Virginia Coastal Zone MANAGEMENT PROGRAM

Final Project Summary

Your final project summary is an important contribution to the Virginia Coastal Zone Management Program's communication efforts and will be used to produce accomplishment reports, fact sheets and Virginia Coastal Zone Management Web Site information.

Please submit this form electronically to: April.Bahen@deq.virginia.gov.

YOU DO NOT NEED TO SUBMIT A HARD COPY

NOAA Grant #:	**NA10NOS4190205**	**Grant Year:**	**11**	**Task #:**	**8**
Agency/Locality:	**Virginia Institute of Marine Science – Wetlands Program**				
Project Title:	**Tidal Wetlands Management Technical Support**				
Name:	**Dawn Fleming**	**Email Address:**	**dawnf@vims.edu**	**Phone Number:**	**804-684-7380**

PROJECT SUMMARY: Please confine your summary to the space provided below. Remember to:

- write for the public
- do not use first person
- include an abstract of project results
- provide a brief description, and titles, of publication(s) and/or dataset(s) produced
- describe how products will be distributed and if available on-line, please give the **Web address!**

This project provided operational support for tidal wetlands management technical support provided by the Center for Coastal Resources Management Wetlands Program staff. Wetlands Program personnel provided routine advisories and impact assessment preparation; maintenance of a permit database and website; and produced newsletters and the supporting materials for outreach education offerings. Technical advisory activities encompassed everything from verbal communications to written environmental assessments. In a cooperative effort, Wetlands Program staff are attending wetlands board meetings where VMRC is presenting information on the legislative requirement for a living shoreline general permit. In September, VIMS attended 11 of these meetings to listen to issues and concerns and to answer technical questions. The Center continues to maintain an online tutorial to help applicants correctly fill out the joint permit application. In addition, VIMS alone serves the permit data online which is routinely accessed by applicants and other government agencies through a searchable database. The permit data includes the original joint permit application; VIMS permit review reports, incomplete forms and impact estimates table; and all related additional information, public notices and photos. CCRM produces two biannual newsletters – the *Virginia Wetlands Report* and *Rivers & Coast*. The *Virginia Wetlands Report* informs readers of near-shore environmental science and related issues to influence better tidal shoreline decisions, and serves to announce upcoming workshops and educational opportunities. The *Rivers & Coast* newsletter covers one topic written for three perspectives – the general public, managers, and legislators – and provides information that goes from the big picture down to local relevance. Both newsletters are mailed to approximately 2000 individuals, including all local wetlands board members, local and state agency personnel, General Assembly members, and interested private citizens. The newsletters are distributed for free to any interested subscriber, and are available online. The Center also sends an e-newsletter to approximately 1250 email addresses. The CCRM e-News provides the reader with reminders, quick tips, and alerts, by summarizing issues that relate to coastal and estuarine resources, shoreline and wetland habitats, climate change, and shallow water management and by pointing the reader to more detailed information on our website. The Wetlands Program was responsible for organizing and hosting a Tidal Wetlands Workshop held at VIMS on May 5th, 2011. This workshop on applying policy to shoreline management unveiled CCRM's Decision Tree for Currently Defended Shorelines. This is the second decision tree in a series which leads users through several questions about shoreline characteristics and results in a recommendation of the environmentally preferable treatment(s) for that shoreline. The process of planning, developing, training, online automation, and field validation for several more decision trees is currently underway. In addition, CCRM trainings for local government staff on "Tools for Coastal Resource Management" including how to use the Decision Trees and an introduction to the Center's newly developed Comprehensive Coastal Resource Management Plans (CCRMP) was initiated at the end of this grant year. *To view any of the previously mentioned items, please see CCRM's website (http://ccrm.vims.edu//).*

Tidal Wetlands Management Technical Support

Dawn Fleming

October 17, 2011

Grant #NA10NOS4190205
Task #8

This project was funded, in part, by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant # NA10NOS4190205 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended. The views expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Department of Commerce, NOAA, or any of its subagencies.

Table of Contents

The Center for Coastal Resource Management's Wetlands Program staff provides written recommendations from an environmental perspective on tidal shoreline projects that have been assigned a VMRC number and include the minimal information needed for project assessment. Attached are an Incomplete Form, VIMS Report and Impact Estimate Table.

The Wetlands Program planned, organized and hosted two Tidal Wetlands Workshops at VIMS. Attendees were introduced to coastal management tools including the first two in a series of decision trees using hands-on exercises and case studies.

Rivers and Coast, Spring 2011, Vol. 6, No. 1 – Coastal Resource Management Planning
Rivers and Coast, Summer 2011, Vol. 6, No. 2 – Virginia's Comprehensive Wetland Program Plan

Virginia Wetlands Report, Spring 2011, Vol. 26, Issue 1 – Applying Policy to Shoreline Management & Decision Tree for Currently Defended Shorelines
Virginia Wetlands Report, Fall 2011, Vol. 26, Issue 2 – Comprehensive Coastal Resource Management Plans & Tools for Coastal Resource Management

CCRM e-News, February 2011 - (workshop announcement)
CCRM e-News, May 2011 - (decision tools, wetlands program changes, workshop & topics catalog)

CCRM posts tidal wetland Joint Permit Applications with associated photos, additional information and VIMS Reports in a searchable database on our website. Attached is a listing of all the applications that were posted to our website with a VIMS Report for this grant year.

Summary

This grant provides financial support for wetlands management technical assistance provided by Virginia Institute of Marine Science Wetlands Program staff. Specifically, this project supports routine advisories and impact assessment preparation for VIMS Reports; training that targets local wetlands board members and their staff; publication of technical reports and newsletters; as well as the maintenance of a permit database website.

APPLICANT: Karla Hehl VMRC # 11-0375 Date: 3/29/11

LOCALITY: Northampton County

The following information is the **minimal** required for VIMS to conduct an assessment of an application. Additional information may be required and requested for specific projects; however, **ALL** applications must provide the minimum information before VIMS will conduct an evaluation of a project.

Applications NOT providing the minimal information prior to the 20 day public notice notification deadline will not be evaluated and a shoreline report will NOT be generated for the project.

NOTE: This review does not serve to determine application completeness for local wetland boards or other regulatory agencies or advisory authorities.

A detailed description of the project is provided? Yes ☑ No ☐

Comments:

Location of the project (911 address or latitude/longitude) is provided? Yes ☑ No ☐
Specific driving directions or detailed vicinity map is provided? Yes ☑ No ☐
(Can project be located?)

Comments: vicinity map a bit hard to read

A scaled PLAN VIEW (or with dimensions) is provided? Yes ☑ No ☐
Plan is readable? Yes ☑ No ☐
MHW and MLW clearly are depicted? Yes ☑ No ☐
Proposed project location is identified? Yes ☑ No ☐

A scaled CROSS SECTION (or with dimensions) is provided? Yes ☑ No ☐
For each proposed structure? Yes ☑ No ☐
Cross Section(s) is (are) readable? Yes ☑ No ☐
MHW and MLW are clearly depicted? Yes ☐ No ☒

Comments: The plan view drawing should note the location each cross section drawing is illustrating. Page labelled cross section drawing does not depict MHW and MLW.

Information provided is consistent? Yes ☐ No ☐

Comments:

Benchmark distances are provided? Yes ☐ No ☒
Distances are from permanent points of reference? Yes ☐ No ☐
Distances are readable? Yes ☐ No ☐

Application provides the MINIMAL information required: ☐

Application does NOT provide the minimal information required - Additional info necessary ☒

FINAL REVIEW: Minimum still not met - NO REPORT WILL BE GENERATED ☐

Please direct questions regarding this Minimum Information Review to wetlands@vims.edu

VIMS Shoreline Permit Application Report # 11-0375

APPLICANT:	**HEHL PROPERTIES, LLC**
Locality:	NORTHAMPTON COUNTY
Immediate Waterway:	Magothy Bay
Report Date:	4/16/11

EXISTING SITE CONDITIONS AND PROPOSED ACTIONS:

After-the-fact authorization is requested for a 500-ft revetment recently constructed on Holly Bluff Island located in Magothy Bay. This is a sandy shoreline with adjacent tidal marshes. This shoreline was used in the past for the disposal of dredged material from the adjacent Intracoastal Waterway.

Before the revetment was constructed, there was a failed timber bulkhead, existing geo-tube groins at each end of the bulkhead, and an articulated concrete mat 16 ft channelward from the bulkhead. The upland area of this island is developed with residential use. A house is located about 100 feet or less from the project shoreline.

The revetment was constructed with stacked concrete blocks over filter cloth covered by concrete rubble. There are additional concrete blocks at both ends of the revetment. These materials were barged to the island. The area landward from the revetment was backfilled. The source of backfill is reported to be upland material in the application, but it has a similar appearance to dredged material based on sediment color and shell content. A portion of the backfill area was recently planted with grass plugs.

The project drawings in the application do not accurately depict the revetment as it was built. The existing articulated concrete block mat is not visible 8 to 14 ft channelward from the revetment toe, as depicted in the plan view and cross-section. There is a section of this mat visible at the west return wall. The additional concrete blocks at both return walls are not shown in the plan view. These return walls appear to be approximately 120 ft in length instead of 70 ft as shown.

In addition, it is not clear how far channelward the revetment toe is located from the original bulkhead alignment. No benchmarks were provided from the house to the original bulkhead in previous applications, or to the new revetment toe in this current application. The mean high water and mean low water elevations are not depicted in relation to a tidal datum. The height of the revetment and backfill in relation to the MHW and MLW elevations are not shown.

THE PREFERRED APPROACH FROM AN INTEGRATED MARINE ENVIRONMENTAL VIEWPOINT:

If we had reviewed this project before the existing revetment was constructed, the following recommendations would have been provided. A series of offshore breakwaters located near MLW is typically the preferred approach for sandy shorelines where beach nourishment alone

would not provide adequate protection. It is not clear why two previous proposals for offshore structures were revised (VMRC #93-0707, #07-1189).

If offshore structures with a wide sand beach are not feasible, then a sloped revetment is the next alternative to consider given the proximity of the house to the shoreline. A revetment extending 16 ft channelward from the original bulkhead was previously approved (#07-1189). The proposed revetment dimensions should be justified based on the expected wave height and energy for this location. It should be located as far landward as possible to minimize impacts to the adjacent beach, tidal wetlands, and shallow water habitat.

Concrete blocks and concrete pieces are generally not as effective as quarry stone for the construction of revetments. This is primarily because concrete is more easily moved by the force of waves and water. If concrete rubble is used to construct a revetment, it is best used as core material covered by quarry stone in all settings except where wave action is not significant. Concrete rubble should be broken into appropriately sized units so that no individual unit is longer than 3 times its minimum dimension. For example, a concrete slab that is 6 inches thick should be broken so that the average length is no greater than 18 inches.

The haphazard placement or dumping of concrete rubble is not effective for erosion protection. The concrete material should be carefully placed with similar dimensions and slope as a stone revetment, including the use of filter cloth under smaller core material covered by larger sized armor pieces. A buried toe and 2:1 slope are also recommended for structural integrity. All re-bar should be cut flush with each unit. All asphalt material and other solid waste or construction debris should be removed prior to installation.

In this case, the as-built revetment base width and height in relation to MHW, MLW, and the potential wave energy at this location could not be confirmed. Local knowledge of the wave climate or other supporting information is needed to justify the dimensions of the structure as-built. A more landward location of the revetment would have reduced the amount of rubble and backfill material needed, as well as the 120-ft length of the return walls and the size of the area where vegetation needs to be restored.

The concrete material appeared to be mixed and not sorted or placed as core and armor sizes. The rubble is mostly clean but does contain some visible protruding re-bar and loose metal pieces. There does not appear to be a buried toe if the existing articulated mat remains underneath the revetment. The potential for toe scour and premature failure is uncertain with this unconventional design. The free-standing concrete blocks at the return walls may shift out of place from the original locations. The use of quarry stone or properly sized concrete pieces is typically more effective.

The source of the backfill should be verified. The use of clean, upland material is typically recommended because it promotes vegetation growth. If recently dredged material was used for backfill, it is best to wait before planting to allow salts to leach out and for the material to settle

before introducing new vegetation.

Restoring a vegetation cover over the entire backfill area is advised to prevent loss of sediment back into the water. It is not clear what species were used in the planted area or if additional planting is proposed. Native, salt-tolerant grasses are advised, such as saltmeadow hay, switch grass, and American beach grass. Woody vegetation could also be included on the landward side of the planting area if tidal inundation over the top of the revetment would be infrequent. Temporary erosion and sediment control measures may be needed until a vegetation cover can be established.

RECOMMENDATIONS SUMMARY:

* Revise plan view, cross-section, and impact estimates to accurately depict project as-built
* Clarify MHW, MLW, and local wave climate in relation to project dimensions
* Provide adequate benchmarks from house to channelward limit of all structures
* Remove loose metal pieces and protruding re-bar if possible
* Confirm source of backfill material
* Provide planting plan for backfill area
* Provide temporary sediment controls as needed until vegetation cover is restored

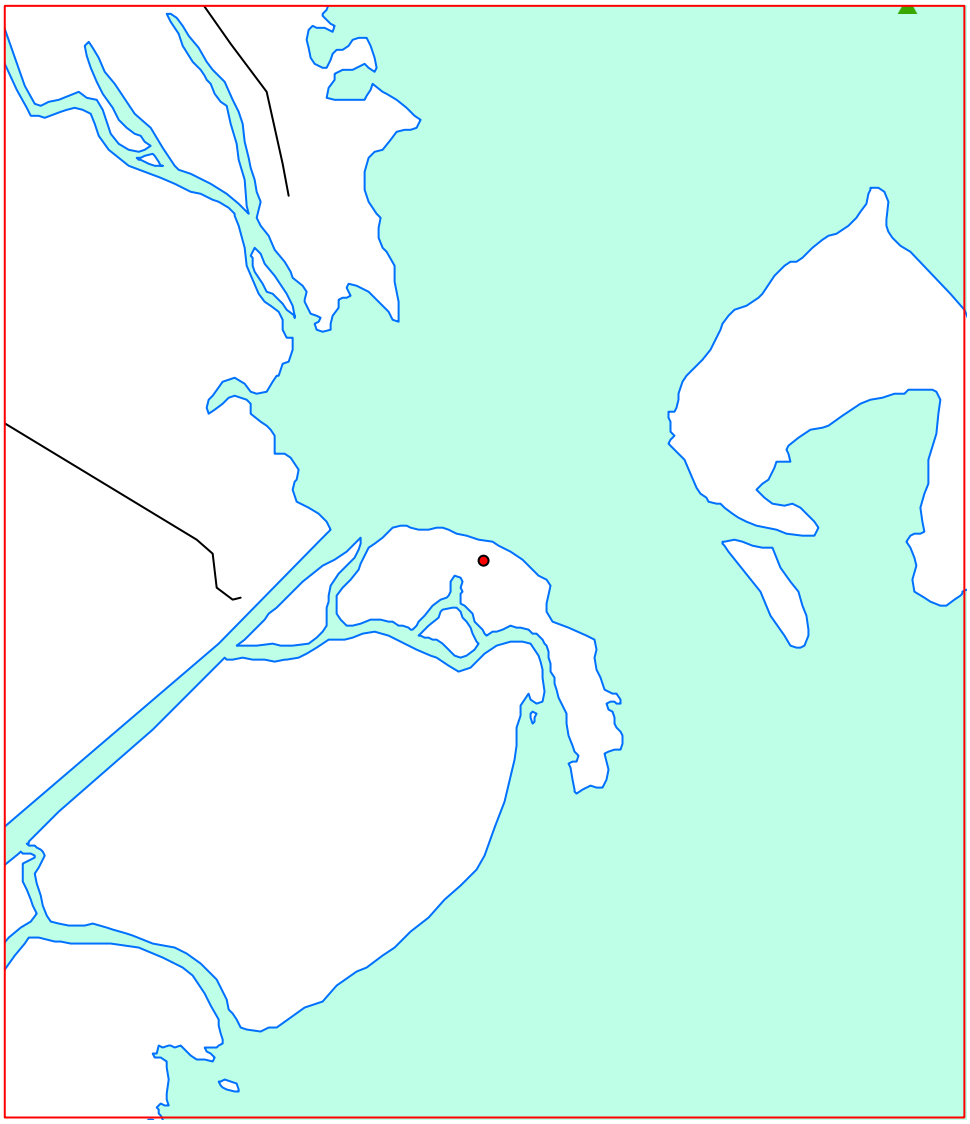
NOTE

The Virginia Institute of Marine Science (VIMS) applies an integrated coastal management perspective during the review of proposed activities on tidal shorelines. The coastal ecosystem has dynamic connections between wetlands, coastal waters and the surrounding landscape. This provides valuable ecosystem services, such as maintaining water quality, shoreline stability, and wildlife habitat. Activities should be designed to avoid adverse impacts to coastal resources. When impacts are unavoidable, every effort should be made to minimize impacts and provide compensation as required.

VIMS Shoreline Permit Application Report # 11-0375

Permit Site Study Area

Magothy Bay
Northampton County



Project site

Roads

Shoreline access structures
STRUCTURE
- Boathouse
- Dilapidated dock
- Dock
- Ramp

Shoreline erosion structures
STRUCTURE
- Breakwater
- Bulkhead
- Dilapidated bulkhead
- Groin
- Jetty
- Marina
- Miscellaneous
- Riprap
- Seawall
- Wharf

Oyster reefs
TYPE
- Completed
- Proposed

Bathymetric contours
DEPTH
- -1 meters
- -2 meters

SAV habitat

Open water

N

0 0.1 0.2 Miles

VIMS Shoreline Permit Application Report # 11-0375

APPLICANT:	**HEHL PROPERTIES, LLC**
Locality:	NORTHAMPTON COUNTY
Immediate Waterway:	Magothy Bay
Report Date:	4/16/11

A site visit and impact assessment were conducted by VIMS on 4/13/2011. These impact estimates are based on observations made and information provided in the Joint Permit Application.

Type of Activity	Permanent Loss/Fill Area (SF)	Impact Area (SF)
Riprap (500 LF)		
Vegetated	0	0
Non-vegetated	12440	12440
Beach and Dune	0	0
Sub-aqueous	0	0
Totals (500 LF)		
Vegetated	0	0
Non-vegetated	12440	12440
Beach and Dune	0	0
Sub-aqueous	0	0

Wetlands Program
wetlands@vims.edu

Center for Coastal Resources Management
P.O. Box 1346
Gloucester Point, VA 23062-1346
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William & Mary VIMS
Virginia Institute of Marine Science
School of Marine Science

What's Up? CCRM Update

Thursday, November 4, 2010
Virginia Institute of Marine Science
Gloucester Point, VA

AGENDA

8:00 – 9:00	Registration & Coffee - Watermen's Hall Lobby
9:00 – 9:15	**Welcome & Workshop Theme**
9:15 – 9:30	**Center for Coastal Resources Management Program Status** *Carl Hershner, Director, Center for Coastal Resources Management*
9:15 – 9:45	**Current Permit Review Process** *Christine Breddy, CCRM*
9:45 – 10:15	**Currently Defended Shorelines – the Next CCRM Decision Tree** *Karen Duhring, CCRM*
10:15 – 10:30	*Break*
10:30 - 10:50	**Joint Resolution Shoreline Management Study** *Pam Mason, CCRM*
10:50 – 11:20	**Living Shoreline Website** *Karen Reay and Karen Duhring, CCRM*
11:20 – 11:40	**Living Shoreline Monitoring** *Donna Bilkovic, CCRM*
11:40 – 12:45	LUNCH - Box Lunch served in lobby, seats available in classrooms and outside (weather permitting)
12:45 – 1:15	**Derelict Crab Pot Retrieval Update** *Kirk Havens, CCRM*
1:15 – 1:30	**York River Tidal Marsh Survey** *Molly Roggero, CCRM*
1:30 – 2:00	**Hampton Waterway Management Plan** *Marcia Berman, CCRM*
2:00 – 3:30	**Shoreline Management Planning and Information Sharing** *Marcia Berman, CCRM*

Applying Policy to Shoreline Management

Thursday, May 5, 2011
Virginia Institute of Marine Science
Gloucester Point, VA

AGENDA – White Group

8:00 – 9:00	Check-in & Coffee - Watermen's Hall Lobby
9:00 – 9:15	**Welcome & Workshop Theme** *Dr. Carl Hershner, Director, VIMS-CCRM*
9:15 – 9:30	**Virginia Senate Bill 964 – Coastal Resource Management** *Matt Strickler, Legislative Assistant for Sen. Ralph Northam*
9:30 – 9:45	**SB964 –The General Permit and Integrated Guidance** *Tony Watkinson, Chief, Habitat Management Division, VMRC*
9:45 – 9:55	**Virginia Wetland Program Plan** *Pam Mason, VIMS-CCRM*
9:55 – 10:25	**Establishing Tidal Datums** *Hank Badger, Environmental Engineer and Marine Surveyor, VMRC*
10:25 – 10:40	*Break*
10:40 – 11:00	**York River Breakwaters and VIMS Shoreline** *Scott Hardaway, Director, VIMS Shoreline Studies Program*
11:00 – 12:00	**Breakout Session #1 - Shoreline Assessment Mapper & Shoreline Inventory Maps –** *Computer Lab*
12:00 – 1:00	LUNCH - Box Lunch served in lobby, seats available in classrooms and outside (weather permitting)
1:00 – 2:00	**Breakout Session #2 – Field Trip – VIMS Shoreline** *Meet at flagpole outside Watermen's Hall front door*
2:00 – 3:00	**Breakout Session #3 - Decision Tree - Currently Defended Shorelines** *Classrooms A/B and C*
3:00 – 3:30	**Discussion and Wrap-up** *Auditorium*

Newsletter of the Center for Coastal Resources Management

Rivers & Coast

Spring 2011, Vol. 6, No. 1

In this issue:

Sea level rise and development patterns put wetlands and other shoreline resources at risk.

Sustaining public benefits from shoreline systems will require comprehensive management and planning.

Comprehensive Coastal Resource Management Plans will assist localities with information about important natural resources, preferred shoreline management options, potential use conflicts, and risk reduction.

✤ ✤ ✤

Coastal Resource Management Planning

About 11% of shoreline in Virginia tidal waters have been hardened with bulkhead and riprap revetment structures and on average 18 miles of shoreline continue to be hardened each year.

Shoreline management in Virginia has evolved over the past 40 years to keep pace with increased understanding of these complex systems. In 1972 the Tidal Wetlands Act was focused on minimizing impacts on marshes. Over the next 30 years, other parts of the shoreline system – beaches, mudflats, riparian buffers (adjacent wetlands) - were also recognized as valuable. By the turn of the century, integrated management acknowledged that all components of the system needed to be managed in concert to optimize public benefits. Now we understand the entire system is changing, driven by climate and development. As a consequence management must expand to include planning for future conditions. Comprehensive coastal resource management plans now under development by the Center for Coastal Resources Management are the response to this need.

Anticipated Pressures

The Commonwealth of Virginia has extensive areas of shallow tidal water supporting essential habitats for plants and animals. Important habitats include tidal wetlands, submerged aquatic vegetation (SAV) and estuarine beaches. The two foremost pressures that have the potential to significantly alter ecosystems and the services that they provide to society are coastal development and climate change.

- Coastal development can involve shoreline alteration and adjacent uplands. Shorelines are often altered to protect against erosion. The most common strategies currently employed are bulkheads and riprap revetments which sever the land-water connection.
- The Chesapeake Bay is extremely vulnerable to climate change as rates of relative sea level rise are currently more than double the global mean and rising (~4.2mm/yr in Chesapeake versus 1.7 mm/yr globally). As climate change continues, sea level rise rates are expected to increase and additional negative effects will likely include intensified coastal flood and storm events, increased shore erosion, inundation of wetlands and low-lying lands, and salt-water intrusion into groundwater.

Rivers & Coast is a biannual publication of the Center for Coastal Resources Management, Virginia Institute of Marine Science, College of William and Mary. If you would like to be added to or removed from the mailing list, please send correspondence to:

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Illustrations: Molly Roggero
Photographs: Dave O'Brien and Karen Duhring

Layout: Ruth Hershner

This report was funded, in part, by the Virginia Institute of Marine Science and by the Virginia Coastal Zone Management Program of the Department of Environmental Quality through Grant #NA10NOS4190205 Task #8 of the National Oceanic and Atmospheric Administration, Office of Ocean and Coastal Resources Management, under the Coastal Zone Management Act, as amended. The views expressed herein are those of the authors and do not necessarily reflect the views of NOAA or any of its subagencies or DEQ.

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Areas with shoreline and riparian development effectively prevent the migration of coastal habitats landward in response to climate changes. This issue will intensify unless shoreline management and land use planning begin to consistently consider cumulative impacts of activities. An examination of land use plans for low-lying areas (below 1-m) along the US Atlantic Coast indicated only approximately 10% of lands have been set aside for conservation and that almost 60% of the land is expected to be developed and thus unavailable for the inland migration of coastal habitats (Titus et al 2009).

The amount of shoreline hardening occurring can vary among years (e.g. high permit activity following a significant storm event), but overall long-term trends can be an indication of what our future shorelines will look like. Based on current average rates of shoreline hardening, approximately 9-18% of additional Virginia shoreline will be hardened 50 - 100 years into the future (assuming no shifts in management practices and no accelerated activity due to sea level rise and storm events). Likewise, approximately 27% of riparian lands in Virginia have been developed and development pressures continue.

As a first step to understanding this complex issue, we characterized existing shallow water habitats in Virginia tidal waters and predicted climate driven changes within the next 50 to 100 years (http://ccrm.vims.edu/research/climate_change/index.html). Coastal habitats experienced significant reductions under the simulated sea level rise scenarios (with a range of 0.5 - 5 foot rise in sea level by 2100).

- Seagrass beds: In lower salinity waters, current beds may experience losses due to sea level rise of 13-24% by 2050 and 27-76% by 2100. Development induced degradation of water quality has the potential to exacerbate losses.
- Eelgrass beds: In high salinity waters, if temperature is elevated by a few degrees Celsius and sea level rises, eelgrass beds may experience 65-94% loss by the year 2050
- Tidal marshes and beaches: approximately 38% of tidal marshes and 85% of beaches are moderately-highly vulnerable to sea level rise due to adjacent development which prevents landward migration

Preserving landscapes that allow for the transgression of the Bay's essential shallow-water habitats should be a high conservation priority. The loss of these habitats could significantly alter the character of the Chesapeake Bay from a highly productive shallow water estuary that provides crucial spawning and nursery habitat for numerous species to one with reduced ecosystem function.

Strategies for addressing some of these shoreline management issues have been developed and integrated into policy in several coastal states. In particular management of tidal shoreline erosion has moved from traditional shoreline hardening to alternative approaches that use soft stabilization or living shoreline treatments. These adaptations are known to promote ecosystem resilience in the face of climate change.

The Shoreline Management Model

Processes that contribute to erosion include: high wave energy generated during storm events, tidal currents, upland runoff, sea level rise, boat wake activity, deforestation, and sediment starvation. While all of these processes may act upon a reach of shoreline at any given time, storm events by far contribute most measurably.

Shoreline protection has evolved over the last 40 years. We have learned that traditional techniques for erosion control can have immediate adverse impacts on intertidal habitat, and longer term impacts on resource sustainability. The choices made can severely impact the stability of adjacent shorelines and alter the ecosystem on site indefinitely. Any action that severs natural processes and connectivity between the upland and the aquatic system will result in some impact.

Providing guidance to property owners and decision makers on the issue of shoreline protection has been a focus of activities within CCRM since its inception. Over the last several years, the guidance has evolved to reflect the growing need to maximize long-term ecological services and sustainability of coastal resources, while still providing the best possible solutions for erosion control. To that end, CCRM has developed a number of products and service tools to improve the capacity of property owners as well as local and state coastal managers to make informed decisions.

The Shoreline Management Model (SMM) is an automated, science-based decision support tool that integrates management decisions across the coastal profile (Figure 1). Using GIS technology and best available geo-spatial data, the model determines the most ecologically appropriate management technique to counter erosion control on a reach by reach basis. The model gives preference to erosion control options that preserve the connection of the various habitats across the natural landscape profile.

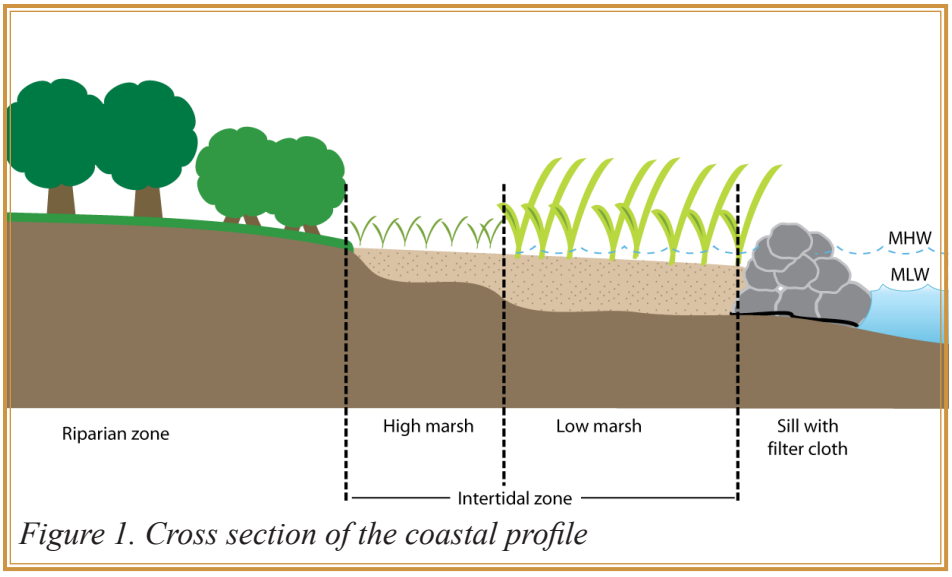

Figure 1. Cross section of the coastal profile

The SSM is a logic model which follows the Decision Tree Guidance developed previously by CCRM (http://ccrm.vims.edu/decisiontree/index.html).

The Decision Tree guides the user through a series of questions pertaining to site conditions. Based on the responses the user follows a decision path which leads to a recommendation for shoreline treatment. The SMM has developed algorithms which follow the same flow path of questions and searches the GIS databases for the data to answer those questions. The GIS data required to run the model is gathered from a number of databases, including the VIMS Shoreline Inventory.

The Shoreline Inventory database is an extensive collection of conditional data that has been collected in the field using GPS. The data includes very site specific information that characterizes bank height, shoreline stability, presence of marsh and beach habitat, tree canopy, riparian land use, and existing shoreline structures (http://ccrm.vims.edu/gis_data_maps/shoreline_inventories/index.html).

CCRM developed a model that calculates wave climate potential along the shoreline. External databases such as NOAA's bathymetry data are used to describe the depth of the nearshore subaqueous bottom. Collectively, variations in all these attributes control the appropriateness and effectiveness of a treatment option for a specific site. The SMM integrates this information to return a recommended strategy for countering an erosion problem at a given location along the shoreline. See below for an example.

The scope of treatment options can range from a "do nothing" approach, or "vegetation management" to "revetments" or "breakwaters with beach nourishment" depending on the set of circumstances and conditions found at each site.

A shallow nearshore zone can support marsh growth but the wave exposure requires a marsh sill to protect the plantings from wave energy. If the wave exposure were low, a temporary bio-log would be sufficient.

Output for the SMM will be presented in maps. Using color-coded symbology, these maps will show the recommended treatment options along the shoreline. A sample map is shown for the City of Hampton (Figure 2, p. 5).

An interactive website is also planned where the SMM output as well as other data can be made available. This application will be similar in format to the Shoreline Assessment Mapper (SAM) tool developed to give local government access to information to improve their decision making capacity (http://139.70.26.131:8008/ShorelineAssessmentMapper/).

The SSM will ultimately be part of the Comprehensive Coastal Resource Management Plan (CCRMP).

Comprehensive Coastal Resource Management Plan

A Comprehensive Coastal Resource Management Plan (CCRMP) is a guidance document provided to local governments that offers an eco-system based approach to managing coastal resources. The CCRMP targets riparian lands management; tidal lands including wetlands, beaches, and dunes; subaqueous lands such as SAV and oyster reefs; and non-tidal wetlands. The CCRMP draws information, strategies, and recommendations from a vast array of resource management tools and assessment methodologies developed within CCRM at the VIMS as well as tools and models available from other sources.

Figure 2. Shoreline Management Model output for a section of the Back River in Hampton

A CCRMP addresses a suite of environmental issues, evaluates trends and conditions, and presents options for management. Shoreline protection is one of these environmental issues and the SMM is the tool to arrive at best management options. Below are some other environmental issues and the tools addressed by CCRMP.

- **Flooding:** Flooding can occur during high energy coastal storms and during extremly high tides when lunar tides combined with barometric pressure cause the elevation of the water to exceed normal limits and during heavy rain events. These distinctions are important. Flooding is a site specific problem and must be managed differently than an eroding shoreline.

The CCRMP can use elevation models to identify areas at risk from different types of flooding and discuss possible mechanisms for managing the problem. Today the accuracy of elevation models is limited by the elevation data available for input. Virginia's recent contract to develop LIDAR (LIght Detection And Ranging) for the entire coastal zone of Virginia will provide a new and highly accurate source of data from which elevation models can be generated. These data are expected to be released in 2011 for a large section of the coastal zone.

- **Sea level Rise:** Virginia has the highest current and predicted sea level rise rates anywhere on the east coast of the United States. We currently expect a minimum of 0.70 meters (2.3 feet) of rise in the next 100 years. The impacts of sea level rise have already been seen in communities who note higher water levels during high tides and greater damage from coastal storms. Mitigating impacts associated with these events involves identification of areas at risk (see example in Figure 3, p. 6) and control of future development.
- **Managed Retreat:** Managed Retreat is a planning strategy that allows certain areas which have been previously defended or developed to be reclaimed by natural processes. It can be used as a strategy to mitigate for wetland losses associated with sea level rise by setting aside upland for future inundation and marsh migration. It is also used as a mechanism for shoreline protection since it moves the development

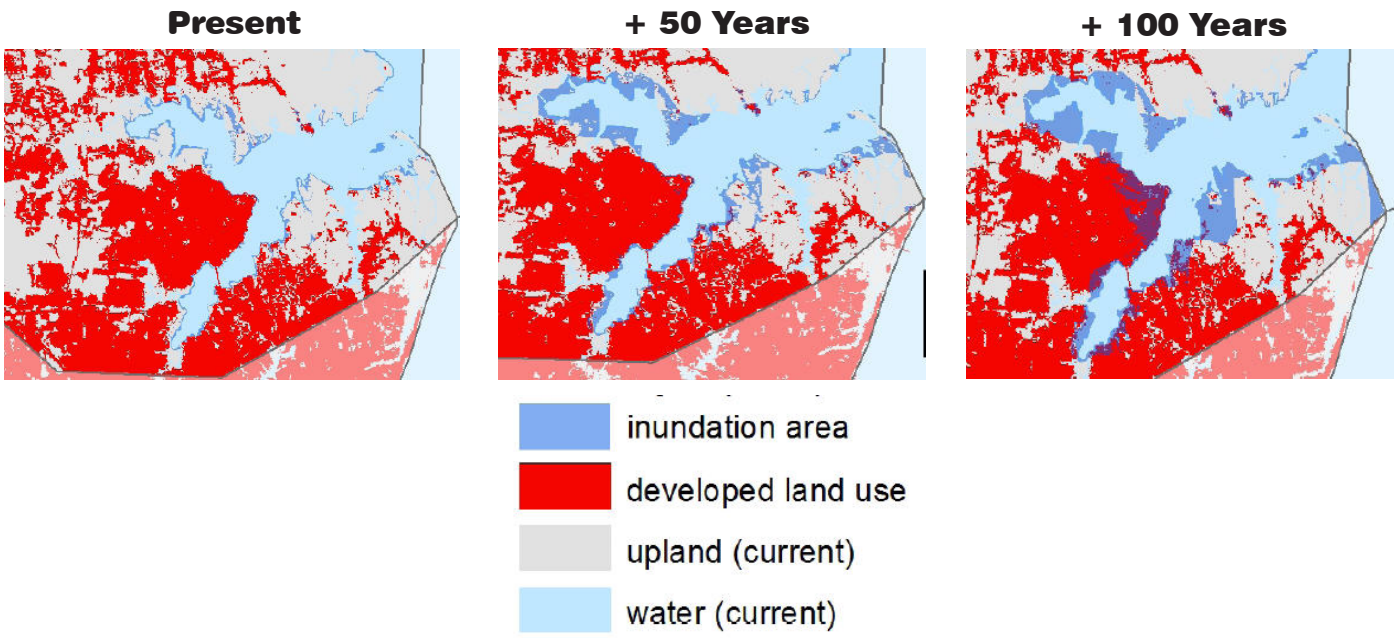

Figure 3. Sea level rise inundation in the City of Hampton's Back River over 100-years

inland and allows the riparian area to buffer or protect inland development.

Vulnerability models developed at the Center have captured the importance of managed retreat. Using coastal development and shoreline hardening as indicators of human response to rising sea level, the relative vulnerability of shallow water tidal habitat was assessed. Within the constraints of the model the vulnerability of these habitats would increase with the presence of existing shoreline structures or riparian development. Why? The developed landscape prevents the natural transgression of intertidal habitat landward as sea level rises. Therefore, intertidal habitat adjacent to unmanaged, natural open space provides the greatest opportunity for inland retreat of the shallow water habitat to occur. Figure 4, p. 7, from one of the Climate Change Vulnerability Models illustrates vulnerability of tidal wetlands based on these assumptions.

- **Sensitive Lands and Aquatic Living Resources:** Sensitive lands are habitats that support important living resources such as nesting areas for birds, finfish nurseries, shellfish growing areas, or species of special concern. They include, but are not limited to beaches and dunes, wetlands, submerged aquatic vegetation, and reefs. The CCRMP will identify the current state of these resources for each locality. It will inform communities on ways in which local planning and zoning impact these habitats.

A priority conservation area assessment tool known as the Virginia Ecological Values Assessment (VEVA) combines various terrestrial and aquatic natural resource layers into a spatial model and ranks land and water mass areas based on the ecological value of the resources present. A sample from the lower Rappahannock River is illustrated in Figure 5, p. 7. This conservation targeting tool allows us to identify areas of critical environmental value and plan for conservation implementation measures.

VEVA is a multi-agency effort funded by NOAA's Coastal Zone Management Program in Virginia. Collaborators include VADGIF, VCU, DCR, VIMS, and DEQ

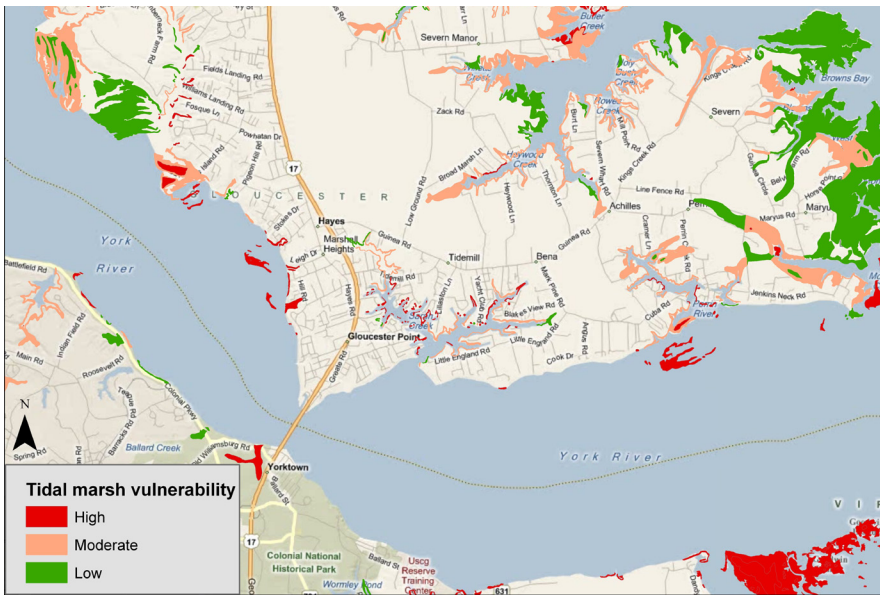

Figure 4. Shoreline hardening and development define the future vulnerability of tidal wetlands along the lower York River (from CCRM, 2009).

The tool is particularly useful for communities who wish to engage in conservation planning.

- **Water Quality:** The leading issue today for local governments is the Virginia Chesapeake Bay Watershed Implementation Plan being developed by the state to address Total Maximum Daily Loads (TMDLs). The plan responds to enforceable policy directives from the Environmental Protection Agency (EPA), and will call on local governments to implement best management practices (BMPs) intended to reduce nutrient loads to the Chesapeake Bay Watershed. To the extent that is reasonable and appropriate, the CCRMP will discuss issues associated with BMPs that mitigate water quality impacts.

- **Societal Conflicts - Public Access, Recreation and Economics:** Public access and recreational opportunities within a locality will be addressed in CCRMPs. As well, the conflict between recreational and commercial use of the waterfront versus conservation of open space will also be discussed within localities where working waterfronts and shallow water fisheries are an important economic base. Other critical conflict examples include aquaculture and SAV restoration. Identifying the extent of these conflicts helps local governments anticipate where obstacles can be expected and where planning for future expansion may present challenges.

CCRM has modeled several of these conflicts using geo-spatial data to delineate where these activities can occur independently, and where their occurrences overlap. The models can compute available area for a specific use or analyze for trade-offs where necessary.

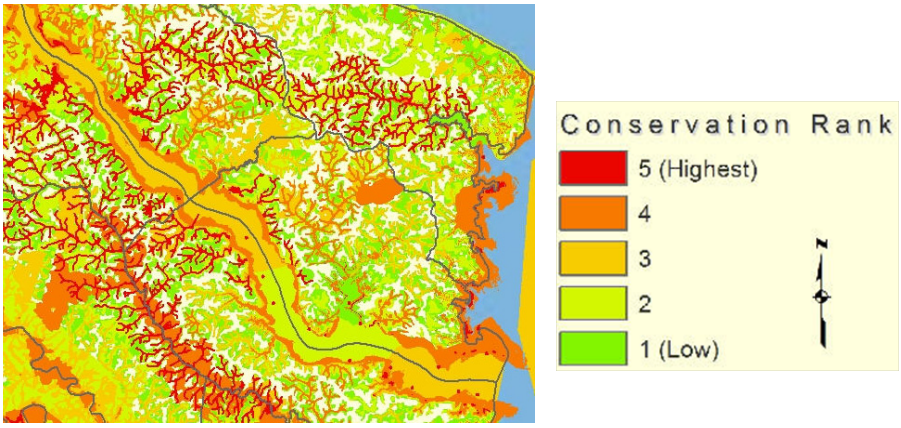

Figure 5. VEVA output for the lower Rappahannock River. Areas in red denote areas of highest ecological value and thus priorities for conservation.

Comprehensive Coastal Resource Management Plans were recommended as an approach to achieve sustained protection of tidal shoreline resources (wetlands, beaches, dunes and riparian buffer) in a report to the Governor and General Assembly of Virginia as mandated by Senate Joint Resolution 35 of the 2010 Assembly (http://leg2.state.va.us/dls/h&sdocs.nsf/By+Year/SD162010/$file/SD16.pdf). This recommendation was included in legislation introduced in the 2011 Session of the General Assembly in Senate Bill 964. The bill has been enrolled (passed the Senate and the House) and awaits the Governor's signature.

CCRMPs will be produced for each locality in Tidewater Virginia. The plans are designed to be incorporated into local government planning and decision–making to stem the tide of adverse environmental effects on coastal resources linked to shoreline development.

The Plans are:

- *One-stop-shop. Comprehensive Coastal Resources Management Plan is a long name for a report that applies an integrated ecosystem approach to a lot of data and provides the best available technical advice for managing shorelines*
- *Produced by VIMS, Center for Coastal Resources Management*
- *For use by local governments, the general public and management agencies*

The Plans can:

- *Identify preferred locations for the use of living shorelines that employ natural habitat elements including emergent marsh grasses, submerged aquatic vegetation, riparian vegetation, coarse woody debris, and oyster reef and shell for erosion protection*
- *Be adapted based on local data*
- *Be web-based to allow easy access to the maps, tables and text*

Newsletter of the Center for Coastal Resources Management

Rivers & Coast

Summer 2011, Vol. 6, No. 2

In this issue:

Virginia has a newly approved Wetland Program Plan (WPP). Virginia developed a wetland plan to assess current management efforts, identify actions to improve efforts and communicate those ideas. The development of a wetland plan is voluntarily. It was developed with guidance from the Environmental Protection Agency (EPA) and approved by that agency. The EPA encourages each State or Tribal government to produce a plan. As of yet, only a handful have done so. In this newsletter, we provide excerpts from the Virginia WPP.

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Virginia's Comprehensive Wetland Program Plan

What is a Wetland Plan?

A Wetland Plan is a planning and communication tool. The development of a plan requires a review of wetland efforts and identification of actions to strengthen management programs to achieve goals. The content of a Plan should include:

- summary and detailed information that describes a process to promote overall effective wetland protection and restoration goals,
- specific actions to successfully achieve goals, and
- a medium to communicate intentions and needs.

Four Core Elements form the framework for the wetland Plans. Each Plan does not need to address all, but must address at least one core element. The Core Elements are:

1. Monitoring and Assessment
2. Regulation
3. Voluntary Restoration, and
4. Water Quality Standards for Wetlands.

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The Virginia Wetland Program Plan

The plan recently developed for Virginia defines and describes a strategy to accomplish several existing wetland goals:

1. Achieve no net loss of existing wetland acreage and function through regulatory programs;
2. Achieve net wetland resource gain through wetland restoration; and
3. Assist local governments and community groups with development of wetland preservation plans as part of integrated locally based watershed planning. (Chesapeake Bay 2000 Agreement *http://www.chesapeakebay.net/content/publications/cbp_12081.pdf*).

For Virginia, plans to address the four core elements alone do not properly address long term sustainability of wetland resources. In order to do that, Virginia also needs the following elements:

- Planning and Sustainability,
- Information Acquisition, and
- Outreach/Education.

The Virginia Plan provides a framework to improve its wetland programs over the next five years (2011-2015). At the same time, the Plan recognizes issues, such as sea level rise, for which a longer-term planning horizon is important. Action items are identified to address gaps, or strengthen existing efforts.

Poquoson Flats

A. Monitoring and Assessment

The overarching goal of Virginia's wetland monitoring and assessment program is to support efforts to protect the physical, chemical, and biological integrity of the Commonwealth's water resources, including wetlands. The assessment method involves three levels of data collection. Level 1 is a geo-spatial computer model built from remotely sensed data that provides an assessment of the water quality and habitat services provided by each wetland. Level 2 and Level 3 are field sampling efforts intended to calibrate and validate the computer model. The program is being implemented by the Department of Environmental Quality (DEQ) and the Center for Coastal Resources Management at the Virginia Institute of Marine Science (CCRM) using funds awarded through EPA's Wetland Program Development Grants. Virginia is recognized as one of five states leading this initiative nationally.

Monitoring and Assessment Action: Virginia will maintain wetland monitoring and assessment efforts over the next 5 years.

B. Regulation

From the state perspective, Virginia's wetlands are managed primarily by two agencies. The Virginia Marine Resources Commission (VMRC) has state oversight of the local cooperative implementation of the Tidal Wetlands Act and the DEQ implements the Nontidal Wetlands Act as the Virginia Water Protection Permit. In addition, the Chesapeake Bay Preservation Act designates tidal and non-tidal wetlands adjacent to tidal wetlands as Resource Protection Areas.

The Tidal Wetlands Act (Va. Code §28.2-1300 et seq.) established a state-local program giving regulatory authority over tidal wetlands to the VMRC, with the option for Tidewater localities to adopt a model ordinance and regulate tidal wetlands through a citizen Wetlands Board. Currently, 34 Tidewater counties and cities, and 2 towns administer the ordinance. Twelve localities have not adopted the ordinance and the VMRC acts as the permitting authority for those locales.

Tidal wetlands and non-tidal wetlands adjacent to tidal wetlands are also considered Resource Protection Areas (RPAs) under the Chesapeake Bay Preservation Act (Va. Code §10.1-2100 thru 10.1-2116). The program establishes limitations on land uses permitted within RPAs and applies to all Tidewater localities.

The Virginia Water Protection Permit Program (VWP) is administered by DEQ's Office of Wetlands & Water Protection. A VWP permit must be obtained before disturbing a nontidal or tidal wetland or stream by clearing, filling, excavating, draining, or ditching.

In addition to the regulatory agencies, there are state and federal advisory agencies linked to wetland permit review including:

- Virginia Institute of Marine Science (VIMS)
- Virginia Department of Game and Inland Fisheries (DGIF)
- Virginia Department of Conservation and Recreation (DCR)
- Virginia Department of Historic Resources (DHR)
- U.S. National Resource Conservation Service (USDA-NRCS
- U.S. Fish and Wildlife Service (USFWS) and
- National Marine Fisheries Service (NOAA-NMFS)

Living Shorelines

Living shoreline designs have become a widely accepted and preferred strategy for tidal shoreline management. Living Shorelines address erosion by providing long-term protection, restoration or enhancement of vegetated shoreline habitats through strategic placement of plants, stone, sand fill and other structural or organic materials. Living shoreline treatments reflect the best understanding of how shoreline systems work, and how the benefits they provide can be sustained. For these reasons, promoting the use of living shorelines is seen as desirable by resource managers and scientific advisors.

Virginia has pursued efforts to promote the use of living shorelines. While there are many options for promotion of living shorelines, the recommendation put forth in the Joint Resolution 35 Report to the Governor and General Assembly of Virginia, was for the development of a general permit (CCRM, VIMS,

2010). This recommendation was included in Senate Bill 964 which will become law July 1, 2011.

Living Shorelines Action: Develop a general permit for living shorelines.

Tidal Wetland Management Assessment

VIMS is mandated by law to provide scientific and technical guidance on ecological aspects of tidal wetlands. This guidance can be used for project planning and during the permit review process. In addition to the ecological guidance from VIMS, local wetlands boards also consider the social and economic aspects of shoreline projects. CCRM is conducting a study aimed at describing to what extent ecologic, social and economic issues are being considered in the permit decision-making process. With that information, it is possible to suggest a framework to facilitate a consistent and transparent process for incorporating these issues in decisions concerning tidal wetlands.

For the study, CCRM will monitor permit decisions made by local wetlands boards in order to describe the various considerations that go into a permit decision. The information that goes into project decisions is being compiled using Wetlands Board Hearing minutes and phone and email follow-up after each hearing. Data collection will be for two years. The outcome of the assessment will be used to direct changes in the guidance offered by CCRM as print material, online products, and training.

Management Assessment Action: Continue the assessment of tidal wetland decision-making. Modify CCRM outreach efforts based upon this assessment.

Track Unpermitted Activities

The DEQ Status and Trends Report (2010) for the VWP Program shows there is no-net loss of wetlands, and a net gain associated with the permit process. And yet, there are continued nontidal wetland losses. This suggested that non-permitted losses are the issue. Working with a grant from DEQ, Virginia Tech conducted a pilot wetland change analysis in using automated methods to remotely detect potential wetland losses. The results of this study suggest that a wider application to other regions of the Commonwealth would be worthwhile. This expanded application will improve compliance with the WPP. Adding this capability will help Virginia meet its statutory requirement of no net-loss of wetland acreage and function.

Track Wetlands Action: Track unpermitted wetland impacts. DEQ is working to locate and quantify unpermitted wetland impacts.

Spartina alterniflora

First Landing State Park, *Tillandsia usneoides*

C. Voluntary Protection and Restoration

Wetland protection is defined as removing a threat or preventing the decline of wetland conditions. Wetland restoration is the manipulation of a former or degraded wetland to return its natural functions.

Various non-governmental groups and federal government entities are known to have restored, purchased, or otherwise protected through easements many acres of tidal and non-tidal wetlands. The restoration projects have been undertaken by groups such as:

- The Nature Conservancy,
- the Chesapeake Bay Foundation,
- the Department of Defense,
- the Living River Restoration Trust (formerly the Elizabeth River Project), and others.

Virginia lacks a single comprehensive data set on these projects. In addition to the importance of this information from a Virginia perspective, the data is necessary for tracking restoration goals set by Chesapeake Bay Program Partners. Virginia has made several unsuccessful attempts to collect data on voluntary restoration projects. Despite these various efforts, the last real estimate for Virginia was apparently too low and considered inaccurate by personnel commonly involved in wetland restoration projects.

Virginia needs an effective collection and reporting system for voluntary wetland restoration. This need also highlights the potential benefits of improved coordination among the regulatory and non-regulatory entities with regard to restoration targeting and project planning.

Voluntary Efforts Action: Develop and implement a voluntary wetland restoration geo-referenced database.

D. Water Quality Standards for Wetlands

Water quality standards are the foundation of the water quality-based pollution control program established by the Clean Water Act (CWA). Standards define the goals for a water body by:

- designating attainable uses (ie. shellfish harvesting, water supply),
- setting criteria based on the current scientific information to protect those uses (ie. temperature, dissolved oxygen levels), and
- protecting from pollution.

All states have water quality standards programs, but they don't

have standards specific to the attainable uses and ecosystem services of wetlands. Standards developed specifically for wetlands would help ensure that the wetlands are protected under the Clean Water Act. There are five steps for developing water quality standards for wetlands:

1. define wetlands as "state waters";
2. designate uses that protect the structure and function of wetlands;
3. adopt narrative criteria and appropriate numeric criteria in the standards to protect the designated uses;
4. adopt narrative biological criteria in the standards; and
5. extend the anti-degradation policy and implementation methods.

Virginia has completed the first step in the inclusion of wetlands in the definition of state waters. Virginia does not have designated uses, narrative or numeric criteria specific to wetlands.

Water Quality Standards Action: Continue to assess the relationship between wetlands in the watershed and ambient water quality, particularly water quality impairment.

Tidal freshwater wetland, Chicahominy River

Tidal Wetlands Status and Trends

According to the report, Status and Trends of Wetlands in the Coastal Watersheds of the Eastern United States, 1998 to 2004 (Stedman and Dahl 2008), about 18 percent of all coastal wetlands losses are tidal salt marsh. The cumulative losses of tidal wetlands and watershed development are having adverse effects on the health of Virginia's tidal waters and the animals that inhabit them. Shoreline alteration linked with watershed land development has been shown to have negative effects on water quality and a wide variety of aquatic animal populations including blue crabs, finfish, marsh birds, and the benthic organisms living in the nearshore waters (Lerberg et al. 2000; DeLuca et al. 2004; King et al. 2005; Bilkovic et al. 2006; Seitz et al. 2006; Bilkovic and Roggero 2008).

Current trends suggest tidal marshes will not be able to maintain themselves at present and projected rates of sea level rise. In fact, estimates of tidal wetlands, beach, and riparian land loss in Virginia due to sea level rise are in the thousands to tens of thousands of acres (NWF 2008). The sustainability of tidal and riparian shoreline resources will largely depend upon the capacity of the resources to move landward. The capacity of marshes to migrate landward onto vacant land is limited by the high rate of anticipated development and the routine approval of shore protection structures in Virginia and throughout the Atlantic Coast (Titus et.al. 2009).

E. Planning and Sustainability

Tidal wetlands are subject to both natural and human pressures. These pressures include: the effects of shoreline hardening, losses due to erosion and land conversion, and marsh drowning from relative sea level rise. Tidal wetland losses can be attributed to human activities, as well as erosion and sea level rise.

Maintaining valuable tidal marshes and shoreline resources will require planning to minimize wetland losses through the regulatory process and accommodate wetland retreat landward. Plans of this sort would be necessarily integrated and comprehensive enabling well informed permit decision-making regarding shoreline structures in the near-term, as well as future, long-term planning.

Those planning elements are being incorporated into the comprehensive coastal resource management plans, CCRMPs, under development at CCRM. In the production of the CCRMPs local conditions are inventoried, risks to both natural and human resources are assessed, preferred shoreline management strategies are identified, and opportunities to provide for natural resources into the future are delineated. The plans will enable integrated management of tidal shoreline resources, address shoreline erosion requirements for local comprehensive plans, and provide information to support local planning efforts to adapt to sea level rise.

The CCRMPs will be developed by the state on a local scale. The development of the CCRMPs has been mandated by Senate Bill 964.

Saltmeadow, Gloucester, Virginia

The plans will be built from existing data with the opportunity to incorporate local data where available. The Plans will incorporate data:

- Shoreline Inventories
- Tidal Wetland Inventories
- Shoreline Management Model
- Shoreline Evolution Data
- Non-tidal Wetland Data

Planning Action: Develop Comprehensive Coastal Resource Management Plans (CCRMPs).

F. Information Acquisition

Virginia has a breadth and depth of information about its wetlands, and yet much of the information is dated, or lacks the necessary detail. The most important information need is landcover data that includes accurate, detailed elevation (such as LIDAR). Landcover data is required for the on-going monitoring and assessment effort, to track status and trends and plan for integrated wetland restoration, preservation, and tidal wetland retreat in the face of sea level rise.

Information Action: Obtain iterative landcover data set. This effort is critical to a comprehensive picture of Virginia's wetlands with regard to human and/or natural losses of wetland acreage and ecosystem services. The timeline for this action is dependent upon funding availability.

G. Outreach Education

Outreach and education on tidal and nontidal wetland issues in Virginia are undertaken by a broad range of entities from primary and secondary schools, to state agencies, institutes of higher education and non-governmental organizations. There are outreach programs that target the general, or regulated public, while others target specific audiences such as

CCRM Workshop

school-aged children, citizens of a certain geographic area, or those in positions of decision-making.

Citizen-comprised local Wetlands Boards play a critical role in tidal wetland permit decision-making. Two other citizen boards, the Virginia Marine Resources Commission and the State Water Control Board are responsible for oversight and regulatory decisions for wetlands. Training, publications, and technical advice directed toward citizen decision-makers help ensure better informed decisions.

Outreach Action: Maintain and build upon existing outreach for local government decision-makers. CCRM will continue on-going outreach activities directed toward the local government decision-makers. Input from the assessment of tidal wetlands management will guide development of new training, tools and publications.

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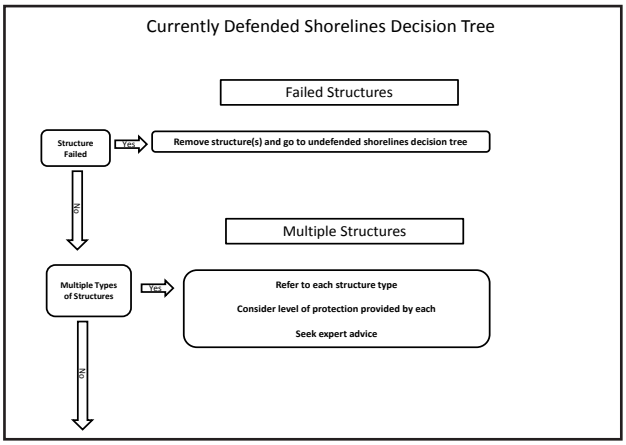
Virginia Wetlands Report

Volume 26, Issue 1 | A Biannual Publication Focused on Virginia Wetland Issues and Training | Spring 2011

Decision Tree for Currently Defended Shorelines

The Center for Coastal Resources Management has completed a Decision Tree for Currently Defended Shorelines, to be used where shoreline defense structures are already in place. This decision tree has separate branches for different structures, such as existing revetments, bulkheads, groins, marsh sills, and offshore breakwaters. Users are led through structure and site characteristics and arrive at the environmentally preferred approach for the shoreline. This is the second in a series of decision trees to be developed for coastal decision makers and shoreline property owners. The first was a Decision Tree for Undefended Shorelines, presented at the Spring 2010 workshop. Our next workshop, scheduled for May 5, 2011, will provide hands-on experience with the new decision tree.



In this issue:

WORKSHOP ANNOUNCEMENT

Cinco de Mayo Fest:

Applying Policy to Shoreline Management

Thursday, May 5, 2011

at VIMS

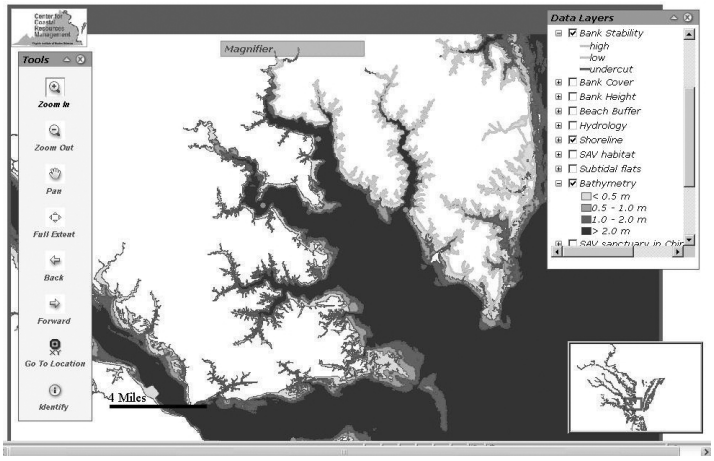
See inside for information & registration!

Also

Tidal Wetlands News & Events

SAM and Shoreline Inventory Data Tools – hands on!

Also introduced at the Spring 2010 workshop was SAM, or Shoreline Assessment Mapper, a new interactive online GIS tool with various upland, wetland, and shallow water habitat data and site conditions. The workshop will provide hands-on time in our computer lab to work with SAM and our Shoreline Inventory maps.



Example of SAM interface

Establishment of Tidal Datums: Finding MLW at Your Location

Shoreline ownership and regulatory jurisdictions are defined in part by tidal datums such as mean low water (MLW) and mean high water (MHW). These datums are established by long term monitoring at NOAA tide gauge stations and change as sea level rises. A common problem arises in transferring these tidal datums to individual shoreline lots. At the workshop, marine surveyors from VMRC will discuss tidal datums, other datums, and surveying details, as well as provide an explanation of how tidal datums are established in the field.

General Assembly Updates

The Virginia General Assembly passed a resolution during the 2010 session tasking VIMS with a study of shoreline management in Virginia. That report was delivered prior to the 2011 General Assembly session. In the 2011 session, Sen. Northam introduced Senate Bill 964, which incorporated recommendations from the VIMS study. The Bill passed both houses and awaits the Governor's signature.

The bill requires:

- VMRC to establish and implement a general permit regulation that authorizes and encourages the use of living shorelines as the preferred alternative for stabilizing tidal shorelines.
- VMRC, DCR, and VIMS to develop integrated guidance for the management of tidal shoreline systems for the regulatory entities with authority over shoreline management projects.
- VIMS to develop comprehensive coastal resource management guidance for local governments, who would be required to incorporate such guidance at the next scheduled review of their comprehensive plan.

State Wetland Program Plan

US EPA is encouraging states to develop Wetland Program Plans that outline goals and plans over the next few years and a schedule for implementation of the plans. States that have developed Plans will have an advantage in the EPA funding process. Virginia wetland management entities are working to prepare a Virginia Wetland Program Plan, and VIMS-CCRM is coordinating that effort.

Topic areas to be addressed in the plan include: monitoring and assessment, regulation, voluntary restoration and protection, water quality standards for wetlands, planning, information acquisition and outreach/education The Plan should outline goals and actions over a time period of 3 to 5 years, with a schedule for carrying out the actions and achieving the goals. Virginia's Plan will be based upon a 5 year timeframe with consideration given to a longer planning horizon to address longer term sustainability of wetlands, particularly tidal wetland resources. The Virginia Plan identifies actions to improve implementation and develop new programmatic elements to help achieve the overall goal of no net loss/ net resource gain.

WORKSHOP ANNOUNCEMENT

Cinco de Mayo Fest:
Applying Policy to Shoreline Management

Thursday, May 5, 2011

Watermen's Hall Lobby & Auditorium
Virginia Institute of Marine Science, Gloucester Point, VA

8:00 am - 9:00 am Registration
9:00 am - 3:30 pm Workshop
Workshop Web Site: *ccrm.vims.edu/Spring2011.html*

A workshop will be held at VIMS for local government staff, advisory board members, marine contractors, permitting agents, environmental consultants, and anyone else interested in coastal resources management in the Commonwealth. Speakers include VIMS CCRM scientists, VMRC engineers, and General Assembly legislative staff.

Planned Workshop Topics

- Coastal Management Decision Tree for Currently Defended Shorelines – hands on!
- Shoreline Assessment Mapper (SAM) – hands on!
- Shoreline Inventory Maps – hands on!
- Establishing Tidal Datums at a Location
- General Assembly Updates
- State Wetland Plan
- and other updates!

Name_____

Affiliation_____

Address_____

Phone_____Fax_____

Email_____

Registration - $25 (includes lunch).
Deadline for payment & registration: April 28, 2011

If paying by VISA/MasterCard please email (dawnf@vims.edu) or fax (804-684-7179) registration form AND call Dawn at 804-684-7380 with credit card information.

Make checks payable to: VIMS Tidal Wetlands Workshop
Please mail: Tidal Wetlands Workshop/CCRM
P.O. Box 1346
Gloucester Point, VA 23062

The Virginia Wetlands Report is a biannual publication of the Wetlands Program at the Virginia Institute of Marine Science of the College of William and Mary. To subscribe to this newsletter, please contact:

Virginia Wetlands Report/CCRM
P.O. Box 1346
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(804) 684-7380
dawnf@vims.edu

CCRM Director: Dr. Carl Hershner

Produced by: CCRM Communications Committee

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Tidal Wetlands News & Events

Environment Virginia Symposium. April 5-7, 2011. Lexington, VA. "Sustainable Solutions for Uncertain Times: Partnering for Economic and Environmental Success". Details at: *http://www.vmi.edu/environmentva.*

Virginia Association of Wetland Professionals – Spring Workshop. April 7, 2011. Charlottesville, VA. "Status of the Science: Wetland Restoration, Stream Restoration and Watershed Management." Details at: *http://www.vawp.org/*

York River Research Symposium. April 20, 2011, VIMS. Sponsored by CBNERRS. Details at: *http://www.vims.edu/cbnerr/coastal_training/upcoming_workshops/*

2011 Mitigation & Ecosystem Banking Conference. April 26-29, 2011. Baltimore, MD. Details at: *http://www.mitigationbankingconference.com/*

Are Blue Crabs on the Rebound? April 28, 2011,VIMS. VIMS After-hours lecture, Dr. Rom Lipcius. Details at: *http://events.wm.edu/vimsafterhours/2011/04/28/170/*

Virginia Association of Wetland Professionals – Workshop Series. May 13, 2011. VCU Rice Center, Charles City, VA. "Benthic Macro-Invertebrates." Details at: *http://www.vawp.org/*

Society of Wetland Scientists – Joint meeting with WETPOL & Wetlands Biogeochemistry Symposium. July 3-8, 2011. Prague, Czech Republic. Details at: *http://www.sws2011.com*

Oyster Aquaculture in the Bay. July 28, 2011. VIMS After-hours lecture, Dr. Stan Allen. Details at: *http://events.wm.edu/vimsafterhours/2011/07/28/181/*

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Virginia Wetlands Report

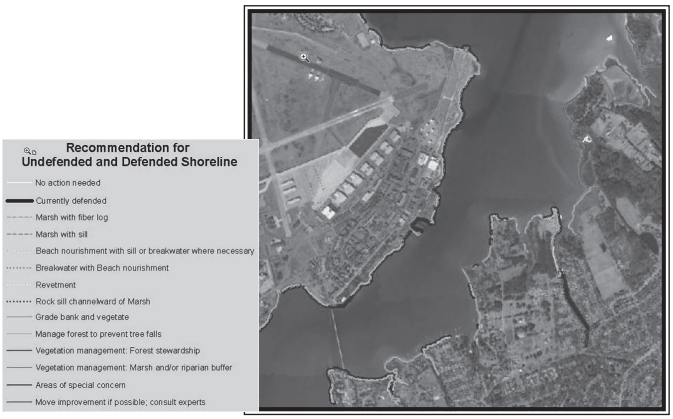
Volume 26, Issue 2 | A Biannual Publication Focused on Virginia Wetland Issues and Training | Fall 2011

Comprehensive Coastal Resource Management Plans

In its most recent session, the Virginia General Assembly passed legislation (Senate Bill 964) that, among other things, requires VIMS to provide Comprehensive Coastal Resource Management Plans (CCRMP) for each of Virginia's tidewater localities. These plans must be incorporated into localities' comprehensive plans at the next scheduled comprehensive plan review. CCRM is working to develop the CCRMPs and plans a series of outreach efforts to provide training and education in the various components of the CCRMPs.

The CCRMP draws information, strategies, and recommendations from a vast array of resource management tools and assessment methodologies developed within CCRM as well as tools and models available through open-source technologies, the public domain, and the scientific literature. Each locality's CCRMP is envisioned to include the following components:

1. Best Management Practices (BMPs) for Erosion Control
2. Local Inventory Data for Tidal Wetlands and Shoreline Condition
3. Planning Information and Guidance for Climate Change Risks and Adaptations
4. Managers Toolbox



BMPs for Erosion Control

Tidal Marsh Inventory Data

In this issue:

WORKSHOP ANNOUNCEMENT

LOCAL WORKSHOPS:

Tools for Coastal Resource Management

See inside for information.

Also

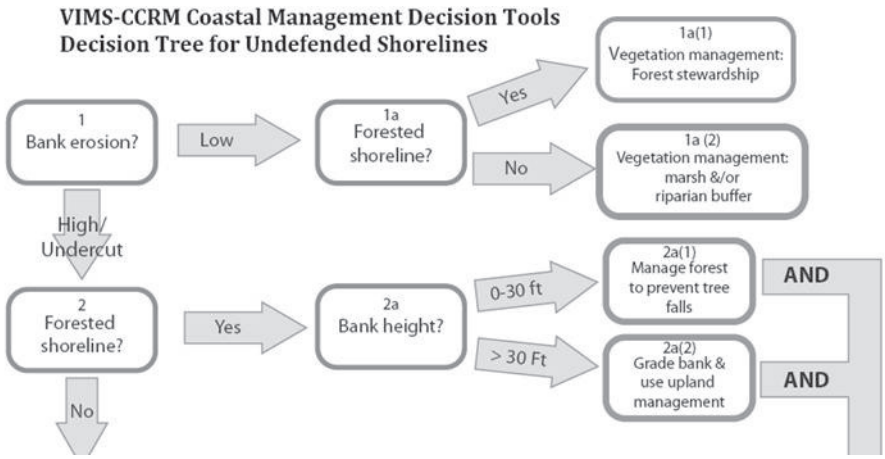
Tidal Wetlands News & Events

We are going Paperless. Don't let this be your last Virginia Wetlands Report. If you'd like to keep the newsletter coming to you, please send an email to let us know what email address we can use to send your newsletter. Send these requests to *dawnf@vims.edu.* Looking forward to hearing from you. Thanks.

BMPs for Erosion Control

Shoreline protection is a major component of the CCRMP. Erosion control is behind the majority of management challenges associated with shoreline protection. We have learned that traditional techniques for erosion control can have immediate adverse impacts on intertidal habitat, and longer-term impacts on resource sustainability. The choices made can severely impact the stability of adjacent shorelines and alter the ecosystem of the site indefinitely. Any action that severs natural processes and connectivity between the upland and the aquatic system will result in some impact.

Over the last decade, guidance has evolved to reflect the growing need to maximize long-term ecological services and sustainability of coastal resources. The challenge has been to achieve this while still providing the best possible solutions for erosion control. To that end, CCRM has developed a decision support model that forms the foundation of the CCRMP. This Shoreline Management Model (SMM) is a logic model that follows the Decision Tree Guidance developed previously by CCRM (*http://ccrm.vims.edu/decisiontree/index.html*). The SMM gives preference to erosion control options that preserve the connection of the various habitats across the natural landscape profile, thus advancing the concept of living shorelines in an applied sense. This guidance is based on many years of research into ecological impacts of shoreline hardening, effectiveness of shoreline treatments to counter erosion, and advisory service to local governments and private citizens. The BMPs for erosion control will be delivered in map format and as an element within an online Data Viewer.



Local Inventory Data for Tidal Wetlands and Shoreline Condition

The CCRMP will also provide local governments with direct access to the best available data for tidal wetlands and shoreline condition. These data are generated from ongoing surveying programs within CCRM that map tidal shoreline condition and tidal wetland boundaries using field observations and remote sensing technology. These local scale mapping efforts survey conditions that pertain to riparian land use, bank morphology and stability, and shoreline characteristics including the location of all erosion control structures. Tidal marshes are delineated from high-resolution imagery where possible and verified in the field. A general community structure assessment is completed for each marsh polygon. All data will be delivered in a GIS format through a web-based interface.

WORKSHOP ANNOUNCEMENT

Center for Coastal Resources Management
Virginia Institute of Marine Science

Tools for Coastal Resource Management
Fall 2011 – Spring 2012
Locations and times to be determined.

William & Mary VIMS
Virginia Institute of Marine Science
School of Marine Science

Rather than having our traditional fall workshop at VIMS, we will be scheduling a series of local workshops throughout fall 2011 and spring 2012. Although open to all, the workshops are intended for local wetland board members and their staff, with the objective of teaching participants how to use the Decision Trees that are the basis for the CCRMPs and to introduce participants to inventory data that is available from VIMS for their locality. Workshops will include an indoor lecture and hands-on session and, with logistical assistance from the locality, will ideally also include on-site use of the Decision Trees at one or more sites within the locality. Depending on logistics, the free workshops should last approximately a half day. If neighboring localities would like to schedule a joint workshop, this can also be arranged. Local Wetlands Board Staff please contact Julie Bradshaw to schedule a workshop for your locality, (*julieb@vims.edu* or 804-684-7894).

Additional Outreach Education

Also planned is a series of workshops intended for local planners on the entire CCRMP, including incorporation of the components into the comprehensive plan.

Finally, an online education program in comprehensive coastal resource management is planned that will provide training for various audiences, including local wetland board members, local government staff, other government staff, property owners, and agents, contractors, and consultants.

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Tidal Wetlands News & Events

Harmful Algal Blooms in Chesapeake Bay. Sept. 29, 2011. VIMS. After-hours lecture, Dr. Kim Reece. Details at: *http://events.wm.edu/vims/2011/09/29/1742.*

Mad Lab: Crazy, Creepy, & Cryptic. Oct. 18, 2011. VIMS. Halloween-themed Discovery Lab. Details at: *http://events.wm.edu/vims/2011/10/18/184/.*

Secrets of the Sea Floor. Oct. 27, 2011. VIMS After-hours lecture, Dr. Steve Kuehl. Details at: *http://events.wm.edu/vims/2011/10/27/2477/*

Environment Virginia: Annual Conference, April 10-12, 2012. VMI, Lexington, VA. Details at: *http://www.vmi.edu/Content.aspx?id=32347*

Society of Wetland Scientists – Joint meeting with INTECOL "Wetlands in a Complex World." June 3-8, 2012, Orlando, FL. Details at: *http://www.sws.org.*

Happy Cinco de Mayo from the Center for Coastal Resources Management (CCRM)!

Dear Dawn,

Save the Date - **May 5, 2011** - for the next Center for Coastal Resources Management Tidal Wetlands Workshop at the Virginia Institute of Marine Science!

Don't miss out on a "fiesta" of information with hands-on decision making tools and other shoreline, coastal, and wetlands-related talks and demonstrations!

We will be sending more information on specific topic titles in the next few weeks, but for now, please be sure to pencil in the date - May 5, 2011 - on your calendar.

Center for Coastal Resources Management e-Newsletter

CCRM e-News May 2011

In This Issue

Comments from Tidal Wetlands Workshop Participants

"Decision Trees for failing structures are very timely considering the shelf life of bulkheads and timber groins."

"I am never disappointed in any VIMS workshop or conference. The only thing I would ask for is more of them."

"Would love to see more of our Wetlands and CBPA Board people here."

"The Mathews Shoreline Management Plan has been invaluable! Thank you!

Quicklinks

VA Wetlands Report
Shoreline Guidance
More About Us

Coastal Decision Tools

The Center for Coastal Resources Management (CCRM) has developed a set of Coastal Decision Tools for shoreline management that leads users through a series of questions about shoreline characteristics and results in recommendations of environmentally preferable treatment(s) for that shoreline.

The decision tree's web page is split into two sections: a decision tree for undefended shorelines and those with failed structures, and decision trees for currently defended shorelines. The decision trees for currently defended shorelines have many different structure scenarios. Decision trees are also in development for dredging projects, boat ramps, and marinas and may be available by the end of this year.

CCRM No Longer Providing Site Visits & VIMS Reports on Permit Applications

On-site review and VIMS reports related to permit applications will end as of July 1, 2011 as CCRM is forced to scale back activities to match available funding. State budget reductions have made it impossible for VIMS to maintain the service begun back in the 1970's. For the past year, the Institute was able to use federal stimulus dollars to underpin the activity, but that funding disappears in June.

VIMS will continue to seek state support to reinstitute the service, but absent that, CCRM will focus on developing guidance and decision support tools to facilitate local wetlands board efforts (see the article above).

At this time CCRM intends to maintain the permit records web site that provides online access to original applications and additional information provided by VMRC. We will, however, no longer be conducting the application completeness reviews.

Spring 2011 Tidal Wetlands Workshop

The spring CCRM Tidal Wetlands Workshop was held on May 5, 2011 where the topic of discussion was "Decision Trees for Currently Defended Shorelines", as well as other policy applications for shoreline management.

Attendees were able to hear presentations on the Virginia Wetland Permit Plan and Senate Bill 964, take part in hands-on demonstrations of the Shoreline Assessment Mapper, work on case studies using the new decision trees and take a tour of the VIMS beach breakwater system guided by the person who designed them. Read more about the workshop and see photos at Spring VWR and Workshop Photos.

Coastal Topics Catalog

A Coastal Topics Catalog has been developed with highlighted links and descriptions of research, publications, maps and training from CCRM. There are 21 topic categories from which to choose information.

Upcoming Events

Training sessions are being developed for Fall 2011 to unveil the new Comprehensive Coastal Resource Management Plan (CCRMP) for each region to assist managers and planners. More information will be coming to you this summer.

Contact Info

Carl Hershner, Director
Center for Coastal Resources Management, Virginia Institute of Marine Science
carl@vims.edu
(804) 684-7380

VMRC #	APPLICANT	LOCALITY	DATE POSTED
10-1249	Robert E Syrett	Lancaster County	2010-10-04
10-1325	Richard Sutton	Lancaster County	2010-10-04
10-1262	John Calhoun	Lancaster County	2010-10-05
10-1509	Richard & Linda Schermerhorn	Northumberland County	2010-10-05
10-1564	Patrick & Laura Gleason	Northumberland County	2010-10-06
10-1537	Brian McCue	City of Norfolk	2010-10-07
09-0612	Norfolk, City of	City of Norfolk	2010-10-07
10-1538	Michael G. Murphy, II	Northumberland County	2010-10-07
10-1245	David R Ancarrow	York County	2010-10-09
10-1486	Ray Rilee	Gloucester County	2010-10-09
10-1307	New Tides, LLC	Lancaster County	2010-10-10
10-1495	Edward Donahue	Lancaster County	2010-10-11
10-1315	Bluewater Point	Lancaster County	2010-10-11
10-1342	Nancy P Minton	City of Virginia Beach	2010-10-11
10-1306	Ella C Barrack, et al	Lancaster County	2010-10-11
10-1366	Knull Properties LLC	Lancaster County	2010-10-11
10-1578	J C Davenport, et al	City of Virginia Beach	2010-10-11
10-1407	Vaughn Lewis	Stafford County	2010-10-12
10-1288	Federal Highway Administration	James City County	2010-10-12
10-1360	Gerald E Miller	City of Newport News	2010-10-12
10-1467	Susie M. Biedler	Westmoreland County	2010-10-12
10-1386	Kenneth & Victoria Cooke	Westmoreland County	2010-10-12
09-0089	William T. Jordan	Gloucester County	2010-10-12
10-1478	Carolyn S. Southard, et al, Trust	Westmoreland County	2010-10-13
10-1463	Dale Quakenbush	Westmoreland County	2010-10-13
10-1370	Zoar Baptist Church	Middlesex County	2010-10-15
10-1608	Old Plantation Oyster Company, LLC	Northampton County	2010-10-15
10-1291	Fernand Baruch, Jr.	Middlesex County	2010-10-15
10-0041	Bill Saunders	City of Newport News	2010-10-15
10-1487	Richard Holland, Sr.	Accomack County	2010-10-15
10-1062	Queen Anne's Cove Assoc.	Middlesex County	2010-10-16
10-1610	Nicholas Wright	City of Virginia Beach	2010-10-18
10-1595	Hampton University	City of Hampton	2010-10-18
10-1373	Virginia Beach, City of	City of Virginia Beach	2010-10-18
10-1442	Timothy Robertson	City of Virginia Beach	2010-10-20
10-1448	Federal Highway Administration, et al	City of Alexandria	2010-10-21
10-1640	Gary Bodie, et al	City of Hampton	2010-10-28
10-1633	Jud Black	Mathews County	2010-10-29
10-1632	James H. & Diane M. Timberlake	Mathews County	2010-10-30
10-1430	James & Mary Carle Warren	Mathews County	2010-10-30
10-1605	Jim Thomas	City of Portsmouth	2010-10-30
10-1664	BRG Promenade Pointe, LLC	City of Norfolk	2010-11-03
10-1119	Bluewater Point Homeowners Association	Lancaster County	2010-11-03
10-1493	Matthew D Sydnor	James City County	2010-11-04
10-1642	Norman & Beth Downey, et al	Northumberland County	2010-11-04
10-1643	J. M. Saunders, Jr.	Northumberland County	2010-11-04
10-1646	Billy S Clark	York County	2010-11-04
10-1696	Mary E Murphy	Gloucester County	2010-11-04
10-1690	Taskmaker Creek, L.L.C.	Northumberland County	2010-11-04
10-1613	Iqbal Hamza	Northumberland County	2010-11-05
10-1545	Richard S Krolak	Lancaster County	2010-11-06
10-1540	C T Deary	City of Virginia Beach	2010-11-08
10-1541	Ocean Breeze Festival Park	City of Virginia Beach	2010-11-08
10-1726	Frank A Trigeiro	Lancaster County	2010-11-08
10-1693	G K Bruce	City of Virginia Beach	2010-11-08
10-1672	Reginald D. Ray	Northumberland County	2010-11-08
10-1607	Howard L Kyzer, Jr.	Lancaster County	2010-11-08
10-1719	Robert B Brendli	City of Virginia Beach	2010-11-08

10-1687	Cynthia Lehman	Lancaster County	2010-11-09
10-1727	6875 El Camino Del Norte, Inc.	Lancaster County	2010-11-09
10-1688	John J Bersik, Jr.	Lancaster County	2010-11-09
10-1694	Mondale & Amanda Conley	Westmoreland County	2010-11-09
10-1689	Hurst Harvey Oil, Inc.	Lancaster County	2010-11-09
10-1614	David & Susan Dickens	Westmoreland County	2010-11-09
10-1050	Lyon Shipyard, Inc.	City of Norfolk	2010-11-11
10-1471	New Tides, LLC	Lancaster County	2010-11-11
10-1469	Frederick Riggins	City of Poquoson	2010-11-12
10-0281	Navy, Department of	City of Portsmouth	2010-11-12
10-1721	Virginia Electric & Power Company	City of Chesapeake	2010-11-13
10-1663	John Newcomb	Gloucester County	2010-11-13
10-1761	David May	Gloucester County	2010-11-13
10-1649	White Point Cove Association, Inc.	Middlesex County	2010-11-16
10-1760	Gregory N Packett	Richmond County	2010-11-16
10-1738	Norfolk Southern Corp.	multiple	2010-11-16
10-1714	Department of the Navy	City of Portsmouth	2010-11-16
10-1118	Navy, Department of	King George County	2010-11-23
10-1017	Betty J Myers	City of Norfolk	2010-11-30
10-1786	C. Foster Jennings, Jr.	Mathews County	2010-11-30
10-1846	Robert Thompson	Lancaster County	2010-12-02
10-1844	Kenneth L McKim	Lancaster County	2010-12-02
10-1857	Dana L Stillman	Lancaster County	2010-12-02
10-1826	David Wiker	Gloucester County	2010-12-03
10-1464	James H Vogeley	York County	2010-12-03
10-1880	John E. & Martha Sim	York County	2010-12-03
10-1803	Dockside Condominium Owner's Association	Gloucester County	2010-12-03
10-1697	J W Stoudt	Accomack County	2010-12-04
10-1850	Stanley Barr	City of Norfolk	2010-12-04
10-1834	Highland Timber, LLC	Northumberland County	2010-12-04
10-1862	Robert M. & Carolyn F. Ginnings	Northumberland County	2010-12-04
10-1827	Charles & Maureen Gillmer	Northumberland County	2010-12-04
10-1828	Menhaden Fisheries, Inc.	Northumberland County	2010-12-04
10-1820	Richard E. Wiley	Northumberland County	2010-12-06
10-1657	John W Craine, Jr.	Middlesex County	2010-12-08
10-1739	P R Anderson	Northampton County	2010-12-09
10-1841	Timothy Robertson	City of Virginia Beach	2010-12-09
10-1636	Paul K Longest	Middlesex County	2010-12-09
10-1242	Fishing Bay Harbor Marina	Middlesex County	2010-12-09
10-1873	Jon Wergin & Maike Phillpsen	Northumberland County	2010-12-10
10-1162	Virginia Electric and Power Company	multiple	2010-12-10
10-1815	Richard Burroughs	City of Virginia Beach	2010-12-10
10-1816	Trails End Campground Assoc.	Accomack County	2010-12-11
10-1793	Gail C Hilder	City of Virginia Beach	2010-12-13
10-1823	G K Bruce	City of Virginia Beach	2010-12-13
10-1265	David Gilbert	City of Virginia Beach	2010-12-13
10-1831	Robert Shelburne	City of Virginia Beach	2010-12-13
09-0989	Marina Shores Marina	City of Virginia Beach	2010-12-14
10-1375	Thomas Whittemore	City of Virginia Beach	2010-12-15
10-1825	Christopher Honenberger	Essex County	2010-12-16
10-1868	Steven Reger	Essex County	2010-12-16
10-1502	Donald F Kern	City of Virginia Beach	2010-12-16
10-1808	John Maganas	Accomack County	2010-12-16
10-1769	Perdue Grain and Oilseed, LLC	Essex County	2010-12-16
10-1822	Beverly Heath	King and Queen County	2010-12-17
10-1821	Paul Irwin	King and Queen County	2010-12-17
10-0836	Floyd A Raduege	New Kent County	2011-01-04
10-1685	Dominion Terminal Associates	City of Newport News	2011-01-04
10-1894	Indian Creek Yacht and Country Club, Inc	Northumberland County	2011-01-05
10-1878	Donna Dean	Richmond County	2011-01-05

10-1855	Stephen M. Tevault	Northumberland County	2011-01-05
10-1885	Elizabeth Beaman	City of Norfolk	2011-01-06
10-1886	Bryan Grinnan	City of Norfolk	2011-01-06
10-0483	Navy, Department of	City of Norfolk	2011-01-07
10-1975	Steven R Smithgall	Northumberland County	2011-01-07
10-1940	Lillian M Hudson	Lancaster County	2011-01-07
10-1933	Eleanor H. Jones	Northumberland County	2011-01-07
10-1896	Alice Swift	Northumberland County	2011-01-07
10-1905	Robert Weekley	Lancaster County	2011-01-07
10-1985	John G. & Kathleen Litter	Northumberland County	2011-01-07
10-1895	Charles Shirley	York County	2011-01-08
10-1887	Mark Batzel, et al	City of Virginia Beach	2011-01-12
10-1543	Shelton Wetherington	City of Virginia Beach	2011-01-12
10-1968	Kevin Jones	City of Virginia Beach	2011-01-12
10-1635	Walter Westhoff	City of Virginia Beach	2011-01-12
10-1976	Robert Chisholm	City of Virginia Beach	2011-01-12
10-1947	Sugar Run, LLC	Northampton County	2011-01-13
10-1946	Bruce D Jones	Northampton County	2011-01-13
10-0747	Dwight Wolf	Isle of Wight County	2011-01-14
10-1648	Joseph Oren	Lancaster County	2011-01-19
10-1919	Shawn C Tuthill	King and Queen County	2011-01-19
10-1910	Stephen & Valerie Wenderoth	Westmoreland County	2011-01-19
10-1872	Gary D Hylton	King and Queen County	2011-01-19
10-1972	Charles Williams	Accomack County	2011-01-20
10-1971	Harvey Muller	Accomack County	2011-01-20
10-0289	George H. Brisbin, Jr.	City of Portsmouth	2011-01-20
10-1949	Thomas & Archer Williams	Westmoreland County	2011-01-20
10-1954	Karl & Marjorie Finkelburg	Westmoreland County	2011-01-20
10-1570	Ocean Land Trust, Ltd.	Accomack County	2011-01-20
10-1892	Stephen Gallup	Accomack County	2011-01-20
10-1864	Harmony Investments	Accomack County	2011-01-21
10-1863	Harmony Investments	Accomack County	2011-01-21
10-1993	Kermit P Thomas Jr.	Richmond County	2011-01-21
11-0006	Mark B. O'Brien	Northumberland County	2011-01-27
11-0002	Frederica Mullen	Northumberland County	2011-01-27
11-0058	Robert S. Hudnall	Northumberland County	2011-01-28
11-0028	Zapata Haynie Corp., et al	Northumberland County	2011-01-28
10-1869	Deagles Marine Railway Inc.	Middlesex County	2011-01-31
10-1959	James R. Berlinghoff	Middlesex County	2011-02-01
10-0453	R C Swallow	City of Norfolk	2011-02-01
10-1141	Mark Dewey	City of Norfolk	2011-02-01
10-2004	Steven R Cablk	Lancaster County	2011-02-04
11-0032	R H Whay	Lancaster County	2011-02-04
11-0074	Sidney B Hazelwood	City of Suffolk	2011-02-10
10-1745	Doug Small	Lancaster County	2011-02-10
10-1368	Dan McGhee	City of Chesapeake	2011-02-11
10-1932	Revelle and Barbara Young	Northampton County	2011-02-11
10-1798	Lloyd C Taylor, et al	Spotsylvania County	2011-02-11
10-2021	Broadwater Seafood LC	Northampton County	2011-02-11
10-2003	National Aeronautics and Space Administr	Accomack County	2011-02-14
10-1924	Richard Lewis	City of Virginia Beach	2011-02-16
10-1624	Albert Leyndecker, III	City of Virginia Beach	2011-02-16
11-0130	Peter Lalor	Accomack County	2011-02-16
11-0048	Karen Islam	City of Virginia Beach	2011-02-16
10-1809	Stephen W Lester	City of Suffolk	2011-02-17
11-0109	Jeff & Isabelle Roseme	Mathews County	2011-02-18
11-0047	Janet B. Martin	Mathews County	2011-02-18
10-1706	Susanne F. Myatt	Northumberland County	2011-02-18
10-1598	Thomas Boothe	Surry County	2011-02-18
11-0100	Patricia L. Martin	Mathews County	2011-02-18

10-1514	Aquia Harbour Property Owners Associatio	Stafford County	2011-02-22
11-0080	Michael R Turner	King George County	2011-02-22
10-1650	George & Nancy Duffield	Stafford County	2011-02-22
10-0683	Jeffrey Knisely	King George County	2011-02-22
10-1906	Douglas Brown	Mathews County	2011-02-23
10-1628	Department of the Navy	City of Portsmouth	2011-02-23
11-0117	Leo Charles Adlon	Westmoreland County	2011-02-24
10-2019	George P. & Kennie L. Lupton	Westmoreland County	2011-02-24
10-1994	Ellis & Elizabeth Dunkum	Westmoreland County	2011-02-24
11-0036	Frederic A. & Nancy L. Ludwig	Westmoreland County	2011-02-25
11-0098	Harold D. Schuler	Westmoreland County	2011-02-25
11-0101	Kathleen B West	Middlesex County	2011-02-26
10-1219	Ruby Deboe	Middlesex County	2011-03-01
11-0084	Hermitage Foundation, The	City of Norfolk	2011-03-01
10-0697	Paul Garbett	Middlesex County	2011-03-01
11-0152	Louise E Harrell	Middlesex County	2011-03-02
11-0148	Thomas W. Osborne	Northumberland County	2011-03-02
10-1943	John Guy	Middlesex County	2011-03-02
11-0004	Gaylon Layfield	Middlesex County	2011-03-02
11-0097	Menhaden Fisheries, Inc.	Northumberland County	2011-03-03
11-0174	Eric J Baldwin	Gloucester County	2011-03-03
11-0188	Duncan Critchfield	Northumberland County	2011-03-03
11-0115	Timberneck, LLC	Gloucester County	2011-03-03
11-0179	William H. Dean	Northumberland County	2011-03-03
11-0091	Raymond C. & Henrietta C.Smith	Northumberland County	2011-03-03
10-1937	Accomack, County of	Accomack County	2011-03-03
11-0088	Donald H Shanklin	Lancaster County	2011-03-03
11-0061	Deborah Lang	Lancaster County	2011-03-03
11-0173	Barbour T Farinhold	Gloucester County	2011-03-03
10-2018	Game and Inland Fisheries, Department of	Surry County	2011-03-06
10-1651	Virginia Beach, City of	City of Virginia Beach	2011-03-06
10-1898	Lee Carolina, LLC	Prince William County	2011-03-08
11-0175	Ralph Jackson	Gloucester County	2011-03-09
11-0096	Gregg Gross	City of Chesapeake	2011-03-09
11-0208	Nicholas Wilson	City of Virginia Beach	2011-03-10
11-0183	Hugh Fard	City of Virginia Beach	2011-03-10
11-0182	Betty P Cimmino	City of Virginia Beach	2011-03-10
11-0200	David Parker	City of Virginia Beach	2011-03-10
10-1416	Duke of Windsor Dredge, LLC	City of Virginia Beach	2011-03-10
11-0191	Mildred Morrisette	City of Virginia Beach	2011-03-10
10-1742	St. Mary Star of the Sea School	City of Hampton	2011-03-11
11-0105	Edward V. Allison, Jr. & Joyce S.	Westmoreland County	2011-03-11
11-0019	Richard Fairbank	Fairfax County	2011-03-11
11-0090	Conservation & Recreation, Dept of	Northampton County	2011-03-11
11-0103	Jennings C. & Doris K. Burton	Westmoreland County	2011-03-12
10-1665	John Lawson	City of Newport News	2011-03-12
11-0107	Richard K. Moran	Westmoreland County	2011-03-12
10-1805	Ed Boyd	City of Hampton	2011-03-17
11-0192	Trails End Campground Assoc.	Accomack County	2011-03-18
11-0102	Norrfolk Southern Railway Company	City of Norfolk	2011-03-21
11-0049	National Oceanic & Atmospheric Administr	City of Norfolk	2011-03-21
10-1552	Virginia Railway Express	multiple	2011-03-22
09-0700	Lyon Shipyard, Inc.	City of Norfolk	2011-03-22
11-0156	Robert Rea, et al	Town of Cape Charles	2011-03-23
11-0278	William M. Stall	Mathews County	2011-03-30
11-0213	Donald W. Davis	Mathews County	2011-03-31
11-0212	Marguerite T. Landrum	Mathews County	2011-03-31
11-0243	Hope Springs Marina, L.L.C.	Stafford County	2011-04-04
11-0240	Urbanna Harbour Yacht Club Association	Middlesex County	2011-04-05
11-0259	James R Wagner	Middlesex County	2011-04-05

11-0246	James A. Combs	Northumberland County	2011-04-06
11-0255	Michael J Levine, et al	James City County	2011-04-07
11-0277	Paul A Fox, III	Lancaster County	2011-04-07
11-0112	John A Belsha	City of Norfolk	2011-04-07
11-0320	Daniel Parr	Gloucester County	2011-04-07
07-2528	James A. Resolute, Jr.	City of Norfolk	2011-04-07
11-0317	Christopher C Williams, et al	Gloucester County	2011-04-07
11-0295	Todd W Geisert	Gloucester County	2011-04-07
11-0319	David H Driver	Gloucester County	2011-04-07
11-0390	Charles & Kimberly Wedel	Northumberland County	2011-04-07
11-0218	Raymond Davis	Gloucester County	2011-04-07
11-0282	Robert Reed	City of Virginia Beach	2011-04-08
10-1979	Lawrence Grey	Charles City County	2011-04-08
11-0365	Hugh Patterson	City of Virginia Beach	2011-04-08
11-0078	Terrence R McHugh	City of Virginia Beach	2011-04-08
11-0256	Christopher J Eckenfels	James City County	2011-04-08
09-1451	William C French, Jr.	City of Virginia Beach	2011-04-08
11-0170	Aaron Marlow	City of Suffolk	2011-04-11
11-0244	Sidney B Hazelwood	City of Suffolk	2011-04-11
11-0135	Marina Shores Marina	City of Virginia Beach	2011-04-13
11-0274	Richard W. & Bette L. Freer	Northumberland County	2011-04-14
11-0496	Audrey H Thomas	Richmond County	2011-04-15
11-0375	Hehl Properties, LLC	Northampton County	2011-04-16
11-0500	Gay H Packett	Richmond County	2011-04-16
11-0273	Air Force, Department of	City of Hampton	2011-04-18
11-0429	Metro Machine Corporation	City of Norfolk	2011-04-19
11-0327	Middlesex County Board of Supervisors	Middlesex County	2011-04-19
10-1659	Reedville Steamboat Wharf, Inc.	Northumberland County	2011-04-20
11-0394	Chesapeake Bay Oyster Company, LLC	Middlesex County	2011-04-21
11-0224	George B Sterling, Jr.	Accomack County	2011-04-21
11-0285	Individuals of Ancillary 6	City of Hampton	2011-04-27
11-0373	John V O'Shea	City of Portsmouth	2011-04-28
11-0161	Chesapeake, City of	City of Chesapeake	2011-04-28
11-0465	Julian C Ferras	Northumberland County	2011-05-06
11-0430	Inland Harbour Property Owners Assoc.	Northumberland County	2011-05-06
11-0536	Ann F Sentz, et al	Northumberland County	2011-05-06
11-0545	David Watts	Northumberland County	2011-05-06
11-0453	Kenneth Warren, et al	Northumberland County	2011-05-06
11-0542	Chesapeake Bay Properties, Inc.	Northumberland County	2011-05-06
11-0383	Peter M Hudson	Northumberland County	2011-05-06
11-0512	Highland Park Civic League, et al	City of Norfolk	2011-05-06
11-0513	Gary Laws	City of Norfolk	2011-05-09
11-0502	Dave Schwoeppe	City of Virginia Beach	2011-05-10
11-0386	Navy, JEB Little Creek	City of Virginia Beach	2011-05-10
11-0421	Navy, JEB Fort Story	City of Virginia Beach	2011-05-10
11-0045	Jacquelyn Wood	City of Norfolk	2011-05-10
11-0306	Smurfit-Stone	Town of West Point	2011-05-10
11-0468	John H Davis, et al	Westmoreland County	2011-05-10
11-0424	John Fraim	City of Virginia Beach	2011-05-10
10-2025	Bubba's Marina	City of Virginia Beach	2011-05-10
10-0587	Gary Stull	City of Norfolk	2011-05-11
11-0346	McAllister Towing of Virginia	City of Norfolk	2011-05-12
11-0495	Betty Cook	Lancaster County	2011-05-13
11-0531	David D Owen	Lancaster County	2011-05-13
11-0328	Richard E Dougherty, Jr.	Middlesex County	2011-05-13
10-1708	Shri Ganesh, LLC	City of Hampton	2011-05-13
11-0527	Dwight D Timm	Lancaster County	2011-05-13
11-0355	James Hughes	Middlesex County	2011-05-13
11-0395	Peter Mansfield	Middlesex County	2011-05-13
11-0528	William M Greene	Lancaster County	2011-05-13

11-0459	Sandra Neumann	Middlesex County	2011-05-13
11-0372	Christopher Coffing	Middlesex County	2011-05-16
10-1256	Dominion Virginia Power	multiple	2011-05-16
11-0158	Brian T McDermott, et al	King George County	2011-05-18
11-0309	Robert M Hodges, Jr.	Isle of Wight County	2011-05-20
11-0636	Mortimer Payne, Jr.	Richmond County	2011-05-20
11-0601	Verizon	Middlesex County	2011-05-21
11-0544	Douglas Brown	Mathews County	2011-05-24
11-0487	Ellis J Strelitz	City of Virginia Beach	2011-05-24
11-0479	Edward M Inge	Mathews County	2011-05-24
11-0608	Greenvale Creek Maintenance Association	Lancaster County	2011-05-27
11-0695	Albert C Pollard	Lancaster County	2011-05-28
11-0417	Jamestown-Yorktown Foundation	James City County	2011-06-01
11-0350	Jamestown-Yorktown Foundation	James City County	2011-06-01
11-0590	Bristow Beach Community Civic Associatio	Gloucester County	2011-06-02
11-0694	Shelly L Pereira, et al	Gloucester County	2011-06-02
11-0597	Carolyn Brooks	Gloucester County	2011-06-02
11-0658	Thomas Sheridan	Northumberland County	2011-06-04
11-0705	Stephen Johnson	Northumberland County	2011-06-04
11-0720	Virginia Institute of Marine Science	Northampton County	2011-06-04
11-0686	William B Dickler	Northumberland County	2011-06-06
10-1318	Robert N Harrell, Jr.	City of Norfolk	2011-06-06
11-0570	Mark Stufflebeem	City of Virginia Beach	2011-06-06
11-0692	Donald F Kern	City of Virginia Beach	2011-06-08
11-0582	Coves at Wilton Creek Owners Association	Middlesex County	2011-06-08
11-0617	Louis W Stone	Middlesex County	2011-06-09
11-0398	Richard E Jernigan, Jr.	City of Chesapeake	2011-06-10
11-0685	John B Morgan, II	Middlesex County	2011-06-10
11-0743	Inez H Noel	Northumberland County	2011-06-13
10-1731	Southall Landings Marina	City of Hampton	2011-06-13
11-0726	W S THompson	Northumberland County	2011-06-13
11-0605	Navy, Department of	Westmoreland County	2011-06-14
11-0558	Thomas M Hedgpeth, et al	Northumberland County	2011-06-14
11-0689	Henry Custis, Jr.	Accomack County	2011-06-14
11-0651	John F Sigler	Westmoreland County	2011-06-15
11-0120	Hayden H Gordon	City of Hampton	2011-06-15
11-0486	William K Doyle, Jr.	Westmoreland County	2011-06-15
11-0662	Edward A McAllister, II	Westmoreland County	2011-06-21
10-1787	Dominion Resources, Inc.	Chesterfield County	2011-06-28
07-1141	Robert W. White, Jr.	Northumberland County	2011-07-06
11-0204	Chesapeake Bay Foundation, Inc.	Accomack County	2011-08-05