Virginia Water Central

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After heavy rain on May 12, 2008, two men attempt to remove debris from a cable that guides the ferry crossing the Potomac River near Leesburg. For recent precipitation, stream flow, and groundwater information, please see the Water Status Report.

IN THIS ISSUE

S^2 on H_2O

A Partnership to Address Imperiled Mussels

By Stephen Schoenholtz, Director Virginia Water Resources Research Center

The Clinch and Powell Rivers have headwaters in southwestern Virginia and flow into eastern Tennessee, where they join the Tennessee River. The Clinch and Powell have globally significant populations of freshwater mussels and fish and are internationally recognized for their high aquatic biodiversity. Both rivers support populations of federally threatened and endangered fish species and have been designated as critical habitat for specific endangered mussel and fish species. Several surveys have documented the decline of mussel populations in these two rivers, where coal mining and processing, agriculture, urbanization, and development of transportation corridors pose potential impacts on water quality, habitat, and aquatic biota. These are some of the main reasons for the recently started **Clinch-Powell Clean Rivers Initiative**.

The Clinch-Powell Clean Rivers Initiative is the outcome of a newly formed partnership resulting from a memorandum of understanding (MOU) signed in late 2007 by EPA Regions 3 and 4, the Tennessee Department of Environment and Conservation, the Virginia Department of Environmental Quality, and the Virginia Department of Mines, Minerals, and Energy. The MOU established a working group for coordinating efforts to protect and restore the Clinch and Powell Rivers. These five agencies are responsible for administering the federal Clean Water Act and associated state laws in Tennessee and Virginia.

The idea for the MOU was spawned by the first Clinch-Powell River Symposium entitled, "A Collaborative Discussion on Coal Mining and the Aquatic Environment" held in Abingdon, Virginia, in September 2007 (presentations are available at www.cpe.vt.edu/cmrs/agenda.html). The symposium brought together regulators, industry, government officials, researchers, and

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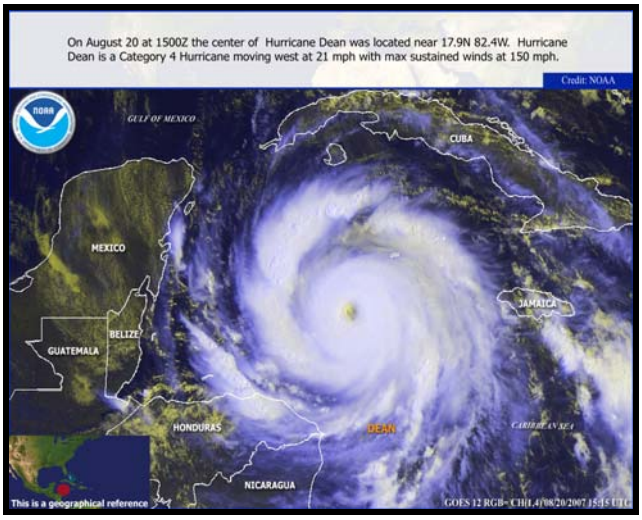
FEATURE ARTICLE

Time to Be Ready for Hurricanes



Hurricane Dean on August 20, 2007 (a Category 4 hurricane at the time), south of Cuba. Photo taken from National Oceanic and Atmospheric Administration (NOAA) Web page, www.osei.noaa.gov/Events/Tropical/Atlantic/2007/, 5/27/08.

The Atlantic hurricane season runs from June 1 to November 30, with August to October the usual period of peak activity. On May 22, 2008, the Climate Prediction Center of the National Oceanic and Atmospheric Administration (NOAA) released its outlook for the 2008 Atlantic hurricane season.[1] Allowing for various uncertainties (which are detailed in the full outlook document), the outlook estimated a **65-percent probability of an "above-normal" Atlantic hurricane season in 2008**, and a 60- to 70-percent chance for each of the following ranges of activity: 12 to 16 named storms; 6 to 9 hurricanes; and 2 to 5 major hurricanes (major hurricanes are those rated "Category 3" or higher on the Saffir-Simpson Scale and that have sustained winds of at least 111 miles per hour).

A "near-normal" season typically has 6 to 14 named storms, 4 to 8 hurricanes, and 1 to 3 major hurricanes.

[1] The full text of the outlook is available online at www.cpc.ncep.noaa.gov/products/outlooks/hurricane.shtml (this was the most recent outlook available as of 7/14/08). The outlook is a collaboration of the Climate Prediction Center, the National Hurricane Center, and the Hurricane Research Division, all within NOAA.

The Climate Prediction Center notes that the outlook is "a general guide to the expected overall nature of the upcoming hurricane season. It is not a seasonal hurricane landfall forecast, and it does not imply levels of activity for any particular region. Hurricane disasters can occur whether the season is active or quiet. Residents, businesses, and government agencies of coastal and near-coastal regions should prepare for every hurricane season regardless of the seasonal outlook."

Hurricane Preparedness Week, organized by NOAA and the Federal Emergency Management Agency (FEMA), was May 25-31, 2008. The NOAA/FEMA Web site for the week, at www.nhc.noaa.gov/HAW2/english/intro.shtml, includes information about historic tropical storms, potential impacts of tropical storms (including high winds, storm surges, tornadoes, and inland flooding), and recommended preparation and response actions.

This rest of this article presents hurricane safety and preparedness tips, information regarding safety for your pets, a hurricane-preparedness quiz, and sources of more information.

Safety and Preparedness Tips

The following tips were taken from the Virginia Department of Emergency Management in August 2005 (edited here for space). Much more information on hurricanes and other emergencies is available at the VDEM site, www.vdem.state.va.us/threats/hurricane/index.cfm.

Before the Storm

- Know your risk. Find out if your home is in the expected storm surge or flooding zone. Consult your area emergency management office for this information.
- Identify where to go if you are told to evacuate and also the safest route to get there. Choose several places—a friend's home in another town, a motel, or a shelter. Remember, typically public shelters and many motels don't allow pets in their facilities.
- Get ready for a possible power outage by gathering a minimum one-week supply of foods that don't require refrigeration or cooking, as well as water, flashlights with extra batteries, a first-aid kit, and battery-powered radio. If you need to evacuate, make sure you can consolidate these items into a portable "go" kit, like a backpack or duffel bag.
- Purchase a radio that receives National Weather Service reports, watches, and warnings.
- Check your supply of plywood, tools, batteries, tarps, and plastic sheeting for roof repairs.
- Cut dead trees and limbs that could fall on your home.
- Consider retrofitting your garage door by installing horizontal bracing onto each door panel. High winds that enter through the garage can blow out doors, windows, walls, and even the roof.
- Make sure you have a current flood insurance policy (not typically part of a homeowner's policy). A 30-day waiting period is generally required to purchase flood insurance, so take time well before a storm to attend to this.
- Take pictures of your property before the storm to help validate your claim and remember to take your policies with you if you need to evacuate.

When a Hurricane is Approaching

- Listen to local media for updated storm information. A hurricane *watch* means possible danger. If the danger increases, a hurricane *warning* will be issued.
- If you have space in your refrigerator or freezer, consider filling plastic containers with water, leaving about an inch of space inside each one. Place the containers in the refrigerator or freezer. This chilled or frozen water will help keep food cold for several hours if the power goes out.
- Fill your bathtub with water to use for toilet flushing in case water services are unavailable following the storm.
- Bring in garbage cans, lawn furniture, and other items that could blow away.
- Fill your car's gas tank and prepare to evacuate if told to do so.

During the Storm

•If you are not advised to evacuate, remain indoors and away from windows. If necessary, seek refuge in an interior, windowless room. Cover yourself with pillows or a blanket for protection from falling debris.

After the Storm

•Check local media for official disaster relief information and instructions.
•Prepare to be without power, telephone, or any outside services for a week or more.
•Watch out for downed power lines, weakened structures, rodents, and snakes
•Avoid standing water.
•Avoid drinking tap water unless officials say it is safe. Eat only foods you know to be safe.
•Be extra careful when handling power tools, gas lanterns, and matches.
•Operate generators outdoors only in a well-ventilated, dry area, away from air intakes to the home. Never use a generator indoors or in attached garages. Poor ventilation can result in carbon monoxide poisoning or death.
•Avoid using candles as a light source. Deadly fires can result.

Tips about Pets

The following information is an excerpt (edited here for space) from the National Hurricane Center Web site, "Hurricane Preparedness—Pet Plan," at www.nhc.noaa.gov/HAW2/english/prepare/pet_plan.shtml (accessed 7/14/08).

Before the Disaster

•Contact your veterinarian or local humane society for information on preparing your pets for an emergency.
•Make sure that your pets have current vaccinations.
•Have a current photograph of your pets.
•Keep a collar with identification on your pet and have a leash on hand to control your pet.
•Have a properly-sized pet carrier for each animal (large enough for the animal to stand and turn around).
• If you plan to shelter your pet, work it into your evacuation route planning. Specialized pet shelters, animal control shelters, veterinary clinics, and friends and relatives out of harm's way are all potential refuges for your pet during a disaster.

During the Disaster

•Bring pets indoors well in advance of a storm; reassure them and remain calm.
•Pet shelters will be filled on first-come, first-served basis; call ahead and determine availability.
•Animals brought to a pet shelter are typically required to have a proper identification collar and rabies tag, proper identification on all belongings, a carrier or cage, a leash, an ample supply of food, water and food bowls, any necessary medications, specific care instructions, and newspapers or trash bags for clean-up.

After the Disaster

•Walk pets on a leash until they become re-oriented to their home. Often familiar scents and landmarks may be altered and pets could easily be confused and become lost. Also, downed power lines, reptiles brought in with high water, and debris can all pose a threat for animals after a disaster.
•If pets cannot be found after a disaster, contact the local animal-control office to find out where lost animals can be recovered. Bring along a picture of your pet if possible.
•After a disaster, animals can become aggressive or defensive; monitor their behavior.

Hurricane Preparedness Quiz

The Virginia Department of Emergency Management's Web site provided this true/false quiz in August 2005 (it's no longer available at the site). It has been slightly edited here for space.

1. Your family disaster plan should include a phone number for an out-of-state contact. T / F
2. Candles are the best source of light during a power outage. T / F
3. Most deaths from a hurricane happen during the height of the storm. T / F
4. It takes as little as two feet of water to carry away most vehicles. T / F
5. Pets are welcome at emergency shelters. T / F
6. Most homeowners' insurance policies cover flood damage. T / F
7. Virginians need be concerned only about hurricanes that make *landfall* in Virginia. T / F
8. Tropical storms or depressions can cause more damage than hurricanes. T / F

Quiz Answers

1. *True.* During an emergency, long-distance phone lines are more likely to be operational. Local phone lines could be affected by the disaster, and cell phone relay towers might be

overloaded. The purpose of an out-of-state contact is for each member of the family to check in and let loved ones know where they are.
2. *False.* Candles pose a fire hazard and should not be used during an emergency, especially if there is a chance that a gas line is broken. Instead, use a flashlight and keep extra batteries.
3. *False.* Most deaths occur *after* the hurricane, during the clean-up phase, when failure to follow proper safety procedures can lead to chainsaw accidents, falls from roofs, or carbon monoxide deaths from improperly ventilated generators.
4. *True.* Very little moving water is needed to move vehicles. Moreover, what looks like shallow water can mask a deep hole where the road has been washed away.
5. *False.* Due to health regulations, only *service animals* are permitted in emergency shelters. Contact animal hospitals or kennels outside your evacuation area that will care for animals during an emergency. If you want to stay with your pet, contact hotels to find ones that accept pets.
6. *False.* Most homeowners' policies do not cover flood damage. If you live in an area that can flood, contact a licensed insurance agent about flood coverage.
7. *False.* Some of the worst storms in Virginia history made landfall in other states; for example, Isabel in 2003 landed in North Carolina.
8. *True.* Tropical storms and depressions can be just as damaging or deadly as hurricanes. For example, Hurricane Gaston in 2004 had weakened to a tropical depression when it moved through central Virginia, but its heavy rain caused record flooding, nine deaths, and major property damage.

Other Hurricane Safety Information Sources

American Red Cross, www.redcross.org/general/0,1082,0_587_1613,00.html, or phone (800) RED CROSS (733-2767).

Centers for Disease Control and Prevention (CDC), "Hurricanes: Health and Safety," http://emergency.cdc.gov/disasters/hurricanes/, or phone (800) CDC-INFO (232-4636); (888) 232-6348 (TTY). *(Also available in French, German, Haitian Creole, Portuguese, Spanish, and Vietnamese.)*

Federal Emergency Management Agency (FEMA), "Are You Ready?—Hurricanes," www.fema.gov/areyouready/hurricanes.shtm, or phone (800) 621-FEMA (3362).

En Español

Centro Nacional de Hurcanes, "Semana Nacional de Preparación Contra Huracnes, www.nhc.noaa.gov/HAW2/espanol/intro_espanol.shtml.

Centros para el Control y la Prevención de Enfermedades, "Huracanes: Salud y seguridad," http://emergency.cdc.gov/disasters/hurricanes/espanol/.

Cruz Roja Nacional Americana, "¿Está preparado para un huracán?" www.redcross.org/spanish/services/ds/hurrspn.html

And For More on Hurricane Science

Science and the Storms: The USGS Response to the 2005 Hurricanes covers new developments in hurricane science since the 2005 hurricanes Dennis, Katrina, Rita, and Wilma. Free online at http://pubs.usgs.gov/circ/1306; print copies available for sale by contacting the Government Printing Office, phone (toll free) (866) 512-1800.

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, Special Water Quality section, Water Status Report, and Drought Report. The SOLs listed below are from Virginia's 2003 Science SOLs and 2001 Social Studies SOLs. Abbreviations: BIO = biology; CE = civics and economics; ES=earth science; GOV = Va. and U.S. government; LS=life science; WG = world geography.

Newsletter Section	Science SOLs	Social Studies SOLs
Hurricane Preparedness	4.6, 6.3, 6.6, 6.9, ES.13	WG.2
Water Quality Sampler (several sections treated collectively here)	6.7, 6.9, LS.12, ES.7, ES.9, BIO.9	CE.7, WG.2, WG.7, GOV.9, GOV. 16
Water Status (Precipitation, Groundwater, and Stream Flow)	4.6, 4.8, 6.5, 6.7, LS.7, LS.12, ES.7, ES.9, ES.13	WG.2
Drought Report	4.5, 4.8, 6.5, 6.7, LS.7, LS.12, ES.7, ES.9, ES.13	WG.2

A WATER QUALITY SAMPLER

An Introduction to Water Quality

"How healthy is the water?" is a question water resources workers often receive from citizens concerned about their local lake, stream, or other water body. As in other complicated systems—such as a human body—the overall "health" of an *aquatic* system depends on the status of the system's various components. Generally speaking, an aquatic system's components include the water and any materials it contains, the land and other physical features where the water exists, and the organisms living in or around the aquatic system. Accordingly, assessing the health of an aquatic system involves looking at the system's **chemical, biological, and physical features**. The basic objective of the federal Clean Water Act (CWA), for example, is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[2]

The term "**water quality**" is often used to encompass the health of a water body or aquatic system. Traditionally, water-quality assessments included measurements of various aspects of the water itself, particularly temperature, the amount of oxygen dissolved in the water, the water's acidity (pH), and the amount of any pollutants in the water. Today, measurements of various biological and physical aspects are also often used to assess the overall quality of an aquatic system. (For more detail on the various aspects of water quality, please see "A Fish-eye View of Water Quality" in the Oct. 1998 *Water Central*, p. 6)

Under the CWA, states set (with U.S. Environmental Protection Agency approval) water quality **standards**, which include the following: designated uses of water bodies (such as for swimming, fishing, etc.); measurements known as **criteria** that establish allowable levels for water characteristics and for substances contained in the water; and an "antidegradation policy" intended to protect waters from any further deterioration. In Virginia, the Virginia Department of Environmental Quality (DEQ) administers water-quality standards.

The foregoing has referred primarily to the assessment and regulation of the quality of *surface* waters. The chemical quality of *groundwater*, however, is also a major concern because groundwater provides drinking water to many citizens both in Virginia and nationwide. Several programs and agencies in Virginia deal with groundwater quality.

One more key area of water-quality concern is drinking water, whether the source is surface water or groundwater. The key regulatory framework for drinking water quality is the federal Safe Drinking Water Act, which sets limits for substances allowed in drinking water, sets treatment requirements, and sets requirements for protecting drinking water sources.[3]

Below, *Water Central* presents five items on a range of current water-quality issues. For a list of sources of water-quality information, please see the May 2007 *Water Central*, p. 34.

Item 1: Virginia's Draft 2008 Water Quality Assessment Report

Sections 305(b) and 303(d) of the federal CWA require that states submit biennially a report on the quality of a state's water resources and also that they identify water bodies that do not meet water quality standards. Virginia law also requires regular water-quality reporting.

In accordance with these legislative mandates, on June 16, 2008, the Virginia Department of Environmental Quality (DEQ) released the *Draft 2008 305(b)/303(d) Water Quality Assessment Integrated Report*. The full report is available online at http://www.deq.virginia.gov/wqa/305b2008.html. A copy on CD (no charge) may be requested by sending an e-mail to pmcarpin@deq.virginia.gov.

Through July 25, 2008, the DEQ is accepting comments from the public on the draft report. Comments and questions should be submitted to Darryl Glover, DEQ Water Quality Monitoring and Assessment Manager, via regular mail to P.O. Box 1105, Richmond, VA 23218, or via e-mail to dmglover@deq.virginia.gov. Along with your comment, please include your name, mailing address, phone number, and e-mail address.

[2] Section 101 [33 U.S.C. 1251]. EPA information on the Clean Water Act is available at www.epa.gov/lawsregs/laws/cwa.html. For a CWA overview, please see the October 1998 issue of *Water Central*, p. 1.

[3] EPA information on the Safe Drinking Water Act is available at www.epa.gov/safewater/sdwa/index.html. Also, for a SDWA overview, please see the December 1998 *Water Central*, p. 1.

Below is a reprint of the Executive Summary of the draft report, edited in some places for space or clarity.

Chapter 1.1 Executive Summary

The 2008 Water Quality Assessment 305(b) and 303(d) Integrated Report (IR) describes the water quality conditions in the Commonwealth of Virginia during the time period January 1, 2001, through December 31, 2006. The primary purpose of this report is to satisfy the water quality reporting requirements of the Commonwealth of Virginia under Sections 305(b), 303(d), 106, 314 and 319 of the Federal Clean Water Act and the Virginia Water Quality Monitoring, Information and Restoration Act (Section 62.1-44.19:5 C of the *Code of Virginia*).

Overview of Results

Impaired area in rivers and streams increased from 9,002 miles in 2006 to 10,604 miles in 2008. Impaired area in estuaries decreased from 2,216 square miles in 2006 to 2,185 in 2008. Additionally, impaired area for significant lakes decreased from 109,208 acres in 2006 to 94,039 in 2008. This decrease was primarily due to the new assessment methodology for lake nutrient and dissolved oxygen (DO) standards that became effective during 2007. As per established assessment guidance, impaired waters from previous assessments that do not have an approved TMDL [or] a rescinded shellfish condemnation, [have not] been confirmed as naturally impaired, or [have not been] re-assessed according to appropriate/updated Standards continue to be counted as impaired in 2008 even if they were not monitored during the current reporting period. [Ed. note: TMDL stands for "Total Maximum Daily Load," defined as the daily amount of a pollutant that a water body can assimilate and still meet water-quality standards. Va. DEQ information on TMDLs is available at www.deq.virginia.gov/tmdl/homepage.html.]

For the 2008 assessment, DEQ has used the 6th Order (12-digit) sub-watershed delineation scheme of the National Watershed Boundary Dataset (NWBD) which breaks down the former 494 watersheds into 1,247 smaller ones. At this scale 1,188 sub-watersheds have been assessed for at least one designated use between 2002 – 2008 using either water column and/or living resource data (Figure 1.1-1).

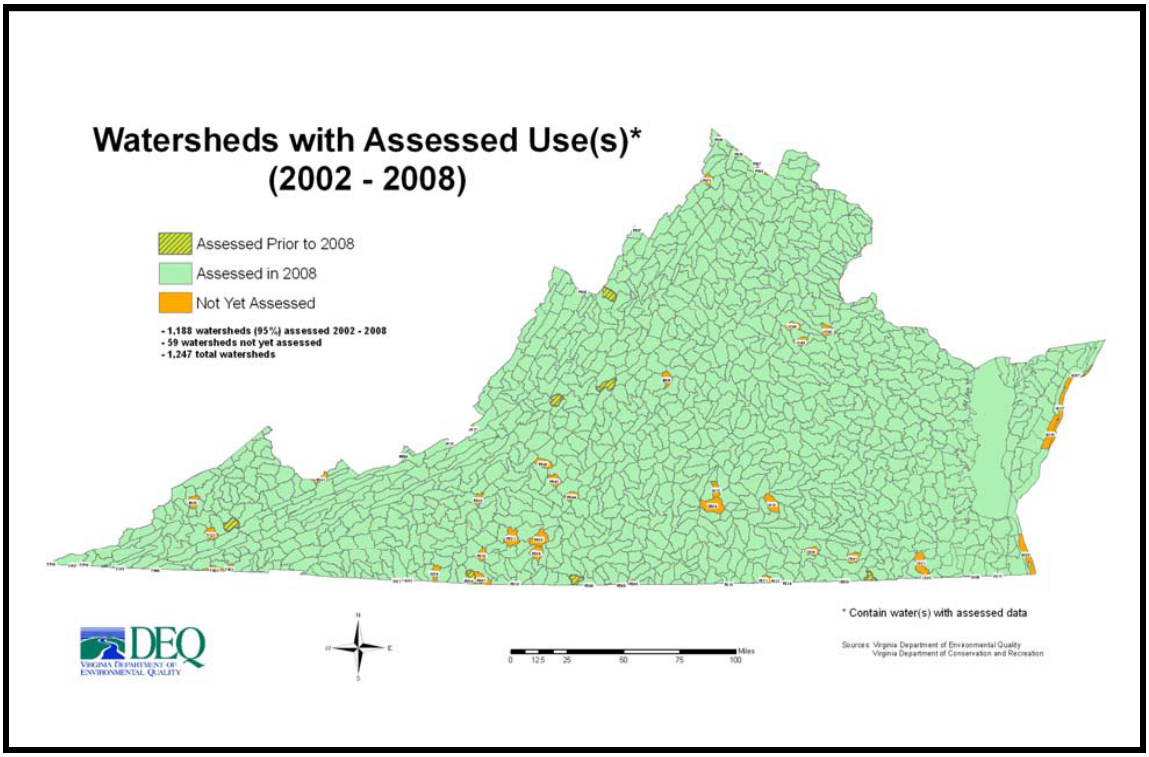


Figure 1.1-1. Virginia sub-watersheds assessed for water quality since Virginia's 2002 biennial water-quality report.

The Impaired Watershed Distribution Map (Figure 1.1-2) is a more accurate qualitative snapshot of the quality of surface waters in Virginia. Sub-watersheds that contain at least one impaired water body are shown in Figure 1.1-2. Reporting more evenly-sized impaired sub-watersheds in this report will replace the reporting of impaired "segments" which varied too greatly in size to enable meaningful comparisons over a period of years. [As Figure 1.1-2 shows, the percentages of sub-watersheds by number of impairments were as follows:]

0 impairments: 191 sub-watersheds (15%);
1-2 impairments: 514 sub-watersheds (41%);
3-5 impairments: 340 sub-watersheds (27%);
6-9 impairments: 133 sub-watersheds (11%);
≥10 impairments: 69 sub-watersheds (6%).

A history of impaired area by waterbody type is provided in Table 1.1-1. Additional details on each water body type are contained in Tables 1.1-2, 1.1-3, and 1.1-4.

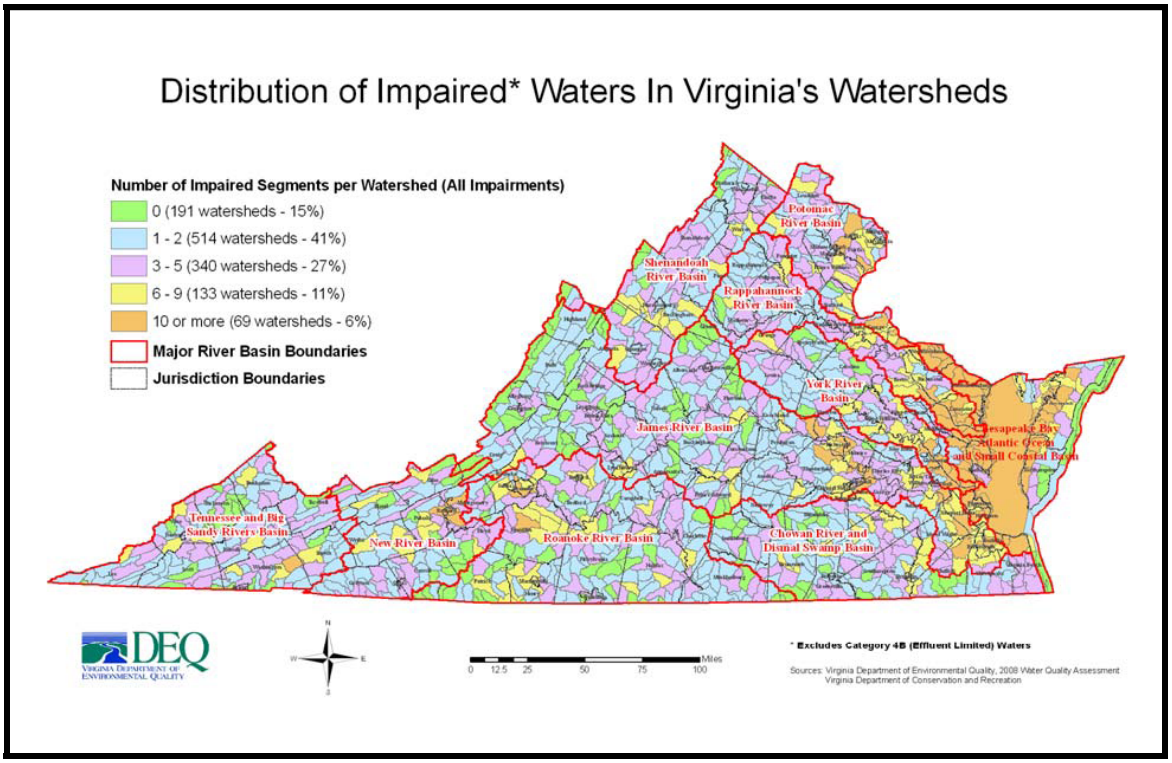


Figure 1.1-2. Distribution of impaired waters in Virginia watersheds in 2008 biennial water-quality report.

Table 1.1-1. Impaired Area Identified Per Assessment Cycle by Waterbody Type, 1996–2008.

Waterbody Type	1996	1998	2002	2004	2006	2008
Rivers & Streams (miles; 51,027 total miles in Va.)	2,016	2,611	4,838	6.931	9,002	10,604
Lakes (acres; 114,884 total acres in Va.)	17,141	0	115,558*	89,834	109,208	94,039
Estuaries (square miles; 2,308 total sq. miles in Va.)	506	437	1,689	1,907	2,216	2,185

*Area included lakes shared by Virginia and North Carolina. Additional 25,724 acres determined to be in North Carolina and removed from Virginia's total impaired acreage.

Assessment Method Used in This Report

DEQ initially incorporated the Integrated Reporting (IR) guidance and associated "Category" classification the U.S. Environmental Protection Agency (EPA) developed for the 2004 assessment. Like the 2004 and 2006 IR, the 2008 assessment combines the 305(b) overall assessment of Virginia's waters with those waters assessed as impaired but not needing a TMDL (Category 4), as well as [those] impaired and needing a TMDL (Category 5) as per Section 303(d) of the Clean Water Act. Every water or "assessment unit" (AU) has been placed in the highest category applicable (i.e. 5 > 1) to any of the designated uses for which they were assessed. Below are the U.S. EPA-defined Categories:

Category 1: Water fully supports all designated uses.

Category 2: Water fully supports all designated uses data are available for, but there is either insufficient or no information regarding the remaining designated uses.

Category 3: There is insufficient information to determine if any designated uses are being met.

Category 4: Waters are impaired or threatened but do not need a TMDL.

Category 5: Waters are impaired and do need a TMDL.

The EPA Integrated Report guidance allows the states to subdivide the federal categories in order to address state programmatic needs. Virginia established subcategories for most EPA categories in 2004 and continues to refine subcategories, as needed, for 2008. See Chapter 2.2 of this report for a description of the Virginia-defined subcategories and other information on the methodologies used for the assessment.

EPA defines threatened waters as those waters that are predicted not to meet Water Quality Standards during the next 305(b) reporting cycle and [are] therefore considered [to need] a TMDL. DEQ believes impairment should be confirmed by current monitoring data that are compared to Water Quality Standards criteria prior to scheduling for TMDL development. DEQ uses trend analysis to determine which waters are threatened. For the 2008 assessment, the results of the first phase of probabilistic monitoring (ProbMon) for freshwater free-flowing wadeable streams have also been included. See Chapter 2.4 for additional details.

Virginia has used and continues to use the "observed effects" classification found in Virginia sub-categories 2B and 3C for waters that may indicate potential water quality problems. These assessments are primarily based on evaluated or other related data, especially those associated with nonpoint source impacts. See Chapter 2.2 for additional information on the assessment of waters with observed effects. As part of the ongoing assessment process, follow-up monitoring of these waters with observed effects, as resources allow, should provide more conclusive data for future assessments. Additional detail on impairment causes and sources can be found in Chapter 3.1 and overviews of the assessment in each river basin are detailed in Chapter 3.2.

Results – Rivers and Streams

This report presents the results of the assessment of water quality in approximately 16,191 miles (31.7%) of the total 51,021 miles of the state's free-flowing streams and rivers for which sufficient data [were] available to assess at least one or more designated uses. The remaining stream miles were evaluated as [having] insufficient data to determine if designated uses are being met. Related information is presented based on sub-watersheds; however, since sub-watersheds often have more than one waterbody, these numbers cannot be added together.

Table 1.1-2 presents the results of the 2008 assessment for the river and stream miles assessed.

Table 1.1-2. 2008 Assessment Results for Virginia Rivers and Streams.

Degree of Use Support	Total Miles *(nearest whole number)*	No. of Sub-watersheds Affected
Supports Uses (EPA Categories 1 and 2)	5,587	609
Insufficient Data (EPA Category 3)	34,830	1,110
Impaired (EPA Categories 4 and 5)	10,604	891
Total	51,021	N/A

The leading cause of impairment of designated uses in Virginia's rivers and streams is violation of the *E. coli* bacteria Standards (6,032 mi). In 2003, Virginia adopted three bacteria criteria for primary recreation (swimming) use including fecal coliform, *E. coli*, and enterococci. See [the *Virginia Administrative Code* of regulations at] 9 VAC 25-260-170 for additional information on these criteria. For 2008, DEQ has used *E. coli* (in freshwater) and enterococci (in

estuaries) as the recreational-use bacteria indicator, replacing fecal coliform criteria. However, previous fecal coliform impairments have been carried forward if no data [have] been collected for the new indicators. Agricultural practices appear to be one of the primary sources contributing to the bacteria standards violations. However, urban runoff, leaking sanitary sewers, urban storm sewers, failing septic tanks, domestic animals, and even wildlife can also be significant contributing sources. [*Ed. note:* For more on bacterial indicators and standards, please see "Beaches and Bacteria" in the August 2004 *Water Central*.]

Results – Lakes and Reservoirs

Table 1.1-3 presents the results from the 2008 assessment of lakes and reservoirs.

Table 1.1-3. 2008 Assessment Results for Virginia Lakes and Reservoirs.

Degree of Use Support	Total Acres *(nearest whole number)*	No. of Sub-watersheds Affected
Supports Uses (EPA Categories 1 and 2)	18,150	74
Insufficient Data (EPA Category 3)	2,695	13
Impaired (EPA Categories 4 and 5)	94,039	107
Total	114,884	N/A

Per the 2008 assessment guidance, lakes and reservoirs that are regulated under 9 VAC 26-260-187 (§187-Lake/Reservoir Nutrient Standards), are publicly accessible and greater than 100 acres, or serve as a public water supply are considered "significant" and a priority for monitoring and assessment. Other non-significant lakes may have also been monitored and assessed for special studies or other assessment needs and the results are included in the total sizes listed in Table 1.1-3. For 2008, Virginia assessed 108 of the 122 significant lakes/reservoirs found in Appendix C of this report. For the reporting period, a total of 112,189 acres (97.7%) were monitored in Virginia and assessed with sufficient data for one or more designated uses. The remaining acres were evaluated as insufficient to assess any designated uses.

Many reservoirs were previously impaired for aquatic life use, primarily due to naturl stratification causing dissolved oxygen (DO) depletion in the hypolimnion (bottom waters). However, nutrient Standards adopted in 2007 for 187 lakes and reservoirs limit DO assessment to the epilimnion (top layer above stratification) during the warmer months of each year. This has eliminated many natural DO impairments due to stratification in the hypolimnion (bottom waters) from assessment Category 4 and resulted in many reservoirs being delisted for DO in 2008. Exceedence of the fish tissue standard for PCB (polychlorinated biphenyls) remains a major cause of fish-consumption use-impairment in lakes and reservoirs.

Results – Tidal Estuaries

Chesapeake Bay Water Quality Standards adopted in 2005, and refined in 2006 and 2007, were assessed in the 2008 report. Additional details and assessment information related to the Chesapeake Bay can be found in Chapter 6.7. Additional refinements to Chesapeake Bay criteria assessments will be incorporated by all Bay partners in 2010. Table 1.1-4 presents the assessment category results from the 2008 assessment of tidal estuaries. Sufficient data [were] available for assessment of one or more designated uses in essentially all of the 2,308 square miles of estuarine waters.

Table 1.1-4. 2008 Assessment Results for Virginia Estuarine Waters.

Degree of Use Support	Total Square Miles *(nearest whole number)*	No. of Sub-watersheds Affected
Supports Designated Uses (EPA Categories 1 and 2)	122	36
Insufficient Data (EPA Category 3)	0	4
Impaired (EPA Categories 4 and 5)	2,185	182
Total	2,308	N/A

A leading cause of impairment in Virginia's estuarine waters is failure to meet the Shallow Water Use goals (primarily submerged aquatic vegetation), adopted in 2005, which is associated with the overall aquatic life use. Dissolved oxygen

violations during the summer months are also widespread in estuarine waters (Chapter 6.7). Another major cause of impairment is violation of the fecal coliform bacteria standard associated with shellfish-consumption advisories. Shellfish use is determined by fecal coliform bacteria, rather than *E.coli* or enterococci bacteria indicators, which are used for recreation use assessment.

Based on limited available information, all of Virginia's 120 miles of the Atlantic Ocean Coastal Waters were evaluated as fully supporting Virginia's designated uses.

Fish-consumption Advisories

As of December 31, 2007, there were 54 fish-consumption advisories in Virginia: 39 for PCBs, 20 for mercury, and one for kepone. Five advisories are for both PCBs and mercury, three others have overlapping PCBs and mercury segments, and one [has an overlapping segment] for kepone and PCBs. The fish-consumption advisories due to mercury are [based on] DEQ fish-tissue monitoring in certain waterbodies that have environmental conditions which have been associated with increased potential for bioaccumulation of mercury in fish. These environmental conditions include low pH, low dissolved oxygen, and high organic matter. Many of these waterbodies are swamp waters (Class VII), have little or no industrial or municipal dischargers, and have not been sampled before. The Virginia Department of Health issues fish-consumption advisories. Additional information can be found in Chapter 6.5.

Item 2: Fish Kills in the Shenandoah and James River Basins—2007 Study Results and June 2008 Update

2007 Research Results

Following is a May 19, 2008, news release (edited slightly) from the Virginia Department of Environmental Quality (DEQ) and the Virginia Department of Game and Inland Fisheries (DGIF), summarizing the findings in 2007 of research into fish kills in watersheds of the Shenandoah River and James River. The information was compiled April 24, 2008. This document is available online at www.deq.virginia.gov/info/srfishkill.html (as of 6/30/08). For more information about the 2007 results, contact Don Kain, DEQ, at (540) 574-7815 or dgkain@deq.virginia.gov; or Steve Reeser, DGIF, at (540) 248-9372 or steve.reeser@dgif.virginia.gov.

The Virginia Department of Environmental Quality (DEQ) and Department of Game and Inland Fisheries (DGIF) coordinated investigations into fish mortality in the Shenandoah, James, and Cowpasture rivers in 2007. Those investigations continue into 2008. Findings from 2007 are summarized below.

Water and Sediment Chemistry

Conventional pollutants. DEQ monitored weekly for conventional pollutants from March through August 2007 at 12 sites. Parameters included nitrate, nitrite, ammonia, TKN [total Kjeldahl nitrogen], total and dissolved phosphorous, and suspended solids. All results were within "normal" ranges or, where water quality standards exist, they were below those threshold values.

Continuous monitoring. DEQ recorded pH, temperature, dissolved oxygen, and conductivity at six sites every 15 minutes from the end of March through August 2007. Results showed high variability in daily pH measurements, with the largest swings in daily pH ranging from about 7.5 to 9.3 pH units. This is a large swing, but similar pH shifts have been seen in other Virginia waters with no associated fish kills; also some sites where fish kills occurred had relatively small daily swings of less than 1 pH unit. Therefore, pH changes do not appear to be related to the fish kills.

Dissolved oxygen does not seem to be a factor in the fish kills. Levels were acceptable at all sites during the spring period (when fish kills occurred). Low dissolved oxygen levels occurred in the North Fork Shenandoah River at Cootes Store when the water flows dropped and temperatures increased in July and August, but there were no fish kills at that time.

Water temperature seems to be related to timing of fish kills. Problems seemed to begin once river temperatures reached about 15 ° C (59° F), then seemed to stop when river temperatures reached about 25° C (75° F).

Passive Samplers. From March-May, 2007, DEQ and the Friends of the North Fork Shenandoah deployed passive samplers—devices designed to collect polar and non-polar organic chemicals. These units are typically submerged in the river for six to eight weeks and are particularly effective at measuring chemicals that are normally at concentrations too low to be quantified through conventional sampling

methods. The samplers were placed at 12 locations including the Shenandoah River, North Fork Shenandoah River, South Fork Shenandoah River, Linville Creek, Cedar Creek, North River, South River, Cowpasture River, and Maury River. Extracts from the passive samplers were analyzed by a U.S. Geological Survey (USGS) laboratory for a list of 199 organic chemicals including PAHs [polycyclic aromatic hydrocarbons], PCBs [polychlorinated biphenyls], herbicides, pesticides, waste indicators, pharmaceuticals, and hormones.

While laboratory results are still preliminary, and data analysis is ongoing, some initial findings have emerged. As with many rivers that have been sampled using this technology, the fish-kill areas yielded a diverse listing of compounds. The chemicals detected and the levels present were largely indicative of an agricultural area. Chemicals such as PCBs, pesticides, PAHs, and pharmaceutical compounds were found, but results were not inconsistent with other developed areas that have not experienced fish kills. No individual chemical compounds were found at levels that by themselves would indicate a clear cause of observed fish mortality.

Ambient Toxicity Testing. Water samples were collected from four sites in the Shenandoah River drainage for 7-day chronic toxicity testing by the EPA Region III Office of Analytical Services and Quality in Wheeling, W. Va. Water taken from all four sites during the week of March 19, 2007, had significant effects on survival relative to a control (or reference) sample. EPA scientists suspected that a pathogen may have been interfering with the tests, so sampling was repeated during the week of May 14. The South Fork Shenandoah River water did not have any significant effect on survival or growth in the follow-up tests. Water from the remaining three sites all had significant effects on survival. When water from North Fork Shenandoah River and Cedar Creek was disinfected with ultraviolet radiation, however, there was no significant effect on survival or biomass. It appears that the outcome of these tests could have been more strongly influenced by a biological pathogen than [by] chemical constituents in the water.

Sediment Metals Concentrations. Sediments were sampled at North Fork and South Fork Shenandoah River sites, and sites in the South, North, Maury, and Cowpasture Rivers. The sediments were analyzed for heavy metals and arsenic. No samples had concentrations in excess of levels that would be expected to have effects on growth or survival in fish. Metals tested for included arsenic, copper, cadmium, nickel, zinc, lead, and mercury.

Volunteer Storm Monitoring. Citizen volunteers and DEQ personnel continued to collect samples for ammonia and other nutrients during storm events. Samples from several storms were collected during the period from March 2007 to June 2007. Results of the analyses indicated that levels of ammonia were below either chronic or acute toxic concentrations for fish. These levels were also below Water Quality Criteria for Virginia fresh waters.

Water Column Metals Analyses. Several sampling events were conducted during the spring of 2007. Water samples were analyzed for metals to determine whether water-column concentrations exceeded chronic or acute concentrations. Results of the analyses were that all metals were detected below levels expected to cause death or sub-lethal effects in fish.

Fish and other Aquatic Life: Health and Community Evaluations

Benthic Invertebrate Communities. Virginia Tech has been conducting a multi-year study of benthic invertebrates [immature insects and other animals that live on stream bottoms] in fish-kill waters and reference streams since 2006. Initial findings confirm that the fish-kill areas in the Shenandoah system are indicative of a nutrient-rich environment, a common condition in rivers of this size, but there is no indication of any invertebrate taxa [group] being eliminated due to toxic compounds. More detailed analyses and statistical testing continue.

In 2007, field work focusing on local land-use influences on invertebrates and water chemistry in tributary streams was initiated, along with responses of selected organisms to laboratory chemical exposures. Data from 2007 projects are now under review. Some of the research topics for 2008 include [the following]: quantitative measurements of snail density and rates of parasitic infection; determining relationships of these [snail] measurements with environmental stressors [and] land use; identification of trematode parasites using snails as an intermediate host; further investigation of the relationship of observed snail responses and land use; and investigation of the effects of specific stressors on snail respiratory, immune, and reproductive systems.

Fish Viruses. Virus testing was conducted during 2007 by the U.S. Fish and Wildlife Service (at the Fish Health Center of the Northeast Fishery Center in Lamar, Penn.) and by Cornell

University. No known fish viruses were found in numbers sufficient to account for the fish-kill events. Testing by Cornell University specifically for Viral Hemorrhagic Septicemia (VHS-v), a virus currently causing lesions and mortality in the Great Lakes and elsewhere, was negative in all samples. A small percentage of Virginia fish-kill samples tested positive for Largemouth Bass Virus (LMB-v); the low rate of incidence suggests it is not a cause of the fish kills, although it may further compromise the health of infected fish.

Fish Bacteria. Bacterial assays were conducted by the U.S. Geological Survey (at the National Fish Health Research Lab in Leetown, W. Va.) and the U.S. Fish and Wildlife Service. A number of indigenous, opportunistic bacteria were cultured from skin, lesions, and gills of fish from both fish-kill and non-fish-kill sites. These organisms are considered part of the normal bacterial flora, and typically only cause infection in already compromised hosts. In addition to normal bacterial flora, fish from sites experiencing fish kills showed unexpectedly high numbers of two obligate pathogens (*Aeromonas salmonicida* and *Flavobacterium columnare*). These pathogens are known to be capable of functioning as primary pathogens—that is, they can be the causative agent of fish disease. These organisms were found at active fish-kill sites (in the Shenandoah, Cowpasture, and James rivers in April and May 2007) and were not found at sites that were not experiencing fish kills (Potomac River, Gauley River, and North Fork Shenandoah prior to fish-kill onset in March 2007). A follow-up study on bacteria by USGS is underway in 2008 to better characterize the roles of *A. salmonicida, F. columnare*, and other bacteria.

Fish Parasites. USGS researchers have noted high parasite loads externally and in gills, livers, kidneys, and spleens of fish from the fish-kill areas. These parasites may weaken fish and increase their susceptibility to disease. Many of these parasites have intermediate hosts, such as snails, zooplankton, and benthic invertebrates, all of which may be found at higher densities in nutrient-enriched waters. This link is being explored further.

Fish Pathology, Physiology, and Histology. USGS research suggests that smallmouth bass and sunfish are stressed populations which succumb to a variety of athogens and parasites when stressed beyond their tolerance. Evidence includes [the following]:

- gill lesions, suggesting that ammonia, diatoms, or other irritants may be leading to respiratory problems;
- massive proliferation of internal parasites in bile ducts, leading to destruction of large portions of the liver;
- macrophage [a type of cell] aggregates in a variety of internal organs [with] increase [of these cells] in response both to infectious agents and to contaminants;
- moderate to high incidence of intersex in male smallmouth bass [that is, males showing female characteristics], suggestive of exposure to estrogenic compounds.

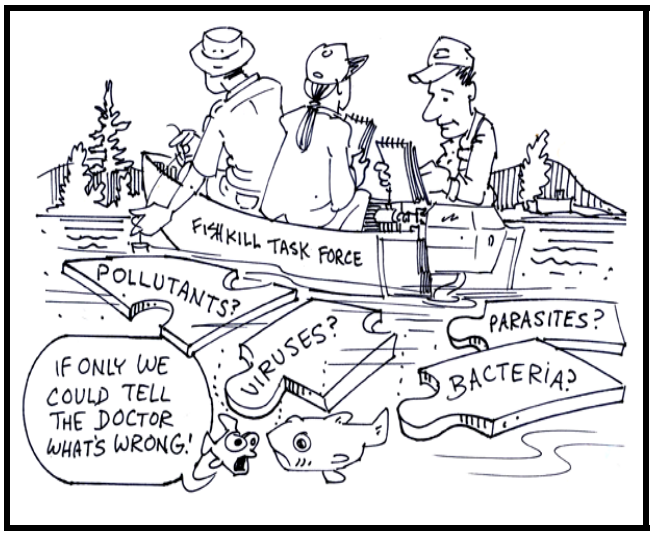
Summary

Extensive water-quality and biological sampling was conducted in fish-kill and reference areas in 2007. Findings seem to rule out the following possible causes:

- individual water-quality constituents as primary causes of mortality, including pH, ammonia, dissolved oxygen, nutrients, metals, and organics;
- likely fish viruses, including Largemouth Bass Virus (LMB-v) and Viral Hemorrhagic Septicemia (VHS-v), along with several opportunistic bacteria.

Areas needing continued or further study include [the following].

- Effects and relationships of combinations of water-quality constituents. Even though no individual constituent appears responsible for the fish kills, how might different combinations of chemicals behave? Are combinations of chemicals additive? Synergistic? Could they have secondary effects as stressors? What differences exist between the rivers experiencing fish kills and rivers with no kills?
- Biological pathogens. Further work is needed to determine if organisms such as the bacterium *Areomonas salmonicida* are functioning as primary pathogens. Are there other bacteria or viruses that have not yet been identified?
- Fish health measurements. Additional measurements of tissue responses and histology, blood chemistry, hormones, organ function, and infestation and role of parasites are needed. Sample sizes must be adequate for statistical comparisons between sites, species, age groups, and sex of specimens. Sufficient numbers of specimens need to be collected from reference streams and fish-kill areas.
- Do the fish responses such as intersex have a bearing on fish kills?
- Are measurable, sublethal effects occurring in other members of the aquatic community, such as benthic macroinvertebrates?



June 2008 Update

Following is a June 13, 2008, news release (edited slightly) from the Virginia DEQ and the Virginia DGIF on fish kills in 2008 in the James and Shenandoah river basins. This and other DEQ news releases are available online at www.deq.virginia.gov/info/newsreleases.html. The agency contacts for this release are as follows: Bill Hayden, DEQ, at (804) 698-4447 or wphayden@deq.virginia.gov; or Julia Dixon, DGIF, at (804) 367-0991 or julia.dixon@dgif.virginia.gov.

Fish kills are occurring in Virginia rivers again [in 2008] but have developed more slowly than in past years, according to ongoing studies by the Department of Environmental Quality (DEQ) and the Department of Game and Inland Fisheries (DGIF). The severity of the kills in the Shenandoah River watershed may be more moderate this year, though fish kills in the upper James River watershed appear similar to those in 2007, the agencies reported today.

Fish kills and fish with lesions have been observed in the upper James River and some tributaries, including the Jackson and Cowpasture rivers. DGIF sampling on these rivers has confirmed recent anglers' reports that 25 percent to 30 percent of fish have lesions.

There have been no problems reported on the mainstem Shenandoah River, though the upper North and South Forks of the Shenandoah have seen low numbers of affected fish this year. The sections of both forks that experienced kills in past years are reporting greatly improved catches this spring.

Though the fish kills each year apparently have followed the onset of warmer water temperatures during the spring, no cause for the fish deaths and lesions has been identified. The kills have not occurred after June in previous years. The Shenandoah River Fish Kill Task Force, chaired by DEQ and DGIF, began extensive investigations into the problem in 2005.

The number of kills began to increase this spring after stream temperatures rose in late May. Investigators have collected water and fish samples before and during the fish kills, and the same type of sampling has been conducted at other streams—in rivers with similar fish species but no fish kills. Laboratory processing of these samples may take several months.

Here is a summary of fish problems reported in 2008.

James River and Tributaries

- The upper James River began showing signs of ailing fish in early April. Numbers of dead fish and fish with lesions—mostly smallmouth bass and sunfish—have increased since stream temperatures increased and stayed warm. Anglers are reporting that fishing remains slow, and many are seeing numerous dead fish on each trip. They also are seeing lesions regularly on the live fish they catch.
- For the first time, the Jackson River is experiencing fish kills. Anglers on the lower Jackson downstream of Covington are providing reports similar to those on the James. Fewer reports have been received from the Jackson than from the James, possibly because there are fewer fishermen on the Jackson.
- The Cowpasture River has generated fewer reports than last year, but the reports all include some lesions and dead fish.
- Craig Creek, a tributary of the James at Eagle Rock, has seen a small number of reports of dead fish and lesions. Fish kills have not been reported on this stream in past years.

Shenandoah River, and North and South Forks

- No problems have been reported this year on the mainstem Shenandoah River, downstream of Front Royal.
- Compared to past years, fairly low numbers of dead fish have been reported on the North and South Forks. Lesion rates of 10 percent to 20 percent have been reported in the past several weeks, primarily upstream of the Mount Jackson-Edinburg area on the North Fork and upstream of Elkton on the South Fork.
- Anglers on most sections of the Shenandoah are reporting excellent success and few fish with visible problems. In particular, the lower North Fork from Woodstock to the mouth is producing very good catches this year. The South Fork

also is supporting excellent catches in areas that previously experienced fish kills. Sunfish and rock bass, whose numbers were reduced during the kills, appear to be recovering well.

DEQ and DGIF have set priorities for available funds and are coordinating a number of investigations this year. For example, studies in 2008 include sampling before, during, and after fish kills in the rivers experiencing those problems. The investigation also is emphasizing rivers where fish kills have not occurred, expanded lists of chemical analyses with a focus on storm flows, and multiple fish health investigations.

The investigating agencies and the Fish Kill Task Force encourage the public to provide information on the location, number, and type of fish found dead or sick in the Shenandoah and James river systems. Anyone with information is asked to call the DEQ regional office in Harrisonburg at (540) 574-7800, or toll-free in Virginia at (800) 592-5482. Information also can be emailed to fishreports@deq.virginia.gov.

Item 3: Private Water Supply Protection—Revitalizing the Virginia Household Water Quality Program

By Erin James, Extension Associate in the Virginia Tech Department of Biological Systems Engineering and coordinator of the Virginia Household Water Quality Program.

Groundwater quality is a concern for all residents using private water supplies. The majority of households in 60 of Virginia's 95 counties rely on private water-supply systems (wells, springs, or cisterns). Unlike homes served by public water, private-system owners are responsible for all aspects of their water systems, including routine maintenance, regular water testing, and addressing water-quality and water-quantity problems. A lack of knowledge about private water-supply management and water-quality issues may lead to system neglect and poor quality water.

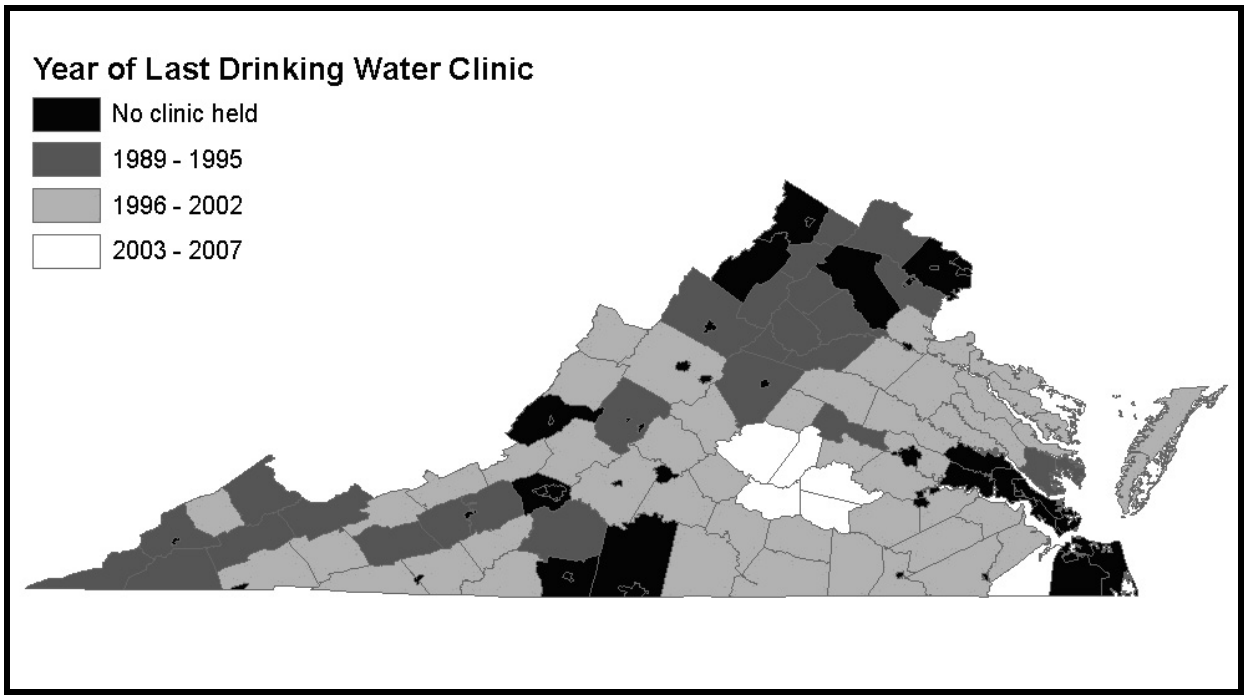
Initially launched in 1989, the Virginia Cooperative Extension Virginia Household Water Quality Program (VAHWQP) consisted of county-based household water-sampling clinics, which included confidential water-sample analysis followed by a meeting where citizens learned about proper care and maintenance of their water-supply system, how to interpret their sample-analysis report, and about potential water treatment options (if needed). As the following map (next page) shows, a first set of clinics was conducted in several localities between 1989 and 1995, a second set was conducted in the late 1990s and early 2000s, and a third set was conducted between 2003 and 2007.

[*Ed. note:* Reports from the most recent set of clinics are available at www.ext.vt.edu/cgi-bin/WebObjects/Docs.woa/wa/getcat?cat=ir-nrem-wq-ehwq. Paper copies of the reports from the 1990s and early 2000s are available at the Virginia Tech Library. A list is available online at http://addison.vt.edu; at this site, search for "Evaluation of Household Water Quality." If your local library does not have copies, you may be able to request a Virginia Tech copy through an interlibrary loan.]

The VAHWQP was greatly reduced in 2003 due to budget reductions. But now a competitive grant to Dr. Brian Benham (Virginia Tech Biological Systems Engineering Department) from the U.S. Department of Agriculture's Cooperative State Research Education and Extension Service is being used to revitalize the VAHWQP. Erin James joined the Biological Systems Engineering Department in March 2008 to serve as VAHWQP coordinator. Virginia Cooperative Extension is also supporting the program.

The grant, which runs from fall 2007 to fall 2010, is also being used to establish the Virginia Master Well Owner Network (VAMWON). The VAMWON will be patterned after a similar, very successful master well-owner volunteer network established in Pennsylvania. The VAMWON will consist of Cooperative Extension agents and lay volunteers trained in the proper design, management, and maintenance of private water-supply systems.

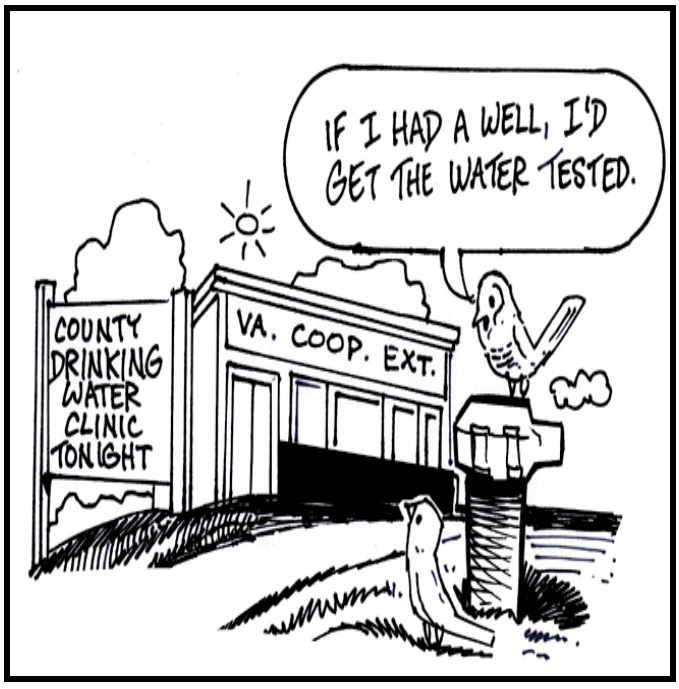
As part of the VAHWQP revitalization process, trained Extension agents will organize and conduct county-based drinking-water clinics and serve as a local resource for clientele with household water-quality concerns. Trained volunteers will reach out to private water-system owners in a variety of ways, ranging from speaking to local community groups to peer-to-peer education of friends and neighbors. The master well-owner network will strengthen the household water quality program by enabling



trained agents and volunteers to work together to inform Virginians dependent on private water systems about water testing, water treatment, and system maintenance. Resources that are being created and updated to support the VAHWQP include revised Extension water-quality publications, a Web site, and a newsletter.

Project outcomes specified in the USDA grant include conducting at least 18 county drinking-water clinics, which will involve collecting and analyzing over 5,400 household water samples, and training at least 70 VAMWON Extension agents and 240 VAMWON volunteers. The VAMWON will enhance Extension's capacity to offer future education and outreach to private water-system owners. The USDA-funded project includes a commitment to reach rural citizens characterized as members of underserved communities.

For additional information about the Virginia Household Water Quality Program or the Virginia Master Well Owner Network, please contact Erin James at ejames@vt.edu or (540) 231-9058.



Item 4. Paying for Water Quality—A Boost from the Farm Bill

Maintaining and improving water quality cost money. Significant funds are needed for monitoring and assessing conditions; implementing and enforcing water-quality regulations; building, operating, and upgrading wastewater treatment plants; implementing land-use practices that reduce soil erosion and runoff of pollutants; implementing ipollution-prevention activities; restoring aquatic habitat; conducting research; and providing needed information to citizens, businesses, and policy-makers. For example, two water-quality bills facing Virginia include the cost of TMDLs and TMDL implementation plans, estimated at about $31,000

each for hundreds of impaired waters;[4] and the much larger cost of implementing tributary strategies to reduce nutrients and sediment reaching the Chesapeake Bay, estimated in 2004 at almost $10 billion.[5]

Funds for water-quality activities come from many federal, state, and local sources. This section describes one important recent development: the conservation-program funds in the recently passed 2008 Farm Bill, formally called the Food, Conservation and Energy Act of 2008.

The Food, Conservation and Energy Act of 2008: Highlights of Conservation Provisions

By Jim Pease, Extension Economist for Farm Management in the Virginia Tech Department of Agricultural and Applied Economics.

The following is an excerpt from an article originally published in June-July 2008 issue of *Farm Business Management Update*, published by the Virginia Tech Department of Agricultural Economics, and electronically accessible through the Virginia Cooperative Extension Web site at http://www.ext.vt.edu/. *Water Central* thanks *Farm Business Management Update* for permission to reprint this excerpt.

The Food, Conservation and Energy Act of 2008 (FCE) is a continuation of the omnibus, multi-year Farm Bills that authorize and fund most federal government programs that concern agriculture. …Many observers consider FCE to be little more than an addendum to the 2002 Farm Security and Rural Investment Act, but the 2008 Act does fund some new programs that will affect commodity, conservation, and other interests.

FCE has been "scored" by the Congressional Budget Office at $307 billion over 2008-2012 [with] $209 billion (68%) for nutrition programs, $35 billion (11%) for commodity programs, and $25 billion (8%) for conservation programs. …

Conservation programs will receive a funding increase of $7.9 billion in FCE, for a total of $25 billion over 2008-2012. All major programs were reauthorized and most received funding increases or expanded authorizations. Provisions are included in several programs requiring consideration of organic, socially disadvantaged, and beginning farmers, and payment limitations are instituted for some conservation programs.

The Environmental Quality Incentives Program (EQIP) offers financial and technical assistance to farmers implementing conservation structures or practices on their land. In FY2007, Virginia was allocated approximately $14 million out of the national EQIP allocation of approximately $1 billion. Under FCE, EQIP receives $7.3 billion over FY2008-2012, an additional $2.7 billion over that originally allocated in the 2002 Farm Bill.

The Conservation Reserve Program is the principal federal land-retirement program. In exchange for removing environmentally sensitive land from production, owners receive annual rental payments for the duration of the contract. Congress reduced the acreage authorization…to 32 million acres over 2010-2012, down from the 39.2 million authorization of the 2002 Farm Bill.

The Conservation Security Program was initiated in the 2002 Farm Bill…. [N]ow re-named the Conservation Stewardship Program…, the program will establish contracts between USDA and the participating producer who proves eligibility through satisfying a minimum stewardship threshold (usually including a nutrient management plan and a soil conservation plan). Non-industrial private forest land is also eligible up to 10% of total enrollment acres. Incentive payments are made over the 5-year contract period to the producer who implements conservation activities beyond the threshold that addresses resource concerns identified at the state level. Over FY2009 – FY2017, the program is authorized to enroll an additional 12.8 million acres per year, with projected cost of approximately $230 million per year.

The Wetlands Reserve Program authorizes long-term easements, permanent easements, and cost-share agreements to restore wetlands on farmland. The program is not large in Virginia: the state received $837,000 (0.3 percent of the national total) allocation in FY2007. Funding [nationwide] is increased to $1.3 billion in FCE, sufficient to enroll 1.22 million wetland acres.

The Wildlife Habitat Incentives Program (WHIP) provides cost-share agreements to develop and improve wildlife habitat. Both technical assistance and up to 75% cost-share assistance are provided to establish/improve fish and wildlife habitat, with agreements lasting from 5-10 years.

[4] The Virginia DEQ's *TMDL Program Six Year Progress Report* (May 2007) estimated $19,000 to complete a TMDL (p. 6) and $12,500 to complete a TMDL implementation plan (p. 8). The report is available online at www.deq.virginia.gov/tmdl/homepage.html (7/15/08).

[5] Commonwealth of Virginia, *Chesapeake Bay Nutrient and Sediment Reduction Tributary Strategy* (January 2005), p. 44.; available online at www.deq.virginia.gov/bay/wqifdown.html (7/7/08).

Virginia was allocated $473,000 under this program for FY2007 (1 percent of the national total). The WHIP program is allocated $85 million nationwide per fiscal year in FY2008-2014.

The Grassland Reserve Program (GRP) provides technical assistance and pays landowners to establish long-term contracts or easements to restore or conserve grasslands. FCE authorizes enrollment of up to 1.22 million grassland acres. This program is relatively new to Virginia, which was allocated $105,000 (4.5 percent of the national total) in FY2007. The newly re-named Farmland Protection Program (FPP) provides partial funding to state, local, and tribal governments, and to nonprofit organizations for purchase of easements on agricultural lands that protect against land development. Virginia received about $1 million (1.5 percent of the national total) under FPP in FY2007. Nationwide funding for FPP is increased in FY2008-2012 to $773 million.

A provision of the Conservation Title generating considerable interest in this region is Section 1240Q, which provides assistance to agricultural producers in the Chesapeake Bay watershed for…improving water quality and quantity and…[for] soil, air, and related resources. Section 1240Q represents a victory for the Bay states, which have pushed for Farm Bill consideration of the Chesapeake Bay programs since 2005 [see, for example, "Policy for the Bay," by the Chesapeake Bay Commission, at www.chesbay.state.va.us/farmbill.html]. The Farm Bill allocates $188 million during FY 2009-2012 to assist producers through existing programs to implement conservation activities on agricultural lands in the watershed, with particular consideration to producers in the Susquehanna, Shenandoah, Potomac, and Patuxent river basins. Conservation activities on farms that will be supported include controlling soil and nutrient losses to surface and groundwater, and habitat conservation, restoration, and enhancement measures of lands with significant ecological value.

Item 5. Blue Crabs—One Way Water Quality Matters

In April 2008, recent surveys showing declining Blue Crab populations led both Virginia and Maryland to implement new restrictions on Blue Crab harvesting, starting with the 2008 season. At the April 22 Virginia Marine Resources Commission meeting where the Commission approved new restrictions, many Virginia watermen expressed vigorous disagreement about the new restrictions and the impact of harvests on crab populations. But one point of agreement at that contentious public hearing was that water quality is a key factor affecting crab populations.

Water quality influences habitat quality for Blue Crabs and many other Bay watershed animals and plants. The main water-quality factors affecting Bay organisms are the level of nutrients (nitrogen and phosphorus), the amount of sediment, and the level of many kinds of contaminants. Land uses that affect the delivery of these substances to water are a major focus of Bay clean-up and restoration efforts.

Given this connection between water quality and the "health" of the Chesapeake Bay, *Water Central* ends this Water Quality Sampler with recent developments about Chesapeake Bay Blue Crabs.

Joint Statement by Virginia and Maryland Governors on Status of Blue Crabs, April 15, 2008

Meeting in Colonial Beach, Va., Virginia Governor Tim Kaine and Maryland Governor Martin O'Malley received the results of the latest winter survey of Blue Crab populations in the Chesapeake Bay, indicating numbers significantly below what scientists estimate as a healthy population. The governors released the following statement on the status of Bay crabs and the states' collaborative response to rebuild the crab population.[6]

"Our review today of the winter 2007/2008 dredge survey results has confirmed our increased concerns: The Chesapeake Bay's blue crab population is suffering near historic lows in spawning stock and unacceptably high fishing rates—an estimated 60 % of the available crabs were caught in 2007. The evidence is clear that our most valuable commercial fishery is in imminent danger–producing in 2007 one of the worst harvest years on record–and at risk for an economic collapse.

"Maryland and Virginia must act now, and we must act together, to reduce harvest pressure on blue crabs immediately, and in so doing, protect both the biological and the economic sustainability of our shared resource. Not to act would be irresponsible.

[6] Text taken from Gov. Kaine's Web site at www.governor.virginia.gov/MediaRelations/NewsReleases/index.cfm , 5/1/08.

"We learned from our experts today that our crab populations are down 70 percent from 1990 levels and are showing no signs of recovery, despite the last harvest reduction actions taken in 2001, which initially helped stabilize an earlier decline. We also learned that our best chance to return to a healthy, more productive population quickly is to focus on protecting mature female crabs. To that end, our scientists have recommended a reduction of 34 percent in the 2008 harvest of female crabs. This will lead to a projected increase of 20-26 million female crabs left in the bay to spawn.

"Each year, tens of millions of mature, egg-bearing female crabs migrate down the Bay in the fall, in preparation for releasing their eggs the following summer. We must do a better job of protecting these crabs if we are to rebuild our blue crab stocks and the economy that they sustain.

"The blue crab rests at the heart of our culture and heritage. The blue crab industry is an important financial driver for many small Bay communities, with an annual economic impact of $120 million to $200 million bay-wide, and provides a livelihood for thousands of people.

"We know that a variety of environmental factors–degraded water quality and loss of submerged aquatic vegetation, in particular–have disrupted the balance of the Bay ecosystem and likely contributed to the decline of the fishery. Both Virginia and Maryland are committed to improving the health of the Bay's waters. We have taken bold steps to improve water quality and are working to accelerate our efforts.

"Blue crabs are a public trust resource owned by the citizens of Maryland and Virginia. The most immediate opportunity to rebuild the crab population is through a reduction in harvest pressure. Unfortunately, we cannot rebuild this fishery without some short-term economic impact to the industry.

"Our goal of removing no more than 46 percent of the available crabs has been exceeded in eight of the last ten years–reaching 60 percent in 2007. We cannot protect, let alone rebuild, a stock while we are overfishing at that rate. Therefore, we are directing our regulatory agencies to take immediate steps to reduce the 2008 crab harvest and to take all measures necessary to create a sustainable fishery.

"Fortunately, the blue crab is a resilient species. With effective management actions in place, we should see immediate increases in the spawning stock leading to significant population increases and harvest levels within a few short years.

"We are at an historic juncture today where Maryland and Virginia are collaborating at unprecedented levels. We will monitor our progress, closely tracking this year's harvest and scrutinizing the winter dredge survey results next year. And we are committed to working together, and with our stakeholders, to properly manage this species for the long-term. It is only by working together that we will achieve a bay-wide solution and return the Chesapeake blue crab to its rightful place of abundance in the Bay's ecology, economy and heritage."

Other Recent Blue Crab Developments

On April 22, the **Virginia Marine Resources Commission** (VMRC) approved the following regulatory changes designed to cut the 2008 Blue Crab harvest by 34 percent: abolishing the winter dredge fishery; closing the fall season for female crabs on Oct. 27 (five weeks early); eliminating the five-pot recreational crab license; requiring two additional, and larger, cull rings on crab pots; reducing the number of hard crab pots per license by 15 percent as of May 1 and another 15 percent in 2009; and reducing the number of peeler pots per license by 30 percent on May 1.[7]

At meetings in February and March 2008 the VMRC had passed other crabbing restrictions, including limiting the number of winter dredge permits to the current 53, requiring the two cull rings on crab pots to remain open at all times, increasing the minimum allowable size for peeler crabs, and allowing a permit holder to authorize only one additional person to work crab pots.[8]

In May, Maryland approved several new restrictions: prohibiting recreational crabbers from keeping female crabs (except for peeler crabs); shortening the commercial crabbing season by about seven weeks; and imposing limits on the amount of female crabs that can be taken in September and October.[9]

Also in May, Govs. Kaine and O'Malley requested from the U.S. Department of Commerce a federal **fishery disaster declaration for Chesapeake Blue Crabs**. If the declaration is approved, Bay watermen and communities would become eligible for disaster-relief funds. The National Oceanic and Atmospheric Administration will evaluate the request.[10]

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[7] Minutes of VMRC's 4/22/08 meeting, online at www.mrc.virginia.gov/commission_summaries/cs0408.shtm (as of 7/11/08).

[8] *Rappahannock Record*, 5/2/08.

[9] *Baltimore Sun*, 4/22/08, and *Annapolis Capital*, 5/23/08.

[10] *Annapolis Capital*, 5/3/08.

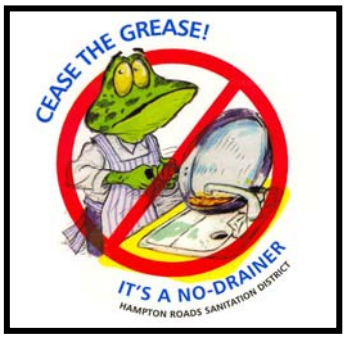
WATER QUALITY and YOU/ LA CALIDAD de AGUA y USTED

In this section, *Water Central* offers suggestions for how individuals can help maintain and improve the condition of Virginia's waters and aquatic habitats. Unless otherwise noted, you are welcome to reproduce and distribute items in this section, but please retain the credits to the original source(s). All Web sites mentioned were functional as of 7/9/08. *Para información en español, por favor vea bajo.*

Keeping Fats, Oils, and Grease (FOG) Out of Sewer Lines

The following information (and illustration) on proper disposal of fats, oils, and grease was provided by the Hampton Roads Sanitation District (HRSD), Virginia Beach, Virginia; Web site: www.hrsd.state.va.us. *Water Central* thanks HRSD for permission to use the information and illustration.

Everyday waste can cause damage to wastewater systems. Fats, oils, and grease not only clog your arteries—they also clog your sanitary sewer pipes. Grease sticks to the inside of sewer pipes, both on your property and in the street. Over time, grease can build up and block the entire pipe. Blocked sewer pipes can cause backups and overflows, which could damage your home or business and the sewer system and harm the environment.



Here are some tips to help prevent these problems and potentially costly repairs and maintenance for you:

- Don't pour grease into sinks or toilets.
- Scrape grease and food scraps from plates, grills, and pots and pans and put them in the trash.
- Put baskets/strainers in sink drains to catch remaining food scraps.

For more detailed information on proper handling of waste fats, oil, and grease:

- "A Fact Sheet for Best Management Practices for Fats, Oils, and Grease," North Carolina Department of Environment and Natural Resources, online at www.p2pays.org/ref/05/04281.pdf.
- "Fats, Oils, and Grease Program (FOG)" Web page, Washington Suburban Sanitary Commission, www.wsscwater.com/rsg/FOGProgram/index.cfm.

En Español

En esta sección, *Water Central* le ofrece sugestiónes de como individuales pueden mantener y mejorar la condición de las aguas y los habitats acuáticos de Virginia. Aprovechese de repdroducir y distribuir esta pagina, pero por favor retenga los credítos a los originales. Todos los sitios Web mencionados funcionaban el 9 Julio 2008.

Por Favor Evite Las Grasas y Aceites en Los Alcantarillados

Fuente de la información y la ilustración: El Distrito para Saneamiento de Hampton Roads (HRSD), localizado en Virginia Beach, Virginia; sitio Web: www.hrsd.state.va.us. *Water Central* agradece a HRSD por el permiso a usar la información y la ilustración. Gracias también a Carlos Elias y Pedro Peña para ayuda con esta traducción. Todos errores son la responsibilidad de *Water Central*.

Los desperdicios ordinarios pueden dañar los sistemas de aguas residuales. Las grasas y aceites comestibles pueden atascar no solo sus arterias sino también las cañerías de su alcantarillado.

La grasa se pega al interior de las cañerías del alcantarillado, en su propiedad y en la calle. Con el tiempo, la grasa se puede acumalar y obstruir la cañería toda. Las cañerías bloqueadas pueden causar excesos de aguas residuales, las cuales pueden dañar en su casa, en su negocio, y en el sistema de aguas residuals, y afectar el medio ambiente.

Los siguientes son algunos consejos para impedir esos problemas y reparaciónes potencialmente costosas.

- No eche grasa en los fregaderos o sanitarios.
- Limpie la grasa y sobras grasosas de los platos, las parillas, y las sartenes y pongalas en la basura.
- Ponga coladores en los fregaderos para acumular las sobras, y ponga estas sobras en la basura.

Para más información (en inglés):

- Folleto informativo del Departamento del Medio Ambiente y Recursos Naturales de North Carolina: www.p2pays.org/ref/05/04281.pdf.
- Sitio Web de la Comisión Sanitaria de la Periferia de Washington: www.wsscwater.com/rsg/FOGProgram/index.cfm.

VIRGINIA WATER STATUS REPORT

This section of *Water Central* presents recent and historical data on Virginia's precipitation, groundwater levels, and stream flow. A drought report is also included in this issue (starts on fifth page).

Precipitation in Virginia, July 2007-June 2008

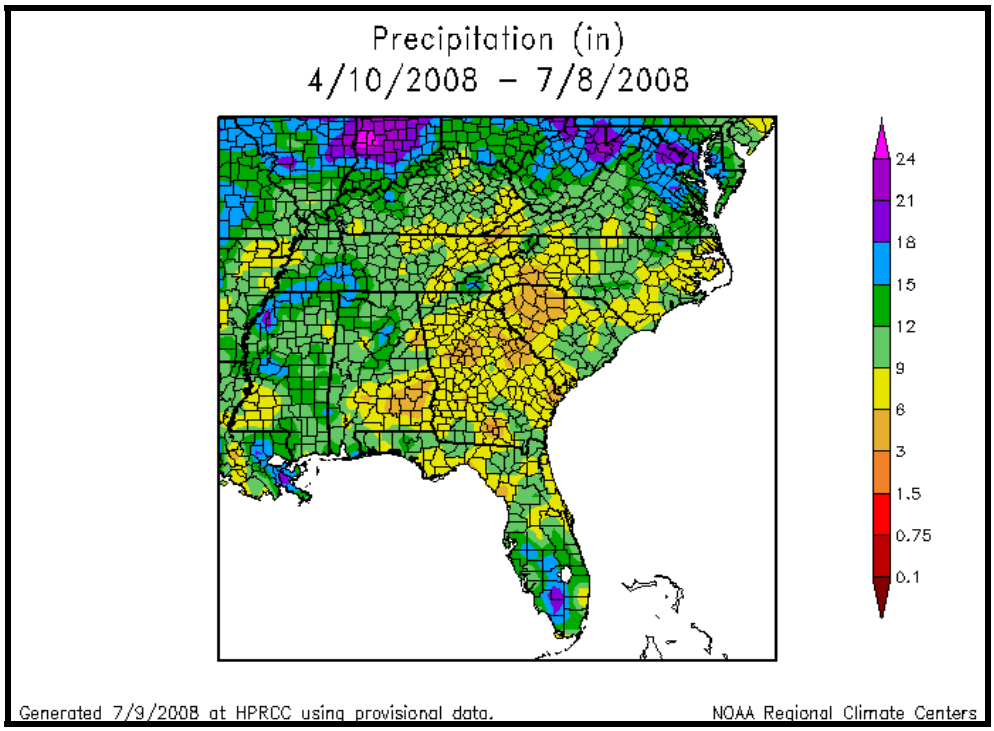
The chart below shows precipitation (in inches) over the last 12 months at nine National Weather Service (NWS) observation sites in or near Virginia. The upper number for each entry is the **total precipitation** for the respective site and month (with yearly total at the bottom of the chart), including the equivalent amount of water contained in any snowfall or other frozen precipitation. These values were found (on 7/7/08) at the "Climate" sections of NWS Web sites, as follows: www.weather.gov/climate/index.php?wfo=mrx for the Tri-cities Airport in Tennessee, about 20 miles from Bristol, Va.; www.weather.gov/climate/index.php?wfo=rnk, for Blacksburg, Danville, Lynchburg, and Roanoke; www.weather.gov/climate/index.php?wfo=lwx, for Charlottesville* and Washington-Dulles; and http://mi.nws.noaa.gov/climate/index.php?wfo=akq, for Norfolk and Richmond. The lower number in each entry (in parenthesis) is the **average precipitation** for the respective site month (again, with the average yearly total at the bottom of the chart), over the period 1971—2000, according to the National Climatic Data Center, *Climatography of the United States No. 81* (available online at www5.ncdc.noaa.gov/climatenormals/clim81/VAnorm.pdf, as of 7/7/08). RL and RH mean record low or high, respectively, for that month. The recent monthly amounts (but not the long-term averages) are classified by the Weather Service as *provisional* data and are subject to revision; the National Climatic Data Center maintains any edited and *certified* data that are available.

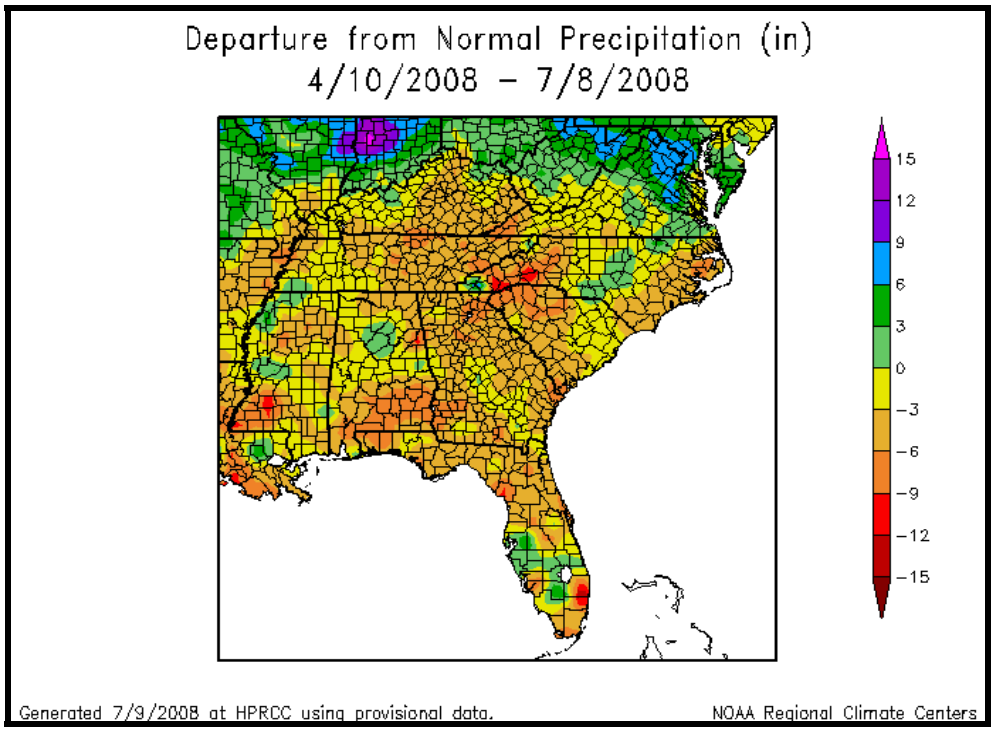
	Bristol (Tri-Cities, Tenn., Airport)	Blacks-burg (Station #012)	Charlottes-ville (Station #023)	Danville (Station #037)	Lynchburg (Municipal Airport)	Norfolk (Internat. Airport)	Richmond (Byrd Intern. Airport)	Roanoke (Woodrum Airport)	Wash.-Dulles Airport
Jul. 2007	3.97 (4.21)	2.83 (4.17)	2.90 (4.94)	3.96 (4.44)	7.19 (4.39)	4.77 (5.17)	1.69 (4.67)	3.22 (4.00)	1.75 (3.57)
Aug. 2007	**0.37 RL** (3.00)	1.75 (3.68)	3.43 (4.14)	**0.60 RL** (3.54)	1.49 (3.41)	3.71 (4.79)	6.81 (4.18)	1.50 (3.74)	1.67 (3.78)
Sep. 2007	0.74 (3.08)	0.97 (3.39)	0.69 (4.85)	1.71 (4.08)	1.21 (3.88)	0.38 (4.06)	1.11 (3.98)	1.11 (3.85)	1.40 (3.82)
Oct. 2007	1.58 (2.30)	4.93 (3.19)	5.22 (4.22)	6.35 (3.71)	4.97 (3.39)	5.39 (3.47)	3.54 (3.60)	5.33 (3.15)	3.52 (3.37)
Nov. 2007	1.41 (3.08)	0.78 (2.96)	0.71 (3.74)	1.02 (3.07)	0.46 (3.18)	0.31 (2.98)	0.80 (3.06)	**0.18 RL** (3.21)	1.49 (3.31)
Dec. 2007	3.07 (3.39)	2.67 (2.87)	2.68 (3.26)	3.18 (3.16)	2.65 (3.23)	3.50 (3.03)	3.24 (3.12)	2.76 (2.86)	2.97 (3.07)
Jan. 2008	3.45 (3.52)	1.40 (3.37)	1.04 (3.71)	0.79 (4.03)	1.27 (3.54)	1.36 (3.93)	0.96 (3.55)	0.96 (3.23)	1.26 (3.05)
Feb. 2008	3.63 (3.40)	1.86 (3.02)	2.86 (3.30)	2.24 (3.41)	1.95 (3.10)	3.41 (3.34)	3.41 (2.98)	1.86 (3.08)	2.68 (2.77)
Mar. 2008	3.84 (3.91)	2.57 (3.83)	3.58 (4.05)	3.11 (4.25)	3.61 (3.83)	2.96 (4.08)	3.50 (4.09)	2.27 (3.84)	2.47 (3.55)
Apr. 2008	2.84 (3.23)	5.69 (3.83)	5.09* (3.34)	5.38 (3.83)	4.39 (3.46)	6.37 (3.38)	8.32 (3.18)	4.94 (3.61)	6.22 (3.22)
May 2008	1.50 (4.32)	3.19 (4.39)	4.93* (4.86)	3.67 (3.96)	2.86 (4.11)	2.88 (3.74)	5.10 (3.96)	2.08 (4.24)	9.38 (4.22)
Jun. 2008	2.26 (3.89)	2.27 (3.93)	2.10 (4.46)	**0.88 RL** (3.50)	1.94 (3.79)	1.93 (3.77)	3.64 (3.54)	4.64 (3.68)	4.21 (4.07)
Period Total	28.66 (41.33)	30.91 (42.63)	35.23 (48.87)	32.89 (44.98)	33.99 (43.31)	36.97 (45.74)	42.12 (43.91)	30.85 (42.49)	39.02 (41.80)

*April and May 2008 values provided by personal communication from University of Virginia Climatology Office, 7/11/08.

Precipitation, continued

For a more visual presentation over a wider area, the two graphs below—from the National Oceanic and Atmospheric Administration's (NOAA) Southeast Regional Climate Center, located at the University of North Carolina in Chapel Hill—show the total precipitation (in inches; top) over the past three months and the departure from normal (in inches above or below normal; bottom) over that period. T*hese data also are provisional.* These graphs were taken from http://www.sercc.com/climateinfo/precip_maps) on 7/9/08.





More Virginia climate information and data are available from the University of Virginia Climatology Office, online at http://climate.virginia.edu. To contact the office in Charlottesville, phone (434) 924-0548 or send e-mail to climate@virginia.edu.

Groundwater Levels at Selected Virginia Wells, July 2008

As of July 8, 2008, the Virginia Active Water Level Network—maintained by the U.S. Geological Survey (USGS) and available online at http://groundwaterwatch.usgs.gov/StateMaps/VA.html—provided access to groundwater levels at 469 wells in 66 Virginia counties and cities. At 67 of these observation wells in 31 localities, *real-time data* (updated every 5 to 60 minutes) were being recorded. The table below shows one July 7 measurement from each of 19 real-time observation wells; all July 2008 readings are *provisional* (i.e., subject to revision). All measurements are in **feet below the land surface**, rounded to the nearest 0.1 foot; **a smaller value means wetter conditions, while a larger value means drier conditions.** The table also shows levels reported in previous issues of *Water Central*, plus the median July level, the deepest (driest) level, and shallowest (wettest) level for each well's period of record. Period of record values were found on the Water Level Network Web pages for individual wells. Historical information on groundwater is also available from the USGS' annual reports of groundwater and surface water data. Annual reports back to 2002 are available online at http://wdr.water.usgs.gov/; for previous years, check your local library.

Well (Local #)	7/7/08 Level	4/8/08 Level	1/2/08 Level	July Median for Period of Record	Record Deepest (Driest)	Record Shallowest (Wettest)	Period of Record
Accomack (66M 19 SOW 110S)	9.3	9.2	10.0	9.7	11.3 (Nov. 1981)	7.4 (Nov. 2006)	Since Sep. 1978
Buckingham (41H 3)	24.6	24.3	25.3	20.2	36.7 (Jan. 2002)	7.4 (Apr. 1973)	Since Mar. 1970
Clarke (46W 175)	37.5	42.2	43.7	37.0	45.7 (Sep. 2002)	23.5 (Sep. 2003)	Since Mar. 1987
Fairfax (52V 2D)	14.0	14.0	16.2	14.2	24.9 (Dec. 1998)	6.5 (Mar. 1984)	Since Oct. 1976
Frederick (46X 110)	37.1	44.3	43.9	36.0	47.0 (Jun. 2006)	18.2 (Sep. 2004)	Since Nov. 2002
Hanover (53K 19 SOW 080)	19.0	19.0	21.3	19.0	22.9 (Aug. 1984)	5.1 (Aug. 2004)	Since Jan. 1978
Loudoun (49Y 1 SOW 022)	59.8	59.7	61.5	59.4	62.0 (Feb. 2008)	48.0 (June 1972)	Since Nov. 1963
Montgomery (27F 2 SOW 019)	6.3	4.5	5.4	5.1	7.3 (Dec. 1969)	0.0 (Mar. 1993)	Jul. 1953, then since Apr. 1969
Northampton (63H 6 SOW 103A)	6.9	6.9	7.7	6.8	10.0 (Oct. 2002)	0.8 (Aug. 2004)	Since Sep. 1977
Orange (45P 1 SOW 030)	26.7	29.6	37.1	25.4	39.0 (Aug. 2002)	11.8 (Apr. 1973)	Since Feb. 1965
Prince William (49V 1)	10.3	8.1	9.2	10.5	13.1 (Sep. 1991)	6.6 (May 2008)	Since Nov. 1968
Roanoke City (31G 1 SOW 008)	18.7	18.6	18.8	18.1	19.3 (Jun. 1987)	12.4 (Feb. 1986)	Since Aug. 1966
Rockbridge (35K 1 SOW 063)	27.7	26.9	28.5	24.5	30.4 (Sep. 2002)	14.3 (Apr. 1987)	Feb. 1964, then since Jun. 1972
Rockingham (41Q 1)	70.8	79.5	85.2	68.2	99.0 (Oct. 2002)	57.7 (Feb. 1998)	Since Aug. 1970
Suffolk (58B 13)	11.0	10.4	13.2	10.0	13.4 (Jan. 1981)	2.0 (Sep. 1999)	Since Mar. 1975
Surry (57E 13 SOW 094C)	9.7	7.9	9.5	9.2	11.2 (Dec. 1981)	3.9 (May 1980)	Since Jul. 1978
Virginia Beach (62B 1 SOW 098A)	4.7	3.4	5.5	4.7	12.0 (Sep. 1980)	0.9 (Aug. 2004)	Since Jun. 1979
Westmoreland (55P 9)	4.7	1.6	10.8	7.4	12.8 (Dec. 1988)	0.0 (Dec. 2003)	Since Jul. 1977
York (59F 74 SOW 184C)	11.2	6.7	6.8	10.2	14.1 (Jan. 2002)	0.9 (Nov. 2006)	Since Jun. 1990

Stream Flow in Virginia, Late May- Early July, 2008

The graphs on this page from the U.S. Geological Survey's (USGS) Internet site, "WaterWatch—Current Water Resources Conditions" (http://water.usgs.gov/waterwatch/?m=real&r=va&w=real%2Cplot, 7/8/08) compare recent Virginia stream flow to historical records.

The data in the graphs come from 101 sites that have at least 30 years of records. Each graph uses a "**stream flow index**," which measures how a site's average stream flow *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 monitoring stations*.

Index values (1-7 on the vertical axis in the graphs) mean the following:

Values indicating dry conditions:

1 = average daily flow is record low for that date;
2 = average daily flow is in the lowest 10 percent of historical values for that date;
3 = average daily flow is in the lowest 25 percent of historical values for that date, but exceeds the lowest 10 percent.

Value indicating "normal" flow:

4 = average daily flow exceeds the lowest 25 percent of historical values for that date, but is less that the highest 25 percent of values.

Values indicating wet conditions:

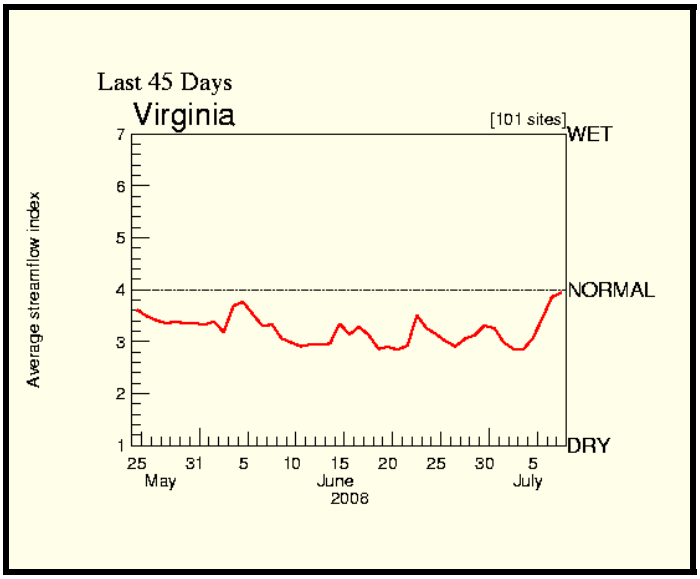
5 = average daily flow exceeds 75 of historical values for the date, but is lower than the highest 10 percent of values.
6 = average daily flow exceeds 90 percent of historical values for that date;
7 = average daily flow for the graphed date is record high for that date.

Gaps in the data: Data are not plotted for days when less than two-thirds of the sites report data (due to equipment or weather problems), because a statewide average on those days may misrepresent actual conditions.

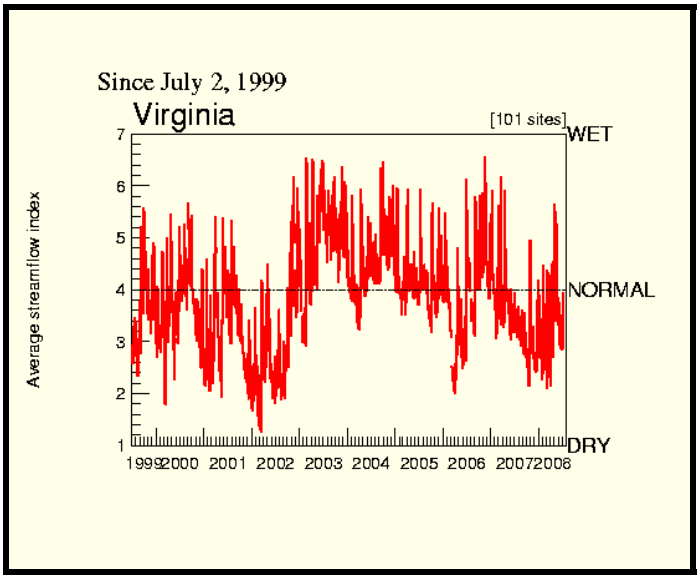
A USGS **map of current stream flow conditions** (with links providing access to details for each measuring station) is available online at http://water.usgs.gov/waterwatch/?m=real&w=map&r=va. Maps are also available showing average flows over the previous 7-, 14-, and 28-day periods.

Average Daily Stream Flow Index, Compared to the Historical Average for the Date

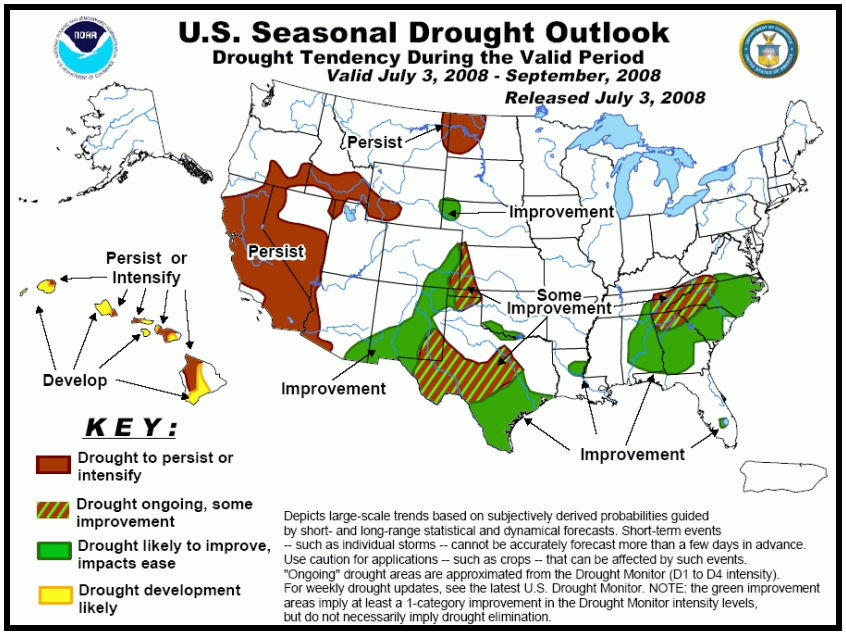
For May 25—July 8, 2008



For July 1999—July 2008



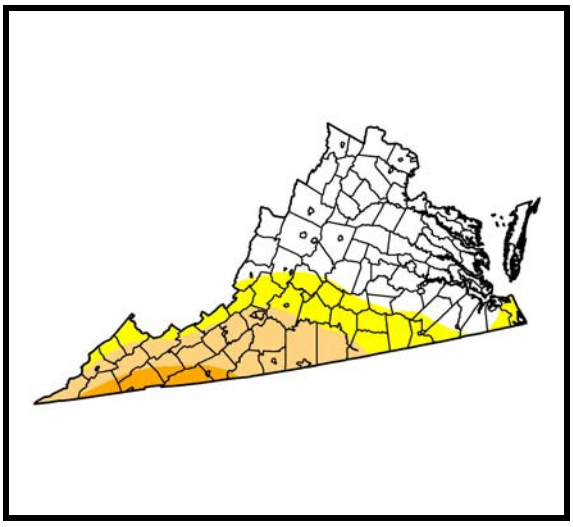
DROUGHT REPORT



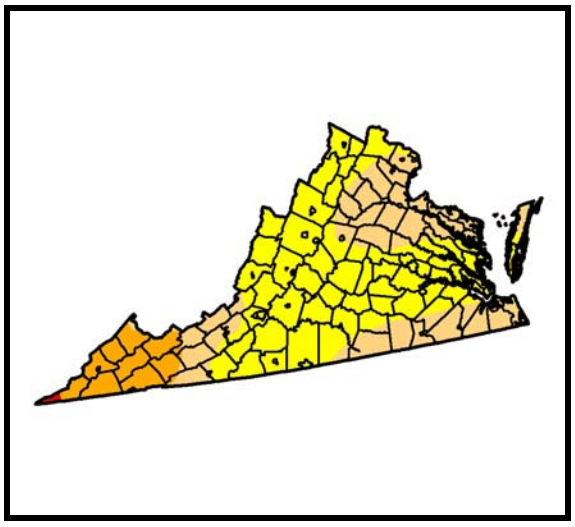
The national drought outlook for July-September 2008, according to the National Oceanic and Atmospheric Administration (NOAA) Climate Prediction Center Web site, www.cpc.ncep.noaa.gov/products/expert_assessment/seasonal_drought.html, accessed 7/11/08.

From the U.S. Drought Monitor: Conditions Now, Recently, and One Year Ago

The U.S. Drought Monitor, available online at www.drought.unl.edu/dm/monitor.html, is a weekly nationwide drought assessment by federal agencies and state climatological centers. The following graphs show Drought Monitor assessments of Virginia conditions on July 8, 2008 compared to July 10, 2007. Note that by this time in 2007 Virginia was experiencing statewide dry conditions, which continued into early 2008.



July 8, 2008



July 10, 2007

= D0 Abnormally Dry = D1 Moderate Drought = D2 Severe Drought = D3 Extreme Drought = D4 Exceptional Drought

Source: Images taken from archive of U.S. Drought Monitor, www.drought.unl.edu/dm/archive.html, 7/10/08. Authors: Rich Tinker, CPC/NOAA, for July 8, 2008 image; Douglas Le Comte, CPC/NOAA, for July 10, 2007 image.

The Drought Monitor also gives *percentages* of the country, of regions, and of individual states classified in the drought categories. The following table shows how much of the country and of Virginia received different Drought Monitor ratings between early May and early July, as well as the ratings one year ago. Note again the difference in Virginia and the entire country between early July 2007 and early July 2008.

Drought Monitor Report Date	Percentage of area rated "abnormally dry" (D0) or worse	Percentage of area rated "severe drought" (D2) or worse
7/8/08	U.S. = 40% Va. = 46%	U.S. = 10% Va. = 5%
6/3/08	U.S. = 38% Va. = 33%	U.S. = 7% Va. = 0%
5/6/08	U.S. = 47% Va. = 83%	U.S. = 9% Va. = 0%
7/10/07	U.S. = 54% Va. = 100%	U.S. = 16% Va. = 11%

From the Virginia Drought Monitoring Task Force

Following is a brief excerpt from the June 23, 2008, monthly report from the Virginia Drought Monitoring Task Force (the latest report available as of 7/10/08). The complete June report and other previous reports are available online at www.deq.virginia.gov/waterresources/drought.php.

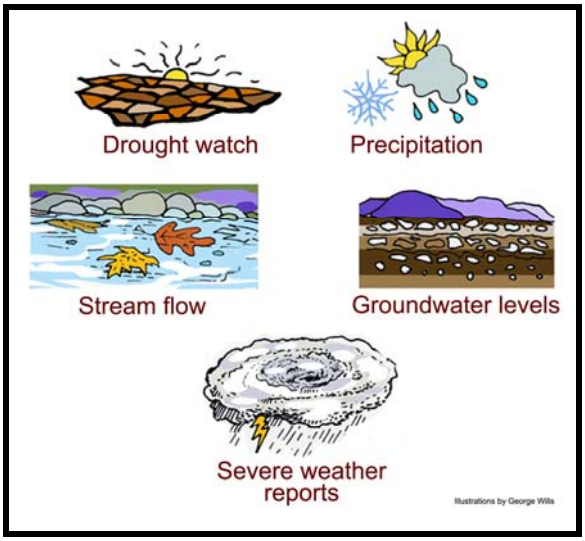
"The intensity of drought impacts…increased during the last month [mid-May to mid-June 2008] due to a relatively short period of record high temperatures coupled with below normal rainfall. The lower-than-normal groundwater levels, especially in the western portions of the Commonwealth, have resulted in very rapid decreases in streamflows. These below normal streamflows raise concerns regarding future reservoir conditions, especially in the western half of the Commonwealth. It should also be noted that the areas that are currently experiencing drought conditions in western Virginia are the same areas that experienced the greatest agricultural drought impacts last year. It is important to remember that localized drought impacts, particularly agricultural drought impacts, are a normal occurrence in an 'average' Virginia summer."

Other Useful Sources of Information Online

- Presentations from the Governor's Conference on Water Conservation and Drought (June 2, 2008, in Richmond): www.naturalresources.virginia.gov/WaterConservationConference/index.cfm
- U.S. Geological Survey "Drought Watch" for Virginia: http://va.water.usgs.gov/drought/.
- Virginia Forestry Department list of burn bans: http://www.dof.virginia.gov/fire/burn-bans.shtml.
- Virginia Department of Environmental Quality water-conservation tips: www.deq.virginia.gov/waterresources/waterconservation.html.

NEW WATER STATUS PAGE AT WATER CENTER WEB SITE

On July 14, 2008, the Water Center started a new "Water Status Information" area on its Web site. The area has links to current and historical information on drought, groundwater, precipitation, stream flow, and severe weather. Look for the image at the right, located at www.vwrrc.vt.edu/water_status.html, and please let us know how you like this new resource (via e-mail to araflo@vt.edu or phone to 540-231-5463). The Water Center thanks Ana Constantinescu for building this Web site and George Wills for the illustrations.



IN AND *OUT OF* THE NEWS
Newsworthy Items You May Have Missed

For this issue of *Water Central*, the regular "In and Out of the News" section is taking a one-issue break.

In the meantime, *Water Central* is taking this opportunity to announce and solicit your feedback on a new Web-site initiative: the Virginia Water News Grouper (the name is subject to change—suggestions welcomed!)

Every day, news media produce many articles about events, trends, people, or places connected to water resources and the environment in Virginia and the region. Various organizations search out such articles and post them online daily; for example, *Water Central* follows the daily article collections provided by the Virginia Department of Environmental Quality, at www.deq.virginia.gov/info/newsclips.html, and by the Chesapeake Bay Program, at www.chesapeakebay.net/thebayinthenews.aspx?menuitem=14852. Keeping up with the growing number of daily items and assessing their content for topics of interest is an increasingly challenging task.

That's where the News Grouper comes in. Our plan is to provide a service that categorizes daily news items into water-related subject areas. From the two sites mentioned above and from various other sources, we will group items of potential interest to Virginians into the categories and add a short description of the items' content. Each item will retain the original publication title and Internet link (as long as the publisher maintains the link) and the date of publication. The categorized compilation of items will be posted at the Water Center's Web site weekly or biweekly.

We hope that this service will help readers keep up with water-related news, and we would like to know what *you* think about this approach. A sample compilation is provided below; this compilation covers June 30-July 10. In the coming weeks as we refine the idea and work to implement it, your comments on the value (or not) and presentation of this service would greatly help our work. Please provide any comments you have to Alan Raflo, (540) 231-5463; araflo@vt.edu; or 210 Cheatham Hall (0444), Blacksburg, VA 24061. Thank you!

Miscellaneous Items

Quarry workers find a 2-ton fossil, *Roanoke Times*, 7/1/08—Large, 500-million-year-old stromatolite (fossilized algae) found in Botetourt County.

Shenandoah summer likely to see spike in ozone levels, *Northern Virginia Daily*, 7/1/08—Air pollution in Shenandoah National Park, including ozone and particulates.

Thunderstorms could spread 'historic' Dismal Swamp fire, *Norfolk Virginian-Pilot*, 6/30/08; Winds, storms hinder efforts to contain Dismal Swamp blaze, *Norfolk Virginian-Pilot*, 7/1/08; Crews open tap into lake as they try to finish off Dismal Swamp fire, *Norfolk Virginian-Pilot*, 7/2/08; Great Dismal Swamp fire won't give up, *Richmond Times-Dispatch*, 7/6/08; Showers dampen fire, but not for long, *Daily Press*, 7/8/08—Four-thousand-acre fire in Great Dismal Swamp National Wildlife Refuge.

Merrily, merrily down the James, for a good cause, *Richmond Times-Dispatch*, 7/6/08; James River Association hopes race draws attention to conservation, *Lynchburg News & Advance*, 7/9/08; River race to promote conservation, *Daily Press*, 7/10/08—James River Runoff Rundown, held July 12.

*A climate threat from flat TVs, microchips, *Los Angeles Times*, 7/10/08—Potential impact of nitrogen triflouride.

Aquatic Systems' Status and Restoration (including Chesapeake Bay)

*Berkeley signs onto watershed initiative, *Martinsburg (WV) Journal*, 6/30/2008—Berkeley County, W. Va., joining interstate Trash Free Potomac River Watershed Initiative.

*Man puts bay talk into action, *The Delmarva (MD) Daily Times*, 6/30/08—"Living shoreline" project (natural vegetation plantings along shoreline) in Crisfield, Maryland.

*Pentagon Fights EPA On Pollution Cleanup, *Washington Post*, 6/30/08; and Senators Fault Pentagon On Bases' Toxic Cleanup, *Washington Post*, 7/1/08—Defense Department conflict with U.S. EPA over chemical cleanup at Fort Meade, Md., and two other bases.

*Water lettuce chokes aquatic life, *Delmarva (MD) Daily Times*, 6/30/2008—Non-native invasive aquatic plant in upper Potomac River.

Watermen's leader treated for infection, *Richmond Times-Dispatch*, 6/28/08; Little-known, dangerous bacteria dwell in bay, *Richmond Times-Dispatch*, 7/7/08 —*Vibrio* bacteria in Chesapeake Bay.

*$2.9 billion works deal to provide more jobs, Patriot (PA) News, 7/1/08; Sewer plant overhaul to cost $8 million, *Centre (Pa.) Daily Times*, 7/2/08; Sewers get big money in budget, *Hanover (PA) Evening Sun*, 7/3/08; Water, sewer systems in line for cash infusion; *Carlisle (PA) Sentinel*, 7/3/08; Pa. budget contains funding for sewer plant upgrades, *Sayre Morning Times*, 7/7/08; New budget supports wastewater, leaves farmers behind, *Tri-State Observer*, 7/8/08; Danville may get $13M for sewer work, *Sunbury Daily Item*, 7/9/08; New bill to help municipalities with sewer upgrades, *Carlisle Sentinel*, 7/10/08—Financing Chesapeake Bay nutrient-related wastewater-treatment upgrades in Pennsylvania.

3 turtles released into Chesapeake Bay, Associated Press, 7/1/08—Loggerhead Turtle, Kemp's Ridley Turtle, and Green Turtle released from Virginia Aquarium and Marine Science Center.

*Blue crab harvest is booming in MD, WMDT (MD) Television, 7/1/2008—2008 Chesapeake Bay Blue Crab Harvest.

Opinion: Saving the Bay has finally begun, *Harrisonburg (VA) Daily News Record*, 7/1/08. Commentary on Chesapeake Bay funding, federal Farm Bill, and Virginia stormwater regulations.

Undersea Chesapeake Crater offers hints to Mars life, *National Geographic*, 7/1/2008—Update on research into Chesapeake Bay Impact Crater near Cape Charles in Northampton County.

Opinion: Save the Bay, *Daily Press*, 7/2/08—Letter to editor on Clean Water Restoration Act bill in Congress.

*Funkstown wastewater treatment plant completed, *Hagerstown (MD) Herald-Mail*, 7/3/08—Pennsylvania locality's wastewater upgrades to meet Bay-related nutrient requirements.

Couple's business a boon for Chesapeake Bay restoration, *Daily Press*, 7/4/08—Gloucester County business selling Bay-related products and donating part of profits to Bay restoration groups.

*Residents help regrow Maryland oyster population, *Baltimore Examiner*, 7/5/08; Hard-Shell Tactics, *Washington Post*, 7/7/08; Community gives baby oysters a helping hand, *Washington Post*, 7/10/08 —Oyster cultivation on private docks in Calvert County, Maryland.

Va.'s trout streams in trouble, *Richmond Times-Dispatch*, 7/5/08—Air and water connections: acid rain; western Virginia.

*Watermen struggle with pollution, inflation, Annapolis Capital, 7/6/08—Account of a Maryland crabber in Summer 2008.

Bay's glamour species gets help from W & M team, *Richmond Times-Dispatch*, 7/8/08—Diamondback Terrapin research by William and Mary; use of "excluders" on crab pots (required in Maryland by not in Virginia).

*Will county get its share under state's new plan, *Hagerstown (MD) Herald-Mail*, 7/8/08—Editorial: Washington County, Md,, Bay-related wastewater-treatment upgrades.

*Blog: Can the market clean the bay? (column) and Credit where credit's due (editorial), *Baltimore Sun*, 7/9/08—Chesapeake Bay Foundation's idea for a privately run nutrient offset program; "nutrient footprints."

*A natural gem slipping away, Business Gazette (Md.), 7/9/2008—Column on Blackwater Wildlife Refuge in Maryland.

Invasive algae continues to spread (scroll down), *Roanoke Times*, 7/10/28—Didymo algae.

Boating

EPA permit is bureaucratic nightmare, *Washington Times*, 7/9/2008—Commentary: EPA regulation on recreational boat discharges.

Energy Use and Developments (includes impacts on water and climate)

Dominion begins construction of coal-fired plant in Wise, *Richmond Times-Dispatch*, 6/30/08; Power plant closer to reality, *Stafford County Sun*, 6/30/08; Weak Laws Lead to Plants Approval, *Bristol Herald Courier*, 7/1/08 (editorial); Protest of power plant leads to 12 arrests, *Richmond Times-Dispatch*, 7/1/08; Protest may lead to time in jail, *Richmond Times-Dispatch*, 7/2/08; Another Dominion protest set today in Richmond, *Richmond Times-Dispatch*, 7/7/08; Power plant opponents plan court battle, *Roanoke Times*, 7/8/08; Coalition will sue on plant, *Richmond Times-Dispatch*, 7/8/08; Megawatts in Wise, *Fredericksburg Free Lance-Star*, 7/10/08 (editorial)—Dominion Resources' proposed coal-fired power plant for Wise County.

Alexandria residents upset over ethanol facility, Fox 5 Television (Washington, D.C.), 7/1/08—Discusses proposed ethanol transfer station and ethanol transportation issues.

Dominion CEO tells of North Anna plans, *Richmond Times-Dispatch*, 7/1/08; Dominion reactor proposal leads pack, *Fredericksburg Free Lance-Star*, 7/2/08—Nuclear power; new reactor planned at North Anna Nuclear Station in Louisa County.

Editorial: A focus on energy, *Roanoke Times*, 7/1/08—U.S. Rep. Randy Forbes proposal for "Manhattan Project" style energy program.

Mountaintop removal mining appeal scheduled for Sept. 23, *Charleston Gazette*, 7/1/08—Case in U.S. Court of Appeals for 4th Circuit, in Richmond, on coal mining's land and water impacts in West Virginia.

Appalachian Power looks to launch renewable energy program, *Lynchburg News & Advance*, 7/2/08—Application to State Corporation Commission; purchase of credits from hydroelectric power plant.

All power, *Richmond Times-Dispatch*, 7/6/08—Editorial on Wise coal plant, off-shore energy development, and other energy issues.

Methane gas to run hospital's new complex, *Harrisonburg Daily News-Record*, 7/9/08—Landfill gas to be for energy in Rockingham County.

Virginia legislators expected to take up offshore drilling bill tomorrow, *Norfolk Virginian-Pilot*, 7/8/08—Delegate's proposal to fund transportation with offshore oil/gas revenue.

How to make the move to an oil-less future, *Lynchburg News & Advance*, 7/6/08—Editorial on energy, oil, and conservation.

*G-8 approves plan to cut greenhouse gas emissions, *Washington Post*, 7/9/08—Climate change: agreement by industrialized nations to reduce emissions by 50 percent by 2050.

Fishing

*NOAA wants a tally of sports anglers, *Washington Times*, 7/2/08—Proposed rule to register all anglers in federal salt waters.

Opinion: Here, fishy, fishy, *Daily Press*, 7/2/08—Train cars as artificial reefs off Chincoteague.

Land Use (including buffers, easements, development, and floodplain issues)

Shenandoah Valley's battlefields to gain protection, *Washington Times*, 6/30/08—New state and federal initiative for historic land preservation.

Plan to preserve, develop Fort Monroe wins board's OK, *Norfolk Virginian-Pilot*, 7/1/08--Plan on development after base closing in Hampton Roads approved by Fort Monroe Federal Area Development Authority.

Richmonders gather to hear about revisions to flood map, *Richmond Times-Dispatch*, 7/2/08—New FEMA floodplain map for Richmond under review; occurring in other localities, too.

*Urging A Plan for Growth, *Washington Post*, 7/5/08—Statewide planning in Maryland.

*Zoning officials seek to halt violators, *Salisbury (MD) Daily Times*, 7/9/08—Maryland Critical Areas Law; Somerset County case.

Solid Waste Management

With times tough, less waste going to landfills, *Fredericksburg Free Lance-Star*, 6/28/08—Annual Virginia state solid-waste report.

Virginia Beach sees options for post-SPSA trash handling, *Norfolk Virginian-Pilot*, 7/2/08; Virginia Beach to try recycling bins at the Oceanfront, *Norfolk Virginian-Pilot*, 7/4/08—Hampton Roads area solid-waste management.

Regionalism brings about trash savings, *Lynchburg News & Advance*, 7/8/08—Editorial: regional solid waste program in Appomattox, Bedford, Campbell, Lynchburg, and Nelson.

City manager of Franklin hired as new director of SPSA, *Norfolk Virginian-Pilot*, 7/9/08—Hampton Roads solid waste; "flow control."

Chesterfield landfill sold, *Richmond Times-Dispatch*, 7/10/08—Shoosmith landfill in Chesterfield County purchasedd by Texas investors.

Stormwater Management

STORMWATER STRAIN: Shifting currents, NewsVirginian.com, 6/29/08—Stormwater in Waynesboro; debate over possible stormwater utility fee.

*Pipe dreams, *Baltimore Sun*, 7/3/08—Commentary on paying for urban stormwater management in Maryland and the Chesapeake and Atlantic Coastal Bays Restoration Fund.

*Rain Gardens Make Water Good to the Last Drop, *Washington Post*, 7/3/08—Household stormwater management in Silver Spring, Md.

State Farm's rooftop grass a lofty idea, *Charlottesville Daily Progress*, 7/6/08—Low-impact development; "green roof" added to existing building in Charlottesville area.

Heritage and promise, *Stormwater* magazine, Jul.-Aug. 2008 issue—Case studies of three local Virginia situations: greenway in Luray, stream in Harrisonburg, and Shenandoah River fish kills.

Wastewater (includes subsequent use of sludge or biosolids)

Biosolids set to come to first Campbell County field, Lynchburg News & Advance, 6/30/08—Plan for biosolids (treated sewage sludge) land application; likely from Blue Plains Wastewater Treatment Plant.

11-Mile Pipeline,, *Harrisonburg Daily News Record*, 7/3/08—Wastewater pipeline in Rockingham County; result of demands of wastewater system due to age, population increase, Chesapeake Bay requirements.

Isle of Wight sets schedule for pumping septic tanks, *Tidewater News*, 7/3/08—Chesapeake Bay-related mandate for pumping septic tanks; new county ordinance details.

Water Conservation

***Water Use Habits Get a Splash of Fresh Ideas, *Washington Post*, 7/3/08—Water management and conservation on golf courses.

Water Quality items (includes impaired waters, toxic spills, kills of fish or other aquatic life)

Riverkeeper to throw party to celebrate the Shenandoah, *Northern Virginia Daily*, 6/30/08—Shenandoah Riverkeeper sponsoring July 19 event to gain public attention for Shenandoah River issues.

Portsmouth shipyard again fined for environmental violations, *Norfolk Virginian-Pilot*, 7/1/08—Va. DEQ fines against Associated Naval Architects for permit violations along Elizabeth River.

Heat, rain suspected in fish kill at Suffolk Lake, *Norfolk Virginian-Pilot*, 7/8/08; Fish in Suffolk lake likely died from cold rain on Friday, *Norfolk Virginian-Pilot*, 7/9/08—Fish kill at 50-acre Sleepy Lake.

Randolph student, instructor help crack tree swallow egg puzzle, *Lynchburg News & Advance*, 7/9/08—Mercury in birds along South River.

Water Supply

Town considers study of expanding water supply, *Culpeper Star Exponent,* 7/3/08—Town of Culpeper water supply: possible reservoir expansion and use of wells.

Thirsty county has eye on lake, *Roanoke Times*, 7/7/08—Bedford County Public Service Authority application to withdraw more water from Smith Mountain Lake.

Weather

June was hot, wet in Roanoke; not as hot, but very dry in Blacksburg, *Roanoke Times*, 7/2/08—Column on weather and rainfall in southwestern Virginia.

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conservation organizations to promote understanding of coal mining, freshwater mussel status, reclamation and restoration efforts, and aquatic resource conservation.

The Virginia Water Resources Research Center is participating in the Clinch-Powell Initiative, so in early July I attended a meeting of the Initiative's working group. Developments from that meeting included the following: (1) a steering committee has been formed; (2) a science plan is being coordinated to help determine causes of mussel population declines in parts of the Clinch and Powell River watersheds; and (3) initial steps have been taken to organize a symposium planned for Fall 2009 to share information about successfully managing these watersheds.

Successful outcomes of the Clinch-Powell Initiative—maintaining current fish and mussel populations and restoring habitat to facilitate recovery of declining species—will depend on coordination and focused efforts from a variety of stakeholders. One of the underlying keys to achieving the Initiative's goals is a better understanding of the complex interactions among water quality, land use activities, and the aquatic biota we aim to protect or restore. The Water Center looks forward to helping this effort.

VIRGINA GOVERNMENT WATER ISSUES OVERVIEW

This section lists water issues under current or recent consideration (study or regulation) by state boards, commissions, or agencies in Virginia. The first part identifies areas undergoing Total Maximum Daily Load (TMDL) processes. The second part identifies areas where solid waste facilities are undergoing a groundwater monitoring or corrective-action process. The third part covers other water-related topics of statewide concern that are currently being considered. The final part gives schedule and contact information for key water-related boards and commissions. Information in this issue is based on public meetings listed **April 15-July 18, 2008,** on the Virginia Regulatory Town Hall Web site, at www.townhall.state.va.us. The Town Hall site posts agendas of upcoming meetings and minutes of past meetings held by Virginia's boards, commissions, and departments. Unless otherwise noted, all contact people listed in this section are Virginia state employees. To find the e-mail address any state employee, go online to www.employees.state.va.us/directory-search.cfm. You can also request state employee phone numbers by calling (800) 422-2319. All Web sites listed in this section were functional as of 7/09/08.

Total Maximum Daily Load (TMDL) Processes

Under the federal Clean Water, when a water body fails (with a certain frequency) to meet state water-quality standards, the water is to be designated as "impaired," requiring development of a total maximum daily load (TMDL). A TMDL *study* identifies the pollutant source(s) causing the impairment and determines how much of the pollutant(s) the water can receive (the "load") and still meet standards. A TMDL *implementation plan* (required by Virginia law) maps a process for reducing the pollutant load to the TMDL level. Many Virginia TMDLs are underway, each involving many public meetings. The table below lists those where public meetings were held during the period noted above. Information on the status of all TMDLs in Virginia is available online at www.deq.state.va.us/tmdl/.

Location	Water(s) & Impairment	Larger Watershed(s)	For More Information
Amelia and Prince Edward counties	Bush River, Briery Creek, Little Sandy Creek, Saylers Creek, and Spring Creek for bacteria	James River	Ram Gupta
Campbell, Franklin, and Pittsylvania counties	Big Chestnut Creek, Leesville Lake, Pigg River, Snow Creek, and Storey Creek for bacteria.	Roanoke River	Mary Dail
Grayson County	Elk Creek for bacteria	New River	Shelley D. Williams
Highland County	Strait Creek and West Strait Creek for benthic impairment	South Branch Potomac River/Potomac River	Robert Brent
Page and Rockingham counties	Naked Creek and South Fork Shenandoah River for bacteria and benthic impairment	Potomac River	Robert Brent
Russell County	Dumps Creek for benthic impairment	Clinch River	Shelley D. Williams
Tazewell County	Bluestone River for aquatic life impairment and bacteria	New River	Martha Chapman
Westmoreland County	Lower Machodoc Creek shellfish areas for bacteria	Potomac River	Margaret Smigo

Ongoing Solid Waste Groundwater Program Situations

The Virginia Department of Environmental Quality's (DEQ) Waste Management Division regulates solid waste landfills and other sites where contaminants potentially can seep into groundwater. When this occurs, a monitoring program or corrective action plan may be needed, and various public meetings are held during development of such plans. The following table lists locations where groundwater monitoring programs or corrective action plans were addressed in public meetings during the period noted at the

beginning of this section. Information on the DEQ's Solid Waste Groundwater Program and solid waste groundwater remediation is available online at www.deq.virginia.gov/waste/groundwater.html, or by contacting Geoff Christe, (804) 698-4283 or gxchriste@deq.virginia.gov. For questions about specific facilities other than those listed below, contact the regional DEQ office nearest you: Northern Regional Office, Woodbridge; Piedmont Regional Office, Richmond/Glen Allen; South Central Regional Office, Lynchburg; Southwest Regional Office, Abingdon; Tidewater Regional Office, Virginia Beach; Valley Regional Office, Harrisonburg; West Central Regional Office, Roanoke. Internet inks for these offices are available at www.deq.virginia.gov/regions; phone numbers for these offices should be in the state government pages of your local phone book.

Location	Facility/issue	For More Information
Culpeper County	Laurel Valley landfill groundwater corrective action plan proposal	Larry Syverson
Giles County	Closed county landfill; draft permit amendment to incorporate a groundwater monitoring plan	Aziz Farahmand

Other Topics Under Current Consideration

The following lists topics considered in public meetings held during the period noted at the beginning of this section. Items are listed alphabetically by topic, followed by the agency or group coordinating state study or action and then a contact name. Minutes of most meetings listed are available at the Virginia Regulatory Town Hall Web site, www.townhall.state.va.us, Agency Abbreviations: DCR = Dept. Conservation and Recreation; DEQ = Dept. Environmental Quality; DGIF = Dept. Game and Inland Fisheries; DMME = Dept. Mines, Minerals and Energy; SWCB = State Water Control Board; VDH = Department of Health. "VAC" numbers indicate the *Virginia Administrative Code* section for a particular regulation; you can access and search the VAC at http://legis.state.va.us/Laws/AdminCode.htm. "NOIRA" stands for Notice of Intended Regulatory Action.

Aquaculture Enhancement Zones—The SWCB is considering amending Virginia's Water Quality Standards to establish "aquaculture enhancement zones" on the Eastern Shore. The advisory committee met Apr. 24, May 22, and Jun. 19. More information: Elleanore Daub. (For more on this issue, please see the Sept. 2007 *Water Central*, p. 18, and the Dec. 2007 *Water Central*, p. 15.)

Biosolids—A state panel, established by the Secretary of Natural Resources and the Secretary of Health and Human Resources, is studying biosolids in Virginia. A joint work group meeting was held Apr. 23. More information: Jeff Corbin.

Coal Combustion By-products— The Coal Combustion By-Product (CCB) Technical Review Committee researches information on CCB re-use, impacts, and regulatory requirements, and the committee is to provide recommendations on any regulatory changes to the Technical Advisory Committee for Amendment 7 of the Virginia Solid Waste Management Regulations (9 VAC 20-80). The CCB Technical Review Committee met Jun. 12. More information: Leslie Beckwith. (Please see below for more information on the Solid Waste Management Regulation Amendment 7.)

Industrial Activity Stormwater Discharge General Permit Regulation (9 VAC 25-151)—The SWCB is considering reissuance, including possible amendments, of this regulation. The advisory committee for this regulation met May 19, Jun. 11, and Jun. 12. More information: Burt Tuxford.

Invasive Species—DCR's working group met Jun. 4. More information: David Dowling.

Marine Resources Commission General Business—The VMRC held regular monthly meetings on April 22, May 27, and June 24. Minutes of VMRC meetings are available online at www.mrc.virginia.gov/calendar.shtm.

Mined Land Reclamation—DMME's Division of Mined Land Reclamation **Permit Enhancement Workgroup and Regulatory Workgroup** met Apr. 16 to discuss draft language to amend the DMLR regulations and review of existing DMLR regulations. The **Orphaned Land Advisory Committee**, which meets annually to help the DMME prioritize *non-coal-mining* abandoned sites for reclamation using the Orphaned Land Fund, met May 20-21. The **Abandoned Mined Land Advisory Committee**, which helps with *coal-mining* abandoned lands, met May 28. More information: Jan Zentmeyer for the Permit Enhancement Workgroup; Allen Bishop for the Orphaned Land Committee; and Roger L. Williams for the Abandoned Mined Land Committee.

No Discharge Zone for Boats (9VAC 25-71, "Regulations Governing Discharge of Sewage and Other Wastes from Boats"—The SWCB is considering adding Broad Creek, Jackson Creek and Fishing Bay watersheds in Middlesex County as a vessel No Discharge Zone. A public meeting was held May 5, and the public comment period ended June 4. More information: Chester Bigelow.

Non-metallic Mineral Mining Discharge General Permit Regulation (9 VAC 25-190)—The SWCB is considering reissuance, including possible amendments, to this regulation. The technical advisory committee for this regulation met May 22 and Jun. 25. More information: George Cosby.

Nutrient Criteria for Fresh Waters—The DEQ, in cooperation with its Academic Advisory Committee (which is coordinated by the Virginia Water Resources Research Center), has been working to establish water-quality criteria for nutrients in Virginia's fresh waters. A stakeholder meeting on development of these criteria was held Jun. 12. More information: Jean Gregory. (Please see the Water Center's Web site at www.vwrrc.vt.edu/special_reports.html for several reports on nutrient criteria development.)

Portable Water Treatment Plants General Permit Regulation (9 VAC 25-860)—The SWCB is reviewing a proposed Virginia Pollution Discharge Elimination System general permit for such plants. The proposed regulation was published in the May 12, 2008, *Virginia Register of Regulations*. A public hearing was held Jun. 17, and the public comment period ended Jul. 11. More information: George Cosby.

Poultry Waste Management Regulation (9 VAC 25-630)—The SWCB is considering amendments to the Virginia Pollution Abatement (VPA) Permit Regulation on managing poultry waste. The advisory committee met Apr. 25 and Jun. 5. More information: Betsy K. Bowles.

Recycling—DEQ's Recycling Markets Development Council met Jun. 5. More information: Thomas Smith, Prince William County Public Works, tsmith@pwcgov.org or (703) 792-6252.

Sewage Handling and Disposal Regulations—VDH's advisory committee met on May 16, Jun. 13, and Jul. 11. More information: Donald Alexander.

Solid Waste Management Regulation (9 VAC 20-80), Amendment 7—According to the Waste Management Board's Notice of Intended Regulatory Action (NOIRA), the purpose of this amendment is to "review each section of the regulation [covering siting, design, construction, operation, closure, and post-closure care of solid waste facilities] for clarity and complexity in order to transform the regulation into a standard that is easier for the public and regulated community to read and to follow" (January 21, 2008, issue of the *Virginia Register of Regulations*). The Advisory Committee for development of the proposed amendment met May 5, May 19, Jun. 5, Jun. 19, and Jul. 7. More information: Allen Brockman.

State Water Control Board General Business—The SWCB held a regular quarterly meetings on April 10. Minutes of these meetings are available at the "Past Meetings" section of the Regulatory Town Hall Web site: www.townhall.state.va.us/L/meetings.cfm?time=past180. More information: Cindy Berndt.

Stormwater Best Management Practices (BMPs)—The Virginia Stormwater BMP Clearinghouse Committee, coordinated by the DCR and the Virginia Water Resources Research Center, is working to develop a publicly accessible Web site that will serve as Virginia's reference site for stormwater BMPs. The committee met Jun. 12. More information: David Dowling.

Stormwater Management Regulations (4 VAC 50-60)—The DCR's technical advisory committee that assists in revisions to these regulations met Jun. 10 and Jul. 16. More information: David Dowling.

Stormwater Quantity—The Soil and Water Conservation Board/DCR's workgroup on criteria for controlling stormwater quantity met on Apr. 22, May 20, May 27, and Jul. 8. More information: David Dowling.

Underground Storage Tank Operator Training Requirements Regulation (9 VAC 25-580)—The SWCB is considering whether to amend this regulation. A NOIRA was published in the March 17 *Virginia Register of Regulations*, a public meeting on the NOIRA was held Apr. 24, and the comment period on the NOIRA ended May 1. More information: Russ Ellison.

Voluntary Remediation Program Regulations (9 VAC 20-160)—The Virginia Waste Management Board/DEQ's Voluntary Remediation Regulations address voluntary clean-up of contaminated sites that are not subject to a *required* clean-up under any federal or state law. The Board is considering amendments (Amendment 2) to these regulations. A NOIRA appeared in the May 12, 2008, *Virginia Register of Regulations*; a public meeting on the NOIRA was held Jun. 16; and the public comment period on the NOIRA ended Jul. 11. More information: Virginia Butler.

Water-quality standards (9 VAC 25-260) triennial review—The SWCB is conducting its required triennial review of water-quality standards regulations. Public hearings on proposed amendments were held May 1, 2, and 8, and the public comment period closed May 30. More information: Jean W. Gregory.

Regular Meetings of Statewide Boards and Commissions

Cave Board—meets three times per year. More information: DCR (804) 786-7951; www.dcr.virginia.gov/natural_heritage/cavehome.shtml.

Chesapeake Bay Local Assistance Board—meets March, June, September, and December. More information: (800) CHESBAY; www.dcr.virginia.gov/chesapeake_bay_local_assistance/board.shtml.

Game and Inland Fisheries Board—meets bimonthly. More information: www.dgif.virginia.gov/about/.

Gas and Oil Board—meets the third Tuesday of each month. More information: Bob Wilson, DMME, (276) 5423, bob.Wilson@dmme.virginia.gov; http://www.dmme.virginia.gov/divisiongasoil.shtml.

Groundwater Protection Steering Committee—meets third Tuesday of odd-numbered months. More information: www.deq.virginia.gov/gwpsc/.

Land Conservation Foundation—meets about three times per year. More information: DCR, (804) 786-3218; www.dcr.virginia.gov/virginia_land_conservation_foundation/index.shtml.

Licensing and Regulation Boards for engineers, soil scientists, waterworks and wastewater works operators, and wetland delineators, under the Dept. of Professional and Occupational Regulation, (804) 367-8500, TDD (804) 367-9753; www.dpor.virginia.gov/dporweb/boards.cfm.

Marine Resources Commission—meets monthly. More information: (757) 247-2200, TDD (757) 247-2292; www.mrc.state.va.us.

Scenic River Advisory Board—meets at least two times a year. More information: Lynn Crump, DCR, (804) 786-5054 or lynn.Crump@dcr.virginia.gov; www.dcr.virginia.gov/recreational_planning/srmain.shtml.

Soil and Water Conservation Board—meets bimonthly. More information: DCR (804) 786-1712; www.dcr.virginia.gov/soil_&_water/vs&wcb.shtml.

State Water Control Board—meets March, June, September, and December. More information: Dept. of Environmental Quality, (800) 592-5482; www.deq.virginia.gov/cboards/homepage.html#water.

Waste Management Board—meets about three times per year. More information: Dept. of Environmental Quality, (800) 592-5482; www.deq.virginia.gov/cboards/homepage.html#waste.

2008 Mid-Atlantic Regional Water Resources Research Conference "The Water-Energy Nexus: A Necessary Synergy for the 21st Century"

November 17-19, 2008
National Conservation Training Center, Shepherdstown, West Virginia

The Water-Energy Nexus: A Necessary Synergy for the 21st Century will be held **November 17-19, 2008**, at the National Conservation Training Center of the U.S. Fish and Wildlife Service in Shepherdstown, West Virginia. The West Virginia Water Research Institute is the lead sponsor. Co-sponsors are the Virginia Water Center and the state water centers of Delaware, the District of Columbia, Maryland, New Jersey, New York, and Pennsylvania.

CALL FOR PAPERS! Researchers from colleges and universities (faculty and students), federal and state agencies, private organizations, consulting firms, and others are invited to present papers. Please submit abstracts via email to the conference coordinator, Tamara Vandivort, at tamara.vandivort@mail.wvu.edu by **August 15 (extended from June 30)**. For more information, please visit the conference Web site at wvwri.nrcce.wvu.edu/2008waterconference.

N O T I C E S

All Web sites listed in this section were functional as of July 11, 2008.

TMDL Knowledgebase Clearinghouse

The Center for Total Maximum Daily Load (TMDL) and Watershed Studies, in Virginia Tech's Biological Systems Engineering Department, has developed an on-line database to house selected TMDL-related information and documents. The searchable clearinghouse contains three types of resources: TMDL guidance documents, reviews and summaries of TMDL-related technical and trade literature, and state-by-state summaries of TMDL programs across the nation. The TMDL Clearinghouse is available at www.tmdl.bse.vt.edu/site/knowledgebase/.

New Impaired Waters and TMDL Web Site from EPA

The U.S. EPA recently released a new "Impaired Waters and Total Maximum Daily Loads" (TMDLs) Web site at www.epa.gov/owow/tmdl. The site includes an overview of the Clean Water Act Section 303(d) program activities, provides access to program resources, and highlights new resources. The "Evolving Issues" section currently includes areas for mercury/air deposition and for stormwater.

DEQ Citizen Monitoring Grant Program

The Virginia Department of Environmental Quality (DEQ) is accepting proposals under the Citizen Monitoring Grant Program, for expenses accrued during 2009. Awards usually range from $1,000 to $5,000. The deadline for submitting proposals is **September 1, 2008**. More information and the application are available at www.deq.virginia.gov/cmonitor, or contact James Beckley at jebeckley@deq.virginia.gov or (804) 698-4025.

World Water Monitoring Day Kits

"World Water Monitoring Day," observed from September 18 to October 18, is an international program for increasing public awareness and involvement in protecting water resources. An easy-to-use kit enables participants to measure a core set of water-quality indicators in local water bodies. Results are shared through the WWMD Web site. WWMD encourages participation from low- and middle-income countries through the donation of monitoring kits. Monitoring kits can be ordered online at www.worldwatermonitoringday.org/Test_Kits/Kits_Main.html. For more information, please contact wwmd@wef.org.

23.4 Million Tons and What Do You Get?

You get the amount of solid waste reported in Virginia in 2007. This fact and much more information are available in the Virginia DEQ's annual report on solid waste management. The June 2008 report and previous years' reports are online at www.deq.virginia.gov/waste/aswrs.html.

Virginia Waterways Cleanup

Clean Virginia Waterway's annual Waterways Cleanup Day is a series of local beach, bay, river, stream, lake, and pond cleanups across the state in September and October. For more information about joining or sponsoring a Virginia event: (434) 395-2602 or cleanva@longwood.edu; Web site: www.longwood.edu/cleanva/iccva.htm.

(A color poster from South Carolina Sea Grant showing how the break-down time of various litter items is available at http://www.vwrrc.vt.edu/more_resources.html.)

Virginia's Game and Fish Could Use You

The Virginia Department of Game and Inland Fisheries seeks volunteers for its Complementary Work Force Program. For information about the program, contact Susan Alger at (703) 481-2102 or susan.alger@dgif.virginia.gov; Web site: www.dgif.virginia.gov/volunteer/.

Help for Having a "Green" Trip

Travel with reduced environmental impact is the focus of Virginia Green, a collaboration of the Virginia Tourism Corporation, the Virginia Hospitality and Travel Association, and the Va. DEQ. The Virginia Green Web site, at www.virginia.org/green, has trip ideas, travel resources, and a list of "eco-friendly" events.

Make a River Video and Win a Gas-saving Car

Well, it's not *that* easy, but Toms' of Maine will award a new hybrid car to the winner of its "River Stories" video contest. According to the contest Web site, the contest seeks to highlight people "making a positive difference" for rivers in their communities. The deadline to submit a video is October 31, 2008.

EPA Watershed Planning Handbook

The U.S. EPA has released a new version of *Handbook for Developing Watershed Plans to Restore and Protect Our Waters* (EPA 841-B-08-002). The document is available online at www.epa.gov/owow/nps/watershed_handbook/. For a print copy, phone (800) 490-9198 or send e-mail to nscep@bps.lmit.com (be sure to include the publication number show above).

Well Water Quality in 16 States

Summary of Selected U.S. Geological Survey Data on Domestic Well Water Quality for the Centers for Disease Control's National Environmental Public Health Tracking Program was released in November 2007. The report does not include Virginia but does include nearby Maryland and Pennsylvania. The report is available at http://pubs.usgs.gov/sir/2007/5213/.

Upcoming Conferences and Workshops

If you would like to receive a weekly e-mail notification about *upcoming meetings, conferences, and other events related to water quality*, you may do so by joining the Virginia Water Monitoring Council; contact Jane Walker at the Water Center at (540) 231-4159 or janewalk@vt.edu.

Also, please see the Water Center's "Quick Guide to Water-related Meetings and Conferences in Virginia," on our Web site at www.vwrrc.vt.edu/VAConfQuickGuide.html.

Events In Virginia

Aug. 1-2, Abingdon: **Citizen Water Monitoring Course--Habitat assessment.** Organized by Southwest Virginia Community College and the Upper Tennessee River Roundtable. More information: (276) 628-1600 or uppertnriver@yahoo.com;. Web site: www.uppertnriver.org.

Oct. 6, Hopewell: **Chesapeake Bay Foundation Meaningful Watershed Experience Training** (workshop for environmental educators). Organized by the Va. Dept. of Environmental Quality. More information: David Ruble, 804) 698-4039 or dnruble@deq.virginia.gov.

Oct. 6-8, Roanoke: **Virginia Environmental Management System Conference.** More information: Bob Herbert at 540-853-8275 or bherbert@vt.edu; Web site: www.cpe.vt.edu/va-ems/index.html.

Oct. 15-19, Roanoke: **Society of Environmental Journalists Annual Conference.** Virginia Tech is the university host. More information: (215) 884-8174 or sej@sej.org; Web site: www.sej.org/confer/index1.htm.

Oct. 24-26, Appomattox: **Forest Landowners' Retreat.** Deadline to register is Sep. 22. More information: Neil Clark, (757) 657-6450, ext. 406.

Nov. 13-15, Hampton Roads Convention Center: **Virginia Association of Science Teachers .** More information: president.elect@vast.org; Web site: http://education.jlab.org/vast/.

Events Elsewhere

Aug. 19-20, Troy, Ohio: **Water Quality Trading Workshop.** Sponsored by the Conservation Technology Information Center. More information: (765) 494-9555 or ctic@conservationinformation.org.

Sept. 7-10, Dallas, Tex.: **23rd Annual WateReuse Symposium.** Organized by the WateReuse Association (in Alexandria, Va.). More information: Courtney Tharpe at (703) 548-0880, ext. 101 or ctharpe@watereuse.org; Web site: www.watereuse.org/index.html.

Sep. 14-18, Columbus, Ohio: **National Nonpoint Source Monitoring Workshop.** Organized by Ohio State University. More information: Jessica D'Ambrosio, (614) 688-4438 or dambrosio.9@osu.edu; Web site: http://streams.osu.edu/conf.php.

Sep. 15-18, Portland, Ore.: **"Wetlands and Global Climate Change."** Association of State Wetland Managers annual conference. More information: Laura Burchill, (207) 892-3399 or laura@aswm.org; Web site: www.aswm.org.

Oct. 11-15, Providence, R.I.: **4th National Conference on Coastal and Estuarine Habitat Restoration.** Organized by Restore America's Estuaries. More information: (703) 524-0248 or conference@estuaries.org; Web site: www.estuaries.org/?id=4.

Nov. 3-6, Asheville, N.C.: **Biennial Southeast Regional Stream Restoration Conference.** Organized by North Carolina State University. More information: (919) 515-6780 or cathy_smith@ncsu.edu; Web site: www.ncsu.edu/sri.

Nov. 17-19, Shepherdstown, W. Va.: **The Water-Energy Nexus. 2008 Mid-Atlantic Regional Water Resources Research Conference.** *Please see the larger notice two pages above.*

Nov. 17-20, New Orleans, La.: **American Water Resources Association Annual Meeting.** More information: (540) 687-8390 or info@awra.org; Web site: www.awra.org.

AT THE WATER CENTER

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

La revedere si mult noroc, Ana!

That's "Good-bye and good luck, Ana!" in Romanian. Ana Constantinescu (a Romanian native) is leaving the Water Center at the end of July after having worked since May 2007 as manager for public relations and marketing activities. Ana's accomplishments at the Water Center include helping develop a new Center logo, redesigning the Center's Web site, generating publicity for Center activities in various media, creating a new Virginia Water Status Web site, and providing invaluable assistance with the 2007 research symposium. We wish Ana the best of luck in her new home and work in Chicago.

New Publications Available

Two new Special Reports are available online at www.vwrrc.vt.edu/special_reports.html.

Analysis of Nutrient-Response Characteristics to Support Criteria Development for Constructed Reservoirs, by Meredith Pavlick Warren and Tamim Younos (SR37-2008). This study sought to develop a regional dataset for nutrient criteria development, determine if reservoirs demonstrate consistent relationships between nutrient levels and two response variables (secchi depth and chlorophyll-*a*), and determine if factors such as reservoir physical features and ecoregion exert influence on reservoirs' nutrient characteristics.

Feasibility of Rainwater Harvesting BMP for Stormwater Management, by Dana Gowland and Tamim Younos (SR38-2008). The study reviews relevant research, identifies case studies of modern rainwater-harvesting systems, and uses a case-study site to investigate effects of rainwater harvesting on stormwater management.

Competitive Grants for 2009 Approved

The Water Center has approved the following two projects for FY 2009 Competitive Grant funding:

"Ecology of mycobacterial striped bass pathogens in water and sediments of the Rappahannock River, Virginia." $19,952 to D. T. Gauthier, Virginia Institute of Marine Science.

"Molecular assessment of the fate of pathogenic organisms in dairy manure." $20,000 to Z. Wen, Virginia Tech Department of Biological Systems Engineering.

Peer reviews of the proposals are available upon request. For more information, please contact Tamim Younos at tyounos@vt.edu or (540) 231-8039.

Congratulations, Arizona Water Center!

The Virginia Water Center congratulates its Arizona counterpart, the Arizona Water Resources Research Center, on that center's 50th anniversary. The Arizona center evolved from the University of Arizona's Institute of Water Utilization, which began in 1957. The Mar.-Apr. 2008 issue of *Arizona Water Resource*, available at http://ag.arizona.edu/azwater/awr/marapr08/image.html, tells the interesting story of the Arizona center's founding.

Virginia Water Central

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Water Central is available online at www.vwrrc.vt.edu. If you would like an e-mail notification when new issues are posted, please notify us at (540) 231-5463 or araflo@vt.edu. Also, please let us know if your e-mail address has changed or if you no longer wish to receive the e-mail notification.

If you do not have Internet access and would like a photocopy of the newsletter, please contact us.

Thank you!

YOU GET THE LAST WORD

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 in the box above, or e-mail your responses to araflo@vt.edu. Thank you.

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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?

6. Please add any other **comments** you wish to make.