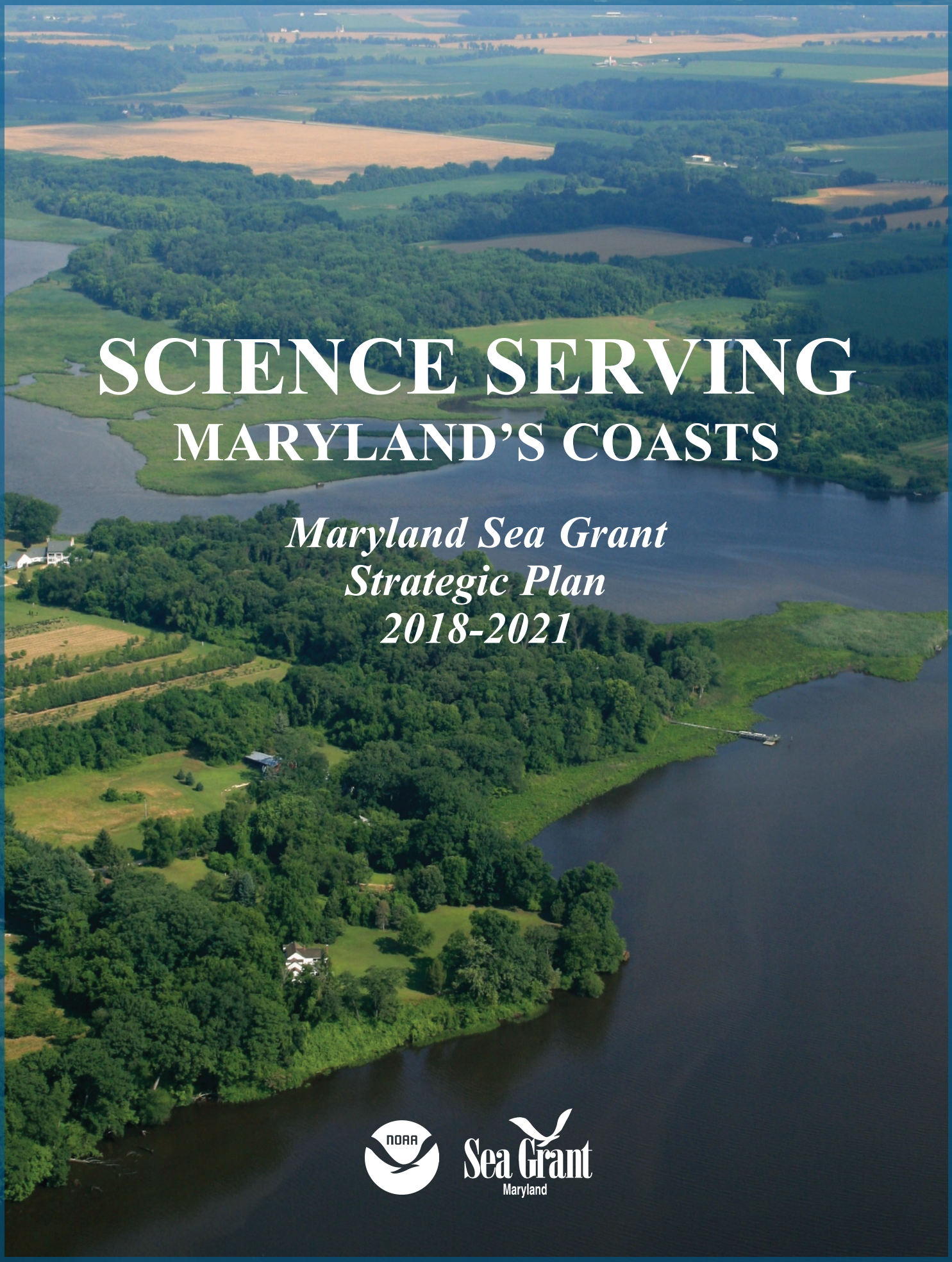

SCIENCE SERVING
MARYLAND'S COASTS

Maryland Sea Grant
Strategic Plan
2018-2021

NOAA

Sea Grant
Maryland

SCIENCE SERVING
MARYLAND'S COASTS

Maryland Sea Grant
Strategic Plan
2018–2021

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Contents

Introduction **3**

Mission and Vision **3**

Vision 2018-2021 4

Mission 4

Core Values and Operational Principles **4**

Core Values 4

Partner Synergies 5

Diversity 5

Organizational Excellence 6

Strategic Decision-Making 6

Key Influences on Our 2018-2021 Strategic Plan **7**

Federal and State Policy Drivers 7

Strategic Plan Alignment 9

Strategic Plan 2018-2021 ..... **10**

Focus Area 1. Healthy Coastal Ecosystems 10

Focus Area 2. Sustainable Fisheries and Aquaculture 11

Focus Area 3. Resilient Communities and Economies 12

Focus Area 4. Effective Environmental Science Education 13

Stakeholder Engagement in the Strategic Planning Process 14

Appendix I **15**

Introduction

Maryland Sea Grant's strategic plan focuses on the Chesapeake and coastal bays and their watersheds. The watershed of the iconic Chesapeake Bay touches all of Maryland's counties and drains over 95 percent of state land, and the Bay dominates Maryland's history, ecology, and economy. Over 30 years ago, Maryland led a multi-state drive to Maryland's restore the Chesapeake Bay ecosystem. That effort created a complicated coalition of federal and state agencies, non-governmental organizations, local municipalities, and universities drawn from six states and the District of Columbia committed to the conservation and restoration of the Chesapeake Bay. That alliance has accomplished much but continues to face long-standing challenges, like the increasing urbanization of the watershed and, more recently, effects of climate change.

In this complex nexus of policy and environmental change, Maryland Sea Grant occupies an important niche and plays a crucial role in addressing critical watershed, coastal, and marine science-based issues concerning conservation, restoration, sustainability, and coastal resilience in the region. Over four decades our research has addressed gaps in the knowledge needed for science-based management to restore water quality and achieve sustainable commercial and recreational fisheries for species important to Maryland. Our outreach work has engaged multiple audiences to help inform and advance multiple efforts in ecosystem restoration. More recently, our attention has drawn more fully to understanding the effects of climate change on public health and the stability of Maryland's maritime economy. This 2018 through 2021 plan outlines our goals, outcomes, and strategies to address stakeholder driven priorities.

Mission and Vision

Since its beginning in 1977, Maryland Sea Grant College has prospered as a partnership between the National Oceanic and Atmospheric Administration (NOAA) and the University System of Maryland, a partnership that serves the state of Maryland. Maryland Sea Grant is administered by the University of Maryland Center for Environmental Science.

Vision 2018-2021

Maryland Sea Grant contributes to achieving a healthy, resilient, sustainable coastal environment and economy within Maryland's Chesapeake and coastal bays and watersheds.

Mission

Maryland Sea Grant's mission is to conduct a locally responsive and nationally eminent program that supports research to address key questions important to environmental management; supports and enriches marine education for students of all ages; and supports outreach efforts that clarify for key audiences the applications of research findings to science-based management of our watersheds and coastal ecosystems.

Core Values and Operational Principles

Maryland Sea Grant's commitment to achieving our strategic plan goals, outcomes, and strategies and advancing an ecosystem-based management approach to the state's watershed, coastal, and marine issues rests on our core values and operational principles.

Core Values

To serve the needs of our diverse constituencies, Maryland Sea Grant strives to:

- ***Be broadly collaborative.*** We will engage a diversity of groups dedicated to restoring and sustaining the Chesapeake and coastal bays and their watersheds.
- ***Catalyze translational and transformational science.*** We will address scientific topics that advance innovation, inform decision-making, develop new products, and foster new economic opportunities.
- ***Deliver innovative and integrative education and outreach.*** We will create opportunities and deliver programs and products that integrate research with outreach and education, empowering scientists, policymakers, managers, teachers, students, and committed citizens as they collectively work to understand issues and exercise their responsibility as stewards of the Chesapeake and coastal bays and their watersheds.

- ***Be locally, regionally, and nationally relevant.*** We will support research and engage in activities that have impact at multiple scales.
- ***Achieve organizational excellence.*** We will responsibly manage our program, maintain staff excellence through professional development, and serve our constituents with distinction.

Partner Synergies

Partnerships strengthen the quality of the research we support and extend our outreach to diverse audiences. They enrich our capacity to influence policy and achieve our strategic goals. An important aspect of Maryland Sea Grant's program is our history of collaborating closely with Sea Grant programs in Virginia and Delaware, so as to draw on the expertise of their scientists and to leverage joint funding for regional research efforts. More recently, we have developed research agendas, communication strategies, and educational programming with Sea Grant regional partners from New York to North Carolina. Comprehensively, our program also flourishes because of the unique strengths and capabilities we draw on across the Sea Grant network. Our ability to leverage the capacity and influence of the network greatly expands our program's resources and reach.

In addition to our Sea Grant partners, other external partners are critical to Maryland Sea Grant's mission to improve the health of the Chesapeake and coastal bays and their watersheds. Key government partners include the Chesapeake Bay Program Office, administered by the Environmental Protection Agency; the NOAA Chesapeake Bay Office; and numerous Maryland state agencies, including the Departments of Natural Resources, Environment, Planning, and Agriculture. Further, non-governmental organizations with whom we partner serve as critical advocates for conservation and restoration in the region. Many of these partners have key responsibilities for implementing the policies, noted above, that are particularly relevant to our programming.

Diversity

Maryland Sea Grant is committed to expanding the diversity of our thinking and of our workforce. Both are needed for addressing the complex problems facing the Chesapeake and coastal bays and their watersheds, so as to advance environmental and economic health in the region. Building diversity in our workforce brings the greatest breadth of ideas, cultures, experiences, and backgrounds into play in the quest to build a sustainable environment and a stable economy. Diversity in our portfolio of activities through expanded partnerships and leveraging of resources strengthens our program's resilience.

Organizational Excellence

We view ourselves as a service organization whose strengths in administration, communication, extension, education, and research unite to advance our mission. The role of program management is to engage the diverse talent of Maryland's academic and scientific communities and to link this expertise to diverse constituencies. We connect our core support activities — research, outreach, education — in a concerted fashion to push for effective progress on important issues. Our extension program includes agents and specialists trained in applying scientific findings for audiences in seafood industries, county and city planning, science education, and watershed and resource management. Our communications program focuses on interpreting, synthesizing, and translating science to diverse audiences of scientists and non-scientists through print and web publications and broadcast television. The result: Maryland Sea Grant reaches and informs multiple audiences — industry leaders, natural resource managers, school children, for example — engaged in issues critical to the ecological and economic future of our watersheds, coastal, and marine systems.

Strategic Decision-Making

By learning about science, policy, and management gaps from stakeholders and evaluating our programmatic outcomes, we can take a nimble and adaptive approach to advancing scientific understanding and applying science to help solve environmental problems. We work in an iterative manner to optimize our programmatic portfolio and respond quickly to emerging opportunities. For this approach to work, Maryland Sea Grant leadership carefully considers which issues we can address within our resources and capacities, in part by considering the following questions:

- 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 the program's stakeholders?
- Can innovative science make a contribution and is there reasonable probability of achieving significant progress within the typical funding limitations of Maryland Sea Grant?
- Will Maryland Sea Grant's support contribute meaningfully toward addressing the issue with a demonstrable application and impact?
- Will the issue remain "unaddressed" without our involvement?
- Are the talent and expertise necessary to address the issue available in Maryland or the region?
- Would support from Sea Grant enhance, directly or indirectly, the talent base for watershed, coastal, and marine issues?

Once we have identified our targets, we play a leadership role in advancing science-based decision-making through our research, education, communication, and extension assets. As an

academic institution, whose mission is to serve the constituents of our state, Maryland Sea Grant acts as an honest broker to help resolve environmental conflicts involving stakeholders with various vested interests. Policymakers, managers, and the general public expect we will make substantive contributions to finding solutions for problems facing the Chesapeake and coastal bays and their watersheds. We honor our leadership role to make progress on local, regional, and national priorities and fulfill state and federal mandates.

Key Influences on Our 2018-2021 Strategic Plan

Federal and State Policy Drivers

For 2018-2021, our program is responsive to important federal and state efforts focused on restoring and protecting the health and economic resilience of the Chesapeake and coastal bays, their watersheds, and the marine waters of the Mid-Atlantic region. Those policy efforts include:

- *Chesapeake Bay Watershed Agreement*. This partnership, established in 1983, now includes six states and the District of Columbia that fall within the Bay's watershed. In 2014, the partners recommitted to advance restoration and protection of the Bay's ecosystem and its watershed. For the first time, increasing the Bay watershed's resiliency to climate change was identified as a goal. This partnership is managed by the Chesapeake Bay Commission.

- *Chesapeake Bay Executive Order*. In 2009, President Obama issued this executive order that called on federal agencies to develop a new strategy to restore the Chesapeake Bay and its watershed. This strategy established the Chesapeake Action Plan (CAP), which outlines strategies for Bay restoration, provides targets for restoration, conservation, and sustainability, and supports an adaptive management process. The Chesapeake Bay Program Office (CBPO) administers the CAP.

- *Chesapeake Bay TMDL*. The Chesapeake Bay Total Maximum Daily Load (TMDL) was established by the U.S. EPA in December 2010. As required by the Clean Water Act, the TMDL sets specific limits on nutrient and sediment inputs to the Bay and is a keystone commitment of the federal agencies' strategy in response to the 2009 Executive Order noted above. The CBPO has the primary regulatory responsibility for overseeing Chesapeake Bay TMDL compliance.

- *Chesapeake and Atlantic Coastal Bays Trust Fund*. This legislation passed in 2007 by the Maryland General Assembly provides support to meet Maryland's Chesapeake Bay restoration goals. The Trust Fund is administered by Maryland's Department of Natural Resources (MD DNR).

- *Maryland Coastal Bays Conservation and Management Plan*. In 2014, the Maryland Coastal Bays Program updated its comprehensive plan to highlight actions that will foster the health and prosperity of the coastal bays ecosystems from 2015-2025.

- *Maryland Greenhouse Gas Emissions Reduction Act of 2016*. This legislation renewed Maryland's commitment to a 25-percent cut from 2006 levels of greenhouse gas emissions by 2020 and a 40-percent reduction by 2030.

- *Maryland Commission on Climate Change*. Codified by the Maryland General Assembly in 2015, this panel develops work plans and actions to mitigate and adapt to the consequences of climate change.

- *Maryland's Next Generation Science Standards and Environmental Literacy Standards*. In 2011, Maryland's Education Board required high school students complete an environmental literacy program and in 2013 adopted the national Next Generation Science Standards (NGSS) for K-12 science education.

- *Mid-Atlantic Regional Ocean Research Plan*. Supported by the National Sea Grant Office, this 2012 plan identifies priority research needs associated with ocean and coastal issues in the Mid-Atlantic region such as climate change impacts, offshore energy development, water quality concerns, ecosystem structure and function, and the human dimensions of ocean and coastal management.

- *10-Year Sea Grant Aquaculture Vision*. In 2016, the Sea Grant Association released a comprehensive report setting recommendations on directions the National Sea Grant Program and the Sea Grant College programs should consider as they develop their own aquaculture strategies.

- *National Ocean Policy*. Established by Presidential Executive Order in 2010, this action set a course for creating a "National Policy for the Stewardship of the Ocean, Coasts, and Great Lakes." In 2012, the *National Ocean Policy Implementation Plan* set specific objectives for achieving the National Ocean Policy goals.

- *The Coastal Zone Management Act of 1972*. Under this federal law, Maryland receives support for its Coastal Zone Management Program, which includes the CoastSmart Communities Grant Program and coastal enhancement projects to address issues regarding wetlands, coastal hazards, marine debris, and aquaculture. The program is administered through MD DNR.

Strategic Plan Alignment

Maryland Sea Grant is defined by its position as a Congressionally mandated, federal-state partnership program, overseen by a federal government entity, the National Sea Grant Office (NSGO) of the National Oceanic and Atmospheric Administration (NOAA), and administered through the University of Maryland Center for Environmental Science (UMCES). Our effectiveness as a program depends on understanding the priorities and strengths articulated in strategic plans of those organizations that fund, oversee, and collaborate with our program. We look to align our strategic plan with the strategic plans of key partners: NOAA, the University System of Maryland (USM), UMCES, and the University of Maryland Extension (UME) administered by the College of Agriculture and Natural Resources within the University of Maryland College Park. Our clear alignment with these plans allows for effective collaboration and synergistic activities and leveraging of resources and competencies.

- **National Sea Grant College Program.** The Maryland Sea Grant Strategic Plan advances and supports the *National Sea Grant College Program Strategic Plan Charting the course for the future: 2018-2021's* four focus areas and eight goals. Our state-specific definition and implementation of these national focus areas, goals, outcomes, and strategies reflects our program's alignment with the needs and strategies of our state and other Maryland partners. Further, our strategic plan integrates with the National Sea Grant College Program's plan and the relevant portions of the strategic plans of NOAA, Department of Commerce, and of the White House.

- **University System of Maryland.** The USM's 2010-2020 strategic plan, *Powering Maryland Forward*, describes USM's vision to be a leader in college completion rates and economic innovation. Maryland Sea Grant supports the USM plan through our research, education, and outreach efforts on state environmental issues and by seeking ways to complement the five core themes of the USM plan.

- **University of Maryland Extension.** The University of Maryland College Park (UMCP) and the University of Maryland Eastern Shore (UMES) have historically housed key components of the state's Cooperative Extension program. Maryland Sea Grant partners with UME by supporting marine extension agents and specialists whose work advances environmental stewardship of the Chesapeake and coastal bays and their watersheds. The Maryland Sea Grant Extension Program (MSGEP) is tightly integrated into the *University of Maryland Extension Strategic Plan 2014-2019*.

- **University of Maryland Center for Environmental Science.** Maryland Sea Grant is administered by UMCES and shares many of its priorities. Both MDSG and UMCES are committed to supporting the conservation, restoration, and sustainability of Maryland waters from the mountains to the sea. Our strategic planning process involved close consideration of how our alignment with UMCES' *Focus on the Future* 2012-2018 strategic plan complements our program's goals, strategies, and outcomes.

Strategic Plan 2018-2021

The focus areas, goals, and outcomes highlighted below speak to the important challenges our program faces and closely align with those of the National Sea Grant College Program Strategic Plan. We need to make wise investments that yield useful outcomes, while working with limited resources. Our constituents and advisory boards encourage us to create a broad strategic plan that allows us flexibility in setting our priorities through which we can successfully implement our plan. To that end, the state focus areas, goals, and outcomes below provide the framework through which we can shape our program strategies and research priorities, drive our requests for proposals, and structure the work we do during the next four years.

Focus Area 1. Healthy Coastal Ecosystems

Maryland's environmental challenges reflect those across the nation in that weather, water, and climate affect all aspects of our state's rich coastal economy and ecosystem. Urbanization, intensive agriculture, and large-scale changes within the air/watershed are primary contributors to excess nutrients and sediments that have degraded the ecosystem — impairments evident in the water quality, habitat structure, and biodiversity of Maryland's coastal and freshwater systems. These anthropogenic influences coupled with changes in large-scale hydrological and atmospheric processes create a complex ecosystem dynamic that is difficult to understand accurately and thus pose fundamental challenges to those seeking to manage the estuary and watershed.

Promoting the sustainability of the Chesapeake and coastal bays requires science-based decisions about how and when conservation and restoration efforts can be most effective. Success in the multi-year effort to restore the Chesapeake Bay — through hard work like reducing nutrient and sediment inputs, adapting to climate change, and managing our fisheries in a more sustainable manner — will not reproduce an idealized version of a past Chesapeake Bay. Rather, the result will be a Bay that remains dynamic and whose sustainability requires informed, adaptive management. We seek to address questions that can inform this management: What will the "new" ecosystem look like? How will it function? How will it evolve as management actions continue? Are there ecosystem thresholds? What role does society play in the environmental decisions for the bays? These are fundamental questions we need to answer.

To address these issues of conservation, restoration, and resilience, Maryland Sea Grant will investigate key ecosystem processes in our watersheds and coastal and marine waters and assess how they respond to changing conditions, such as management activities that reduce nutrient and sediment inputs and address climate variability across multiple scales. Maryland Sea Grant will provide critical information for describing the temporal and spatial scales over which management actions may be effective and for predicting the trajectories that the ecosystem may

follow as restoration or resiliency goals are pursued. We will support strong science to understand climate change drivers and approaches to adapt to changing climate conditions. These efforts will improve ecosystem-based decision making in the Bay watershed by providing decision makers and constituents with the information and analyses needed for addressing complex socio-environmental issues.

Goal 1.1 Watersheds and coastal and marine ecosystems are healthy and sustainable

Outcomes

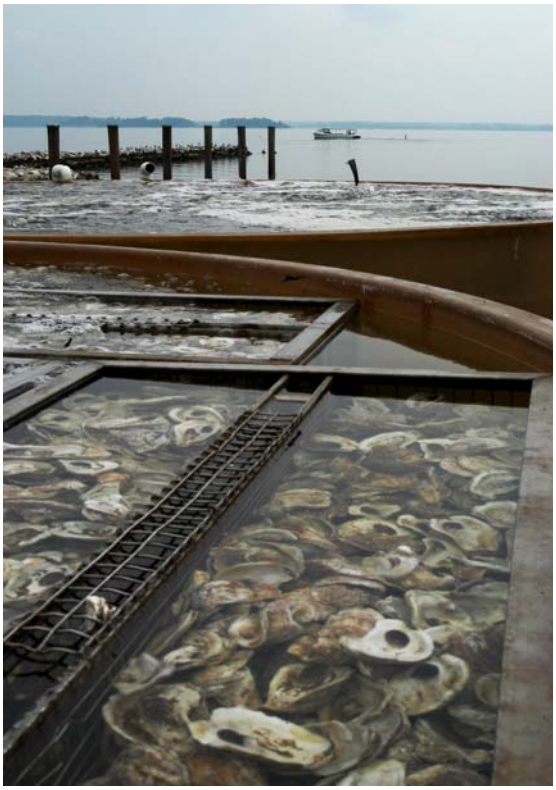
- Scientific understanding of ecosystem processes and responses to changing conditions is improved.
- Scientific understanding of ecosystem responses to the effects of climate change is improved.
- Scientific information and resources are available to relevant stakeholders.

Goal 1.2 Sound science informs management decisions focused on the Chesapeake and coastal bays and their watersheds

Outcomes

- Scientific understanding of ecosystem restoration and conservation is improved.
- Constituents are engaged and informed about scientific findings that can improve coastal and watershed management.

Focus Area 2. Sustainable Fisheries and Aquaculture



An in-depth research foundation is critical for achieving profitable aquaculture in Maryland and supporting ecosystem-based fisheries management. Aquaculture, coupled with new techniques and tools in engineering and biotechnology, may expand the types of species produced and generate new consumer options, catalyzing economic development and job creation. Ecosystem-based fisheries management (EBFM) is an approach we believe is essential for restoring and conserving sustainable fisheries. To succeed, EBFM will require work on many fronts, among them investigations of species' population trends, harvest targets, and the effect of harvests on ecosystems. On the social sciences side, developing a better understanding of the needs of multiple audiences with differing views and priorities regarding fishing sustainability and regulation will be important for building support for effective fisheries management strategies. Successful EBFM will also require an adaptive approach to ecosystem-based management that

embraces sound policies for sustainable use. Technologies to improve seafood products and enhance the industry's ability to deliver a safe and satisfying product are also important to ensure the economically sustainable use of Maryland's natural resources.

Maryland Sea Grant will address these themes by supporting natural and social science, synthesizing and translating research results, and engaging stakeholders in the movement toward ecosystem-based fisheries management, aquaculture development, and improved seafood safety and technology.

Goal 2.1 Fisheries and aquaculture industries are viable and use safe practices

Outcomes

- Seafood safety, technologies, and practices in fisheries and aquaculture industries are improved.

Goal 2.2 Fisheries and aquaculture are healthy and sustainable

Outcomes

- Fisheries and aquaculture research improves the sustainability of the commercial and recreational fishing industries.
- Scientific foundations for ecosystem-based fisheries management are advanced.

Focus Area 3. Resilient Communities and Economies

The emerging need to adapt to the effects of climate change and meet new TMDL requirements to limit nutrient and sediment pollution present unprecedented challenges for communities and local governments throughout the Chesapeake and coastal bays and their watersheds. Additionally, addressing energy, food, and water needs under changing climate conditions is likely to require comprehensive planning and adaptation across the region. For Maryland, the term "coastal community" is now commonly understood to include communities in the upper watershed reaches because they influence estuarine and coastal environmental conditions. Increased precipitation and changing rates of sea-level rise, both anticipated consequences of climate change, require well-informed communities who understand these issues and are engaged in strategic decision-making to respond effectively. New energy technologies and efforts to reduce greenhouse gas emissions are likely to touch all sectors of the state. It is imperative that Maryland Sea Grant work collaboratively with our constituents to improve understanding of both social and environmental drivers that can affect our ability to reach state and national goals in stormwater management and climate adaptation. In addition, we need to understand the societal constraints that influence policy directions and community engagement and action. We will address these issues through

research and by directly working with communities to facilitate their efforts to respond to water quality regulations, adapt to flooding and storm events, and improve their resilience to climate change.

Goal 3.1 Communities are empowered to become more resilient to coastal hazards, extreme weather events, and the impacts of climate change

Outcomes

- Communities are informed and understand issues important to community resilience.
- Understanding of climate change and hazard risks is improved and shared among scientists, decision-makers, and communities.

Goal 3.2 Water resources in the Chesapeake and coastal bays and their watersheds are better managed and more sustainable

Outcomes

- Communities plan for and adopt practices to address water quality and quantity issues.

Focus Area 4. Effective Environmental Science Education

Education, both formal and informal, is the foundation for building communities who understand environmental issues and engage in decision making about sustaining the Chesapeake and coastal bays and their watersheds. A greater awareness of the issues and their complexities empowers individuals to make informed decisions. Formal education also trains future scientists who can investigate environmental complexities, explain scientific findings, and help improve the management of our environmental resources. Education focused on “hands-on” curriculum requires teaching to be project-based rather than lecture-based, and as a result, improves student engagement with science in the classroom and beyond.

Maryland Sea Grant will pursue strategies that encourage project-based instruction and that deepen and broaden the knowledge and skill sets of students, educators, science practitioners, decision makers, and citizen scientists. Our efforts will include partnerships with other programs, research experiences for undergraduate students, research and policy fellowships for graduate students, and communication and outreach projects directed to a variety of audiences.

Goal 4.1 A public educated about watershed, coastal, and marine issues

Outcomes

- The public's knowledge and stewardship of watershed, coastal, and marine systems improve.

Goal 4.2 A diverse workforce educated in watershed, coastal, and marine science

Outcomes

- Project-based learning introduces students to marine and environmental science and retains them in these and other disciplines in science, technology, engineering, and mathematics (STEM).
- Students pursue advanced degrees and careers in marine science and related fields.
- Students underserved and underrepresented in marine and environmental sciences gain access to these fields.

Stakeholder Engagement in the Strategic Planning Process

Our planning process for the 2018-2021 cycle included meetings and discussions with and surveys of our constituents to assess our program's progress and solicit recommendations about future directions. We also consulted with our staff, extension agents, and external advisory board. In these discussions, it became clear that our constituents were strongly supportive of our program's existing goals and strategies, while also encouraging us to plan strategically to accomplish more in key areas. Our discussions and the survey results encouraged Maryland Sea Grant to continue to maintain a nimble program with a wide range of foci but with the capacity to dig deeply into chronic or emerging environmental issues when needed. We concluded from these consultations that our constituents and stakeholders strongly support and agree with the goals and strategies contained in Maryland Sea Grant's previous strategic plan for 2014-2017, strongly support our continuing on our existing path, and believe that we have been fulfilling their needs. Importantly, our constituents urged us to continue to work with other partner organizations to leverage funds and resources in order to effectively achieve our goals.

Appendix I

Maryland Sea Grant Strategic Plan 2018-2021: National and State Goals, Outcomes, Strategies

National focus areas and goals align with state focus areas and goals. Each state plan goal has a series of associated outcomes and strategies.

Maryland Sea Grant Strategic Plan Alignment with National Goals and Focus Areas			
National Plan Goals	**State Plan Goals (End State)**	**State Plan Outcomes (Result/What is achieved)**	**State Plan Strategies (Actions-Milestones/ What we will do)**
Healthy Coastal Ecosystems (HCE)			
Habitat, ecosystems, and the services they provide are protected, enhanced, and/or restored	Watersheds and coastal and marine ecosystems are healthy and sustainable	Scientific understanding of ecosystem processes and responses to changing conditions is improved Scientific understanding of ecosystem responses to the effects of climate change is improved Scientific information and resources are made available to relevant stakeholders	Support research to understand species responses (e.g. keystone, invasive, harmful algae) to environmental conditions Support research to understand how changing coastal, estuarine, and watershed conditions (e.g., temperature, salinity, precipitation, wind, waves, nutrients, sediments, contaminants, heat and flooding) affect ecosystem function and food web dynamics on multiple spatial and temporal scales Support integrated social and natural science research to understand ecosystem responses to the effects of climate change, energy development, water quality, restoration and management actions, and other emerging issues
Land, water, and living resources are managed by applying sound science, tools, and services to sustain ecosystems	Sound science informs management decisions focused on the Chesapeake and coastal bays and their watersheds	Scientific understanding of ecosystem restoration and conservation is improved Constituents are engaged and informed about scientific findings that can improve coastal and watershed management	Determine how restoration efforts affect or are affected by changes in coastal and estuarine conditions Develop and assess restoration and resiliency practices and their effectiveness to prevent and/or reduce loading of nutrients, sediments and other pollutants within the watershed Support social, economic, and environmental research; synthesis; and statistical analysis to understand ecosystem change over time and to advance ecosystem-based management

Sustainable Fisheries and Aquaculture (SFA)			
Fisheries, aquaculture, and other coastal and freshwater product industries supply food, jobs, and economic and cultural benefits	Fisheries and aquaculture industries are viable and use safe practices	Seafood safety, technologies, and practices in fisheries and aquaculture industries are improved	Support research and develop technologies, strategies and training in support of safe aquaculture and seafood production
Natural resources are sustained to support fishing communities and industries, including commercial, recreational, and subsistence fisheries, and aquaculture	Fisheries and aquaculture are healthy and sustainable	Fisheries and aquaculture research improves the sustainability of the commercial and recreational fishing industries Scientific foundations for ecosystem-based fisheries management are advanced	Support research on sustainable recreational and commercial fisheries and aquaculture and their effects on ecosystem function and restoration Support natural and social science research on sustainable fisheries targets, economics and ecosystem-based fisheries management Support technology innovation, business development and sustainable practices in fisheries and aquaculture Support collaboration and communication for developing stronger fisheries and aquaculture industries
Resilient Communities and Economies (RCE)			
Coastal communities use their knowledge of changing conditions and risks to become resilient to extreme events, economic disruptions, and other threats to community well-being	Communities are empowered to become more resilient to coastal hazards, extreme weather events, and the impacts of climate change	Communities are informed and understand issues important to community resilience Understanding of climate change and hazard risks is improved and shared among scientists, decision-makers, and communities	Support development of technologies and research-based strategies for sustainable and resilient communities, focusing on such topics as stable shorelines, tourism, working waterfronts, and natural hazards Support socio-economic research to understand and help coastal communities become more resilient Support environmental research and outreach in rural and urban communities where resources and understanding of environmental issues may be limited Develop tools and strategies to engage with communities and decision makers regarding the risks from climate change and other hazards

Water resources are sustained and protected to meet existing and emerging needs of the communities, economies, and ecosystems that depend on them	Water resources in the Chesapeake and coastal bays and their watersheds are better managed and more sustainable	Communities plan for and adopt practices to address water quality and quantity issues	Develop tools and support research to understand the socioeconomic value and ecological consequences of water resources management options Engage communities and decision makers on water quality and quantity issues (e.g. TMDLs, BMPs) Assist communities to improve their capacity to reduce sediments and nutrients in stormwater and advance their understanding of green infrastructure and other appropriate BMPs for water management Support natural and social science research, including modeling, to understand the effects of land use on ecosystems and communities
Effective Environmental Science Education [National Focus Area: Environmental Literacy and Workforce Development]			
An environmentally literate public that is informed by lifelong formal and informal opportunities that reflect the range of diversity of our communities	A public educated about watershed, coastal and marine issues	The public's knowledge and stewardship of watershed, coastal, and marine systems improve	Develop partnerships and programs and associated materials to educate diverse audiences Support best practices to understand and implement effective education pedagogy for diverse audiences Expand use of new communications technologies (e.g. website, online multimedia presentations, social media, e-books) to educate and meet the information needs of diverse audiences
A diverse and skilled workforce is engaged and enabled to address critical local, regional, and national needs	A diverse workforce educated in watershed, coastal and marine science	High quality teacher professional development engages teachers in project-based learning and effective pedagogy Project-based learning introduces students to marine and environmental science and promotes college and career readiness Students are retained in STEM fields and pursue advanced degrees and careers in those disciplines Students underserved and underrepresented in marine and environmental sciences gain access to these fields	Develop STEM instructional strategies and technologies that enhance local curriculum for K-12 teachers/ administrators and informal education professionals Develop teacher professional development programs that integrate academic research and PBL and engage students in classroom and field activities Develop, improve and market graduate and undergraduate research and fellowship opportunities and extend their reach to under-represented groups in coastal and marine sciences

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