

**SCIENCE SERVING**

**Maryland's Coasts**

**Maryland Sea Grant Strategic Plan**

**2010-2013**

**Revised May 2009**

# Introduction

*“The dynamic mix of ecology, hydrology and socioeconomics that defines the Chesapeake Bay — America’s largest estuary — presents a set of challenges that are as complex as the estuary itself. Those working toward the conservation, restoration, and sustainable use of Maryland’s rich coastal resources not only face increased urbanization in the Bay’s watershed but also a gathering public perception that those charged with caring for the Bay have made insufficient progress during the past two decades. The challenges that now face the Bay community urge us to strengthen the ties between science and the actions required to drive positive change leading to the goal of a resilient Chesapeake Bay and healthy coastal areas”*

## Introduction to the Revised Plan

These challenges, framed in the introduction to Maryland Sea Grant’s Strategic Plan nearly five years ago remain as important to the conservation and restoration community as when they were written. However, our community is now confronting the fact that many of the ambitious goals set for Bay restoration will not be met by the 2010 deadline and that the public is demanding that we do better. The human dimensions of the challenges have now emerged to impact us in ways that extend from local to global scales while the imperatives of the ecological landscape continue to demand action. The implications for Maryland Sea Grant are large. A detailed evaluation of what we have accomplished over the first half of our planning cycle reveals that we have much to be proud of — in numerous cases Maryland Sea Grant has provided essential scientific insights that have informed the development of environmental policy and applications to meet the needs of our constituents. Our pride in these achievements must be tempered, though, by the challenges the Bay continues to face. This emphasizes that we must adapt our strategies in ways that will enhance the community’s efforts to achieve the promise of a restored, sustainable watershed. The revisions found in this plan reflect our commitment to better employ our strengths to meet that overarching goal. We will build on our position in the academic and Bay communities, on our historical strengths as a cohesive and innovative program, and on our ability to build links among many constituencies. Our actions will be proactive and calibrated to join larger collective efforts focused on our coastal waters. We believe that through strong connections to the research and management communities, Maryland Sea Grant will help build the foundation for the sustainable use of coastal resources locally and beyond.

Maryland has many diverse stakeholders, all passionate about coastal resources and the watershed, and it hosts many federal, state, and local programs directed towards Bay conservation and restoration. Within this context, Maryland Sea Grant’s university-based position provides a singular niche. It enables us to maintain a neutral platform and allows for entrepreneurship and the opportunity to work across boundaries to achieve results quickly. Recognizing both the scope and resources of our program, this strategic plan charts a course that will shape our program’s research, education, and outreach efforts and will guide us as we develop integrated portfolios (see below). All our efforts — from research awards to outreach programs to synthesis and communications products — link

the quest for basic understanding with a consideration of the ultimate use of new knowledge.<sup>1</sup>

If we are to contribute to effective stewardship of Maryland's coastal resources we must be open to change and must manage our resources wisely. This revised plan will continue to guide us in making relevant, timely contributions that achieve measurable impacts.

*Maryland Sea Grant will engage the scientific and university community to address important coastal issues. We will provide a tangible bridge to decision-makers and will realize important opportunities for effective stewardship of Maryland's coastal resources.*

### **Maryland Sea Grant's Mission (2010-2013)**

The Maryland Sea Grant College, a university-based partnership with the National Oceanic and Atmospheric Administration (NOAA), is a service organization in the State of Maryland, administered for the University System of Maryland by the University of Maryland Center for Environmental Science. Its mission is to conduct a locally responsive and nationally eminent program to foster research, education and outreach for the sustainable use and conservation of coastal, marine, and watershed resources in Maryland, in the Mid-Atlantic region, and in the nation.

### **A Vision for 2010-2013**

Maryland Sea Grant will meet the challenges of the Chesapeake Bay and Maryland's coastal waters by shaping a cohesive program positioned to anticipate future needs and to respond to emerging issues. We will engage the talent and resources of the academic and research communities in Maryland and beyond. We will adopt strategies designed to foster program evolution and support adaptive management to meet the challenges of our varied constituencies in the state, region, and nation. To realize this vision, we will use the tools of research, outreach, and education in an integrated manner to influence the conservation, stewardship, and restoration of coastal resources, generate sustainable economic opportunities, and serve as a highly credible source of information for stakeholders and decision-makers.

Our programmatic vision builds upon our historical foundation as:

- **Leaders.** Sea Grant will take appropriate risks to facilitate innovation and adaptive change through application of nationally eminent research and engagement of the scientific community.
- **Integrators.** Sea Grant will serve as an integrator and communicator of diverse approaches and complex research findings to enhance understanding and empower decision-making.
- **A Neutral Forum.** Sea Grant will provide a neutral forum for the lively discussion of problems, solutions and creative ideas.

## **Programmatic and Organizational Values**

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<sup>1</sup> Donald Stokes. Pasteur's Quadrant: Basic Science and Technological Innovation. Brookings Institution Press, 1997.

Maryland Sea Grant's values reflect a programmatic commitment to serve the needs of a diverse constituency.

We strive to:

- Engage constituencies dedicated to conservation, sustainable use and restoration of Chesapeake Bay and Maryland coastal resources.
- Catalyze the application of preeminent science to fill critical gaps and realize new opportunities.
- Link science to outreach, leading to improved decision-making, new products, and new economic opportunities.
- Deliver innovative education for Maryland's citizens of all ages to foster coastal, marine, and scientific literacy.
- Adhere to responsible stewardship for all resources allocated to our program in our role as trustees.
- Commit to professionalism and organizational excellence for our stakeholders and to respect for our colleagues and their integrity as individuals.

## **The Context for Maryland Sea Grant's Revised Plan**

### ***The Chesapeake Bay 2010-2013***

Twenty-five years have passed since the historic signing of the 1983 Chesapeake Bay Agreement, where the federal government joined with regional states to commit to restore the nation's largest estuary. While this first document set forth very general goals, subsequent agreements brought more specific targets. In 1987, the Bay partners agreed to reduce nitrogen and phosphorus inputs to the estuary by 40 percent. In 2000, the ambitious Chesapeake 2000 (C2K) agreement set forth a long list of specific goals for increasing forest cover, implementing best management practices, and other concrete restoration activities.

Despite these goals and commitments, the past several years have brought a sense of public frustration as the Bay continues to show signs of decline. Mid-Bay measurements of turbidity, for example, have actually worsened virtually every year since monitoring began in 1985. Last year's alarming winter survey of blue crabs led the governors of Maryland and Virginia to hold a summit where they called for — and then implemented — regulations meant to lower the harvest pressure on female crabs by 34 percent. Dismal crab harvests have led to federal disaster relief for the Bay's seafood industry.

Concerned citizens and decision-makers are calling for greater accountability, especially of publicly funded programs. The Government Accounting Office (GAO) and the Office of the Inspector General (OIG) have each conducted assessments of the region wide Chesapeake Bay Program. The GAO report (2005) resulted in Congressional

appropriations language (2007) calling for the implementation of the GAO recommendations and a new Chesapeake Action Plan (CAP). In Maryland, Governor Martin O'Malley has instituted BayStat, an accountability process that sets concrete targets and then measures performance (see <http://www.baystat.maryland.gov/>). In this charged context of ecological complexity and public pressure, the demand is high for supporting, translating, and implementing high quality technical know-how. The public will not accept simply documenting the Bay's decline. Stakeholders from all parts of the policy spectrum are demanding that good science drive effective implementation.

As we move forward with our own planning, Maryland Sea Grant is taking account of recent planning and policy documents, in addition to the multijurisdictional Bay agreements referenced above. Among these are the following:

- Presidential Executive Order. On May 12, 2009, President Barack Obama issued an Executive Order establishing a Chesapeake Bay Federal Leadership Committee comprised of high-level officials from multiple federal agencies. The Order called for increased accountability for Bay restoration and the submission of a plan within 180 days for moving forward.
- Two-year milestones. In November, 2008, the Executive Council of the Chesapeake Bay Program announced a new emphasis on short-term, highly accountable goals. This move accelerates the pace for setting targets and adapting to changes on the ground, and it increases accountability in the short-term. (The Executive Council is comprised of the governors of the Bay watershed states, the mayor of the District of Columbia, the chair of the Chesapeake Bay Commission, and the head of the U.S. EPA.)
- Chesapeake Action Plan (CAP). In July 2008, the Chesapeake Bay Program submitted a report to Congress on strengthening the management, coordination, and accountability of the Chesapeake Bay Program (see <http://cap.chesapeakebay.net/rtc.htm>). The CAP calls for a new adaptive management process and other strategic efficiencies for improving the restoration effort.
- BayStat. As described above, BayStat sets very specific benchmarks for Bay restoration efforts in the state of Maryland. These benchmarks and the methods for reaching them will require our very best science and technology.
- Maryland Climate Change Assessment. This report notes that the region's climate, after relative stability for 6,000 years, has begun to change, resulting in warming temperatures and sea level rise. The state is taking a number of actions to respond. In April, 2009, the Maryland General Assembly passed the Greenhouse Gas Emissions Reduction Act, which requires a 25 percent cut from 2006 levels of greenhouse gas emissions by 2020. Some have called this the strongest piece of legislation of its kind in the country.
- Ecosystem-based Management (EBM). Decision-makers are beginning to embrace this whole-system approach to natural resource management. Maryland Sea Grant has been a leader in investigating this approach and is currently overseeing a Baywide Ecosystem-Based Fishery Management (EBFM) initiative supported by the Chesapeake Bay Program, state agencies in Maryland and Virginia, and the NOAA Chesapeake Bay Office.

Residents of the Chesapeake Bay watershed continue to be committed to actions that will

conserve existing resources and ecological functions and return the regional ecosystem of Chesapeake Bay to a better, healthier state. They envision a Bay that supports a diverse, well-functioning ecosystem, a variety of uses, and many communities — a Bay that is ecologically and economically resilient.

## ***Linkages with Our Partners***

Maryland Sea Grant recognizes that to best use our programmatic strengths, we must draw insights from important high-level analyses of Chesapeake Bay and from similar studies of our coastal resources nationwide. Furthermore, we must ensure that there is appropriate articulation of our priorities with those of relevant entities at the federal, state, and local levels. In addition to the policy documents referenced above, we must take account of a number of strategic plans that help clarify opportunities for us to contribute both singularly and through partnerships. In doing so, we more clearly define our niche in this complex programmatic and institutional environment.

***Strategic Plans of Agencies and Institutions.*** Acknowledging the essential federal--state partnership that forms the foundation of our efforts, Maryland Sea Grant's strategic plan must articulate well with that of the NOAA National Sea Grant College Program. More locally, our program exists within a dynamic academic and research environment supported by the University System of Maryland, the University of Maryland Center for Environmental Science, and the University of Maryland College Park in service to the entire state. Our "effectiveness" must be based on an understanding of the priorities and strengths of these institutions if we are to make the connections needed to develop lasting impacts in critical areas.

- ***The NOAA National Sea Grant Office Strategic Plan.*** This plan reflects the set of focus areas that have been developed by Sea Grant as organizing principles for contributions to issues of national importance. They are being implemented by the Sea Grant Network as a whole. In our case, the four focus areas provide a context for linking our local priorities to those of other programs across the nation. As detailed below, Maryland Sea Grant will contribute to all four national focus areas with an emphasis on the three that are most relevant to our state and region and in a manner that is consistent with our resources, scope, and the unique niche that we fill in our local setting. We will contribute to these areas in a variety of ways. At any given time, however, the apportioning of our investments in each will vary, depending on priorities and resources within the state and region. Maryland Sea Grant's portfolio approach and investments that engage all our programmatic resources are consistent with the integrated approach embraced by the Sea Grant Network in developing and implementing these focus areas.
- ***University Strategic Plans.*** The State of Maryland — at all levels — continues to place high value on the importance of a strong statewide research and education enterprise that can be brought to bear on key issues. This presents both tremendous opportunities and challenges for the academic community and for programs like Maryland Sea Grant. These realities are central to the strategic plans of the academic institutions that support Sea Grant. At the broad level of the University System of Maryland (USM), a fundamental focus on Maryland's "knowledge-based economy" places priority on the creation and use of knowledge "to advance the state's economy and to improve the quality of life for Maryland's residents." In

addition, the effort to educate, prepare, retain, and enhance K-12 teachers and their students through the Science, Technology, Engineering, and Mathematics (STEM) initiative forms a central mission for the USM.

The University of Maryland College Park and the University of Maryland Eastern Shore are the two Land Grant campuses within the University System. These institutions have embraced a strategy and vision that highlights the importance of engagement, partnerships, collaboration, and multidisciplinary efforts to reach and impact the greater community. Maryland Cooperative Extension (MCE) operates as a seamless program of professionals, some of whom have joint appointments between the two campuses. Extension partners with Maryland Sea Grant to provide technology transfer and outreach services statewide. MCE has implemented actions to advance environmental stewardship of the Chesapeake Bay and its watershed, to build greater economic opportunities for Maryland's residents, and to foster quality educational opportunities for all learners. The University of Maryland Center for Environmental Science (UMCES), Maryland Sea Grant's administrative home, has acknowledged the challenges of restoring and managing Chesapeake Bay and has set forth a plan that focuses on four strategic areas, two of which are most important to Maryland Sea Grant's mission — science to support ecosystem-based management and multi-scale ecosystem restoration. In adopting a science and education strategy that casts local impacts within a national and international context, UMCES engages and supports many efforts statewide. In total, these plans provide a strong foundation for our own efforts. Also part of the larger context are the plans of our other institutional partners within the University System of Maryland and the broader academic community (e.g., Johns Hopkins University, Smithsonian Environmental Research Center, and Morgan State University).

It is significant that several of these institutions have either recently completed or are in the process of revising their own strategic plans. In general terms, a much stronger focus on issues pertaining to all aspects of sustainability, as well as a strong commitment to activities that support and enhance stewardship of the Chesapeake Bay and its watershed, is a common theme. Maryland Sea Grant's goals are clearly aligned with those of our key partners, allowing us to contribute broadly and leverage resources in creative ways.

- ***Plans from Local and Regional Programs.*** Coordination and effective partnering are critical in the Chesapeake Bay, where many federal, state, and local entities have interests and capacities relevant to Maryland Sea Grant's mission and goals. Clearly the Chesapeake Bay Program provides a strong context for our collective activities. We are actively engaged with this regional partnership. As noted earlier, the new Chesapeake Action Plan, biennial restoration targets, and the 2009 Presidential Executive Order are all having a major impact on those of us working to conserve and restore the Bay, and they will continue to do so over the coming years. All of the participants in this effort will have to focus their energies and manage adaptively as regional priorities are clarified and specific needs are identified for research, outreach, and education. Several other programs are also particularly important to Maryland Sea Grant as partners and collaborators. Included is the Maryland Chesapeake and Coastal Program (NOAA Coastal Zone Program), whose focus on habitat, coast-smart communities, and healthy waters aligns well with our focus areas and with whom we have substantive collaborations on multiple levels. The NOAA Chesapeake Bay Office is similarly another important partner. Close

linkages and coordination with Sea Grant programs in Virginia and Delaware and NOAA will continue to insure greater leveraging of funds for broad regional impacts. Examination of the plans of our sister programs reveals considerable congruity, particularly with joint emphases on understanding ecosystem processes, sustainable fisheries, and education. We also recognize the importance of non-governmental organizations as critical advocates for conservation and restoration of the Bay and its watershed, and the opportunity to join in mutually beneficial partnerships.

## **Designing for Programmatic Impact**

### ***Strategic Management***

The role of program management is to engage the diverse talent of Maryland's academic and scientific communities in conjunction with the resources and capabilities of our program. In so doing, Maryland Sea Grant provides a bridge linking this expertise to a broad group of users. A bridge implies a two-way exchange, and Maryland Sea Grant will actively facilitate this intellectual commerce.

Maryland Sea Grant has chosen the term "portfolio" to reflect our investments in priority areas. Each portfolio includes a linked set of activities — whether research, outreach, education, or all three — brought to bear in a concerted fashion to achieve effective resolution of important issues. This portfolio approach allows the program to marshal a diversity of assets to address key challenges and opportunities, and draws on the varied strengths of the Sea Grant community in an efficient and synergistic manner. We stress the importance of active, productive partnerships, open lines of communication, and willingness to leverage input and resources from many quarters to address targeted issues.

Prioritizing efforts to construct effective portfolios requires opportunities and investments to be "filtered" through several levels of questions that reflect overarching programmatic considerations and their potential impact. To identify appropriate issues and rank their importance, Maryland Sea Grant considers the following questions to be first steps in priority setting:

- Does the issue fall within Maryland Sea Grant's mission and would it be an appropriate university-based activity?
- Is the issue important to the region and to the program's stakeholders?
- Will the contribution stem from innovative science and is there reasonable probability that significant progress can be made within the typical boundaries of Maryland Sea Grant funding?
- Will Maryland Sea Grant support a meaningful contribution toward addressing the issue with a demonstrable application and impact? Will the issue remain "unaddressed" without our involvement?
- Is the talent and expertise available in Maryland or in the region to address the issue? Would Sea Grant support enhance, directly or indirectly, the talent base for marine and coastal issues?

Specifically, through funded research, scholarship, and synthesis, we will play a leadership role in the application of the most forward-thinking science to the sustainable use, conservation, and restoration of the Chesapeake Bay and to the broad advancement of coastal, marine, and watershed research.

By acting as an integrator, we will bring together researchers, users, managers, and others to address key issues and to synthesize information into neutral and objective forms for use by the larger community — integrating scientific research with outreach efforts and policy analysis.

Because Sea Grant has neither regulatory nor rule-making responsibility, we will use our strong position to provide a balanced, neutral platform for sharing ideas. This allows us to serve as an honest broker to help resolve emerging resource conflicts. We will work to make this platform available when appropriate to aid in solving difficult resource issues.

### ***Targeted Capacity***

The difficult choices facing the Chesapeake watershed underscore the need for Maryland Sea Grant to apply its resources strategically — in a manner that matches our capacity to achieve substantive impacts. Similarly, we should be entrepreneurial and seek funding for activities that are realistic, logical extensions of our skills into new areas and that build upon strong partnerships with the institutions we serve.

- ***Science.*** Maryland Sea Grant has sustained a long-term effort to provide a better understanding of the fundamental mechanisms that regulate estuarine function and response to anthropogenic influences. This high quality science has helped to “define” Chesapeake Bay and has served to clarify how estuaries function worldwide. With a proven ability to identify and implement research that fills critical knowledge gaps, Maryland Sea Grant is well positioned to make important contributions to the conservation and restoration of Chesapeake Bay and Maryland’s coastal waters.
- ***Policy.*** Innovative links forged between the scientific community and decision makers through outreach are fundamental to Maryland Sea Grant’s mission. The demand is growing for clear, unbiased information to help shape conservation, restoration, and policy development. Maryland Sea Grant stands at the forefront of providing translation and syntheses that will be needed in the coming years. As the region comes to grips with the reality of what conservation and restoration will require, Sea Grant must remain a strong highly credible source for information and facilitation.
- ***Community.*** New economic opportunities, an informed citizenry, and stronger communities will be critical in conserving and restoring the Chesapeake watershed. Maryland Sea Grant’s commitment to innovative extension and education programming has positioned us to be leaders in the development of evolving but sustainable communities that are effective stewards of our coastal resources.
- ***Cooperation.*** Confronting watershed conservation and restoration will require strengthening regional alliances and fostering cooperation and coordination that goes beyond state boundaries. Maryland Sea Grant’s commitment to working with our neighboring Sea Grant programs and the broader community in the Mid-Atlantic and

nation as a whole positions us to be a strong active participant and leader in regional initiatives.

## **Charting an Effective Course to 2013**

Maryland Sea Grant was in a somewhat unique position with respect to the development of this revised plan. The development of the new NOAA National Sea Grant Strategic and Implementation plans focused attention on aligning not only goals and strategies but also research cycles. Accordingly, it was necessary for Maryland Sea Grant to shift its omnibus cycle by one year to conform to national policy. Given that, and the continued relevance of most of our original plan, we chose to revise our current plan rather than undertake a completely new strategic planning cycle. This is consistent with our view that plans are living documents and that iterative changes are not only useful and important, but essential if we are to maintain our value to the communities of stakeholders we serve. Our intent is to undertake a completely new planning process in conjunction with the development of the next national plan starting in 2012.

In undertaking this revision, we recognize that our challenge is to bridge local and national priorities and, in so doing, demonstrate how Maryland Sea Grant can best serve the needs of our constituents and best fulfill our federal mandate as a program. We re-examined our priorities using a detailed analysis of our actions and outcomes over the first half of our planning cycle. This included an iterative evaluation of Maryland Sea Grants goals and their alignment with the national plan as well as emerging priorities in the Chesapeake Bay watershed. We also have recognized that there is a greatly enhanced expectation on the part of policymakers, managers, and the general public in the Chesapeake region that we will make substantive contributions. We view the greater level of accountability we now face as a very real challenge to make wise investments that yield strong outcomes.

The result of these analyses is a plan for the next three years that is more focused, with a renewed emphasis on reaching specific endpoints using all the tools we have at our disposal. We have sharpened the language for all goals and strategies in order to enhance clarity. In addition we have reduced the overall number of goals and strategies to better reflect our suite of resources — both financial and human. We have also added two new strategies to address important aspects of climate change in the coming years. Finally, to conform to the NOAA National Sea Grant Strategic Plan, we have adopted the common language used therein (focus areas, goals, strategies).

Maryland Sea Grant operates in a complex programmatic and institutional environment, populated with efforts that have evolved to pursue conservation and restoration of the Chesapeake Bay and Maryland's coastal waters. Our expertise in the support and interpretation of scientific inquiry positions us to make strong contributions in both research and outreach. At the same time, our size and scope demand that we be selective in choosing issues and targeting resources. This revised strategic plan provides us with a roadmap and emphasizes the importance of fostering preeminent scientific contributions — contributions that can, through a variety of mechanisms, inform and influence the policymaking process. Defining and filling critical knowledge gaps and conveying information to those engaged in the adaptive management of Maryland's coastal resources builds upon the historical strength of this program and will continue to position us to be leaders in the coming years.

The specific goals and strategies that follow synthesize the advice of our stakeholders and

partners and define a niche for our program that mobilizes all of our resources and capabilities in an integrated manner. We organize our efforts into three major focus areas. By design, there is considerable “cross-talk” between them — representing the true interdisciplinary nature of the issues that face coastal Maryland. Maryland Sea Grant’s focus areas are:

*Maryland Focus Area 1: Resilient Ecosystem Processes and Responses*

*Maryland Focus Area 2: Sustainable Natural Resources of Coastal Maryland*

*Maryland Focus Area 3: Viable Coastal Communities and Economies*

In this plan Maryland Sea Grant explicitly addresses three of the four national focus areas defined for the NOAA National Sea Grant Strategic Plan. These are:

*National Focus Area 1: Healthy Coastal Ecosystems*

*National Focus Area 2: Safe and Sustainable Seafood Supply*

*National Focus Area 3: Sustainable Coastal Development*

The specific foci and goals articulated here are closely aligned with those of the national plan. An important distinction with respect to Maryland Focus Area 2 lies in the fact that — while we acknowledge the importance of seafood supply (National Focus Area 2) — we view natural resources in a broader context that includes fisheries, habitat, and other biological, physical, and socioeconomic attributes that shape our use of the Bay. This is consistent with our intent to work in the ecosystem-based management context that is emerging in the Chesapeake Bay watershed. In addition, Maryland Sea Grant does not have a separate focus area dedicated to hazard resilience. We address issues pertinent to this priority in Maryland through activities in Focus Area 3: Viable Coastal Communities.

Positive ecological change in the Chesapeake Bay will depend on the ability to integrate the best scientific information available with a dynamic policymaking and implementation process. In embracing this challenge, Maryland Sea Grant has adopted three overarching themes that will impact our approach. We recognize their importance to all of our focus areas. Included are:

- **Building Capacity for Decision-Making:** As part of its scientific synthesis and outreach functions, Maryland Sea Grant has a clear mandate to provide strong educational programming to help inform and empower coastal stewards. Through carefully thought-out and well-directed efforts we can impact constituents in ways that extend across the watershed as well as across generations. We strongly believe that we should provide a variety of opportunities and products that enhance the capacity of the scientific community, policymakers, managers, teachers, students, and the general public as they collectively work to understand issues and their responsibility as stewards of the Bay and its watershed.
- **Climate Change:** The diverse impacts of climate change have great ramifications for Maryland and the entire Chesapeake Bay watershed. These may be particularly acute in the context of the ongoing efforts to restore essential ecosystem services. We will seek appropriate ways to use our suite of resources and tools to actively engage the scientific community, policymakers, and multiple constituencies as we confront this challenge.

- **Adaptive Management:** The concept of “adaptive management” describes a process of systematic improvement in managing complex, highly uncertain systems. This approach seeks to improve management policies and practices by integrating multiple techniques and disciplines — from natural to social sciences — in planning, implementation, and evaluation. In an iterative manner, it seeks to learn both from stakeholders and from the outcomes of operational programs to ensure more effective performance — in this case, the conservation and restoration of natural resources over time. Maryland Sea Grant will continue to embrace this approach as we seek new ways to advance ecosystem-based management of the Bay and its resources.

## Maryland Sea Grant’s Strategic Goals 2010-2013

### *Focus Area 1. Resilient Ecosystem Processes and Responses*

Scientists recognize that the Chesapeake Bay has experienced a profound functional shift from an ecosystem dominated by benthic processes to one driven by production in the water column. Urbanization and large-scale changes within the watershed are primary contributors to an ecosystem functionally impaired by excess nutrients and sediments — impairments evident in the water quality of Maryland coastal and freshwater systems, and in their habitat structure and biodiversity. The impacts of anthropogenic loads occur within the context of changes in broad hydrological cycles. This complex interaction poses fundamental challenges to those seeking to manage the estuary and watershed. Achieving a sustainable Chesapeake Bay will require science-based decisions that must consider how and when conservation and restoration efforts can be most effective. Ultimately, restoration will create a dynamic Bay that reflects the reality of what can be accomplished in meeting specific criteria rather than one that reflects an idealized vision of a Bay of the past. Therefore, there is a fundamental need to understand what a “new” ecosystem might look like, how it might function, and how the current system will evolve as management actions are implemented.

Maryland Sea Grant will address the issue of conservation and restoration by considering how key coastal processes and ecosystems respond as existing nutrient and sediment reduction goals are achieved and maintained over time. In this way, the program will provide critical information to help determine the temporal and spatial scales over which actions will be effective and the trajectories that the ecosystem may follow once actions are initiated. Key to this effort is the goal of developing and communicating a better understanding of the thresholds that the Bay ecosystem will cross as it shifts to new stable states.

#### **Goal 1.1 Build scientific understanding of ecosystem processes and responses**

Strategy 1.1a Support research to understand and predict large-scale ecosystem responses and trajectories.

Strategy 1.1b Support research to understand how changes in coastal and estuarine conditions (e.g., anthropogenic inputs of nutrients, sediments and contaminant loadings) relate to ecosystem health and food web dynamics.

Strategy 1.1c Determine how keystone species and key ecosystem

characteristics respond to environmental management.

Strategy 1.1d Determine impacts of and ecosystem responses to climate change and sea level rise.

### **Goal 1.2 Build scientific foundations for implementing ecosystem restoration**

Strategy 1.2a: Determine how obligate ecological processes and communities affect and respond to conservation, management and restoration actions.

Strategy 1.2b: Determine how restoration efforts affect or are affected by changes in coastal and estuarine conditions (e.g. temperature, salinity, wind, wave, nutrients, sediments, contaminants, and climate change).

Strategy 1.2c: Determine how anthropogenic influences including nutrient, sediment, and contaminant loading affect restoration efforts and their likelihood of success.

Strategy 1.2d: Develop indicators of restoration success and/or failure.

## ***Focus Area 2. Sustainable Natural Resources of Coastal Maryland***

Research to support the implementation of ecosystem-based management of critical natural resources is integral to building a comprehensive approach to conservation, restoration and sustainable use of Maryland's coastal resources. Success will require adaptive management that embraces sound policies for sustainable use as well as emerging technologies. Aquaculture, along with a suite of novel applications for engineering and biotechnology, may help reduce pressure on Chesapeake Bay resources as well as catalyze new uses leading to economic development and jobs.

Maryland Sea Grant will address the issue of conservation and restoration by considering how best to support innovations in the science and application of ecosystem-based management and sustainable use of Maryland's coastal resources.

### **Goal 2.1 Improve scientific foundations for managing, conserving and restoring natural resources**

Strategy 2.1a: Develop measures of natural resource performance and carrying capacity (e.g., harvestable fish species, essential habitat).

Strategy 2.1b: Develop understanding of targets for and roadblocks to sustaining natural resources (e.g., effects of climate, diseases, contaminants on harvestable fish species and essential habitat).

### **Goal 2.2 Implementation of ecosystem-based fisheries management in Chesapeake Bay**

Strategy 2.2a: Support the scientific foundation for, and the regional structures and processes needed to, advance ecosystem-based fisheries

management.

### **Goal 2.3 Develop technologies for restoration, aquaculture and marine products**

Strategy 2.3a: Support the development and appropriate use of aquaculture for restoration and/or commercial enterprise.

Strategy 2.3b: Support technologies and strategies for the development of marine products, energy sources, and bio- and phyto- remediation.

### ***Focus Area 3. Viable Coastal Communities and Economies***

Restoration and sustainability mean different things to different interest groups or stakeholders. “Conservation,” “preservation,” and “community” all connote different images and realities for residents of the Bay watershed. Traditional drivers such as commercial fishing and agricultural patterns in coastal communities are changing. Policy choices and other factors leading to different or new economic opportunities exert great influence and yield changes in traditional communities. As restoration moves ahead, many communities may be forced to adjust to change while balancing the desire to preserve a sense of place.

Maryland Sea Grant will address the issue of conservation and restoration by considering the socioeconomic implications of the changing watershed on coastal communities and economies and will advance dialog and positive engagement of diverse stakeholders.

### **Goal 3.1 Develop Tools for Improved Coastal Management**

Strategy 3.1a: Support and provide facilitation and conflict resolution for multiple use issues in coastal communities.

Strategy 3.1b: Working together with university, federal, state, and local partners foster development and use of new tools for sustainability in coastal communities and watersheds.

Strategy 3.1c: Develop an understanding of immediate and long-term effects of climate change, sea level rise, and other hazards on coastal communities.

### **Goal 3.2 Support and Enhance Sustainable Coastal Land Use and Restoration**

Strategy 3.2a: Foster the development of new environmentally sustainable options for shoreline stabilization and restoration.

Strategy 3.2b: Develop a better understanding of dredging impacts and better dredged material placement options.

Strategy 3.2c: Examine new technologies to prevent and /or remediate nutrient and sediment loading within the watershed.

### **Goal 3.3 Foster Sustainable Coastal Economic Development**

Strategy 3.3a: Support sustainable fisheries-dependent and seafood processing technologies.

Strategy 3.3b: Support improved understanding of the role of marine-dependent industries on the sustainability of coastal economies.

Strategy 3.3 c: Develop a better understanding of socioeconomic implications of environmental change and efforts to restore the Bay.

### **Goal 3.4 Build knowledge, research, and stewardship capacity in coastal communities**

Strategy 3.4a: Synthesize, translate, and provide science-based information to support ecosystem approaches for management by coastal decision makers.

Strategy 3.4b: Enhance and market graduate and undergraduate research fellowship funding opportunities and extend their reach to under-represented groups in coastal and marine sciences.

Strategy 3.4c: Develop K-12 STEM content, lessons, curriculum enhancements, and research experiences for K-12 teachers focused on coastal and watershed issues.

Strategy 3.4d: Develop programs for the general public through partnerships with new venues (aquaria, visitor's centers and museums) and through opportunities that extend knowledge beyond traditional stakeholder groups.

Maryland Sea Grant 2010-2013 Strategic Plan Alignment Submitted to NSGO

Table 1 Shows the alignment of Maryland Sea Grant 2010-2013 Strategic Plan focus areas, goals and strategies with the National Sea Grant Strategic Plan.

<b>TABLE 1. FOCUS AREAS, GOALS AND STRATEGIES</b>	
<b>NATIONAL STRATEGIC PLAN</b>	<b>MD SG STRATEGIC PLAN Strategies</b>
<b>FOCUS AREA: HEALTHY COASTAL ECOSYSTEMS</b>	<b>MDSG FOCUS AREA 1. Resilient Ecosystem Processes and Responses (REPR)</b>
<b>Goal HCE 1: Sound scientific information to support ecosystem-based approaches to managing the coastal environment.</b>	<b>Goal: 1.1 Build scientific understanding of ecosystem processes and responses.</b>
Strategy HCE 1.1: Conduct research on ecosystem processes, the relationships between coastal stressors—water quality degradation, contaminants, harmful algal blooms, invasive species, and wetlands loss—and long-term human and ecosystem health, and communicate this information to public and private planners, decision-makers and managers.	Strategy 1.1a: Support research to understand and predict large scale ecosystem responses and trajectories.
Strategy HCE 1.2: Contribute to the development of baseline data, standards, and indicators to support ecosystem-based approaches to land use, water, fisheries, and other resource management, working with programs such as NOAA's National Centers for Coastal Ocean Science, ocean observing programs, and others.	Strategy 1.1b: Support research to understand how changes in coastal and estuarine conditions (e.g., anthropogenic inputs of nutrients, sediments and contaminant loadings) relate to ecosystem health and food web dynamics.  Strategy 2.1a: Develop measures of natural resources performance and carrying capacity (e.g. harvestable fish species, essential habitat).
Strategy HCE 1.3: Develop methodologies that can be used to evaluate ecosystem-based management approaches to assess their effectiveness once they are in place, and to guide future management efforts, working with the National Marine Fisheries Service and other federal, state and local partners.	Strategy 1.1c: Determine how keystone species and key ecosystem characteristics respond to environmental management.
Strategy:	Strategy 1.1d: Determine effects of and ecosystem responses to climate change and sea level rise.
<b>Goal: Widespread use of ecosystem-based approaches to managing land, water and living resources in coastal areas.</b>	<b>Goal: 3.4 Build knowledge, research and stewardship capacity in coastal communities.</b>
Strategy HCE 2.1: Work with partners within and outside of NOAA to develop data, models, and training activities that support ecosystem-based planning and management approaches, and share these with a wide variety of constituencies.	Strategy 3.4a: Synthesize, translate and provide science based information to support ecosystem approaches for management by coastal decision makers.

<b>TABLE 1. FOCUS AREAS, GOALS AND STRATEGIES</b>	
<b>NATIONAL STRATEGIC PLAN</b>	<b>MD SG STRATEGIC PLAN Strategies</b>
Strategy HCE 2.2: Support the development of regional coastal observation systems and other collaborative efforts that advance our capability to predict the effects of human activities and environmental changes on coastal resources in order to take steps to mitigate their effects.	
Strategy HCE 2.3: Provide life-long learning programs for people of all ages that enhance understanding of coastal, ocean and Great Lakes environments and promote stewardship of healthy ecosystems.	<p>Strategy 3.4c: Develop K-12 STEM content, lessons, curriculum enhancements and research experiences for K-12 teachers focused on coastal and watershed issues.</p> <p>Strategy 3.4d: Develop programs for the general public through partnership with new venues (aquaria, visitor's centers and museums) and through opportunities that extend knowledge beyond traditional stakeholder groups.</p>
Strategy:	Strategy 3.4b: Enhance and market graduate and undergraduate research fellowship funding opportunities and extend their reach to under-represented groups in coastal and marine sciences.
<b>Goal HCE 3: Restored function and productivity of degraded ecosystems.</b>	<p><b>Goals:</b></p> <p><b>1.2 Build scientific foundations for implementing ecosystem restoration</b></p> <p><b>2.1 Improve scientific foundations for managing, conserving and restoring natural resources</b></p>

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<b>NATIONAL STRATEGIC PLAN</b>	<b>MD SG STRATEGIC PLAN Strategies</b>
Strategy HCE 3.1: Support research to improve the effectiveness of ecosystem restoration and identify promising new restoration approaches and technologies.	<p>Strategy 1.2a: Determine how obligate ecological processes and communities affect and respond to conservation, management and restoration actions.</p> <p>Strategy 1.2b: Determine how restoration efforts affect or are affected by changes in coastal and estuarine conditions (e.g. temperature, salinity, wind, wave, nutrients, sediments, contaminants, climate change).</p> <p>Strategy 1.2c: Determine how anthropogenic influences, including nutrient, sediment and contaminant loading affect restoration efforts and their likelihood of success.</p> <p>Strategy 1.2d: Develop indicators of restoration success and/or failure.</p>
Strategy HCE 3.2: Invest in the development and dissemination of new information, policies, technologies and methods to address water quality degradation, prevent the introduction and spread of aquatic non-native species, and minimize the negative impacts of these on coastal, ocean and Great Lakes food webs.	Strategy 2.3b: Support technologies and strategies for the development of marine products, energy sources and bio- and phyto- remediation.
Strategy HCE 3.3: Provide technical support for citizens and businesses that need help with specific mitigation/restoration problems, giving them access to the latest information and techniques.	Strategy 2.1b: Develop understanding of targets for and roadblocks to sustaining natural resources (e.g., effects of climate, diseases, contaminants on harvestable fish species and essential habitat).
<b>FOCUS AREA: SUSTAINABLE COASTAL DEVELOPMENT</b>	<b>MDSG FOCUS AREA 3. Viable Coastal Communities and Economies (VCCE)</b>
<b>Goal SCD 1: Healthy coastal economies that include working waterfronts, an abundance of recreation and tourism opportunities, and coastal access for all citizens.</b>	<b>Goal: 3.1 Develop Tools for Improved Coastal Management</b>
Strategy SCD 1.1: Support research and outreach activities that provide local communities with information and techniques to help them enhance their waterfront-related economic activities such as commercial and recreational fishing, aquaculture, tourism, and energy and port development, without diminishing the long-term health of the natural coastal environment.	Strategy 3.1b Working together with university, federal, state and local partners foster development and use of new tools for sustainable coastal communities and watersheds.
Strategy: Support local, regional, and national efforts to preserve and increase public access to the nation's beaches and waterfronts through assessment of access needs, analysis of legal issues, and technical assistance.	

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<b>NATIONAL STRATEGIC PLAN</b>	<b>MD SG STRATEGIC PLAN Strategies</b>
Strategy SCD 1.3: Use Sea Grant extension and education capabilities to engage coastal communities in planning processes that support the efforts of community leaders to identify and pursue sustainable economic development policies and programs.	Strategy 3.1a: Support and provide facilitation and conflict resolution for multiple use issues in coastal communities.
Strategy:	Strategy 3.1c: Develop an understanding of immediate and long-term effects of climate change, sea level rise and other hazards on coastal communities.
<b>Goal SCD 2: Coastal communities that make efficient use of land, energy and water resources and protect the resources needed to sustain coastal ecosystems and quality of life.</b>	<b>Goal: 3.2 Support and Enhance Sustainable Coastal Land Use and Restoration</b>
Strategy SCD 2.1: Strengthen Sea Grant's research activities and extension capacity to help coastal communities determine the sustainable carrying capacity of their land, water, and other resources through resource assessments, scenario building, modeling, and other techniques.	Strategy 3.2c: Examine new technologies to prevent and /or remediate nutrient and sediment loading within the watershed.
Strategy SCD 2.2: Support innovative research on land-use practices and building designs that promote energy and water conservation, coastal-ocean related renewable energy technologies, and the creation of other tools to help communities grow in sustainable ways.	Strategy 3.2a: Foster the development of new environmentally sustainable options for shoreline stabilization and restoration.
Strategy: Work with NOAA's Climate Program Office, coastal programs, and other partners to help communities evaluate their ecological footprints and grow in environmentally sustainable ways.	
<b>Goal SCD 3: Coastal citizens, community leaders, and industries that recognize the complex inter-relationships between social, economic and environmental values in coastal areas and work together to balance multiple uses and optimize environmental sustainability.</b>	<b>Goal: 3.3 Foster Sustainable Coastal Economic Development</b>
Strategy SCD 3.1: Work with NOAA's Office of Ocean and Coastal Resource Management and Coastal Services Center, EPA's Offices of Smart Growth, and other federal, state and local partners to disseminate assessment tools, model plans and ordinances, best management practices, alternative development approaches, and other techniques that will enable the citizens of our coastal zones to develop their coastal economies in environmentally-sound ways.	Strategy 3.3c Develop a better understanding of socioeconomic implications of environmental change and efforts to restore the Bay.
Strategy SCD 3.2: Build local capacity to evaluate cost-benefit trade-offs in the coastal zone through a greater emphasis on socio-economic research, impact studies, and other methods of evaluating alternative future scenarios for coastal communities.	Strategy 3.3b Support improved understanding of the role of marine-dependent industries on the sustainability of coastal economies.
Strategy SCD 3.3: Foster regional cooperation and partnerships among local government officials, community stakeholders, and regional planning organizations to promote sustainable growth plans and strategies that protect local and regional natural resources that will ensure an abundance of these resources is available to serve future generations.	Strategy 3.1b: Working together with university, federal, state and local partners foster development and use of new tools for sustainability in coastal communities and watersheds.
Strategy:	Strategy 3.2b: Develop a better understanding of dredging impacts and better dredged material placement options
<b>FOCUS AREA: SAFE AND SUSTAINABLE SEAFOOD SUPPLY</b>	<b>MDSG FOCUS AREA 2. Sustainable Natural Resources of Coastal Maryland (SNR)</b>

<b>TABLE 1. FOCUS AREAS, GOALS AND STRATEGIES</b>	
<b>NATIONAL STRATEGIC PLAN</b>	<b>MD SG STRATEGIC PLAN Strategies</b>
<b>Goal SSST 1: A sustainable supply of safe seafood to meet public demand.</b>	<b>Goals:</b> <b>2.1 Improve scientific foundations for managing, conserving and restoring natural resources</b>  <b>2.3 Develop technologies for restoration, aquaculture and marine products</b>
Strategy SSST 1.1: Use Sea Grant's research, extension, education, and communication capabilities to develop and disseminate essential knowledge about natural and human threats to the long-term viability of wild fish populations, to identify ways to minimize these threats, and to use ecosystem-based fisheries management and other innovative approaches to accomplish this.	Strategy 2.1a: Develop measures of natural resource performance and carrying capacity (e.g. harvestable fish species, essential habitat).  Strategy 2.1b: Develop understanding of targets for and roadblocks to sustaining natural resources (e.g., effects of climate, diseases, contaminants on harvestable fish species and essential habitat)
Strategy SSST 1.2: Conduct integrated research, education, and outreach activities to support a viable domestic aquaculture industry with acceptable environmental impacts, in ways that are consistent with national objectives, building on the leadership role Sea Grant plays in this area.	Strategy 2.3a: Support the development and appropriate use of aquaculture for restoration and/or commercial enterprise.
Strategy SSST 1.3: Work with NOAA's National Marine Fisheries Program, other federal and state partners, and the seafood industry to enhance the management and productivity of wild fisheries.	SEE EBFM and Goal Below
<b>Goal SSST 2: A healthy domestic seafood industry that harvests, produces, processes, and markets seafood responsibly and efficiently.</b>	<b>Goal:</b> <b>2.2 Implementation of ecosystem-based fisheries management in Chesapeake Bay</b>
Strategy SSST 2.1: Engage harvesters, recreational fisherman, producers and managers in the development of research and management innovations related to the condition, use, and conservation of the natural resources they depend on.	Strategy 2.2a: Support the scientific foundation for, and the regional structures and processes needed to advance ecosystem-based fisheries management.
Strategy SSST 2.2: Support research, development, and transfer of new technologies to keep the domestic seafood industry financially competitive and environmentally responsible.	Strategy 3.3a: Support sustainable fisheries-dependent and seafood processing technologies.
Strategy SSST 2.3: Work with the seafood industry to develop new products and innovative marketing approaches to increase seafood availability and profitability.	Strategy 3.3a: Support sustainable fisheries-dependent and seafood processing technologies.
<b>Goal SSST 3: Informed consumers who understand the importance of ecosystem health and sustainable harvesting practices to the future of our domestic fisheries, who appreciate the health benefits of seafood consumption, and who understand how to evaluate the safety of the seafood products they buy.</b>	

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<b>NATIONAL STRATEGIC PLAN</b>	<b>MD SG STRATEGIC PLAN Strategies</b>
Strategy SSST 3.1: Enhance training and technical assistance programs related to the application of standards for safe domestic and imported seafood.	Strategy 3.3a: Support sustainable fisheries-dependent and seafood processing technologies. (see above also)
Strategy SSST 3.2: Develop educational programs and materials that enhance the American public's understanding of what is required to maintain sustainable domestic fisheries and to build the public's awareness of differences in the quality, safety, and nutritional benefits of different seafood products so they will be informed advocates and consumers.	Strategy 2.2a: Support the scientific foundation for, and the regional structures and processes needed to advance ecosystem-based fisheries management.
Strategy SSST 1.3: Work in close coordination with the National Marine Fisheries Service and other federal partners to develop information portals that give access to factual information on seafood safety.	Strategy 3.3a: Support sustainable fisheries-dependent and seafood processing technologies
<b>FOCUS AREA: HAZARD RESILIENCE IN COASTAL COMMUNITIES</b>	
<b>Goal HRCC 1: Widespread understanding of the risks associated with living, working, and doing business along the nation's coasts.</b>	<b>MDSG Cross-Cut: Understanding regional effects of climate change and sea level rise and their impacts on coastal communities and ecosystems</b>
Strategy HRCC 1.1: Conduct research to assess hazard-related risks and increase the availability and usefulness of hazard-related information and forecasting for citizens, industries, and decision-makers in coastal communities.	Strategy 1.1d : Determine effects of and ecosystem responses to climate change and sea level rise.
Strategy: Work with marine commercial enterprises to assess the risks associated with doing business in coastal areas in the context of hurricanes and other coastal storms, climate-related changes, and dramatic changes in port and international trade activities.	
Strategy HRCC 1.3: Work with the NOAA Climate Change Program and other public and private sector partners to develop comprehensive education/literacy programs on the immediate and long-term effects of climate-related changes, and other hazardous events, on human safety and property along the coast, and how to prepare for and survive them.	Strategy 3.1c: Develop an understanding of immediate and long-term effects of climate change, sea level rise and other hazards on coastal communities.
<b>Goal: Community capacity to prepare for and respond to hazardous events.</b>	
Strategy: • Help public and private decision-makers create and adopt policies, plans, and ordinances to reduce risks, manage catastrophic events and speed recovery.	
Strategy: Create and disseminate, in partnership with NOAA's National Weather Service and other entities, integrated demographic and coastal hazard information databases that help measure human vulnerability in specific coastal regions, support hazard-related planning activities, and facilitate disaster relief efforts.	
Strategy: Conduct research and communicate information on how the use of natural features and new technologies can help communities prepare for and mitigate the impacts of hazardous events.	
<b>Goal: Effective response to coastal catastrophes.</b>	
Strategy: Work with NOAA's National Weather Service and the National Ocean Service, regional ocean observation systems, and other partners to make hazard-related data and data-derived products available and relevant to support decision-making during crisis events.	
Strategy: Contribute to the nation's rapid response capability by developing ways to mobilize Sea Grant's national network of scientific and technical expertise to inform response strategies and activities.	
Strategy: Make Sea Grant's local knowledge and contacts available to work with federal, state, regional, and local agencies, non-governmental organizations, and international partners that have hazardous event responsibilities, to facilitate the speed and quality of response to these crises.	