a marine education center, which includes an educational facility and an aquarium, and a shellfish laboratory both in Savannah; and an advisory station, including a workshop, dock and extension agent offices, in Brunswick. The Brunswick station staff expertise includes hazard resilience of coastal communities, sustainable development, coastal septic issues, seafood safety, water quality, commercial and recreational fisheries and fishing gear design.

Every research project funded by Georgia Sea Grant must include an outreach plan created in collaboration with MAREX. This requirement ensures that the research is designed to meet stakeholder needs and that outreach meets a high professional standard. MAREX also partners with other state and federal agencies to offer outreach programs designed to resolve coastal resource issues and problems. Guided by a memorandum of understanding facilitated by University of Georgia Vice Presidents for Research and for Public Service and Outreach, Georgia Sea Grant and MAREX endeavor to make their partnership as seamless as possible.

MAREX submits a proposal to Georgia Sea Grant each 2-yr funding cycle to support additional research and outreach projects, effectively leveraging both state and federal support for the combined program.

### **Communications**

Like Extension, Communications is an important part of Georgia Sea Grant’s and MAREX’s strategic plan. Approximately 60% of its activity supports administrative and extension functions of the program through expertise in writing, editing, graphics, publications, and other media. Communications also handles public and press relations and also initiates its own outreach activities. For example, Communications works with the Southeastern Building Trade Association to offer an accredited continuing education



course in the economics of sustainable building to coastal contractors. The course annually reaches over 7000 contractors.

Like MAREX, Communications submits a proposal each grant cycle in which it specifies the support activities and initiatives it will perform.

### **Education**

The Marine Education Center and Aquarium (MECA), a unit of MAREX, is the primary partner for educational programs. Georgia Sea Grant funds three post-graduate education internships that support day-to-day instruction at MECA in Savannah. The center teaches 15,000 students a year and offers K-12 as well as teacher instruction in ocean and estuarine science. Instruction ranges from classroom field trips to intensive two-week camps that prepare teachers to take ocean science back to their classrooms.

### **ENSURING A WISE INVESTMENT**

The effectiveness of Georgia Sea Grant and the UGA Marine Extension Service is evaluated as a whole by the national program every four years and each individual project is evaluated upon the conclusion of its two-year funding. Each project must aspire to achieve a specific societal benefit and identify performance measures that can be used to determine whether or not it succeeded. This focus on results ensures that resources stay directed toward solutions to problems important to citizens.

## **Appendix I: 2014-2017 Strategic Planning Process**

### **Overview**

In its report summarizing the 2010 evaluation of the Georgia Sea Grant program, the National Sea Grant Office praised Georgia Sea Grant's strategic planning process and recommended that it become a Best Management Practice (BMP) for the entire Sea Grant Network. Georgia Sea Grant built upon this success by continuing its partnership with NOAA's Coastal Services Center (CSC) to develop a long-range strategic plan reflecting the knowledge, needs and experience of Georgia's coastal stakeholders, our advisory board and Georgia Sea Grant and University of Georgia Marine Extension Service (MAREX) staff. The CSC's Ann Weaver and Jessie Ritter worked with Georgia Sea Grant in planning the process and facilitated a culminating workshop that gathered final input for the plan. With their help, we implemented an inclusive, multi-step process that embodied the vision of stakeholders, our advisory board and Georgia Sea Grant/MAREX staff.

### **Planning Process Steps**

- A. Since the last Strategic Plan in 2009, Georgia Sea Grant and MAREX specialists met with individual stakeholders to discuss their changing needs and concerns.
- B. In December 2011, Georgia Sea Grant partnered with the University of Georgia Carl Vinson Institute of Government to develop a comprehensive web-based survey of coastal needs.
- C. Survey solicitations were distributed to as many stakeholders as possible (e.g., coastal managers, planners, public and elected officials, scientists, educators, businessmen and women, NGO's, port authorities, etc.).

- D. Additional measures were taken to gather in-depth information from certain targeted audiences. For example, two surveys were developed for seafood inspectors and seafood dealers to learn more about their priorities and needs. SG/MAREX staff also visited docks to speak with shrimpers who might not participate in an online survey.
- E. Members of the SG/MAREX staff met in small groups to identify organizational strengths and weaknesses, anticipate emerging issues and methods, and identify other organizations whose efforts overlap with those of SG/ MAREX, the end being to strategically identify the niches in which SG/MAREX could produce the best results.
- F. A one-day Strategic Planning Workshop was held in Savannah on September 22. The Advisory Board and over 50 stakeholders attended. Results of the survey, needs assessment, and organizational self-assessments informed the deliberations and participants identified and prioritized potential SG/MAREX activities in each of five focus areas.
- G. In a two-day retreat following the stakeholder workshop, Georgia Sea Grant and MAREX staff met to review their mission statement and craft goals and strategies to achieve the vision that emerged from stakeholders and the advisory board. That work forms the basis for this strategic plan.

## **Appendix II: Sea Grant and Marine Extension in Georgia – A Brief History**

Georgia’s Sea Grant Program evolved over a period of time from an initial grant in 1971 for marsh ecosystems research, marine extension service and related marine activities, through several distinct programmatic levels until 1980, when the University of Georgia was recognized as the nation’s fifteenth Sea Grant College. In order to fully understand this evolutionary process, however, it’s helpful to see it in the larger context of how marine science first came to Georgia’s coast. It’s an interesting story. As it unfolds, one gets a sense of how Sea Grant’s unique organizational model of research, education and outreach was in the right place at the right time.

While not blessed with as many miles of sandy beaches as its neighbors SC and Florida, Georgia IS blessed with one of nature’s most amazing natural laboratories – the extensive salt marshes that extend the length of its 90-mile coastline. In the 19<sup>th</sup> and early 20<sup>th</sup> centuries, several of Georgia’s thirteen barrier islands were acquired as retreats by wealthy industrialists. This protected the islands from residential and commercial development. And because Georgia’s coast was still relatively pristine, they were an ideal location for two world-class marine research institutions, the University of Georgia’s Marine Institute on Sapelo Island and the Skidaway Institute of Oceanography, founded in 1953 and 1968, respectively. To build on this research capacity, University System of Georgia Chancellor George Simpson made Dr. E.L. Cheatham Director of Coastal Resource Development for the University System in 1969 and charged him with coordinating the University System’s various coastal programs to avoid duplication of effort; and developing a marine extension program to assist the state’s seafood industry. A distinguished wildlife biologist, Cheatham had little background in marine science, so

in January of 1970 he hired Dr. Edward Chin from Texas A&M University and delegated to him the responsibility for developing the University's coastal research and extension programs. Chin's leadership over the next twenty-four years would lead to the establishment of Georgia's Sea Grant Program, the Marine Extension Service and ultimately to the creation of the School of Marine Programs at UGA.

In 1971, Chin appointed Dr. David Menzel of Woods Hole Oceanographic Institution to head both UGA's Marine Institute and the Skidaway Institute. Menzel establish distinct missions for both facilities. The Skidaway Institute's research concentrated on the oceanography of the continental shelf in the South Atlantic Bight (Cape Hatteras to Cape Canaveral), while the Marine Institute on Sapelo continued to study salt marshes and estuarine ecosystems.

With the research programs underway, Chin next turned to his third major responsibility: the development of a marine extension program to increase the efficiency and effectiveness of the state's seafood industry. The University of Georgia has a strong tradition of public service, and its VP for Public Services at the time, J.W. Fanning, had long advocated the creation of a marine extension service to assist Georgia's seafood industry and promote coastal economic growth. At the same time, new federal programs were underway to also promote development of coastal resources. Beginning in 1970, Fanning authorized funds to start up a marine extension service, which was a first step in matching federally available funds through the nascent Sea Grant program, which required matching state funds and the integration of university research with both education and marine extension services.

Chin knew the majority of Georgia's population was located inland, and understood the need to educate this population about the value of its coastal resources in order to create a statewide sense of stewardship. He acquired a \$451,000 federal grant to add a marine education center to the extension facility on Skidaway Island. It opened in 1971, and in 1972 a federal grant was secured for the addition of dormitory and cafeteria facilities to accommodate overnight visitors. Since its opening, the Marine Education Center and Aquarium on Skidaway Island has helped foster greater environmental awareness of Georgia's unique salt-marsh ecosystem for hundreds of thousands of students, teachers and adults who have visited for the day or for longer stays.

The establishment of an educational component of Georgia's extension program opened the possibility of UGA to become a Sea Grant institution. In 1971 Chin submitted a proposal to the National Sea Grant Program seeking support for marsh ecosystems research, marine extension outreach and related marine activities. Chin's proposal was accepted, and the University of Georgia received a Sea Grant award at the Coherent Program level, the first step to being designated a Sea Grant College. Demonstrated progress resulted in UGA taking the second step, earning Sea Grant Institution status, in 1974. Finally, in 1980, on the basis of its accomplishments in marine research, education and extension services UGA was designated the nation's fifteenth Sea Grant College.

In achieving this status, Chin greatly expanded the facilities and scope of Sea Grant and the Marine Extension Service. In 1972, Skidaway's Marine Extension campus added a shellfish research laboratory adjacent to the education facility. Chin obtained a half-million dollar federal grant for the initial structure, and in 1989 the facility was expanded

with a grant from the Governor's Energy office to develop an efficient greenhouse system for growing algae as shellfish food.

In the early 1970's, shrimping was Georgia's largest fishery. From the outset it was clear that having the marine extension service centered on Skidaway Island was problematic, since the majority of Georgia's shrimp industry (its major fishery at that time) was centered further south near Darien and Brunswick. In an effort to assist shrimp harvesters and processors, the Marine Extension Service opened its first office in Brunswick, the center of Georgia's coastal fisheries. Housed originally at Brunswick Junior College, a permanent home was built in 1980 on three acres of waterfront property in the heart of Brunswick's seafood industry. The Marine Extension Service Fisheries Station assisted fishermen with gear R&D and offered seafood technology and safety expertise to area harvesters and packers. An additional wing was added to the facility in 1991. UGA also purchased and staffed a 73-foot research vessel, the R/V GEORGIA BULLDOG, to augment fisheries research, training, education and technology transfer.

Early on Georgia Sea Grant helped fund Marine Extension (MAREX) agents who worked closely with shrimpers in developing more efficient net designs that increased catch levels and fuel efficiency. During this period MAREX agents helped usher in the twin trawl net system, which dramatically accelerated landings. Georgia Sea Grant and MAREX slowly gained a reputation for listening to their client base – fishermen – and using their feedback to design innovative gear. With the GEORGIA BULLDOG, they were able to fish side-by-side with shrimpers and test the gear in real-world conditions.

By the 1990's the fishing industry was facing numerous new challenges - species decline, increased environmental regulations, rising overhead costs in fuel and insurance and fierce international competition for seafood markets. Endangered species regulations, specifically for sea turtles here in Georgia, required shrimpers to install turtle excluder devices (TEDs) in their nets. Sea Grant and MAREX responded by collaborating with Georgia fishermen to design and produce inexpensive and effective TEDs. As bycatch regulation became more common, Sea Grant-supported MAREX agents helped create new bycatch reduction devices (BRDs) that were used throughout the industry.

In the new millennium, seafood safety has assumed growing importance. With the passage of the nation's first seafood safety law – the Hazard Analysis Critical Control Point (HACCP) – seafood suppliers must now maintain federal guidelines. Georgia MAREX agents with Sea Grant support have been among the leaders in nationwide HACCP training.

Fisheries technology and seafood safety are just two areas in which Georgia Sea Grant has had an impact on our coastal communities. Today our coast is changing constantly, and Sea Grant continues to be relevant in helping to address these changes. As funding gets tighter, Sea Grant has expanded its range of partnerships by collaborating with new outreach organizations within the University System. An important part of Sea Grant's and Marine Extension's strategy is to increase its leverage by partnering with organizations whose interests we share, including other outreach units at the University of Georgia (e.g., Public Service and Outreach and Cooperative Extension); state agencies and organizations (e.g., Georgia Department of Natural Resources – Coastal Resources Division, the DNR- CRD Coastal Management Program and the Coastal Regional

Commission); and federal agencies and offices (e.g., the Sapelo Island National Estuarine Research Reserve, NOAA Coastal Services Center, and other state Sea Grant programs).

Reporting lines for Georgia Sea Grant and the Marine Extension Service have changed over time. Through the 70's and 80's, Ed Chin was director of both Sea Grant and Marine Extension and he reported to the Vice Presidents of Research, Academic Affairs, and Services. Around 1990, the School of Marine Programs was created with Chin assuming additional oversight of the Department of Marine Sciences, which was within the Franklin College of Arts and Sciences. With Chin's retirement in the mid-90's, former assistant directors under Chin (Mac Rawson and Fred Lyda) became Directors of Sea Grant and Marine Extension, respectively, and Robert Hodson became director of the School of Marine Programs. Oversight and integration of Sea Grant and MAREX suffered as Sea Grant reported to the Dean of the Franklin College, and MAREX reported to the Vice President for Public Service and Outreach. Following advice from the National Sea Grant Office, Sea Grant moved to the Office of the Vice President for Research. Full integration of Sea Grant and MAREX was restored in 2012 following the adoption of a Memorandum of Understanding between SG, MAREX, and the two Vice Presidents' Offices. Finally, in late 2012 Sea Grant was transferred to the Vice President of Public Service and Outreach. Thus both programs are now administered by the same Office. The Strategic Plan of 2014-2018 became the first plan to serve as the combined plan of both Sea Grant and the Marine Extension Service.

As commercial fishing has declined, Sea Grant and MAREX have begun to address new coastal concerns. Today's most pressing issues involve **water quality** – is it safe? is it potable?; **water quantity** – is there enough to meet municipal, agricultural, industrial and ecosystem needs? can salt water intrusion be prevented?; - **sustainable development** – how can we protect our coastal resources while accommodating smart growth?; - **land use change** and **climate adaptation** – what steps can coastal communities take to minimize their vulnerability to storm surge and rising sea levels? Sea Grant, working with MAREX, continues to bring university-based knowledge to bear on real world problems. Working with clients, user groups and our advisory panel, we stay abreast of new developments and anticipate ways in which Sea Grant and MAREX can be effective and relevant in today's coastal Georgia.