The Virginia Wetlands Report

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VIMS Upgrades Shoreline Advisory Reports

By Karen Duhring

Many readers are probably familiar with the VIMS Shoreline Permit Application Report, also known as the "VIMS Report." The Wetlands Program at the Center for Coastal Resources Management has published approximately 22,400 of these advisory reports between 1972 and 2003. VIMS scientists provide an independent, environmental assessment for almost every permit application in tidal waters by analyzing proposed activities in light of currently accepted guidelines and the best scientific information available. Alternative approaches are suggested if they will accomplish the project's objectives with less environmental impact.

The first VIMS Report in the 1970's was simple with a check box format to indicate if a project was basically acceptable or unacceptable from an environmental perspective. As the number and variety of permit applications increased through the 1980's and 1990's, the complexity and format of the VIMS Report also changed to keep pace. The Tidal Wetlands Database was improved in 1993 to systematically track impacts to marine resources throughout the Tidewater region and the format of the VIMS Report subsequently became more quantitative and detailed.

The first Geographic Information System (GIS) based format was introduced in 2001 through cooperation with the Comprehensive Coastal Inventory program at the Center for Coastal Resources Management (the Center). This program is responsible for comprehensive GIS shoreline resource inventories and updating these databases as new information becomes available. The professional expertise and on-site assessments of the VIMS wetland scientists are now complimented with desktop access to the Center's GIS databases (coverages).

Generating the Reports

The process of generating each report involves the integration of five different components and software programs. The collection of GPS

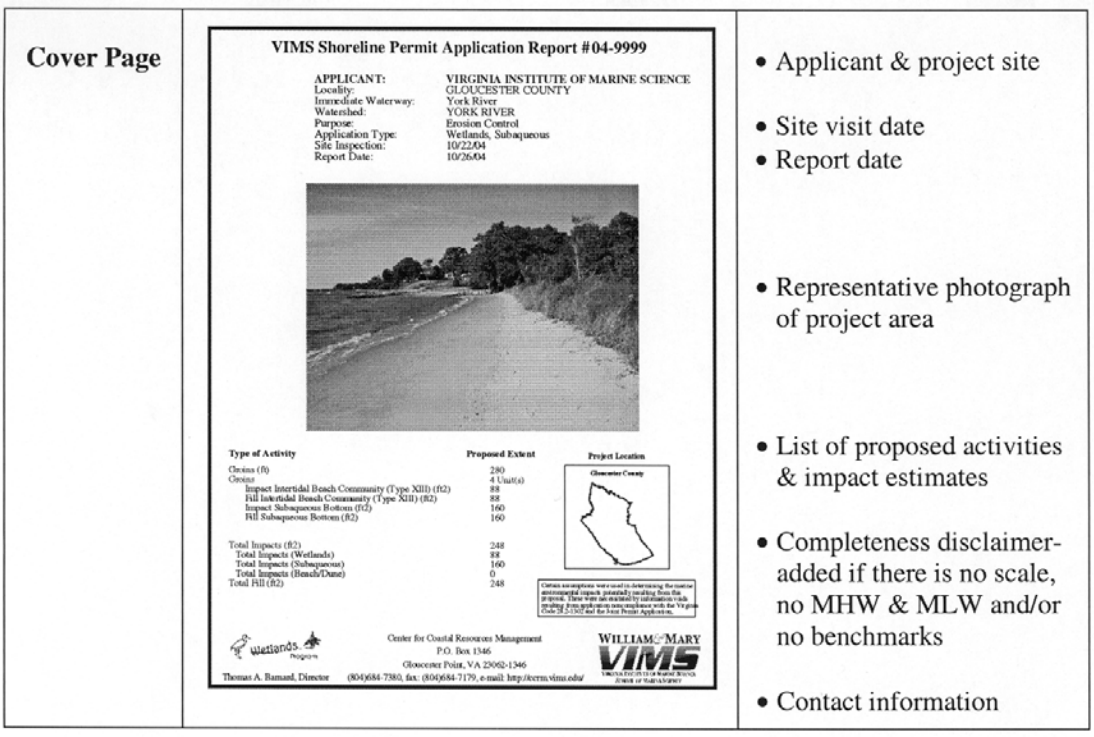

Figure 1a. *This sample report illustrates the various components and information provided in the VIMS Shoreline Permit Application Report. This is a fictitious case for demonstration purposes only.* *(The figure continues on pages 3 and 4.)*

points during site visits is a key link that was missing in the previous formats. With GPS coordinates, each project site can now be linked to GIS shoreline and resource inventories. Representative project photographs are also taken with digital cameras.

After returning to the office, the GPS points and digital photographs are downloaded and stored on a shared network. The applicant's information, proposed activities, resource habitat types and the proposed impact areas are entered into a database. Finally, advisory comments are compiled and entered separately into standard word processing software. ArcView software then pulls these components together into a template to generate the final report.

The VIMS Reports are distributed electronically by posting them to the Center's web site for viewing and downloading by local, state and federal agencies, local Wetlands Boards, project applicants, agents and contractors, as well as the general public. Automatic e-mail notifications are also sent to individual local government and VMRC staff. The reports are thus available to a wider audience than before supporting public participation in the decision making process. Electronic distribution has reduced paperwork, administrative costs and mailing delays. Hard copies are still printed and mailed to each project applicant.

Contents of the VIMS Report

The GIS version of the VIMS Report is produced in color, including several maps and a site photograph. Each report is typically five pages long. The report contents on each page are highlighted in a fictitious case presented here (Figure 1a through 1e). The cover page of the report includes information about the project location, the site photograph, proposed activities and the estimated impact and fill areas within different marine habitat types. If the application was considered to be incomplete due to missing information, then a notice is also provided on the first page (Fig. 1a).

Advisory Findings and Recommendations are provided in the second section of the report. This project assessment only addresses marine environmental concerns and includes suggestions for avoiding or reducing impacts through alternative approaches or other project modifications (Fig. 1b).

A Watershed and Cumulative Impact Evaluation is provided to encourage consideration of a project's impact from a watershed perspective. A map depicts the watershed where the project is located in relation to the locality boundary. Cumulative impacts that result from multiple projects over time in the immediate waterway are reported in tabular format (Fig. 1c).

A detailed Permit Site Study Area map depicts current shoreline and marine resource inventories in the project vicinity through a display of multiple GIS data layers. The GIS data available for this section of the report include roads, shorelines, hydrology, Tidal Marsh Inventory, National Wetlands Inventory, Submerged Aquatic Vegetation (SAV), shallow water flats and erosion control structures (Fig. 1d).

The last page of the report is a form pre-printed with the proposed activities and impact areas. This form allows the

Editor's Note:

The Virginia Institute of Marine Science has had, since its inception in 1940 as the Virginia Fisheries Laboratory, a primary mission of providing scientific advice to state, local and national entities pertaining to marine environmental issues. With the passage of the Wetlands Act in 1972, the Institute was called on to provide scientific expertise and educational programs in support of the Virginia Marine Resources Commission (VMRC) and local wetlands boards, now numbering 35, in their efforts to manage the Commonwealth's tidal wetland resource. One of the primary methods of accomplishing this mandate has been through the development of the VIMS Shoreline Application Report. The report is an environmental assessment prepared for each shoreline application heard at public hearing by the local boards and the VMRC.

These impact assessment reports and the scientists who prepare them have changed over the years but the guiding principles remain the same. Very recently however, significant changes in report format and content have occurred, spurred by technological innovations and the need to improve efficiency in the report generation process. Given these innovations and a very recent format change, the *Virginia Wetlands Report* is devoting a major portion of this issue to provide a general orientation to, and a summary of the information now contained in each VIMS Shoreline Permit Application Report.

The Virginia Wetlands Report is a quarterly publication of the Wetlands Program at the Virginia Institute of Marine Science of the College of William and Mary. Subscriptions are available without charge upon written request to: Wetlands Program, Virginia Institute of Marine Science, P.O. Box 1346, Gloucester Pt, VA 23062 USA.
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In this Issue:

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regulatory agencies to easily report if each project is approved as proposed, denied or if modifications were required. This information is entered into the database to track impact avoidance and minimization measures imposed on each project through the regulatory process (Fig. 1e).

Recent GIS Format Changes

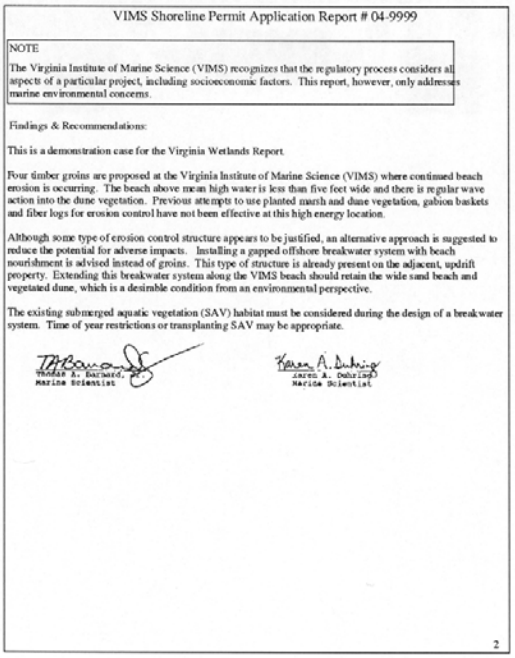
Updates to the GIS report format were completed this summer. The Findings & Recommendations layout was simplified. The Watershed and Cumulative Impact Evaluation was revised to focus on a local watershed level. The improved map depicts the hydrologic unit or small watershed where the project is located and, in most cases, demonstrates how watershed boundaries do not correlate with jurisdictional locality boundaries. The associated text provides definitions and identifies the local governments that share responsibility for managing coastal resources within the same hydrologic unit (Fig. 1c).

The cumulative impacts table on this page of the report was also simplified. The proposed project impacts are now compared with previously permitted impacts along the same immediate waterway and also within the locality over the past three years. These cumulative impacts are reported for beaches

Continued on the next page.

Figure 1b.

Advisory Comments



VIMS Shoreline Permit Application Report # 04-9999

NOTE

The Virginia Institute of Marine Science (VIMS) recognizes that the regulatory process considers all aspects of a particular project, including socioeconomic factors. This report, however, only addresses marine environmental concerns.

Findings & Recommendations:

This is a demonstration case for the Virginia Wetlands Report.

Four timber groins are proposed at the Virginia Institute of Marine Science (VIMS) where continued beach erosion is occurring. The beach above mean high water is less than five feet wide and there is regular wave action into the dune vegetation. Previous attempts to use planted marsh and dune vegetation, gabion baskets and fiber logs for erosion control have not been effective at this high energy location.

Although some type of erosion control structure appears to be justified, an alternative approach is suggested to reduce the potential for adverse impacts. Installing a gapped offshore breakwater system with beach nourishment is advised instead of groins. This type of structure is already present on the adjacent, updrift property. Extending this breakwater system along the VIMS beach should retain the wide sand beach and vegetated dune, which is a desirable condition from an environmental perspective.

The existing submerged aquatic vegetation (SAV) habitat must be considered during the design of a breakwater system. Time of year restrictions or transplanting SAV may be appropriate.

Thomas A. Barnard, Jr.
Marine Scientist

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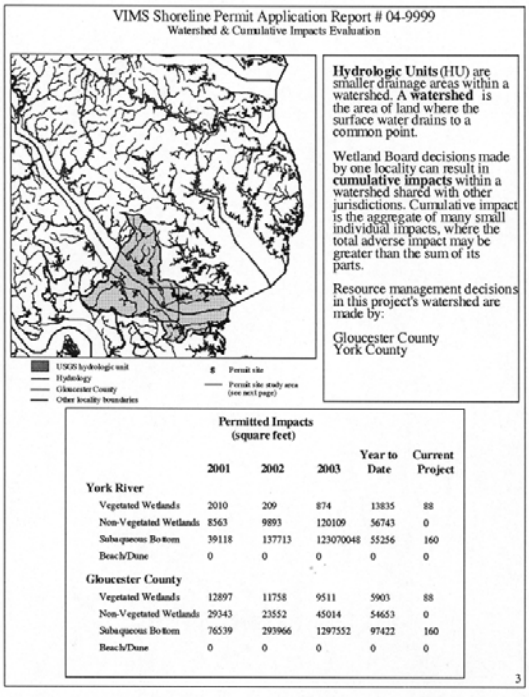
- Only marine environmental concerns are addressed
- **Findings & Recommendations –** includes suggestions for avoiding or reducing impacts
- **Electronic signature(s)-** includes both the reviewing scientist and the Program Director if alternative approach is advised or if project is controversial

Figure 1c.

Watershed and Cumulative Impacts Evaluation



VIMS Shoreline Permit Application Report # 04-9999
Watershed & Cumulative Impacts Evaluation

Hydrologic Units (HU) are smaller drainage areas within a watershed. A **watershed** is the area of land where the surface water drains to a common point.

Wetland Board decisions made by one locality can result in **cumulative impacts** within a watershed shared with other jurisdictions. Cumulative impact is the aggregate of many small individual impacts, where the total adverse impact may be greater than the sum of its parts.

Resource management decisions in this project's watershed are made by:

Gloucester County
York County

USGS hydrologic unit
Hydrology
Gloucester County
Other locality boundaries
Permit site
Permit site study area (see next page)

Permitted Impacts (square feet)

	2001	2002	2003	Year to Date	Current Project
York River					
Vegetated Wetlands	2010	209	874	13835	88
Non-Vegetated Wetlands	8563	9893	120109	56743	0
Subaqueous Bottom	39118	137713	123070048	55256	160
Beach/Dune	0	0	0	0	0
Gloucester County					
Vegetated Wetlands	12897	11758	9511	5903	88
Non-Vegetated Wetlands	29343	23552	45014	54653	0
Subaqueous Bottom	76539	293966	1297552	97422	160
Beach/Dune	0	0	0	0	0

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- **Map of project watershed & locality**
- **Watershed and cumulative impacts** definitions
- **Shared responsibility** for resource management within watershed
- **Cumulative impacts** permitted to occur during the past 3 years, compared to current project
  - Immediate Waterway
  - Locality

and dunes, vegetated and non-vegetated tidal wetlands, and subaqueous bottom.

New GIS data layers have also been added to the Permit Site Study Area map. Recently completed shoreline inventories are now available for certain localities. The data layers now available in these localities include shoreline land use, updated erosion control structures, and access structures such as docks and boat ramps. The original shoreline inventory from 1990 is provided for those localities where a more recent inventory is not yet available.

Other useful GIS data layers, presented when relevant to the permit reports, include the 2001 Submerged Aquatic Vegetation (SAV) inventory and bathymetric contours for Chesapeake Bay shorelines. New shellfish resource inventories include public Baylor grounds, existing and proposed oyster restoration reefs, and condemnation areas (Fig. 1d). These data layers will continue to be updated as the Comprehensive Coastal Inventory program acquires new information.

Downloading Reports from the CCRM Web Site

The VIMS Reports are posted at the Center for Coastal Resources Management web site (http://*ccrm.vims.edu*). There is a link to the Permit Reports in the left column on the home page. The list of reports is arranged in reverse numerical order, with the most recent reports appearing near the top (Figure 2, on page 8). Click on the blue underlined permit number in

Continued on page 8

Figure 1d.

Permit Site Study Area	VIMS Shoreline Permit Application Report # 04-9999 Permit Site Study Area York River Gloucester County N 0 0.25 0.5 Miles 4	• Shoreline inventory & site conditions in project vicinity • Project location • GIS data layers may include roads, Tidal Marsh Inventory, Submerged Aquatic Vegetation, shallow flats, erosion control structures, bathymetry contours, public & condemned shellfish grounds, oyster restoration reefs, other resource inventories as they become available

Figure 1e.

Regulatory Action Form Official use only	VIMS Shoreline Permit Application Report # 04-9999 To Wetlands Board / VMRC : Please indicate Wetlands Board / VMRC action on this sheet and return to VIMS Application Number: 04-9999 Name: Virginia Institute of Marine Science Locality: Gloucester County Waterway: York River Please check here if this application was approved as proposed ____ Complete the form below if the application was modified. ACTIVITIES — PROPOSED — PERMITTED Groins (ft) 280 Groins 4 Units Impact Intertidal Beach Community (Type XIII) (ft2) 88 Fill Intertidal Beach Community (Type XIII) (ft2) 88 Impact Subaqueous Bottom (ft2) 160 Fill Subaqueous Bottom (ft2) 160 Please specify required modifications: _____ Wetlands Program Thomas A. Barnard, Director William & Mary VIMS	• For official use only by local Wetlands Boards & VMRC • Required project modifications typically to avoid or reduce environmental impact

GIS Geographic Information System

Online Tools Now Available for Coastal Managers

By Marcia R. Berman

The Comprehensive Coastal Inventory Program (CCI) at the Virginia Institute of Marine Science has been developing tools for coastal managers for several years. Our target audience includes regulators of wetlands, local government planners, and non-government organizations. These tools utilize the Geographic Information System (GIS) technology along with the power of the Internet. With only Internet access necessary, these tools are accessible from your office desktop computer. You are not required to have GIS software. Recently, CCI hosted the first of three workshops to train managers to use these tools effectively. The following tools were highlighted.

Shoreline Managers Assessment Kit (SMAK) (http://ccrm.vims.edu/SMAK_intro.html):

SMAK was originally developed to support the concept of holistic, watershed-based management. To that end, SMAK allows users to view site-specific data, as well as information developed at the scale of tributaries or localities. SMAK pulls data from the same database used in the current GIS-based permit review reports, which are familiar to many of you. Twenty-two layers are included.

Oil Spill Clean-up and Response Tool (OSCAR) (http://ccrm.vims.edu/OSCAR_intro.html):

OSCAR is an oil spill response tool designed to assist in the identification of sensitive resources for the Chesapeake Bay coastal region. During the last several decades, the Chesapeake Bay has experienced several large spill events threatening our environment. The Bay's resources remain vulnerable as they share the coastal area with several large shipping ports, major interstate commerce routes, extensive underground pipelines, industrial facilities, and other areas that have the potential to cause significant environmental damage through accidental spills. This Internet application allows you to create customized maps, and with a click of the mouse, identify a point of interest and view detailed scientific data associated with that location. For rapid and effective response to incidents that may occur, vulnerable resources must be identified in advance. OSCAR provides information on protection priorities within the Chesapeake Bay basin.

Wetlands Mitigation-Restoration Targeting Tool: (http://ccrm.vims.edu/cci/wet_target/)

The Wetlands Mitigation-Restoration Targeting Tool was developed to target sites in the landscape suitable for wetland creation. The project generated a GIS suitability model and produced a series of maps locating sites ranked as suitable based on a defined protocol. ArcIMS was used to generate an interactive query system to allow users to customize their site search based on project specific requirements. Both static maps and the query system are available on the website.

The model takes a landscape approach to site selection and is hierarchical. The protocol applied evaluates suitability on the basis of five parameters: presence of hydric soils, presence of hydrology, adjacency to existing wetlands, existing landuse, the opportunity for landscape conversion, and proximity to designated conservation areas.

The Marina Site Suitability Tool (http://ccrm.vims.edu/wet_target/index.html)

The Commonwealth of Virginia, through the Virginia Marine Resources Commission, developed detailed criteria for siting of marina facilities. The Marina Site Suitability Tool was developed to integrate the VMRC siting criteria into a GIS data model. Static maps and an interactive map tool are available online. The model groups and ranks siting criteria by three major categories: criteria associated with design parameters, water quality issues, and habitat considerations. GIS algorithms were developed to model the VMRC criteria, and an index of suitability was formed.

Shoreline Situation Reports (http://ccrm.vims.edu/gisdatabases.html)

The Virginia Shoreline Inventory is comprised of a series of reports known as the Shoreline Situation Reports. Each report documents conditions along the tidal shoreline of each coastal jurisdiction in Virginia. They compile and display information pertaining to riparian land use, bank condition, and shoreline features. The inventory is developed using on the ground GPS surveying techniques combined with GIS for database management and map display. While earlier reports were hardcopy documents, electronic venues are now utilized for data reporting and distribution. This reduces costs and aids in efficiency. Efforts to complete this series are ongoing in Virginia. The websites post maps and data for those counties that are complete.

Beaks & Bills

Bank-nesting Birds: Belted Kingfisher *(Ceryle alcyon)*, Bank Swallow *(Riparia riparia)*, and Northern Rough-winged Swallow *(Stelgidopteryx serripennis)*; Or, Eroding Banks, They're Not All Bad

by Julie G. Bradshaw

In keeping with the "online" nature of this issue of the Virginia Wetlands Report, the birds for this issue are often found "online"—perched on a utility line, that is. They also have something else in common: they all nest in burrows in eroding banks along the Bay's river systems.

The most distinctive of these three species, both in appearance and vocalization, is the belted kingfisher. The kingfisher is about 12 inches long and has a head and bill that are disproportionately large compared to the rest of its body. The head crest, back, top of wings, and band across the top of the chest are a blue-gray color. The front of the neck, belly, and underside of wings are white. The female, more colorful than the male, also has a rusty band across the belly. Kingfishers are often seen hovering or perched on utility lines or branches over water, looking for their primary food, small fish. The birds capture their prey by diving into the water and catching the small fish (generally 4 inches or less) in their bills and immediately flying out of the water to a perch. They generally feed in shallow water and dive no deeper than 2 feet into the water body, which may range from calm marine waters through estuaries to freshwater lakes and streams. They are dependent on being able to see their prey, and are thus sensitive to high levels of turbidity and to high wave action. When disturbed, the kingfisher gives a distinctive loud mechanical rattle call, often as it flies away from the disturbance.

The other two bank-nesting species, the bank swallow and northern rough-winged swallow, are the least colorful of the swallows found in our area. Both are brown with light underparts. Both are small, about 5 inches long. As with other swallows, they have long pointed wings, swift agile flight, and prey primarily on flying insects. Although they may feed over water, they are just as likely to feed over land. They are thus tied to water not by feeding habits but by nesting habitat. All three species will also nest in banks at sand and gravel quarries.

All 3 of the bank-nesting bird species are migratory, wintering as far south as South America. The swallows migrate in large flocks with other bird species. The belted kingfisher is generally solitary except during the breeding season. All three species nest in burrows in the faces of steep banks that are clear of vegetation. Upon their return from the south in the spring, when they arrive back on breeding grounds, the belted kingfishers and bank swallows begin excavating their burrows. Excavation takes from a few days to a week. If nest burrows survive from the previous year, they may be reused, although flea infestation may be a drawback. Rough-winged swallows are generally thought to occupy existing burrows, but there is evidence that they will also dig their own.

These bank-nesters choose steep non-vegetated banks in order to minimize the chance that predators will be able to reach their nests. However, predation is still an issue. Snakes, mammals such as skunks and raccoons, and birds, primarily raptors, are important predators of these bank-nesting birds.

The material of which the bank is made is important in

Continued on next page

Figure 1. Belted Kingfisher

Figure 2. Kingfisher burrow

Figure 3. *Bank swallows at burrow.*

Figure 4. *Swallow burrows.*

determining whether the birds use the bank for nesting. The material must be easy for the birds to dig through using their bills and feet, so banks that are high in clay or rock content cannot be used. However, the material must not be so unconsolidated that the burrows collapse, so extremely sandy banks are not used successfully. The burrows that the birds dig go approximately 4-6 feet into the bank for kingfishers, and 2-3 feet for bank swallows. The holes that lead into the burrows range from about 2 x 3 inches for bank swallows to about 3.5 inches high and wide for kingfishers.

Kingfishers may excavate more than one burrow, but use only one for nesting. Bank swallows, known as Sand Martins in the Old World, nest in colonies consisting of up to several thousand pairs of birds. More typically, colonies consist of a few hundred pairs. Dr. Bryan Watts of William and Mary's Center for Conservation Biology found, in a survey of the entire tidal Chesapeake Bay shoreline in 1995, only one bank swallow colony along Virginia's tidal shoreline. It occurred along the James River and consisted of 49 burrows. Rough-winged swallows and belted kingfishers may each nest as single pairs, or may be associated with bank swallow colonies.

In his 1995 survey of tidal shorelines, Watts found in Virginia a total of 782 banks that were appropriate for bank-nesters (i.e., at least 6 feet high, steep, nonvegetated), occupying approximately 43 miles of shoreline. Approximately half of these banks were occupied by rough-winged swallows, and kingfishers occupied 28 percent of the banks. In addition to the colony of 49 bank swallow burrows, 1081 rough-winged swallow burrows and 299 kingfisher burrows were observed by Watts along Virginia's tidal shoreline.

For all three species, availability of nesting habitat is a major factor affecting the populations. Studies in California (cited in Garrison, 1999) documented the decline of bank swallow populations due to bank grading associated with flood- and erosion-control projects. This trend could be expected in Virginia as well, as more of our shorelines are graded and the banks critical for nesting are eliminated. Sand and gravel quarry closure is also reducing bird populations (Blem & Blem 1990, cited by Garrison, 1999). As human pressure for shoreline development increases, the values of steep eroding banks should be kept in mind as decisions are made regarding the fate of those banks. Not only are they valuable for bank-nesting birds, they are also a source of sediment for maintaining beaches and marshes as sea level rises. Steep eroding banks are not all bad, and we should make an effort to maintain some portion of them in their natural state in order to support populations of bank-nesting birds.

Sources:

Blem, C. R., L. B. Blem. 1990. Bank Swallows at Presquile National Wildlife Refuge: 1975-1989. Raven 17: 3–6. Cited in Garrison, 1999.

DeJong, M. J. 1996. Northern Rough-winged Swallow (*Stelgidopteryx serripennis*). *In* The Birds of North America, No. 234 (A. Poole and F. Gill, eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Garrison, B. A. 1999. Bank Swallow (*Riparia riparia*). *In* The Birds of North America, No. 414 (A. Poole and F. Gill, eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Hamas, M. J. 1994. Belted Kingfisher (*Ceryle alcyon*). *In* The Birds of North America, No. 84 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Watts, B.D. Unpublished 1995 data. Center for Conservation Biology. College of William & Mary. Personal communication, Oct. 2004.

Image Credits:

Figure 1. Illustration of Belted Kingfisher, by Louis Agassiz Fuertes, 1896. Scanned from 1907 edition of Citizen Bird, p.319. From http://en.wikipedia.org/wiki/Belted_kingfisher. This image is in the public domain in the United States and possibly other jurisdictions.

Figure 2. Kingfisher burrow photo by Julie Bradshaw, VIMS.

Figure 3. Bank swallows at burrow. National Park Service/Yukon-Charley Rivers National Preserve.

Figure 4. Swallow burrow photo by Karen Duhring, VIMS.

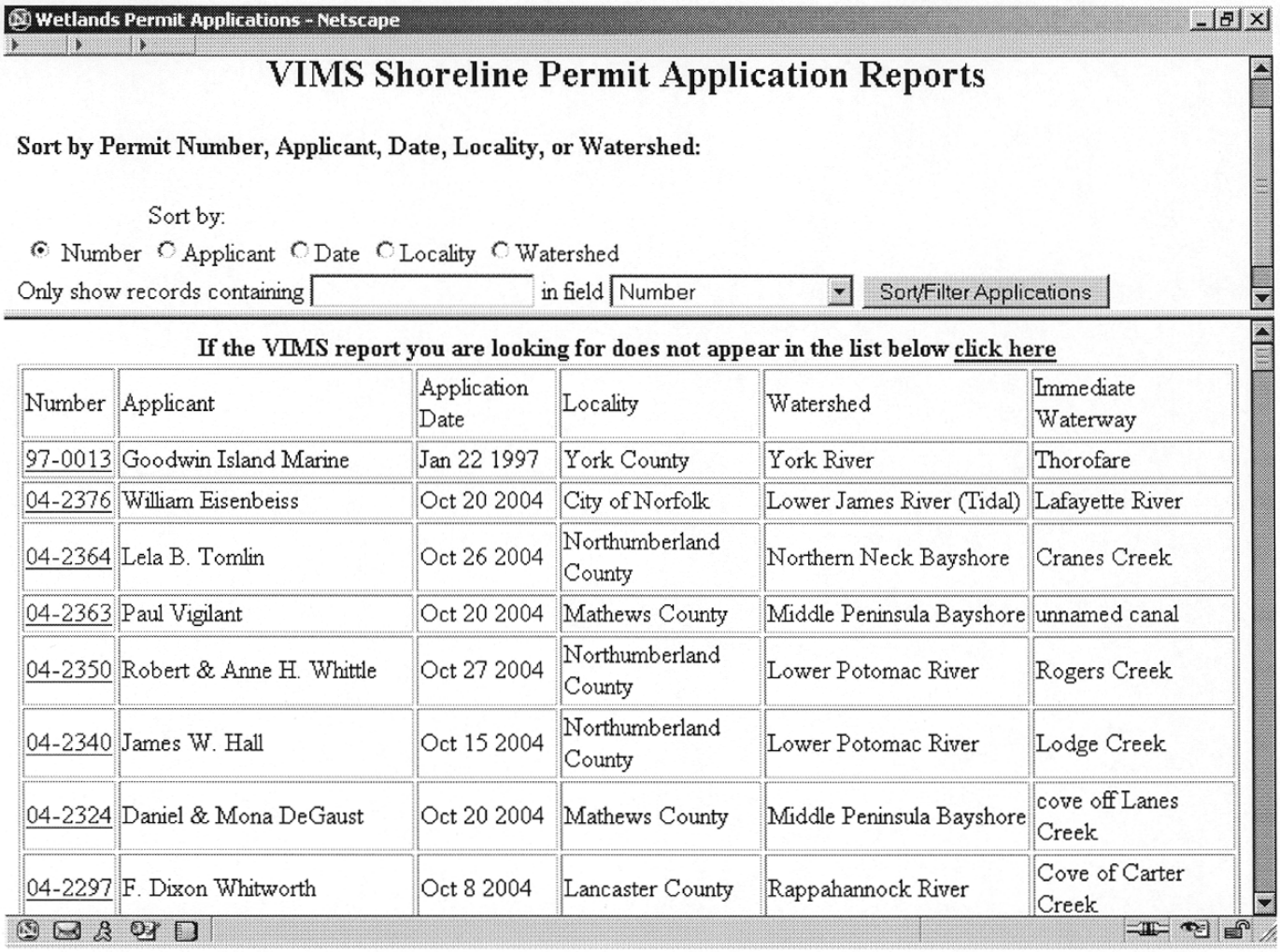
Calendar of Upcoming Events

December 6-10, 2004	**First National Conference on Ecosystem Restoration.** Orlando, FL. Includes large systems such as the Everglades and Chesapeake Bay http://conference.ifas.ufl.edu/ecosystem/#committee
March 20- 23, 2005	**9th International Symposium on Biogeochemistry of Wetlands.** Baton Rouge, LA. Abstracts due January 12, 2005. http://conference.ifls.ufl.edu/wetlands/index.html
March 29-April 1, 2005	**8th National Mitigation and Conservation Banking Conference.** Charlotte, NC. http://www.mitigationbankingconference.com Telephone (703) 548-5473.

Shoreline Advisory Reports continued from page 4

order to open and view the report. Additional reports and information for projects dating back to 1971 can be accessed using the link available at the top of the list (*http://ccrm.vims.edu/wetlands/scan.html*).

In the future, this platform will provide the foundation for on-line pre-application guidance for the shoreline property owner before contractors are hired for a specific job. The program will allow users to log on and review the shoreline management options best suited for their property location, shoreline conditions and existing coastal resources. The system will be available to anyone with Internet access and users will not be required to have GIS software on their own computer or maintain any databases.



Number	Applicant	Application Date	Locality	Watershed	Immediate Waterway
97-0013	Goodwin Island Marine	Jan 22 1997	York County	York River	Thorofare
04-2376	William Eisenbeiss	Oct 20 2004	City of Norfolk	Lower James River (Tidal)	Lafayette River
04-2364	Lela B. Tomlin	Oct 26 2004	Northumberland County	Northern Neck Bayshore	Cranes Creek
04-2363	Paul Vigilant	Oct 20 2004	Mathews County	Middle Peninsula Bayshore	unnamed canal
04-2350	Robert & Anne H. Whittle	Oct 27 2004	Northumberland County	Lower Potomac River	Rogers Creek
04-2340	James W. Hall	Oct 15 2004	Northumberland County	Lower Potomac River	Lodge Creek
04-2324	Daniel & Mona DeGaust	Oct 20 2004	Mathews County	Middle Peninsula Bayshore	cove off Lanes Creek
04-2297	F. Dixon Whitworth	Oct 8 2004	Lancaster County	Rappahannock River	Cove of Carter Creek

Figure 2. *Recently posted VIMS Shoreline Permit Application Reports as they appear on the Center for Coastal Resources Management web site.*