

Texas Sea Grant Strategic Plan 2014-2017



AT TEXAS A&M UNIVERSITY
TexasSeaGrant.org

Revised June 2016

Publication supported in part by an Institutional Grant (NA10OAR4170099) to the Texas Sea Grant College Program from the National Sea Grant Office, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. TAMU-SG-16-601 June 2016 NA14OAR4170102

TEXAS SEA GRANT COLLEGE PROGRAM 2014–2017 STRATEGIC PLAN

INTRODUCTION

The Texas Gulf Coast provides a wealth of natural resources that drive the Texas economy, provide food and fuel for a rapidly growing human population and sustain and nourish life. The quality and abundance of these natural resources is pivotal to sustained growth in Texas. Balancing the economic, environmental and cultural benefits these natural resources offer is Texas' grand challenge. The Texas Sea Grant College Program's research and engagement programs respond to this challenge by capturing the academic potential of our universities, linking universities to the needs of Texans, building knowledge, creating innovative tools and services with a public purpose, translating research results to the public, developing the Texas workforce, sustaining industries and solving real-world problems to improve human welfare and the health of our natural resources.

This plan aligns with the National Sea Grant Strategic Plan 2014-2017 and NOAA's goals and objectives as articulated in NOAA's Next Generation Strategic Plan: climate adaptation and mitigation, weather-ready nation, healthy oceans, and resilient coastal communities and economies. This plan capitalizes on Texas Sea Grant's unique capacities and strengths, and establishes a prioritized direction to guide Texas Sea Grant in addressing critical state needs.

PROGRAM BACKGROUND

Texas A&M University, one of the first Sea Grant Institutions established through the National Sea Grant College and Program Act of 1966, fulfills its sea grant mission through the Texas Sea Grant College Program. Texas Sea Grant is a partnership that unites the resources of the federal government, the State of Texas, local governments, industry and universities across the state. Texas Sea Grant yields a 15:1 return on investment.

Texas Sea Grant is part of a national network of Sea Grant programs in coastal and Great Lakes states. The network is funded by NOAA in partnership with the states to help connect the research conducted at Sea Grant Institutions with the public. Sea Grant is NOAA's primary university-based program, dedicated to helping citizens use scientific information to support a vibrant economy while ensuring ecological sustainability.

VISION

Texas Sea Grant envisions a future where people live, work and play along the Texas Gulf Coast in harmony with the natural resources that attract and sustain them, and 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.

MISSION

Texas Sea Grant's mission is to improve the understanding, wise use and stewardship of Texas coastal and marine resources.

To achieve this mission, Texas Sea Grant directs its research and engagement programs to benefit the citizens, businesses and communities of Texas – from providing grants and scholarships that benefit students and develop Texas' workforce, to funding Texas' innovative researchers to solve real-world problems, to deploying boots-on-the-ground extension professionals to help small businesses be more competitive in a global marketplace and coastal communities to grow sustainably and build resilience to impacts from storms and other hazards.

FOCUS AREAS

To help Texans understand, manage and use Texas Gulf Coast resources wisely, Texas Sea Grant identified four focus areas central to the program's activities:

1. Healthy Coastal Ecosystems
2. Sustainable Fisheries and Aquaculture
3. Resilient Communities and Economies
4. Environmental Literacy and Workforce Development

These focus areas evolved from the National Sea Grant Program's 2009-2013 Strategic Plan and reflect America's most urgent coastal needs, NOAA's goals and Sea Grant's strengths and core values. Each focus area has goals, outcomes and performance measures. The goals describe the desired long-term direction for each focus area. The outcomes are benchmarks that Texas Sea Grant can use to track progress toward achieving each goal. Performance measures are quantitative ways of measuring outcomes.

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

- Learning (short-term) outcomes lead to increased awareness, knowledge and skills, and 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 can only be realized through full utilization of Texas 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 action outcomes can be achieved. Simply

stated, Texas Sea Grant-sponsored research is the “engine” that leads to new products, tools or other discoveries used by Texas 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. The four-year target for each performance measure appears in parentheses following each of the 12 measures.

Focus Area: Healthy Coastal Ecosystems (HCE)

Healthy coastal ecosystems, sustained by their surrounding watersheds, are the foundation of life along the Gulf Coast. Keeping coastal ecosystems healthy is a challenge because of the diversity of stressors each system faces. This is further complicated because ecosystems do not adhere to traditional political boundaries. Responsible management of these systems requires new kinds of thinking and actions, often termed ecosystem-based management¹. 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 our coast. They also require understanding of the characteristics of species, landscapes and their interactions within each ecosystem.

In general, increasingly rapid development of the built environment, 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 multitude 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.

1. Goal: Ecosystem services are improved by enhanced health, diversity and abundance of fish, wildlife and plants.

Learning Outcomes

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

Action Outcomes

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

Consequence Outcomes

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

¹ Ecosystem-based management is an integrated approach to management that considers the entire ecosystem, including humans.

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 protected², 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.
- 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.

² In the context of this goal, protected areas are those places in some form of a conservation management program.

Healthy Coastal Ecosystems Performance Measures

1. Number of resource managers who use ecosystem-based approaches in the management of land, water and living resources as a result of Texas Sea Grant activities (10).
2. Number of acres of coastal habitat protected, enhanced or restored as a result of Texas Sea Grant activities (8,000).

Focus Area: Sustainable Fisheries and Aquaculture (SFA)³

The overall economic impact of the commercial, recreational, for-hire fisheries and aquaculture industries in the United States is more than \$276 billion. The commercial fishing industry supports about 1 million full- and part-time jobs and generates \$116 billion⁴. The recreational and for-hire fishing industries generate significant tourism revenue with \$73 billion in total economic impact for saltwater fishing and an additional \$6 billion annually for Great Lakes recreational and for-hire fisheries. The U.S. aquaculture industry generates an economic impact of \$1 billion, provides additional opportunities for job creation, and contributes to meeting the nation's demand for finfish and shellfish.

Texas Sea Grant will maintain its leadership role in working with the seafood industry to ensure a safe and sustainable supply of seafood products now and for future generations. Seafood safety will continue to be an ongoing concern for consumers as foreign imports, some of which are associated with seafood contamination, continue to increase. Texas Sea Grant's partnership with NOAA Fisheries, state agencies, 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. Goal: A safe, secure and sustainable supply of seafood to meet public demand.

Learning Outcomes

- 4.1. Fishery managers and fishermen understand the dynamics of wild fish populations.
- 4.2. The seafood industry⁵ 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 product.
- 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.

Action Outcomes

- 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.

³ 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."

⁴ NOAA Fisheries, 2009. Fisheries Economics, Sociocultural Status and Trends Series: <http://www.st.nmfs.noaa.gov/st5/publication/>.

⁵ The seafood industry includes all sectors of the industry, including aquaculturists, fishermen, processors, wholesalers, retailers and supporting businesses.

- 4.8. The seafood industry adopts innovative technologies and approaches to supply safe, sustainable and competitively marketable 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.
- 4.11. Resource managers establish policies and regulations that achieve a sustainable 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 seafood⁶ supply is sustainable and safe.
- 4.14. The economic viability and sustainability of domestic fishing and aquaculture industries is maintained.

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. Seafood consumers have the knowledge to evaluate sustainable seafood choices.
- 5.4. 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. 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 seafood industry operates sustainably and is economically viable.

Sustainable Fisheries and Aquaculture Performance Measures

- 3. 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 Texas Sea Grant activities (300).

⁶ Seafood includes product originating from all sectors of the fishing and aquaculture industries.

Focus Area: Resilient Communities and Economies (RCE)⁷

To accommodate more people and activity while balancing demands on coastal resources, Texas must develop innovative policies, institutional capacities and management approaches to increase community resilience. Texas Sea Grant will continue to support cutting-edge research in the areas of marine-related energy sources, climate change, coastal processes, energy efficiency, hazards, storm water management and tourism. Texas Sea Grant programs will engage our diverse and growing coastal populations to apply the best-available scientific knowledge that addresses increased resource demands and vulnerability. Ultimately, Texas Sea Grant 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 natural and built environments.

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

Learning Outcomes

- 6.1. Communities⁸ 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 waterfronts⁹.

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.

⁷ 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.

⁸ Communities are defined broadly to include governments, businesses, residents, visitors and non-governmental organizations.

⁹ 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 implement water conservation measures.
- 8.5. Communities engage in planning efforts to protect water supplies and improve water quality.
- 8.6. 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

- 8.7. Water supplies are sustained.
- 8.8. 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 for 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

4. 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 Texas Sea Grant activities (10).
5. Number of communities that implemented hazard resiliency practices to prepare for, respond to or minimize coastal hazardous events as a result of Texas Sea Grant activities (10).

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*¹⁰, states that building a workforce literate in science, technology, engineering and mathematics is crucial to maintaining America's competitiveness in a rapidly changing global economy. These skills are also necessary to advance cutting-edge research and to promote enhanced resource management. In recognition of these needs, the America COMPETES Act¹¹ 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 Texas 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 and the relationships and interactions between the natural and built environment and the ability to understand and use scientific evidence to make informed decisions regarding environmental issues¹². These issues involve uncertainty and require the consideration of economic, aesthetic, cultural and ethical values.

¹⁰ National Academy of Sciences, 2010: http://www.nap.edu/catalog.php?record_id=12999

¹¹ America COMPETES, 2010: <http://www.commerce.gov/americancompetes>

¹² 2009-2029 NOAA Education Strategic Plan

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

Learning Outcomes

- 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.

Action Outcomes

- 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.
- 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 broad understandings of their actions on the environment into personal decisions.

11. Goal: A future workforce reflecting the diversity of Texas Sea Grant programs, skilled in science, technology, engineering, mathematics and other disciplines critical to local, state, 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 has high job satisfaction.

Environmental Literacy and Workforce Development Performance Measures

6. Number of Texas Sea Grant products that are used to advance environmental literacy and workforce development (20).
7. Number of people engaged in Texas Sea Grant-supported informal education programs (60,000).
8. Number of Texas Sea Grant-supported graduates who become employed in a career related to their degree within two years of graduation (20).

CROSS-CUTTING PERFORMANCE MEASURES

9. Number of Texas Sea Grant tools, technologies and information services that are used by our partners/customers to improve ecosystem-based management (10).
10. Economic (market and non-market; jobs and businesses created or sustained) impacts derived from Texas Sea Grant activities (\$25 million; 800 jobs created or retained).
11. Number of peer-reviewed publications produced by Texas Sea Grant (25).

