

# Virginia Water Central

Virginia Water Resources Research Center Blacksburg, Virginia January 2005 (No. 33)

*The staff of the Virginia Water Resources Research Center expresses our condolences for the tragic losses from the December 26, 2004, earthquake and tsunami and our encouragement to the survivors and all who are helping to relieve the suffering caused by the disaster.*

*For an excellent single source of information on groups accepting donations and the kinds of assistance they are providing, visit the Web site of InterAction, the American Council for Voluntary International Action, at [www.interaction.org/sasia/index.html](http://www.interaction.org/sasia/index.html).*

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VIRGINIA POLYTECHNIC INSTITUTE  
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## FEATURE ARTICLE

### Water Center Report: The Potential for Desalination in Eastern Virginia

“It may be completely impractical, but I woke up one morning and said, ‘James City County does this, what are the economics of [it]?’”

That was the early-morning epiphany of Hampton City Council member Randy Gilliland about **desalination** as a water-source for his city, as reported in the *Newport News Daily Press* (9/16/04). When Mr. Gilliland asked city staff to research the possibility, he had the same idea that the Virginia General Assembly had in 2003 when it passed Senate Joint Resolution No. 381, requesting the Virginia Water Resources Research Center to study desalination issues as part of a strategy to meet the Commonwealth's future drinking-water needs.

In June 2004, the Water Center completed Special Report SR25-2004, *The Feasibility of Using Desalination to Supplement Drinking Water Supplies in Eastern Virginia*, and submitted the report to the State Water Commission. The report identified the following issues as critical to implementing desalination technologies: type of desalination technology, environmental concerns and regulations, energy availability and cost, availability of water source for desalination, and cost to the customer.

This article presents the report's background on the desalination issue, synopses for each chapter, and the report's recommendations. The full report, written by Water Center Interim Director Tamim Younos, is available online at the Water Center's Web site, at [www.vwrrc.vt.edu/publications/Desal.pdf](http://www.vwrrc.vt.edu/publications/Desal.pdf).



#### Background on the Interest in Desalination (Report Chapter 1 Excerpt)

From 1999 to 2002, many localities in Virginia experienced a severe drought condition. But periodic droughts in Virginia are not unusual. The impact of the recent drought was significant because of the increased water demand and declining groundwater levels in many regions of the state. Normally, groundwater resources have served as a backup resource during critical water shortages. There is a high probability that Virginia, specifically in populated coastal areas and northern Virginia, faces a severe water shortage in coming decades because of increased water demand and periodic natural droughts.

## Meeting Future Water Demand in Virginia

There are several measures, or a combination of measures, that Virginia can implement to meet future water demand. Some of the conventional methods to meet future water demands, however, may not be considered practical or economical any longer. For example, building dams and reservoirs, one of the popular water storage and supply measures, may not be a viable solution because of the high cost of acquiring land and meeting environmental and regulatory requirements. Another alternative, interbasin water transfer, has supplied water to some regions of the state during past decades. Future interbasin-transfer projects, however, would face significant economic, environmental, regulatory, and societal challenges.

To meet long-term water supply demands, decision-makers can consider these additional options, or combinations of these options, to supplement existing water resources: water conservation, water reuse, groundwater recharge, and desalination.

Water conservation is an effective method where saved water can compensate for additional demand. Generally speaking, each gallon of water that is conserved by one user ‘creates’ a gallon for another user. In Virginia, citizens practice water conservation mostly during drought conditions. Ensuring water conservation during normal years requires public education programs. However, conservation by itself is unlikely to meet increased water demand.

Water reuse is another option. Currently, reclaimed water is reused in industry and agriculture in the United States and other countries. Similar to water conservation, each gallon of reused water substitutes for a gallon of water that from natural sources. An example of a successful water reuse strategy is the Occoquan reservoir system in northern Virginia. The Upper Occoquan Sewage Authority Water Reclamation Facility is one of the nation’s largest and most successful projects for the indirect reuse of reclaimed water to supplement a public surface water supply. Implementation of reuse strategies in other Virginia localities is a matter of public perception and public policy.

Preservation and restoration of groundwater aquifers is another water conservation option. Elements of long-term water supply planning should include protecting aquifer recharge zones along with increasing subsurface infiltration and groundwater recharge by implementing low-impact development techniques, such as forestation and bioretention in urban and suburban areas. Underground storage of excess water in half-empty aquifers during wet periods and artificial recharge of highly treated wastewater are options to be studied for their potential to meet future water demand.

## Introduction to Desalination

A broad definition of desalination includes treatment of *all impaired waters*, that is, waters contaminated by salts, metals, radionuclides, biologic organisms, organic chemicals, fertilizers, pesticides, and a host of other substances that must be removed prior to water being suitable for potable use. For the purposes of the report and this article, however, the definition of desalination (or **desalinization**) is limited to removing **salts**, or **total dissolved solids (TDS)**, from brackish water and/or seawater to produce potable water.

The concentration of TDS in water describes the amount of salts in the water. TDS refers to the sum of all minerals, salts, metals, and electrically charged molecules called **ions** (**cations** are positively charged, and **anions** are negatively charged) dissolved in water. There are more than 70 elements dissolved in seawater but only six make up greater than 99 percent (by the weight) of all dissolved salts. These major elements occur as ions.

The concentration of dissolved salts in water, expressed in milligrams of salts per liter of water (mg/L), is a measurement used to distinguish among seawater (or **saline** water), **brackish** water, and fresh water. Table 1.1 shows the approximate concentrations of the six main elements in typical seawater. Brackish water, on the other hand, contains less TDS than seawater but more than freshwater; moreover, most brackish water environments are dynamic and TDS levels in these environments fluctuate spatially and temporally (much more so than in seawater). The level of TDS in brackish surface water near the coast can vary depending on the tide, the amount of freshwater entering the system as rain or river flows, and the rate of evaporation.

Brackish water also occurs in coastal aquifers. Some deep groundwater aquifers contain brackish water under natural conditions. In addition, excessive groundwater withdrawals may cause seawater to move into coastal freshwater aquifers (a phenomenon known as saltwater intrusion) and create brackish water in the aquifers.

Because of many influencing factors, the range of TDS concentrations in brackish water and seawater can range between 500 mg/L to 50,000 mg/L, with brackish water TDS concentrations in the lower range and seawater TDS concentrations on the upper end of the range. The U.S. Environmental Protection Agency has set the Secondary Maximum Contaminant Level (SMCL) or aesthetic standard for TDS in potable water as <500 mg/L.<sup>1</sup>

**Table 1. Typical Composition of Seawater.**

Element (and Chemical Symbol)	Concentration (mg/L)
Chloride (Cl)	19,400
Sulfate (SO <sub>4</sub> )	904
Calcium (Ca)	411
Sodium (Na)	10,800
Magnesium (Mg)	1290
Potassium (K)	392

Conventional water-treatment plants that use coagulation, sedimentation, and filtration technologies cannot remove dissolved salts from brackish or seawater. Desalination technologies are being developed and used worldwide to convert brackish water and seawater to water that meets drinking water standards or other intended uses. **Currently there are 12,500 desalination plants in the world totaling a water production capacity of approximately 6 billion gallons/day.**<sup>2</sup> At present, major large-scale desalination facilities in the United States are being developed or planned in Florida and California. Chapter 5 of this report describes existing desalination plants in Virginia and North Carolina.

## Synopses of Report Chapters 2—5

### Chapter 2: Overview of Treatment Technologies Applied to Desalination

This chapter examines current and futuristic desalination technologies to treat brackish and saltwater to produce potable water. The three main categories of technologies described are **membrane filtration** (using thin films of porous materials to remove certain particles from water); **ion-exchange** (using solid chemical resins to remove, or exchange, ions from surrounding water); and **thermal technologies** (using heat to evaporate water and leave salts behind). The chapter discusses the applicability and the limitations of the technologies.

### Chapter 3: Environmental Issues of Desalination

The objective of Chapter 3 is to provide an overview of environmental issues related to desalination. **Environmental concerns are a major factor in the design and implementation of cost-effective desalination technologies.** Major environmental concerns include issues related to brackish groundwater withdrawal, surface water intake, disposal of brine and other water treatment residuals (called **concentrate**), and ecosystem effects. The report discusses five main concentrate-disposal methods: discharge to surface waters, disposal to a publicly owned wastewater treatment works, land application, deep well injection, and use of evaporation ponds.

### Chapter 4: Energy Needs, Consumption, and Sources

Chapter 4 presents energy types used for various desalination techniques, amounts of energy used, methods of conservation, and the potential use of renewable energy resources for desalination (solar, wind,

<sup>1</sup> A TDS concentration of less than 200 mg/L in drinking water is desirable. High TDS content in potable water is a nuisance that may cause scaling in pipes, staining bathroom fixtures, corrosion of piping and fixtures, reducing soap lathering, and objectionable tastes.

<sup>2</sup> Countries using desalination include (among others) Australia, Canada, Egypt, France, Germany, India, Indonesia, Italy, Kuwait, Japan, Mexico, Qatar, Saudi Arabia, Spain, Tunisia, and United Arab Emirates.

geothermal, tidal, waves, and ocean heat gradients). One section describes attempts to couple desalination with the heat generated from nuclear power plants. **Desalination is energy-intensive, so energy consumption directly affects the cost-effectiveness of using desalination technologies.** Energy is needed in various stages of desalination, particularly for pumps, which consume a significant amount of energy. For example, pumps are necessary in feedwater intake, treatment processes, and discharge of product water and concentrate. The amount of energy pumps consume depends on the type of process, the TDS concentration in the feedwater, the capacity of the treatment plant, the temperature of the feedwater, and the location of the plant with respect to the location of the intake water and concentrate disposal site. The report found published values of desalination energy use ranging from 1.7 to 23.2 kilowatt hours per cubic meter of potable water produced (one cubic meter equals 264 gallons).

Some of the information provided in this chapter may not be applicable to today's Virginia energy issues, but the chapter's comparison of costs associated with various desalination energy sources worldwide can be used as a reference for future energy development and use in Virginia.

## Chapter 5: Feasibility of Using Desalination in Eastern Virginia

Chapter 5 focuses on issues that relate to the feasibility of implementing desalination in eastern Virginia. This chapter provides data on projected population growth and future water demand, available surface and groundwater resources, the rationale for implementing desalination technologies, a description of the four existing desalination plants in eastern Virginia<sup>3</sup>, and a discussion of the feasibility of using desalination technologies in eastern Virginia.

A major assumption of this study is that the greatest potential for implementing desalination exists in the counties and cities in eastern Virginia within close proximity of the Chesapeake Bay and the Atlantic Ocean. Specifically, the report considers four geographic regions: Hampton Roads, the Eastern Shore, the Middle Peninsula, and the Richmond/Petersburg area with their surrounding counties. Many localities in eastern Virginia project significant population growth that will affect future water demand. Estimates from this study show that projected population increases (using 2000 population data as a reference) will translate to an **additional drinking water demand of approximately 20 million gallons per day (MGD) by 2010, 50 MGD by 2020, and 75 MGD by 2030 in eastern Virginia.**

The feasibility issues discussed in this chapter include potential water resources for desalination, environmental effects of desalination, required permits and regulations, availability of energy resources, and potential costs.

## Conclusions (from Chapter 6)

### The Need for Desalination

While there is no comprehensive inventory of water resources for eastern Virginia, the available information indicates that *a significant need exists for using desalination in eastern Virginia.* The following 10 points define the need more specifically.

1. The Hampton Roads area is the home of one of the largest port facilities in the country and hosts a major military complex. As a result, the area has experienced rapid population growth that has strained local water supplies. Because of the population growth and the difficulty in developing new water sources locally, water shortages in the region have become commonplace over the last two decades. Water restrictions resulting from water shortages have occurred in every dry period since 1976.
2. Because of withdrawals from Coastal Plain aquifers, groundwater levels have declined in the region as deep as 160 feet below sea level near major pumping centers. Groundwater levels in the interior portions of the Middle Potomac aquifer (Southampton County), in the Yorktown-Eastover aquifer (Southampton County), and Chickahominy-Piney Point aquifer (King William, Caroline, and King and Queen counties) are approaching critical conditions.
3. Major cities in eastern Virginia (Chesapeake, Virginia Beach, Norfolk, Newport News, Portsmouth and Suffolk) are within the Groundwater Management Area. From a regulatory standpoint, the stress on the

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<sup>3</sup> The four existing desalination plants in eastern Virginia are in Chesapeake, Gloucester, Newport News, and Suffolk. A fifth desalination plant is scheduled to be in operation in January 2005 in James City County. All five plants use brackish groundwater.

aquifer system is such that the DEQ may have to start denying permit issuance in some areas of the Ground Water Management Area.

4. Virginia Beach, the largest city in the area, has very little fresh groundwater available to meet current or future needs. Virginia Beach relies on interbasin transfer from the Lake Gaston pipeline. If the pipeline is disrupted for any reason, it will have major consequences for Virginia Beach and the region.
5. The Virginia Department of Health has advised the City of Newport News (Newport News Water Works) and James City County of the need to develop additional sources of supply, as the current demands have exceeded the “trigger level” contained in the *Commonwealth of Virginia Waterworks Regulations* for such action. To meet future demand, brackish groundwater or other saline waters will be the only available local resources.
6. Portsmouth and Norfolk, the older cities in the area, developed the limited surface water supplies before the newer cities of Chesapeake, Suffolk, and Virginia Beach came into existence. Portsmouth and Norfolk have sufficient water supplies to meet their current needs and supply their surplus water to Virginia Beach and Chesapeake. But the surplus is not adequate to meet the needs of these latter cities, where much of the population growth is occurring.
7. The proposed King William Reservoir project will supply only up to 60 percent of the Lower Peninsula’s future water needs. Desalination of brackish groundwater is considered as potential way to supplement a portion of the additional demand.
8. Construction of additional reservoirs in eastern Virginia is less likely because of environmental concerns, high cost, and difficulty in purchasing the needed land.
9. Parts of the counties of Charles City, Hanover, Henrico, and New Kent and of the city of Petersburg are situated within the Eastern Virginia Ground Water Management Area. These localities will compete with Hampton Roads area and the Middle Peninsula for available water resources in the region.
10. Accomack and Northampton counties rely solely on groundwater to meet drinking water needs. Future economic growth in the area depends of the availability of alternative water sources.

## Recommendations

Desalination cannot be considered as a stand-alone measure to meet increased water demand for public water supplies. Rather, **desalination should be considered as a viable component of an overall water supply management plan that includes all available sources of water** (fresh and impure) and all uses of water (public water supply, agriculture, industry, etc.).

Technology is not a limiting factor in implementing desalination in eastern Virginia. Technologies are available for desalination of brackish and seawater. These technologies are implemented worldwide, and further research and development of more cost-effective desalination technologies are underway. Advanced brackish water desalination technologies are already implemented in the Hampton Roads area with acceptable cost to the public.

But better or more use of desalination in eastern Virginia requires addressing issues in three areas: knowledge of available water sources, institutional arrangements, and ecosystem impacts.

**Water Resource Inventory.** At present, a comprehensive and reliable database of surface water and groundwater resources in eastern Virginia is not available. It is important to understand that brackish and saline groundwater resources are not disconnected from fresh surface and groundwater resources. Extraction of brackish water will have effects on adjacent fresh groundwater reservoirs and ultimately on surface water resources as well. *A better inventory of surface and groundwater resources is needed for optimal site selection of desalination plants.*

•**Recommendation:** Legislative guidance and state government leadership are needed to develop a comprehensive database of available water resources in eastern Virginia. This should be followed by a viable regional water supply and allocation plan based on the scientific evaluation of existing water resources and the potential for developing impure water sources such as saline water.

**Institutional Issues.** *There is a significant need for regional collaboration for successful implementation of desalination and to meet future water demand.*

•**Recommendation:** Legislative guidance and state government support are needed to form a regional utility task force that will coordinate activities of numerous utilities in the region and to develop a strategic plan for future use of large-scale desalination technologies in eastern Virginia. The task force should determine where the needs are and identify potential sites to locate desalination facilities.

•**Recommendation:** Legislative guidance is needed to form an inter-governmental task force that will coordinate and expedite permit reviews among various federal and state agencies for the implementation of future desalination plants.

•**Recommendation:** Energy costs are a major factor in the production cost for desalination plants, particularly when using high salinity waters such as tidal water and seawater. There is a need to develop a mechanism for enhanced cooperation between water utilities and power companies to make existing and future desalination plants more cost-competitive.

**Ecosystem Management Issues.** Less is known about various effects of desalination plants on receiving waters and coastal ecosystems. *Research is needed to provide science-based information that can facilitate science-based permitting and developing regulatory guidelines.*

•**Recommendation:** Legislative action is needed to provide funds that can support research for developing environmentally sound desalination practices. Research is needed to address ecosystem impacts, including the effects of water withdrawal, water intake structures, and brine disposal. Research is also needed on the cost-effectiveness of various brine disposal and management technologies, such as Zero Liquid Discharge and brine reuse potential.

## TEACHING WATER

### Especially for Virginia's K-12 teachers

### This Issue and the Virginia Standards of Learning

Below are suggestions for Virginia Standards of Learning (SOLs) that may be supported by this issue's Feature Article, Water Status Report, and For the Record section. The SOLs listed below are from Virginia's 2003 Science SOLs and 2001 Social Studies SOLs. Abbreviations: CE = civics and economics; ES = earth science; GOVT = Va. and U.S. government; LS=life science; WG = world geography.

Newsletter Section	Science SOLs	Social Studies SOLs
Feature (Desalination)	6.9, LS.12, ES.7, ES.9, ES.11	WG.2, WG.7
Water Status (Stream Flow)	6.1, 6.5, 6.7, ES.7, ES.9	None
For the Record (Following the General Assembly)	6.9, LS.12	CE.7, GOVT.1, GOVT.8, GOVT.9, GOVT.16

## VIRGINIA WATER STATUS REPORT

This section of *Water Central* presents recent and historical data on Virginia's precipitation, stream flow, and groundwater levels (one topic per issue, rotating among the three topics).

### Recent Stream Flow in Virginia: Normal to Above Normal

The following graphs, taken from the U.S. Geological Survey's Internet site, "WaterWatch—Current Water Resources Conditions,"<sup>4</sup> compare recent Virginia stream flow to historical records. The sites included in the graphs all have at least 30 years of records. The top graph covers November 21, 2004—January 5, 2005; the bottom graph covers July 1999 through December 2004. Each graph uses a "stream flow index," which measures how a site's average streamflow *over 24 hours* (the **average daily stream flow**) compares to the historical average stream flow *for that same site and date*. The graphs show a further average: the stream flow index averaged *over all the monitoring stations*.

Index values mean the following:

Values indicating dry conditions:

- 1 = average daily flow for the graphed date is a record low flow for that date;
- 2 = average daily flow for the graphed date exceeds less than 10 percent of historical values for that date;
- 3 = average daily flow on the graphed date exceeds 10—24 percent of historical values for that date;

Value indicating "normal" flow:

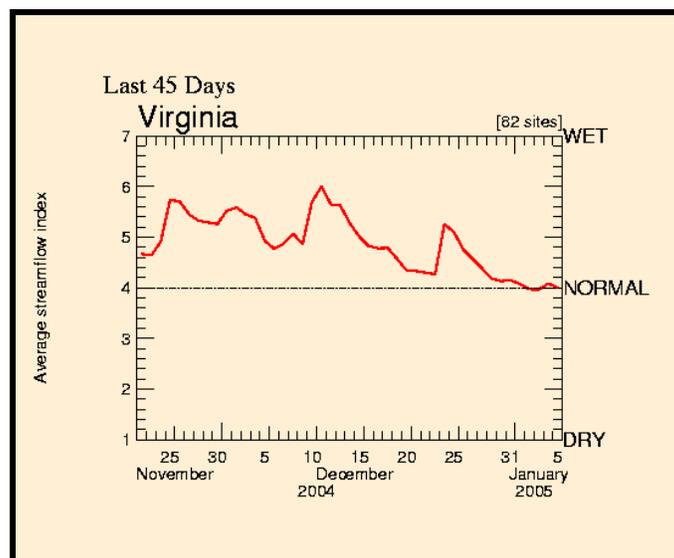
- 4 = average daily flow on the graphed date exceeds 25—74 percent of historical values for that date;

Values indicating wet conditions:

- 5 = average daily flow on the graphed date exceeds 75—89 percent of historical values for that date;
- 6 = average daily flow on the graphed date exceeds 90 percent of historical values for that date;
- 7 = average daily flow for the graphed date is a record high flow for that date.

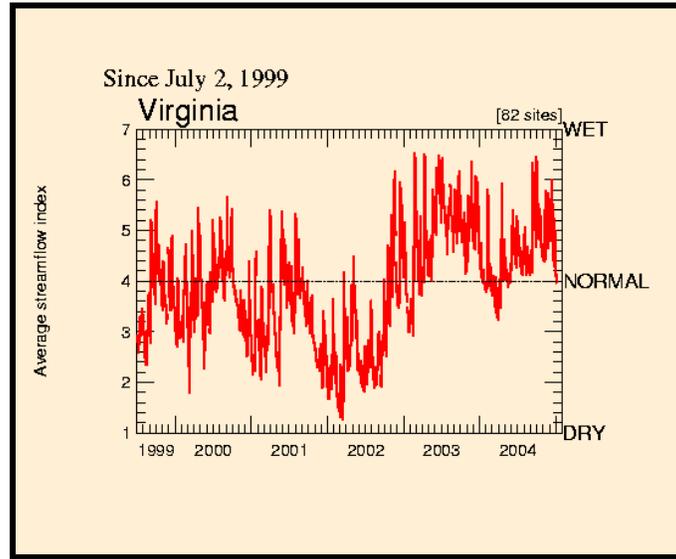
**Gaps in the data:** Data are not plotted for days when fewer than two-thirds of the stations report data (due to equipment or weather problems). On such days, plotting a statewide average value may misrepresent actual conditions.

#### Average Daily Stream Flow Index, Compared to the Historical Average, November 21, 2004—January 5, 2005.



<sup>4</sup> [Water.usgs.gov/waterwatch/index.html](http://Water.usgs.gov/waterwatch/index.html), 1/6/05. At this site, click on Virginia on the U.S. map, then click on "Time Series Plot of Real-time Streamflow."

### Average Daily Stream Flow Index, Compared to the Historical Average, July 1999—March 2004.



## IN AND OUT OF THE NEWS

### Newsworthy Items You May Have Missed

The following summaries are based on information in the source(s) indicated in parentheses, usually at the end of each item. Selection of this issue's items ended in late December 2004 (with some updates from early January 2005). Except as otherwise noted, the localities mentioned are in Virginia and the dates are in 2004.

### In Virginia...

#### Chesapeake Bay News

Recent news about the Chesapeake Bay focused on measurements, oysters, craters, money, menhaden, lawsuits, and law.

•In November the Chesapeake Bay Foundation released its annual **State of the Bay Report** and rated the overall Bay health a "D." The latest report covers the 12-month period ending September 30, 2004. In each report, the Bay Foundation rates 13 biological and chemical measurements from 0 to 100, with 100 intended to represent conditions as they existed before European settlement. The report then averages the scores to give an overall Bay score. This year's average score is 27, the same as the past three years. A score of 40 by the year 2010 is the goal set in the Chesapeake Bay 2000 agreement. Following are scores from the past five reports:



	2000	2001	2002	2003	2004
Forested Buffers	53	54	54	55	55
Resource Lands	33	30	30	29	29
SAV*	12	12	12	22	18
Wetlands	42	42	42	42	42
Blue Crabs	46	42	40	38	38
Oysters	2	2	2	2	2
Rockfish	75	75	75	75	73
Shad	5	6	7	9	10
Dissolved Oxygen	15	15	15	12	13
Nitrogen	15	15	16	13	12
Phosphorus	15	15	16	13	16
Toxics	30	30	28	28	27
Water Clarity	15	15	16	14	15
<b>AVERAGE</b>	<b>28</b>	<b>27</b>	<b>27</b>	<b>27</b>	<b>27</b>

\*Submerged aquatic vegetation, also called "Bay grasses."

The current and previous years' State of the Bay reports are available online at the Bay Foundation's Web site, [www.cbf.org](http://www.cbf.org).

(Additional information for this item came from *Richmond Times-Dispatch*, 11/30/04, and *Annapolis Capital*, 11/30/04)

•Research and debate continues over the **possible introduction of non-native oysters** (*Crassostrea ariakensis*) into the Chesapeake Bay. A study by the National Academy of Science's National Research Council suggested that it would take six or seven years to research the question adequately. In Fall 2004, the National Oceanic and Atmospheric Administration's Chesapeake Bay Office, the U.S. Environmental

Protection Agency (EPA), the U.S. Fish & Wildlife Service, and other scientists proposed a three-year research plan. Virginia and Maryland are cooperating on an environmental impact statement that is to provide a recommendation by Summer 2005. Finally, Maryland appointed a panel in November 2004 to determine by February or March, 2005, if enough information is available to go ahead with an introduction. In December 2004, fisheries officials in Delaware and New Jersey stated that they preferred several more years of research.

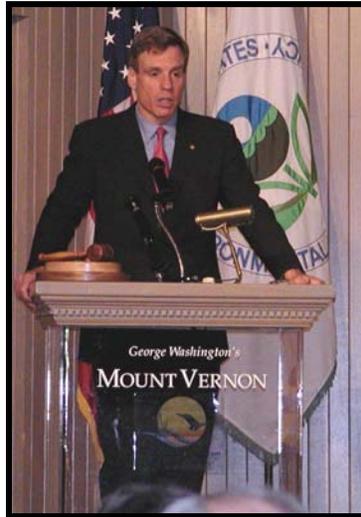
Preliminary tests have shown that *C. ariakensis* are disease-resistant, grow quickly in the Bay, and perform well in taste-tests, all of which would be helpful to the stressed oyster industry. But the oysters are not widely used in commercial production and therefore relatively little is known about them. Key questions include the following: *C. ariakensis* actually refers to two distinct species; scientists do not know if the oysters will build reefs, necessary in replacing the reef habitats once provided by native oysters; the non-native oysters are highly susceptible to a parasite (*Bonamia*); they have thinner shells than those of the native *Crassostrea virginica*, making them more vulnerable to predators; and it is unknown whether they would compete with native oysters for habitat. (*Bay Journal*, October 2004; and *Baltimore Sun*, 12/29/04)

•**An update into the investigation on the Chesapeake Bay impact crater:** in October, the U.S. Geological Survey set off a line of underground explosions, 70 feet deep, stretching 20 miles from Cape Charles to Nassawadox. The resulting underground vibrations were recorded by approximately 700 seismographs. The map created from these results will be used to determine where a team will drill a deep well into the 35-million-year-old, 56-mile-wide crater. The well will help scientists investigate the crater's geological make-up and impact on local groundwater. (*Virginian-Pilot*, 10/11/04. For a related previous article, please see the August 2004 *Water Central*, p. 16.)

•In October the Chesapeake Bay Watershed **Blue Ribbon Finance Panel** released a 40-page report, *Saving a National Treasure: Financing the Cleanup of the Chesapeake Bay*. The main recommendation was for the federal government and Bay states to commit \$15 billion (\$12 billion federal, \$3 billion from states) over six years to a regional financing authority. According to the panel's Web site, the proposed authority would "generate sustainable revenue streams to adequately fund long-term Bay restoration programs; provide funds to all sectors of Bay pollution, but specifically address agriculture and wastewater treatment; and...distribute funds across state boundaries in all parts of the Bay watershed." The report is available online at [www.chesapeakebay.net/blueribbon.htm](http://www.chesapeakebay.net/blueribbon.htm).

The following month, Virginia's two U.S. senators and three of its U.S. representatives signed a letter to President Bush requesting \$1 billion in the Fiscal Year 2006 federal budget for Bay cleanup efforts. The Blue Ribbon Panel's report recommended this amount in the first year of the proposed six-year plan. The letter was also signed by the U.S. senators from Maryland and Pennsylvania and by several other U.S. representatives. (Blue Ribbon Panel Web site [see above], 11/12/04; *Richmond Times-Dispatch*, 12/2/04; and *Bay Journal*, Jan.-Feb. 2005)

At its annual meeting on January 10, 2005, the **Chesapeake Bay Executive Council**—the governors of Virginia, Maryland, and Pennsylvania, the mayor of Washington, D.C., and the director of the U.S. EPA—pledged to lobby Congress this year for more federal funds for the Bay. The Council also agreed to work toward the regional financing authority called for by the Blue Ribbon Finance Panel. The staff of the Executive Council is to convene a group of finance and legal experts to develop a specific proposal by July 2005 for creating such an authority. (Chesapeake Executive Council Director No. 04-1, 1/10/05; *Newport News Daily Press*, 1/11/05)



Virginia Gov. Mark Warner addressing the public session of the Chesapeake Bay Executive Council meeting, January 10, 2004, at Mt. Vernon. Photo by Alan Rafló.

•Meeting in November, the Atlantic States Marine Fisheries Commission's Menhaden Management Board (MMB) declined to impose a temporary cap on **menhaden fishing**, instead calling for extensive research on the menhaden population, especially in the Chesapeake Bay. Those concerned about the welfare of the menhaden, ranging from Striped Bass (Rockfish) fishers in New Jersey to Chesapeake Bay environmentalists, are apprehensive that without the cap, there may not be enough time to conduct long-term research on the fish without risking its disappearance. Others groups—such as Omega Protein, a Houston company with a menhaden-processing plant in Reedville (Northumberland County)—maintain that the population is healthy and catch limits are not necessary.

Menhaden was one of the top ten money-producing species on the East Coast in 2003, with a value of \$24.4 million; some 300 million pounds were caught in Virginia waters in 2002. Menhaden also provide food for other fish (including Striped Bass), birds, and mammals, and they help maintain water quality through their filter-feeding process. In February, the MMB will meet with a committee of scientists assembled to study the fish; those scientists are to provide a preliminary report in August. (*Annapolis Capital*, 11/10/04; *Asbury Park [N.J.] Press*, 11/14/04; and *Newport News Daily Press*, 12/5/04)



Menhaden in the hold of a fishing vessel. Photo by Bob Williams, from the online Photo Library of the National Oceanic and Atmospheric Administration ([www.photolib.noaa.gov](http://www.photolib.noaa.gov))

Meanwhile, a bill is expected in the 2005 Virginia General Assembly that would move regulatory authority for Virginia menhaden harvests from the legislature to the Virginia Marine Resources Commission. (*Virginian-Pilot*, 12/29/04)

- The Chesapeake Bay Foundation filed a lawsuit in November against the Environmental Protection Agency (EPA) for **allegedly failing to respond adequately to nitrogen pollution in the Bay watershed**. The Bay Foundation's concerns were voiced to the EPA in a legal action they filed December 1, 2003, which outlined a number of actions the group considers necessary to reduce nitrogen pollution in the Bay, such as requiring Bay states to enforce nitrogen-discharge limits. The lawsuit asks the federal court to speed up EPA's response to the December 2003 petition. (*Washington Post*, 11/10/04 and *Lynchburg News and Advance*, 11/10/04)

- The so-called "**Virginia Clean Streams Law**" is expected to generate debate and controversy in the 2005 Virginia General Assembly (convenes January 12; adjournment scheduled for February 26). The bill proposes a \$1-per-week sewer fee levied on residences and industries, generating an estimated \$160 million annually to improve water quality in the Bay as well as in other state waters. About two-thirds of the money would be used for nutrient-removal technology at large sewage-treatment facilities (reducing nutrients—nitrogen and phosphorus—is considered the most important task in improving Bay water quality). The remaining funds would be used to reduce pollution from stormwater runoff from agricultural lands. Maryland passed a similar measure in 2004. (*Newport News Daily Press*, 12/17/04; *Virginian-Pilot*, 1/2/05)

## Other Virginia News

- What will future Virginians find down by the riverside?** Several recent news items reveal various ways that Virginians and others are managing their riverfront lands. The first three items below involve efforts to minimize development near rivers; the next three involve large-scale riverfront-development projects (one project is along the Potomac in Maryland); and the last one involves an urban riverfront preservation and recreation effort.

### River Land Conservation Efforts

- In October, the Virginia Outdoors Foundation (VOF) and the Friends of Chesterfield's Riverfront established a conservation easement to preserve **263 acres in the Enon area of Chesterfield County**. The easement covers the Brown & Williamson Conservation Area, a mile of which lies along the **James River**. Plans were announced to add parking, trails, and an access road, which is expected to cost approximately \$500,000 and take around six years to complete. (*Richmond Times-Dispatch*, 10/6/04)

- In December, VOF received two conservation easements, granted by two families, covering **458 acres and 3.5 miles along the New River in Grayson County**. Groups working to secure the easements were American Farmland Trust, the Blue Ridge Rural Land Trust, the Conservation Fund, the National Committee for the New River, and the New River Land Trust. (*Roanoke Times*, 12/10/04)

- The state granted approval in December for Stafford County to use up to \$30 million from the Virginia Clean Water Revolving Loan Fund to purchase **Crow's Nest, an undeveloped, 4,125-acre peninsula near the Potomac River**. The ecologically rich area lies between Potomac Creek and Accokeek Creek in eastern Stafford County. The loan would add to other money that state and local agencies have set aside for the property, for which the owner—the K&M company of McLean—has said it wants approximately \$50 million. While purchase discussions continued, K&M submitted a preliminary subdivision plan for the property. Late in December, the Stafford County supervisors were debating whether the county could afford to borrow the money for the purchase. (*Fredericksburg Free Lance-Star*, 12/4/04; and *Washington Post*, 12/28/04)

### Riverfront Development Projects

- In November Prince William County announced plans by KSI Services, Inc., to build a **272,000-square foot hotel and conference center along the Potomac River**. The \$50-million center will be part of Harbor Station, a mixed-use waterfront development located a few miles south of Woodbridge. The Prince William County supervisor representing the district hailed the project for preserving open space, being sensitive to environmental concerns, and allowing more people to experience the riverfront. (Prince William County Department of Economic Development press release, 11/4/04)

••On December 2, ground was broken for **National Harbor, a \$2-billion resort, convention, and commercial center** along the Potomac River in Prince George's County, Maryland. A 400,000-square-foot, 1500-room convention center, the first phase of the project, is scheduled to open in 2008. Construction of the entire project is expected to take 10 years. (*Washington Post*, 12/3/04)

••In December the Henrico County Planning Commission was considering a proposal by HHHunt Corporation to build over **3,200 homes mixed with stores and offices on a 1,185-acre tract along the James River**, near Varina. The development, which would be one of the largest in the county, would provide 147 acres along the river for a county park. The county planning commissioner who represents the area said much of the community approved of having a planned development rather than a series of smaller subdivisions. (*Richmond Times-Dispatch*, 12/5/05)

#### Urban Riverfront Preservation and Recreation

••On November 9, Alexandria's City Council approved beginning negotiations to **purchase 2.1 acres of land along the Potomac River in an effort to preserve and utilize parts of its historic waterfront for public recreation**. Alexandria's mayor said he hopes there will be a recreation plan in place by early 2006. Seven parcels of land have been targeted for acquisition, but buying them could cost between \$10 million to \$15 million and possibly more, which has drawn some criticism. Other criticism has come from the Old Dominion Boat Club, which has functioned in Alexandria since 1880. The club's current location is on a parcel the City wants to obtain, and the club is concerned that they may lose their location without having a viable alternative site. (*Washington Post*, 11/10/04)



•In October, the American Automobile Association (AAA) sponsored an **effort to replace mercury light switches** on cars with safer, ball-bearing switches. The one gram of mercury, a neurotoxin, contained in one switch is enough to pollute a 20-acre lake. It is estimated that in Virginia, there are around 4.5 million mercury switches on the road, which could add up to over 9,900 pounds of the potentially harmful substance. The mercury light switches are found in many domestic cars made before 2001, and in imports made before 1995. AAA-sponsored auto shops offered to change the switches for free in October, but the simple procedure can be done at any time. More information, including a search engine for local auto-shops and a table showing which cars are affected, is available online at [www.aaamidatlantic.com/automotive/aar/promo.asp](http://www.aaamidatlantic.com/automotive/aar/promo.asp). (*Richmond Times-Dispatch*, 10/14/04. For another mercury-related item, please see second item in the "Outside of Virginia" section below.)

•On October 25, the U.S. EPA presented the **source water protection award to Amherst County**. Besides the county, other organizations involved were the Town of Amherst, the Robert E. Lee Water and Soil Conservation District, the Amherst County Service Authority, Lynchburg and Sweet Briar Colleges, and the Virginia Department of Conservation and Recreation. These organizations worked in the Harris Creek, Graham Creek, and Buffalo River watersheds, adopting zoning ordinances, conducting field surveys, and installing best management practices. (News release from the U.S. EPA Web site, [www.epa.gov/reg3/wapd/swp](http://www.epa.gov/reg3/wapd/swp), 10/25/04)

•On November 8, authorities arrested a Bedford County mobile-home-park owner and charged him with **Clean Water Act violations related to sewage disposal**. The owner, who has assets of \$4.8 million according to court records, allegedly has failed to maintain proper sewage disposal at the 106-home park since 1979; federal authorities at one time estimated the cost to correct the problems at less than \$200,000. The charges carry maximum penalties of 39 years in prison and a \$3.2 million fine. The Virginia Department of Health (VDH) has also brought administrative actions against the owner over drinking water at the park. Both the VDH and the Virginia Department of Environmental Quality (DEQ) have turned their complaints over to the Virginia attorney general. (*Roanoke Times*, 11/9/04)

•The Frederick County Board of Supervisors decided in November to establish a program to **monitor farmland application of biosolids** (solid material remaining after wastewater treatment). In various Virginia localities, residents have raised concerns about biosolids, but it is against state law for counties to prevent land application of biosolids. (An Appomattox County lawsuit over attempted local regulation of biosolids was settled in February 2004; please see the April 2004 *Water Central*, p. 14.) The Frederick County measure requires farmers to notify the county each time they spread biosolids on their property and provides for a county employee to ensure that application follows state and federal laws. The county will also seek to collect revenue from companies that apply biosolids for farmers, in order to pay for the cost of monitoring. (*Winchester Star*, 11/11/04)

•**Cobbs Creek in northern Cumberland County** has been chosen by the Cumberland Board of Supervisors as the **proposed site for a new reservoir**. The reservoir is to help stimulate economic development in Cumberland and provide Henrico County with an additional water source during dry periods. According to preliminary estimates, the lake would cover an estimated 1,100 acres (flooding only one acre of wetlands), hold 15 billion gallons of water, and cost approximately \$170 million. The supervisors rejected an alternative, Muddy Creek that would have covered about 3,600 acres and would have flooded more than 200 acres of wetlands. Cumberland is speaking with officials in Richmond and Powhatan—two localities between Cumberland and Henrico—about joining the endeavor. A public meeting to discuss to reservoir was held on December 1, 2004, and a final decision on whether to go ahead with the reservoir project is expected in 2006. (*Richmond Times-Dispatch*, 11/11/04)

•**Put the fats in the trash, not down the drain!** That's the message Hampton and Virginia Beach public works officials are trying to spread about proper disposal of kitchen grease, other fats, and oils. As in many other localities, many sewage backups in these two cities are caused by residents and restaurants putting grease down the drain. In Fall 2004, Hampton began giving plastic buckets for grease disposal to residents in areas where persistent sewage backups had occurred. At Virginia Beach's public libraries and recreation centers, residents can pick up "Grease Avenger" comic strips and grease-can lids. And the Hampton Roads Planning District Commission is developing educational materials on proper grease disposal by restaurants. (*Virginian-Pilot*, 11/25/04; and *Newport News Daily Press*, 12/20/04)

•On December 2, after over two years of consideration, the State Water Control Board (SWBC) designated ten "**exceptional waters**." The federal Clean Water Act requires states to have an exceptional-waters program under which the highest-quality water bodies can be designated for special protection (for example, no new discharges may be added to an exceptional water). Nominations of exceptional waters can come from citizens or from the Virginia DEQ staff.

The newly designated waters are as follows:

Bottom Creek, Montgomery/Roanoke counties;  
 Brown Mountain Creek, Amherst County;  
 Lake Drummond, Chesapeake/Suffolk cities.  
 Laurel Fork, Highland County;  
 Little Stony Creek, Giles County;  
 North Fork Buffalo River, Amherst County;  
 Pedlar River, Amherst County;  
 Ragged Island Creek, Isle of Wight County.  
 Ramseys Draft, Augusta County;  
 Whitetop Laurel Creek, Washington County.

One other stream, North Creek in Botetourt County, had previously been designated. The SWCB is currently considering a proposal for exceptional water status for a section of the Cowpasture River in Alleghany County. (*Richmond Times-Dispatch*, 12/3/04. For a previous item on the Cowpasture River proposal, please see the August 2004 *Water Central*, p. 17.)

•Installing a "**green roof**"—a roof covered with soil and growing plants—is a stormwater-capturing technique that's capturing a lot of attention. The idea of a green roof is for the plants and soil to allow rainwater to collect, infiltrate, and eventually evaporate, rather than run off quickly to a downspout, storm drain, and local stream. The technique can also reduce building temperature in the summer and provide insulation in the winter. Such roofs typically cost more to install but reportedly can last much longer than a conventional roof. Three recent news items showed how the idea is spreading:

••Aided by a grant from the Virginia Department of Conservation and Recreation (DCR), **Fire Station 30 in Fairfax County** will install a green roof, along with porous pavers to reduce the amount of impervious surface in the station's parking lot.

••The **Albemarle County Office Building** will get a green roof this summer. The DCR also provided a grant for this project.

••The **Alliance for the Chesapeake Bay** will give a \$28,000 grant for a demonstration green roof on a commercial, multi-residential, recreational, or municipal building in James City or New Kent counties or the Richmond area. Applications are due by February 14, 2005. For information on applying, phone (804) 775-0951 or visit [www.acb-online.org](http://www.acb-online.org). (*Washington Post*, 12/12/04; *Charlottesville Daily Progress*, 12/14/04; and *Newport News Daily Press*, 12/22/04)

## ...and Outside of Virginia

•**Do stormwater-management ponds and wetlands lead to more mosquitoes?** North Carolina State University researchers are trying to get some hard data on the question. In 2004 the researchers surveyed stormwater ponds and wetlands to quantify mosquito populations and to determine how well certain natural mosquito-control techniques—such as vegetation to attract dragonflies and other mosquito predators—actually work. The study, “Quantifying Mosquito Presence at Stormwater Treatment Wetlands and Innovative Wet Ponds,” was funded by the North Carolina Urban Water Consortium. (North Carolina Water Resources Research Institute newsletter, Jul.-Aug. 2004)



•Studies of bird feathers by Florida researchers show that **mercury levels in the Everglades** decreased by 90 percent from 1994 to 2003. The decrease in mercury contamination in birds (and in fish) paralleled a similar decrease in locally generated emissions of mercury from medical and municipal waste incineration. The researchers believe that regulations implemented in the 1990s on municipal waste combustors, medical waste incinerators, and mercury content of household goods (such as batteries) led to the decreased mercury emissions. (*National Wetlands Newsletter*, Sep.-Oct. 2004 and Jan.-Feb. 2005)

•**Mountaintop mining, so-called valley fills, and a U.S. Army Corps of Engineers “nationwide permit”** were the subject of a July 8 ruling in the case of *Ohio Valley Environmental Coalition v. William Bolen*. The U.S. District Court for the Southern District of West Virginia ruled the Corps’ Nationwide 21 (NWP 21) permit program unlawful and revoked authorization of general mining permits issued under NWP 21 in southern West Virginia. Under Section 404(e) of the Clean Water Act, a general permit may be issued for activities that are determined *before* the permit’s issuance to have minimal environmental impacts; the court ruled NWP 21 unlawful because it requires assessment of impacts *after* the activities had taken place. The ruling means that mining companies in the area covered by this court will now have to obtain *individual* permits in order to continue with activities previously covered under NWP 21; such permits usually involve significantly more time and review than general permits do.

Opponents of the use of NWP 21 for mountaintop mining claimed that the permit allowed disposal of dirt and rock debris in nearby streams, a practice commonly known as “valley fills,” without proper analysis of the environmental impacts. One plaintiff in the case, the Natural Resources Defense Council, asserts that NWP 21-permitted practices have resulted in damage to over 1,200 stream miles in Appalachia since the mid-1990s. Conversely, the West Virginia Coal Association (WVCA) maintains that “NWP 21 was an environmentally sound and defensible permit [and that] the individual permitting process...will offer no measurable environmental benefits. It will only increase the permitting timeframes...and generally overwhelm the Corps’ permit review and approval process.” The WVCA, the National Mining Association, the Kentucky Coal Association, the Ohio Coal Association, and Coal Operators and Associates have joined the Corps to appeal the decision to the Fourth Circuit Court of Appeals in Richmond. (*InsideEPA’s Water Policy Report*, 7/12/04 and 9/6/04; *National Wetlands Newsletter*, Sep.-Oct. 2004; and e-mail correspondence to *Water Central* from Jason Bostic of the WVCA, 11/30/04)

•A program has been developed by North Carolina State University and the Internet search company Fast Search & Transfer to **help identify vendors who are selling outlawed invasive plant, animal, and insect species online**. The Agricultural Internet Monitoring System (AIMS), unveiled in January 2005, will enable federal authorities to issue warnings to those selling banned organisms in the United States, requiring them either to produce a federal permit to sell them or stop selling them. Pilot tests of AIMS identified over 6,500 Web pages belonging to U.S. suppliers who may be buying or distributing illegal plants, mollusks, and insects. Although the program will initially target vendors in the United States, AIMS is also working with Australia and Britain, among other countries, to identify problems abroad before they develop in the United States. Under federal law, selling banned organisms or bringing banned organisms into the United States can result in criminal penalties and fines up to \$250,000. (*The Christian Science Monitor*, 10/28/04. For an introduction to non-native species, please see the August 2001 issue of *Virginia Water Central*.)

•In November, a group of international climate experts issued an **urgent warning on global climate change**. Among the environmental trends listed in the Arctic Climate Impact Assessment (ACIA), compiled over four and a half years of study, were the following: a significant reduction in the summer ice pack in the Arctic Ocean, which has decreased by as much as 20 percent in the last 30 years and is expected to decrease by another 10 to 50 percent by the end of the century; the rapid melting of Arctic glaciers; and Arctic temperatures projected to rise by up to 13 degrees F over the next century, almost twice as fast as occurred over the past 50 years. The study group included some 300 scientists from the world's top polar-research centers. More information on the report is available online at the ACIA Web site, [www.acia.uaf.edu/](http://www.acia.uaf.edu/).

Meanwhile, in November Russia officially ratified the **1997 Kyoto Protocol**, which provided the required number of countries for the Protocol to take effect (in ratifying countries). The Kyoto Protocol requires industrial nations who have signed the pact to reduce their carbon dioxide emissions by an average of 5.5 percent between 2008 and 2012. Talks on a post-Kyoto agreement are set to begin in 2005. And climate change is to be one of the priorities of the incoming (in January 2005) president of the G-8 group of industrialized nations, British Prime Minister Tony Blair. (*The Christian Science Monitor*, 11/9/04)

•The omnibus federal appropriations bill for Fiscal Year 2005, passed by Congress on November 20, included a **\$250 million cut in the EPA's clean water state revolving fund (SRF)**. The funding level for FY 2005 is \$1.1 billion, down from \$1.35 billion in FY 2004. FY 2005 funding for EPA's *drinking water* SRF remained at \$850 million. The clean water and drinking water SRF's help support infrastructure construction or improvement at wastewater and water-supply facilities, respectively. (*Inside EPA's Water Policy Report*, 11/29/04)

•As of January 10, 2005, over 1,500 workers and 100 vessels continued the response to the November 26, 2004, **spill of over 470,000 gallons of crude oil into the Delaware River**. About 66,000 gallons of oil had been recovered and 49 percent of the affected shoreline had been "grossly decontaminated" (about 57 miles of shoreline were affected). The spill occurred when a single-hulled part of the Greek tanker *Athos I* was punctured. All barges and tankers are to be double-hulled by 2015, according to a mandate being implemented by the U.S. Coast Guard. (U.S. Department of Homeland Security, "Delaware River Oil Spill Fact Sheet," 1/10/05; and *Baltimore Sun*, 12/2/04)

## A Final Word

"And I'll be doggone if that little Duffy is going to ride across the Shenandoah River with me and look down and see a Wal-Mart parking lot, not on my watch."—State Senator H. Russell Potts, Jr., referring to his opposition to a proposed Wal-Mart store along the South Fork of the Shenandoah River in Warren County. (Duffy is Sen. Potts' grandson.) (*Winchester Star*, 12/14/04)

"I think a face to face meeting would be appropriate at this point, with [Potts] or anyone else involved, and review the [Town of Front Royal's rezoning approval] process from the start."—Wal-Mart Community Affairs Manager Keith Morris (*Warren Sentinel*, 1/6/05)

—By Katie Moore and Alan Raflo

Katie Moore, a senior English major at Virginia Tech, was an intern at the Water Center for the Fall 2004 semester.

## SPECIAL NEWS ITEM

### The National Weather Service's StormReady Program

Over 90 percent of all presidential declared disasters are weather related. The mission of the National Weather Service (NWS) is to reduce the loss of life and property from these storms. StormReady is a way that communities and counties can become better prepared for the next weather disaster.

**StormReady** is a program that works with communities and counties to take a proactive approach for improving local hazardous weather operations and public awareness. This nationwide community preparedness program uses a grassroots approach to help counties, cities, military installations, universities and other community groups develop plans to handle severe weather and flooding threats. The program is voluntary and provides communities with advice from a partnership between the local NWS Forecast Office and state and local emergency managers.

StormReady communities are better prepared to save lives from the onslaught of severe weather through better planning, education, and awareness. No community is storm proof, but StormReady can help communities save lives. Requirements for being recognized as StormReady vary based on population. The NWS will advise localities what needs to be done to become StormReady. Some of these requirements include the following:

- Establish a 24-hour warning point and emergency operations center.
- Have more than one way to receive severe weather warnings and forecasts and to alert the public.
- Create a system that monitors weather conditions locally.
- Promote the importance of public readiness through community seminars.
- Develop a formal hazardous weather plan, which includes training severe-weather spotters.

There are more than 825 StormReady communities in 48 states. In Virginia there are currently three StormReady communities (Danville, Hampton, and Newport News) and two StormReady counties (Fairfax and Loudoun). Any Virginia community or county that is interested in becoming StormReady should contact the National Weather Service office that serves their area and ask to speak to the Warning Coordination Meteorologist (see Figure 1). More information about StormReady is available at the following Web site: [www.stormready.noaa.gov](http://www.stormready.noaa.gov).

—By Hendricus Lulofs, Warning Coordination Meteorologist, National Weather Service, Blacksburg, Va.

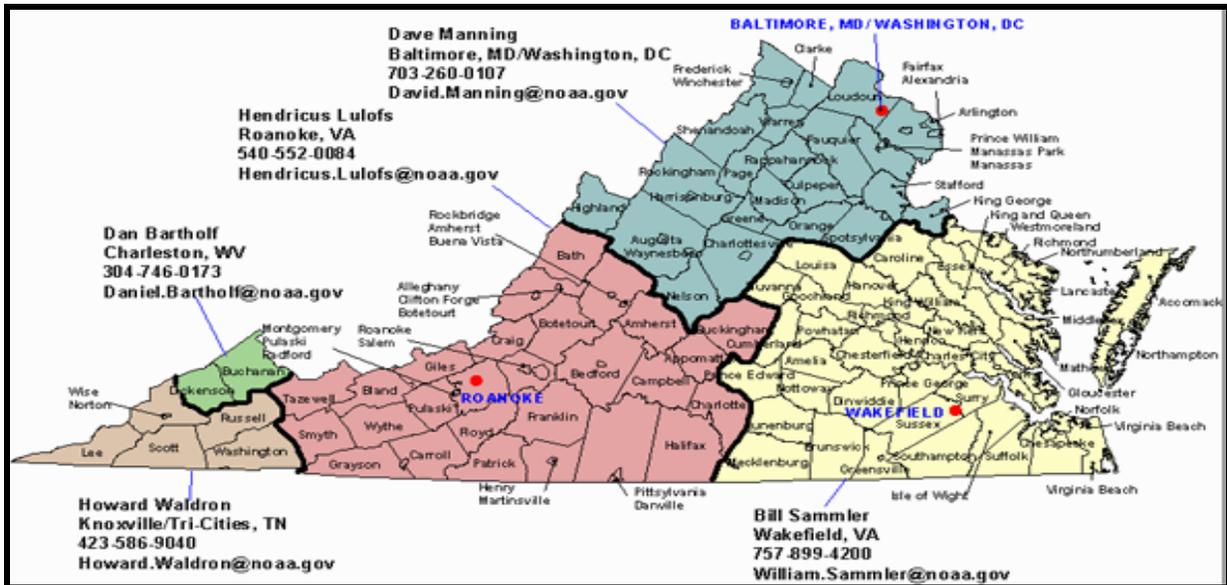


Figure 1. Map showing Virginia contact information for the National Weather Service's StormReady program.

# N O T I C E S

## Recent State Water Meetings

The Virginia Department of Environmental Quality (DEQ) posts notices of regulatory action, public hearings and meetings, and other events on-line at [www.deq.state.va.us/info/](http://www.deq.state.va.us/info/) (click on "Public Calendar"). The Regulatory Town Hall Web site, at [www.townhall.state.va.us/Intro.cfm](http://www.townhall.state.va.us/Intro.cfm), has schedules of, and minutes from, public meetings by all of Virginia's boards, commissions, and departments.

Following is a list of water-related events that occurred between November 10, 2004, and January 13, 2005, with contact information for further information. To find the e-mail address or phone number of the contact people, go to the Regulatory Town Hall Web site, click on Meetings (Future or Past), and then click on the particular event. You can also request state employee phone numbers by calling (800) 422-2319, and you can find the e-mail address of any state employee online at [www.employees.state.va.us/directory-search.cfm](http://www.employees.state.va.us/directory-search.cfm).

## Total Maximum Daily Load (TMDL) Meetings

- 11/16/04, Warrenton: Public meeting on TMDLs for **Carter Run and Great Run watersheds**. More information: Bryant Thomas.
- 11/23/04, Bridgewater: Public meeting on TMDL implementation plan for **Cooks Creek and Blacks Run**. More information: Robert Brent.
- 12/9/04, Charlottesville: Public meeting for TMDL implementation plan for **Moore's Creek**. More information: Robert Brent.
- 12/16/04, Orange: Advisory committee meeting on proposed TMDL for the **Robinson River watershed** in Madison County; **Mountain Run and Mine Run** in Orange County; and the stream **tributaries to Lake Anna** in Orange, Spotsylvania and Louisa counties. More information: [Bryant Thomas](#).
- 1/11/05, Prater: Public meeting on proposed TMDL for **Russell Prater Creek** in Buchanan and Dickenson counties. More information: [Nancy T. Norton](#).
- 1/12/05, Blackstone: Public meeting on proposed TMDL for the **Nottoway River basin** in Prince Edward, Nottoway, Lunenburg, and Dinwiddie counties. An advisory committee meeting on the proposed TMDL was held 12/15/04. More information: [Kelly J. Wills](#).

## Regular Meeting of Statewide Board and Commission Meetings

- Board for Waterworks and Wastewater Works Operators: 12/8/04, Richmond. More information: David Dick.
- Chesapeake Bay Local Assistance Board: 12/13/04, Chesterfield. More information: David Dowling.
- Groundwater Protection Steering Committee: 11/16/04 in Richmond. More information: Mary Ann Massie.
- Invasive Species Council: 12/15/04, Glen Allen. More information: David Dowling.
- Marine Resources Commission: 11/23 and 12/21/04, Newport News. More information: Jane McCroskey.
- Soil and Water Conservation Board: 11/9/04, Glen Allen. More information: David Dowling.
- State Water Control Board: 12/2/04, Richmond. More information: Cindy Berndt.

## Other

- 11/10/04, Clifton Forge: State Water Control Board public meeting to consider designating a portion of the Cowpasture River as an **exceptional (Tier III) water**. More information: Jean W. Gregory.
- 11/17 and 11/18/04, Williamsburg: Joint meeting of the State Air Pollution Control, State Water Control, and Virginia Waste Management boards. More information: Cindy Berndt.
- 11/30/04 to 12/7/04, various locations: State Water Control Board public hearings on proposed amendments to the water-quality standards concerning **nutrients**. More information: Eleanore Daub.
- 1/13/05, Richmond: Public outreach meeting on **wetland monitoring and assessment** strategy. More information: [David L. Davis](#).

## Money for Mine Drainage Reclamation

The U.S. Office of Surface Mining and Reclamation (OSMRE) is seeking applications from 503(c)(3) organizations for grants up to \$100,000 for acid mine drainage reclamation projects. Most of the money must be used for construction, and the grants require significant matches of funds or in-kind contributions. For more information, contact Ronnie Vicars in Big Stone Gap, (540) 523-0024 or [rvicars@osmre.gov](mailto:rvicars@osmre.gov).

## FEMA Seeks Flood-Mapping Partners

The Federal Emergency Management Agency (FEMA) is seeking local and regional partners to collaborate on maintaining up-to-date flood-hazard maps and information. Cooperating technical partners benefit by improving their own floodplain information and management. For more information online, visit [www.fema.gov/fhm/](http://www.fema.gov/fhm/) and click on the Cooperating Technical Partners link; or the FEMA Map Assistance Center at (877) 336-2627.

## More Help Against High Water: FloodSmart.gov

The FloodSmart Web site, [www.floodsmart.gov](http://www.floodsmart.gov), is sponsored by the National Flood Insurance Program (NFIP). The site has information for individuals and communities on preparing for floods, assessing flooding risk, acquiring flood insurance, and the role of the NFIP. An electronic newsletter is available. You can contact the NFIP by phone at (888) 379-9531 (TTY 800-427-5593) or e-mail to [floodsmart@dhs.gov](mailto:floodsmart@dhs.gov).

## Conferences and Other Gatherings

•**National Mitigation and Conservation Banking Conference.** March 29-April 1, 2005, Charlotte, N.C. Sponsored by a number of organizations. More information: (703) 548-5473; Web site: [www.mitigationbankingconference.com](http://www.mitigationbankingconference.com).

•**Managing Water Quality and Quantity: Integrating Science, Technology, and Policy.** April 5, 2005, Raleigh, N.C. Annual conference of the North Carolina Water Resources Research Institute. More information: (919) 515-2815; [water\\_resources@ncsu.edu](mailto:water_resources@ncsu.edu); Web site: [www2.ncsu.edu/ncsu/CIL/WRRI/](http://www2.ncsu.edu/ncsu/CIL/WRRI/).

•**Solutions to Coastal Disasters.** May 8-11, 2005, Charleston, S.C. Sponsored by the American Society of Civil Engineers. More information: (800) 548-2723; Web site: [www.asce.org/conferences/cd05/](http://www.asce.org/conferences/cd05/).

## Also Out There...

*From the many water-related publications that arrive in the Water Center's mail, here's a brief description of a recent, detailed article:*

•**Return of the Natives: Reclaiming Biodiversity for a World Class Region.** This 20-page booklet has 14 articles on efforts to restore natural aquatic habitats and organisms throughout the southeastern United States, a region with aquatic biodiversity exceeded only by the Amazon Basin, according to one article. Published by the Southeast Watershed Forum, Nashville, (866) 902-7300; available online at [www.southeastwaterforum.org](http://www.southeastwaterforum.org) (click on Newsletters).

## AT THE VIRGINIA WATER CENTER

To reach the Virginia Water Resources Research Center: phone (540) 231-5624; FAX (540) 231-6673; e-mail [water@vt.edu](mailto:water@vt.edu); Web site [www.vwrrc.vt.edu](http://www.vwrrc.vt.edu).

## New Reports

- Recent and Historical Environmental Change in Lake Drummond, Within the Great Dismal Swamp*, by David J. Burdige, *et al.*, Old Dominion University.
- Water Research Needs in Virginia*, by Tamim Younos, Virginia Tech (based on responses from a statewide survey of water-resource professionals).
- Development of Predictive Relationships Between Stressors and Macrobenthic Communities for Use in Implementing TMDLs*, by Gary R. Long and R. Christian Jones, George Mason University.

These three reports are available online at [www.vwrrc.vt.edu](http://www.vwrrc.vt.edu) (click on Publications, then Recent Publications). We're sorry, but no printed copies are available.

## VIRGINIA WATER RESOURCES RESEARCH CENTER AWARD AND GRANT OPPORTUNITIES FOR 2005

**For more information about the opportunities listed on this page:** Please contact Dr. Tamim Younos, Interim Director, Virginia Water Resources Research Center, 23 Agnew Hall, Virginia Tech, Blacksburg, VA 24061-0444; phone (540) 231-8039; FAX (540) 231-6673; or e-mail [tyounos@vt.edu](mailto:tyounos@vt.edu). Award application materials and research proposal guidelines are available at the Water Center's Web site, [www.vwrrc.vt.edu](http://www.vwrrc.vt.edu).

### UNDERGRADUATE RESEARCH AWARDS

The Water Center will award up to two undergraduate research summer fellowships related to water resources protection and management. The goal of the program is to provide a research opportunity for outstanding undergraduates with anticipation that these students will pursue a graduate degree in a water resources field. Since 1996, 15 outstanding students have received summer fellowships under this program. **Application deadline is 5:00 p.m., March 31, 2005.** Awards will be announced on April 15, 2005.

### WALKER GRADUATE RESEARCH AWARD

The Water Center's William R. Walker Graduate Research Fellow Award provides up to \$2,500 to individuals preparing for a professional career in water resources. Only individuals pursuing graduate work in a field different from their field of emphasis as an undergraduate, or individuals with work experience returning to graduate school, are eligible to apply. A special panel selects the award recipient. The award will be effective July 1, 2005, and can be used at the recipient's discretion during residency in a university as a student, for professional development (such as attending workshops and conferences), and purchasing materials that will enhance professional productivity (such as books and software). **Application deadline is March 31, 2005.** The competition results will be announced on May 30, 2005.

### COMPETITIVE GRANTS

The Water Center will consider research proposals for up to \$20,000 and project duration of one year (July 1, 2005—June 30, 2006). Proposals will be considered in the following areas: **urban stormwater management; water supply demand and management; surface/groundwater interaction; lake and reservoir management; enhancing waterworks infrastructure; development of alternative sources of water; ecological impacts of hydrologic alterations; fate of emerging contaminants in natural; and engineered environments.** Research proposals should demonstrate the potential for significant contribution to advancing the scientific foundation for water resources management and water source development in the Commonwealth of Virginia. Demonstration of the importance of research to decision making in Virginia should be documented in the proposal. The proposed project should provide research opportunities for graduate and undergraduate students. Submission of interdisciplinary proposals is encouraged. A detailed budget justification is required. Graduate student tuition match is required. Recipients of competitive grants are expected to submit to the Center a brief (two pages) progress report by December 30, 2005, and a final report by June 30, 2006. **The deadline for electronic proposal submission is 5:00 p.m., March 31, 2005.** Successful proposals will be announced by May 30, 2005.

### SEED GRANTS

The Water Center will provide a limited number of research seed grants of up to \$5,000. These grants are to be used in support of background studies and preliminary research that will lead to submission of full proposals to external funding agencies in areas related to **water-monitoring science and development of innovative sensor technologies and decision-support systems.** By accepting a seed grant award, the principal investigator commits to development of a full proposal suitable for submission for full funding to external funding agencies. The external proposal's budget should include *one percent of the total cost to be returned to the Water Center* upon successful funding of the project. Duration of each award is one year (July 1, 2005 to June 30, 2006). Funds may be used for student support, laboratory supplies, preliminary analysis to develop a project proposal, workshop travel, visiting a potential research site and/or to establish appropriate linkages with funding agencies. Funds may not be used to purchase office supplies or pay tuition. Recipients of seed grants are expected to submit to the Center a brief (two pages) progress report by December 30, 2005; and a final report in the form of a full research proposal suitable for submission to a funding agency by June 30, 2006. **The deadline for electronic proposal submission is 5:00 p.m., March 31, 2005.** Successful proposals will be announced by May 30, 2005.

# NATIONAL WATER RESEARCH SYMPOSIUM CALL FOR PAPERS

## “Balancing Water Law and Science”

### A National Water Research Symposium, Celebrating the 40<sup>th</sup> Anniversary of the Virginia Water Resources Research Center

October 10-12, 2005

**Virginia Tech Inn and Skelton Conference Center, Blacksburg, Virginia**

In 1899, the U.S. Congress passed the first statutory environmental law, The Refuse Act. Since then, several federal laws and regulations have been promulgated in the United States to manage the nation's water quantity and water quality, to secure water supplies for an increasing population and enhance economic productivity, and to protect and preserve the nation's diverse ecosystems. At the same time, significant advances in water science have improved our understanding of water resource issues. However, across the country, questions have been raised about the scientific validity of certain regulations and the socio-economic costs attributed to the implementation of some water resource regulations.

The purpose of this symposium is to discuss openly the scientific basis of water laws and regulations, reflect on the conflicts within existing laws and regulations, discuss case studies of interest, and propose conflict-resolution strategies. Topical areas of interest include, but are not limited to, research that addresses the following questions:

- Do watershed-based management approaches make scientific sense?
- Is privatization of public water supplies the best way to reduce water costs?
- What are the scientific bases for state water rights?
- How do we regulate concentrated animal-feeding operations?
- Do we know how to protect instream uses, including meeting the needs of fish and other aquatic organisms?
- Is wetland construction a realistic mitigation measure for water resource development?
- Will climate changes force a change in water law?
- What water conservation goals are realistic?
- What is the feasibility of alternative water sources, such as desalination and wastewater reclamation? Can these alternative sources replace the need for reservoir construction?
- Has the time arrived to integrate land-use planning with water management?

The Virginia Water Resources Research Center invites researchers from colleges and universities (faculty, graduate and undergraduate students), federal and state agencies, private organizations, law firms, consulting firms, and others to propose papers or workshops for this Symposium. Basic and applied research papers are solicited.

#### **Deadlines**

- |  |                 |
|--|-----------------|
| 1. Submission of Abstracts and Workshop Proposals    | March 31, 2005  |
| 2. Notification of Acceptance/Rejection              | May 1, 2005     |
| 3. Papers for inclusion in the symposium proceedings | August 15, 2005 |

**Abstract Submission:** Submit a 200-250 word abstract that includes the paper title, author(s) and author(s) affiliation, phone number, fax number, and e-mail address of the corresponding author. Indicate if the presenter is a graduate or undergraduate student.

**Workshop Proposal Submission:** Submit a 1-2 page workshop outline that includes information on the subject matter and name(s), affiliation(s), e-mail address, and phone number of workshop instructors.

**Electronic Submission:** E-mail to [tyounos@vt.edu](mailto:tyounos@vt.edu).

**Hard Copy Submission:** National Water Research Symposium 2005, Virginia Water Resources Research Center, 23 Agnew Hall (0444), Blacksburg, VA 24061.

**Author Guidelines for Full Paper Submission:** Full papers will be accepted for publication in the symposium proceedings. Guidelines will be posted on symposium Web site: [www.vwrrc.vt.edu/2005symposium](http://www.vwrrc.vt.edu/2005symposium).

**Symposium Participation Policy:** Individuals and organizations presenting papers agree to register and pay the assigned registration fee for the symposium.

## THE VIRGINIA STEP PROGRAM in SUMMER 2004

Through the **Service Training for Environmental Progress (STEP)** program, students live in Virginia communities while working on a water-related project identified by the community. Following are summaries of the four STEP projects in Summer 2004; for a copy of any of the full reports, please contact STEP (contact information follows). **If you are a member of community group interested in STEP assistance, or a student interested in a STEP internship**, please contact Alan Raflø, (540) 231-5463; araflo@vt.edu; 23 Agnew Hall (0444), Blacksburg, VA 24061. You can get more information about STEP at the Water Center's Web site, <http://www.vwrrc.vt.edu> (click on Education, then STEP).

### “Assessment of the Rockfish River in Nelson County, Virginia,” by Robert Hopper and Julie Still.

Working with the Friends of Rockfish River Watershed, these STEP interns assessed 43 miles of the Rockfish River and its main tributaries. The interns used digital cameras and GPS units to record significant features and problems affecting the river, such as potential access areas and severe erosion sites.



Rob Hopper and Julie Still

### “Developing Teacher Preparation Tools for the Spotsylvania County Meaningful Day Experience” by Maureen Sohler.

The objective of this project was to help improve the “Meaningful Day Experience” conducted by the Spotsylvania County Virginia Cooperative Extension. The intern developed an activity book for use by teachers before and after the field day. She also interviewed field day presenters to identify possible improvements and put this information into a packet for the use of the field day planners.



Maureen Sohler

**“Water Supply Planning in the New River Valley,” by Fernina Taliaferro.**

Assisting the New River Valley Planning District Commission, the intern compiled information on local water systems that might be served by a regional system. The information included use and capacity, demand projections through the year 2030, and predicted dates that each system would have to upgrade its capacity. She also compiled information on funding sources to aid in the creation of a regional water plan.



Fernina Taliaferro

**“Groundwater Trends in the North Fork Shenandoah River Watershed: Ten Years of Results from the Citizens’ Groundwater Monitoring Program,” by Jeremy Yoder.**

The purpose of this project was to help the Friends of the North Fork Shenandoah River analyze 10 years of groundwater data collected by the group in Shenandoah County. The intern investigated and documented statistically sound methods for assessing the existing data and for gathering future data.



Jeremy Yoder

## FOR THE RECORD

### Sources for Selected Water Resources Topics

#### Following the Virginia General Assembly

(This section reprints information previously presented in the December 2001 *Water Central*, p. 18. We have updated or corrected the information where necessary.)

This page describes how to follow General Assembly legislation and the state budget process. The 2005 session (a 45-day session) convened January 12 and was scheduled to conclude on February 26. The Assembly is to reconvene on April 6 to reconsider any bills vetoed by the governor.

#### Finding Basic Information

The General Assembly's Web site, [legis.state.va.us](http://legis.state.va.us), includes law-making fundamentals, the Virginia Constitution, the *Code of Virginia*, and other useful documents. The site also provides the current session's dates and minutes of the floor sessions.

#### Finding Your Legislators

The General Assembly Web site (listed above) lists all the members of the House of Delegates and Senate. The site also allows users to search for their legislators by a constituent's address.

If you know your House or Senate district, you can get the phone number for the General Assembly office of your delegate or senator from the following formula:

**Delegates' Numbers** = (804) 698-10 plus the House district number. For example, delegate of the 1<sup>st</sup> House District: (804) 698-1001.

**Senators' Numbers** = (804) 698-75 plus the Senate district number. For example, senator of the 39<sup>th</sup> Senate District: (804) 698-7539.

People who wish to **register their opinion** with a delegate or senator on the budget or other current legislation can do so by calling (800) 889-0229, toll-free, 7 a.m.—7 p.m., M—F during the session.

#### Tracking Legislation

Internet users can find and follow legislation at the **Legislative Information System** Web site, at <http://leg1.state.va.us/>. The site provides the full text, a summary, and a record of action on every bill; bills are indexed by subject, number, and committee.

People without Internet access can get a copy of any bill or resolution from the Legislative Bill Room, (804) 786-6984 (you will need to know the bill or resolution *number*). You can learn about the status of current legislation from the **Legislative Information Offices**: House, (804) 698-1500, or toll-free (877) 391-FACT; Senate, (804) 698-7410. **Text Telephone (TTY/TDD) Services** are available in the Legislative Information offices: (804) 786-2369 for the House and (804) 698-7419 for the Senate.

#### Tracking the Budget Process

The 2005 session is the second session of a two-year cycle, so the General Assembly is considering **amendments to the state's 2004-06 biennial budget** (passed in 2004). The process begins in the December prior to the session, when the governor submits amendments to current budget. During the session, the House and Senate each consider a **budget bill** (HB1500 and SB700 in 2005). Budget bill work occurs in the House Appropriations Committee and the Senate Finance Committee. Eventually each house passes a version of the budget bill. The two versions must be reconciled in conference committee and each house must then pass the final version.

For Internet users, the Legislative Information System provides the budget online at the Web site listed above. To identify budget items related to a particular topic (such as "water"), select "State Budget," then "Full Text Search"; then type in the specific search topic.

People without Internet access can get a copy of the budget bill from the Bill Room (see phone number above) or at one of the 12 state-depository libraries (call the Library of Virginia in Richmond at 804-692-3562 to learn the location of your nearest state-depository library). You can request information about specific budget topics by calling the Legislative Information Office for either house (please see the numbers listed above).

**Next "For the Record": Water Maps (previously scheduled for this issue).** For a list of all previous "For the Record" topics, please see the Guide to Past *Water Central Articles* in this issue of *Water Central*.

## Guide to *Water Central* Article Topics, June 1998—January 2005

The following lists topics in *Water Central* issues from June 1998 (the first issue) through January 2005 (issue #33). The list does not include items from the “In and Out of the News” or “Notices” sections of the newsletter. All issues of *Water Central* are available online at [www.vwrrc.vt.edu](http://www.vwrrc.vt.edu); page numbers below refer to the two-column versions of each issue (a one-column version of recent issues is also available online). To request a paper copy: phone (540) 231-5624; e-mail [water@vt.edu](mailto:water@vt.edu).

### Feature Articles

- Coastal Conditions—Aug. 2004, p.8
- Desalination—Jan. 2005, p. 1
- Disaster Preparedness and Response—Aug.-Sept. 2001, p.2
- Drinking Water (including Safe Drinking Water Act and treatment issues)—Dec. 1998, p.1; Feb. 1999, p.1; Jan. 2001, p.1
- Groundwater—Oct. 2002, p.1
- Impaired Waters and TMDLs—Oct. 1998, p.1; Oct. 1999, p.1; Dec. 1999, p.1; Dec. 2001, p.1
- Marine Fisheries—Nov. 2003, p.2
- Market-based Water Quality Management—Aug. 2003, p.2
- Non-tidal Wetlands—Nov. 2000, p.1
- Nutrients—Jun. 2003, p.2; Jan. 2004, p.7
- Oceans—Aug. 2004, p.1 (report of Oceans Commission)
- Rappahannock River Water Resources Planning—Feb. 2002, p.1
- Urban Stormwater—Feb. 2000, p.1
- Virginia General Assembly Water-related Legislation: Annual Inventory and Perspectives –Jun. 1998, p.3; Aug. 1998, p.1; Apr. 1999, p.1; Jun. 1999, p.1; Apr. 2000, p. 1; Jun.-Aug. 2000, p.2; Jun. 2001, p.1; Apr.-June. 2002, p.1; Mar. 2003, p.1; Apr. 2004, p.1
- Virginia State Budget Related to Water—Apr. 2001, p.1
- Water Quality Reports—Dec. 2002, p.1
- Virginia Water Supply Policy and Planning—Jan. 2004, p.2; Jan. 2004, p.13 (Report of Water Supply Technical Advisory Committee); Nov. 2004, p.1

### Science Behind the News

- Algae—Jun. 1998, p.9
- Amphibians—Apr. 2001, p.6
- An Introduction to Water-related Sciences—Feb. 1999, p.6
- Aquatic Plants –Nov. 2000, p.7
- Bacteria—Aug. 1998, p.5; Oct. 1999, p.8; Aug. 2004, p.10 (at beaches)
- Benthic Macroinvertebrates—Apr.-Jun. 2002, p.11
- Fish and Water Quality—Oct. 1998, p.6
- Genetics—Apr. 1999, p.8
- Groundwater—Oct. 2002, p.9
- Hurricane Isabel—Nov. 2003, p.8
- Hydrology—Dec. 1998, p.7
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- Non-native/Invasive Aquatic Species—Aug.-Sept. 2001, p.7
- Nutrients—Jun. 2003, p.9
- Safe Yield of Water Supply—Feb. 2002, p.5
- Statistics—Jun.-Aug. 2000, p.8; Jan. 2001, p.6
- TMDL Development—Nov. 2004, p.9
- Watersheds—Feb. 2000, p.8

### Sources of Information (“For the Record” Section)

- Aquatic Life—Nov. 2000, p.19; Nov. 2004, p.27
- Coastal and Marine Resources—Jun. 2001, p.19
- Drinking Water—Aug. 1998, p.14; and Apr.-Jun. 2002, p.27

Federal Legislation and Regulations—Jun. 1998, p.15; and Jun.-Aug. 2000, p.19; Aug. 2004, p.27  
 Groundwater—Feb. 1999, p.15; Apr. 2001, p.19  
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 Maps for Water Resources—Jan. 2001, p.18  
 Virginia Legislation—Feb. 2000, p.15; Dec. 2001, p.18; Jan. 2005, p. 21  
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 Water Law and Water Rights—Dec. 1999, p.10; Aug. 2003, p.22  
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### **Teaching Resources**

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 Dragonflies Poster Source—Apr. 2000, p.8  
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 Teach'n Fishing Workshops—Jun.-Aug. 2000, p.13  
 Understanding Invasive Aquatic Weeds—Apr.-Jun. 2002, p.18  
 U.S. Geological Survey (USGS) Water Education Posters—Mar. 2003, p.12  
 Virginia Standards of Learning (for selected articles)—Each issue, page varies  
 Virginia Water Resources: A Tool for Teachers (book notice)—Jun. 2003, p.23  
 Virginia Watersheds Poster Source—Feb. 2000, p.11

### **Virginia Water Research**

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 Monitoring for Exotic Forest Pests at Virginia's Ports—Aug. 2002, p. 6  
 National Research Council Report—Nov. 2004, p.23  
 Research on Small Water Systems and Community Drinking Water—Aug. 1999, p.2  
 VWRRC Research Program Documentation for 1996-1999—Aug. 1999, p.8  
 Water Science and Water Quality Management—Aug. 1999, p.5

### **Water Center Programs**

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 Forests—Jan. 2004, p.28 (federal "Healthy Forests Act")  
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## Virginia Water Central

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Please answer the following questions to let us know whether the newsletter is meeting your needs. Please mail this page to the Water Center address listed below, or e-mail your responses to [water@vt.edu](mailto:water@vt.edu). Thank you.

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2. Would you rate the appearance as good, fair, or poor?
3. Would you rate the readability of the articles as good, fair, or poor?
4. Is the newsletter too long, too short, or about right?
5. Do the issues come too frequently, too seldom, or about right?
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