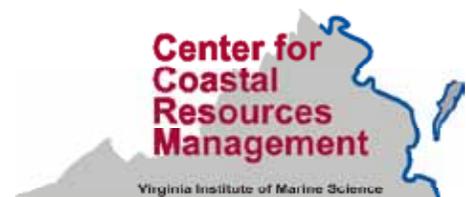




# Center for Coastal Resources Management

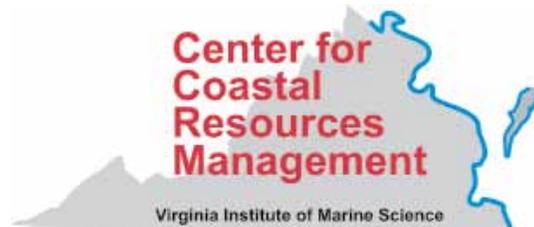
## Annual Report 2010



**“The Wetlands Program provides extensive support to the Commonwealth’s tidal wetlands and subaqueous lands management programs through review of individual tidal wetland permit applications, training for local and state managers, and development/management of data bases supporting and tracking regulatory program activities.”**

# Center for Coastal Resources Management

2010 Annual Report



Virginia Institute of Marine Science  
P.O. Box 1346  
Gloucester Point, Virginia 23062

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# CENTER PROGRAMS

**Freshwater mixed community**

# Background

The Center for Coastal Resources Management exists to develop and support integrated and adaptive management of coastal zone resources. To fulfill this mission, the Center undertakes research, provides advisory service, and conducts outreach education. These tasks are carried out by a staff of professional scientists and technical experts using a mix of state funding and grant/contract support.

Within its broader mission, the Center has specific tasks to support Virginia's wetlands and shoreline management programs. These core activities create a natural focus on the littoral zone and riparian lands in coastal and estuarine areas. Management of resources in these areas has evolved from resource-specific considerations to system-level perspectives. The Center has been an active agent in this change, and has developed the required internal capabilities and external collaborations to support multidisciplinary approaches to management and policy issues.

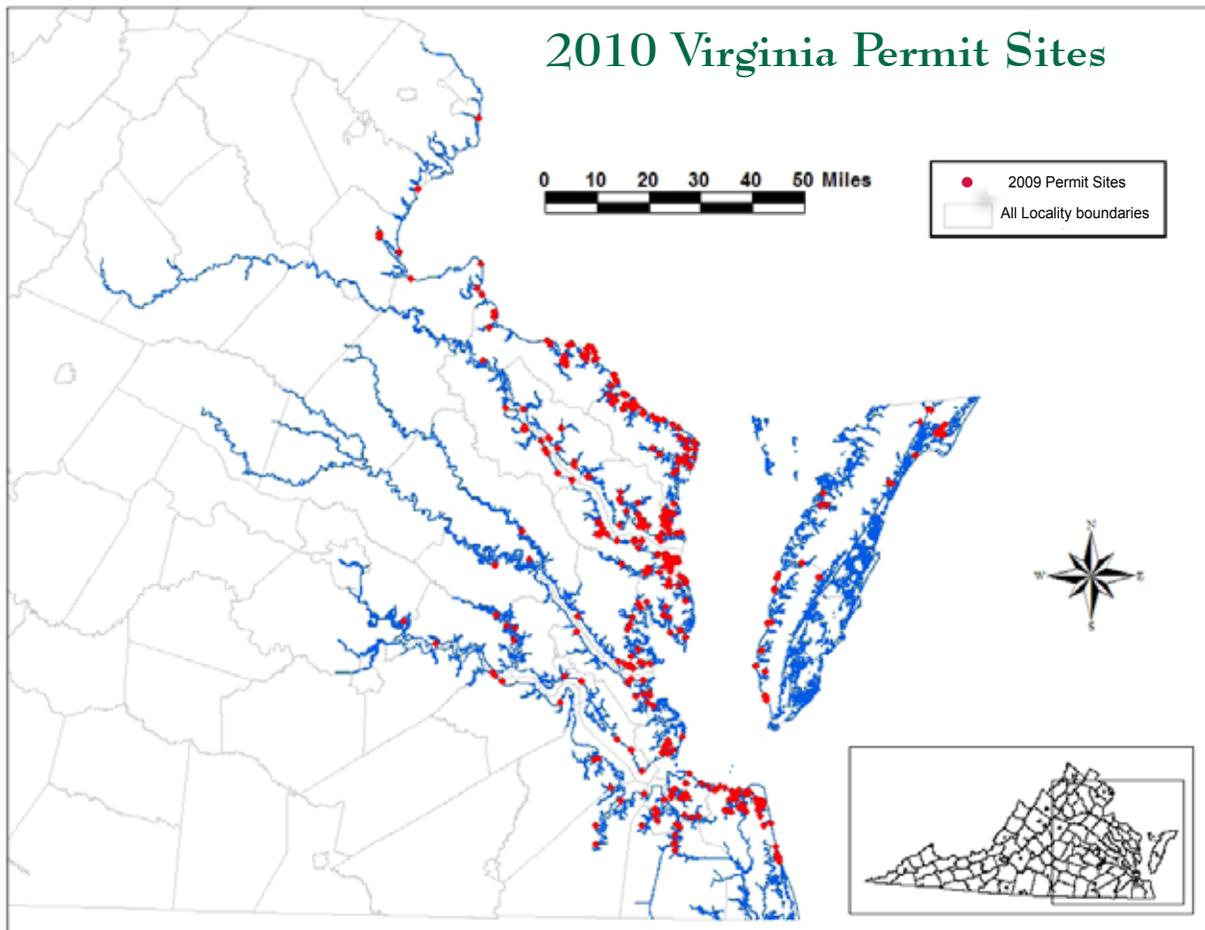
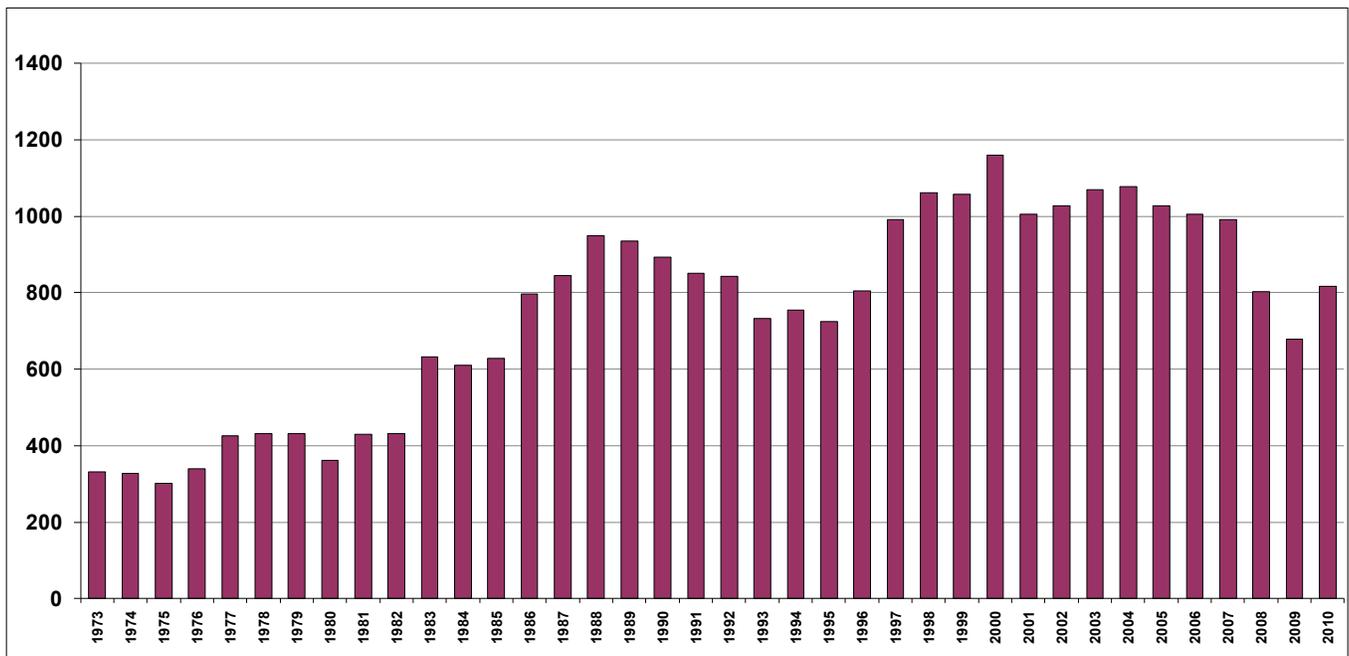
The Center currently manages its multiple activities within three broad and interacting programs.

## The Wetlands Program



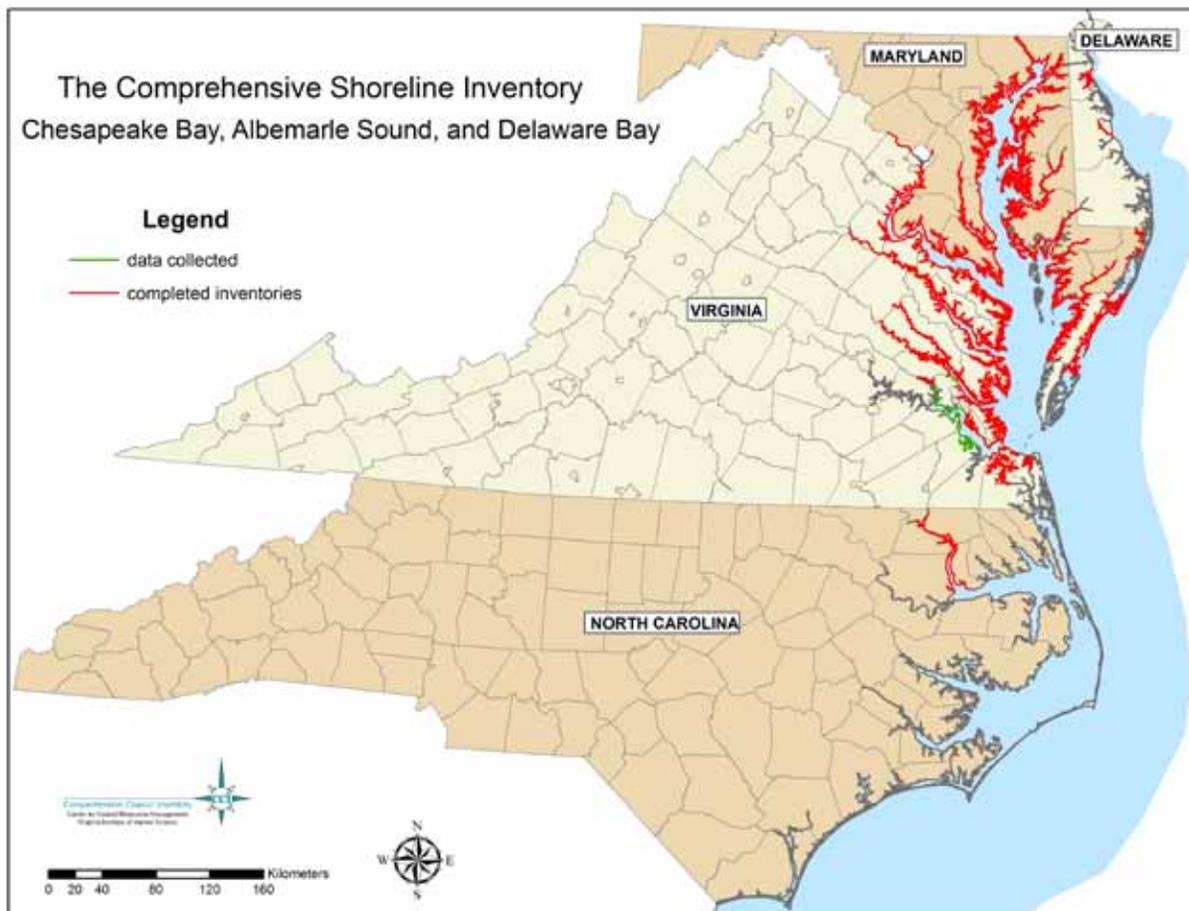
The Wetlands Program deals with both tidal and nontidal wetlands. The program conducts basic research on the structure and functions of these systems, collaborating with researchers throughout the mid-Atlantic region. A wide variety of applied research is also undertaken. This includes policy option analysis, functional assessment methods, inventory and monitoring techniques, and creation/restoration protocols. The Wetlands Program provides extensive support to the Commonwealths tidal wetlands and subaqueous lands management programs through review of individual tidal wetland permit applications, training for local and state managers, and development/ management of data bases supporting and tracking regulatory program activities.

# Permits Reviewed 1973 - 2010



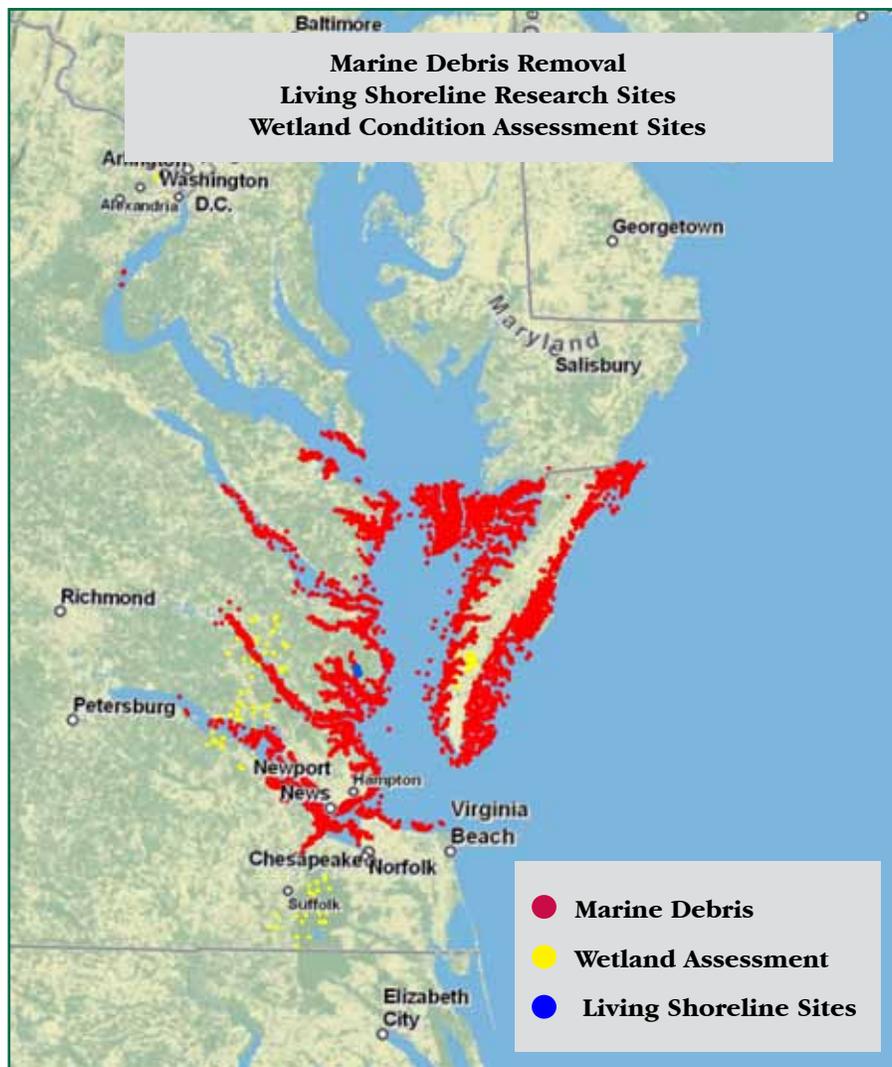
# Coastal Inventory Program

The Coastal Inventory Program has a basic mission to monitor tidal shoreline conditions and to develop policy/management recommendations based on analysis of that information. The Coastal Inventory Program has developed extensive capabilities in geographic information systems and in analysis of remotely sensed information. It has expanded its inventorying activities to include almost all terrestrial and aquatic resources within the coastal zone in support of the Center's focus on integrated and adaptive management. Development of GIS-based analytical protocols has become a major activity in the Coastal Inventory. Development of these tools has proven to be a most effective mechanism for integrating technical understanding and extensive data sets in a format that is comprehensible and informative for managers. The Coastal Inventory generates detailed shoreline condition inventories for every tidal county and city as part of its basic mission, and shares its extensive GIS data bases with state and federal agencies throughout the region.



# Coastal Watersheds Program

The Coastal Watersheds Program evolved to deal with the water quality/quantity, land use, and habitat issues that were part of integrated management of coastal resources. The program focuses on basic and applied research in support of policy and regulation development. There are both regional and international elements in the Coastal Watershed Program. The program is working on development of indicators for health of aquatic ecosystems, use conflict management plans for shallow waters, anadromous fish spawning and nursery habitat studies, and climate change impact assessments. Because much of the work on use conflict analysis, shallow water management, and fishery habitat assessment is of interest in coastal systems around the world, the Center manages growing international collaborations through the Coastal Watersheds Program.



# Personnel and Funding

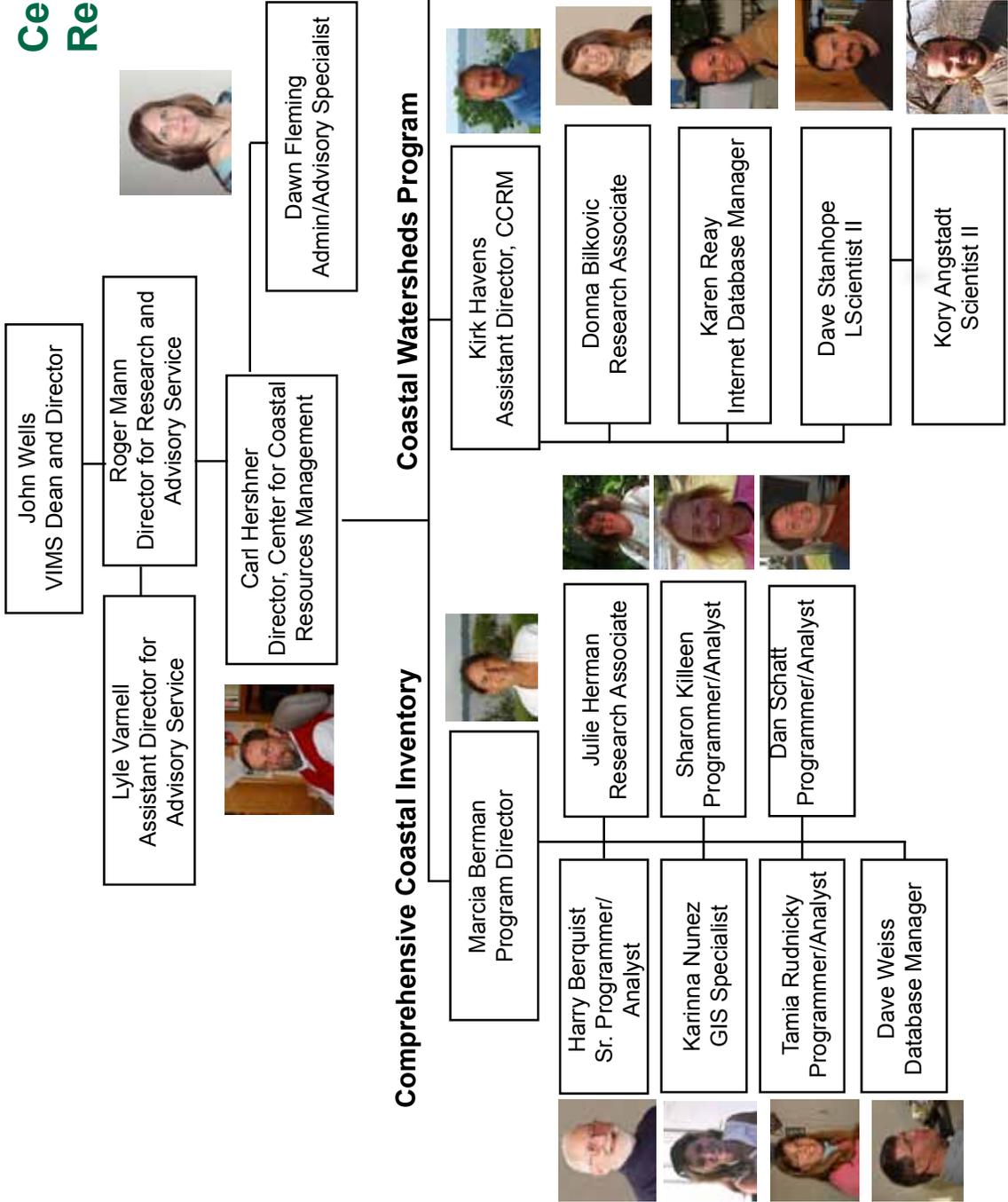
The Center has a full time staff of about 22 individuals and supports several graduate students. The staffing varies slightly depending on grant and contract activities.

Currently the Commonwealth of Virginia provides base funding for the Center that covers less than 50% of the salary expenses and about 15% of the annual operating expenses. The balance of funding is derived from grant and contract activity. The primary sources of this support have been the U.S. Environmental Protection Agency and Virginia's Coastal Resource Management Program (funding from NOAA).

Other sources of recent funding have included National Oceanic and Atmospheric Administration, National Science Foundation, Virginia Department of Health, Virginia Department of Conservation and Recreation, and private donors.



# Center for Coastal Resources Management



# Center Fellows

The Center Fellowship Program is designed to enhance capabilities to provide the very best research and advice by ensuring a constant influx of new ideas and perspectives. The goal is to bring dynamic young scientists into close collaboration with Center staff on a continuing basis. Each Fellow is expected to spend a minimum of one week in residence at the Center giving seminars and leading workshops in areas of their particular expertise. In addition, Fellows are engaged in development of proposals for collaborative research that may extend well beyond their formal appointments. Fellows are selected by the Center's leadership based on nominations from Center staff or colleagues at other institutions. The selection process emphasizes the goal of bringing in post-doctoral scientists who have begun careers as independent researchers, with expertise that compliments but does not duplicate Center staff expertise. Fellowship Program success is measured by the number of new research topics and approaches developed from these collaborations. These appointments started on May 1, 2004.



**Dr. Anamarija Frankic** is an assistant professor in the Environmental Earth and Ocean Science Department of the University of Massachusetts in Boston.



**Dr. Chris Pyke** is the Vice President of Research US Green Building Council



**Dr. Denice Wardrop** is the Assistant Director, Penn State Institutes of Energy & the Environment

Associate Professor of Geography and Ecology  
Associate Director, Cooperative Wetlands Center

# Center Adjunct Research Faculty

CCRM Adjunct Research Faculty are College of William and Mary colleagues from other departments or schools. These individuals collaborate with Center staff on a continuing basis in basic and applied research. Adjunct Research Faculty expand the expertise available for CCRM projects, constituting a very efficient mechanism for addressing multidisciplinary issues. Appointments are for fixed terms and are renewable as the work of the Center and the interest of faculty members dictate. Success in the Adjunct Research Faculty program is judged by generation of collaborative proposals and research products. The first appointments to the CCRM Adjunct Research Faculty were made in December 2005.



**Dr. Randy Chambers** is Associate Professor of Biology and Director of the Keck Environmental Field Laboratory at The College of William and Mary.



**Dr. Gregory Hancock** is Associate Professor of Geology at the College of William and Mary.

# Center Associate Researchers

CCRM Associate Researchers are scientists from other institutions, government agencies, and/or the private sector who collaborate with Center staff on research and advisory projects. Appointment as an Associate Researcher is based on sustained productive interaction. Appointments are for fixed terms and renewable as appropriate. The first appointments of CCRM Associate Researchers were in September 2005.

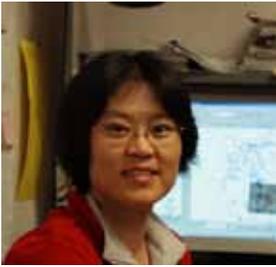


**Daniel Redgate** is an Environmental Scientist at Blueskies Associates, Inc.



**Dr. Ed Sharp** is currently working on developing methodologies for the use of thermal imaging in natural resource research.

# Center Graduate Students



**Mary Huang** - Mary completed her Ph.D. in the School of Marine Science in December 2010. Her dissertation is titled “Spatial and Temporal Analysis of Fecal Coliform Distribution in Virginia Coastal Waters.” Her work involved developing a method for estimating bacterial loads in the small coastal watersheds surrounding Virginia’s shellfish growing waters. The results of her research will improve characterization of the conditions in Virginia waters, and should facilitate efforts to manage and improve conditions in critical oyster growing areas. Mary is now in a post-doctoral position at Florida International University.

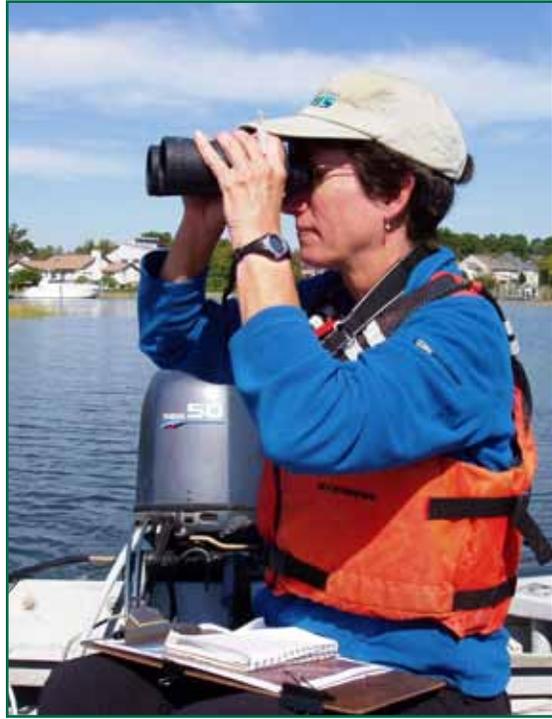


**Karina Nunez** -In December 2010, Karinna obtained her master’s degree in Marine Science in the College of William and Mary, School of Marine Science. Her thesis project included the development of a shoreline change forecast and wetland response model for Dorchester County, MD. The project seeks to advance current approaches to forecasting future shoreline conditions under climate change by considering both inundation and erosion under accelerating sea level rise. Karinna also works for CCRM as a GIS Programmer/Analyst. Her research interests include GIS technology and remote sensing applications for sustainable development of coastal resources.



# Center Collaborations

Albemarle Pamlico National Estuary Program  
Altria Group, Inc.  
Arc Economics, Inc.  
Baltimore District Corp of Engineers  
Chesapeake Bay National Estuarine Research Reserve  
City of Hampton  
College of William and Mary  
Delaware Department of Natural Resources & Environmental Control  
East Carolina University  
Flanders Marine Institute  
Garden Club of America  
Hill Studio  
International Coastal Atlas Network  
Longwood University  
Lynnhaven River NOW  
Maryland Department of the Environment  
Maryland Department of Natural Resources  
Mathews County  
Mathews Maritime Foundation  
Narragansett Bay National Estuary Program  
National Fish & Wildlife Foundation  
NOAA Chesapeake Bay Program Office  
NOAA Coastal Services Center  
North Carolina Coastal Federation  
Oregon State University  
Pennsylvania State University  
Smithsonian Environmental Research Center  
The Nature Conservancy  
UNESCO's International Oceanographic Commission  
U.S. Coast Guard Auxiliary  
U.S. Environmental Protection Agency  
University College Cork, Ireland  
University of Maryland  
University of North Carolina  
University of Oregon  
University of Washington  
University of Wisconsin  
Virginia Coastal Zone Management Program  
Virginia Department of Conservation & Recreation  
Virginia Department of Environmental Quality  
Virginia Department of Forestry  
Virginia Marine Resources Commission  
Virginia Polytechnic Institute and State University  
Washington State Department of Ecology  
Wetlands Watch





# CENTER PROJECTS

# Climate Impacts in VA: Status of Natural Resource Data Records as Tools to Assess Continuing Trends



**Principal Investigators: Berman, Hershner**

**Funding Agency: VEE**

**Period: 04/01/08-01/31/10**

**Amount: \$40,000**

This project reviews existing databases that contain information which would be useful for assessing trends in natural resources which may be driven by climate change impacts. The final product is a digital bibliography of sources that span academic, private, federal, state, and local government

agencies. The report is available by clicking on Climate Change Database Report at this site:

[http://ccrm.vims.edu/climate\\_change/index.html](http://ccrm.vims.edu/climate_change/index.html)

## Tidal Wetlands Management Technical Support

**Principal Investigators: Fleming, Hershner**

**Funding Agency: VA Coastal Zone Management Program / NOAA**

**Period: annually 10/1-9/30**

**Amount: \$42,000**

This project has been a continuing grant renewed annually to support advisory service provided by the Wetlands Program to the Tidal Wetlands Management program. In particular, this grant helps fund travel costs associated with site visits and meeting attendance by staff scientists, publication costs for wetlands newsletters and outreach education materials, as well as some of the expenses of maintaining the tidal wetlands permit database on the Center's website.

<http://ccrm.vims.edu/perms/newpermits.html>

Funding was provided to support production of the following publications:

Rivers and Coast, Winter 2009, Vol. 5, No. 1. Shallow Water Dredging

<http://ccrm.vims.edu/publications/pubs/rivers&coast/Winter2010.pdf>

Rivers and Coast, Summer 2010, Vol. 5, No. 2. Integrated Shoreline Management Decision Tree for Untreated Shorelines

[http://ccrm.vims.edu/publications/pubs/rivers&coast/vol5\\_no2decisiontrees.pdf](http://ccrm.vims.edu/publications/pubs/rivers&coast/vol5_no2decisiontrees.pdf)

Rivers and Coast, Fall 2010, Vol. 5, No. 3. Derelict Crab Pots in the Chesapeake Bay

[http://ccrm.vims.edu/publications/pubs/rivers&coast/vol5\\_no3\\_marine\\_debris\\_1.pdf](http://ccrm.vims.edu/publications/pubs/rivers&coast/vol5_no3_marine_debris_1.pdf)



Virginia Wetlands Report, Spring 2010, Vol. 25, Issue 1.  
Coastal Management Decision Tools  
[http://ccrm.vims.edu/publications/publications\\_topics/vwr/VWR\\_2010\\_spring.pdf](http://ccrm.vims.edu/publications/publications_topics/vwr/VWR_2010_spring.pdf)

Virginia Wetlands Report, Fall 2010, Vol. 25, Issue 2. CCRM  
Living Shorelines Website Update  
[http://ccrm.vims.edu/publications/publications\\_topics/vwr/VWR\\_2010\\_fall.pdf](http://ccrm.vims.edu/publications/publications_topics/vwr/VWR_2010_fall.pdf)

## Living Shoreline Design and Construction Manual

**Principal Investigators: Hardaway, Milligan, Duhring**

**Funding Agency: NOAA**

**Period: 10/01/08 – 03/01/10**

**Amount: \$10,079**



This project developed a manual that provides design and construction guidance for contractors, coastal managers, planners, local governments, homeowners and those interested in sound shoreline management. The manual incorporates graphics and guidelines produced for an on-line course completed in 2008. The manual also served as curriculum for a marine contractors training course held in the fall of 2010. Integrated shoreline management across jurisdictional habitats and maximizing ecosystem services of vegetated coastal habitats are the guiding principles for the manual.

[http://web.vims.edu/physical/research/shoreline/LivingShorelineDesigns/LS\\_Design\\_final\\_v1.2.pdf](http://web.vims.edu/physical/research/shoreline/LivingShorelineDesigns/LS_Design_final_v1.2.pdf)

## Guidebook Hydrogeomorphic Wetlands Assessment

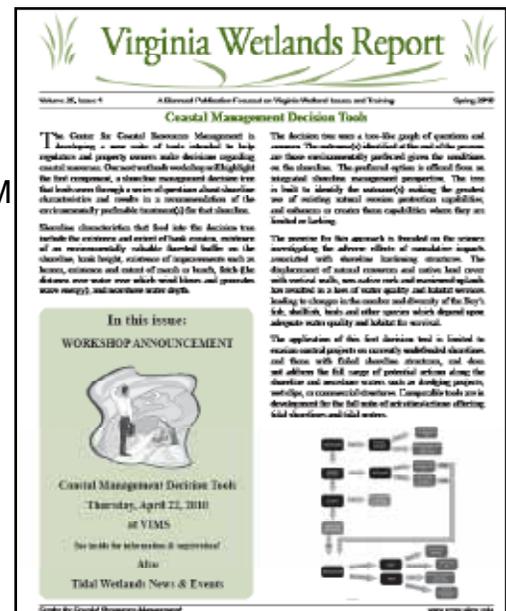
**Principal Investigator: Havens**

**Funding Agency: EPA/HGM**

**Period: 10/01/08 – 9/30/11**

**Amount: \$77,747**

The objective of this project is to develop a finalized HGM guidebook for coastal plain flats in the Mid-Atlantic. The Mid-Atlantic flats guidebook will provide guidance in determining functions associated with flats for use in the regional regulatory programs. The project task is to combine HGM guidance developed in Delaware and Virginia into a guidebook for the Mid-Atlantic. The final product is a Regional HGM Guidebook for Coastal Plain Flats.





## Estuarine Suspended Sediment Loads and Sediment Budgets in Tributaries of Chesapeake Bay

**Principal Investigator: Herman**  
**Funding Agency: Army Corps of Engineers**

**Period: 10/01/08 - 09/30/09**

**Amount: \$48,868**

**Period: 5/01/09 - 09/30/09**

**Amount: \$29,989**



The goals of this project are to calculate sediment transport processes, suspended sediment loads and sediment budgets for the estuarine portions of major tributaries of Chesapeake Bay in Virginia and Maryland. The initial phase will target the York River, VA and the Patuxent River, MD. The second phase calculates sediment loads and several components of the sediment budget for the Potomac River, MD.

The final report and a more detailed description of the project are available at:

[http://ccrm.vims.edu/publications/projreps/Sediment\\_Loads\\_Budget\\_Final\\_Report.pdf](http://ccrm.vims.edu/publications/projreps/Sediment_Loads_Budget_Final_Report.pdf)

## Garden Club of America Scholarship

**Principal Investigators: Hershner, Reay, Bradshaw**

**Funding Agency: Garden Club of America**

**Period: annual (2000 to present)**

**Amount: \$500**

The Center manages the annual advertisement, review, and selection of recipients for the Garden Club of America Scholarship for Wetland Studies. The award is a one-year scholarship for graduate studies in coastal wetlands and carries a stipend of \$5,000 to support field-based research. The Garden Club of America has provided several awards to ranked applicants in past years. Applications are reviewed and ranked by a selection committee of practicing wetland scientists and makes recommendations to the GCA for that year's awards. Awards are open to any graduate student undertaking a field-oriented study of tidal or nontidal wetlands found within coastal states, including the Great Lakes. Applicants should be enrolled at a university within the United States.



**Website:** [http://ccrm.vims.edu/education/garden\\_club/index.html](http://ccrm.vims.edu/education/garden_club/index.html)



## Mid-Atlantic Multi-Level Non-Tidal Wetlands Assessment

**Principal Investigators: Havens, Hershner**

**Funding Agency: EPA**

**Period: 10/01/07 - 09/30/12**

**Amount: \$460,000**

This project implements a level 1 GIS-based protocol for assessment of nontidal wetlands and

their functions in the Mid-Atlantic states of Pennsylvania, Delaware, West Virginia, and the District of Columbia. CCRM and Pennsylvania State University's Cooperative Wetlands Center are collaborating to develop and implement a wetlands assessment protocol for the Mid-Atlantic region. The protocol will synthesize methods currently developed for Pennsylvania, Virginia, Delaware, Ohio and other comparable programs. This project will generate a protocol that can be used for probabilistic sampling and characterization of wetlands in each of the major ecoregions of the Mid-Atlantic.

## Wetlands Permit Review and Report Generator

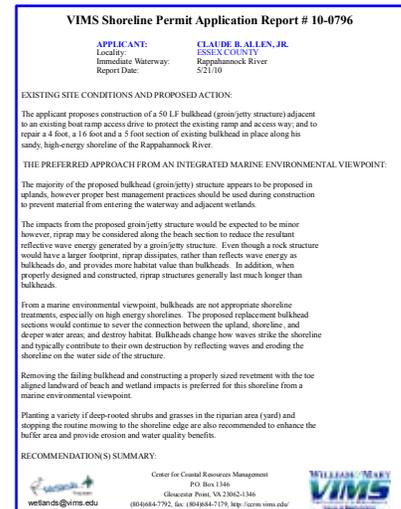
**Principal Investigators: Hershner, Berman, Fleming**

**Funding Agency: in-house**

**Period: 1/30/10**

This project enhances the permit reporting process to increase the amount of information presented while automating systematic reporting. This is the first system of its kind that combines expert staff review with landscape information retrieved from spatial databases. The report generator is always being modified as new landscape information is available. The reports along with the original application and related photos are posted online in a searchable database.

<http://ccrm.vims.edu/perms/newpermits.html>



## Integrated Guidance Project

**Principal Investigators: Mason, and staff**

**Funding Agency: in-house**

**Period: ongoing**

Virginia is battling to change the current trend toward environmental degradation. The effects of direct, secondary and cumulative impacts have had significant adverse impacts on water quality, habitat and aquatic resources. It has become increasingly apparent that in order to reduce the cumulative

and secondary impacts of activities within the multiple jurisdictions and multiple management programs affecting the littoral and riparian zones, better coordination and integration of policies and practices is necessary. The concept of integrated coastal management embodied by sustainability, adaptability and effective coordination provides a framework to address the current problems inherent in coastal management generally, and shoreline management specifically. There are currently a variety of local and state programs managing shoreline development activities. Each of these programs have their own set of regulatory and guidance documentation. And each managed resource, or jurisdictional area, offers various ecosystem services that are valued by society. These services include water quality maintenance and improvement, terrestrial and aquatic wildlife habitat and recreational amenities to name a few. What is lacking is comprehensive guidance from an ecosystem perspective to promote an integrated management approach for the many regulatory programs that have some responsibility for coastal, shoreline resources. This project involves the development of comprehensive guidance for shoreline management based on ecosystem services. Various combinations of riparian and littoral condition will be modeled for two services; habitat and water quality. The impacts of various shoreline development practices will be assessed based upon those services, and environmental preferences that minimize adverse impacts and/or maximize beneficial outcomes will be identified.

Link to more information - [http://ccrm.vims.edu/permits\\_web/guidance/index.html](http://ccrm.vims.edu/permits_web/guidance/index.html)

## Initial Development of a Web-Based Reporting Capacity for Virginia's Chesapeake Bay and Virginia Waters Clean-Up Plan

**Principal Investigators: Hershner, Mason**

**Funding Agency: NOAA**

**Period: 10/01/09 – 9/30/10**

**Amount \$ 50,000**

The principal objective of this project is to develop and publish a web-based report of environmental conditions and management/restoration efforts in Virginia waters. In the initial phase of the project (year1), we focused on development of a web-based reporting capacity for Virginia's Chesapeake Bay and Virginia Waters Clean-up Plan reports. The intended use of the website is by the agencies to communicate information and the public to access information on the condition of Virginia waters along with the status of clean-up efforts. The web site will also provide links to background information and related materials that can enhance public understanding of the Bay and its watershed, as well as the actions necessary to improve its condition. We spent the first years funding, of a proposed 3 year funded effort, to create and prove the concept for data display and delivery. An initial launch was projected for early in year two of the project with the remaining efforts focused on acquisition of the data, and modification where necessary, to work within the website infrastructure. We have not secured funding for the next phase of work at this time.



## Strengthening Virginia's Wetlands Management Programs

**Principal Investigators: Hershner, Berman, Havens**

**Funding Agency: EPA**

**Period: 10/01/09 – 9/30/11**

**Amount \$394,700**



This project involves two activities. The first is initial development of comprehensive wetland management plans for localities. The plans specifically address the threat of climate driven impacts to tidal wetlands. The beginning work will be undertaken in the York River system. The second task begins effective linkage of the Commonwealth's wetland management programs with the Commonwealth's water quality management program. Under this project we are: providing wetland assessment training to water quality monitoring personnel, conducting advanced

assessment of sites of interest to the water quality program; and synthesizing results from both the wetlands and water quality monitoring programs to facilitate collaborative use of the information.

## Estuarine Blue Infrastructure: Priority Conservation Areas for the Virginia Portion of the Chesapeake Bay and the Seaside of the Eastern Shore



**Principal Investigator: Berman**

**Funding Agency: NOAA**

**Period: 9/01/09 – 3/31/10**

**Amount: \$78,350**

Using GIS, aquatic resources will be mapped to identify areas of ecological richness within Virginia's estuaries and bays. The project will collect and disseminate resource information from a variety of agencies, map their distribution and collectively assess areas supporting a large number of aquatic habitat or species. Linkages between these areas and areas defined as high

priority conservation areas on the upland will be generated to determine potential aquatic zones for conservation or preservation. The project contributes to Virginia's ongoing efforts to identify and prioritize conservation opportunities within the watershed.

## Living Shorelines Website for Property Owners, Industry and Managers

**Principal Investigator: Mason, Reay, Duhring**

**Funding Agency: NOAA/DEQ**

**Period: 10/01/09 – 9/30/10**

**Amount \$ 44,090**

The Center for Coastal Resources Management, VIMS, has undertaken an initiative to provide integrated scientific guidance for better-informed decision-making regarding Virginia's shoreline systems. A critical component of the initiative is

the promotion of shoreline management approaches that are sustainable. Commonly called living shorelines, these are approaches that make the best use of natural features to protect property while preserving or enhancing ecosystem services. CCRM is already serving living shorelines information on our website. However, the existing website is a bit dated and some of the information is "hidden" in documents and not easily accessible. We have created a new living shorelines website to address the information needs of the various users involved in shoreline management. The changes to the website reflect input from various user groups including residential property owners, industry, and regulators and decision-makers collected through a series of focus group meetings. The website address is

<http://ccrm.vims.edu/livingshorelines/>.



## Design and Construction of Living Shorelines: Course Development and Implementation

**Principle Investigators: Hardaway, Milligan, Duhring**

**Funding Agency: NOAA/DEQ**

**Period: 10/01/09 - 9/30/10**

**Amount: \$12,869**

A 1-day course on the practical design and construction of living shorelines projects was held in September 2010 for marine contractors and design consultants. The course curriculum included a recently completed design manual that was complimented with site-specific case studies and design lessons. The class also worked through the design process for particular locations. Certificates of completion were awarded to course participants after completing a test to demonstrate their understanding of the materials presented. A field trip to the new VIMS living shoreline project was also conducted to learn how this particular project was designed and constructed. A web site was created to provide a one-stop clearinghouse for various tools and references from the course for future reference.

<http://web.vims.edu/physical/research/shoreline/LivingShorelineDesign.html>



## Derelict Blue Crab Trap Removal

**Principal Investigator: Havens, Bilkovic**

**Funding Agency: NOAA/VMRC**

**Period: 12/1/08 – 11/30/11**

**Amount: \$1,064,600**

Discarded debris such as tires, gill nets, appliances, and crab pots can be found throughout the tidal waters of Virginia. Derelict crab pots may remain in the environment for years and continue to capture and kill fish, shellfish, birds and marine mammals including endangered or threatened species. It is estimated that around 20% of crab pots deployed are lost each season and each functional lost crab pot can continue to capture about

a bushel of market-sized crabs per season. There is an environmental benefit in removing marine debris from Virginia's waters if the removal can be accomplished safely and without damaging the marine habitat and ecosystem. This project includes work specifically aimed at removing marine debris from Virginia's tidal waters with the assistance of watermen. Watermen who would have been eligible to participate in the 2008/2009 crab dredge season (this season was closed by VMRC in April 2008) were invited to participate in the program. Eight additional watermen were added to the program to allow for surveying in shallow water areas. A total of seventy participants will survey the Virginia portion of the Chesapeake Bay. The participants will record the bay-catch associated with the over derelict crab pots that are removed. For detailed information, including specific maps showing the location of all removed items to date visit

[http://ccrm.vims.edu/marine\\_debris\\_removal/](http://ccrm.vims.edu/marine_debris_removal/)

## Reducing Impact of Lost Crab Traps on Fishery Resources

**Principal Investigators: Havens**

**Funding Agency: NFWF**

**Period: 10/01/09 – 12/31/10**

**Amount: \$32,300**

This project involves the real-world testing of the panels by incorporating them into the regular recreational and commercial blue crab fishing operations during the blue crab season from April - October. At least ten residents who regularly deploy blue crab traps from their private piers will be recruited from a waterfront community to test traps modified with degradable panels against unmodified control traps. Each participant will be asked to check their traps at least once per week and note the species trapped and count, sex, and measure (carapace width) the crabs trapped. The entire waterfront community will be surveyed to determine whether they would be willing to pay extra for a trap that is deemed 'green' and promotes a sustainable fishery concept. Five commercial crabbers from various regions of the Virginia portion of the



Chesapeake Bay will incorporate 5 modified traps as part of their normal operation. The five modified traps and five control traps will be checked daily for one week in the spring, summer, and fall season. The crabs trapped will be identified, counted, and measured.

## A Critique of Existing Methodologies for Developing Shoreline Management Plans for Local Governments

**Principal Investigator: Berman**

**Funding Agency: NOAA**

**Period: 1/15/10 – 12/31/10**

**Amount: \$24,000**

This project evaluates costs and benefits of two different approaches for providing guidance to local governments on shoreline protection strategies. Stakeholders in the process were surveyed for input and a review of consistency, efficiency and product accuracy was undertaken. Final report will be submitted to the VA Coastal Zone Management Program upon completion.



## Shoreline Inventory Reports for Tidewater Localities – Northampton

**Principal Investigator: Berman**

**Funding Agency: NOAA/DEQ**

**Period: 10/01/10 – 9/30/11**

**Amount: \$100,000**

This project continues with the development of the Virginia portion of the Chesapeake Bay Shoreline Inventory Series.

The county of Northampton on the Eastern Shore of Virginia will be surveyed and a shoreline inventory report of shoreline conditions will be published. The inventory surveys conditions pertaining to riparian land use, bank condition, shoreline structures, and natural systems such as marshes and beaches. Previous products are available for viewing on the Shoreline Inventory website at this url:

[http://ccrm.vims.edu/gis\\_data\\_maps/shoreline\\_inventories/index.html](http://ccrm.vims.edu/gis_data_maps/shoreline_inventories/index.html).

## Development of Mathews Digital Maritime Heritage and Water Trail Guide for the East River

**Principal Investigator: Berman**

**Funding Agency: Mathews Maritime Foundation**

**Period: 1/01/10 – 9/30/10**

**Amount: \$5,000**

The Mathews Maritime Heritage Trail is a partnership project initiated in January 2009 to preserve the valued coastal landscape, and tell the colorful history of Mathews County's

nautical heritage. An interactive map interface was developed for the East River in Mathews to provide an opportunity for individuals on the water to learn about the historic maritime sites that can be viewed while navigating the river. The site is available to the public at this url:

[http://ccrm.vims.edu/gis\\_data\\_maps/static\\_maps/mathews\\_watertrail/index.html](http://ccrm.vims.edu/gis_data_maps/static_maps/mathews_watertrail/index.html).

## Sustainable Communities: Final PCA Map & Outreach Effort

**Principal Investigator: Berman**

**Funding Agency: NOAA/DCR**

**Period: 11/01/10 – 9/30/11**

**Amount: \$7,000**

This project has two major goals. The first is to integrate an estuarine Aquatic Priority Conservation Model developed at CCRM into an existing state-wide Priority Conservation Model which currently is limited to terrestrial and free flowing stream habitats. The second component of the project is to develop outreach material to teach local governments how to utilize these products to assist them with conservation planning.



## Evaluating Ecological & Erosion Protection Functions of Chesapeake Bay Living Shorelines (773241)

**Principal Investigators: Bilkovic, Roggero**

**Funding Agency: Chesapeake Bay Trust**

**Period: 7/15/10-12/31/11**

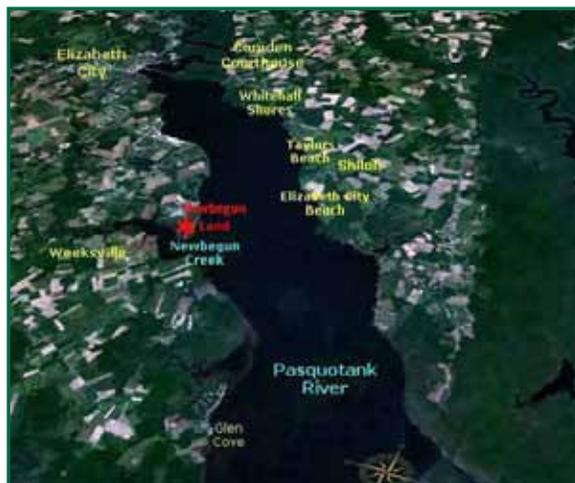
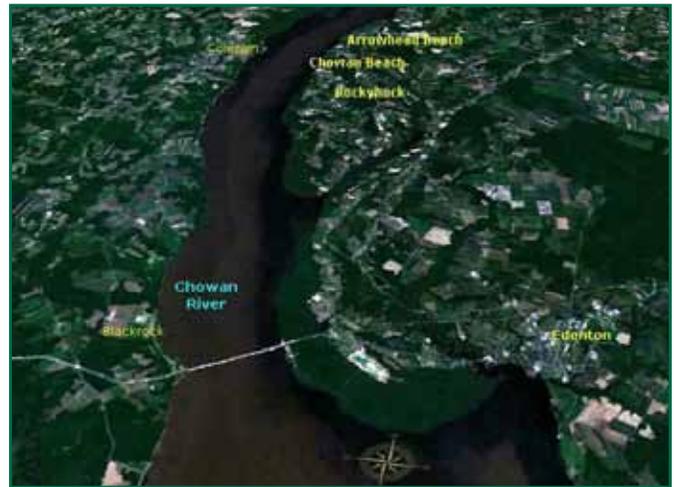
**Amount: \$50,000**

Living shoreline habitat restoration activities are typically designed to control erosion, while simultaneously enhancing estuarine habitats. Expected outcomes are shoreline protection, estuarine habitat creation in the intertidal, beach and subaqueous zones, and enhanced habitat services for fauna and flora communities. However, some questions are yet unanswered in regards to the effectiveness of living shorelines at meeting expected ecological or erosion protection goals. We recently began research to evaluate living shorelines in Maryland and Virginia. Several shoreline types (marsh-sill, natural marsh, intertidal flats, and riprap revetment) will be intensely surveyed to distinguish differences in ecosystem function as well as erosion control. Project results will enhance our understanding and inform regulators on the trade-offs involved in habitat conversion associated with various shoreline protection techniques (i.e. living shoreline, riprap revetment).

## APNEP State of the Chowan & Pasquotank River Basin Study

**Principal Investigator: Havens**  
**Funding Agency: APNEP**  
**Period: 5/17/10 – 12/31/10**  
**Amount: \$25,000**

This work will be a continuation of the Data Inventory and State of the River Basin Project conducted by VIMS for APNEP in FY 2009. This work will focus on refining in the preliminary ecosystem health indicators developed in Phase I, expand the data inventory developed for the Chowan and Pasquotank River basins, and work towards developing an ecosystem report card for the entire APNEP region.



## APNEP State of the Chowan & Pasquotank River Basin Study

**Principal Investigator: Havens**  
**Funding Agency: DCR**  
**Period: 3/31/10 – 9/30/10**  
**Amount: \$25,000**

This work will be a continuation of the Data Inventory and State of the River Basin Project conducted by VIMS for APNEP in FY 2009. This work will focus on refining in the preliminary ecosystem health indicators developed in Phase I,

expand the data inventory developed for the Chowan and Pasquotank River basins to include Virginia water quality data, and work towards developing an ecosystem report card for the entire APNEP region.

## APNEP Technical Support for EBM

**Principal Investigator: Havens**  
**Funding Agency: APNEP**  
**Period: 7/01/10 – 12/31/10**  
**Amount: \$35,000**

Facilitate and support ongoing work by the APNEP EBM workgroup in developing APNEP Comprehensive Conservation Management Plan.



## Regulatory Fidelity to Guidance in Virginia's Tidal Wetlands Program

**Principal Investigators: Hershner**

**Funding Agency: EPA**

**Period: 12/01/10 – 11/30/13**

**Amount \$225,083**

This project is designed to monitor permit decisions made by local wetlands boards and VMRC, comparing those decisions with the outcomes suggested by the technical guidance developed for the management program. The objective is to document the performance of those regulatory

bodies and use the information to refine the guidance and the supporting educational programs promulgated by the Center.

## Study of Tidal Shoreline Management in Virginia: Recommendations for Living Shorelines and Tidal Resources Sustainability [SJR 35 (2010)]

**Principal Investigator: Mason**

**Funding Agency: Virginia General Assembly**

**Period: 2/01/10 - 12/30/10**

**Amount: \$0**

The Virginia Institute of Marine Science (VIMS) was directed under Senate Joint Resolution 35, to conduct a study of tidal shoreline management in Virginia. The resolution directed four specific tasks to be included in the study: “(i) review tidal shoreline management in the Commonwealth and similarly situated states; (ii) identify potential changes to the regulatory structure of tidal shoreline management to reduce the cost and time required to issue a permit; (iii) identify regulatory innovations that would increase adoption of living shorelines among shoreline landowners; and (iv) make specific recommendations to achieve the sustained protection of tidal shoreline resources.”



The Center for Coastal Resources Management at VIMS was delegated the responsibility for the study. We conducted detailed reviews of the shoreline management construct of Virginia along with other states. The review was to assess models for use in Virginia that address

multi-jurisdictional decision-making or living shorelines or both and at the same time, look for possible complications or ineffective programmatic efforts to avoid.

The report identifies possible options for time and costs savings for permit issuance and regulatory innovations to increase the use of living shorelines. A look at the current shoreline management structure in Virginia and the future cast of adverse resource effects due to management decisions and natural losses calls for a comprehensive approach to achieve sustainability of shoreline resources. Six specific recommendations are made to address time and cost, promote living shorelines and achieve long-term protection of tidal shoreline resources.

[http://leg2.state.va.us/dls/h&sdocs.nsf/By+Year/SD162010/\\$file/SD16.pdf](http://leg2.state.va.us/dls/h&sdocs.nsf/By+Year/SD162010/$file/SD16.pdf)







# Advisory Activities



## 2010 Advisory Activity

CCCRM staff participates regularly in a broad range of advisory activities- that is providing advice to individuals and groups of private citizens, resource managers, and decision-makers. Our advisory activities include responding to phone call and email requests for information; field visit consultations; membership and participation on local, state and regional workgroups and committees; written advice on tidal shoreline projects through the joint permit application process; the publication of newsletters and special reports; giving talks; as well as providing training and special topics workshops.

	<b>Information Requests</b>	<b>Field Consults</b>	<b>Meetings</b>	<b>JPA Advisory Reports</b>	<b>Permit Website Hits</b>
January	148	1	22	9	291
February	138	1	15	10	228
March	114	2	20	10	280
April	151	5	20	6	515
May	140	4	18	9	500
June	176	2	17	13	626
July	198	2	23	13	452
August	185	1	24	34	518
September	149	9	24	36	439
October	158	6	27	36	520
November	128	8	14	33	673
December	99	3	17	27	495
<b>Total</b>	<b>1784</b>	<b>44</b>	<b>241</b>	<b>236</b>	<b>5537</b>

# Advisory Committees

## **CCRM Staff provided service on the following advisory committees:**

Albemarle Pamlico National Estuary Program Ecosystem Based Management (EBM) Steering Committee

Albemarle Pamlico National Estuary Program Policy Committee

Albemarle Pamlico National Estuary Program North Carolina Comprehensive Conservation and Management Plan Steering Committee

Albemarle Pamlico National Estuary Program Scientific and Technical Advisory Committee (STAC)

Albemarle Pamlico Scientific and Technical Advisory Committee (STAC) Executive Committee

Chesapeake Bay National Estuarine Research Reserve (CBNERR) Coastal Training Program Advisory Board

Chesapeake Bay Local Assistance Division (CBLAD) Technical Advisory Committee

Chesapeake Bay Program Enhancing Partnership, Leadership, and Management Goal Implementation Team - STAC liaison

Chesapeake Bay Program (CBP) Scientific and Technical Advisory Committee

Chesapeake Bay Program (CBP) Scientific and Technical Advisory Committee - Executive Board

Chesapeake Bay Program Scientific and Technical Analysis and Reporting (STAR) Action Team - STAC liaison

Chesapeake Bay Program (CBP) Sediment Workgroup

Chesapeake Bay Program (CBP) Wetlands Action Team

Department of Environmental Quality (DEQ) Academic Advisory Committee

Department of Environmental Quality (DEQ) Virginia Coastal Policy Team

Mid-Atlantic Wetlands Workgroup

US Army Corps of Engineers (COE) Lynnhaven River Restoration Study Steering Committee

US Coast Guard Area Contingency Planning Committee

Virginia Geographic Information Network (VGIN) State GIS User Group

Virginia Marine Resources Commission (VMRC) Habitat Management Advisory Committee

Virginia Stream Alliance

Virginia TMDL Advisory Committee

Virginia Waters Advisory Committee

York River Watershed Roundtable

# Outreach Education Classes

## Integrated Shoreline Management

Wetlands Program staff provided training on request in the practical application of integrated shoreline management. Topics included discussion of ecosystem services, determination of erosion risk and indicators, determination of preferred shoreline treatments and their impacts, use of decision making tools such as decision trees, as well as basic training in jurisdiction determination, tidal wetland delineation, pre-application strategies, and permit processing and evaluation. The training targeted Wetlands Board members and staff, but also included other local government staff.

- April 13 Northumberland County Wetlands Board
- April 19 Stafford County Wetlands Board
- July 22 King George County Wetlands Board
- September 24 Fairfax Wetlands Board

## Tidal Wetlands Workshops:

The Center provides tidal wetlands workshops twice a year for local government staff, advisory board members, marine contractors, permitting agents, environmental consultants, and anyone else interested in coastal resources in the Commonwealth. The sessions provide information that is useful both in understanding shorelines and in making decisions regarding these important and dynamic resources.

### Coastal Management Decision Tools

April 22, 2010

97 Attendees

- Coastal management decision tree for natural shorelines
- Comprehensive Coastal Resource Management Plan (CCRMP) and the Geospatial Shoreline Management Model
- Shoreline Assessment Mapper (SAM)

[http://ccrm.vims.edu/education/workshops\\_events/april2010/index.html](http://ccrm.vims.edu/education/workshops_events/april2010/index.html)

### What's Up? CCRM Update

November 4, 2010

69 Attendees

- Coastal management decision tree for currently defended shorelines
- Joint Resolution study of shoreline management in Virginia
- Living shoreline updated website
- Living shoreline monitoring project
- Derelict crab pot retrieval update

- York River tidal marsh survey
- Hampton waterway management plan

<http://ccrm.vims.edu/education/seminarpresentations/fall2010/index.html>

## Tours and Talks:

In addition to the workshops, CCRM personnel gave approximately 50 talks to nearly 3000 participants on topics related to integrated shoreline management, climate change & sea level rise, living shorelines & landscapes, marine debris & derelict crab pots, wetland ecosystems, coastal web atlas tools, non-tidal wetlands assessment and Chesapeake Bay monitoring programs.



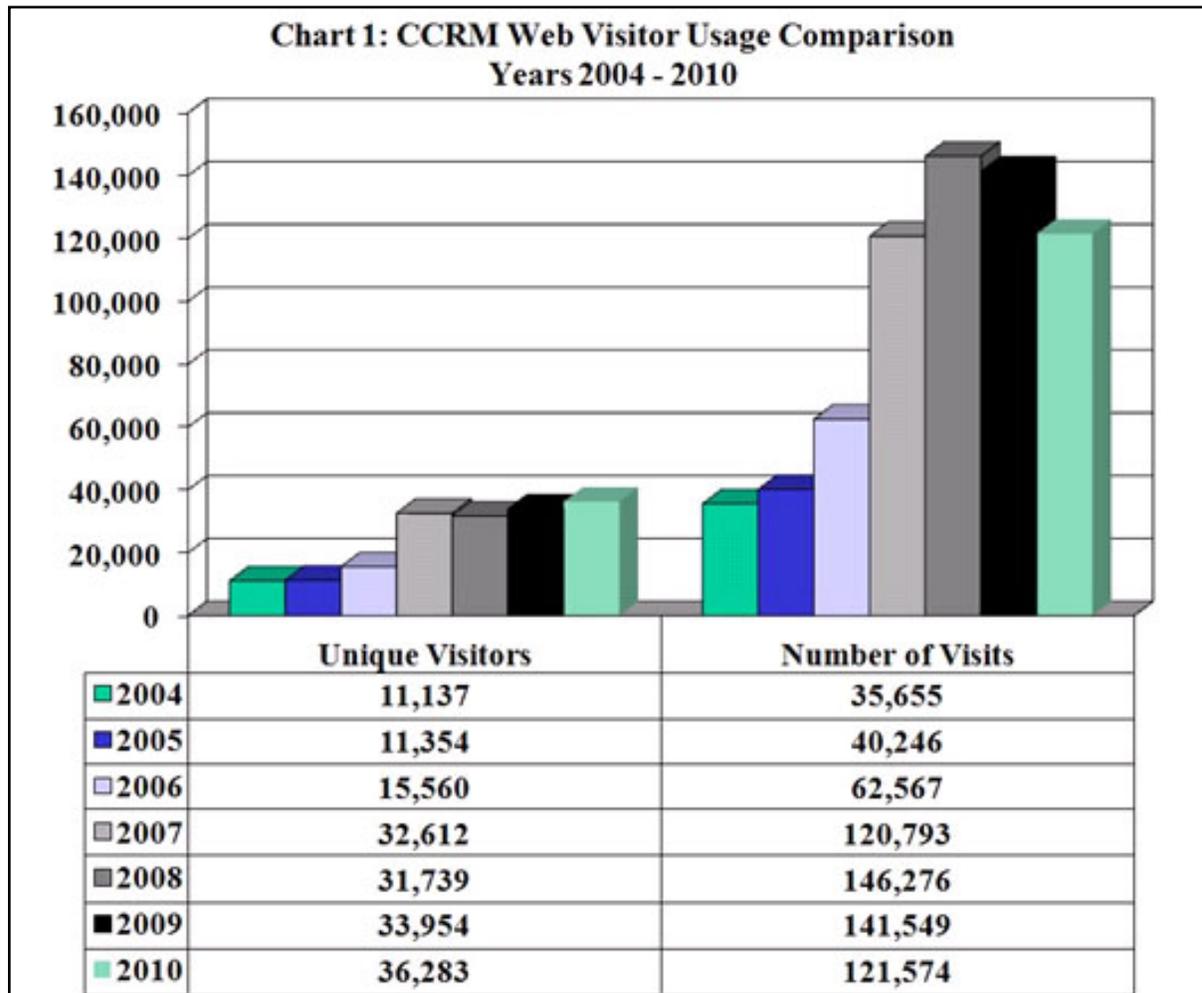
# CCRM Website Report

## ccrm.vims.edu

In 2010, the CCRM Web usage program reports 36,283 unique visitors accessed the site with 121,574 total visits. Visitors came from 49,607 distinct Internet addresses. A typical visitor examined 15.19 distinct files before leaving the site and a typical visit lasted for 12.48 minutes.

Compared with 2009, there were 2,329 more unique visitors in 2010, but a decrease of 19,975 total visits to the system. In 2010, there was an increase of 3 distinct files per visit and the same number of minutes per visit.

The top CCRM website entry pages included the CCRM Index Page, Teaching Marsh, Shoreline Wetlands Seminar Presentations, and Wetland Permits.





# Publications

# Center Publications

## Rivers & Coast:

Rivers and Coast, Winter 2010, Vol. 5, No. 1.

Shallow Water Dredging

<http://ccrm.vims.edu/publications/pubs/rivers&coast/Winter2010.pdf>

Rivers and Coast, Summer 2010, Vol. 5, No. 2.

Integrated Shoreline Management Decision Tree for Untreated Shorelines

[http://ccrm.vims.edu/publications/pubs/rivers&coast/vol5\\_no2decisiontrees.pdf](http://ccrm.vims.edu/publications/pubs/rivers&coast/vol5_no2decisiontrees.pdf)

Rivers and Coast, Fall 2010, Vol. 5, No. 3.

Derelict Crab Pots in the Chesapeake Bay

[http://ccrm.vims.edu/publications/pubs/rivers&coast/vol5\\_no3\\_marine\\_debris\\_1.pdf](http://ccrm.vims.edu/publications/pubs/rivers&coast/vol5_no3_marine_debris_1.pdf)

## Virginia Wetlands Report:

Virginia Wetlands Report, Spring 2010, Vol. 25, Issue 1.

Coastal Management Decision Tools

[http://ccrm.vims.edu/publications/publications\\_topics/vwr/VWR\\_2010\\_spring.pdf](http://ccrm.vims.edu/publications/publications_topics/vwr/VWR_2010_spring.pdf)

Virginia Wetlands Report, Fall 2010, Vol. 25, Issue 2.

CCRM Living Shorelines Website Update

[http://ccrm.vims.edu/publications/publications\\_topics/vwr/VWR\\_2010\\_fall.pdf](http://ccrm.vims.edu/publications/publications_topics/vwr/VWR_2010_fall.pdf)

## E-News: (no links, pdfs saved on CCRM drive/2010AnnualReport/Publications)

- CCRM e-News, Feb 2010. (marine debris & workshop announcement)
- CCRM e News, Nov 2010. (living shorelines website updates & workshop announcement )



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New Season for Marine Debris

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[Sand Dune and Beaches in Virginia: Science and Management](#)  
**Research:**  
[Vulnerability of shallow tidal water habitats in Virginia to climate change](#)

[Join Our Mailing List!](#)

### CCRM e-News February 2010

Dear Karen,

With all the snow, it's hard to imagine that spring will be here in a couple months. Watermen have been hard at work with the removal of **derelict crabpots**. Animals found in pots include duck, fish, and turtles. Click on the [link](#) to see all the animals the pots catch in addition to crabs. You'll be surprised!

It's also time to plan for the CCRM Tidal Wetlands Workshop to be held April 22, 2010. Join us as we unveil a new suite of coastal management decision tools which will enable users to make informed choices about shoreline alterations.

Save the Date - April 22, 2010: CCRM Spring Tidal Wetlands Workshop: Coastal Management Decision Tools

The Center for Coastal Resources Management is developing tools intended to help regulators and property owners make decisions regarding coastal resources. Our next wetlands workshop will highlight the first component, a shoreline management decision tool that leads users through a series of questions



2/11/2010



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CCRM Living Shorelines Update

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**What's New**  
[New Shoreline Situation Reports for Fairfax and Prince William Counties, Virginia](#)  
[Response of Tidal Creek Fish Communities to Dredging and Coastal Development Pressures in a Shallow-Water Estuary](#)

[Join Our Mailing List!](#)

### CCRM e-News October 2010

Dear Karen,

The folks at the Center for Coastal Resources Management have been busy this summer! At our upcoming fall workshop to be held November 4, we will unveil our updated Living Shorelines website and report on several projects that we have underway, including a new decision tree, wetland and shoreline monitoring research, and general assembly mandates for shoreline management in Virginia. Read more about each project in the [Fall 2010 Virginia Wetlands Report](#)

Save the Date - November 4, 2010: Fall Tidal Wetlands Workshop: What's Up - CCRM Update

Please join us on November 4, 2010 at the Virginia Institute of Marine Science, Waterman's Hall, 9am-3:30pm for presentations. Registration is \$25 and morning coffee, snacks, as well as a box lunch are provided with the registration fee.



In addition to the projects described in the [Fall 2010 Virginia Wetlands Report](#) we will have a session at the workshop on an effort funded by the Coastal Zone Management Program that directs CCRM to study existing approaches for collecting and delivering information that supports shoreline management planning. To enable us to provide information in the most cohesive manner possible, audience feedback will be requested. Examples from current methods will be reviewed and the audience will be asked to value the content and format of each presentation.

Additional information and electronic registration options are available in the [Fall 2010 Tidal Wetlands Workshop Registration page](#)

[https://ui.constantcontact.com/visualeditor/visual\\_editor\\_preview.jsp?asentuid=110374852](https://ui.constantcontact.com/visualeditor/visual_editor_preview.jsp?asentuid=110374852) 1/6/2011

# Peer Reviewed Publications

Hershner, C., K. Havens. 2009. Ecosystem Services and Management of Invasive Species in a Changing System: Response to Martin and Blossey. *Conservation Biology*, Vol. 23, No. 2, pp. 497-498.

<http://ccrm.vims.edu/publications/pubs/Hershner-Havens-response-Martin-Blossey.pdf>

Havens, K., D. Bilkovic, D. Stanhope, and K. Angstadt. 2009. Location, Location, Location: The Importance of Cull Ring Placement in Blue Crab Traps. *Transactions of the American Fisheries Society*.

<http://afsjournals.org/doi/pdf/10.1577/T08-168.1>

Perry, J., D. Bilkovic, K. Havens, and C. Hershner. 2009. Book Chapter: Tidal Freshwater Marshes of the Mid-Atlantic and Southeastern United States. In *Tidal Freshwater Wetlands*, pp. 157-166. Edited by A. Barendregt, D.F. Whigham, A.H. Baldwin; Backhuys Publishers, Leiden, The Netherlands.

[http://shop.margraf-publishers.net/uploads/tx\\_ttproducts/datasheet/1551\\_03.pdf](http://shop.margraf-publishers.net/uploads/tx_ttproducts/datasheet/1551_03.pdf)

Bilkovic, D. 2010. Response of Tidal Creek Fish Communities to Dredging and Coastal Development Pressures in a Shallow-Water Estuary. *Estuaries and Coasts* DOI 10.1007/s12237-010-9334-x

[http://www.ccrm.vims.edu/publications/pubs/tidalcreek\\_dredging\\_Bilkovic.pdf](http://www.ccrm.vims.edu/publications/pubs/tidalcreek_dredging_Bilkovic.pdf)

Herman, J. and C. Friedrichs. 2010. Estuarine Suspended Sediment Loads and Sediment Budgets in Tributaries of Chesapeake Bay Phase 1: York, Patuxent, and Potomac Rivers. SRAMSOE No. 420, Final Contract Report, US Army Corps of Engineers, Baltimore, MD

[http://ccrm.vims.edu/publications/projreps/Sediment\\_Loads\\_Budget\\_Final\\_Report.pdf](http://ccrm.vims.edu/publications/projreps/Sediment_Loads_Budget_Final_Report.pdf)

# CCRM Quality Assurance/ Quality Control Policy

The Center for Coastal Resources Management conducts applied research and serves as a scientific advisor to federal, state and local agencies, and the general public. The Center recognizes the importance of how work processes are implemented to ensure that data collected are of the needed and expected quality for their desired use. In order to provide accurate information to user groups, the CCRM is dedicated to an aggressive, proactive Quality Assurance and Quality Control program. A myriad of activities occur within the Center, including direct support of laboratory and field investigations, support and training of graduate students and interns, training of resource agency personnel and the public, direct support of state agencies and local governments, and sponsorship of lectures, seminars, conferences and visiting scientists. Research activities include both field and laboratory measurements and the development and validation of ecological models. The general goal of the CCRM Quality System is to ensure accurate, reproducible, and unbiased data.

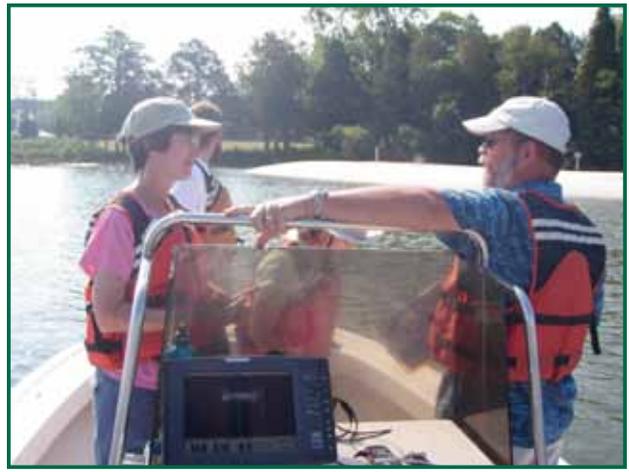
## Operational Procedures

The Center recognizes the need for specific plans for individual data collection operations to ensure that data or information collected are of the needed and expected quality for their desired use. As a Center, the quality assurance operation procedures differ from that of an individual research contract. Each principal investigator is responsible for submitting a project-specific quality assurance plan to the relevant Program Quality Assurance Manager and the Center Quality Assurance Manager. The principal investigators will use the underlying principles described in this document as a framework for the specific quality assurance and quality control plans for each project. These plans should detail:

- The specific objectives of the project, including the hypothesis to be tested.
- The data quality objective for the variables to be measured.
- The specific sampling and analytical protocols required to meet the data quality objective.
- The individual responsible for quality assurance for the project.

All noncompliance or deviation from the approved quality assurance plan will be reported to the Program Quality Assurance Manager and the Center Quality Assurance Manager. More information about CCRM QA/QC can be found at

[http://ccrm.vims.edu/about\\_us/ccrm/CCRM\\_QMP\\_aug06.pdf](http://ccrm.vims.edu/about_us/ccrm/CCRM_QMP_aug06.pdf)



<http://ccrm.vims.edu/>

