Mississippi-Alabama Sea Grant Consortium

2014-2017 Strategic Plan

Sustaining Alabama and Mississippi's ocean and coastal resources through university-based research, communications, education, extension and legal programs

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Introduction

Serious challenges present the greatest opportunities for change, and the Mississippi-Alabama Sea Grant Consortium (MASGC) is prepared to help coastal communities meet these challenges. One of MASGC's demonstrated strengths is its ability to quickly utilize Alabama and Mississippi universities' research and engagement programs to address local challenges. MASGC has been a leader in coastal research, outreach, extension and education for the bi-state region since 1972. The consortium, unlike most Sea Grant programs, serves two states and has nine member institutions, which include Auburn University, Dauphin Island Sea Lab, Jackson State University, Mississippi State University, The University of Alabama, The University of Alabama at Birmingham, The University of Mississippi, The University of Southern Mississippi and University of South Alabama.

The MASGC director leads the consortium with oversight from a Board of Directors that is made up of a representative from each consortium member institution. MASGC seeks input on a regular basis from an advisory council and a technical interagency council, which are composed community leaders and coastal experts from diverse backgrounds.

The MASGC engagement team has members at the following Mississippi locations: Mississippi State University Coastal Research and Extension Center in Biloxi; the Mississippi-Alabama Sea Grant Legal Program at The University of Mississippi School of Law in Oxford; the University of Southern Mississippi Gulf Coast Research Lab and Marine Education Center in Ocean Springs. Alabama locations include Auburn University Marine Extension and Research Center in Mobile; the Mobile County Public School District Environmental Studies Center in Mobile; the Dauphin Island Sea Lab in Dauphin Island; and the Gulf Shores and Orange Beach tourism bureau in Gulf Shores.

MASGC works regionally with the other Gulf of Mexico Sea Grant Programs, the Gulf of Mexico Alliance and the National Oceanic and Atmospheric Administration (NOAA) to address regional challenges of important to local communities. MASGC is also one of 33 programs in the national Sea Grant network of university scientists and communication, education, extension and legal professionals.

At this time of great risk to the sustainability[1] of our ocean and coastal resources, there is an even greater opportunity for MASGC to play a significant role, through innovation and creativity, in addressing the goals set forth in this plan. MASGC will strive to achieve these local, regional and national goals in a manner that reflects the particular needs of individual states and communities and the nation as a whole. This four-year strategic plan establishes a direction to address critical needs at local, state and regional scales in ocean and coastal environments. The plan capitalizes on Sea Grant's unique capacities and strengths and supports the National Sea Grant College Program's 2014-2017 Strategic Plan and NOAA's Next Generation Strategic Plan.

The Sea Grant Model

The U.S. Congress created Sea Grant in 1966 to be a highly leveraged federal and state partnership to harness the intellectual capacity of the nation's universities to solve ocean, coastal, Great Lakes and island (hereby referred to as coastal) problems. The National Sea Grant College Program engages citizens, communities, scientists, organizations and governments to sustain and enhance the vitality, value and wise use of the nation's coastal resources. Administered and supported by NOAA, and implemented through leading research universities, Sea Grant provides unique access to scientific expertise and to new discoveries. Through its scientists and communications, education, extension and legal specialists (hereby referred to as engagement professionals), Sea Grant generates, translates and delivers cutting-edge, unbiased, science-based information to address complex issues.

Sea Grant is a national network. This network includes the National Sea Grant Office, 33 university-based state programs, the National Sea Grant Advisory Board, the National Sea Grant Law Center, the National Sea Grant Library and hundreds of participating institutions. The Sea Grant network enables NOAA and the nation to tap the best science, technology and expertise to balance human and environmental needs in coastal communities. Sea Grant's alliance with major research universities around the country provides access to thousands of scientists, students and engagement professionals. Sea Grant's university-based programs are fundamental to the development of the future scientists and resource managers needed to conduct research and to guide the responsible use and conservation of our nation's coastal resources. With its strong research capabilities, local knowledge and on-the-ground workforce, Sea Grant provides an effective national network of unmatched ability to rapidly identify and capitalize on opportunities and to generate timely, practical solutions to real problems in real places.

[1] Sustainability is defined as meeting the needs of the present generation without compromising the ability of future generations to meet their own needs. Sustainability has three equally weighted components: economic, social and environmental.

Sea Grant Vision and Mission

Mississippi-Alabama Sea Grant consortium envisions a future where people live, work and play along our coasts in harmony with the natural resources that attract and sustain them. This is a vision where we use our natural resources in ways that capture the economic, environmental and cultural benefits they offer, while preserving their quality and abundance for future generations.

MASGC's mission is to provide integrated research, communication, education, extension and legal programs to coastal communities that lead to the responsible use of Alabama, Mississippi, Gulf of Mexico and nation's ocean and coastal resources through informed personal, policy and management decisions.

Sea Grant Core Values

Since its inception, a strong set of core values has provided the foundation for Sea Grant's work. Sea Grant is founded on a belief in the critical importance of university-based research and constituent engagement[2]. Sea Grant invests significantly in merit-reviewed research each year. Research discoveries are then distributed to Sea Grant's constituents through sustained engagement programs. Meaningful and sustained engagement has allowed Sea Grant to form strong partnerships with leading coastal state research universities, with other NOAA programs, and with a wide range of public and private partners at federal, state and local levels. This has proven to be a highly effective way to identify and solve the most relevant problems facing coastal communities.

Sea Grant's unique integration of research with constituent engagement is at the heart of its mission. As a pioneer in translational research (from discovery to application), Sea Grant ensures that unbiased, science-based information is accessible to all. The diverse capabilities of Sea Grant's personnel and partners enable the organization to be creative and responsive in generating policy-relevant research and disseminating scientific and technological discoveries to a wide range of audiences. Sea Grant's science-based, non-regulatory approach and its long-term history of engagement with local communities have made Sea Grant a trusted source of information. Sea Grant serves as a catalyst for decision support by increasing knowledge among decision-makers and the public as a whole. Sea Grant's commitment to these core values is vital to achieving the goals set forth in this plan.

[2] A Mandate to Engage Coastal Users: A Review of the National Sea Grant Extension Program and a Call for Greater National Commitment to Engagement (November 2000) and NOAA's Science Advisory Board's report on Engaging NOAA Constituents. Each report defined constituent engagement as being responsive, accessible, respecting partners, maintaining scientific neutrality, integrating diverse expertise, coordination of efforts and building resource partnerships.

Planning Process

The priorities in the 2014-2017 MASGC Strategic Plan are grounded in local stakeholder input and framed within the four National Sea Grant focus areas. The MASGC Advisory Council and Sea Grant Management Team provided strategic input during a planning retreat in March 2012. Recently completed plans including oil spill recovery plans developed in Alabama and Mississippi were also used because of the large number of people involved in setting environmental, economic and social priorities. This strategic plan also drew from information gathered from numerous efforts including the Gulf of Mexico Ecosystem Restoration Task Force, Gulf of Mexico Research Plan, the Gulf of Mexico Alliance, and the National Ocean Policy. The priorities in this plan focus on serving Alabama and Mississippi needs but also align with the Gulf of Mexico Alliance priorities and other state, regional and national priorities.

Focus Areas

To help understand, manage and use its coastal resources wisely, MASGC's work falls into the following four focus areas:

1. **Healthy Coastal Ecosystems (15% effort)**
2. **Sustainable Fisheries and Aquaculture (20% effort)**
3. **Resilient Communities and Economies (25% effort)**
4. **Environmental Literacy and Workforce Development (40% effort)**

These focus areas align directly with the focus areas in the National Sea Grant College Program's strategic plan and are consistent with the focus areas in MASGC's 2009-2013 Strategic Plan. The focus areas reflect the most urgent needs along our coasts, as well as NOAA goals and Sea Grant's strengths and core values. The focus areas also reflect the integration of Sea Grant's research and engagement programs. These functional areas provide the foundation for implementing this four-year plan.

Each focus area has goals, outcomes and performance measures. Collectively, the four focus areas include 11 goals, 91 outcomes and 12 performance measures. The goals describe the desired long-term direction for each focus area. The outcomes are benchmarks from which Sea Grant can track progress toward achieving each goal. Performance measures are quantitative ways of measuring outcomes with targets developed by each Sea Grant program.

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/or 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, in most cases, 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 2014-2017 MASGC Strategic Plan can only be realized through full utilization of Sea Grant's research and engagement programs. For example, many of the learning outcomes identified require a substantial investment in needs-based and merit-reviewed research before any actionable outcomes. Simply stated, Sea Grant-sponsored research is the "engine" that leads to new products, tools or other discoveries used by Sea Grant's engagement programs to effect change.

There are two types of performance measures identified in this plan. Performance measures that are most closely linked to a single focus area are listed at the end of each focus area section. Cross-cutting performance measures - broad measures of progress toward goals for all focus areas - are listed following the Education and Workforce Development Focus area.

Focus Area: Healthy Coastal Ecosystems (HCE)

Estuaries provide critical habitat for numerous species of commercially and recreationally important fish, waterfowl, migratory birds, marine mammals and sea turtles. The five coastal counties of Mississippi and Alabama contained 834,029 acres of wetlands. Perdido Bay and Mobile Bay in Alabama and the Mississippi Sound are important estuaries representing a total surface area of 2,309 square miles. With a documented 337 species of fish, the Mobile Bay estuary has the greatest species richness of any comparably sized region in North America. Similarly, the Pascagoula River is the only major river estuary in the United States that remains unaffected by channel fragmentation and flow regulation. These estuaries are vital centers of biodiversity and essential fish habitats for numerous threatened and endangered species.

Negative anthropogenic impacts on estuarine ecosystems have led to declines in ecosystem services and total acreage of natural habitat. The overall loss of habitat and increased fragmentation of the remaining natural habitats negatively affect essential ecological benefits.

Keeping coastal ecosystems healthy is a challenge because of the diversity of stressors each system faces. Ecosystems that do not adhere to traditional political boundaries further

complicate this challenge. Responsible management of these systems requires new ways of thinking and new actions, often termed ecosystem-based management[3]. Ecosystem-based approaches require unprecedented levels of coordination among federal, state and local jurisdictions and the active engagement of the people who live, work and play along the coasts. They also require understanding of the characteristics of species, landscapes and their interactions within each ecosystem.

In general, increasingly rapid coastal development, greater demands on fisheries resources, climate change and other human activities are leading to water quality degradation, increased demands on water supplies, changes to fisheries stocks, wetlands loss, proliferation of invasive species and a host of other environmental impacts. It is essential for decision-makers to understand the interconnectedness and interactions of these systems in order to maintain vital habitats and inform restoration efforts within ecosystems and watersheds.

MASGC is a leader in regional approaches to understanding and maintaining healthy ecosystems, with planning efforts across the region to identify information gaps, implement research priorities and coordinate information and technology transfer to people who need it. Sea Grant recognizes the need to determine the value of the myriad ecosystem services[4] that maintain the conditions for life on Earth.

1. **<u>Goal</u>: Ecosystem services are improved by enhanced health, diversity and abundance of fish, wildlife and plants.**

   <u>Learning Outcomes</u>

   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.

   <u>Action Outcomes</u>

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

   <u>Consequence Outcomes</u>

   1.4. Dynamic ecological systems provide a wide range of ecological, economic and societal services and are more resilient to change.

[3] Ecosystem-based management is an integrated approach to management that considers the entire ecosystem, including humans. The goal of ecosystem-based management is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need. Ecosystem-based management differs from current approaches that usually focus on a single species, sector, activity or concern; it considers the cumulative impacts of different sectors.

[4] Ecosystem services include provisioning (food and water), regulating (flood and disease control), cultural (spiritual, recreational and cultural benefits) and supporting (nutrient cycling).

1.5. Greater public stewardship leads to participatory decision-making and collaborative ecosystem-based management decisions.

2. Goal: Ecosystem-based approaches are used to manage land, water and living resources.

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 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: Ecosystems and their habitats are protected[5], enhanced or restored.

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, enhance and restore habitats by incorporating scientific information and public input.

[5] In the context of this goal, protected areas are those places in some form of conservation management program.

3.5. Resource managers, businesses and residents adopt innovative approaches and technologies to maintain or improve the function of ecosystems.

Consequence Outcomes

3.6. Habitats are protected, enhanced or restored.

3.7. Degraded ecosystem function and productivity are restored.

Healthy Coastal Ecosystems Performance Measures

1. Number of Sea Grant tools, technologies and information services that are used by our partners/customers to improve ecosystem-based management.
   MASGC Target: 10
2. Number of ecosystem-based approaches used to manage land, water and living resources in coastal areas as a result of Sea Grant activities.
   MASGC Target: 14
3. Number of acres of coastal habitat protected, enhanced or restored as a result of Sea Grant activities.
   MASGC Target: 155

Focus Area: Sustainable Fisheries and Aquaculture (SFA) [6]

The nation has witnessed the decline of many of its major fisheries while seafood consumption has increased and continues to be encouraged because of its health benefits. To fill the gap between seafood demand and domestic harvests, the United States imports 86 percent[7] of what is consumed leading to a seafood trade deficit of over $10 billion[8] per year. With global wild fisheries harvests at a plateau of around 185 metric tonnes[9], some 50 seafood species are now produced from aquaculture. There are no projected increases in wild capture fisheries, but global aquaculture is predicted to increase by 33 percent over the next decade. These projections create opportunities for an expanded aquaculture industry and for innovative marketing strategies and value-added products for the nation's wild fisheries industry.

Most of the Gulf of Mexico's economically important marine fish and invertebrate species are heavily exploited. The continued presence of healthy populations of living marine resources relies upon healthy and an adequate amount of estuarine and nearshore coastal habitats and ecosystems. The impacts from the Deepwater Horizon oil spill and other anthropogenic factors threaten both the habitats and species supported by them. These stressors also adversely impact real and perceived seafood safety issues.

[6] We use a working definition of "seafood sustainability" that is based on the NOAA Fishwatch concept. Sustainability involves "meeting today's needs without compromising the ability of future generations to meet their needs. In terms of seafood, this means catching or farming seafood responsibly, with consideration for the long-term health of the environment and the livelihoods of the people who depend upon the environment."

[7] Food and Agriculture Organization of the United Nations.

[8] U.S. Department of Agriculture Foreign Agricultural Service statistics.

[9] Food and Agriculture Organization of the United Nations.

Commercial and recreational fishing are major drivers of coastal economies in Mississippi and Alabama. In 2009, there were 15,000 jobs with an income impact of $251 million and $680 million in total sales provided by the seafood industry. Also in 2009, saltwater anglers spent $946 million on recreational fishing. This supported more than 8,000 jobs with an income impact of more than $260 million and sales impact of more than $891 million in the two states.

Sea Grant continues to play a leadership role in developing innovative technologies for all sectors of the seafood industry, including fishing, aquaculture, seafood processing and consumer safety, to ensure a safe and sustainable supply of seafood products now and for future generations. Seafood safety will continue to be a concern for consumers as foreign imports, some of which are associated with seafood contamination, continue to increase. Sea Grant's partnership with NOAA Fisheries, state fisheries managers, seafood processors, fishing associations and consumer groups will ensure safe, secure and sustainable supplies of domestic seafood and decrease our reliance on seafood imports.

4. <u>Goal</u>: A safe, secure and sustainable supply of seafood to meet public demand.

<u>Learning Outcomes</u>

4.1. Fishery managers and fishermen understand the dynamics of wild fish populations.
4.2. The seafood industry[10] is knowledgeable about innovative technologies, approaches and policies.
4.3. Commercial and recreational fishermen are knowledgeable about efficient and responsible fishing techniques.
4.4. The commercial fishing industry is aware of innovative marketing strategies to add value to its products.
4.5. The seafood processing industry learns and understands economically viable techniques and processes to ensure the production and delivery of safe and healthy seafood.

<u>Action Outcomes</u>

4.6. Fishermen employ efficient fishing techniques, including bycatch reduction.
4.7. Fishermen apply techniques to reduce negative impacts on depleted, threatened or endangered species.
4.8. The seafood industry adopts innovative technologies and approaches to supply safe and sustainable seafood.
4.9. The commercial fishing and aquaculture industries adopt innovative marketing strategies to add value to their products.
4.10. The seafood industry adopts techniques and approaches to minimize the environmental impact of their sectors.

[10] The seafood industry includes all sectors of the industry, including aquaculturists, fishermen, processors, wholesalers, retailers and supporting businesses.

4.11. Resource managers establish policies and regulations that achieve a better balance between economic benefit and conservation goals.
4.12. 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
4.13. The U.S. seafood[11] supply is sustainable and safe.
4.14. There is an expansion of the sustainable domestic fishing and aquaculture industries.

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

Learning Outcomes
5.1. The seafood industry is aware of the standards for safe seafood.
5.2. The seafood industry is knowledgeable about consumer trends regarding seafood sustainability and safety and how to adjust operations to meet emerging demands.
5.3. U.S. seafood consumers have the knowledge to evaluate sustainable seafood choices.
5.4. U.S. seafood consumers have an increased knowledge of the nutritional benefits of seafood products and know how to judge seafood safety and quality.

Action Outcomes
5.5. The seafood industry adopts standards for safe seafood.
5.6. The seafood industry adopts technologies and techniques to ensure seafood safety.
5.7. U.S. seafood consumers preferentially purchase sustainable seafood products.

Consequence Outcomes
5.8. Consumers improve their health through increased consumption of safe and sustainable seafood products.
5.9. The U.S. seafood industry operates sustainably and is economically viable.

Sustainable Fisheries and Aquaculture Performance Measures

4. Number of fishermen, seafood processors and aquaculture industry personnel who modify their practices using knowledge gained in fisheries sustainability and seafood safety as a result of Sea Grant activities.
   MASGC Target: 4,800
5. Number of seafood consumers who modify their purchases using knowledge gained in fisheries sustainability, seafood safety and the health benefits of seafood as a result of Sea Grant activities.
   MASGC Target: 42,000

[11] Seafood includes product originating from all sectors of the fishing and aquaculture industries.

Focus Area: Resilient Communities and Economies (RCE) [12]

Coastal communities in Alabama and Mississippi provide vital economic, social and recreational opportunities for hundreds of thousands of Americans. From 1980 to 2020, the five coastal counties in Alabama and Mississippi are expected to increase by 307,450 people. Over this 40-year period each coastal county is predicted to have population increases between 17 percent and 200 percent. Twenty-one percent of the 3,620 acres of land converted to development between 2001 and 2006 were in a FEMA floodplain. As of 2010 the five coastal counties of Alabama and Mississippi had 218,079 residents living within the FEMA floodplain, which covers 738,308 acres. Coastal communities must balance population growth and coastal development with ecosystem health while adopting resilience strategies for acute events, such as hurricanes and oil spills, and chronic events, such as sea-level change and hydrologic changes in estuarine environments. This balance involves long-term planning to prepare for and quickly recover from hazards while recognizing and assessing vulnerable populations.

Decades of population migration and coastal hazards have transformed coastal landscapes and intensified demand on finite coastal resources. Alabama and Mississippi experienced devastating losses due to natural hazard events in 2004 and 2005. Hurricanes Ivan and Katrina caused the loss of more than 1,800 lives and damages that exceeded $96 billion. In 2005, more than 275,000 housing units were damaged or destroyed in Alabama and Mississippi from Hurricanes Katrina, Rita and Wilma. As the coast continues to recover and rebuild from the hurricane seasons of 2004 and 2005 and the 2010 Deepwater Horizon oil spill, there are opportunities to wisely use resources and to balance development while accommodating the more than 834,000 residents of and many visitors to the five coastal counties. Planning at local and regional levels is required to adequately address these opportunities.

Population growth is also leading to gentrification of coastal communities. Historically important industries, such as commercial and recreational fishing, shipbuilding, water-borne transportation, ports and harbors, public marinas and public access, are being displaced by nontraditional uses. However, ocean-related businesses remain important drivers in the region. In 2009, ocean-related jobs supported 45,841 employees, $1.5 billion in wages and $2.5 billion in goods and services.

Polluted runoff from urban, suburban and agricultural areas is one of the greatest threats to the Alabama and Mississippi coast. Poorly planned growth exacerbates the negative impacts from impervious surfaces, reduces and fragments fish and wildlife habitat and alters sedimentation rates and flows.

MASGC will continue to support cutting-edge research in the areas of climate change, coastal processes, energy efficiency, hazards, stormwater management and tourism. Sea Grant will

[12] Resilience is determined by the degree to which a community is capable of organizing itself to increase its capacity for learning from past economic, natural or technological disasters.

engage our diverse and growing coastal populations in applying the best-available scientific knowledge to address increased resource demands and vulnerability. Ultimately, MASGC will bring its unique research and engagement capabilities to support the development of resilient coastal communities that sustain diverse and vibrant economies, effectively respond to and mitigate natural and technological hazards and function within the limits of their ecosystems.

6. Goal: Development of vibrant and resilient coastal economies.

Learning Outcomes

6.1. Communities[13] are aware of the interdependence between the health of the economy and the health of the natural and cultural systems.
6.2. Communities have access to information needed to understand the value of waterfront- and tourism-related economic activities.
6.3. Communities understand the strengths and weaknesses of alternative development scenarios on resource consumption and local economies.
6.4. Communities are aware of regulatory regimes affecting economic sustainability.
6.5. Communities are knowledgeable about economic savings from energy planning and conservation.

Action Outcomes

6.6. Citizens are actively engaged in management and regulatory decisions.
6.7. 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

6.8. Communities have diverse, healthy economies and industries without displacing traditional working waterfronts[14].

7. Goal: Communities use comprehensive planning to make informed strategic decisions.

Learning Outcomes

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

[13] Communities are defined broadly to include governments, businesses, residents, visitors and non-governmental organizations.

[14] Working waterfront is a term broadly used in this plan to include water-dependent and water-related industries, such as energy production, tourism, ports and harbors, marine transportation, shipyards, marinas, commercial fishing, recreational fishing, aquaculture, fishing piers and public access.

Action Outcomes

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

Consequence Outcomes

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

8. Goal: Improvements in coastal water resources sustain human health and ecosystem services.

Learning Outcomes

8.1. Communities are aware of the impact of human activities on water quality and supply.
8.2. Communities understand the value of clean water, adequate supplies and healthy watersheds.
8.3. Communities understand water laws and policies affecting the use and allocation of water resources.

Action Outcomes

8.4. Communities engage in planning efforts to protect water supplies and improve water quality.
8.5. Communities adopt mitigation measures, best management practices and improved site designs in local policies and ordinances to address water supplies and water quality.

Consequence Outcomes

8.6. Water supplies are sustained.
8.7. Water quality improves.

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

Learning Outcomes

9.1. Residents and decision-makers are aware of and understand the processes that produce hazards and climate change and the implications of those processes for them and their communities.
9.2. Decision-makers are aware of existing and available hazard- and climate-related data and resources and have access to information and skills to assess local risk vulnerability.

9.3. Communities have access to data and innovative and adaptive tools and techniques to minimize the potential negative impact from hazards.
9.4. 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

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

Consequence Outcomes

9.10. Communities effectively prepare hazardous events and climate change.
9.11. Communities are resilient and experience minimum disruption to life and economy following hazard events.

Resilient Communities and Economies Performance Measures

6. Number of communities that implemented sustainable economic and environmental development practices and policies (e.g., land-use planning, working waterfronts, energy efficiency, climate change planning, smart growth measures, green infrastructure) as a result of Sea Grant activities.
   MASGC Target: 13
7. Number of communities that implemented hazard resilience practices as a result of Sea Grant activities to prepare for, respond to or minimize coastal hazardous events.
   MASGC Target: 12

Focus Area: Environmental Literacy and Workforce Development (ELWD)

The scientific, technical and communication skills needed to address the daunting environmental challenges confronting our nation are critical to developing a national workforce capacity. The Congressional report, *Rising Above the Gathering Storm*[15], states that building a workforce literate in science, technology, engineering and mathematics is crucial to maintaining

[15] National Academy of Sciences, 2010: http://www.nap.edu/catalog.php?record_id=12999

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 [16] 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 that 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[17]. These issues involve uncertainty and require the consideration of economic, aesthetic, cultural and ethical values.

Alabama and Mississippi stand at a critical juncture to shape its future. According to the Center for Disease Control (CDC), Alabama ranks 46th, Mississippi, 51st in the nation in childhood obesity with 36% and 44%, respectively, of its school-age population considered overweight or obese. Irrespective of the methodology or statistic chosen, Alabama and Mississippi students rank among the bottom tier of all 50 states in educational achievement. The states face a number of environmental problems, including water quality, air quality, land use issues (such as urbanization and land loss) and climate change impacts, particularly in their coastal regions. Additionally, the needs of the Alabama and Mississippi workforce are changing. Alabama and Mississippi cite health-related and computer-related jobs as the fastest growing occupations in the next 10 years. Both states offer a rich array of outdoor habitats and experiences: Alabama is even one of the most bio-diverse states in the United States. Increasing environmental literacy through place-based and other environmental education programs is one way to address these problems and increase the sense of pride and stewardship among the area's school-age students.

A wealth of research shows that environmental education programs can engage students, improve student performance, promote action and instill stewardship. The Coastal Roots program in Louisiana, in which students grow coastal plants for dune and marsh restoration, demonstrated high science test scores among participants than in a control group[18]. Active and personally relevant environmental education enhances recall of information in the long term and participation with "wild" nature before age 11 was a critical element in determining both

[16] America COMPETES, 2010: http://www.commerce.gov/americacompetes
[17] 2009-2029 NOAA Education Strategic Plan
[18] Kathryn Karsh, Edward Bush, Janice Hinson and Pamela Blanchard. Integrating Horticulture Biology and Environmental Coastal Issues into the Middle School Science Curriculum. HortTechnology, 19: 813-817 (2009). http://www.sciencedaily.com/releases/2009/12/091211093641.htm

environmental attitudes and behaviors in adulthood[19]. The face-to-face element to environmental education by teachers increases the likelihood of environmental education programs being taught to students[20]. Environmental education involving students (and people of all ages) in the restoration of native habitats contributed to both individual (sense of place, community participation, pro-environmental behavior) and ecological (biodiversity, ecosystem health) outcomes[21]. Environmental education in the context of resilience of social-ecological systems increases the development of characteristics of resilient social-ecological systems[22].

With the adoption of common core standards, the development of literacy principles in many Science, Technology, Engineering and Math (STEM) fields (e.g. Ocean Literacy Principles, Climate Literacy Principles, Earth Science Literacy Principles, and others), the drive to integrate STEM education, the impending adoption of the Next Generation Science Standards, and the environmental education certification movement, it is critical that MASGC continues to engage and support environmental education leaders in its area.

10. <u>Goal</u>: An environmentally literate public supported and informed by a continuum of lifelong formal and informal engagement opportunities.

<u>Learning Outcomes</u>

10.1. Formal and informal educators are knowledgeable of the best available science on the effectiveness of environmental science education.
10.2. Formal and informal educators understand environmental literacy principles.
10.3. Lifelong learners are able to engage in informal science education opportunities focused on coastal topics.

<u>Action Outcomes</u>

10.4. Engagement professionals use environmental literacy principles in their programs.
10.5. Engagement programs are developed and refined using the best available research on the effectiveness of environmental and science education.
10.6. Formal and informal education programs incorporate environmental literacy components.
10.7. Formal and informal education programs take advantage of the knowledge of Sea Grant-supported scientists and engagement professionals.

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10.8. Formal and informal educators, students and/or the public collect and use coastal weather data in inquiry and evidence-based activities.
10.9. Lifelong learners make choices and decisions based on information they learned through informal science education opportunities.
10.10. Educators work cooperatively to leverage federal, state and local investments in coastal environmental education.

Consequence Outcomes

10.11. Members of the public incorporate a broad understanding of their actions on the environment into their personal decisions.

11. Goal: A future workforce reflecting the diversity of Sea Grant programs, skilled in science, technology, engineering, mathematics and other disciplines critical to local, regional and national needs.

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 trained in science, technology, engineering, mathematics, law, policy or other job-related fields is employed and have high job satisfaction.

Environmental Literacy and Workforce Development Performance Measures

8. Number of Sea Grant facilitated curricula adopted by formal and informal educators.
   MASGC Target: 28
9. Number of people engaged in Sea Grant supported informal education programs.
   MASGC Target: 74,000
10. Number of Sea Grant-supported graduates who become employed in a career related to their degree within two years of graduation.
    MASGC Target: 9 of 10

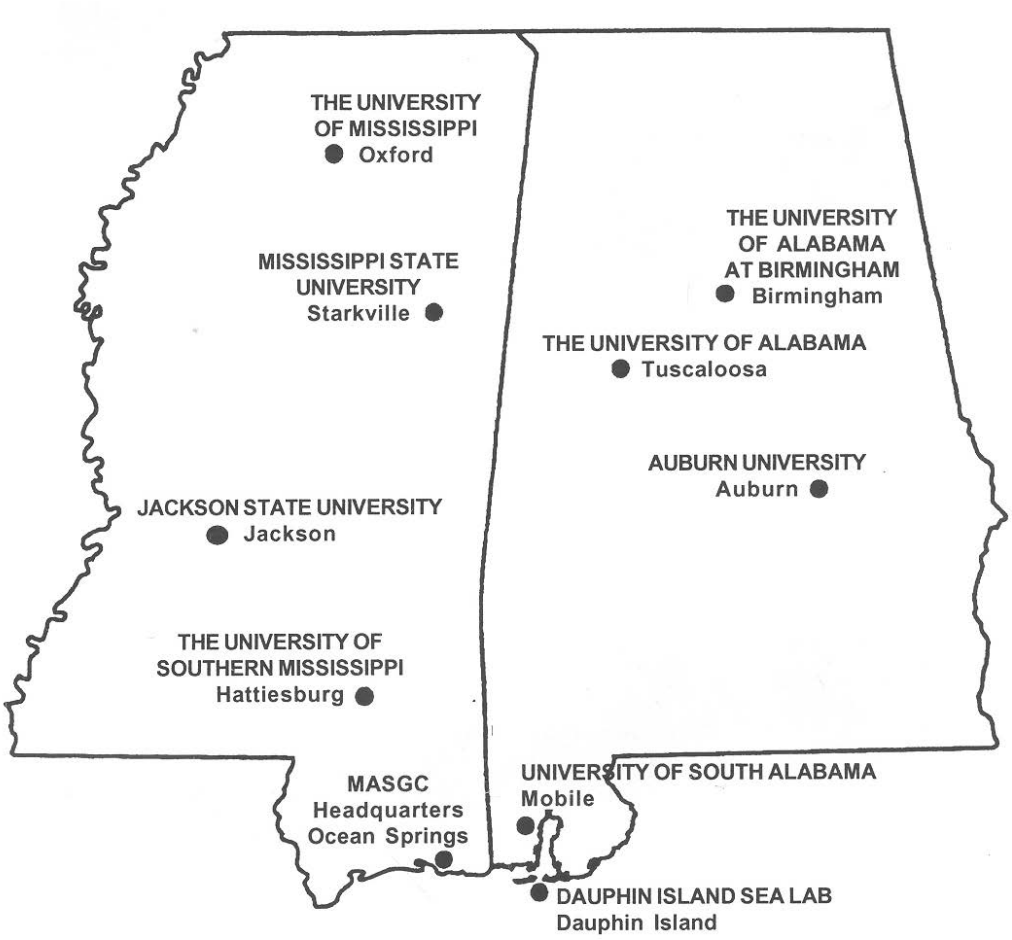
Cross-Cutting Performance Measures

11. Economic (market and non-market; jobs and businesses created or retained) benefits derived from Sea Grant activities.
    MASGC Target
    a. **Economic Impact: $1,440,000**
    b. **Jobs created: 10**
    c. **Businesses created: 2**
    d. **Jobs retained: 12**
    e. **Businesses retained: 12**
12. Number of peer-reviewed publications produced by MASGC scientists and number of citations for all MASGC-supported peer-reviewed publications from the last four years.
    MASGC Target
    a. **Number of peer-reviewed publications produced: 10**
    b. **Number of citations for all peer-reviewed publications from the last four years: 100**

Implementation Strategy

The 2014-2017 MASGC Strategic Plan aligns with the National Sea Grant 2014-2017 Strategic Plan with particular focus on specific needs for Alabama and Mississippi. The MASGC strategic plan will be implemented through the program's portfolio of merit-reviewed research, communications, education, extension and legal projects. This implementation strategy utilizes Sea Grant's unique combination of research and engagement capabilities and capitalizes on its strong federal-university-state-private sector partnerships.

The MASGC strategic plan will be used to assess MASGC's progress toward meeting the goals outlined in it. MASGC will track performance measures, other numerical metrics and impacts to highlight Sea Grant's contributions in achieving the goals identified in the MASGC and National Sea Grant strategic plans. Sea Grant will revisit this plan yearly to ensure that the organization is accomplishing its four-year goals while staying alert to new trends and opportunities.



Mississippi-Alabama Sea Grant Consortium member institutions