

# MARYLAND SEA GRANT

*Science Serving  
the Chesapeake*



2013 Annual Report

# Message from the Director



Maryland Sea Grant College is pleased to provide these highlights of our program's priorities, activities, and accomplishments for 2013. Our program, part of the University System of Maryland, plays an important role among the network of organizations working to manage and restore the Chesapeake Bay and Maryland's coastal bays.

In 2013, we continued working with our many partners to understand and improve the state's marine and coastal natural resources. Through our research, education, communications, and extension activities, we fund, interpret, and share scientific findings that can help leaders and communities make wise decisions to preserve these natural resources. With our outreach efforts, we strive to build a strong coastal economy that uses these resources sustainably to support jobs and businesses in fishing, aquaculture, and other enterprises. Our program remains unwavering in its commitment to fund innovative science that can support management decisions and inform public policy.

In this report you'll see projects that show our passion for educating and engaging citizens and connecting science and society so that together we can make a difference. We want to work with you to make more progress toward improving our coastal environment and economy.

As you peruse these highlights, we hope you'll join us in reflecting on the beauty and richness of our waters, how they help define who we are as Marylanders, and what we can do to help preserve them for future generations to enjoy.

We value your thoughts and comments on our efforts and encourage you to contact any member of our team. Learn more about our projects, partnerships, mission, and achievements at our website, [www.mdsg.umd.edu](http://www.mdsg.umd.edu).

A handwritten signature in blue ink that reads "Fredrika C. Moser". The signature is written in a cursive style and is underlined with a single blue line.

Fredrika C. Moser, Ph.D.  
Maryland Sea Grant



# Program Priorities

Our accomplishments for 2013 reflect priorities that we identified in our strategic plan for 2010–2013, aligned with National Sea Grant priorities, and grouped in these four focus areas. Here are examples of activities we supported in each area.

**Viable Coastal Communities and Economies:** Grow jobs and businesses in Maryland’s aquaculture industry; assist local projects to manage stormwater and improve water quality



**Resilient Ecosystem Processes and Responses:** Fund scientific research to help inform management of coastal resources; help to prepare the next generation of environmental scientists

**Sustainable Natural Resources of Coastal Maryland:** Provide technical analyses and training to help expand Maryland’s aquaculture, fishing, and seafood industries; advise seafood businesses about food safety and processing technology

**Understanding Regional Effects of Climate Change and Sea Level Rise and Their Impacts on Coastal Communities and Ecosystems:** Support scientific research, education, and public outreach to help communities prepare for the future

# Restoring the Ecosystem



## New map of buried streams provides a valuable tool for resource managers ■

This novel, detailed map shows streams in a large region of Maryland not recorded on previous maps. Researchers mapped small and buried streams west of the Chesapeake Bay, providing a tool that can help inform efforts to protect streams from development and to restore those that are buried.

## Evaluation of stream restoration methods will help improve water quality ■

Researchers evaluated methods

for restoring Maryland streams and quantified each method’s effectiveness at reducing nitrogen levels in waterways. The results were used to update the Chesapeake Bay Program’s watershed model for water quality.

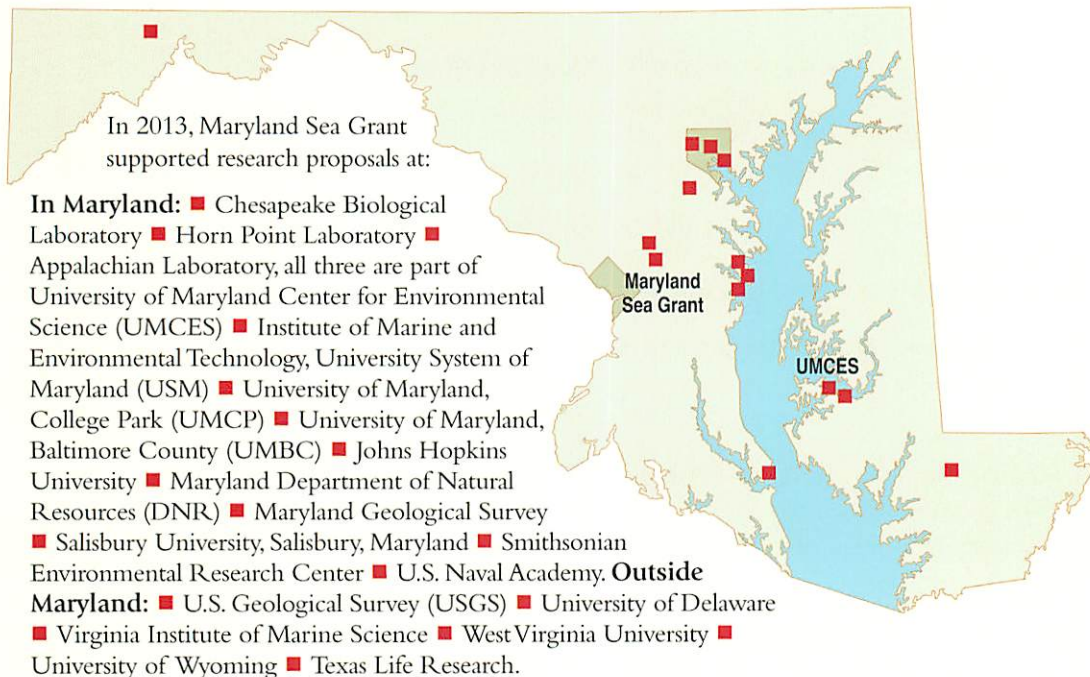
## Molecular monitoring of virus yields a tool to reduce soft crab mortalities

■ A research project developed a fast quantitative PCR assay to study a crab-specific virus that can cause high mortality in flow-through crab shedding operations. The research also provided information about practices that state regulators and watermen could consider to reduce the prevalence of the virus.

## Coupled economic and ecological models inform fisheries management in the Chesapeake Bay ■

Research showed that this coupling can provide more comprehensive assessments of the effects of different fisheries management policies.

# Research Partners



In 2013, Maryland Sea Grant supported research proposals at:

**In Maryland:** ■ Chesapeake Biological Laboratory ■ Horn Point Laboratory ■ Appalachian Laboratory, all three are part of University of Maryland Center for Environmental Science (UMCES) ■ Institute of Marine and Environmental Technology, University System of Maryland (USM) ■ University of Maryland, College Park (UMCP) ■ University of Maryland, Baltimore County (UMBC) ■ Johns Hopkins University ■ Maryland Department of Natural Resources (DNR) ■ Maryland Geological Survey ■ Salisbury University, Salisbury, Maryland ■ Smithsonian Environmental Research Center ■ U.S. Naval Academy. **Outside Maryland:** ■ U.S. Geological Survey (USGS) ■ University of Delaware ■ Virginia Institute of Marine Science ■ West Virginia University ■ University of Wyoming ■ Texas Life Research.

## Program Governance

Maryland Sea Grant is administered by the University of Maryland Center for Environmental Science (UMCES).

### External Advisory Board (EAB)

Mr. Mark Bryer, The Nature Conservancy  
Dr. Jana Davis, Chesapeake Bay Trust  
Mr. William Matuszeski, U.S. EPA Chesapeake Bay Program (retired)  
Dr. Beth McGee, Chesapeake Bay Foundation  
Dr. Thomas Miller, Chesapeake Biological Laboratory, UMCES (AAC liaison)  
Ms. Ann Swanson, Chesapeake Bay Commission  
Mr. Dave Wilson, Maryland Coastal Bays Program

### Academic Advisory Committee (AAC)

Dr. William Boicourt, Horn Point Laboratory, UMCES  
Dr. Marie Bundy, Estuarine Reserves Division, NOAA  
Dr. Feng Chen, Institute of Marine and Environmental Technology, USM  
Dr. Patricia Delgado, Jug Bay Wetlands Sanctuary  
Dr. Matt Fitzpatrick, Appalachian Laboratory, UMCES  
Mr. Brent McCloskey, Environmental Finance Center  
Dr. Thomas Miller, Chesapeake Biological Laboratory, UMCES (EAB liaison)  
Dr. Brad Stevens, University of Maryland, Eastern Shore  
Dr. Peter Tango, USGS at Chesapeake Bay Program Office

*"Maryland Sea Grant Extension's role was key. They worked hand in hand with our staff. Persistence, energy — they had it all going."*

— Kordell Wilen, Cecil County Dept. of Public Works, about starting a Watershed Stewards Academy

# Investing in Coastal Communities



**Business assistance for oyster growers results in \$731,000 in loan commitments** ■ Extension specialists helped entrepreneurs in the state obtain low-interest loans to invest in new oyster aquaculture operations.

**Economic analyses inform revised regulations and new legislation governing commercial fisheries** ■ The

Extension program's fisheries economics specialist conducted analyses that informed new rules about the commercial fisheries in Maryland and the striped bass fishery in the Chesapeake Bay. The state altered permit fees, generating more funding for fisheries management, and adopted an Individual Transferable Quota system in the Maryland striped bass fishery.

**Projects add 800,000 square feet of new "rainscaping" and 44 green jobs for students, improve water quality** ■

Extension's watershed restoration specialists assisted in training volunteers to install green design projects around the state. In Howard County, Extension assisted with a project that created summer jobs for students to install rain gardens and conservation landscaping to reduce stormwater runoff.

# Preparing the Next Generation

**Fellowships support 30 students in marine science** ■ Students funded by Maryland Sea Grant acquire training by participating in research and policy activities. During 2013, 11 graduate students carried out marine science projects at Maryland institutions, and four worked in federal government offices through the Knauss Marine Policy Fellowships program. The summer Research Experiences for Undergraduates program supported 15 students.

**Maryland teachers learn to use aquaculture and biodiversity to introduce students to marine science** ■ Our assistant director for education worked with school districts and mentored individual teachers, providing them with professional development in Chesapeake Bay science. He helped teachers incorporate this science into lessons to meet new state and national standards in science education and environmental literacy.

**Hispanic students receive increased training opportunities in marine science** ■ Maryland Sea Grant, with funding from the National Science Foundation, offered opportunities for students from groups traditionally underrepresented in marine sciences through its Maryland-based Research Experiences for Undergraduates (REU) program and a pilot REU program in Puerto Rico. Eleven of these students presented their findings at scientific meetings.



# Research Projects Funded for 2013

## Projects Led by Faculty

A biologically-optimized environmental classification of Maryland streams; assessing impacts of stream burial and responses to climate change; Matthew C. Fitzpatrick, Appalachian Laboratory, UMCES; *Miriam Johnston\**

Advancing ecosystem based fisheries management: biological reference points for nutritional status of striped bass (*Morone saxatilis*); Reginald M. Harrell, UMCP; *Will Haus*

Associations between billfish and their monogenean ectoparasites: equipment needs; Anne Barse, Salisbury University

Developing a framework for the use of computable general equilibrium economic and ecological models for fisheries management in the Chesapeake Bay; John Tschirhart, University of Wyoming

Development and evaluation of eco-engineered macroalgae and shellfish multi-trophic aquaculture systems in the Chesapeake Bay; Ji Li, UMCP

Forecasting watershed loading and lagoon response along the Delmarva Peninsula due to changing land use and climate; Lora Harris, Chesapeake Biological Laboratory, UMCES; *Jessica Foley*

In situ setting of *Crassostrea virginica* larvae on restored reefs: a complementary method for restoring oyster populations; Cecily Steppe, U.S. Naval Academy

Long-term impacts of different techniques for shoreline stabilization in the Maryland Chesapeake Bay; Lawrence Sanford, Horn Point Laboratory, UMCES

Monitoring for outbreaks of a fatal blue crab virus in rivers with soft shell production systems; Eric Schott, Institute of Marine and Environmental Technology, USM; *Emily Flowers*

*Phragmites australis* invasion in the Chesapeake Bay: implications of nitrogen pollution, elevated CO<sub>2</sub>, and genotypic variation for tidal marsh management; Patrick Megonigal, Smithsonian Environmental Research Center; *Justin Meschter*

Robust ecosystem-based management of the Chesapeake Bay blue crab fishery; Richard Woodward, Texas AgriLife Research

Unexpected resurgence of submersed plant beds in Chesapeake Bay: role of nutrient inputs and biogeochemical cycling; Michael Kemp, Horn Point Laboratory, UMCES; *Cassie Gurbisz*



## Projects Led by Graduate Fellows

Diet and feeding of menhaden using barcoding identification based on Cox1 sequences to enable the linking of primary productivity to fisheries; *Ammar Hanif*, Institute of Marine and Environmental Technology, USM

Fate of carbon produced by winter dinoflagellate blooms; *Nicole Millette*, Horn Point Laboratory, UMCES

Implications of restoration design for hydrologic response in urban streams; *Garth Lindner*, UMBC

Riparian buffer indicators of ecohydraulic function for improved watershed management and monitoring; *Molly Van Appledorn*, UMBC

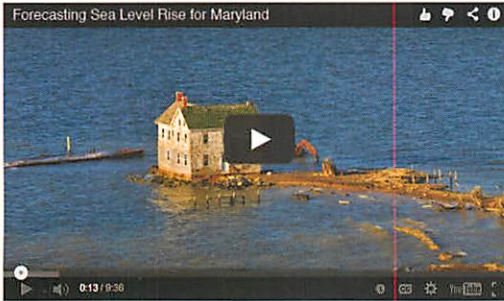
Seasonal trend, source appointment, spatial budget, and in-stream cycling of nutrient and sediment from the Susquehanna River basin to Chesapeake Bay; *Qian Zhang*, Johns Hopkins University

\*Names of Maryland Sea Grant Graduate Research Fellows are in italic

# Communicating Science

Online video explains the science predicting rapid sea level rise in the Mid-Atlantic region, gets 3,000 views

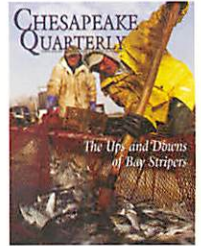
■ Maryland Sea Grant’s film producer made “Forecasting Sea Level Rise for Maryland,” a nine-minute video about sea level rise and coastal flooding. Posted on our YouTube channel, the video explored scientific understanding about the rapid rate of sea level rise in coastal waters of Maryland and other Mid-Atlantic states and projections for further increases. The video was also highlighted at national conferences.



Documentary describing oysters and restoration shown on public television stations ■ Public television stations aired our documentary “Who Killed *Crassostrea virginica*?” about the decline of the Chesapeake Bay’s oyster fishery. The film provided a large audience with a science-based analysis of long-standing controversies about oyster harvesting, oyster disease, and recent plans for oyster restoration.

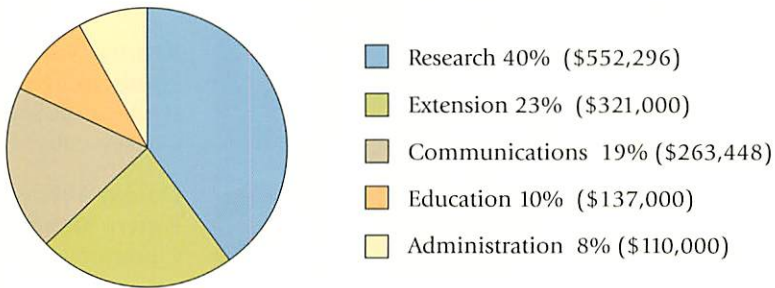
**Chesapeake Quarterly magazine reaches more than 5,400 subscribers** ■ Four issues

of our award-winning magazine covered a wide array of research in the Chesapeake Bay watershed, including the migration of striped bass and white perch, biodiversity, marsh restoration on an engineered island, ancient climate change, and paleontology.

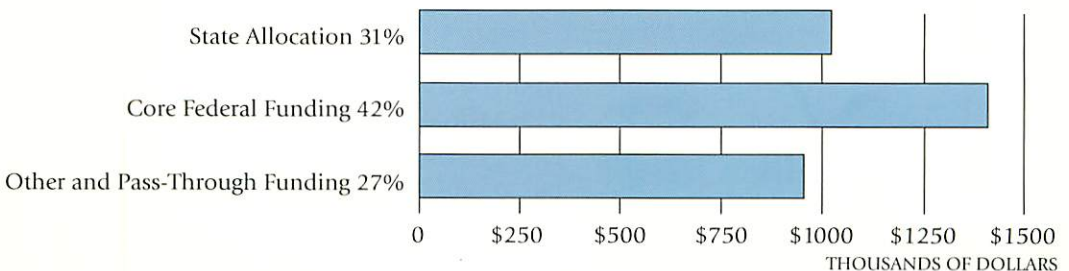


# Budget Overview

Core Federal Funding 2013



All Funding Sources 2013



# Maryland Sea Grant Staff

## Maryland Sea Grant Office

### Director's Office

Fredrika Moser, Director

Adrienne Hieb, Assistant to the Director

### Research

Mike Allen, Assistant Director for Research

Jenna Clark, Program and Planning Assistant

### Administration

Bonny Marcellino, Assistant Director for Administration

Theresa Lee, Grants Coordinator

Kim Cox, Administrative Coordinator

Jeannette Connors, Payroll Coordinator/NMEA\* Office Manager

Mariah Belden, Account Clerk

### Information Technology

Dan Jacobs, Information Technology Manager/Webmaster

### Education

Adam Frederick, Assistant Director for Education

### Communications

Jeffrey Brainard, Assistant Director for Communications

Michael W. Fincham, Writer/Film Producer

Daniel Strain, Science Writer

Sandy Rodgers, Art Director/Editor

### Maryland Sea Grant Extension Offices

Andrew Lazur, Interim Director, College Park, MD

Nancy McIntee, Administrative Assistant, Cambridge, MD

Vicky Carrasco, Coastal Communities Specialist, College Park, MD

Jennifer Dindinger, Lower Eastern Shore Watershed Restoration Specialist, Cambridge, MD

Jorge Holzer, Fisheries Economics Specialist, College Park, MD

Chengchu (Cathy) Liu, Seafood Technology Specialist, Princess Anne, MD

Donald Meritt, Shellfish Aquaculture Specialist, Cambridge, MD

Matt Parker, Aquaculture Business Specialist, Clinton, MD

Amanda Rockler, Central Maryland Watershed Restoration Specialist, Derwood, MD

Jacqueline Takacs, Southern Maryland Watershed Restoration Specialist, St. Mary's City, MD

Kristian Varsa, Northern Maryland Watershed Restoration Specialist, Cockeysville, MD

Donald Webster, Eastern Shore Agent, Queenstown, MD



\*Maryland Sea Grant hosts the national office for the National Marine Educator's Association (NMEA)  
For full addresses and contact information for our staff, visit the web at: [www.mdsg.umd.edu/our-office](http://www.mdsg.umd.edu/our-office)

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National Sea Grant  
Maryland  
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