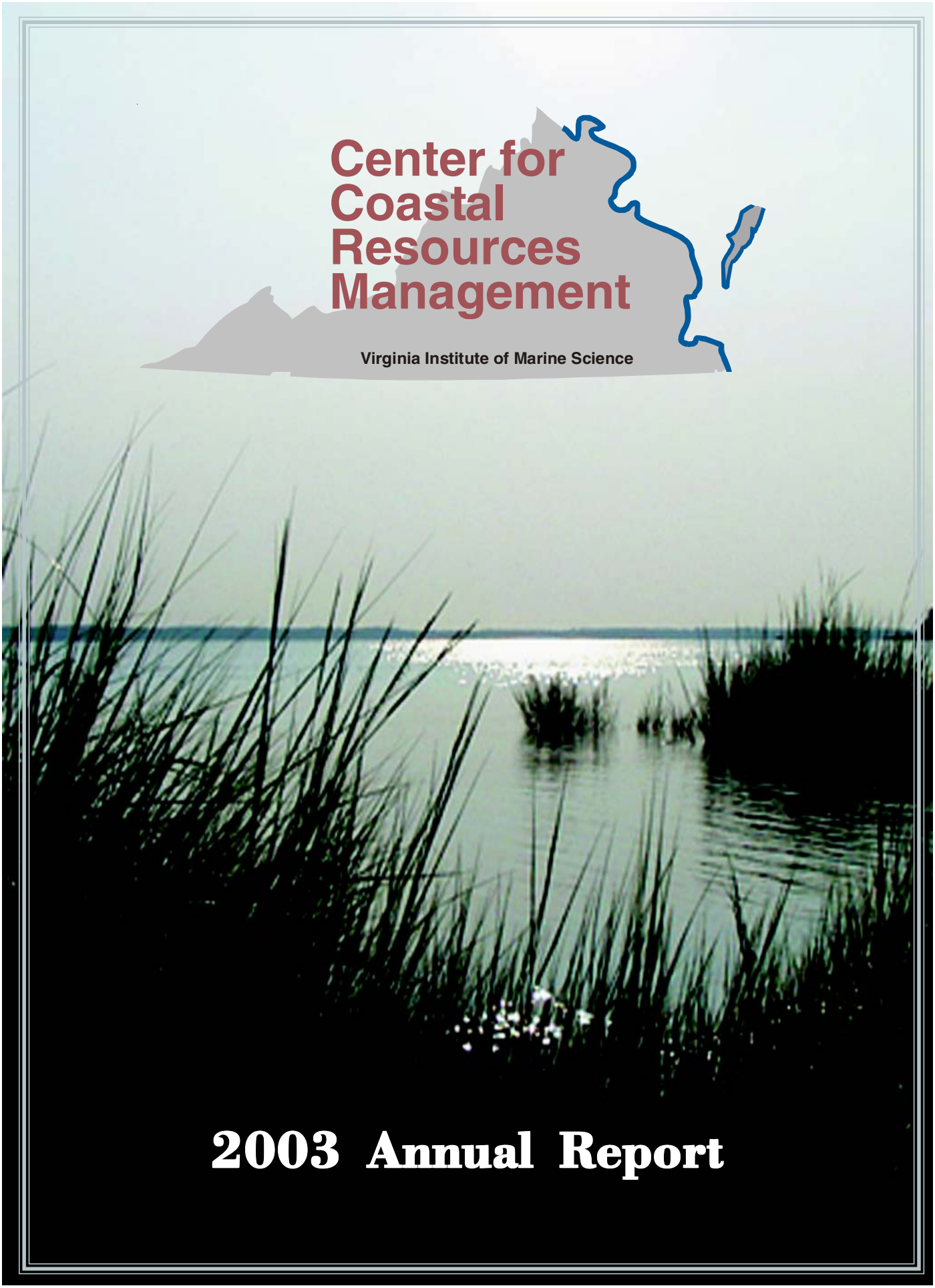

2003 Annual Report


WILLIAM & MARY
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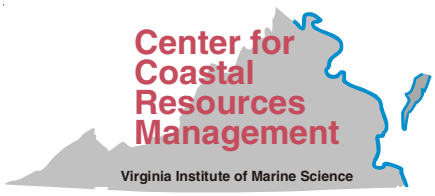
Center for
Coastal
Resources
Management
Virginia Institute of Marine Science


Wetlands
Program


Comprehensive Coastal Inventory
Center for Coastal Resources Management
Virginia Institute of Marine Science
cci

Center for Coastal Resources Management

2003 Annual Report

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


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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.

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, creation/restoration protocols. The Wetlands Program provides extensive support to the Commonwealths two management programs through review of individual tidal wetland permit applications, to training for local and state managers, to development and management of data bases supporting and tracking regulatory program activities.

Comprehensive Coastal Inventory
Center for Coastal Resources Management
Virginia Institute of Marine Science

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.

Center for Coastal Resources Management
Virginia Institute of Marine Science

The **Coastal Watershed 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 Watershed Program.

Personnel and Funding

The Center has a full time staff of about 26 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.

Report contents

Off-road access to a study site with new truck proves challenging.

Experimenting with artificial increases in marsh elevation.

Center for Coastal Resources Management

J.T. Wells
VIMS Dean and Director

R.L. Mann
Director for Research and Advisory Service

A.D. Lewis
Business Manager A

C.H. Hershner
Director, Center for Coastal Resources Management

D.B. Fleming
Admin/Advisory Spec.

M.I. Boerner
Secretary

Comprehensive Coastal Inventory

M.R. Berman
Program Director

- H.E. Berquist, Sr. Programr/Analyst
- J.D. Herman, Research Assoc.
- S. Killeen, Programmer
- K. Nunez, Lab. Spec.
- T.C. Rudnicky, Programr/Analyst
- D.E. Schatt, Programr/Analyst
- D.W. Weiss, Database Manager
- H.E. Woods, GIS Specialist

Coastal Watershed Program

K.J. Havens
Assistant Director, CCRM

- D. M . Bilkovic, Research Assoc.
- A. Frankic, Research Assoc.
- N. Hill, Environ. Spec. I
- K.K. Reay, Info. Tech Spec. II
- D. Stanhope, Lab/Research Manager
  - K. Angstadt, Research Specialist
  - T. Jones, Research Tech.
  - R. Rios-Gonzales, Research Tech
  - D. Wilt, Research Tech.
- M. Strickler, Graduate Intern

Wetlands Program

T. A. Barnard, Jr.
Assistant Professor

- J.G. Bradshaw, Marine Scientist, Sr.
- K.A. Duhring, Marine Scientist Supervisor
- P.A. Mason, Marine Science Supervisor
- D.L. O'Brien, Marine Scientist Supervisor
- W.I. Priest, III, Marine Science Supervisor

August 2004

Center Projects 2002 - 2003

Development of Nontidal Wetland Inventory, Functional Assessment, and Monitoring Strategy for Virginia

PIs: **Hershner, Havens, O'Brien**

Funding Agency: **USEPA/VaDEQ**

Period: **10/1/03 – 9/30/05**

Amount: **(F) $310,866**

This project develops and implements a three level assessment protocol for nontidal wetlands in Virginia. This is the first phase of a series of projects which are intended to provide assessments across all of Virginia. In this project a level I – GIS based assessment will be completed on all wetlands mapped by the National Wetlands Inventory in Virginia. Level II assessments involving field assessments of stressors will be initiated in the coastal plain of Virginia. Level III assessments will involve detailed analysis of habitat and water quality functions on selected sites. Preliminary site selection in the coastal plain will be undertaken in this project phase.

Comprehensive Shoreline Inventory for the State of Maryland

PI: **Berman**

Funding Agency: **NOAA/MD DNR**

Period: **8/01/02 – 3/31/04**

Amount: **$163,000**

This project involves application of the shoreline inventory protocols developed by the Center to all of the tidal shoreline in Maryland. The resultant data base provides a spatially explicit inventory of shoreline condition, resources, and structures in a GIS accessible format. The project involves extensive field work to complete boat surveys of the shoreline with advanced GPS equipment.

Monitoring of Thin-Layer Placement of Material Dredged from Bogues Bay Channel in Virginia

PIs: **Barnard, Priest, O'Brien**

Funding Agency: **US Army Corps of Engineers**

Period: **8/7/03 – 9/30/04**

Amount: **$33,631**

This project involves assessment of the impacts of spray dredging with disposal onto intertidal salt marshes in the Chincoteague Bay area. Plant communities and dredged material placement will be monitored over several years to develop management guidance for potential wider use of this disposal method. This project is the first phase of the study and incorporates the preliminary survey work and the initial post dredging followup.

Wetland Restoration Plan at Norfolk Naval Shipyard, Portsmouth, Virginia

PI: **Priest**

Funding Agency: **Shaw Environmental**

Period: **7/1/03 – 6/30/04**

Amount: **$11,142**

This project involves providing expert advice on the design and construction of a wetlands restoration project on the naval shipyard property.

Development of the "Blue" Portion of Virginia's Blue/Green Infrastructure Mapping

PIs: **Berman, Hershner**

Funding Agency: **VaCRMP**

Period: **10/1/03 – 9/30/04**

Amount: **(F) $39,000**

This is the first phase of a multipart project to develop blue a infrastructure inventory and analysis for Virginia coastal waters. In this phase data needs are identified with the help of a multi-agency steering committee, and available GIS data sets are assembled.

Training Workshop for Virginia's Natural Resource Managers: An Introduction to the Toolbox

PI: **Berman**

Funding Agency: **USEPA**

Period: **8/18/03 – 9/30/04**

Amount: **(F) $74,997 (M) $24,999 = $99,996**

This project involves design and offering of training for natural resource managers in the use of online tools developed by the Center with previous support from the EPA and other sources. The training is hands-on case studies to demonstrate application of the tools to real world problems relevant to Virginia's coastal resource managers.

Occurrence of the invasive weedy species *Phragmites australis* adjacent to agricultural lands and its response to conservation reserve program (CRP) control methods.

PIs: **Havens, Chambers**

Funding Agency: **USDA**

Period**: 8/1/03 – 7/31/06**

Amount: **(F) $179,280**

This project focuses on developing a model of *Phragmites* invasiveness at upland/wetland interfaces by determining the mechanism of invasion, competition and spread of *Phragmites*. With respect to weed control, one of our applied hypotheses is that CRP sites enhance N removal prior to groundwater discharge to the wetland-upland interface, and that best management practices like buffer strips are environmentally sound forms of controlling *Phragmites* invasion and spread.

Ecological and Socioeconomic Indicators for Integrated Assessment of Aquatic Ecosystems of the Atlantic Slope

PIs: **Hershner, Havens, Bilkovic, Varnell, Berman**

Funding Agency: **US EPA**

Period: **4/01/01 – 12/18/05**

Amount: **(F) $1,163,435**

Project objectives are to 1) develop and test ecological and socioeconomic indicators of aquatic resource condition, construct models that use environmental, geographic, and stressor data to predict indicator responses, and use models to link upstream watersheds and downstream estuaries. 2) Develop large scale measures for characterizing landscape attributes and land-use patterns to serve as predictors of a range of environmental conditions. 3) Deliver a nested suite of indicators to managers, where the implications of aggregating models at various scales are considered, and for which reliability is known. This is a collaborative project with Pennsylvania State University, Smithsonian Environmental Research Center, East Carolina University, and the Environmental Law Institute.

Development of a Draft Woody Depressional Wetland HGM Model for the Coastal Plain of Virginia

PI: **Havens**

Funding Agency: **US EPA**

Period: **07/01/02 - 06/30/04**

Amount: **(F)$202,203 + (M)$67,401 = $269,604**

This project takes the preliminary information developed in completion of the Development of a Forested Depressional Wetland HGM Model project and expands it to a Draft Woody Depressional Wetland HGM Model. The project expands the preliminary reference set from 8 sites to approximately 24 sites and coordinates the model development with similar efforts in Maryland and Delaware.

Initiating Development of a Forested Headwater Wetland HGM Model for Wetlands Management in Virginia

PI: **Havens**

Funding Agency: **US EPA**

Period: **07/01/02 - 06/30/04**

Funding: **(F)$163,199 + (M)$54,347 = $217,546**

The Forested Headwater Wetland Subclass is unique in that it is partially defined in law by the average current flow (or lack thereof) in the associated stream. This project initiates the development of an HGM model for the Forested Headwater Wetland subclass by determining the extent of these wetlands systems as related to annual average stream flow. The final report will include development of a preliminary definition of Forested Headwater Wetlands for HGM model development and preliminary data collection of potential HGM variables.

Internet based decision tool for siting wetland restoration sites in Hampton Roads, VA

PI: **Berman**

Funding Agency: **US EPA**

Period: **6/1/02 – 12/31/03**

Amount: **(F)$61,771 + (M)$20,590 = $82,361**

This project uses the protocol and findings of the Advanced Identification of wetland Restoration sites, to develop and interactive, web-based management tool to assist regulators, developers, and project agents in location of potential compensatory mitigation sites in Hampton Roads.

USACroatia Workshop: Biocomplexity and sustainable ecosystem management; Integrating natural, social and economic sciences.

PIs: **Hershner, Frankic**

Funding Agency: **NSF, W&M Reeves Center**

Period: **09/01/02 & 08/01/03**

Amount: **$12,769(NSF) + $500 (W&M)**

This was the first workshop that brought together representatives from disciplines of natural, social and economic sciences to develop a collaborative project in the South Adriatic Region. Workshop discussions identified the main problem as a lack of comprehensive scientific data related to coastal and marine ecosystems in the area. Another problem is the lack of communication and collaboration among scientific institutions in the country. The workshop produced three key recommendations: (1) develop a multidisciplinary South Adriatic project from several suggested research projects; (2) initiate steps for exchange of students and young experts between USA and Croatia; and (3) establish graduate and undergraduate studies in environmental and coastal management in Dubrovnik, Croatia (already underway, with first semester starting in fall of 2003). This collaborative effort will continue with a visit of a Croatian team in February 2003.

Enhancement of Aquaculture Management in Virginia II

PI: **Hershner**

Funding Agency: **Virginia CRMP/NOAA**

Period: **10/1/02 – 12/31/03**

Amount: **$76,500**

This project follows a previous project that involved identification of suitable sites for clam and oyster aquaculture in Virginia based on existing environmental conditions. This project examines each of the sites identified as potentially suitable to generate an assessment of potential conflicts and management issues. The project also involves review of existing management tools and development of proposals for new or enhanced regulatory tools.

Oyster aquaculture - preparing mesh culture bags for deployment.

Enhancement of Virginia's Nontidal Wetlands Regulatory Program

PI: **Hershner**

Funding Agency: **Virginia CRMP/NOAA**

Period: **10/1/01 – 9/30/02**

Amount:

This project involved developoment of two protocols for the new nonitdal wetlands management program. The first is a method for assessing compensatory mitigation efforts for unavoidable wetland losses. The assessment is used to evaluate the replacement ratios used for general permits, providing and adaptive management approach to revision of the ratios at each 5 year renewal of the general permits. The second protocol is an assessment and analysis approach to enable regulators to conduct cumulative impact assessments associated with permits for wetland impacts. The protocol is based on a GIS analysis of existing distributions of the wetland resources by watersheds.

Enhancement of Virginia's Nontidal Wetlands Regulatory Program II

PI: **Hershner**

Funding Agency: **Virginia CRMP/NOAA**

Period: **10/1/02 – 9/30/03**

Amount: **$90,500**

The project that preceded the current effort involved development of two protocols for the new nonitdal wetlands management program. The first is a method for assessing compensatory mitigation efforts for unavoidable wetland losses. The assessment is used to evaluate the replacement ratios used for general permits, providing and adaptive management approach to revision of the ratios at each 5 year renewal of the general permits. The second protocol is an assessment and analysis approach to enable regulators to conduct cumulative impact assessments associated with permits for wetland impacts. The protocol is based on a GIS analysis of existing distributions of the wetland resources by watersheds.

The current project conducts the initial testing and implementation of the two protocols. The objective is to refine the protocols and ensure that they are useful for the regulatory program.

Enhancement of Virginia's Nontidal Wetlands Regulatory Program III

PI: **Hershner**

Funding Agency: **Virginia CRMP/NOAA**

Period: **10/1/03 – 9/30/04**

Amount: **$50,000**

This project concludes the work on developing protocols for the nontidal wetlands program, by revising the protocols based on preliminary tests, and working with the Department of Environmental Quality staff to move the protocols into regular implementation.

Tidal Wetlands Management Technical Support

PIs: **Hershner, Barnard**

Funding Agency: **Virginia CRMP/NOAA**

Period: **annually 10/1 – 9/30**

Amount: **(F)$40,000 + (M)$40,000 = $80,000**

This project has been a continuing grant renewed annually to support the advisory service provided by the Wetlands Program to the Tidal Wetlands Management program. In particular this grant helps fund the travel costs for site visits and meeting attendance by staff scientists, the publication costs for the Wetlands Newsletter, and some of the expenses of maintaining the tidal wetlands permit data base on line on the Center's web site.

Shallow Water Use Management Plan

PI: **Hershner**

Funding Agency: **n/a**

Period: **7/1/00 - 9/30/04**

Amount: **n/a**

This project uses GIS to evaluate conditions suitable for a variety of activities that may occur within the shallow water zone of the estuary. Uses include SAV growth, aquaculture, crabbing, recreational fishing, etc. Nearly 20 uses were modeled. First use suitability models were developed, specifying conditions which must exist for a particular use to occur. Second, GIS algorithms are prepared to analyze available environmental data and indicate areas of suitable conditions for each use within the shallow water zone. Spatial models of use suitability were then combined according to a conflict prediction model to identify potential use conflicts. Final steps in the project will be identification of management issues and options, and development of policy recommendations.

L to R - Cohoke, Cousiac, SweetHall Hill and Lee marshes in the Pamunkey River.

Monitoring the Active Replenishment of Subsiding Habitat (MARSH) project **

PIs: **Hershner, Havens, Bilkovic, O=Brien**

Funding Agency: **Private donors**

Period: **12/1/00 to present**

Funding: $158,002

This project is an ongoing study of the Lee, Hill, and Sweet Hall marshes in the Pamunkey River. The study focuses on the documentation of the relationship between marsh surface elevation and the marsh plant community. The project includes experimental manipulation of the study sites involving a variety of methods for raising the elevation of the marsh. Evaluation of the potential for controlling the composition of the marsh plant community by incremental additions of material to the marsh surface is underway. Other studies include the community structure of birds, fish, insects, and benthos as well as detailed water quality and elevation monitoring. Interim Report**:** http://ccrm.vims.edu/MarshNewsletter.pdf

Shad Spawning Habitat in Mattaponi and Pamunkey

PIs: **Bilkovic, Hershner**

Funding Agency: **National Marine Fisheries Service and inhouse**

Period: **Ongoing (NMFS 2000-2001)**

Amount: **(NMFS - $25,000)**

This project involves development of landscape level habitat suitability models for shad using the Mattaponi and Pamunkey rivers. HSM are developed: (1) from literature review (basically water quality parameters); (2) empirically from field surveys (plankton sampling to locate river reaches with shad eggs and larvae during spawning, followed by analysis of landscape descriptors); and theoretically from models of flow mediated transport of eggs and larvae. The project began with the dissertation research of Donna Bilkovic.

CARA/MUAR

PI: **Hershner**

Funding Agency: **PSU/NOAA/EPA**

Period: **10/1/02 – 9/30/05**

Amount: **$60,000**

This project involves collaboration with researchers from Penn State University, Rhode Island University, and Carnegie Mellon University. The Center's role is facilitation of a case study of climate change and landuse change information use in Hampton Roads, VA. The project is intended to result in development of a climate change center that can provide web-based information of maximum utility to local planners and decision makers.

Historic Oyster Reef Mapping

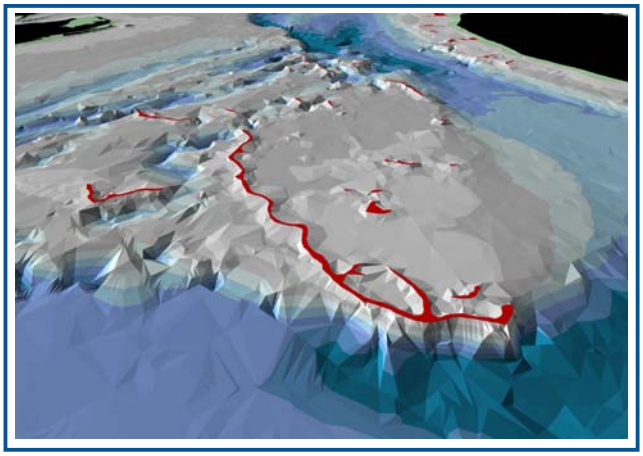
PI: **Hargis**

Funding Agency: **VMRC, Sea Grant, inhouse**

Period: **1/1/99 to present**

Amount: **$5,000 (VMRC), $10,000 (Sea Grant)**

Historic bathymetric charts dating back to the 1800s and including major tributaries in Virginia are being digitized using ArcInfo. Bathymetric soundings from the mid to late 1800s suggest that bathymetric highs within the rivers may represent historic oyster reefs. Using the triangular integrated network (TIN) model to develop three dimensional representations of these relief areas, the structures appear to be elongated, elliptical or dome shaped. Bottom sampling from the early 1970s reveal that many of these are associated with shell bottom providing some verification that they were oyster reefs. Today, these reefs are gone from Virginia's tributaries. This ongoing project to



Point of Shoals reef system in the James River. Long Shoal reef extended above water for nearly 3km. Red indicates emergent features.

reconstruct the distribution of reefs in history may assist in understanding the demise of these habitats and ensure the success of future restoration efforts.

Chesapeake Bay Dune Systems Evolution and Status

PIs: **Varnell, Hardaway**

Funding Agency: **VA Coastal Resources Management Program**

Period: **10/01/01 - 03/31/04**

Amount: **(F)$44,946**

This project combines GIS, GPS, remote sensing, and knowledge of dune systems to map and classify the primary and secondary dune systems in Virginia. Surveys of all dune systems in Virginia include shoreline profiles, grain size analysis, vegetation makeup, and offshore bathymetry. Identification of sites were done from aerial photos and lowlevel oblique videos. Products from the study will include an inventory of the regulated resource, development of a classification system for primary dunes and dune fields, and a geologic history of selected dune field shorelines. The project is in its third phase and text reports are available.

Beach and dune surveying.

Development of Virginia Nontidal Wetlands Database

PIs: **Hershner, Varnell, Weiss**

Funding Agency: **US EPA**

Period: **09/04/01 - 1/31/04**

Amount: **(F)$124,132**

Development of a website-accessible database for nontidal wetlands permitting in Virginia.

Development of TMDL models for Virginia Shellfish Growing Waters

PIs: **Hershner, Mason, Herman, Kator, Shen**

Funding Agency: **Department of Environmental Quality**

Period: **4/1/03 – 4/30/05**

Amount: **$294,496**

There are presently 106 shellfish growing areas currently closed for the taking of shellfish due to elevated fecal coliform levels. Virginia must develop TMDL models for all of these waters. This project involves development of the databases and report formats for these models, and development of reports for half of the total number of areas.

Development of a GIS Database in Support of Virginia's Shellfish Sanitation Program

PI: **Berman**

Funding Agency: **VA Department of Health, Department of Conservation and Recreation**

Period: **2/11/02 - 3/31/03**

Amount: **(F)$100,000 + (M/VDH)$12,489 = $112,489**

This project provides technical support in the development of a GIS database for the Division of Shellfish Sanitation at the Virginia Department of Health. This Division collects and maintains a vast amount of water quality data relevant to point and non-point source pollution that will be required for TMDL modeling. This effort converts the DSS hardcopy products to digital formats and provides the division with an extensive archive of existing data. In addition, the project provides technical support in the acquisition and use of GPS equipment for data collection in the field.

Shoreline Situation Reports

PI: **Berman**

Funding Agency(s): **EPA, CBLAD, inhouse**

Period: **ongoing**

Amount: **various**

This project advances the development of Shoreline Situation Reports throughout the cities and localities within the Tidewater region of Virginia. Shoreline Situation Reports were first developed by VIMS in the 1970s to support coastal management activities and

decisionmaking. CCI is attempting to update the series, and publish a new inventory for each city or locality. The process includes robust data collection in the field using GPS equipment, post processing of data using GIS and remote sensing tools, and the development of map inventories on a county by county basis. Early reports were published as hardcopy and copies are available by contacting project director. This year, 2002, marks the change to electronic formats only, unless otherwise specified. GIS data for all published inventories are posted under Shoreline Situation Reports at: http://www.vims.edu/ccrm/gis/gisdata.html

Wetlands Permit Review and Report Generator

PIs: **Hershner, Berman, Barnard**

Funding Agency: **inhouse**

Period: **ongoing**

Amount: **n/a**

This project revitalizes the permit reporting process in an effort to enhance 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.

Remote Sensing of River Bed Structure, Rappahannock River - Assessment of Habitat

PIs: **Hershner, Havens, Bilkovic**

Funding Agency: **inhouse**

Period: **9/1/02 – present**

Amount: **n/a**

Very high resolution imagery captured during extremely low stands in water levels are being processed to determine river bed characteristics. Image recognition software is being tested as a method for classifying riverbed morphology and composition. The data are being sought as a preliminary fisheries habitat assessment of the river prior to the removal of a large dam known to impact anadromous fish passage. The data will enhance fisheries habitat projects along this and other similar river systems.

Determination of Minimal Instream Flow for Recreational Use

PIs: **Havens, Hershner, Berquist**

Funding Agency: **inhouse**

Period: **ongoing**

Amount: **n/a**

Recreational canoeists established a network of gages in the 1970's that reflect stream levels on Virginia=s rivers. This network of gages depicts at what level canoeing would become impracticable. As such, this is a potential measure of minimal instream flow requirements for recreational boating. This project uses the established network of gages and GPS technology to tie them to elevation benchmarks in order to relate the depicted stream levels to USGS steam gage data.

Field inventory of Phragmites

PIs: **Berman, Havens**

Funding Agency: **various, inhouse**

Period: **ongoing**

The delineation of Phragmites along tidal shorelines is being collected in conjunction with data for the Shoreline Situation Reports. Analysis of status and trends in distribution will be used in management and policy recommendations.

Phragmites australis

Albemarle-Pamlico National Estuary Program/Chesapeake Bay Program Coordination

PIs: **Hershner, Havens**

Funding Agency: **US EPA, Virginia DCR**

Period: **7/01/02 – 12/30/03**

Amount: **$46,800**

This project staffs the coordination of the Virginia and North Carolina estuary programs by placing an individual in the DCR office in Franklin, VA. The project involves intergovernmental coordination and community outreach.

Garden Club of America Scholarship

PI: **Hershner**

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. Each year the Center advertises and responds to inquiries regarding the award. In February it receives, reviews, and ranks applicants and makes a recommendation to the GCA for that years awards. Awards are open to any graduate student undertaking a field oriented study of wetlands at an American university.

Fish data collection on the Rappahannock River, Virginia using a backpack electrofisher..

Center for Coastal Resources Management 2003

Advisory Activity

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Information Requests	184	164	220	214	163	204	186	192	161	201	174	155	2218
Additional Site Visits/Field Consults	27	26	18	30	39	40	34	31	28	33	32	18	356
Meetings	31	22	48	41	37	28	18	15	20	22	19	24	325
Advisory Reports/Publications	94	95	81	83	82	103	106	114	68	59	72	69	1026
Permit Website Hits	300	404	449	292	362	435	672	491	340	400	419	311	4875

Outreach Education Classes in 2003

July

- Tidal Wetland Seminar - local government, state agency, public

August

- NRCS Watermen Cultural Day
- Wetland Plant Identification and Collection- public
- Advanced Plant Identification - public

September

- Wetland Identification and Delineation - public

October

- Advanced Hydric Soils - public
- Wetland Identification, Functions and Values - NRCS SWCD

December

- Winter Botany - public

Talks given by CCRM staff in 2003

January

Bill Roberts	Coastal Communities
Bill Roberts	Wetland Functions and Values
Carl Hershner	Watersheds and Water Quality in the Chesapeake Bay

February

Carl Hershner	The Hydrosphere: Waterbudgets and Watersheds
Kirk Havens	Dragon Run Swamp: Head of the Dragon

March

Anamarija Frankic	Pesticides in Coastal Waters (invited speaker and panelist)
Bill Roberts	Wetland Functions and Values
Bill Roberts	Winter Botany
Carl Hershner	King William Reservoir Development and Issues
Dave O'Brien	Chemical Application in the Chesapeake Bay Watershed
Karen Duhring	Permitted Tidal Wetland Impacts 2002: A Brief Overview
Karen Duhring	Shoreline Management: Current Practices & Environmental Guidelines
Marcia Berman	Development of Shoreline Situation Report for Maryland
Tom Barnard	Virginia Wetlands Mitigation/Compensation Policy: An Historical Perspective
Walter Priest	Teaching Marsh Ecology
Walter Priest	Wetlands Functions and Value

April

Anamarija Frankic	Erosion Control and Coastal Structures
Donna Bilkovic	Conceptual Model of Probable Indicators and Data Integration
Karen Duhring	Guidelines for Planting a Salt Marsh (followed by planted marsh demonstration)
Karen Duhring	Introduction to BayScapes

May

Becky Thomas	Shoreline Management
Carl Hershner	Environmentally Sensitive Landscaping - Successes and Failures
Karen Duhring	Why is a Forest included in Marine Science Day?
Kirk Havens	Natural vs. Artificial Wetlands: The Scientific Perspective

June

Anamarija Frankic	ICZM Plan for Croatia with Special Focus on Aquaculture
Bill Roberts	Planting a Tidal Wetland
Bill Roberts	Wetland Values
Carl Hershner	Shallow Water Use Conflict and Management in Virginia Waters
Karen Duhring	Shoreline Management

July

Becky Thomas	Benthic Macroinvertebrates of the Intertidal Flats
Bill Roberts	Planting Techniques - Wetlands and Uplands - Plants of Importance
Bill Roberts	Tidal Wetland Plants
Carl Hershner	The Virginia Institute of Marine Science and Current Resource Management Issues
Karen Duhring	Tide Range Demonstration
Marcia Berman	Comprehensive Coastal Inventory Program and Projects - an Introduction
Marcia Berman	Introduction to VIMS and Comprehensive Coastal Inventory Program
Tom Barnard	Wetland Benthic Communities

August

Bill Roberts	Watermen's Cultural Heritage Day
Bill Roberts	Wetland Values
Kirk Havens	Coastal Watersheds. We All Live Downstream

September

Carl Hershner	Considering Climate Change in Resource Management of Hampton Roads, VA
Carl Hershner	Proposed Management Strategy for Aquaculture in Shallow Waters of Virginia
Dave O'Brien	Comprehensive Methods in Wetland Delineation
Dave O'Brien	Preparing a Request for Jurisdictional Determination
Dave O'Brien	Routine Methods of Wetland Delineation
Donna Bilkovic	POSTER-Evaluating Shoreline Conditions as Indicators of Ecosystem Health

October

Bill Roberts	Teaching Marsh - Functions, Values and Purpose
Carl Hershner	VIMS and Hurricane Isabel
Dave O'Brien	Basic Oxidation - Reduction Chemistry
Dave O'Brien	Field Indicators of Hydric Soils of the US
Dave O'Brien	Routine Methods in Wetland Delineation
Dave O'Brien	Wetland Identification and Delineation
Dave O'Brien	Wetlands Functions and Values
Donna Bilkovic	Evaluating Estuarine Indicators of Ecosystem Health
Karen Duhring	Coastal Habitat Demonstration Areas at VIMS
Karen Duhring	Functions and Values of the Teaching Marsh
Kirk Havens	Wetlands Regulation in Virginia
Marcia Berman	GIS at CCRM
Walter Priest	Wetlands Ecology Lab
Walter Priest	Long Island University Sea Semester

November

Bill Roberts	Wetlands Ecology and the Teaching Marsh
Dave O'Brien	Wetland Assessment Methodologies
Kirk Havens	Coastal Watersheds: We All Live Downstream
Marcia Berman	General GIS at CCI
Marcia Berman	The Use of GIS and Remote Sensing to Model Suitable Sites for Wetland Restoration
Walter Priest	Wetland Restoration Case Studies
Walter Priest	Wetlands and Sea Level Rise

December

Carl Hershner	Scientific and Technical Advisory Committee update
Donna Bilkovic	POSTER- Evaluating Estuarine Indicators of Ecosystem Health
Kirk Havens	Virginia State Assessment of Wetlands
Pam Mason	Aquaculture conflict management in Virginia
Tom Barnard	Shoreline Management Issues

Meetings Attended by CCRM Staff in 2003

January

Ambassador Supports US-Croatia Science
NSF Biocomplexity Project Grant
Board of Professional Soil and Wetland Scientists
Craney Island Expansion Mitigation Subcommittee
Croatia-VIMS-Collaboration and Financial Support
Croatia-VIMS-NOAA Collaboration, Charles Ehler
Elizabeth River Environmental Restoration Steering
Environmental Dean & Directors Meeting
EPA Headwater/CWA ANPRM
USGS Groundwater
Habitat Management Advisory Committee
EPA Headwater and Isolated Wetlands
CBP Implementation Subcommittee
VIMS KW Reservoir
Insect Indentification
Middlesex County Wetland Board
VMRC Public Hearing on Quinby Creek Dredging
NCSE Conference
ERP Paradise Creek Stormwater Project
Parks and Recreation review
CBP Scientific and Technical Advisory Committee
CBP Sediment Workgroup
ERP Technical Policy Committee
Virginia Association of Wetland Professionals
VMRC Public Hearing

February

VMRC Aquaculture
CBPA Video Script Review
City of Norfolk Wetlands Board
Dragon Run Symposium
Hampton Roads Users Group
Heartquake Creek Mitigation Bank
DEQ Integrated Strategy Proposal Development
King William Reservoir Discussion
Lancaster County Wetlands Board
Norfolk Naval Shipyard Wetland Restoration Plan
Panel on Adaptive Management
VMRC Public Hearing
Croatia-USA Scientific and Educational Projects
CBP Scientific and Technical Advisory Committee
CBP Sediment BMPs
CBP Sediment Workgroup

March

Aquaculture
Biological Indicators of Ecological Health
DEQ Blue Green Infrastructure
Boat Basin Planning Session
City of Virginia Beach Wetlands Board
Coastal Management, Ireland
VMRC Commission Meeting
Craney Island Expansion Mitigation Subcommittee
Eagles/MAIA
Envirothon
Heartquake Wetland Mitigation Bank
CBP Implementation Subcommittee
King William Reservoir Briefing/Discussion
Lancaster County Wetlands Board
MD Coastal Program
EPA, USGS National Parks and Monitoring
Norfolk-Steamboat Creek Wetland Restoration
Norfolk Shipyard Restoration Groundbreaking
NPDES/CBPA VIMS Permit and Compliance
Panel on Valuation of Aquatic Resources
ERP Paradise Creek Stormwater Project
ERP Restoration Ground Breaking
CBP Scientific and Technical Advisory Committee
VIMS Shorelands Planning
CBLAD Shoreline Permitting Coordination
ERP Technical Policy Committee
Tidal Wetlands Workshop
Virginia Association of Wetland Professionals
Virginia Chesapeake Bay Interagency Coordination
DEQ Virginia Coastal Policy Team
Virginia Tidal Wetlands Management Symposium
VMRC Public Hearing
VMRC Wetlands & Subaqueous Permitting

April

Area III Envirothon Competition
CBP Budget Steering Committee
EPA Discussion of Grants with Charlie Rhodes
EAGLES Project
EPA Eaglets
Elizabeth River Environmental Restoration Steering
Heartquake Creek Mitigation Bank
HGM Depressional Wetlands Workshop
CBP Implementation Subcommittee

VMRC and NN on KW Reservoir
Middlesex County Wetlands Board
CBP Monitoring and Modeling Workgroup
Natural Resource Leadership Summit
NOAA, NERRS
CBP Nutrient Subcommittee, Forestry Workgroup
Public Hearing-King William Reservoir Project
Riparian Restoration Tech. Comm. Embrey Dam
CBP Sediment Workgroup
CRM Shorelands Technical Advisory Committee
ERP Technical Policy Committee
CMRC University Cork, Ireland
USCG meeting
VIMS Council

May

Technical Advisory Meeting for Shellfish TMDLs
VAWP Annual Meeting
CORPS Bogue's Bay Spray Dredging Contract
Bogues Bay/Cat's Creek Spray Dredge Project
Croatia Project, Bonnie Thompson
CARA all hands meeting
City of Portsmouth Wetlands Board
CRM Wetlands Grant Coordination
DEQ CRMP Shorelands Project
Discussion of Grants, Charlie Rhodes
International Projects and ICZM, B.Cicin-Sain
Colonial SWCD Environmental Credit Trading
KW Reservoir
Lynnhaven River Environmental Restoration
Mathews County Wetlands Board
EPA Mid-Atlantic Wetlands Workgroup
CORPS Nassawaddox Creek Dredging Plan
NOAA Congressional Delegation
NRCS Nutrient Trading
CBP Scientific and Technical Advisory Committee
VIMS Shorelands Technical Committee
VMRC Public Hearing
Water Quality Issues in Tanzania
CRM Wetlands Project Meeting

June

City of Newport News, Stoney Ck Greenway Corrid
City of Portsmouth Wetlands Board
Craney Island Expansion Mitigation Subcommittee
IRB/NSF Project Preparation, Dr. Legovic
IZOR/NSF Project Preparation, Dr. Peharda
EPA EAGLES Planning
Elizabeth River Environmental Restoration Steering
Heartquake Creek Mitigation Bank
ERP Monitoring Committee
CBP Nutrient Subcommittee, Forestry Workgroup
USAID Project GEMS in Dubrovnik
CBP Sediment Workgroup Field Trip
Senator Mathias Tour
VIMS Shorelands Project
Sediment Dynamics upon Dam Removal
ERP Technical Policy Committee
CBP Training Symposium
CBC Virginia Delegation
VMRC Wetlands & Subaqueous Permitting
DCR York River Tributary Strategy Revision
York River Watershed Council

July

City of Portsmouth Wetlands Board
College Cork CMRC
CZM Project in Croatia
EPA EAGLES Project
Global Forum Conference Coordination
Indicators for ICZM
Integrated Coastal Management Course, Brazil
KW Reservoir FOI
EPA National Forum on Nutrient Trading Policy
Native Phragmites Identification
Phragmites Conference - Native vs. Non-native
ERP Technical Policy Committee
Tidal Wetlands Workshop
VMRC Public Hearing

August

ERP Board of Directors
Chesapeake Bay Commission - Virginia Delegation
City of Virginia Beach Wetlands Board
Coastal and Marine Research Center
CZM Project, Croatia
Dam Removal: Lessons Learned Workshop
Global Forum Conference Coordination
DGIF Gloucester Point Boat Ramp
Indicators for CZM
Integrated Coastal Management, Brazil
NAS Aquatic Ecosystem Valuation Panel
NOAA 312 Evaluation
NOAA Chesapeake Bay Office
CORPS Research Plan for Shad Run in James River
CBP Scientific and Technical Advisory Committee
VA Coastal Resource Management Program
VLCF Annual Meeting

September

VMRC Aquaculture
ERP Board of Directors
Chesapeake Bay Commission - Virginia Delegation
Coastal and Marine Research Center
Coastal Ocean Observing Panel
Consortium for Atlantic Regional Assessment
VMRC Croatan Beach Restoration
ERF Estuaries on the Edge
Gloucester Wetlands Bd. Emergency Response
Governor Warner Press Conference
DEQ Permit Process Review
CBP RESAC
CBP Scientific and Technical Advisory Committee
DEQ VA Wetland Restoration and Enhancement

October

10th Anniv. PSU Center for Wetlands Resources
City Attorney for Virginia Beach
Croatian Ambassador
CORPS Davis Creek Dredging
ERP DEQ/EPA - Peck Metals
EPA EAGLES Workgroup
Esturarine Indicator Workshop
GOOS-Coastal Ocean Observing Panel
CORPS Interagency Mitigation Bank Review Team
Phragmites Project, Randy Chambers
NAVY Uniform National Discharge Standards
VMRC Public Hearing
CBP Sediment Workgroup
DEQ Wetland Assessment Protocol Development
DEQ Wetland Monitoring
DCR York River Tributary Strategy Revision

November

30th International Symposium on Remote Sensing
ASC-EAGLES Research Team
Atlantic Slope Consortium for EAGLES Program
ERP Board of Directors
Chesapeake Bay Commission - Virginia Delegation
CORPS Dredge Management Committee
EPA EAGLES Project
ERP Sediment Remediation Partnership
Global Oceans, Coasts and Islands Conference
ODU Sailing Center Pre-application
CBP Scientific and Technical Advisory Committee
VMRC Public Hearing
Wetland Delineator Certification
William & Mary Parking Committee
DCR York River Tributary Strategy Revision

December

GEF Adriatic Conservation Project
Center for Seachange, Christophe Tulou
DEQ Coastal Partners Workshop
DEQ Coastal Partners Workshop - Special Session
Consortium for the Atlantic Regional Assessment
CZM Partnership workshop
VIMS Executive Council
CORP/DEQ Low Impact Development Practices
Univerisity of the United Arab Emirate Members
Mid-Atlantic Wetlands Workgroup
VIMS Parking Committee
VMRC Public Hearing
CBP Scientific and Technical Advisory Committee
CBP Sediment Workgroup
Virginia Coastal Partners Workshop
VMRC Wetlands & Subaqueous Permitting

Clapper Rail (Rallus longirostris)

Coastal Inventory Program Products 2003

Shoreline Situation Reports

- **Northumberland County, VA Shoreline Situation Report**
- **St Mary's County, MD Shoreline Situation Report**
- **Dorchester County, MD Shoreline Situation Report**

Shoreline Inventories

area	digital shoreline	field survey	data processed	QA/QC
Wicomico County, MD	X	X	X	X
Somerset County, MD	X	X	X	X
Caroline County, MD	X	X	X	X
Talbot County, MD	X	IP	IP	
Baltimore County, MD	X	X	X	
Anne Arundel County, MD	X	IP		
Cecil County, MD	X			
Hartford County, MD	X			
Queen Anne's County, MD	X			
Richmond County, VA	X	X	X	IP
Westmoreland County, VA	X	X	X	IP
Pagan River, VA	X	X	X	X
Warwick River, VA	X	X	X	X
Mid-lower James River, VA	X	X		
Chickahominy River, VA	X	IP		
Lower Rappahannock River, VA*	X	X	X	
Mid-Rappahannock River, VA*	X	X	X	
Upper Rappahannock River, VA*		X		
Lower York River, VA*	X	X	X	

* = data collected in previous year(s)
IP = in progress

Historic Bathymetric Mapping

- 19th century York River
- 18th century Potomac River

Contract Reports

- An Internet Based Decision Tool for Siting Wetlands Restoration Sites in Hampton Roads, VA
- Waterfront Development and Potential Impacts to Aquatic Habitat – A Planning Tool for Evaluating Resource Sensitivity.
- Evaluating Shoreline Conditions at Different Spatial Scales - Implications as an Ecological Indicator
- Weedy Invasive Species Phragmites australis adjacent to agricultural land: response to conservation reserve program (CRP) control methods – Interim report
- Shallow Water Use Conflict – continued

- Jurisdictional Coordination of State and Local Regulatory Programs – GIS model
- First order stream wetlands (GIS model)
- Watershed/wetlands drainage models (GIS model)
- Isolated wetlands model – rerun (GIS model)
- Dune study – historic shoreline mapping (continued)

Coastal Watershed Program Products 2003

Havens, K.J., H. Berquist, and W. I. Priest. 2003. Phragmites expansion into constructed wetlands: Are we mortgaging our wetland future? ***Estuaries*** 26 (2B) 417-422.

Bilkovic, D.M. 2003. Current research in the assessment of the condition and integrity of an aquatic ecosystem: a bibliography. Center for Coastal Resources Management Report 03-2.

Havens, K.J., D. O'Brien, D. Stanhope, R. Thomas, G. Silberhorn. 2003. Initiating development of a forested depressional wetland HGM model for wetland management in Virginia. Final Report to the U.S. Environmental Protection Agency, 49pp, http://ccrm.vims.edu/pubs/Hgmmodel.pdf

Frankic, A. 2003. ICZM Plan for Croatia with special focus on aquaculture.Workshop, Zagreb, Croatia, June 15-18. http://ccrm.vims.edu/staff/Adriaticaquaculture.pdf

Frankic, A. and C. Hershner. 2003. Final Report (NSF grant): Biocomplexity and Sustainable Ecosystem Management: Integrating natural, social and economic sciences. http://ccrm.vims.edu/staff/dubrovnikreport.pdf

Bilkovic, D.M., D. Stanhope and C.H. Hershner. 2002. Assessing Larval American Shad Growth and Survival with in situ mesocosm experiments in three differing habitats within a coastal estuary. Center for Coastal Resources Management Report 03-3.

Frankic, A. 2002. USA-Adriatic Cooperation in coastal affairs. NATO Research Workshop, Ljubljana, Slovenia, July 2001. Pp 173-180. *In*: B.C. Sain et al (eds.), ***Sustainable Coastal Management: A Transatlantic and Euro-Mediterranean Perspective***. Kluwer Academic Publisher.

Wetland Program Publications in 2003

The Virginia Wetlands Report:

- Spring 2003. Vol. 18, No. 1. Economics vs. Wetland Protection: How Do Wetland Boards Do It?
- Summer 2003. Vol. 18, No. 2. Cumulative Index 1986 - 2002
- Fall 2003. Vol 18, No. 3. Study Offers Options For Protection of Secondary Dunes

Center Equipment Inventory

Laboratory/Field Equipment:

- YSI 6600 Sonde units with probes for depth, temperature, dissolved oxygen, pH, conductivity/salinity and turbidity (3)
- YSI 650 Multiparameter Display System connected to a YSI 6820 handheld probe for depth, temperature, dissolved oxygen, pH, conductivity/salinity and turbidity
- remote solar powered acoustic tide gauge with cell phone data transmission system
- videomicroscopy system
- trinocular stereomaster zoom microscope with an 88 mm working distance (small objects)
- trinocular stereomaster zoom microscope with an 56 cm working distance (large objects)
- high resolution digital camera
- fiberoptic light sources
- drying oven
- analytical balance
- Spectronic 20 spectrophotometer
- Limnoterra Electronic Fishboard
- malaise tent insect traps (4)
- blacklight insect traps (12)
- Eckman Grabs (2)
- fyke nets (4)
- beach seine net
- otter trawl
- plankton net
- mesocosm nets (36)
- plankton pump
- Flowtracker Current Meter
- 100' unguyed, self-erecting tower for weather instrumentation
- RDS water level wells, programmable, recording (30)
- trash pump
- soil compaction meter
- SET table
- Dodge Dakota, crew cab, 4wd pickup
- Ford Explorer 4wd
- Chevrolet Silverado 2500 HD, Crew Cab, 4wd pickup
- Old Town canoe
- Digitial Cameras
- Cruz All Angles (11)
- Palm Pilot Vx (4)
- Palm Pilot m515 (3)
- Palm Pilot Tungsten E (3)
- Smith Root LR-24 Electrofisher
- RDS Rain gauges, programmable, recording
- General Oceanics Mechanical Flowmeter (3)
- Teaching Marsh Remote Camera

Survey Equipment

- Trimble 4000ST survey grade, single frequency GPS units (3)
- Trimble Geo-Explorers, mapping grade handheld GPS units (7)
- Trimble 4700 geodetic grade, dual frequency GPS unit
- Trimble GPS base station
- Garmin GPS12 (15)
- Garmin GPS12 (3)
- TopCon Total Station survey system
- Marine Sonics side scan sonar (600 kHz)
- Marine Sonics side scan sonar (900 kHz)

Teaching Marsh Remote Camera

Computing resources (fully networked system)

- 10 Unix workstation
- 28 NT pcs
- 2 100GB expandable RAID disk array
- AIT-1 tape back-up system with 10 tape changer
- 4 Numonics digitizing stations
- Canon 950 Color Copier
- Multi-user ArcInfo (University license)
- Multi-user ArcView (University license)
- ArcIMS
- ESRI 3D Spatial Analyst
- ESRI Spatial Analyst
- ESRI ArcPad
- Multi-user Erdas Imagine (Higher education lease agreement/University license)
- Multi-user Erdas Modules (Vector, Virtual GIS, Orthomax, Sub-pixel classifier)
- Visual Learning Systems' Feature Analyst software
- Mr. Sid

Trimble Geo-Explorers, mapping grade handheld GPS unit

Installing a remote solar powered tide guage

Flowtracker Current Meter


Stoecker


Stoecker


Stoecker