



SCIENCE SERVING MARYLAND'S C O A S T S

Maryland Sea Grant
Implementation Plan
2005-2007



Sea Grant

SCIENCE SERVING MARYLAND'S C O A S T S

**Maryland
Sea Grant
Implementation
Plan
2005-2007**





The Implementation Plan summarizes Maryland Sea Grant's actions and evaluative benchmarks for the years 2005-2007.

Maryland Sea Grant College, a university-based partnership with the National Oceanic and Atmospheric Administration, is a service organization in the State of Maryland administered by the University System of Maryland; its mission is to conduct a program of research, education and outreach to use and conserve coastal and marine resources for a sustainable economy and environment in Maryland, in the Mid-Atlantic region and in the nation.

Publication Number
UM-SG-PI-2005-04

Published by the Maryland Sea Grant College Program, College Park, Maryland, 2005. Free copies are available by writing or calling:

Sea Grant College Park
4321 Hartwick Road, Suite 300
University System of Maryland
College Park, Maryland 20740
(301) 403-4220, x22
fax (301) 403-4255

For more information, visit our World Wide Web site:

<http://www.mdsg.umd.edu/MDSG>



This publication is made possible by grant NA05OAR4171042, projects M-1 and M-4, awarded by the National Oceanic and Atmospheric Administration to the University of Maryland Sea Grant College Program.

The University of Maryland is an equal opportunity employer.

Contents

Introduction	4
Maryland Sea Grant’s Approach	4
Organization of the Implementation Plan	5
Operating Principles	5
Strategic Assets	6
Alignment of Actions with Strategic Goals	7
Table 1. Actions for Addressing Strategic Goal 1: Coastal Processes and Ecosystem Responses.....	8
Table 2. Actions for Addressing Strategic Goal 2: Natural Resources of Coastal Maryland	9
Table 3. Actions for Addressing Strategic Goal3 : Education	10
Table 4. Actions for Addressing Strategic Goal 4: Maryland’s Coastal Communities and Economies	12
Metrics to Evaluate Progress	13
Measures of Outputs and Performance	13
Synthesis to Determine Impacts.....	13
Table 5. Evaluation Criteria for Organizing and Managing the Program.....	14
Table 6. Evaluation Criteria for Contributions to Science and Technology	15
Table 7. Evaluation Criteria for Extension and Outreach	16
Table 8. Evaluation Criteria for Contributions to Education	18

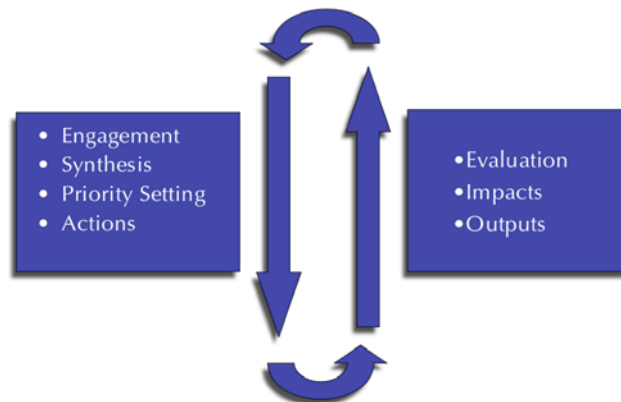
Introduction

Maryland Sea Grant's 2005-2010 Strategic Plan — Science Serving Maryland's Coasts — provides overarching guidance and clear goals that challenge us to employ our program assets innovatively, productively, and efficiently. This Implementation Plan provides details on how Maryland Sea Grant will meet these challenges for the periods 2005-2007. It is a living document that will evolve with us as we learn new ways to be effective in building impacts to benefit our state, the region and beyond. It will be updated and revised for the period 2008-2010 as we move to complete our planning cycle.

Maryland Sea Grant's Approach

Maryland Sea Grant seeks to be a catalyst for both integrative science in the Chesapeake watershed and the development of ecosystem-based approaches to the management of our coastal resources. The multi-dimensional characteristic of this challenge is found in many, if not most, of the goals of our strategic plan. This demands that we think and act in new ways and recognize the growing importance of science that spans traditional disciplinary boundaries. The goals outlined in our strategic plan: Coastal Processes and Ecosystem Responses; Natural Resources of Coastal Maryland; Education; and Maryland's Coastal Communities and Economies are therefore, by design, interrelated, and many of our efforts impact more than one objective. We call this "crosstalk" and it is an essential mechanism to build greater impacts. Taken in total, our approach positions us well to make strong, creative contributions.

Our program is committed to a process of engagement and synthesis to drive ongoing refinement of priorities and define actions that lead to measurable outcomes. We use critical evaluation to measure our progress. While conceptually we present this as a cycle, operationally there is considerable interaction at all stages — this is an iterative process designed to foster learning and adaptive management. Each operational element of Maryland Sea Grant (research, extension, communications and education) contributes unique capacity and products to this approach, with overall coordination and integration the central focus of program administration. We consider our activities as components of integrated portfolios, each representing strategic investment of resources — both monetary and human — in varying amounts, designed to make tangible impacts.



Maryland Sea Grant has chosen the term "portfolio" to reflect investments made in our 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. Our four portfolios are titled and structured by our four strategic goals — Coastal Processes and Ecosystem Responses, Natural Resources of Coastal Maryland, Education, and Maryland's Coastal Communities and Economies.

Organization of the Implementation Plan

This Implementation Plan is organized in three parts:

- Operating principles
- Alignment of actions with strategic goals
- Metrics to evaluate progress.

Together, these elements establish a clear roadmap that will ensure that we fulfill our programmatic mission.

Operating Principles

The following operational principles¹ articulate how we express our program values and engage with our partners and stakeholders to achieve measurable impacts. They are the foundation for how we function internally and with our external stakeholder communities. They represent a commitment to our conceptual approach and thereby to guide us as we strive to fulfill our mission.

Maryland Sea Grant will be fully engaged with local, regional and national issues and trends relating to the sustainable use and restoration of Maryland's coastal resources through:

- Active participation in appropriate Chesapeake Bay and coastal management/planning activities requiring linkages to the research and academic communities,
- Engagement in the development and implementation of regional structures to foster adaptive management of shared coastal resources,
- Active participation in the National Sea Grant Network and its associated leadership bodies.

Maryland Sea Grant will be an effective conduit from stakeholders to those that can contribute solutions and realize emerging opportunities by:

- Full engagement of Maryland's academic and research communities in applying the highest quality scientific expertise to problem solving,
- Working with all our academic and research stakeholders to foster engagement of new researchers with our program with particular emphasis on increasing diversity and capacity statewide and across the Mid-Atlantic region.

Maryland Sea Grant will work to enhance our public(s) ability to understand complex issues through the use of innovative outreach strategies and full engagement of extension professionals in the program in order to:

- Provide mechanisms and incentive to appropriately link research to outreach through novel vehicles and extension faculty and to fully engage this process throughout the lifetime of given projects,
- Foster the development and use of innovative technology to reach new audiences,
- Improve public awareness of Maryland Sea Grant capabilities, accomplishments, services, and products.

Maryland Sea Grant will manage its assets in portfolios that integrate research, outreach, education and program administration in an efficient, flexible manner to address critical issues and achieve clear outcomes and impacts by

- Evaluating all issues and opportunities in the context of the program's resources and capabilities to determine the most appropriate issues to address,
- Developing and maintaining active planning and communication mechanisms to support the activities of each portfolio,
- Developing and measuring output and impact metrics consistently within and between portfolios to evaluate effectiveness and to help determine the lifespan of each effort,

¹ Adapted from Oregon Sea Grant— Strategic Plan 2004

- Developing and maintaining a professional service-oriented management and administrative system that makes the best use of technology at all levels.

Maryland Sea Grant will develop and nurture partnerships that leverage resources, maximize efficiency and build joint and shared capabilities to contribute to issues of local, regional and national significance by seeking:

- Partnerships with regional Sea Grant Programs and others to address issues in the Chesapeake Bay Watershed and Mid-Atlantic,
- New interactions with “non-traditional” partners outside of our academic and research base to enhance our capability for and impact of education and outreach,
- Partnerships nationally to help address important issues shared across coastal America.

Maryland Sea Grant will be appropriately entrepreneurial in order to leverage resources and fulfill our broad mission by:

- Seeking extramural funding from a variety of sources to advance innovative outreach, facilitation and synthesis,
- Seeking funding from a variety of sources to support and enhance educational opportunities and research experiences for teachers, and university students at the graduate and undergraduate levels,
- Providing funding and incentives to new investigators and emerging projects that have potential to grow to larger efforts.

Maryland Sea Grant will foster a supportive, learning environment that provides opportunity for professional development and enrichment for all Sea Grant staff by:

- Offering each staff member the opportunity for enriching educational or professional development experience on an annual basis,
- Providing opportunities for University of Maryland undergraduate and graduate students to work with MDSG.

Strategic Assets

• **Research Funding.** Research lies at the core of Maryland Sea Grant’s mission with roughly half of our NOAA funding allocated to competitive peer reviewed research programs. Our research program is designed to make contributions that originate on the local level, build to address regional and national needs and achieve scientific accomplishments that are of national and international stature. Research investments initiated with our 2005-2007 Omnibus proposal directly reflect the strategic goals that informed the call for proposals and the research needs articulated by our stakeholders. We augment our Omnibus research (OMNI) through program development funds (PD). These small investments give us the flexibility to rapidly address emerging issues, initiate exploratory research and engage new investigators in Sea Grant’s mission. Program development funds also catalyze outreach and education activities in keeping with the integrative approach we embrace.

• **Sea Grant Extension.** Our extension program is organized to meet integrated objectives in four programmatic areas called Focus Teams — Aquaculture and Restoration, Water Quality, Coastal Communities & Economies, and Marine Science Education. These teams help coordinate the activities of Sea Grant Extension Faculty and are directly linked to Maryland Cooperative Extension’s planning and implementation structure as well. Internally, they allow for formal integration of expertise within our program and provide a mechanism to enfranchise outside expertise

Focus Team Alignment with Strategic Goals

Goal	Focus Team
Coastal Processes and Ecosystem Responses	Water Quality (WQ)
Natural Resources of Coastal Maryland	Aquaculture and Restoration (A&R)
Education	Marine Science Education (MSE)
Maryland’s Coastal Communities and Economies	Coastal Communities and Economies (CCE)

and stakeholder input. Each focus team links directly to one of our four strategic goals and more specifically, the activities of each team align directly to relevant objectives designated in our Strategic Plan. Crosstalk among goals and between focus teams allows for investment and actions by teams in any portfolio as appropriate.

- **Communications.** Our communications program is organized to achieve strong impacts through a suite of vehicles designed to reach targeted publics with scientifically accurate information. The Maryland Sea Grant Communications Team (COMM) employs print, web and video tools in creative ways. Where appropriate, we designate activities that are specific to the Communications Team. As a programmatic approach however, we endeavor to weave communications into all parts of our program and all portfolios in a meaningful manner.

- **Program Management.** Maryland Sea Grant's Management Team has overall responsibility for administrative function and program integration. Administratively, the team (MGT) has a central focus on our role as stewards of program resources, a service ethic and commitment to rigorous procedures and accountability at all levels. The management team is comprised of individuals with a suite of relevant skills as scientists, synthesizers and facilitators. With that in mind, the team's activities expand beyond our administrative focus to engage in a variety of important activities relevant to Sea Grant's mission and strategic goals.

Alignment of Actions with Strategic Goals

To be effective, all of our activities and research funding must be closely aligned with the goals in our strategic plan. While our intent is to address all the goals articulated over the next five years, the focus of our current implementation plan is on actions we will undertake from 2005 to 2007. Revisions to this plan in the second half of our planning cycle will detail how we will meet those long-term goals not addressed here.

We present our goals and actions in tabular form organized by strategic goal/portfolio (Tables 1-4). Each table describes actions coded for the particular sector of the program performing the stated task. As noted throughout this plan, there is considerable crosstalk among goals and actions. For clarity, we present only the dominant linkages here. We encourage readers to contact the program to discuss crosscuts in more detail.

Table 1. Actions Addressing Strategic Goal 1. Coastal Processes and Ecosystem Responses

Goal 1.1 Ecosystem Process and Response				
1.1a Understand and predict large-scale ecosystem responses and trajectories.	1.1b Understand how a changing Bay impacts specific food web dynamics.	1.1c Determine how keystone species respond to change and management	1.1d Understand the relationship between changes in anthropogenic loads of nutrients, sediments and contaminants and ecosystem health.	1.1e Understand the relationship between changes in anthropogenic loads of nutrients, sediments and contaminants and fisheries resources
<p>Objectives</p> <p>Predicting the restoration trajectory and water quality value of benthic microalgae in shallow water Chesapeake sediments (OMNI R/WQ-1)</p> <p>Organize and facilitate regional workshop on the concept of resilience in Chesapeake Bay management (MGT/COMM)</p>	<p>Primer design for detection and quantification of halophilic Bdellovibrionaceae (PD)</p> <p>Develop a new web node to help build a public understanding of the role that algae play in the ecology of the Chesapeake through a new web (WQ/COMM)</p> <p>Establish a volunteer network for HAB monitoring in the Chesapeake Bay (WQ)</p>	<p>Ecosystem effects on living resources: spatially explicit bioenergetic model of white perch carrying capacity (OMNI R/CR-1)</p> <p>Support for operations of the BiState Blue Crab Technical Advisory Committee (PD w/Virginia Sea Grant)</p> <p>Facilitation and outreach of BiState Blue Crab Technical Advisory Committee activities (COMM)</p>	<p>Tracking the source of nutrients fueling brown tide blooms in Maryland (OMNI R/WQ-3)</p> <p>Endocrine disruptors in poultry industry runoff—A pilot study to survey research targets (PD)</p> <p>Toxic Pseudo-nitzschia in the Chesapeake Bay region (PD)</p> <p>Increase awareness of Bay nutrient sources and their impact through in service training for agriculture extension agents (WQ)</p>	<p>Primary production, spring blooms and control of recruitment in pelagic fish (OMNI R/WQ-2)</p>
<p>Actions to Produce Significant Results and Connect to Users</p>				
Goal 1.2 Scientific Foundation for Ecosystem Restoration				
1.2a Determine and target obligate ecological functions for conservation, management and restoration.	1.2b Determine how key ecological communities respond to conservation and restoration efforts.	1.2c Determine and predict how restoration efforts will affect changes in water quality parameters including nutrients, sediments and contaminants	1.2d Determine how anthropogenic influences including nutrient, sediment and contaminant loading affect restoration efforts and their likelihood of success.	1.2e Develop better indicators of restoration success and/or failure.
<p>Objectives</p> <p>Determine and target obligate ecological functions for conservation, management and restoration.</p>	<p>The role of small inlets as reactor vessels for gelatinous zooplankton in Chesapeake Bay: spatial linkages and the potential influence of oyster restoration (OMNI R/P-54)</p>	<p>Impacts of the Bollingbroke Sands oyster reef on water quality in the Choptank River (PD)</p> <p>Increase awareness of mitigation strategies for algae through fact sheets and web-based materials (WQ)</p>	<p>Interactions between shoreline erosion, suspended solids, and submerged aquatic vegetation in the Little Choptank River (OMNI R/EH-2)</p>	<p>Development of human use indicators of ecosystem health—NOAA NOS Partnership study (WQ)</p>
<p>Actions to Produce Significant Results and Connect to Users</p>				

Codes: Omnibus Research w/Project # (OMNI), Program Development Funds (PD), Water Quality Focus Team (WQ), Marine Science Education Focus Team (MSE), Coastal Communities and Economies Focus Team (CCE), Aquaculture and Restoration Focus Team (A&R), Communications Team (COMM), Management Team (MGT)

Table 2. Actions Addressing Strategic Goal 2. Natural Resources of Coastal Maryland

Goal 2.1 Scientific Foundations for Conservation and Restoration of Natural Resources			
Objectives	2.1a Develop better measures of natural resource performance and carrying capacity	2.1b Develop a better understanding of targets for and roadblocks to natural resource restoration (SAV, habitat, critical species)	2.1c Understand current and emerging diseases in key species
Actions to Produce Significant Results and Connect to Users	<i>How do changes in physical conditions and megalopae behavior affect blue crab recruitment variability in Chesapeake and Delaware Bays?</i> (OMNI R/EH-1)	Distribute guide to underwater grasses and link to a new SAV web node with multiple SAV related information sources (COMM)	Studies on <i>C. ariakensis</i> and disease resistant native oysters in Chesapeake Bay (A&R)
Goal 2.2 Sustaining Commercial and Recreational Fisheries			
Objectives	2.2a Support ecosystem and multi-species fisheries management.	2.2b Develop a better understanding of recreational fishing impacts on key species	2.2c Develop a better understanding of the utility of marine protected areas in Maryland coastal waters
Actions to Produce Significant Results and Connect to Users	<i>Estimating sustainable exploitation rates of blue crabs in the Chesapeake Bay while optimizing economic return</i> (OMNI R/CR-2) Publish "The Blue Crab (<i>Callinectes sapidus</i>)" and revamp current blue crab web node to reflect new information (COMM)		<i>Inventory of Maryland's Marine Protected Areas: Collaborative Study with MD-Coastal Zone Management Program</i> (PD)
Goal 2.3 Sustainable Use of Natural Resources			
Objectives	2.3a Support for the appropriate use of aquaculture in restoration of natural resources	2.3b Develop a better understanding of the economic opportunities of aquaculture and biotech & employ these tools to realize new opportunities for sustainable production of coastal and marine products	2.3c Develop new & better strategies and technologies for bio- and phyto-remediation & mitigation of stressors
Actions to Produce Significant Results and Connect to Users	Produce spat and conduct research on oyster restoration (A&R) Conduct workshops/educational programs using oyster hatchery (A&R) Develop sturgeon educational website (A&R)	<i>Population levels of M. degradans 2-40 in the Chesapeake Bay</i> (PD) <i>Anti-mycobacterial compound produced by Chesapeake Bay roseobacters</i> (PD) Conduct recirculating aquaculture system tours within AREL (A&R) Conduct UM Aquaculture Symposium (A&R) Participation on State of Maryland Aquaculture Coordinating Council (A&R)	Conduct a workshop on the use of aquatic plants in stormwater pond management (A&R)

Codes: Omnibus Research w/Project # (OMNI), Program Development Funds (PD), Water Quality Focus Team (WQ), Marine Science Education Focus Team (MSE), Coastal Communities and Economies Focus Team (CCE), Aquaculture and Restoration Focus Team (A&R), Communications Team (COMM), Management Team (MGT)

Table 3. Actions Addressing Strategic Goal 3. Education

Goal 3.1 Information for Managers and Coastal Decision-makers	
Objectives	3.1a Enhance, tailor and accurately target educational products and efforts to the needs of coastal decision-makers.
Actions to Produce Significant Results and Connect to Users	Annual synthetic meeting addressing critical Bay issue for managers and scientist (MGT)
Goal 3.2 K-12 Learners and Teachers	
Objectives	3.2a Develop content, lessons and curriculum enhancements focused on coastal and watershed issues
Actions to Produce Significant Results and Connect to Users	<i>Center for Talented Youth program in marine and coastal sciences (PD)</i> Improve the quality and variety of student programs that link to current laboratory research offered at UMCES and UMBI facilities. (MSE) Enhance the Environmental Science Education Program (ESEP) as a reliable and unique resource through the web, professional meetings and workshops (MSE)
Objectives	3.2b Enhance and expand research experiences for K-12 teachers
Actions to Produce Significant Results and Connect to Users	<i>Maryland Sea Perch Program (PD)</i> Offer teacher professional development opportunities that are based upon curriculum needs and state standards. (MSE) Work with master teachers to develop ideas for products based upon the current needs of classroom teachers and students. (MSE)
Goal 3.3 University Students	
Objectives	3.3a Enhance research fellowship funding and opportunities
Actions to Produce Significant Results and Connect to Users	Explore new fellowship opportunities with NSF (MGT) Increase visibility for MDSC REU Program through participation in national meetings and workshops (MGT) Provide opportunities for graduate and undergraduate students to improve writing skills for non-technical audiences and to work with MDSC staff on film and writing projects (MGT/COMM)
Objectives	3.3b Develop and market research internships for undergraduates
Actions to Produce Significant Results and Connect to Users	Develop a web portal for marine and coastal fellowships and expand recruitment through direct mailings and additional staff contacts (MGT/COMM)

Codes: Omnibus Research w/Project # (OMNI), Program Development Funds (PD), Water Quality Focus Team (WQ), Marine Science Education Focus Team (MSE), Coastal Communities and Economies Focus Team (CCE), Aquaculture and Restoration Focus Team (A&R), Communications Team (COMM), Management Team (MGT)

Table 3 (cont.). Actions Addressing Strategic Goal 3. Education

Goal 3.4 Non-Traditional Stakeholders	
Objectives	3.4a Develop partnerships and programs that diversify traditional stakeholder groups
Actions to Produce Significant Results and Connect to Users	<i>Knowledge attitude and practice on environmental impact on Chesapeake Bay (PD)</i> Target recruitment for REU and other programs to increase underrepresented minority involvement through meetings, partnerships and interactions. (MGT)
Goal 3.5 Free Choice Learning and Emerging Opportunities for Public Education	
Objectives	3.5a Develop interactive displays, exhibits and programs in partnership with new venues (aquaria, visitor centers and museums
Actions to Produce Significant Results and Connect to Users	Seek external funding to fully implement ongoing collaborative partnership (MDSG, Oregon Sea Grant, the National Aquarium in Baltimore and the Institute for Learning Innovation) for free choice learning (MGT)
	3.5b Develop content and materials for non-coastal/watershed publics
	Develop an exotic species educational poster for pet shops (A&R) Conduct pond management, water garden and aquatic health workshops (A&R)

Codes: Omnibus Research w/Project # (OMNI), Program Development Funds (PD), Water Quality Focus Team (WQ), Marine Science Education Focus Team (MSE), Coastal Communities and Economics Focus Team (CCE), Aquaculture and Restoration Focus Team (A&R), Communications Team (COMM), Management Team (MGT)

Table 4. Actions Addressing Strategic Goal 4. Maryland’s Coastal Communities and Economies

Goal 4.1 Develop Tools for Improved Coastal Management	
Objectives	4.1a Support and provide conflict resolution for multiple use issues in coastal communities.
Actions to Produce Significant Results and Connect to Users	Develop partnership with MD Coastal Zone Management Program to lead statewide effort to address coastal communities growth issues (CCE) Participate in Chesapeake Bay municipal education collaborative with NGO’s, state and federal entities (CCE) Lead an effort to form the University of Maryland Bridge to Land Use Education (BLUE) network to provide education to communities on land use policies (CCE)
Objectives	4.1b Foster development and use of new tools for sustainability in coastal communities.
Actions to Produce Significant Results and Connect to Users	<i>Visioning for sustaining rural communities on Maryland’s Eastern Shore (OMNI R/CE-1)</i> Facilitate means to better inform decision-makers on the use of geospatial technology through workshops, seminars, training programs, and land-use policy courses (CCE) Work in partnership with the Environmental Finance Center to foster innovative financing for sustainable coastal community development (MGT)
Objectives	4.1c Develop a better understanding of socioeconomic implications of environmental change and efforts to restore the Bay.
Actions to Produce Significant Results and Connect to Users	Improve public perception of the costs and benefits of water quality improvements through workshops, web materials and fact sheets (WQ)
Goal 4.2 Foster Sustainable Coastal Land Use and Restoration	
Objectives	4.2a Foster the development of new environmentally sustainable options for shoreline stabilization and restoration.
Actions to Produce Significant Results and Connect to Users	
Objectives	4.2b Develop a better understanding of dredging impacts and better dredged material placement options.
Actions to Produce Significant Results and Connect to Users	<i>Workshop on urban watersheds</i> —Collaborative program with MD Water Resources Research Institute (PD)
Goal 4.3 Foster Sustainable Coastal Economic Development	
Objectives	4.3a Support sustainable fisheries-dependent and seafood processing technologies.
Actions to Produce Significant Results and Connect to Users	Make crab storage presentation East Coast Waterman Trade Show (A&R) Provide technical assistance and training programs that promote food safety, profitability and regulatory compliance. (CCE)
Objectives	4.3b Support improved understanding of the role of marine-dependent industries on the sustainability of coastal economies.
Actions to Produce Significant Results and Connect to Users	Communicate the impact of the boating economy in MD, and changes or trends in boater spending patterns to industry members, state agency personnel and state politicians through fact sheets, web materials and meetings (CCE)
Objectives	4.3c Examine new technologies to prevent nutrient and sediment loading within the watershed.
Actions to Produce Significant Results and Connect to Users	<i>Workshop on urban watersheds</i> —Collaborative program with MD Water Resources Research Institute (PD)

Codes: Omnibus Research w/Project # (OMNI), Program Development Funds (PD), Water Quality Focus Team (WQ), Marine Science Education Focus Team (MSE), Coastal Communities and Economies Focus Team (CCE), Aquaculture and Restoration Focus Team (A&R), Communications Team (COMM), Management Team (MGT)

Metrics to Evaluate Progress

Maryland Sea Grant will measure progress in achieving our strategic goals using a variety of tools. We recognize that building impacts requires strong management, consistent engagement and a variety of outputs tailored to our user communities. Many of these can and should be assessed using numerical measures of administration and productivity. Given the integrative nature of our program however, these metrics must be synthesized with other non-numerical indices to fully evaluate our achievements over this planning cycle. Therefore we will take a two-part approach to evaluation.

Measures of Outputs and Performance

We have established a series of criteria for the performance of the program based on nationally agreed upon categories:

- Organizing and Managing the Program
- Contributions to Science and Technology
- Contributions to Extension and Outreach
- Contributions to Education (K-12 and Professional/Informal)

Within each category we have made a detailed analysis of relevant indices over a 5-15 year period of Maryland Sea Grant's history and used this information to establish benchmarks for performance. These targets, while ambitious, represent realistic projections of what Maryland Sea Grant can achieve by 2007 and therefore provide a foundation for accountability at the state and federal level. We will evaluate our progress and revise targets as needed for the second half of our planning cycle. See Tables 5-8.

Synthesis to Determine Impacts

The numerical metrics described in Tables 5-8 are important tools to help us determine if we are achieving our strategic goals. When combined with input from stakeholders and broader syntheses they allow us to understand and present a more complete picture of our accomplishments. Such analyses are generally cumulative in nature and employ other sources of data including inputs from our advisory structure, interactions with user communities (research, education, industry) and comparison with peer programs. This synthetic process is a priority for program management and is undertaken on an ongoing basis. Our annual reports, biennial omnibus proposal and federal evaluation cycle (4-year program assessment intervals) all provide important temporal landmarks that we use to calibrate and report on our evaluative process and our progress in implementing our strategic plan.

Table 5. Evaluation Criteria for Organizing and Managing the Program

Criteria	Metric	Analysis	Benchmarks
Program Leadership and Engagement of Stakeholder Institutions	MDSG engagement in relevant CBP and coastal/marine-related advisory committees and/or professional associations MDSG MGT	23 state, regional and national committees and professional associations	Maintain engagement with relevant entities
	MDSG interactions with research community and input from research and management communities on critical issues and needs	<ul style="list-style-type: none"> • Acad. Advisory Comm. meetings (1-2/year) • Biennial Research Planning Meeting • Numerous meetings w/researchers 	Maintain current schedule and contact rates
	Engagement by Governance Board, Institutional Council and Advisory Board (2000-2005)	<ul style="list-style-type: none"> • Annual meetings • Numerous individual meetings and contacts 	<ul style="list-style-type: none"> • Semiannual meetings • Periodic email updates • Individual meetings and updates as needed
Recruiting Scientific Talent and Proposal Selection Process	Engagement with diverse institutions (2000-2005)	8-10 mtgs/year	15-20 meetings/year
	Engagement of PI's and institutions in Chesapeake Bay and coastal research (2000-2005)	<ul style="list-style-type: none"> • RFP's distributed to 45 institutions and 105 separate departments • 13-100% of funded projects were new with new PIs • Research portfolio composition: averaged 4.5 institutions/16.8 depts./competition 	<ul style="list-style-type: none"> • Maintain RFP distribution rate and enhance targeting by 2007 • 25-50% turnover in PIs in all RFPs
	Program development fund targeting for new PIs examining emerging/critical issues (2000-2005)	43% (range = 33-58%) of PIs who received PD funds were new to MDSC	50% of PD funds to new PIs on annual basis
Managing Resources and Opportunities	Regional research efforts and programming through partnerships with Mid-Atlantic Sea Grant Network	2 regional collaborations (2005-2007)	1-4 regional research projects in 2007-2008 Omnibus Proposal
	Multi institution initiatives (2000-2005)	2 (range = 0-4) multi-institution projects funded per competition	2-4 multi-institutional projects in 2007-2008 Omnibus Proposal
	Projects leveraged through interactions with federal and state partners (2000-2005)	7 projects leveraged other federal funds	1-2 projects in 2007-2008 Omnibus Proposal
Integrating Program Components	External (<i>non-NSGO</i>) funding for MDSG activities (2000-2005)	\$436,500/year (range = \$304K-\$588K/year) in external funds	<ul style="list-style-type: none"> • Maintain external grants and contracts within range • \$20,000 from private fund raising effort by 2007
	Linkages from research projects to outreach and extension activities where appropriate	Outreach identified in 2005-2007 Omnibus Proposals <ul style="list-style-type: none"> • 30 non-peer audiences • 17 outreach mechanisms • 6 outreach partners • 6 MDSG/SCEP partners 	Enhance outreach linkages by 10% in 2007-2008 Omnibus Proposal

Table 6. Evaluation Criteria for Contributions to Science and Technology

Criteria	Metric	Analysis	Benchmark
<p>Contributions through Scientific Excellence</p>	<p>Quality of research proposals as determined by peer review process (last 5 RFPs; NSF Scale; 1-5)</p>	<p>Average scores: External peer review/panel • Funded: 1.55/1.70 • Unfunded: 2.17/2.45</p>	<p>Maintain high scores for funded proposals</p>
	<p>Quantity of research products (journal articles, conferences etc.) (1990-2005)</p>	<p>#Publications/#Conferences (per year by portfolio) • Estuarine Process (5.2/10) • Technology (7.4/10.7) • Fisheries (1.8/4.7) • Communities (0.53/1.2) Mean ISI Impact/range/Impact Index* • Estuarine Process: 2.19/608-5.016/1.93 • Technology: 2.13/355-10.54/2.31 • Fisheries: 1.50/399-3.55/1.25 • Communities: 1.03/404-1.38/643 (*Total ISI Impact/#Citations)</p>	<p>Maintain 1990-2005 levels in new portfolios</p>
	<p>Quality of research publications (journal articles) (1990-2005)* (*For details on calculations of publication impact index please contact MDSG)</p>	<p>3 patents 6 disclosures</p>	<p>2-5 disclosures by 2007</p>
	<p>Patents and Invention Disclosures (2000-2005)</p> <p>MDSG Research Fellows Support for undergraduate (UG) and graduate (GS) students in office Knauss Fellowships (2000-2005)</p>	<p>• MDSG Research Fellows (6/year; range=5-8) • UG (1.7/year; range=1-4) • GS (3.5/year; range =1-6) • Knauss (2.8/year; range =1-4)</p>	<p>• 5-7 MDSG Research Fellows/year • 1-3 GS/year • 1-3 UG/year • 2-4 Knauss Fellows/year</p>
<p>Research Impacts on Society, the Economy and Environment</p>	<p>Degree that research is targeted to address strategic goals in plan as well as addressing emerging issues and opportunities</p>	<p>See Tables 1-4</p>	<p>Maintain high degree of linkage of actions to goals</p>
	<p>Links from funded research to policy, management and economic issues (2000-2005)</p>	<p>MDSG funded research addresses 11 Chesapeake 2000 goals</p>	<p>Increase #Chesapeake 2000 goals addressed as appropriate</p>
<p>Research Impacts on Society, the Economy and Environment</p>	<p>Short to long-term student outcome for undergraduate students (MDSG office assistants) and graduate students (MDSG Fellows, graduate assistants and Knauss Fellows)</p>	<p>#Degrees awarded (2000-2005) • BA (3) • BS (9) • MS (29) • MS Pending (9) • JD (1) • Ph.D (5) • PhD Pending (12) Employment (1995-2005;n=62) • Academic (50%) • Federal Agency (29%) • State Govt. (10%) • NGO (5%) • Private Sector (3%)</p>	<p>Maintain tracking database with semi-annual updates Biennial survey of graduates</p>

Table 7. Evaluation Criteria for Extension and Outreach

Objective	Metrics	Analysis	Benchmarks
Engagement with Appropriate User Communities	Engagement and leadership in MD and MD Cooperative Extension by SGEP focus teams	1-3 per Extension faculty or staff	Maintain current levels of engagement
	Focus teams partnerships between the University and appropriate stakeholders (2000-2005)	15 partnerships	Increase 25% by 2007
	Regional and national outreach partnerships (2000-2005)	7 partnerships	2-3 new partnerships developed by 2007
	Industry/private sector partnerships (2000-2005)	6 industry partners	Increase 20% by 2007
	Synthetic meetings organized and facilitated (2000-2005)	6 major (50-300 participant) synthetic meetings conducted/facilitated)	1 major meeting/year
	"White Papers" and synthesis documents produced (2000-2005)	5 major synthesis documents authored	1 major synthesis document/year
	Media Contacts (2000-2005)	1-3/month	Increase 25% by 2007
	Chesapeake Quarterly (CQ) readership (2002-2005) Marine Notes readership (1995-2002)	5500 CQ readers 3500 Marine Notes readers (ceased publication in 2002)	Increase CQ circulation 50% by 2007
	Distribution of MDSCG print publications (2000-2005)	<ul style="list-style-type: none"> • Books and other publications (2,800) • Videos (1,089) • Reports, fact sheets & brochures (14,500) 	<ul style="list-style-type: none"> • Maintain inventory to meet demands • Increase distribution of selected products 10% by 2007
	Reaching Appropriate User Communities	MDSCG website usage (2000-2005)	Total usage (185,000/month) Selected pages: <ul style="list-style-type: none"> • Research (14,000/month) • Extension (19,600/month) • Education (19,700/month) • Bay Science Gateway (300/month)
Publications accessed through website (2000-2005)		4000 pdf downloads/month	Increase 20% by 2007
MDSCG highlights of key research and outreach contributions (local regional and national) for media (2000-2005)		1-3/year	6-8/year by 2007

Table 7. (cont.) Evaluation Criteria for Extension and Outreach

Objective	Metrics	Analysis	Benchmarks
<p>Innovative Methodologies to Reach User Communities</p>	<p>Communications products (print and Web-based) generated by Extension focus teams (2003-2005)</p>	<p>Newsletters & Fact Sheets/Peer Reviewed Publications — average per year <ul style="list-style-type: none"> • Aquaculture & Restoration 14.5/1.75 • Coastal Communities & Economies 9.5/0.75 • Water Quality 12.5/2.5 • Marine Science Education 3.8/0.0 </p>	<p>Increase 5% by 2007</p>
	<p>Use of web technologies (streaming video and others) to enhance communications (2003-2005)</p>	<p>19 streaming videos with an average of 85 website hits/month</p>	<p>Produce 8/year 250 website hits/month by 2007</p>
	<p>Integrated communication products (web, print & film)</p>	<p>New</p>	<p>2 integrated products by 2007</p>
	<p>New vehicles developed to disseminate scientific information to users (2000-2005)</p>	<p>4 new communications vehicles developed</p>	<p>1 new vehicle by 2007</p>
	<p>Database of MDSG research “outcomes”</p> <p>Leveraged funding for applied research or additional services provided through partnerships or grants</p>	<p>New</p> <p>Externally Funded Projects by focus team, 2001-2005 (Average #per year/average \$ per multi-institutional award per year)</p> <ul style="list-style-type: none"> • Aquaculture & Restoration 3.25/\$155,000 • Coastal Communities & Economies 1.0/\$130,000 • Water Quality 0.25/\$16,500 • Marine Science Education 1.5/\$111,000 	<p>Populate research database with explicit outcomes and impacts (25% new coverage/year)</p> <p>Maintain current funding rate</p>
<p>Extension and Outreach Impacts Society, the Economy and Environment</p>	<p>Technologies developed or transferred (2000-2005)</p>	<p>5 developed/5 transferred</p>	<p>Maintain current rates</p>
	<p>Connections demonstrating that extension is a key source of science-based information for stakeholder community</p>	<p>Analyzed non-numerically through synthesis of interviews and surveys and contact data</p>	<ul style="list-style-type: none"> • Focus teams conduct interviews and follow-up surveys with key user communities • Fully implement electronic reporting system for Extension program

Table 8. Evaluation Criteria for Contributions to Education

Objective	Metric	Analysis	Benchmark
Engagement with User Communities	Planning meetings and individual interactions with teachers, administrators and managers	Numerous	Maintain high contact rates
	MDSG Programs for Managers	New	4 new products/programs by 2007
Contributions to User Driven Needs	K-12 student participation K-12 teacher participation	4,600 students/year (1996-2005) 125 teachers/year (1998-2005)	Student participation at present levels Increase teacher participation 20%/year
	MDSG fostered interactions between research community and K-12 educators (2000-2005)	<ul style="list-style-type: none"> • ~350 indirect interactions (NSF VIP K-16 website project) • 12 direct interactions of teachers and researchers in laboratory experiences per year 	<ul style="list-style-type: none"> • Maintain NSF VIP K-16 effort • Increase direct linkages by 25% by 2007
	Curriculum/lessons developed Curriculum linked to university products consistent with state education goals	8 lessons developed 8 linked to university products an consistent with state goals	Develop 4 new lessons by 2007
Innovative Methodologies to Reach User Communities	Education partnerships (2000-2005)	40 partnerships (schools, counties, NGO's and other education providers)	Increase partnerships 20% by 2007
	External funding for K-12 teacher program (2000-2005)	\$170,000/year	Increase 10% by 2007
	Web activities for education programs (all aspects)	19,700 web hits/month (2000-2005) 4,500 Maryland Sea Grant Network School News hits/month (2001-2005) 2,280 curriculum downloads (2000-2005)	Increase 25% by 2007

