Virginia Water Central

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A Green Tree Frog nestled in an okra leaf in a Williamsburg, Virginia, garden in early October 2009. *Photo by Kathi Mestayer, used with permission.*

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S^2 on H_2O

A Growing Need for Integrated Water Planning in Virginia and the Region

By Stephen Schoenholtz, Director
Virginia Water Resources Research Center

Most successful organizations have a strategic plan that articulates a mission, a vision, and a road map for making that vision a reality. When it comes to strategic planning for water supplies, the need for new or improved planning has never been more pressing. , as increasing competition among water users requires that critical decisions will be made about water allocation for agriculture, consumption by towns and cities, maintenance of in-stream flows for aquatic ecosystems, recreational uses, and industrial and energy production. Authority to manage water resources is largely delegated to States, Tribes, and local municipalities.

The need for water planning is rapidly expanding—at scales ranging from local to regional (multi-state)—because of potential and actual shortages and conflicts (e.g., the conflict among Georgia, Alabama, and Florida over the Atlanta area's use of water from Lake Lanier). The potential for conflict is increasing because of population growth, impacts from land use and development, declining groundwater levels in many areas, a large list of impaired water bodies where water quality is compromised, and the potential challenges presented by climate change.

This issue of *Water Central* reviews ongoing water-planning efforts in Virginia and several other states. Although the Commonwealth—under the leadership of the Virginia Department of Environmental Quality—is requiring water-supply plans that cover each of the state's water-supply systems by 2011, Virginia has yet to develop a statewide, integrated water resources strategy that considers water supplies, water quality, and ecological needs (see page 15 below for Oregon's example of an integrated approach to water resources). That kind of planning approach would bring various stakeholders and policy makers together toward a common purpose of sustainably managing our water resources to meet our current and future water needs. We cannot afford to delay on initiating such an effort.

TEACHING WATER
Especially for Virginia's K-12 teachers

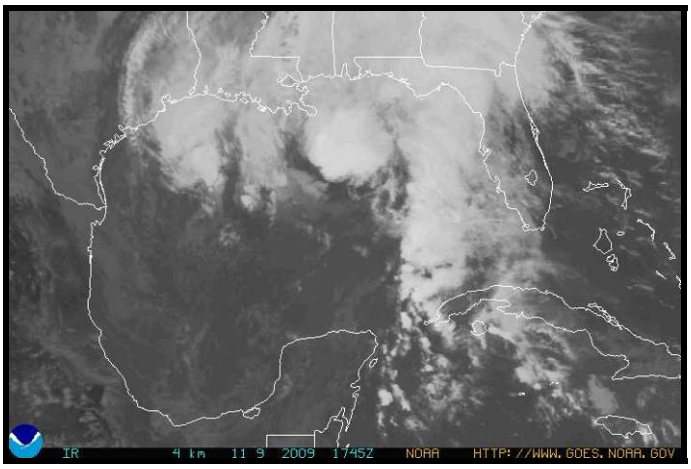
This Issue and the Virginia Standards of Learning

Below are suggestions for Virginia Standards of Learning (SOLs) that may be supported by items in this issue. 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.

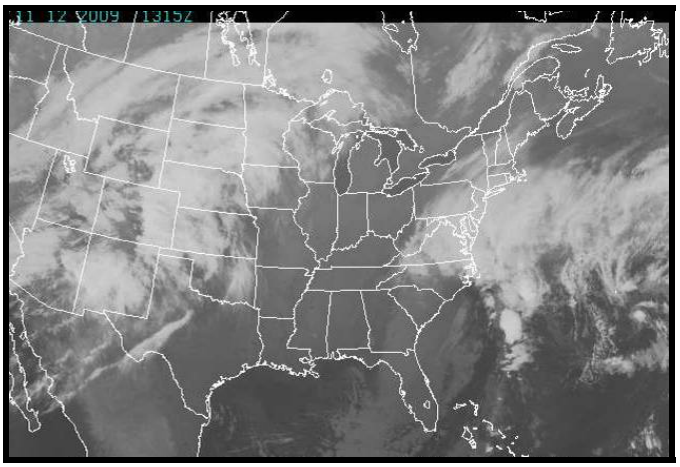
Newsletter Section	Science SOLs	Social Studies SOLs
Ida Meets a Nor'easter	4.6, 4.8, 6.6, 6.7, ES.9, ES.13	WG.2, WG.12
Water-supply Planning	6.5, 6.9, LS.12, ES.7	WG.7, GOV.8, GOV.16
Chesapeake Bay Report	6.7, 6.9, LS.11, LS.12, ES.7, ES.9, ES.11, BIO.9	CE.6, CE.7, WG.7, WG.12, GOV.5, GOV.7, GOV.9, GOV.16
Scenic Rivers Anniversary	4.8, 6.7, 6.9, ES.7, ES.9	CE.7, WG.7, GOV.8, GOV.9
Water Status (precipitation, groundwater, stream flow, tropical storms, and drought)	4.5, 4.6, 4.8, 6.5, 6.7, LS.7, LS.12, ES.7, ES.9, ES.13	WG.2
For the Record: Virginia General Assembly	6.9, ES.11	CE.3, CE.7, GOV.8, GOV.9, GOV.16

FEATURES

Ida Meets a Nor'easter and Soaks Virginia



Tropical Storm Ida approaching the U.S. Gulf Coast, 11/9/09 at 1:45 p.m. Photo from www.nhc.noaa.gov/satellite.shtml.



Storm systems over the middle-Atlantic states, 11/12/09 at 8:15 a.m. Photo from www.nhc.noaa.gov/satellite.shtml.

On November 10, 2009, Tropical Storm Ida made landfall near Mobile, Alabama. The storm, which had been at hurricane strength in the Caribbean Sea on November 7-8, was downgraded to a tropical depression by 9 a.m. on November 10, but it was still predicted to produce three to six inches of rain, with isolated totals up to eight inches, through November 11 from the eastern Gulf Coast across the Southeastern United States into the southern mid-Atlantic states. By the afternoon of November 10, the National Weather Service had issued flood watches for all of southern Virginia in anticipation of rainfall from the remnants of Ida. At the same time, a **nor'easter** was located off Virginia's Atlantic coastline, and gale warnings or small craft advisories had been issued for Virginia's coastal and Bay waters.[1]

By the afternoon of November 11, one to four inches of rain had fallen over much of Virginia, flood watches and some warnings were in effect, and more heavy rain along with high winds were predicted through the night. That evening, Governor Timothy Kaine declared a state of emergency, citing the potential for coastal flooding and storm surge "comparable to the effects of a Category 1 hurricane," and the potential for river flooding in other parts of the state.[2] Indeed, by the morning of November 12, at least 60 U.S. Geological Survey (USGS) stream gaging stations (out of about 190 statewide shown at the USGS "Water Watch" Web page http://water.usgs.gov/waterwatch/?m=real&r=va) were recording stream flow at a record high for that date and location, and approximately 40 more stations showed stream flow in the top 10 percent for the date and location. By November 14, most of Virginia had received between three and nine inches of rain, as shown in the map and in Table 1 on the following page.

According to the November 16 and 17 situation reports from the Virginia Department of Emergency Management (VDEM) (available online at www.vaemergency.com/newsroom/sitreps/), the storm systems generated wind gusts up to 70 miles/hour in coastal Virginia and 50 miles/hour in south-central and southwestern Virginia, and coastal storm-surge levels were comparable to what is expected from a Category 1.

The storms resulted in minor to moderate flooding in the Chesapeake/Eastern Shore rivers, in the Chowan River basin (Blackwater, Nottoway, and Meherrin rivers), James River basin (Appomattox, Chickahominy, and James rivers, and Johns Creek), Potomac River basin (tidal Potomac), Roanoke River basin (Blackwater, Dan, South Fork Roanoke, and Roanoke rivers), and York River basin (Mattaponi and Pamunkey rivers). Details on the rises of these rivers are presented in Table 2 (page 5).

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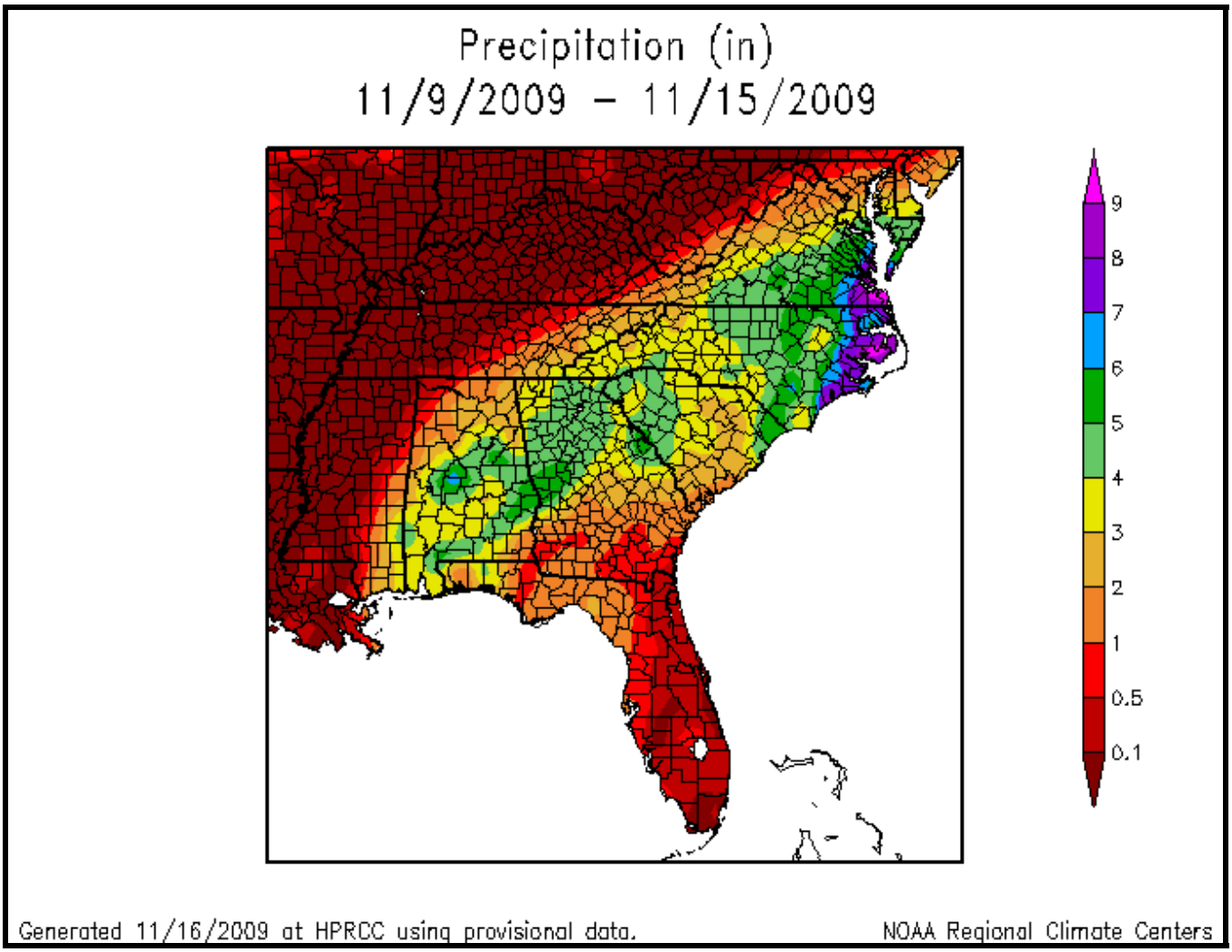
[1] According to the National Oceanic and Atmospheric Administration (www.nws.noaa.gov/glossary/, accessed11/19/09), a **nor'easter** is a strong low-pressure system that affects the Mid-Atlantic and New England States. Nor'easters can form over land or over coastal waters, and they produce heavy snow or rain, tremendous waves, and wind gusts that can exceed hurricane force. The name comes from "continuously strong northeasterly winds blowing in from the ocean ahead of the storm."

[2] The statement is available online at www.governor.virginia.gov/MediaRelations/NewsReleases/viewRelease.cfm?id=1142.



Provisional rainfall totals for November 9-November 15, 2009, in the southeastern United States.
Source: Southeast Regional Climate Center, http://www.sercc.com/climateinfo/precip_maps, accessed 11/16/09.

Table 1. Rainfall at Selected Virginia Locations, Nov. 10-14, 2009.

Location	11/10	11/11	11/12	11/13	11/14	5-day total
Blacksburg	0.85	1.65 R	1.38 R	Trace	0.0	3.88
Danville	0.54	2.67 R	1.35	0.09	0.0	4.65
Lynchburg	0.58	2.81 R	1.30	0.05	0.0	4.74
Norfolk	0.03	2.31 R	4.90 R	0.50	0.06	7.80
Richmond	0.31	1.54	3.51 R	0.17	0.02	5.55
Roanoke	0.68	2.01 R	2.36	Trace	0.0	5.05
Wash.-Dulles	0.0	0.95	0.40	0.34	0.04	1.73
Tri-Cities	1.37 R	0.88	Trace	0.0	0.0	2.25

All measurements in inches. All data are considered preliminary. R = record for that location and date. The normal amount over the period of record for each station for these dates is between 0.5 and 0.56 inches.

Sources: "Daily Climate Report" archives, Web sites of National Weather Service in Blacksburg (www.weather.gov/climate/index.php?wfo=rnk), Sterling (www.weather.gov/climate/index.php?wfo=lwx), Wakefield (mi.nws.noaa.gov/climate/index.php?wfo=akq), and Morristown, Tenn. (www.weather.gov/climate/index.php?wfo=mrx), all accessed 11/12/09.

Table 2. Virginia Rivers Reaching or Exceeding Flood Stage November 12-16, 2009.

	FLOOD STAGE	CREST
CHESAPEAKE BAY/EASTERN SHORE BASINS		
Chesapeake Bay at Bay Bridge Tunnel (tidal)	5.0	7.6 on 11/12 (record stage)
Chesapeake Bay at Kiptopeke (tidal)	4.5	7.0 on 11/13
Atlantic at Wachapreague (tidal)	6.5	6.9 on 11/12
CHOWAN RIVER BASIN		
Blackwater River near Franklin	12.0	13.6 on 11/15
Nottoway River at Rawlings	10.0	12.2 on 11/13
Nottoway River at Stony Creek	15.0	17.4 on 11/15
Nottoway River near Sebrell	16.0	19.0 on 11/18
Meherrin River at Lawrenceville	15.0	22.7 on 11/13
JAMES RIVER		
Johns Creek at New Castle	8.0	8.2 on 11/12
Appomattox River at Farmville	16.0	17.4 on 11/13
Appomattox River at Mattoax	21.0	24.4 on 11/16
Appomattox River at Matoaca	10.0	10.0 on 11/15
Chickahominy River at Providence Forge	10.0	10.3 on 11/15
James River at Bremo Bluff	19.0	20.1 on 11/13
James River at Richmond (Westham)	12.0	13.4 on 11/14
James River at Sewells Point (tidal)	5.0	7.7 on 11/12
NEW RIVER		
Little River at Graysontown	5.0 (action stage)	5.8 on 11/12
POTOMAC RIVER BASIN		
Potomac River at Lewisetta (tidal)	3.0	3.6 on 11/12
ROANOKE RIVER BASIN		
Dan River at Danville	17.0	23.6 on 11/12-11/13
Dan River at Paces	20.0	26.9 on 11/13
S. F. Roanoke River at Shawsville	5.0	8.0 on 11/12
Blackwater River near Rocky Mount	9.0 (action stage)	14.9 on 11/12
Roanoke River at Glenvar	9.0	13.0 on 11/12
Roanoke River at Roanoke (Walnut Street)	10.0	10.3 on 11/12
Roanoke River at Altavista	18.0	20.5 on 11/12
Roanoke River at Brookneal	23.0	27.5 on 11/12
Roanoke River at Randolph	21.0	27.1 on 1/13
YORK RIVER BASIN		
Mattaponi River near Beulahville**	14.0	~14.0 on 11/14
Pamunkey River near Hanover**	14.0	18.8 on 11/15

All measurements in feet above stream bed. For non-tidal rivers, crest is the highest state reading before the rivers stage begins to decrease. For tidal rivers, the crest is the highest level reached during a high tide during the period.

Sources: National Weather Service's Advanced Hydrologic Prediction System (APHS), online at www.weather.gov/ahps/ (as of 11/20/09). Double asterisk (**) indicates information from U.S. Geological Survey's real-time streamflow for Virginia, online at http://water.usgs.gov/waterwatch/?m=real&w=map&r=va (as of 11/20/09).

The storms tragically resulted in six deaths in Virginia: one each in Isle of Wight County, Nelson County, Northampton County, Hampton, and Newport News, and one location not identified (as of November 30). Other social and economic impacts are summarized in the following sub-sections. Except where noted otherwise, the source for this information was VDEM situation reports for November 16-30.

•**Emergency Actions**—Local state of emergency declarations were made in Chincoteague, Colonial Beach, Gloucester County, Halifax County, Hampton, Isle of Wight County, James City County, King William County, Mathews County, Newport News, Norfolk, Pittsylvania County, Poquoson, Portsmouth City, Suffolk, Surry County, Virginia Beach, and York County.

•**Evacuations and Public Shelters**—By November 13, about 500 people in Hampton Roads area had left their homes due to high water, and 45 National Guard soldiers were helping rescue stranded residents (Associated Press, 11/13/09). Shelters were opened in Chesapeake, Hampton, Newport News, Norfolk, and York County. As of

November 13, 170 people and 13 pets had been sheltered at some point. About 30 people remained in a Norfolk shelter until November 25, until other housing arrangements could be made.

•**Power outages**—Virginia Dominion Power reported as many as 350,000 customers (comprising about 1.6 million people) without power at the worst part of the storm, but Dominion reported that all power had been restored by 6 a.m. on November 17, (except some individual problems due to building structures).

•**Road closures**—VDEM's November 13 situation report noted the following closures: 19 primary roads (some partially), 251 secondary roads, the Route 58 Midtown Tunnel across the Elizabeth River (between Norfolk and Portsmouth), the Route 17 James River Bridge between Newport News and Isle of Wight County, and the Jamestown Scotland Ferry. The Associated Press reported on November 13 that more than 400 roads (mostly secondary roads) were closed due primarily to high water but also in some cases due to downed power lines or trees.

•**Shipping impacts**—On November 13, the 700-foot, out-of-service oil tanker Monongahela broke from its moorings in the James River Reserve Fleet area and ran aground about a half-mile downstream. A U.S. Maritime Administration spokesperson said there was no evidence of any ruptures or oil spills. (*Daily Press*, 11/13/09) Also on November 13, two lines broke on a 570-foot barge traveling from Puerto Rico to New Jersey and the vessel ran aground north of Sandbridge Pier in Virginia Beach. The barge was stabilized by November 14, and a Coast Guard inspection found evidence of contamination of the waterway (*Journal of Commerce*, 11/13/09). The barge was removed on November 18.

•**Wastewater impacts**—Floodwaters caused a 50,000-gallon overflow (it was not clear whether of stormwater or of sewage, according to the Hampton Roads Sanitation District's general manager) into the James River in Newport News, and an overflow of an unknown volume (as of November 13) into the York River at the Sanitation District's West Point treatment plant (*Daily Press*, 11/13/09). As of result, the Virginia Department of Health banned shellfish harvesting in Chesapeake Bay waters until November 18, and then extended the ban from November 19-December 2; the waters covered are those in Hampton Roads, the lower James River and the Lynnhaven River watersheds, Cockrell Creek, Totuskey Creek, and the western shore of the Chesapeake Bay from York County to Hampton (*Virginian-Pilot*, 11/19/09).

•Local **damage assessments**—As of VDEM's November 20 situation report, 27 localities had submitted Initial Damage Assessments, identifying the following individual-assistance and public-assistance claims (VDEM notes that as of that date the amounts had been claimed but not verified, and they and do not take into consideration potential insurance payments): individual assistance =$50,445,480; public assistance = $18,306,363.

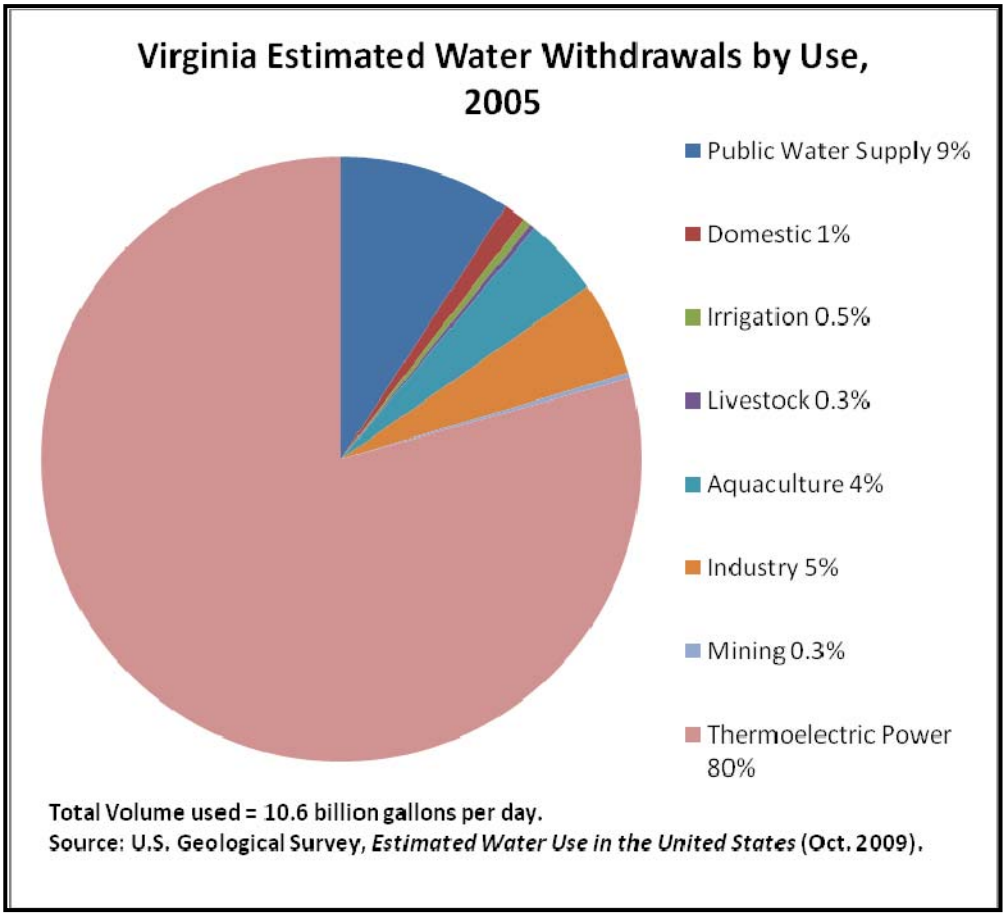
•**Federal assistance**—On November 20, the governor's office requested federal assistance for low-interest loans for home repairs; for public debris removal, infrastructure-repair, and emergency services in the counties of Halifax, Isle of Wight, King and Queen, Northampton and Surry and in the cities of Chesapeake, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Virginia Beach; and for hazard mitigation in all Virginia localities. On November 25, the governor announced approval from the U.S. Small Business Administration of the low-interest loans request, meaning that storm-affected Virginia individuals and businesses are eligible to apply for loans.

•**Volunteer efforts**—By November 19, food, shelter, clean-up assistance, and other recovery services were being provided in Hampton Roads by individuals and by many volunteer organizations, including the American Red Cross, the Salvation Army, the Peninsula Food Bank, and disaster-response teams from various religious denominations. The Southeast Virginia Voluntary Organizations Active in Disasters (VOAD) reported that other volunteer teams and individuals were on stand-by to assist if necessary. VOAD was "preparing for a long recovery effort" (VDEM situation report, 11/18/09).

Feature 2

Water Supply Planning on the Agenda in Virginia and Several Other States

How much water is 10 billion gallons (or 11.9 million acre-feet)? According to the U.S. Geological Survey's (USGS), it's the estimated amount of water withdrawn daily for major water uses in Virginia in 2005.[3] As the following chart shows, this total included withdrawals for public water supply, domestic (self-supplied) use, irrigation, livestock, aquaculture, industry, mining, and thermoelectric power generation. Surface water sources supplied an estimated 97 percent of these withdrawals, and groundwater sources, three percent.



Having such amounts of water available for these uses in five, 10, or 50 years—or even in six months, if a drought develops—is the challenge for water-resource planners at the local, regional, and state level.

Since the drought of 1999-2002, Virginia has been engaged in a statewide water-supply planning effort, mandated by the Virginia General Assembly in 2003. In this article, *Water Central* provides an update on the current statewide water-supply planning in Virginia, then offers examples of current water-resources planning efforts in five other states: Oklahoma, Texas, Minnesota, North Dakota, and Oregon.

Virginia's Statewide Water-supply Planning Process

Following the severe drought of 1999 to 2002, the 2003 Virginia General Assembly passed SB 1221 which required the following:

"The [State Water Control] Board, with the advice and guidance from the Commissioner of Health, local governments, public service authorities, and other interested parties, shall establish a comprehensive water supply planning process for the development of local, regional, and state water supply plans consistent with the provisions of this chapter [Chapter 227 of the *Virginia Code*]. This process shall be designed to (i) ensure that adequate and safe drinking water is available to all citizens of the Commonwealth, (ii) encourage, promote, and protect all other beneficial uses of the Commonwealth's water resources, and (iii) encourage, promote, and develop incentives for alternative water sources, including but not limited to desalinization.

"Local or regional water supply plans shall be prepared and submitted to the Department of Environmental Quality in accordance with criteria and guidelines developed by the Board. Such criteria and guidelines shall take

[3] Kenny, J.F. et al., *Estimated Use of Water in the United States in 2005*, U.S. Geological Survey Circular 1344 (October 2009), p. 6. The Virginia Department of Environmental Quality (DEQ) also compiles water-withdrawal data on a statewide basis under Virginia's Water Withdrawal Reporting Regulation (9VAC-25-200 *et seq.*). The annual reporting requirement applies to users whose average withdrawal exceeds 10,000 gallons per day (surface water or groundwater). (Previn Smith, Va. DEQ, pers. comm., 10/26/09)

into account existing local and regional water supply planning efforts and requirements imposed under other state or federal laws."[4]

In 2005, the State Water Control Board (SWCB) approved a water-supply planning regulation to implement the requirements of SB 1221. Becoming effective on November 2, 2005, the regulation (which listed in the *Virginia Administrative Code* at 9 VAC 25-780) details the process that the Virginia Department of Environmental Quality (DEQ) is to follow to ensure that local or regional water-supply plans have been submitted by the 2011 deadline (earlier in some areas). The legislation also authorized the DEQ to provide financial and technical assistance to local and regional planning efforts. (For more background on the water-supply planning regulation, please see the "Focus on Water Supply" in the November 2005 *Water Central*, p. 1.)

The information required in each plan includes the following:

Water sources;
Water use;
Natural resources;
Water-demand management or current conservation practices;
Drought response and contingency plans;
Projected water demand;
Statement of need based on the adequacy of existing water sources to meet current and projected water demand over the planning period (a minimum of 30 years to a maximum of 50 years).

The schedule for submitting plans is as follows:

November 2008 for local governments with populations greater than 35,000 preparing a local (individual) plan;
November 2009 for local governments with populations of 15,000-35,000 preparing a local (individual) plan;
November 2010 for local governments with populations less than or equal to 15,000 preparing a local (individual) plan;
November 2011 for regional water supply plans.

Status of Water Supply Planning Efforts: Shrinking Budgets and Plan Reviews

In September 2009, Scott Kudlas, the director of the DEQ's Office of Surface and Ground Water Supply Planning, provided an update on the Virginia effort. According to Mr. Kudlas, Virginia's state-government budget shortfall has reduced the available grant funding for water-supply planning. For FY10, $90,000 of grant funding (down from $200,000 in FY09 and $300,000 in FY08) will be available to direct fund local and regional water-supply planning projects.

One formal water supply program submission to the SWCB was expected by November 2009. Additionally, DEQ's water-supply planning staff anticipates the receipt of seven draft water supply plans for team review by December 31, 2009.

The table beginning below summarizes the plan-status information received from Mr. Kudlas. The table is alphabetized by the lead agency or locality. For more information on the planning process in a given locality or region, please contact Mr. Kudlas at the Virginia DEQ, P.O. Box 1105, Richmond, VA 23218; scott.kudlas@deq.virginia.gov; (804) 698-4456; Web site: www.deq.virginia.gov/watersupplyplanning/homepage.html

Lead Agency	Participating Localities	Deadline and Status
Accomack-Northampton Planning District Commission	Accomack County; Towns of Accomac, Belle Haven, Bloxom, Hallwood, Keller, Melfa, Onancock, Onley, Painter, Parksley, Saxis, Tangier, and Wachapreague	November 2011; on schedule to meet deadline.
Accomack-Northampton Planning District Commission	Northampton County; Towns of Cape Charles, Cheriton, Eastville, Exmore, and Nassawadox	November 2011; on schedule to meet deadline.
Amelia County	Amelia County	November 2010; in final stage of plan development.
Appomattox River Water Authority and American Water Company	Counties of Chesterfield, Dinwiddie, and Prince George; Cities of Hopewell and Petersburg; Town of McKenney	November 2011; DEQ staff working with the region to develop a final draft of the plan.

[4] The full text of SB 1221 and access to the relevant sections of the Virginia Code are available at the Virginia Legislative Information System's Web site, at http://leg1.state.va.us/cgi-bin/legp504.exe?ses=031&typ=bil&val=sb1221.

Lead Agency	Participating Localities	Deadline and Status
Towns of Blacksburg and Christiansburg	Towns of Blacksburg and Christiansburg	November 2011; in beginning stage of plan development.
Buckingham County	Buckingham County and the Town of Dillwyn	November 2011; in beginning stages of plan development.
Caroline County	Caroline County and the Town of Bowling Green	November 2011; in middle phases of plan development.
Central Shenandoah Planning District Commission	James River watershed: Counties of Alleghany, Bath, Highland, and Rockbridge; Cities of Buena Vista, Covington, and Lexington; Towns of Clifton Forge, Goshen, Glasgow, Iron Gate, and Monterey	November 2011; in middle phases of plan development.
Central Shenandoah Planning District Commission	Upper Shenandoah River watershed: Counties of Augusta and Rockingham; Cities of Harrisonburg, Staunton, and Waynesboro; Towns of Bridgewater, Broadway, Craigsville, Dayton, Elkton, Grottoes, Mount Crawford, and Timberville	November 2011; on schedule to have draft final plan by 2009.
Charles City County	Charles City County	November 2010; in beginning stage of plan development.
Charlotte County	Charlotte County; Towns of Charlotte Court House, Drakes Branch, Keysville, and Phenix	November 2011; in middle stages of plan development.
Town of Chincoteague	Town of Chincoteague	November 2010; partial draft plan being reviewed by DEQ.
County of Culpeper	County of Culpeper and Town of Culpeper	November 2011; county and town exploring a regional effort.
Counties of Cumberland, Goochland, Henrico, and Powhatan	Counties of Cumberland, Goochland, Henrico, and Powhatan	November 2011; in middle stages of plan development.
Fauquier County	Fauquier County; Towns of Remington and The Plains	November 2011; in middle stages of plan development.
Fluvanna County	Fluvanna County and Town of Columbia	November 2011; in middle stages of plan development.
Greene County	Greene County and Town of Stanardsville	November 2011; draft plan being finalized.
Greensville County Water and Sewer Authority	Counties of Greensville and Sussex; City of Emporia; Towns of Jarrett, Skippers, Stony Creek, Wakefield, and Waverly	November 2011; on schedule to hold public hearings on draft final plan in fall 2009.
Halifax County Service Authority	County of Halifax; Towns of Halifax, Scottsville, South Boston, and Virgilina	November 2011; in beginning stage of plan development.
Hampton Roads Planning District Commission	Counties of Gloucester, Isle of Wight, James City, Southampton, Surry, and York; Cities of Chesapeake, Franklin, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach, and Williamsburg; Towns of Boykins, Branchville, Capron, Claremont, Courtland, Dendron, Ivor, Newsoms, Smithfield, Surry, and Windsor	November 2011; on schedule to submit plan by deadline; recent decisions on King William reservoir project will have an impact on the plan.

Lead Agency	Participating Localities	Deadline and Status
Hanover County	Hanover County and Town of Ashland	November 2011; in beginning stage of plan development.
Town of Hillsboro	Town of Hillsboro	November 2010; no information provided on status.
King George County	King George County	November 2009; on schedule to submit plan by the deadline.
Louisa County	Louisa County; Towns of Louisa and Mineral	November 2011; in middle stages of plan development.
Lunenburg County	County of Lunenburg; Towns of Kenbridge and Victoria	November 2011; in middle stages of plan development.
Madison County	County of Madison and Town of Madison	November 2011; lead agency expects to submit plan by deadline.
Middle Peninsula Planning District Commission	Counties of Essex, King and Queen, King William, Mathews, and Middlesex; Towns of Tappahannock, Urbanna, and West Point	November 2011; on schedule to submit plan by deadline.
Mount Rogers Planning District Commission in cooperation with Cumberland Plateau and LENOWISCO planning district commissions	Counties of Bland, Buchanan, Carroll, Dickenson, Grayson, Lee, Russell, Scott, Smyth, Tazewell, Washington, Wise, and Wythe; Cities of Bristol, Galax, and Norton; Towns of Abingdon, Appalachia, Big Stone Gap, Bluefield, Cedar Bluff, Chilhowie, Cleveland, Clinchco, Clinchport, Clintwood, Coeburn, Damascus, Duffield, Dungannon, Fries, Gate City, Glade Spring, Grundy, Haysi, Hillsville, Honaker, Independence, Jonesville, Lebanon, Marion, Nickelsville, Pennington Gap, Pocahontas, Pound, Richlands, Rural Retreat, Saltville, St. Charles, St. Paul, Tazewell, Troutdale, Weber City, Wise, and Wytheville	November 2011; in later stages of plan development, and approaching work of combining three plans into one regional plan.
New Kent County	New Kent County	November 2010; on schedule to submit plan by deadline.
New River Valley Planning District Commission	Counties of Floyd, Giles, Montgomery, and Pulaski; City of Radford; Towns of Dublin, Floyd, Glen Lyn, Narrows, Pearisburg, Pembroke, Pulaski, and Rich Creek	November 2011; draft plan submitted in summer 2009; lead agency expects to submit plan prior to deadline.
Northern Neck Planning District	Counties of Lancaster, Northumberland, Richmond, and Westmoreland; Towns of Colonial Beach, Kilmarnock, Irvington, Montross, Warsaw, and White Stone	November 2011; in middle stages of plan development.
Northern Shenandoah Valley Regional Commission	Counties of Clarke, Frederick, Page, Shenandoah, and Warren; City of Winchester; Towns of Berryville, Boyce, Edinburg, Front Royal, Luray, Middletown, Mt. Jackson, New Market, Shenandoah, Stanley, Stephens City, Strasburg, Toms Brook, and Woodstock	November 2011; in middle stages of plan development.

Lead Agency	Participating Localities	Deadline and Status
Northern Virginia Regional Commission	Counties of Arlington, Fairfax, Loudoun, and Prince William; Cities of Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park; Towns of Clifton, Dumfries, Hamilton, Haymarket, Herndon, Leesburg, Lovettsville, Middleburg, Occoquan, Purcellville, Quantico, Round Hill, and Vienna	November 2011; in middle stages of plan development.
Nottoway County	Nottoway County; Towns of Blackstone, Burkeville, and Crewe	November 2010; on schedule to submit plan by deadline.
County of Orange	County of Orange; Towns of Gordonsville and Orange	November 2011; expect to submit plan prior to deadline.
Town of Port Royal	Town of Port Royal	November 2010; no information provided on status.
Prince Edward County	Prince Edward County and the Town of Farmville	November 2011; expect to submit plan prior to deadline.
Rappahannock County	Rappahannock County and Town of Washington	November 2011; on schedule to submit plan by deadline.
Richmond Department of Public Utilities	City of Richmond	November 2008; plan submitted by deadline.
Rivanna Water and Sewer Authority	Albemarle County; City of Charlottesville; Town of Scottsville	November 2011; in middle stages of plan development.
Roanoke Valley-Alleghany Regional Commission	Counties of Bedford, Botetourt, Franklin, and Roanoke; Cities of Bedford, Roanoke, and Salem; Towns of Boones Mill, Buchanan, Fincastle, Rocky Mount, Troutville, and Vinton	November 2011; expect to submit plan prior to deadline.
Roanoke Valley-Alleghany Regional Commission	Craig County and Town of New Castle	November 2011; plan development scheduled to begin in fall 2009.
Southside Planning District Commission	Counties of Mecklenburg and Brunswick; Towns of Alberta, Brodnax, Lawrenceville, La Crosse, South Hill, Boydton, Chase City, and Clarksville	November 2011; on schedule to submit plan by deadline.
Spotsylvania County	Spotsylvania County and the City of Fredericksburg	November 2011; water-facilities planning underway in response to immediate needs; this will be incorporated into regional plan.
Stafford County	Stafford County	November 2008; plan submitted by deadline.
Virginia's Region 2000 Local Government Council	Counties of Amherst, Appomattox, Bedford, Campbell, and Nelson; Cities of Bedford and Lynchburg; Towns of Altavista, Amherst, Appomattox, Brookneal, and Pamplin	November 2011; on schedule to submit plan by deadline.
Town of Warrenton	Town of Warrenton	November 2010; expects to submit plan deadline.
West Piedmont Planning District Commission	Counties of Henry, Patrick, and Pittsylvania; Cities of Danville and Martinsville; Towns of Stuart, Gretna, Hurt, Chatham, and Ridgeway	November 2011; on schedule to submit plan by deadline.

Oklahoma's Comprehensive Water Plan

Ed. note: The following section is an excerpt from "Reflection on Passing the Halfway Point," by Dr. Will Focht, director of the Oklahoma Water Resources Research Institute (WRRI). The column was originally published in the September 2009 issue of the Oklahoma WRRI's newsletter, *The AQUAhoman*. *Water Central* thanks the Oklahoma WRRI for permission to reprint this excerpt. More information on the Oklahoma Comprehensive Water Plan and the update process described below is available online at http://environ.okstate.edu/OWRRI/waterplan/ or by contacting the Oklahoma WRRI at 003 Life Sciences East, Stillwater, OK 74078; (405) 744-9994; waterplan@okstate.edu.

[In 2009, Oklahoma is] a little past halfway through our 4.5-year program to update the Oklahoma Comprehensive Water Plan. …[T]housands of citizens…have contributed their valuable time and effort to offer suggestions for how the water plan should be improved. Together, we have accomplished much, but there is still much work to do before a final water plan can be issued in two years. It seems appropriate now to briefly review our progress so far and what lies ahead.

Our public participation program was designed as a grassroots effort to engage citizens all across Oklahoma in developing recommendations for sustainable water resources management. [*Ed. note:* The public-participation program was designed and is being coordinated by the Oklahoma Water Resources Research Institute.] Our goal is to assure that adequate supplies of clean water will be available to meet the needs of all Oklahomans over the next 50 years. To develop these recommendations, we also wanted to provide opportunities for citizens to learn more about the current status of the water supply in Oklahoma as well as projected changes in water supply and use out to 2060. To make sure that public deliberations were both well-informed and responsive to public values and preferences, we adopted a process that coupled technical analyses with fair, inclusive, and transparent deliberation.

[During the process] the public is encouraged to ask questions and propose water-resource management strategies, and then benefit from information generated by experts [to] revise these strategies to make them more practical and sensible. In the end, we hope that the strategic recommendations offered to the Oklahoma Water Resources Board will be well-informed and acceptable to Oklahoma's water users. In other words, we hope that the revised plan will be both a good plan and the right plan for Oklahoma.

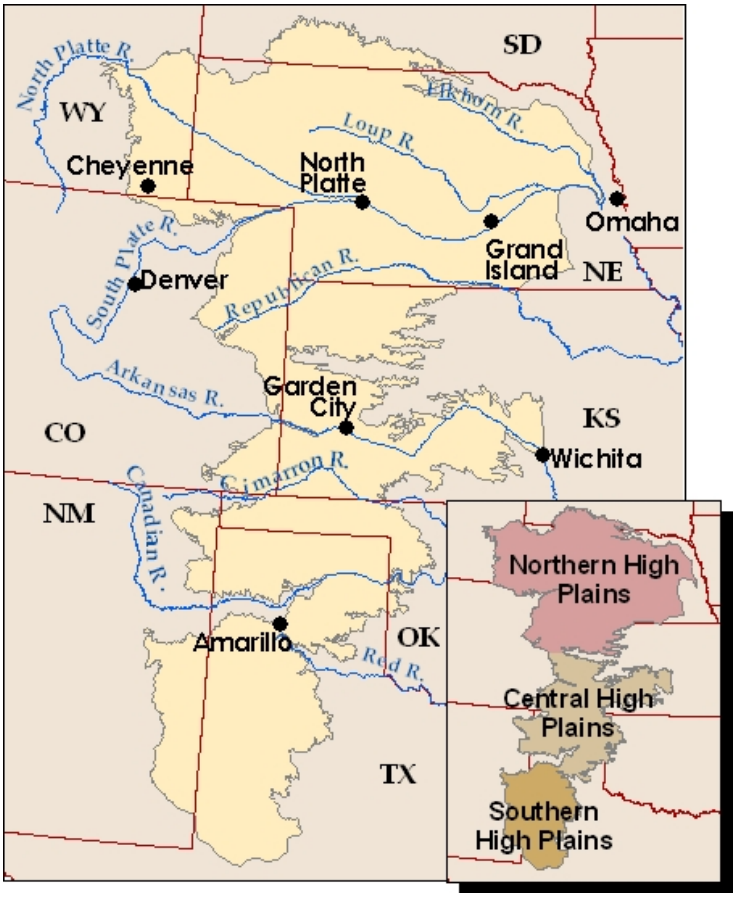
In the first year (2007), we held 42 local input meetings across the state to ask Oklahomans…about their concerns and management preferences. This effort generated 2544 comments [in] 54 issue categories. In…2008, we held 11 regional input meetings in which we asked citizens to rate the importance of these 54 issue categories as to whether they should be further considered as we move forward in the planning process. Based on their judgments, we were able to define 10 water source management themes that addressed those 54 [issue categories].

[In 2009], we are holding three planning workshops. In each workshop, we divide participants into 10 workgroups corresponding to the 10 water resource management themes. To prepare participants for informed deliberation, we distributed briefing documents that provided relevant information on the 10 themes, including technical analyses of water supply and demand both now and over the next 50 years. We are asking each workgroup to develop sensible and practical water resource management strategies based on the technical information provided and the preferences they have on how water should be managed. The strategies that they develop will be analyzed by relevant experts and the results (and answers to questions) will be provided to the participants at the second workshop. This process will be repeated at the third workshop. It is important to note that we are encouraging workshop participants to develop multiple strategies, as long as they are sensible and practical. No voting on the best strategies will be conducted at the workshops.

[In 2010], we will prepare a background document that identifies the pros and cons of each of the strategic recommendations that come out of the workshops. Then, working with the Oklahoma Academy for State Goals, we will hold a three-day Town Hall Meeting to deliberate on the strategies developed in the planning workshops and vote on a series of strategic recommendations that will be forwarded to the Oklahoma Water Resources Board for their consideration in development of a draft of the updated water plan.

In 2011, we will hold 11 more regional meetings to solicit feedback from the public on the Water Board's draft water plan and suggestions for how the plan should be implemented. We will forward these reactions and suggestions to the Water Board for its use in developing the final water plan update. We anticipate that the final plan will be developed by the fall of 2011.

As is plain to see, this process is quite rigorous and involved. However, we believe that it is the most robust and high-quality public participation process ever used in the United States to develop a water plan. As a result, we expect to develop the best plan possible to guide water resources management over the long term. We also hope to build public support for the plan through this process, which will make the plan far more successful in achieving positive results.



Part of the water used in Oklahoma, Texas, and six other states is provided by groundwater from the High Plains aquifer system, shown in tan in the larger figure and divided into three sections in the inset. Map taken from the "High Plains Regional Groundwater Study" page of the U.S. Geological Survey/National Water Quality Assessment Program Web site, http://co.water.usgs.gov/nawqa/hpgw/HPGW_home.html , 11/30/09.

Texas' Groundwater Management Planning

Ed. note: For more information about groundwater planning in Texas, please visit the Texas Water Development Board's (TWDB) Web site at www.twdb.state.tx.us/GwRD/GCD/gcdhome.htm; for information about overall statewide water planning in Texas, visit the TWDB Web site at www.twdb.state.tx.us/wrpi/index.htm; or contact the TWDB at P.O. Box 13231, Austin, TX 78711-3231; (512) 463-7847; info@twdb.state.tx.us.

Texas developed state water plans in 1968, 1984, 1990, 1992, 1997, 2002, and (the current plan) in 2007. According to the Groundwater Resources chapter (chapter 7) of the 2007 plan, groundwater at that time supplied about 59 percent of the 15.6 million acre-feet of water used annually in Texas (1 acre-foot = 325,851 gallons). An estimated 79 percent of the groundwater use was for farm irrigation.

The Texas state constitution authorizes the creation of groundwater-management entities, known as groundwater conservation districts or underground water conservation districts. These districts have authority to regulate the spacing and production of water wells. The first district, the High Plains Underground Water Conservation District in Lubbock, was created in 1951.[5]

The Texas Administrative Code (Chapter 356) and the Texas Water Code (chapters 36.1071 and 36.1072) require each of the state's 98 groundwater districts to adopt a groundwater-management plan, review it annually, and re-adopt it (with our without revisions) every five years. Listed below are the items that are required in groundwater-management plans (with certain exceptions).

1) Management goals:

A) providing the most efficient use of groundwater;

B) controlling and preventing waste of groundwater, which may include the waste of groundwater through contamination induced by abandoned oil and gas wells, abandoned water wells, leaking pipelines, and other sources;

[5] Virginia's Ground Water Management Act of 1992 authorizes creation of groundwater management areas where groundwater withdrawals equal to or greater than 300,000 gallons per month require a permit. Virginia has two groundwater management areas, the Eastern Virginia Area (east of Interstate 95 and south of the Mattaponi and Pamunkey rivers) and the Eastern Shore Area (Accomack and Northampton counties). The Virginia Department of Environmental Quality oversees the permitting program. For more information, visit the DEQ Web site at www.deq.virginia.gov/gwpermitting/.

C) controlling and preventing subsidence;

D) addressing conjunctive surface-water management issues;

E) addressing natural resource issues which impact the use and availability of groundwater, and which are impacted by the use of groundwater;

F) addressing drought conditions;

G) addressing conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control, where appropriate and cost-effective; and

H) addressing, in a quantitative manner, the desired future conditions of the groundwater resources.

2) **Management objectives** that the district will use to achieve the management goals.

3) **Performance standards** for each management objective.

4) **Actions, procedures, performance, avoidance, and rules** necessary to carry out the management plan.

5) **Estimates** of the following:

A) managed available groundwater in the district, based on the desired future condition;

B) amount of groundwater being used within the district on an annual basis;

C) annual amount of recharge from precipitation, if any, to the groundwater resources within the district;

D) for each aquifer, annual volume of water that naturally discharges from the aquifer to springs and any surface water bodies, including lakes, streams, and rivers;

E) annual volume of flow into and out of the district within each aquifer and between aquifers in the district, if a groundwater availability model is available;

F) projected surface water supply in the district according to the most recently adopted state water plan; and

G) projected total demand for water in the district, according to the most recently adopted state water plan;

6) **Groundwater-supply management details**, including a methodology by which the district will track its progress on an annual basis in achieving its management goals; and

7) Consideration of the **water-supply needs** and **water-management strategies** included in the state water plan.

Minnesota's Planning for Sustainable Water Use

Ed. note: The following section is based on information in the June 2009 issue of *Facets of Freshwater*, the newsletter of the Freshwater Society of Excelsior, Minnesota, (952) 471-9773, freshwater@freshwater.org, www.freshwater.org; and the June 2009 issue of *Minnegram*, the newsletter of the University of Minnesota Water Resources Center, (612) 624-9282, umwrc@umn.edu, http://wrc.umn.edu/pubs/index.htm. Information about water-supply planning generally in Minnesota is available from the Department of Natural Resources' Web site at www.dnr.state.mn.us/waters/watermgmt_section/appropriations/eandc_plan.html; or contact the department's Division of Waters at (651) 259-5700.

In November 2008, Minnesota voters approved a constitutional amendment increasing the state sales tax by 3/8 of one percent to provide funds for water and other natural resources, parks/trails, and the arts. In May 2009, the Minnesota legislature passed the Clean Water, Land and Legacy Act that allocated $397 million from the sales tax revenues for the next two years. Among that $397 million was $750,000 allocated to the University of Minnesota Water Resources Center (WRC) to lead the development of a 25-year framework (including a 10-year component) for protection, conservation, and enhancement of surface water and groundwater quality and quantity. The legislation states that the framework is to contain an "implementation schedule and associated benchmarks for policy, research, monitoring, and evaluation in order to achieve sustainable ground and surface water use." The legislation also defined "sustainable" water uses as those that do not "harm ecosystems, degrade water quality, or compromise the ability of future generations to meet their needs."

According to the Minnesota WRC, the framework will consider the following issues: infrastructure; drinking water; groundwater-surface water interactions; stormwater; agricultural and industrial needs; the inter-connection of climate change, land use, and development; and demographics. The plan-development process is to be "highly collaborative with robust citizen participation," according to the Minnesota WRC's director, Deborah Swackhamer.

Above: The sinuous Red River—shown here in May 2006 near the Fargo, N.D./Moorhead, Minn. area—forms much of the North Dakota-Minnesota border. At right: A May 2006 aerial photo of an area northwest of Minneapolis/St. Paul shows a few of Minnesota's thousands of lakes. Northern North Dakota is also dotted with many lakes.

North Dakota's State Water Plan

Ed. note: This section is based on information from the Web site of the North Dakota State Water Commission at http://www.swc.state.nd.us. That site provides access to North Dakota's statewide water plans since 1937 (click on "Reports and Publications"). You can contact the Commission's Planning and Education Division in Bismarck at (701) 328-4989 or dschock@nd.gov.

North Dakota's State Planning Board first published a statewide water plan in 1937, followed by updates in 1968, 1983, 1992, 1999, and 2009. In the 2000s, the state has published a series of biennial "Water Development Reports" to supplement the statewide management plan.

According to the Executive Summary of the 2009 statewide management plan, the purposes of the plan are the following:

1) provide information regarding current and projected water use;
2) identify areas where water is generally available for new beneficial uses;
3) identify goals and objectives for water resource management and development;
4) identify potential water resource management and development projects and programs;
5) provide current information regarding North Dakota's revenue sources for water resource management and development;
6) serve as a formal request for funding from the Resources Trust Fund; and
7) broadly identify water resource management and development opportunities and challenges, and provide recommendations to address them.

The 2009 plan lists the following goals (each with several objectives):

To **regulate** the use of water resource, **develop** water resources, and **manage** water resources (all "for the future welfare and prosperity of the people of North Dakota");

To **educate the public** regarding the nature and occurrence of North Dakota's water resources

To **collect, manage, and distribute information** to facilitate improved management of North Dakota's water resources.

To **conduct research** into the processes affecting the hydrologic cycle to improve the management of North Dakota's water resources.

Oregon's Integrated Water Resources Strategy

Ed. note: The following section is an excerpt from a September 23, 2009, "Briefer" from the Oregon Water Resources Department, available at www.wrd.state.or.us/OWRD/LAW/Integrated_Water_Supply_Strategy.shtml. *Water Central* thanks that department for permission to use the excerpt. For more information about Oregon water-resource planning, contact the Water Resources department in Salem at (503) 986-0900 or webmaster@wrd.state.or.us; main Web site: www.wrd.state.or.us.

Introduction

The 75th [Oregon] Legislative Assembly passed HB 3369 in 2009, directing the Oregon Water Resources Department to develop a statewide, integrated water resources strategy in consultation with the Departments of Environmental Quality and Fish and Wildlife. The Water Resources Commission will provide notice of the strategy to the Environmental Quality Commission, Oregon Department of Agriculture, and Oregon Department of Fish and Wildlife. The strategy will become effective upon adoption by the Water Resources Commission.

What Is a Statewide Integrated Water Resources Strategy?

The strategy, when finished, will be a roadmap for the state to follow as it prepares to meet Oregon's water needs now and in the future for both instream and out-of-stream uses from surface water and groundwater. The approach will be *integrated*, taking into consideration water quantity, water quality, and ecological needs. The intent is to develop a framework, consisting of a set of tools, data, and resources with *statewide* relevance that communities can use to develop their water resource needs. The intention is not to overhaul Oregon water law as it relates to quantity and quality. Nor is the intention to lay out a plan that re-allocates water. If, during the process, statutory modifications are needed to achieve the objectives of the strategy, the Department will forward recommendations to the Legislature as part of its 2012 report.

Why Do We Need an Integrated Water Resources Strategy?

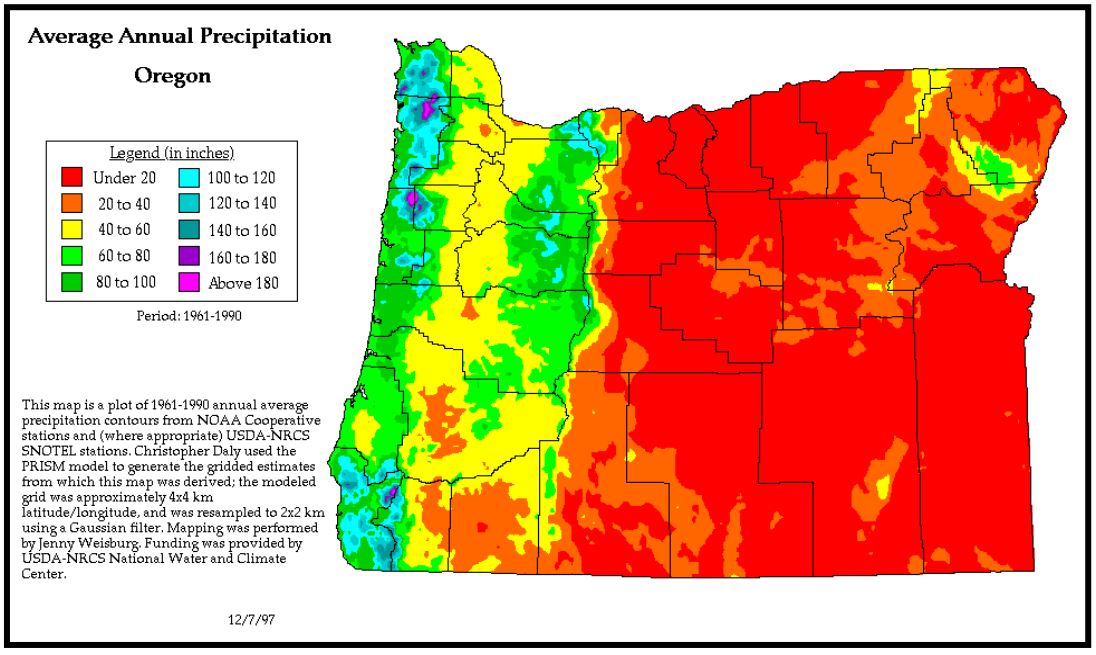
Surface water is nearly fully allocated during the summer months and groundwater is declining in many areas. More than 1,861 water bodies are impaired and not meeting water quality standards. There are also 24 fish species that have been identified as Threatened or Endangered under the Federal Endangered Species Act, while another 31 are listed as state sensitive species. These pressures, along with the potential challenges presented by climate change, population growth, and changes to land use, highlight the urgency for an integrated strategy that meets Oregon's water needs.

Vision Statement

A statewide integrated water resources strategy will bring various sectors and interests together to work toward the common purpose of maintaining healthy water resources to meet the needs of Oregonians and Oregon's environment for generations to come.

Strategy-development Schedule

Phase I: Setting the Stage (Fall 2009)	Phase II: Identifying Water Resource Needs (Spring 2010)	Phase III: Developing a Toolbox (2010-2011)	Phase IV: Producing the 1st Strategy (2012)	Phase V: Project Review (2012).



With western areas receiving over 100 inches of rain annually, and eastern regions receiving less than 20 inches per year, Oregon experiences one of the widest ranges of precipitation of any state in the country. Map accessed at the "Historical Climate Information" page of the National Oceanic and Atmospheric Administration's Western Regional Climate Center, at www.wrcc.dri.edu, 11/30/09.

Feature 3

The Federal Government Takes Another Step into the Chesapeake Bay

On November 9, the Chesapeake Bay Federal Leadership Committee, established by President Obama's May 2009 Executive Order 202, released a draft strategy of federal initiatives on Bay restoration. Federal agencies involved with Bay restoration had submitted reports to the Leadership Committee in September; the November draft strategy built upon those reports. Public comment on the draft strategy is being accepted until January 8, 2010. A final version of the strategy is to be published in May 2010. Following is an excerpt from the Executive Summary of the draft strategy, describing the proposed federal initiatives. The full Executive Summary (14 pages) and the entire draft strategy report (99 pages) are available online at the Chesapeake Bay Executive Order Web site, http://executiveorder.chesapeakebay.net/default.aspx (click on "Reports and Documents").

Water Central has added a set of Chesapeake Bay-related photos on page 20.

The draft strategy contains a comprehensive suite of federal initiatives to address the challenges facing the Chesapeake Bay and its watershed. Collectively, the initiatives support three actions:

- **restore clean water;**
- **conserve treasured places and restore habitats, fish, and wildlife;**
- **adapt to the impacts of climate change.**

These actions are to be achieved through three primary means:

- **empower local efforts;**
- **decision-making through science;**
- **new era of federal leadership.**

Restore Clean Water

Why?

Clean water is a precious resource to communities and people throughout the region and is essential for healthy habitats, wildlife and fish. The health of all water bodies in the watershed, from the most remote streams to the largest rivers, has an impact on the quality of the water in the Chesapeake Bay itself.

How?

Regulatory authority will be expanded to increase accountability for pollution and strengthen permits for animal agriculture, urban/suburban stormwater and new sources. The Environmental Protection Agency (EPA) is setting pollutant limits for nitrogen, phosphorus and sediment through the Chesapeake Bay Total Maximum Daily Load (TMDL). To meet these limits, states and the District of Columbia will develop detailed plans for reducing pollution and measuring progress every two years. EPA will impose consequences for missed targets. EPA will also initiate rulemaking to increase coverage and raise standards for Concentrated Animal Feeding Operations (CAFOs), municipal stormwater, and new dischargers of pollution. However, if the Chesapeake Bay states and D.C. strengthen their pollution control programs to achieve the reductions in nutrient and sediment pollution needed to meet Bay water quality standards, EPA does not expect that it would promulgate new Chesapeake Bay-specific regulations.

New regulations of air sources will substantially reduce air deposition of nitrogen to the Bay watershed. A Chesapeake Bay compliance and enforcement strategy will ensure that CAFOs, stormwater, wastewater facilities, and air pollution sources meet legal requirements. EPA will also take action to reduce discharge of nutrients from municipal and industrial wastewater treatment plants, develop and promote a model program for managing onsite disposal systems, and reduce discharges of toxics to the Bay and its watershed. In coordination with EPA and other federal and state partners, [the Interior Department] will lead studies on emerging contaminants in the Chesapeake Bay watershed and their possible impacts on priority fish and wildlife and their habitats.

Voluntary conservation incentives will be intensively targeted at high priority areas. The Department of Agriculture (USDA) will launch an aggressive, voluntary partnership effort to accelerate the

adoption of conservation practices on the region's farms and forests. This will involve focusing resources on watersheds in critical need of action, targeting financial incentives for putting practices in place, and better coordinating programs with federal, state and local partners, including the private sector. To emphasize accountability, USDA's approach will also include a system for tracking progress and using science to adapt as necessary.

EPA and USDA will partner on a "Healthy Waters, Thriving Agriculture" Initiative. Through this initiative, EPA and USDA will work together to align resources to accelerate the adoption of conservation practices in priority watersheds and develop the next generation of conservation planning tools.

Federal lands and facilities will lead by example by improving stormwater management. The federal government is one of the largest landowners in the Chesapeake Bay watershed, so there is a tremendous opportunity to establish a common federal approach to reduce polluted runoff from existing facilities, new construction, and roads. Federal agencies will continue to promote environmentally friendly site selection, planning, and design and expand the use of land conservation easements. As funding permits, agencies will look to install innovative retrofits to manage stormwater from urbanized areas and paved roads and explore methods to prevent erosion from unpaved roads. This effort will begin with projects in high-priority watersheds for protection of high-quality streams and restoration of degraded waterways.

Roads will be planned and designed to reduce polluted runoff and opportunities will be sought to retrofit existing transportation facilities. The Department of Transportation (DOT) will lead an effort to develop and promote methods and opportunities for controlling polluted runoff from transportation facilities that have impacts on the watershed. Federally assisted roads will continue to be planned and designed to mitigate the impacts of stormwater runoff. DOT will identify opportunities for retrofits to existing transportation facilities to reduce polluted runoff. DOT and EPA will work with cities and states to strengthen the opportunities and methods available for projects to mitigate and/or retrofit for stormwater impacts from existing infrastructure and explore innovative methods, processes, and technologies to further this effort.

What's Different?

These efforts include a focus on expanded regulation of pollution sources, as well as an emphasis on ensuring that current regulations are met. The strategy also focuses voluntary conservation efforts at those areas where they can have the most environmental impact. New emphasis is placed on improving practices on federal land and reducing polluted runoff from transportation infrastructure. These efforts, in combination with those of state and local governments and citizens, are expected to result in implementation by 2025 of the pollution-control measures needed to restore water quality in the Bay.

Conserve Treasured Places and Restore Habitats, Fish, and Wildlife

Why?

The special natural landscapes and waterways of the region are irreplaceable. Not only are they vital to environmental health, but people treasure these places for recreation and for their crucial links to history and culture. The wildlife and fish of the region are an inherent part of the Chesapeake's identity and ecosystem. There is no more cost-effective strategy for retaining environmental and economic health and cultural heritage than conserving existing farms, forests, natural areas, habitat, and other vital resources.

How?

The Chesapeake Treasured Landscapes Initiative is needed to leverage federal programs, assistance, and resources to conserve valuable landscapes and increase public access. The Department of the Interior (DOI), in collaboration with other agencies, will pursue development of a Chesapeake Treasured Landscapes Initiative to protect the environmental, historic, cultural, and recreational value of the region's forests, wetlands, river corridors, and open spaces. The federal government will focus funding to support state and local efforts to conserve landscapes and provide public access through purchases of land and conservation easements. To conserve landscapes, DOI may use, expand, or explore creation of new units of the National Park System, National Wildlife Refuges**,** and National Historic Trails. National Trails and the Chesapeake Bay Gateways and Watertrails Network will seek to improve public access in concert with state and local governments and non-governmental partners, if appropriate. The National Oceanic and Atmospheric Administration (NOAA) will explore the viability of establishing marine protected areas within the Chesapeake Bay, while DOI may explore options for designating a river as part of the National Wild and Scenic Rivers system. To maximize private stewardship and conservation actions by all levels of government, key federal incentives and assistance will be targeted.

Restoration and protection efforts will be initiated on a watershed basis. The Fish and Wildlife Service (USFWS) and NOAA will initiate a comprehensive campaign to restore aquatic and upland habitats and manage fish and wildlife. For habitat, this will involve protection of high-value wetlands and stream systems,

prioritizing and targeting resources to pursue restoration projects on a larger scale in selected tributaries, and providing technical assistance and funding for states to address critical waterways. As part of this effort, the U.S. Army Corps of Engineers (USACE) is prepared to use its extensive ecosystem-restoration experience in the Bay to help implement large-scale restoration. As part of a shift to ecosystem-based management, NOAA will also coordinate an inter-jurisdictional, Bay-wide effort to ensure sustainable fisheries in the Chesapeake Bay. USFWS and NOAA, in coordination with other agencies, will also examine mechanisms to strengthen permit reviews and consultation authorities under existing mechanisms such as the Clean Water Act, Fish and Wildlife Coordination Act, Coastal Zone Management Act, Atlantic Coastal Fisheries Cooperative Management Act, Endangered Species Act, and Magnuson Stevens Fishery Conservation and Management Act.

Oyster restoration and Blue Crab management will be bolstered by a multi-jurisdictional effort. NOAA, USACE, and other federal agencies will coordinate with Maryland, Virginia, and the Potomac River Fisheries Commission with a goal to recover oyster reefs and establish self-sustaining oyster reef sanctuaries in key tributaries by 2020. The federal government must capitalize on the recent, multi-agency decision to restore native oysters to the Bay in the Chesapeake Bay Oyster Restoration Programmatic Environmental Impact Statement. Focused efforts in specific areas are resulting in marked increases in oyster abundance. Greater federal and state commitments to support oyster sanctuaries could further accelerate these efforts. NOAA will help facilitate inter-jurisdictional Baywide strategies to ensure sustainable crab populations and harvest management aimed at achieving a sustainable population of 200 million adult Blue Crabs. Through continued cooperation with Virginia and Maryland, NOAA will present the best available science and provide the jurisdictions with advice necessary to ensure a sustainable annual harvest and informed management decisions.

What's Different?

These recommendations represent a significant effort to focus federal resources on conserving valuable Chesapeake landscapes and waterways, increasing public access, and restoring areas that have been degraded. Community involvement will be a key component of this effort. These actions also include a new commitment to expand oyster sanctuaries and continue to ensure sustainable management of the Blue Crab population. These actions are a tangible example of a shift to ecosystem-based management that is important to the restoration of the Chesapeake Bay.

Adapt to the Impacts of Climate Change

Why?

One of the most significant challenges to successful restoration and protection of the Chesapeake Bay is climate change. Scientists project that climate change will have a variety of impacts on the Chesapeake Bay and its watershed in the decades ahead, including rising sea levels, warmer water and air temperatures, and stronger storms. Because much of the region's infrastructure is tightly interwoven, regional climate-adaptation planning to protect, upgrade, and adapt the region's infrastructure is essential. Ultimately, climate-change considerations must be incorporated into each of the initiatives described in this strategy.

How?

Undertake a concerted effort to coordinate climate-change science and adaptation throughout the watershed. NOAA and the U.S. Geological Survey (USGS) will work closely with federal and state partners to coordinate existing state programs and regional climate programs to provide the science and assistance to adapt to potential impacts of climate change on the Bay and its watershed. The coordinated effort will allow for collaboration among all levels of government, universities, and nonprofit and private organizations, and would be undertaken with consideration of an emerging national network of regional climate services.

Each federal agency with restoration and protection responsibilities in the Bay region will consider climate changes as they implement responsibilities, including programs, funding, and land-management activities. Federal programs will focus on protecting communities and critical habitats and species from the impacts of climate change by targeting resources, launching pilot projects for adaptation, and developing incentives for conservation of priority areas.

What's Different?

Bringing federal and state efforts together is important for developing and communicating information vital to address the impacts of climate on water quality and increase resiliency of communities and valuable habitats to the impacts of a changing climate. These efforts will result in the development of the predictive tools for addressing adaptation action in the near-term and provide projections needed for planning management for the long-term.

Empower Local Efforts

Why?

The condition of the environment has a critical impact on neighborhoods and communities, from cities to suburbs to rural areas. Local governments, watershed organizations, and residents have a great interest and ability to make a difference in the environment. Providing assistance and resources can empower these groups to implement needed changes. Awareness of opportunities and education can motivate the type of widespread behavioral change that is needed to improve the state of the Chesapeake Bay watershed.

How?

Technical assistance and resources to landowners, local governments, and watershed organizations will be expanded to help restore streams, creeks, and rivers in communities. EPA, USDA, and DOI, in collaboration with state and local partners, will provide more technical assistance and resources, as well as set restoration goals, on a more local watershed and community-based level. EPA will launch a new grant program for stream restoration in targeted areas and help guide the efforts of local governments to reduce water pollution. USDA will encourage the adoption of conservation practices on farms and forests through incentives and technical assistance, simplifying participation in programs, and strengthening partnerships with local governments, watershed groups, and communities. USDA will also expand support to local governments and watershed organizations across the watershed to enhance their tree cover in order to meet increasing demands for buffering temperature extremes and flooding. DOI will expand citizen stewardship efforts by engaging local community, tribal, and other organizations to improve local land and water resources through technical assistance and public education.

Federal agencies will support the development of innovative technologies and economic markets for ecosystem services. Innovative technologies hold much promise for reducing water pollution, improving conservation practices and increasing revenue for working lands. EPA, USDA, and DOT will expand public-private research partnerships and focus federal funding on this aim. Additionally, economic markets for ecosystem services are emerging as an innovative way to provide landowners with an incentive to practice sustainable agriculture and forestry. Essentially, entities such as urban water utilities, industrial polluters, and land developers who must mitigate negative impacts to the watershed will pay for the implementation of conservation practices that offset those impacts. USDA will lead a collaborative federal effort to develop ecosystem markets in the Chesapeake Bay watershed.

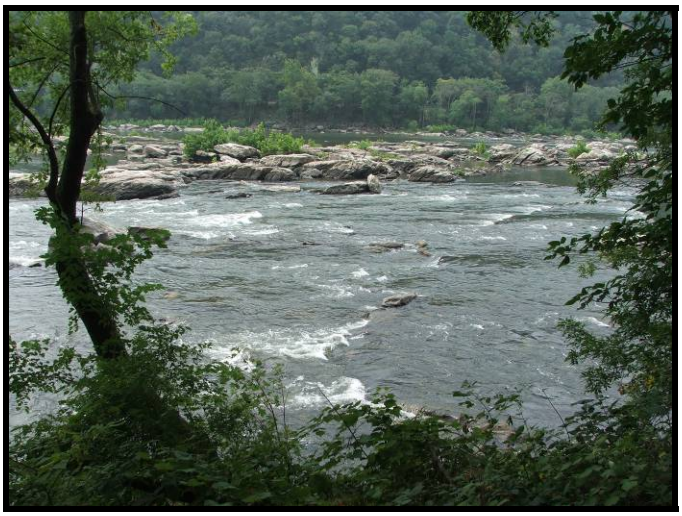
Federal agencies will increase citizen stewardship, with an emphasis on engaging young people. The restoration effort can be invigorated by the actions of the watershed's 17 million residents. To create opportunities for citizens to become directly engaged in on-the-ground and in-the-water restoration activities, DOI and other federal agencies will explore development of a Chesapeake Conservation Corps (CCC). This new CCC would be developed in collaboration with non-governmental partners such as the Student Conservation Association and AmeriCorps to support putting young people to work on projects and equipping them with green job skills for the future.

Public education will be emphasized and an ongoing social marketing campaign will encourage residents to change habits to improve the health of the environment. Public education through place-based interpretation, recreational experiences, and curriculum-based education will be supported through National Park Service (NPS), USFWS, and NOAA programs. NPS will increase the Chesapeake Bay Gateways and Watertrails Network and National Trails programs that provide visitors and residents opportunities to experience the natural and cultural heritage of the Bay region. USFWS will continue to offer public access and interpretation to visitors of the National Wildlife Refuges around the watershed. NOAA's long-standing role as a supporter of environmental education will continue. Federal agencies will also partner with nongovernmental organizations to launch an ongoing, watershed-wide social marketing campaign to educate residents about the impact of their actions on streams, creeks, rivers, and the Chesapeake Bay.

Livable, sustainable communities will be supported through the promotion of smart growth planning and alternative transportation options. Because land use has a direct impact on the environment, federal agencies will promote sustainable development and smart growth through assistance and tools to local governments. DOT, EPA, and the Department of Housing and Urban Development (HUD) will convene a series of forums and partner with local governments to conduct integrated transportation, land use, housing, and water infrastructure planning in a sustainable and environmentally sensitive manner. DOT will promote use of public transportation, bicycling, and walking, and partner with the Department of Energy (DOE) on a pilot project to support increased use of electric cars.

Text continues on page 22

Views from the Chesapeake Bay Watershed



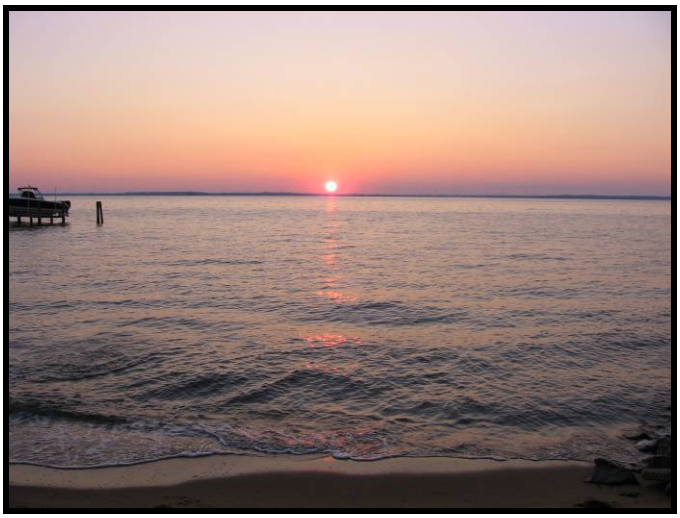
Shenandoah River at Harper's Ferry, W. Va., Aug. 2008.

Anglers on the Bay Bridge-Tunnel pier, Oct. 2007.

James River between Scottsville and Bremo Bluff, Va., July 2009.

Immature Yellow-crowned Night-Heron on rip-rap at Virginia's Kiptopeke State Park, Oct. 2007.

Potomac River at Fairview Beach, Va., June 2009.



Chesapeake Bay at Kent Island, Md., Sept. 2005.

Continued from page 20

What's Different?

Historically, the Chesapeake Bay restoration effort has used a top-down approach. Empowering local communities will give greater momentum to the grassroots and build healthier, sustainable communities. Promoting innovation in technology, techniques and the marketplace is a new area of emphasis and will not only support restoration, but also bolster local economies.

Decision-Making Through Science

Why?

Science underpins the Chesapeake Bay restoration effort. Government must also be accountable for its restoration responsibilities and commitments, and scientific measures can be an accurate barometer of progress and drive action at all levels. While there are significant and robust information and data systems already in place, some gaps remain. Ensuring the Chesapeake Bay watershed population is informed of the scientific basis and results of actions is an important element in encouraging broad participation in restoring the Bay.

How?

ChesapeakeStat will serve as a comprehensive accountability tool for all restoration activities, including projects, funding, and progress, and be publicly accessible. The Chesapeake Bay Program (CBP) will launch ChesapeakeStat, an accountability and decision-making tool modeled after the State of Maryland's BayStat program. ChesapeakeStat will be a Web-based system that provides information about partner restoration activities, funding levels, and progress toward goals. The Web site will also link to tools that use scientific information to drive decision-making on targeting of water quality actions on agricultural and urban lands; conserving lands with important ecological, economic and cultural value; identifying coastal areas vulnerable to sea-level rise and storm surge; and improving land-use planning.

Establish an Interagency Decision-Support Hub to strategically target and assess effectiveness of restoration and conservation practices. USGS and NOAA will work with federal partners to integrate decision-support tools and supporting information. This will improve targeting of actions to restore water quality, preparing spatial plans to target habitats, and conserving important areas in the Bay and its watershed. Specifically, the Chesapeake Online Adaptive Support Toolkit (COAST) will have applications to improve targeting and assessment of water quality and habitat management practices and provide access to other tools such as NOAA's Chesapeake Bay Program Digital Coast and DOT's Eco-Logical. The Hub will utilize decision-support specialists to translate science outcomes into management implications and interact with partners to improve decision-making to achieve environmental goals.

A Chesapeake Monitoring and Observing System will use partnerships to improve the monitoring of environmental conditions beyond water quality and into the watershed. Because monitoring provides essential information on the health of the environment and effectiveness of restoration activities, monitoring needs to be expanded from a focus on water quality to include more information on fish and wildlife, habitats, land use, climate change, socioeconomic factors, and management actions. Monitoring information from the streams, creeks, and rivers throughout the watershed is also needed. USGS and NOAA will lead efforts for a Chesapeake Monitoring and Observing System by coordinating with national monitoring networks and forming new alliances with federal and state programs and local watershed groups to address gaps in current monitoring.

What's Different?

ChesapeakeStat will be the first one-stop tool to improve accountability for all partners in the restoration effort. The Decision-Support Hub will integrate federal tools and activities for more efficient and strategic decision making. Science will be used to focus more precisely on the local level and adapt restoration efforts based on results.

A New Era of Federal Leadership

Why?

Though partners have achieved measurable reductions in pollution and implemented a variety of restoration measures during the past 25 years, the Chesapeake Bay and many tributaries remain degraded. In his Executive Order, President Obama directed the federal government to take a stronger leadership role and to lead by example. The federal agencies are uniquely positioned in terms of authority and expertise to usher in a new era of restoration. The initiatives in the strategy are consistent with federal policy, including Executive Order 13514 on Federal Leadership in Environmental, Energy and Economic Performance; the Obama Administration's climate change policies; and the findings of the Interagency Ocean Policy Task Force.

How?

The federal government will lead a collaborative process with the watershed states and the District of Columbia to create a comprehensive, coordinated strategy for the Chesapeake Bay and watershed. Protecting and restoring the Chesapeake Bay and its watershed, with the wide spectrum of serious environmental challenges throughout the region, will require an unprecedented effort. To be successful, the federal government, the six watershed states, the District of Columbia, and the Chesapeake Bay Commission (CBC) must commit to historic levels of coordination and to fully integrating activities and programs. The Executive Order directs the federal government to lead the collaborative process.

Developing and using a coordinated strategy is a multi-step process that includes extensive collaboration to shape the strategy, selecting environmental goals, reporting progress, and adapting restoration actions as appropriate. The Federal Leadership Committee for the Chesapeake Bay is evaluating the most effective and efficient processes for collaborating with states in developing and implementing a new strategy. The CBP partnership is under consideration as the forum for collaboration because it already has the core design and mechanisms necessary to integrate and coordinate federal and state activities. Senior officials and restoration experts from all levels of government regularly participate in various CBP committees, including the Chesapeake Executive Council (CEC), which includes key federal agency heads, state governors and the mayor of the District of Columbia. The FLC can work closely with the CEC to embark on a new era of coordination and commitment.

Federal agencies will establish two-year milestones for implementing protection and restoration measures related to all aspects of watershed health and set programmatic goals to have practices in place no later than 2025. The six states in the watershed and the District of Columbia have committed to meeting goals—called milestones—every two years for implementing measures to improve water quality. By meeting these milestones, all practices needed for restored water quality will be in place no later than 2025. The federal agencies will join the states in this commitment to establishing two-year milestones for measures that restore water quality, habitats, wildlife, and fish and shellfish, and conserve land and improve science. The federal two-year milestones will be established in May 2011, and necessary measures will be planned for implementation no later than 2025. Federal efforts will also be designed to directly support the states and District of Columbia in meeting their milestones.

As part of the development and implementation of a coordinated federal-state strategy, an interagency process, including states, will be established to develop clear environmental goals for restoring the Bay, including program performance indicators, target dates, and interim milestones. These will be released for public review and comment in early 2010 to inform the final strategy.

Transparency of the restoration effort will be increased through several public reporting tools and an independent evaluation that will analyze the water quality program. ChesapeakeStat will provide a **public, ongoing system for tracking** restoration activities, spending, and progress. The Executive Order also requires the publication of an annual Action Plan that describes how federal funding will be used during each fiscal year. To the extent possible, the Action Plan will incorporate the spending of Bay watershed states to provide a comprehensive accounting of the resources dedicated to restoration. Additionally, the Executive Order requires an annual Progress Report reviewing environmental conditions in the Chesapeake Bay and watershed, assessing implementation of the Action Plan during the preceding fiscal year and recommending steps to improve these efforts. This reporting may be included in an enhanced version of Chesapeake Bay Program's annual health and restoration report, the *Bay Barometer*, beginning in 2011.

The National Academies of Science (NAS) is currently being utilized to provide a **fully independent review** of the Chesapeake Bay Program's water-quality activities to improve strategic and specific efforts. Federal agencies will build on the lessons from the NAS study to establish an ongoing independent evaluation process that covers all aspects of the Executive Order directives.

Under the new strategy, federal agencies and state partners will increase the practice of adaptive **management**. Managers will use extensive feedback from monitoring and tracking tools to understand the effectiveness of restoration activities, identify ways to adapt the efforts, and put the new approaches into practice.

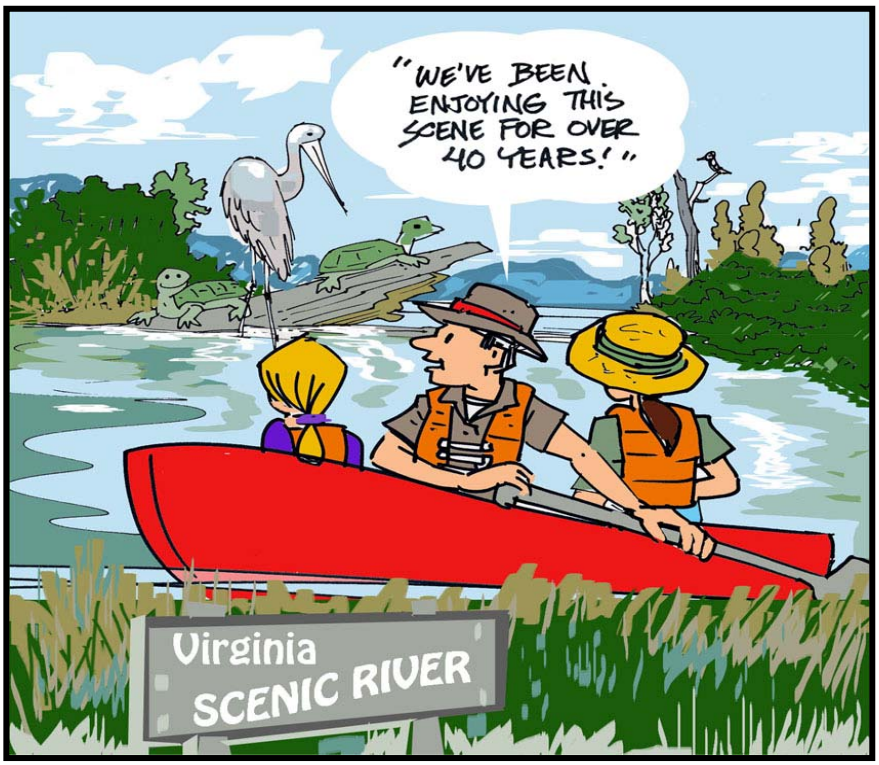
What's Different?

Despite federal and state cooperation in the past, the effort to protect and restore the Chesapeake Bay and its watershed lacked a truly unified strategy. Previous goals for restoration were set a decade or more in the future. Short-term milestones will accelerate progress, increase accountability, and allow for adaptive management to ensure government is moving toward meeting goals for the Bay and watershed.

Feature 4

Virginia's Scenic Rivers Program Celebrates its 40th Anniversary

(The text for this article was adapted from material provided by the Virginia Department of Conservation's Virginia Scenic Rivers Program, at www.dcr.virginia.gov/recreational_planning/srmain.shtml.)



In 2010, the Virginia Scenic Rivers Program will celebrate its 40th anniversary. Administered by the Virginia Department of Conservation and Recreation (DCR), the Scenic Rivers Program honors the state's highest-quality natural waterways, ones where few signs of development—bridges, power lines, roads, buildings, parks, dams, etc.—are visible along the waterway's main course. The 1970 Virginia Scenic Rivers Act (in the *Virginia Code* at Sec. 10.1-400 et seq.) authorizes the program. According to a 2003 amendment to that Act, designation as a Scenic River requires that a river or river segment possess "superior natural and scenic beauty, fish and wildlife, and historic, recreational, geologic, cultural, and other assets."

Inclusion in the Scenic Rivers Program encourages protection and preservation of the river. It does not, however, give the state control over land-use decisions or give public access to private lands. Designation *does* require General Assembly approval for any new dams that would impede flow on a Scenic River segment.

As of June 2009, 24 waterway segments-covering 519 miles-had received Scenic River designation in Virginia; nine segments are in the mountain region, 10 in the Piedmont, and five in the Coastal Plain (please see the list on the second page following). How does such a designation occur? Three main levels of approval are involved.

First, each locality adjacent to a proposed river or river segment must agree to submit a request for a field study of the proposal. Second, paddlers conduct the field study of the proposed segment to record details about 13 categories of evaluation criteria: streambed and stream flow modifications; human development of the visual corridor; historic features; landscape; quality of the fishery; rare, threatened, or endangered species; water quality; parallel roads; crossings; special features affecting aesthetics; recreational access; and land conservation. The field-study details are added to previously collected information to determine if the river qualifies for designation. Finally, if the field study shows that the river or river segment qualifies, it takes local legislators to propose a designation bill to the Virginia General Assembly, passage in the Assembly, and the governor's signature to add the river to the program.

"This program would never exist without community involvement and government support at all levels within the state," said Lynn Crump, manager of the Scenic River Program. "But mostly, it's amazing to see all of the communities around the river come together to honor their beautiful natural features."

The program has an associated governor-appointed board to enhance and promote the program. The Virginia Scenic River Board makes recommendations on the stewardship of scenic rivers and advice on the addition of river segments. In addition, individual Scenic Rivers have local advisory committees.

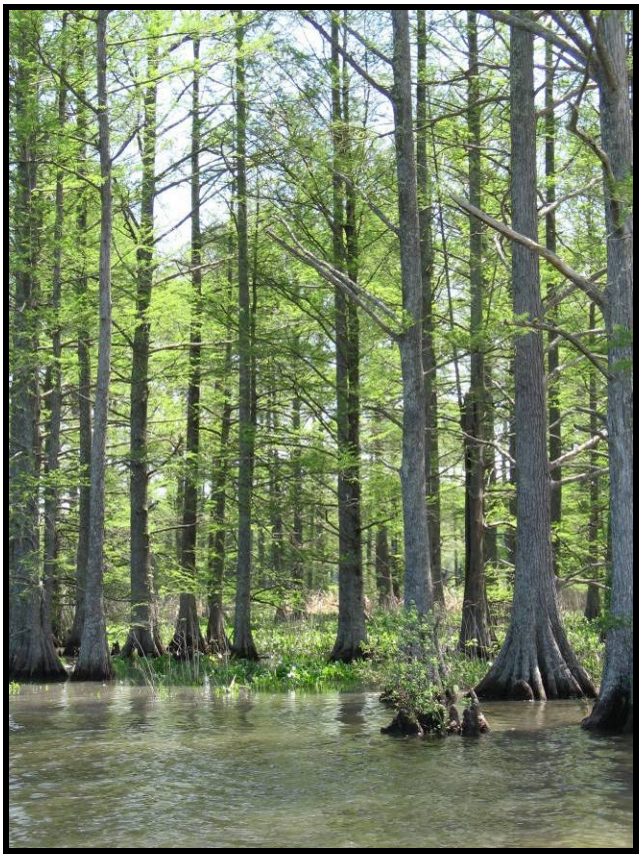
For more information about the Virginia Scenic Rivers Program, including a list of designated rivers, visit the Scenic Rivers Web site at www.dcr.virginia.gov/recreational_planning/srmain.shtml, or contact Lynn M. Crump, Environmental Programs Planner, Virginia Department of Conservation and Recreation (DCR), phone (804) 786-5054, e-mail: lynn.crump@dcr.virginia.gov. For information on the 40th Anniversary celebration, contact Kimberly Hodge, Public Relations Specialist, Virginia DCR, phone (804) 786-7961, e-mail: kim.hodge@dcr.virginia.gov. The mailing address for both contact people is 203 Governor Street, Suite 326, Richmond, VA 23219.

A Sample of Virginia Scenic Rivers

Clinch River, May 2005. Photo by Irvine Wilson, courtesy of Virginia Dept. Conservation and Recreation.

Rockfish River, July 2009, looking toward the confluence with the James River at the Nelson/Albemarle county line.

Shenandoah River, June 2006, at U.S. Route 7 in Clarke County



Chickahominy River, May 2006. Photo by Jennifer Wampler, courtesy of Virginia Dept. Conservation and Recreation.

Goose Creek, May 2008, during high water at U.S. Route 15 in Loudoun County.

Virginia's Designated Scenic River Segments, as of 6/3/09

Waterway	Upstream Boundary	Downstream Boundary	Segment Miles	Original Designation Year
Appomattox River	100 feet from Lake Chesdin Dam	Route 36 (Petersburg)	6.2	1977
Big Cedar Creek	Near Lebanon, 5.8 miles from confluence	Confluence with the Clinch River	5.8	1992
Catoctin Creek	Town of Waterford	Confluence with Potomac River	16	1977
Chickahominy River	Route 360	Hanover/Henrico/ New Kent county line	10.2	1990
Clinch River	Confluence with Little River	Rt. 645 (Nash Ford Bridge)	20	1992
Clinch River	Route 58 in Saint Paul	Confluence with the Guest River	9.2	2002
Goose Creek	Confluence of N. and S. Prongs of Goose Creek	Confluence with the Potomac River	48	1976
Guest River	100 feet downstream of Route 72	Confluence with the Clinch River	6.5	1990
Historic Falls of the James	West Richmond 1970 City Limits	Orleans Street (extended)	8.6	1972
Upper James River	0.2 miles SE of Route 43 at Eagle Rock	Route 630 Bridge at Springwood	14	1985
Lower James Historic River	1.2 miles east of Trees Point	Lawnes Creek	25	1988
North Mayo River	Route 695	North Carolina line	7.1	2008
South Mayo River	Patrick County line	North Carolina line	6.9	2008
Meherrin River	Brunswick/Lunenburg/ Mecklenburg county line	Brunswick/Greensville county line	37	2006
North Meherrin River	Route 712 Bridge	Confluence with South Meherrin River	7.5	1997
Moormans River	Charlottesville Reservoir	Confluence with Mechums River	14	1988
North Landing River	North Carolina line	North Landing Road (Rt. 165)	26.7	1988
Nottoway River	Route 40 Bridge at Stony Creek	Route 653 (Carey's bridge)	39.5	1979
Rappahannock River	Headwaters near Chester Gap	Ferry Farm/ Maysfield Bridge (Route 3 Bypass)	86	1985
Rivanna River	South Fork Rivanna River reservoir	Confluence with the James River	46	1975
Rockfish River	Route 693, Schuyler	Confluence with the James River	9.75	1990
Shenandoah River	Warren/Clarke county line	West Virginia line	21.6	1979
St. Mary's River	Headwaters in Augusta County	Washington-Jefferson National Forest boundary	6	1979
Staunton River	Route 761 (Long Island)	Route 360	51.3	1975

Source: Va. Dept. of Conservation and Recreation, www.dcr.virginia.gov/recreational_planning/srmain.shtml, accessed 12/3/09.

VIRGINIA WATER STATUS REPORT

This section of *Water Central* presents recent and historical data on Virginia's precipitation, groundwater levels, stream flow, and occurrence of drought conditions. All Web sites mentioned were functional on 12/1/09.

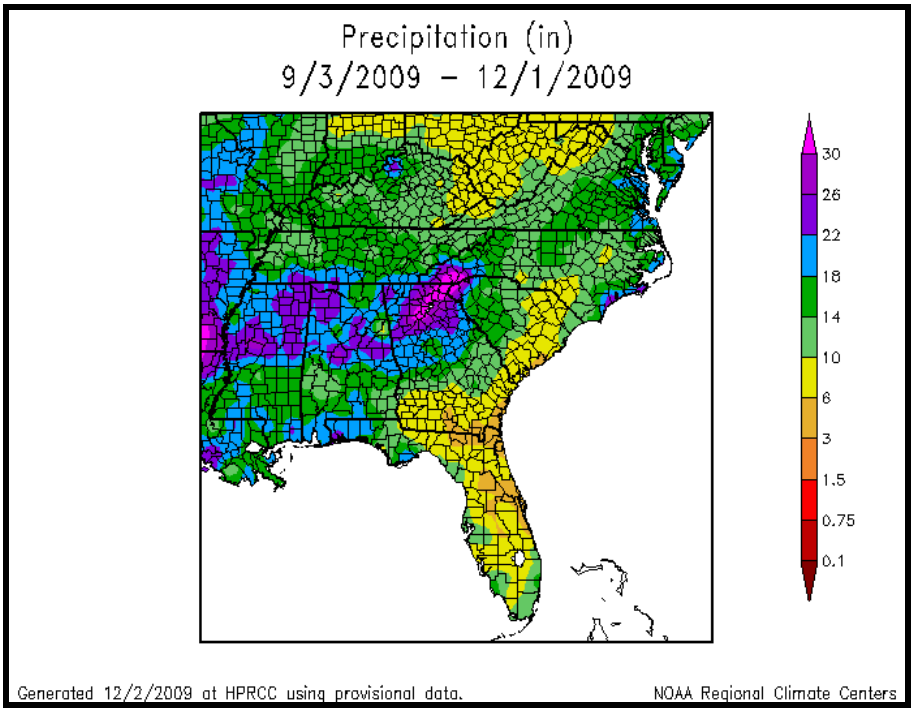
Precipitation in Virginia, December 2008-November 2009

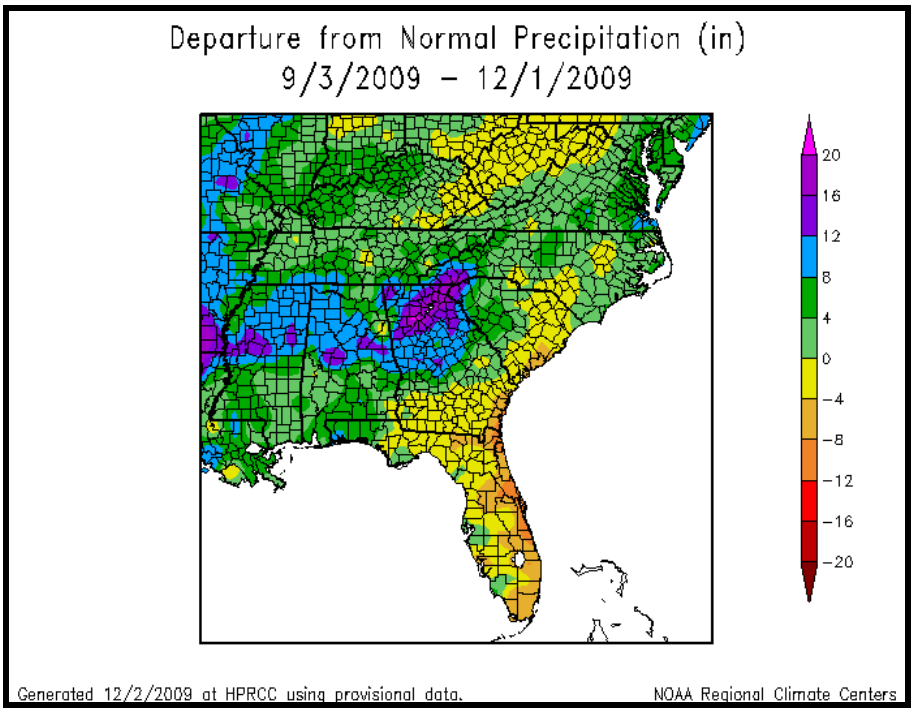
The chart below shows precipitation (in inches) over the last 12 months at nine National Weather Service (NWS) observation sites in or near Virginia. The upper number for each entry is the **total precipitation** for the respective site and month (with yearly total at the bottom of the chart), including the equivalent amount of water contained in any snowfall or other frozen precipitation. These values were found 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 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 locality and 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 http://cdo.ncdc.noaa.gov/climatenormals/clim81/VAnorm.pdf). RL and RH mean record low or high, respectively, for that month. The amounts listed here 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 (Va. Tech Airport)	Danville (Airport)	Lynchburg (Regional Airport)	Norfolk (Internat. Airport)	Richmond (Byrd Intern. Airport)	Roanoke (Woodrum Airport)	Wash.-Dulles Airport
Dec. 2008	4.41 (3.39)	3.43 (2.87)	3.81 (3.16)	3.48 (3.23)	3.83 (3.03)	4.07 (3.12)	2.25 (2.86)	2.63 (3.07)
Jan. 2009	5.67 (3.52)	3.60 (3.37)	3.01 (4.03)	3.13 (3.54)	1.82 (3.93)	1.49 (3.55)	2.72 (3.23)	2.64 (3.05)
Feb. 2009	2.24 (3.40)	1.96 (3.02)	0.97 (3.41)	1.14 (3.10)	1.26 (3.34)	0.74 (2.98)	1.22 (3.08)	0.35 (2.77)
March 2009	2.21 (3.91)	4.58 (3.83)	4.37 (4.25)	3.23 (3.83)	5.28 (4.08)	4.26 (4.09)	3.47 (3.84)	2.41 (3.55)
April 2009	2.72 (3.23)	2.98 (3.83)	2.45 (3.83)	2.87 (3.46)	2.28 (3.38)	2.56 (3.18)	3.20 (3.61)	4.11 (3.22)
May 2009	4.58 (4.32)	9.54 (4.39)	6.56 (3.96)	7.04 (4.11)	4.77 (3.74)	3.71 (3.96)	6.87 (4.24)	**10.26 RH** (4.22)
June 2009	3.57 (3.89)	4.06 (3.93)	4.83 (3.50)	3.71 (3.79)	5.81 (3.77)	4.32 (3.54)	4.54 (3.68)	6.69 (4.07)
July 2009	8.51 (4.21)	6.44 (4.17)	3.57 (4.44)	3.09 (4.39)	2.47 (5.17)	3.99 (4.67)	5.84 (4.00)	2.18 (3.57)
Aug. 2009	1.52 (3.00)	3.25 (3.68)	3.35 (3.54)	2.37 (3.41)	13.22 (4.79)	4.04 (4.18)	4.43 (3.74)	2.75 (3.78)
Sep. 2009	4.98 (3.08)	2.33 (3.39)	2.38 (4.08)	2.17 (3.88)	7.77 (4.06)	2.46 (3.98)	3.14 (3.85)	1.83 (3.82)
Oct. 2009	4.02 (2.30)	3.02 (3.19)	3.23 (3.71)	3.17 (3.39)	3.21 (3.47)	3.59 (3.60)	2.69 (3.15)	5.70 (3.37)
Nov. 2009	3.00 (3.08)	5.12 (2.96)	8.33 (3.07)	8.19 (3.18)	**9.20 RH** (2.98)	**9.60 RH** (3.06)	7.44 (3.21)	3.71 (3.31)
Period Total	47.43 (41.33)	50.31 (42.63)	46.86 (44.98)	43.59 (43.31)	60.92 (45.74)	44.83 (43.91)	47.81 (42.49)	45.26 (41.80)

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 graph) over the past three months and the departure from normal (in inches above or below normal; bottom graph) over that period. Note that the values represented by a given color differ between the two graphs. *These data are provisional.* These graphs were taken from http://www.sercc.com/climateinfo/precip_maps on 12/2/09.





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, November 2009

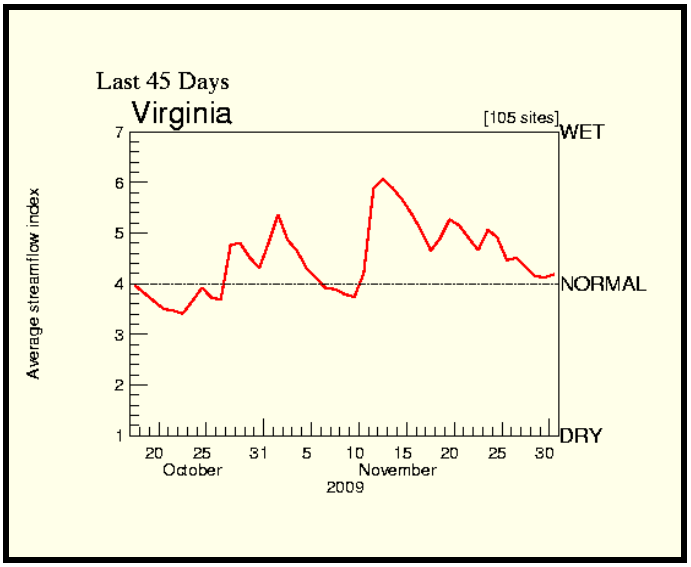
As of November 30, 2009, the Virginia Active Water Level Network—maintained by the U.S. Geological Survey (USGS) and available online at http://groundwaterwatch.usgs.gov/StateMaps/VA.html—provided access to groundwater levels at 505 wells in 65 Virginia counties and cities. At 103 of these observation wells in 37 localities, *real-time data* (updated every 5 to 60 minutes) were being recorded. The table below shows the November 29 daily average level from real-time wells in 19 localities (except where noted otherwise). These 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 November level, the deepest (driest) level, and the shallowest (wettest) level (all for each well's period of record). Historical information on groundwater is also available from the USGS' annual reports of groundwater; annual reports for Water Years (October through September) 2002 to 2008 are available at http://wdr.water.usgs.gov/; for previous years, check your local library.

Well (Local #)	11/29/09 Level	9/7/09 Level	7/5/09 Level	November Median	Record Deepest (Driest)	Record Shallowest (Wettest)	Period of Record
Accomack (66M 19 SOW 110S)	7.7	8.7	9.2	10.0	11.3 (Nov. 1981)	6.8 (Nov. 2009)	Since Sep. 1978
Buckingham (41H 3)	24.6	24.0	22.0	25.4	36.7 (Jan. 2002)	7.4 (Apr. 1973)	Since Mar. 1971
Clarke (46W 175)	41.6	38.2	35.8	38.9	45.7 (Sep. 2002)	23.5 (Sep. 2003)	Since Mar. 1987
Fairfax (52V 2D)	15.4	15.8	13.0 (7/4)	15.4	24.9 (Dec. 1998)	6.5 (Mar. 1984)	Since Oct. 1976
Frederick (46X 110)	42.3 (10/8)	40.8	37.4	40.5 (Oct. med.)	47.9 (Jun. 2006)	18.2 (Sep. 2004)	Since Nov. 2002
Hanover (53K 19 SOW 080)	16.5	20.7	19.3	20.1	22.9 (Aug. 1984)	5.1 (Aug. 2004)	Since Jan. 1978
Loudoun (49Y 1 SOW 022)	60.5 (11/19)	60.2	58.9	59.9	66.5 (Oct. 2008)	48.0 (June 1972)	Since Nov. 1963
Montgomery (27F 2 SOW 019)	2.5	4.4	2.3	5.3	7.3 (Dec. 1969)	< 0.0 (Mar. 1993)	Jul. 1953, then since Apr. 1969
Northampton (63H 6 SOW 103A)	6.2	8.1	7.5	7.5	10.0 (Oct. 2002)	0.8 (Aug. 2004)	Since Sep. 1977
Orange (45P 1 SOW 030)	25.8	27.7	21.9	28.5	39.0 (Aug. 2002)	11.8 (Apr. 1973)	Since Feb. 1965
Prince William (49V 1)	7.6	10.9	9.3	9.6	13.1 (Sep. 1991)	6.6 (May 2008)	Since Nov. 1968
Roanoke City (31G 1 SOW 008)	18.7	18.9	18.9	18.3	19.3 (Jun. 1987)	12.4 (Feb. 1986)	Since Aug. 1966
Rockbridge (35K 1 SOW 063)	23.0	26.4	23.5	25.5	30.4 (Sep. 2002)	14.3 (Apr. 1987)	Feb. 1964, then since Jun. 1972
Rockingham (41Q 1)	79.7	74.7	67.8	74.4	99.0 (Oct. 2002)	57.7 (Feb. 1998)	Since Aug. 1970
Suffolk (58B 13)	6.2	10.3	7.9	10.8	13.4 (Jan. 1981)	2.0 (Sep, 1999)	Since Mar. 1975
Surry (57E 13 SOW 094C)	6.7	9.6	8.0	9.8	11.2 (Dec. 1981)	3.9 (May 1980)	Since Jul. 1978
Virginia Beach (62B 1 SOW 098A)	2.0	4.7	4.2	4.8	12.0 (Sep. 1980)	0.9 (Nov. 2009)	Since Jun. 1979
Westmoreland (55P 9)	8.1	9.0	3.4	7.5	12.8 (Dec. 1988)	< 0.0 (May 2008)	Since Jul. 1977
York (59F 74 SOW 184C)	7.3	9.6	9.7	9.9	14.1 (Jan. 2002)	0.9 (Nov. 2006)	Since Jun. 1990

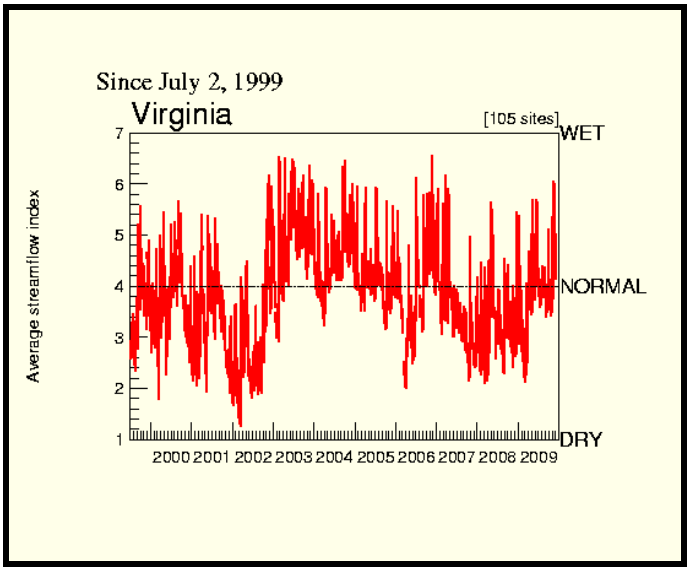
Stream Flow in Virginia, October-November 2009

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

For October 17—November 30, 2009



For July 1999—November 2009



The graphs above, from the U.S. Geological Survey's (USGS) "WaterWatch—Current Water Resources Conditions" Web site (http://water.usgs.gov/waterwatch/?m=real&r=va&w=real%2Cplot, 12/1/09), compare recent Virginia stream flow to historical records.

The data in the graphs come from 105 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.

Gaging station on the Roanoke River at Lafayette, Va. (Montgomery County), November 2009.

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** compared to historical flows is available online at http://water.usgs.gov/waterwatch/?m=real&r=va. This Web site also has maps that show average flows over the previous 7-, 14-, and 28-day periods.

Tropical Storm Review – 2009 Season

November 30 marked the last day of the Atlantic hurricane season (the season begins June 1). As reported in the August 2009 *Water Central*, prior to August no tropical storms had been observed in the North Atlantic, Caribbean Sea, or Gulf of Mexico during the 2009 tropical storm season, although one tropical depression had been observed in late May. In August, activity increased as Tropical Storm Ana, Hurricane Bill, Tropical Storm Claudette, and Tropical Storm Danny all reached or came near to either the Gulf Coast (Ana and Claudette) or the Atlantic Coast (Bill and Danny) between August 16 and 30. In early September, Tropical Storm Erika formed but had no significant impact on the Atlantic coastline. On September 7, Tropical Storm Fred formed and by September 8 had become the season's second hurricane, but it never approached the Atlantic coast or the Gulf. October brought two named storms—Tropical Storms Grace and Henri—but neither developed into a serious storm. In November, Tropical Storm (previously Hurricane) Ida arrived on the Gulf Coast and brought significant rain to Virginia (see page 3 of this newsletter).

The box below contains the National Hurricane Center's (NHC) summary of the 2009 Atlantic hurricane season, with a list of the season's storms and their maximum wind speeds. This information is from the NHC's main Web page at www.nhc.noaa.gov/index.shtml, where you can find information on each storm during the season (including map archives) and reports for each month of the season.

TROPICAL WEATHER SUMMARY – November 2009

National Weather Service/Tropical Prediction Center/National Hurricane Center – Miami, Florida
800a.m., EST - December 1, 2009

For the North Atlantic, Caribbean Sea, and Gulf of Mexico

Tropical cyclone activity during the 2009 Atlantic hurricane season was below normal. A total of nine named storms formed, of which three became hurricanes and two became major hurricanes. The long-term averages are 11 named storms, six hurricanes, and two major hurricanes. There were also two tropical depressions that did not reach tropical storm strength.

In terms of **accumulated cyclone energy** (ACE), which measures the combined strength and duration of tropical storms and hurricanes, 2009 was below normal, at about 60 percent of the long-term median value. The number of tropical storms and the ACE value for 2009 are the lowest for the Atlantic basin since 1997 and are likely related to the moderate El Nino event in the tropical Pacific Ocean this year.

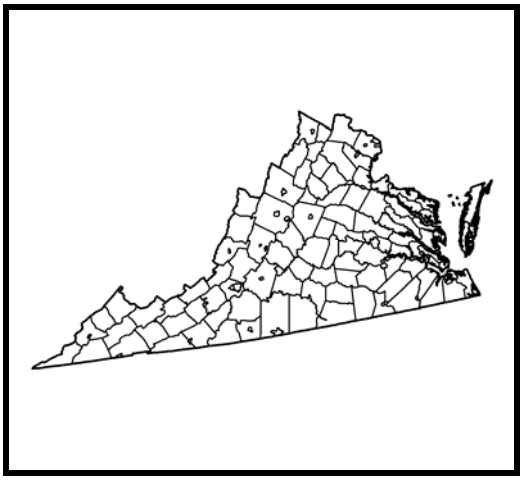
NAME	DATES	MAX WIND (MPH)
Tropical Depression ONE	28-29 MAY	35
Tropical Storm ANA	11-16 AUG	40
Hurricane BILL	15-24 AUG	135
Tropical Storm CLAUDETTE	16-17 AUG	50
Tropical Storm DANNY	26-29 AUG	60
Tropical Storm ERIKA	1- 3 SEP	50
Hurricane FRED	7-12 SEP	120
Tropical Depression EIGHT	25-26 SEP	35
Tropical Storm GRACE	4- 6 OCT	65
Tropical Storm HENRI	6- 8 OCT	50
Hurricane IDA	4-10 NOV	105

NHC information on the Eastern Pacific Ocean 2009 hurricane season (May 15-November 30) is available online at www.nhc.noaa.gov/2009epac.shtml. In that basin in 2009, there were seven hurricanes, 11 tropical storms, and two tropical depressions. According to the NHC, the long-term average for Eastern Pacific tropical storm seasons is 15 to 16 named storms, with nine becoming hurricanes and four-to-five major hurricanes.

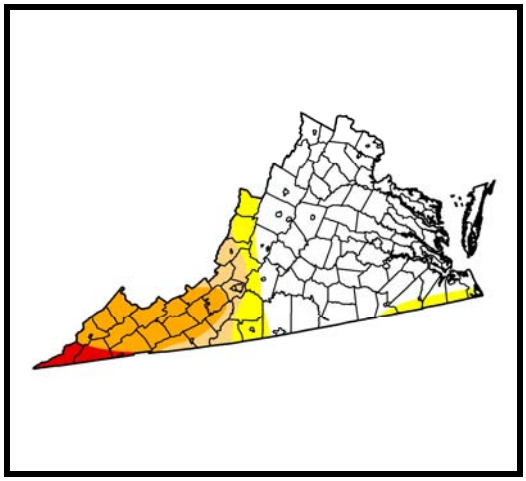
Drought Update

From the U.S. Drought Monitor: Virginia Conditions Now 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 November 24, 2009, compared to November 25, 2008. The all-white left-hand graph indicates **drought-free conditions in Virginia**. According to the Drought Monitor, Virginia has been drought-free since early November 2009; prior to then, Virginia had shown some level of drought—at least in a small percentage of the state—since December 2006.



November 24, 2009



November 25, 2008

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

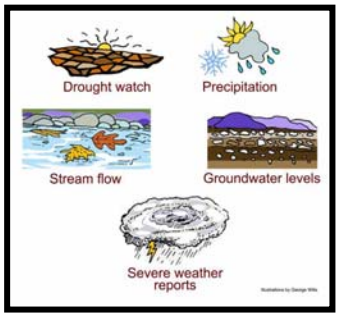
Source: Images taken from archive of U.S. Drought Monitor, www.drought.unl.edu/dm/archive.html, 12/1/09. Authors: Eric Luebehusen, USDA, for 11/24/09 image; Brad Rippey, USDA, for 11/25/08 image.

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 in recent months and one year ago.

Drought Monitor Report Date	Percentage of area rated "abnormally dry" (D0) or worse	Percentage of area rated "severe drought" (D2) or worse
11/24/09	US = 24%; VA = 0%	US = 5%; VA = 0%
10/27/09	US = 24%; VA = 15%	US = 4%; VA = 0%
9/29/09	US = 32%; VA = 13%	US = 5%; VA = 0%
8/25/09	US = 30%; VA = 7%	US = 5%; VA = 0%
7/28/09	US = 32%; VA = 17%	US = 6%; VA = 0%
11/25/08	US = 41%; VA = 33%	US = 7%; VA = 17%

Don't Forget the Water Center's Online Water Status Page!

The Water Center's "Water Status Information" site, at www.vwrrc.vt.edu/water_status.html, has links to current and historical information on drought, groundwater, precipitation, stream flow, and severe weather.



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

The items in this section are based on information in the source(s) indicated in parentheses at the end of each item. Most of this issue's items were reported between September 4 and November 25, 2009. Except as otherwise noted, all localities mentioned are in Virginia and all dates are in 2009. All Web sites listed were functional as of December 3, 2009. Frequently used abbreviations: DEQ = Virginia Department of Environmental Quality; DCR = Virginia Department of Conservation and Recreation; EPA = U.S. Environmental Protection Agency; SWCB = Virginia State Water Control Board; VMRC = Virginia Marine Resources Commission.

Stormwater Regulation Update

On October 5, the Virginia Soil and Water Conservation Board approved major revisions to Virginia's stormwater-management rules, focusing on construction activities, particularly post-construction stormwater management. Water-quality impacts are addressed through a requirement for reducing phosphorus in stormwater, and water-quantity impacts are addressed for channel protection and reducing flooding. A statewide stormwater permit fee structure is established. The proposed final version of the rules generated significant debate, including hundreds of comments submitted online during the original public comment period that ended on August 21 and additional comments at several public meetings. In the version approved on October 5, the board left in place a requirement to reduce phosphorus in the state's Chesapeake Bay watershed area but removed it from the other parts of the state. Because the Board adopted provisions different from those in the original final draft, they allowed an additional 30-day comment period (Oct. 26-Nov. 26). The Board will hold a special called meeting to reconsider the regulations on December 9. The Virginia Department of Conservation and Recreation's (DCR) Web site for stormwater regulation document is www.dcr.virginia.gov/lr2d.shtml.

For more details, particularly on changes by the Board on October 5, see the following Virginia Association of Counties Web site document: http://www.vaco.org/LegislativeNews/StormwaterAlert100509.pdf.

In another stormwater-regulation item, this time at the federal level: On November 23, the U.S. EPA issued a final rule on sediment in run-off from construction sites. The rule sets a numeric standard for the turbidity of stormwater runoff. This is the first time that EPA has issued a national standard for construction-site stormwater. Construction sites of 20 acres or more will have to begin complying with the rule in August 2011 (18 months after the effective date of the rule); sites of 10 acres or more must begin complying in 2014 (four years after the effective date of the rule). EPA documents on this rule are available online at www.epa.gov/waterscience/guide/construction/. (U.S. EPA Fact Sheet, "Final Rule: Effluent Guidelines for Discharges from the Construction and Development Industry," 11/23/09)

Nothing New About Stormwater Worries

"A consulting engineer…advised the [Leesburg Town] council that, after making a survey of town streets, the number one problem remained a storm sewer system. 'The building of a town parking lot with its additional runoff of storm water concentrating in the pocket on King Street will make it worse,' [the consultant said]." January 1948 Leesburg Town Council meeting.

"'You should do something about the drainage before you spend the money adding to the drainage problem,' [said a council member in voting against funding the paving of the town parking lot]." September 1948 Leesburg Town Council meeting.

Both quotes from *Within the Iron Gates* by Frank Raflo (1988), p. 81.

Aquatic Systems, Water Quality, and Restoration (including Chesapeake Bay)

•Besides the implementation of President Obama's May 2009 Executive Order on the federal role in the Chesapeake Bay (please see Feature Article #3, above on page 17), several other significant Bay restoration/regulation developments took place recently.

••In the September 4, 2009, *Federal Register*, the U.S. EPA published a notice that it intends to establish a sediment- and nutrient-related TMDL for the Chesapeake Bay. The three-page notice provides background on why a Bay TMDL is being developed, the timing and scope of the TMDL, and how the TMDL will promote reductions of sediments and nutrients. At public meetings on the TMDL process in recent months, EPA officials said that if states do not make adequate progress toward Bay-restoration goals, the

states risk federal sanctions such as including withholding of federal funds or requirements for offsetting impacts of new wastewater-treatment discharges. (*Richmond Times-Dispatch*, 10/2/09)

••On September 30, the Chesapeake Bay Foundation announced that it is suspending its lawsuit seeking to force the EPA to enforce the Clean Water Act in the Chesapeake Bay. The Foundation filed the suit in January 2009 with co-plaintiffs the Virginia State Watermen's Association, former Virginia secretary of natural resources Tayloe Murphy, former Maryland governor Harry Hughes, and former Washington, D.C., mayor Anthony Williams. (Associated Press, 10/1/09; and *Baltimore Sun*, 10/1/09)

••On September 30, the U.S House of Representatives passed by a 418-1 margin the Chesapeake Bay Accountability and Recovery Act (H.R. 1053), which would require the Office of Management and Budget to prepare a document showing all federal money spent on Chesapeake Bay restoration. The bill, sponsored by Rep. Robert Wittman (R-Va. 1st), would also require an independent review of federal restoration actions. As of December 3, the bill was in the Senate Committee on Environment and Public Works. For details of the bill and its current legislative status, please see http://thomas.loc.gov. (*Fredericksburg Free Lance-Star*, 10/1/09)

••On October 20, Sen. Benjamin Cardin (D-Md.) introduced the Chesapeake Clean Water and Ecosystem Act of 2009 (S.1816). The bill would reauthorize the Chesapeake Bay Program, which is governed by the federal Clean Water Act's Section 117. Here are some of its basic provisions, as introduced: It would strengthen enforcement controls over pollution affecting the Bay, including requiring a Total Maximum Daily Load (TMDL) for the Bay by 2010; codify President Obama's May 12, 2009, Executive Order on the federal role in Bay restoration; establish a regional nutrient-credit trading system by 2012 (Virginia and Pennsylvania already have state nutrient-credit trading programs); authorize $1.5 billion in new funds for stormwater-control grants; create a Chesapeake Bay Stewardship Grants program and authorize $15million/year, to replace $10 million/year provided by the existing Small Watershed Grant and some other Bay grants programs; ban phosphorus in many household cleaning products; ban the introduction of non-native Asian Oysters; retain the basic structure of the federal-state Bay Program; and set a 2025 deadline—which would become part of the Clean Water Act—for restoration efforts to be in place (the same deadline set by the Chesapeake Bay Executive Council on May 12, 2009). As of December 3, the bill was in the Senate Environment and Public Works Committee, and a companion House bill (H.R.3852 sponsored by Rep. Elijah Cummings of Maryland), was in the Water Resources and Environment subcommittee of the House Transportation and Infrastructure Committee. For details on the bills and their legislative status, please visit http://thomas.loc.gov and search for the bill number. (Sen. Benjamin Cardin's Office News Release, 10/19/09; and *Bay Journal*, November 2009.)

••On October 23, the Chesapeake Bay Program's Principals' Staff Committee (senior natural resources officials from the six Bay states, the District of Columbia, and the U.S. EPA) agreed to **new preliminary nutrient targets for Bay tributaries**. The new nutrient-target setting is part of the EPA-led TMDL process (see above). According to a November 3 letter from EPA to the Principals' Staff Committee (available online at www.epa.gov/chesapeakebaytmdl/ResourceLibrary.html#keydocs), the preliminary targets are expected to change as public comment is received in the process of developing a draft, and then a final, TMDL. The EPA has told each state that they should have met 60 percent of the new targets by 2017; 2025 is the target for all Bay-restoration activities to be in place. States are expected to come up with detailed plans to meet these new tributary goals, assigning required reductions at the county or even more localized level. (*Bay Journal*, November 2009)

••At the November 1 deadline, the Virginia Marine Resources Commission (VMRC) had received bids from 665 watermen—one-third of the 1,800 licensed watermen in Virginia—for the **state's crabbing license buy-back program**, approved by the VMRC in July 2009 as a way to reduce harvest pressure on the Blue Crab. The total cost of the bids was $30.4 million, compared to the $6.7 million that Virginia has for the program in federal fishery-disaster relief funds. On November 23, the VMRC announced that it would buy back 359 licenses, permanently retiring the licenses and taking an estimated 75,441 crab pots out of Virginia waters (a 20-percent reduction in the number of permitted crab pots). (*Washington Times*, 11/9/09; and VMRC Crab License Buyback Press Release, 11/23/09)

•A recently published U.S. Geological Survey (USGS) study has found **"widespread" occurrence of intersex characteristics in samples of Smallmouth Bass and Largemouth Bass** between 1995 an 2004 in several U.S. rivers basins. This is the "major finding of the most comprehensive and large-scale evaluation of the condition," according to the USGS' news release, and "reveals that the prevalence of

intersex is far more widespread than anyone anticipated," according to the USGS' associate director for biology. The river basins studied were the Apalachicola, Colorado, Columbia, Mobile, Mississippi, Pee Dee, Rio Grande, Savannah, and Yukon. The article, "Widespread occurrence of intersex in black basses (*Micropterus* spp.) from U.S. Rivers, 1995-2004," is in the August 13, 2009, online edition of *Aquatic Toxicology*. (USGS News Release, 9/14/09)

Education

•A $360,000 grant from the National Oceanic and Atmospheric Administration (NOAA) is allowing **Mary Baldwin College's Environment-based Learning Program** to work with high school students to build, place, and monitor data-collecting buoys in streams. Information collected by the buoys will be added to data collected by the Chesapeake Bay Interpretive Buoy System. (*Waynesboro News Virginian*, 10/3/09)

•In October, five Shenandoah University students and faculty leader John Copenhaver completed **Shenandoah EcoVenture**, a month-long hiking-canoeing trip to explore and research Virginia's Shenandoah region. Starting October 3, the group spent 16 days hiking approximately 105 miles south on the Appalachian Trail through Shenandoah National Park. After two rest days, they embarked on a 10-day, approximately 60-mile paddle down the South Fork Shenandoah River from Lynnwood to Andy Guest State Park near Front Royal. Along the way, they recorded their experiences in photographs, video, and blogs. The trip will be captured in a documentary film by George Patterson for the sponsoring group, The Downstream Project, based in Berryville (Clarke County). (Shenandoah EcoVenture 2009 Web site, www.thedownstreamproject.org/ecoventure.html, 10/30/09)

South Fork Shenandoah River at Guest State Park, December 2003

Energy Use and Developments/Climate Change Developments

•On September 30, the U.S. EPA announced a **proposed regulation, under the Clean Air Act, of greenhouse gas emissions** from large facilities (those emitting over 25,000 tons per year); a 60-day public comment period follows publication of the proposed rule in the *Federal Register*. An EPA fact sheet is available online at http://www.epa.gov/nsr/fs20090930action.html.

Meanwhile, on November 5 the Senate Environment and Public Works Committee (EPW) voted 11-1 to report out **Clean Energy Jobs and American Power Act (S.1733)**, which had been introduced in September by Sens. Barbara Boxer (D-Calif.) (chair of the EPW Committee) and John Kerry (D-Mass.). The bill has the following main provisions: would also focus on large emitters; includes a cap-and-trade system to set carbon limits and allow trading of credits among carbon emitters; sets a greenhouse-gas reduction goal of 20 percent by 2020 and 80 percent by 2050 compared to 2005 levels (the House bill passed in June set a reduction goal of 17 percent by 2020); establishes a system for regulating the price of carbon emissions; and requires the Commodity Futures Trading Commission to set regulations for carbon trading. The committee vote took place in the context of a boycott of the committee's mark-up process by Republican members of the committee, who had called for more analysis of the bill by the U.S. EPA. The Senate Finance Committee and the Senate Energy and Natural Resources Committee both plan now to address the climate-change issue. For details of S.1733, visit http://thomas.loc.gov and search by the bill number. (*Washington Post*, 10/1, 10/25 and 10/27/09; and *Energy and Environment Daily*, www.eenews.net, 11/9/09)

•Old Dominion University, the City of Virginia Beach, the Planktonix company of Asheville, N.C., and several other partners are requesting $46 million in 2009 federal stimulus funds to pursue a $50-million project where **algae—using nutrients in wastewater—would be used to produce biodiesel fuel**. The large-scale—but still experimental—biodiesel operation would be on city property. In September 2008, ODU began a smaller-scale algae-biofuel project in Prince George County; the current proposal would expand upon that work. At least three private companies and several other universities are involved in the current proposal, which will proceed regardless of whether the federal stimulus funds are received, according to Pat

Hatcher, the ODU professor leading the effort. A decision on the federal funds is expected by the end of the 2009. (*Virginian-Pilot*, 10/16/09)

Meanwhile, in October the Virginia Institute of Marine Science (VIMS) announced that it had received a $3-million grant from Norwegian energy company StatoilHydro to produce **biodiesel fuel from algae grown in York River water**. (*Daily Press*, 10/3/09)

Land Use

•In August, the National Park Service (NPS) released a study of the eligibility and suitability of a 19.3-mile segment of the **New River in Virginia and West Virginia for designation as a National Wild and Scenic River**. Congress had authorized the study in 1992. The section, upstream of the New River Gorge National River section, is mostly owned by the federal government and is managed by the U.S. Army Corps of Engineers. The NPS study found that the section is eligible for designation because it is free-flowing and has "outstandingly remarkable values," but the study recommended against Wild and Scenic designation, asserting that the section is already protected, there are no immediate threats that require the designation, and insufficient state and local support for the designation had been demonstrated. A public comment period on the study ran August 6-November 6. The study and more information are available online at http://parkplanning.nps.gov/document.cfm?parkId=261&projectId=27583&documentID=28919.

•On September 9, the U.S. Department of Agriculture/Forest Service announced that about $89 million in 2009 **federal stimulus funds will help fund 78 forest-health projects** in 20 states and the District of Columbia. The projects seek to restore forests damaged by disease, fire, insects, or invasive species. Virginia will receive $1,076,000 for two projects: $897,000 for "Shenandoah Valley Watershed Community Ecosystem Enhancement and Restoration" in eight counties; and $179,000 for "Southside Virginia Community Tree Planting" in three counties. (U.S. Department of Agriculture news release, 9/9/09)

Water Supply and Conservation

•On September 22, **the Newport News City Council ended its two-decade-long effort to build the King William Reservoir**. The acting city manager presented a recommendation that efforts on the project should be halted immediately. On March 31, U.S. District Judge Henry Kennedy, Jr., had ruled that the U.S. Army Corps of Engineers and the U.S. EPA erred in granting a permit in November 2005 for the 13-billion-gallon reservoir project. The ruling required a new study by the Corps. On April 30, the City of Newport News announced that it was suspending work on the project, pending a 120-day review. That review concluded that succeeding in the project now would be very unlikely. The acting city manager reportedly planned to ask the City Council to approve a new water-supply needs assessment, to be done by 2012. (*Virginian-Pilot*, 9/22/09)

•A study by Columbia University researchers and published in the October 1, 2009, issue of *Journal of Climate* reported that the **drought of November 2005-October 2007**—which had significant impacts in the southeastern United States—was a "typical event," in duration and severity, compared to historical droughts in the region. The study was based on recorded precipitation data since 1895, tree-ring data covering the period of 1000-2006, and sea surface temperature data since 1856. (*Land Letter*, 10/8/09)

Wetlands

•Here's a follow-up to a 2007 news item: **Reproduction by Mole Salamanders**—a state "species of special concern"—in 2008 and 2009 is a success story for a **constructed wetland on the property of the Boxley Materials Company's quarry** near Arrington in Nelson County. In September 2007, Mike Hayslett, naturalist at Sweet Briar College in Amherst, and Tom Biebighauser, a U.S. Forest Service biologist, worked with Boxley officials to transplant key parts of a small, isolated wetland (about 25 feet in diameter) that was discovered on land where the company already had plans to expand. The scientists' approach was to move the upper soil and organisms from the bottom of the existing pool to a new, suitable area. The reproduction by Mole Salamanders is evidence that this transplant approach is working. Mr. Hayslett, Mr. Biebighauser, and Boxley officials plan to follow the

Mole Salamander in Pittsylvania County, March 2007. *Photo by Paul Sattler, used with permission.*

same approach to create additional new wetlands over the next several years. Tours of the project may be arranged by contacting Mr. Hayslett at mhayslett@sbc.edu or (434) 381-6439. For more about **vernal pools**—seasonal water bodies that are particularly important for amphibians—visit the Virginia Vernal Pools Web site at www.lynchburgbiz.com/virginiasvernalpools/index.html. (*Richmond Times-Dispatch*, 10/25/09)

Out of Virginia

In the Chesapeake Bay States

•Annapolis, Md., plans to test whether a commercially produced **floating platform of wetland plants** can significantly reduce nutrient levels in a lagoon in the city's Back Creek Nature Park. The 20' by 20' plastic platform supports plants whose roots extend into the water and absorb nutrients. The $300,000 project will provide evidence of whether the technology might be used successfully on a larger scale in the Chesapeake Bay. The city expects to have the device in place by April 20010. (*Baltimore Sun*, 11/21/09)

•In late October, the Pennsylvania Department of Environmental Protection (DEP) announced contracts for nine projects to address **acid mine drainage (AMD) problems** in Allegheny, Cambria, Clarion, Jefferson, Mercer and Somerset counties. The projects are funded with money from the federal Abandoned Mine Lands Fund, which is supported by taxes on current coal operations and distributed in annual grants to states for reclamation of sites mined prior to the 1977 Surface Mining Control and Reclamation Act. Pennsylvania has an estimated 180,000 acres of abandoned mine lands and two billion tons of waste coal in piles, collectively affecting some 5,500 miles of streams. In an example of a project: In November ground was broken in Spangler (Cambia County) on a treatment plant for AMD-affected water from the former 7,100-acre Lancashire #15 mine complex. The $11-million project will treat up to 10 million gallons of acidic water per day and allow it to be discharged into the West Branch of the Susquehanna River. In 1969, a blow-out at this mine caused a 40-mile-long fish kill on the West Branch. The treatment is expected to help restore aquatic habitat in 35 miles of the river. (Reuters, 10/30/09; and *Gant (Penn.) Daily*, 11/13/09)

Elsewhere

•On September 24, U.S. Secretary of Agriculture Thomas Vilsack announced the **Mississippi River Basin Healthy Watersheds Initiative**, which will provide $320 million over four years to help agricultural producers implement management practices (such as conservation tillage and nutrient-management plans) to reduce the impacts of stormwater runoff. The initiative will focus on selected watersheds in Arkansas, Kentucky, Illinois, Indiana, Iowa, Louisiana, Minnesota, Mississippi, Missouri, Ohio, Tennessee, and Wisconsin. More information about the program is available online at www.nrcs.usda.gov/programs/mrbi/mrbi_overview.html or from USDA service centers. (U.S. Department of Agriculture news release, 9/24/09)

•In summer 2009, the **United States and Mexico completed an agreement to protect water levels in Mexico's Santa Clara wetland**—part of the Colorado River Delta Biosphere Reserve—during the course of a one-year trial run to resume operations at the Yuma Desalting Plant in Arizona. The desalinated water is to be discharged to the Colorado River to provide flows required by previous agreements with Mexico, and this new supply will allow the U.S. Bureau of Reclamation (BOR) to hold back more Colorado River water upstream for other uses. But the water for desalination is to come from overland flow that supplies the Santa Clara wetland, so the agreement calls for water to be diverted from various sources to be diverted to the wetlands. According to Jennifer McCloskey, manager of BOR's Yuma area office, this is the "first time [that] the U.S. and Mexican governments have committed to setting aside water for the environment." (*Land Letter*, 10/1/09)

•**About 80 percent of the world's commercial fish species are being harvested at or above the levels that the species population can sustain**, according to the United Nations' Food an Agricultural Organization (FAO). For example, nine of 23 tuna species are being "fully fished" (the catch should not be increased) and four more species are being fished beyond that level. Several international efforts are underway as a response to the problem of overfishing. 1) In September, the United States released an ecosystem-based plan to restore U.S. coastal and ocean waters. 2) In March 2010, the European Commission is expected to ban trade of endangered Atlantic Bluefin Tuna for two years. 3) In 2010, the Western and

Central Pacific Fisheries (25 member nations, including the United States) plans to ban all tuna fishing in two of the four areas of the Pacific located between any nation's exclusive economic zone (these international waters are where much "pirate fishing" by unreported vessels occurs). 4) New rules take effect in January 2010 among European Union nations to reduce illegal and unreported fishing. (*Christian Science Monitor*, 10/4/09)

Another assessment of world fisheries comes from the July 31 issue of *Science*, in which a team of 21 researchers reported that current harvest rates have recently been reduced to below the expected **maximum sustainable yield levels in 5 of 10 major fisheries worldwide**. On the other hand, the researchers wrote, "a significant fraction of stocks will remain collapsed unless there are further reductions in exploitation rates." The systems studied represent about 25 percent of the world's fisheries and catch area. The article, "Rebuilding Global Fisheries," is available at www.sciencemag.org/cgi/content/full/325/5940/578.

Final Words

• "I looked down, and the manatee was right below me. …It was just as strange as if I'd looked up and seen a spacecraft."—Rob Case, commenting on seeing a **manatee in the James River** during a visit to Richmond. The manatee was seen by several observers on October 21-22. Manatees, an aquatic mammal, concentrate in Florida waters in the winter but may travel to more northern areas in the summer. The last reported manatee sighting in Richmond was in 2002. (*Richmond Times-Dispatch*, 10/22/09)

•Here are two **reactions to the proposed Chesapeake Clean Water and Ecosystem Act of 2009**, introduced into the U.S. Senate by Sen. Benjamin Cardin (D-Md.). (Please see the news item on this bill, above on page 35.)

"The Bay is a priceless shared resource, and farmers are willing to do their share to protect it. However, proposed regulatory increases and expansions will effectively shut farmers out of future discussion on how best to preserve the bay."—Wilmer Stoneman, associate director for governmental relations, Virginia Farm Bureau Federation. (*Southeast Farm Press*, 10/22/09)

"Under the Cardin bill, states would be required to meet specific pollution targets, and the EPA would be ordered to bring down the hammer if they don't. …Cardin's bill is just beginning the process, and passage will be difficult. But given the failure of both the states and the federal government to do what must be done to clean the Chesapeake, it might be the Bay's only hope." Editorial, *Virginian-Pilot*, 11/28/09

•"VGPA [Virginia Grain Producers Association] has committed to working with all our partners—including environment and government partners—to achieve our region's **environmental goals and long-term farm profitability**. …Reducing soil erosion, improving field efficiency of nutrient use, and improving water quality are all goals that make our growers more profitable and improve the quality of the land on which they depend."—Molly Pugh, VGPA executive director, in a September appearance before the Water Resources and Environment subcommittee of the U.S. House Committee on Transportation and Infrastructure. (*Southeast Farm Press*, 10/1/09)

For additional news items, please see the November 2009 *Water Central* News Supplement, available online at www.vwrrc.vt.edu/pdfs/newsletter/Nov09NewsSupplement.pdf.

And if you're looking for news items and reference materials on a *particular* water-related topic, try the *Virginia Water Central* News Grouper, at http://www.vwrrc.vt.edu/va_water_grouper.html.

VIRGINA GOVERNMENT WATER ISSUES OVERVIEW

This section lists water issues under current consideration (study or regulation) by state boards, commissions, or agencies in Virginia. Information in this issue is based on public meetings listed **September 10-November 30, 2009,** on the **Virginia Regulatory Town Hall** Web site, at www.townhall.state.va.us/L/meetings.cfm. The Town Hall site posts agendas of upcoming meetings and minutes of past meetings held by Virginia's boards, commissions, and departments; the site can be searched for "water" or other specific topics. 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 12/1/09.

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.

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; unless otherwise noted, the contacts listed for more information are with the Virginia Department of Environmental Quality. 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)	Most Recent Meeting Date	For More Information
All localities in tidal portion of Chesapeake Bay watershed	All impaired segments in the tidal portion of the Bay watershed	Chesapeake Bay	10/2/09	Arthur J. Butt
Accomack County	Pettit Branch for aquatic-life impairment	Chesapeake Bay	11/12/09	Jennifer Howell
Fairfax County and City of Fairfax	Accotink Creek for aquatic-life impairment	Potomac River	9/29/09	Katie Conaway
Essex, Northumberland, Richmond, and Westmoreland counties	Shellfish waters in Rappahannock River for bacteria	Chesapeake Bay	9/30/09	Margaret Smigo
Isle of Wight County and City of Suffolk	Ballard Marsh Creek, Chuckatuck Creek, and Kings Creek for shellfishing impairment	James River	11/9/09	Jennifer Howell
Lancaster County	Beach, Greenvale, and Paynes creeks for bacteria	Rappahannock River	10/7/09	May Sligh, DCR
Northampton County	Shellfish waters in Mattawoman Creek for bacteria	Chesapeake Bay	11/12/09	Jennifer Howell
Rockbridge County	Little Calfpasture River for aquatic life impairment.	Maury River/James River	11/19/09	Tara Sieber

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,

Biosolids Regulations (9 VAC 25-20, 25-31, and 25-32)—SWCB's advisory committee on biosolids regulations met 9/22/09. The SWCB published a Notice of Intended Regulatory Action (NOIRA) in the June 23, 2008, *Virginia Register* about several possible amendments to the biosolids regulations. More information: William K. Norris, DEQ.

Coin-operated Laundry Discharge General Permit Regulation (9 VAC 25-810)—Advisory committee meetings: 10/1/09 and 11/2/09. The SWCB is considering reissuance, including possible amendments, of this regulation. The NOIRA appeared in the April 27, 2009, issue of the *Virginia Register of Regulations*. More information: George Cosby, DEQ.

Gas and Oil Regulations (4 VAC 25-160)—Dept. of Mines, Minerals and Energy (DMME) public hearing: 10/23/09, Big Stone Gap. Following a required periodic review, the DMME and the Gas and Oil Board are proposing amendments to the Virginia Gas and Oil Board Regulations in order to "make technical corrections, improve clarity, increase efficiency, and to restore consistency with other chapters" (according to the Townhall notice). More information: Tabitha Hibbitts Pearce, DMME.

Groundwater Management Area (Eastern) Regulations (9 VAC 25-600 et seq.) and Groundwater Withdrawal Regulations (9 VAC 25-610 et seq.)—Advisory committee meetings: 9/18, 10/28, and 11/19/09. The State Water Control Board (SWCG) published in the July 6, 2009, *Virginia Register of Regulations* a Notice of Intended Regulatory Action (NOIRA) for the periodic review of these regulations. According to the Agency Statement accompanying the NOIRA, the purpose of this regulatory action is to "consider amending the regulation to address the increasing demand on limited groundwater resources, changes to the administrative review process, and regulatory changes necessitated by new information on the coastal plain aquifer system." More information: Melissa Porterfield, DEQ.

James River Heritage Trail—Public meetings on conceptual plan: 10/6, 10/7, 10/8, 11/3, and 11/4/09. The 10/6 meeting focused on the jurisdictions of Amherst, Appomattox, Bedford, Campbell, Lynchburg, and Nelson; the 10/7 meeting, on Alleghany, Botetourt, and Rockbridge; the 10/8 meeting, on Albemarle, Buckingham, Cumberland, and Fluvanna; the 11/3 meeting, on Charles City, Chesterfield, Goochland, Henrico, Hopewell, Powhatan, Prince George, and Richmond; and the 11/4 meeting, on Hampton, Isle of Wight, James City, Newport News, Suffolk, and Surry. More information: Jennifer Wampler, DCR.

Recycling—DEQ's Litter Control and Recycling Fund Advisory Board meeting: 11/13/09; more information: Sheila Mary Barnett, DEQ

Solid Waste Management and Groundwater—1) 9/30/09: Public hearing on a permit-modification application for the **Prince William County Sanitary Landfill** in Manassas. Among items under consideration were amendments related to the cover and bottom liner in certain phases, leachate collection, and corrective actions near certain groundwater monitoring wells. The public comment period ended 10/15/09. More information: Kathryn Perszyk. 2) 10/5/09: Public hearing on a draft permit and variances for the **East End Landfill** located in Henrico County. Among items under consideration were amendments to the groundwater-monitoring plan. The public comment period ended 10/20/09. More information: John P. Godfrey, DEQ. 3) 10/8/09: Public hearing on a draft permit modification for hazardous waste management at the **Radford Army Ammunition Plant** in Montgomery County. A groundwater corrective action plan was under consideration. The public comment period ended 10/23/09. More information: Matthew Stepien, DEQ.

Stormwater Best Management Practices (BMPs)—Virginia Stormwater BMP Clearinghouse Committee meeting: 9/10/09. The BMP Clearinghouse Committee, coordinated by the Va. 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. More information: David Dowling, DCR.

Stormwater Management Regulations (4 VAC 50-60)—Consideration by the Soil and Water Conservation Board: 10/5/09; **reconsideration expected at a special called meeting of the Board on 12/9/09**. Amendments are proposed for Parts 1, 2, 3, and 13 of the Virginia Stormwater Management Program Permit Regulations to address criteria for water quality and quantity, criteria and procedures for local stormwater-management programs, and the administration and schedule of fees. More information: David Dowling, DCR.

Wastewater Discharges under 1,000 Gallons per Day (9 VAC 25-110)—Advisory Committee meeting: 11/9/09. The SWCB is undertaking the reissuance, and amendment if necessary, of the Virginia Pollution Discharge Elimination System (VPDES) general permit for wastewater discharges under 1000 gallons per day. More information: George E. Cosby, DEQ.

Water Quality Management Planning (9 VAC 25-720)—Public meeting on intended regulatory action: 10/5/09. According to the Town Hall notice, "the intent and subject of this rulemaking is to include the **concept of regulating flow** or other qualities of a point source that cause or contribute to pollutants or pollution downstream of point sources. The DEQ proposes to initiate a limited regulatory action to amend existing definitions or adding new definitions to clearly state the State Water Control Board purpose to correct or reduce the alteration of the physical, chemical, or biological properties of any state waters due to flow caused by excessive stormwater runoff." A NOIRA was published in the 8/31/09 *Virginia Register*, and the public comment period ended 10/9/09. More information: Arthur Butt, DEQ.

Wind Energy Permitting—Meetings of regulatory advisory panel for small renewable wind energy project permit by rule: 9/17, 10/13, 10/29, 11/12, and 11/16/09. This advisory panel is helping the DEQ to develop a permit by rule for small renewable wind energy projects, a regulatory action called for by the 2009 General Assembly (HB 2175/SB 1347). More information: Carol C. Wampler, DEQ.

Regular Meetings of Statewide Boards and Commissions

Marine Resources Commission—Meets monthly; most recent meetings: 9/22/09 and 11/24/09; minutes of all VMRC meetings are available online at www.mrc.virginia.gov/calendar.shtm. More information: phone (757) 247-2200, TDD (757) 247-2292; main Web page: www.mrc.virginia.gov/index.shtm.

State Water Control Board—Meets quarterly; most recent meeting: 10/26-27/09; minutes of SWCB meetings are available at the Virginia Regulatory Town Hall Web site, http://www.townhall.state.va.us/L/meetings.cfm (click on "Past Year" for minutes from the past 12 months). More information: Cindy Berndt, DEQ.

Cave Board— Meet three times per year; most recent meeting: 8/15/09. More information: phone (804) 786-7951; Web site: www.dcr.virginia.gov/natural_heritage/cavehome.shtml.

Chesapeake Bay Local Assistance Board—Meets March, June, September, and December. Most recent meetings: 9/14/09 (full board) and 11/3/09 (Southern Area Review Committee). More information: phone (800) CHESBAY; Web site: www.dcr.virginia.gov/chesapeake_bay_local_assistance/board.shtml.

Conservation and Recreation Board—Meets at least three times/year, upon call of chair. Most recent meeting: 11/13/09. More information: David C. Dowling, (804) 786-2291 or david.dowling@dcr.virginia.gov; Web site: www.dcr.virginia.gov/bcr.shtml.

Game and Inland Fisheries Board—Meets bimonthly; most recent meetings: 10/7/09 (Finance, Audit, and Compliance Committee); 10/8/09 (Education, Planning, and Outreach Committee), 10/21/09 (Wildlife and Boat Committee); 10/22/09 (full board). More information: Beth B. Drewery; Web site: www.dgif.virginia.gov/about/.

Gas and Oil Board—Meets monthly; most recent meetings: 9/15, 10/20, and 11/17/09. More information: David Asbury, DMME, (276)415-9650 or david.asbury@dmme.virginia.gov; Web site: www.dmme.virginia.gov/divisiongasoil.shtml.

Groundwater Protection Steering Committee—Meets third Tuesday of odd-numbered months; most recent meeting: 7/21/09. More information: Mary Ann Massie; Web site: www.deq.virginia.gov/gwpsc/.

Land Conservation Foundation—Meets about three times per year; most recent meeting: 3/27/09. More information: phone (804) 786-3218; Web site: www.dcr.virginia.gov/virginia_land_conservation_foundation/index.shtml.

Licensing and Regulation Boards—Licensing boards for engineers, geologists, onsite sewage system professionals, soil scientists, waste-management facility operators, waterworks and wastewater works operators, and wetland delineators are under the Dept. of Professional and Occupational Regulation; phone (804) 367-8500, TDD (804) 367-9753; Web site: www.dpor.virginia.gov/dporweb/boards.cfm.

Outdoors Foundation—Meets at least quarterly; most recent meeting: 10/21-22/09 (full Board of Trustees); 11/24/09 (Finance and Personnel Committee). More information: Bobbie Cabibbo at (540) 327-7727 or bcabibbo@vofonline.org; Web site: www.virginiaoutdoorsfoundation.org.

Scenic River Advisory Board—Meets at least two times a year. Most recent meeting: 5/14/09. More information: Lynn Crump, DCR, (804) 786-5054 or lynn.Crump@dcr.virginia.gov; Web site: www.dcr.virginia.gov/recreational_planning/srmain.shtml.

Soil and Water Conservation Board—Meets bimonthly; most recent regular meeting: 11/19/09. More information: David C. Dowling, (804)786-2291 or david.dowling@dcr.virginia.gov; Web site: www.dcr.virginia.gov/soil_and_water/vs&wcb.shtml.

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

N O T I C E S

If you would like to receive e-mail notifications about meetings, reports, and other items related to water quality and water monitoring, you may do so by joining the Virginia Water Monitoring Council (VWMC); contact Jane Walker at (540) 231-4159 or janewalk@vt.edu, or visit the VWMC Web site at www.vwrrc.vt.edu/vwmc/default.asp.

All Web sites listed in this section were functional as of 12/1/09.

Chesapeake Bay TMDL Official Notice and Public Meetings

In the September 4, 2009, Federal Register, the U.S. EPA published a notice that it intends to establish a sediment- and nutrient-related TMDL for the Chesapeake Bay and is requesting, by December 14, 2009, "information that may be relevant to the development and calculation" of the TMDL. The EPA's Web site for the Bay TMDL is www.epa.gov/chesapeakebaytmdl/. Fourteen public meetings will be held throughout the Bay watershed before the end of the year to discuss the Bay TMDL; the Virginia meetings (all 6:30 p.m. to 8:30 p.m.) are as follows:

December 14, Falls Church: Falls Church High School (in the Little Theater) 7521 Jaguar Trail;
December 15, Williamsburg: 2007 Legacy Hall, 4301 New Town Avenue;
December 16, Penn Laird (Rockingham County): Spotswood High School, 368 Blazer Drive;
December 17, Fredericksburg: Wingate Inn, 20 Sanford Drive.

Speaking of TDMLs…

The U.S. EPA's "TMDL Program Results Analysis" Web site, available at http://www.epa.gov/owow/tmdl/results, provides access to documents reporting the programmatic and environmental results of some 38,000 Total Maximum Daily Load (TMDL) processes throughout the country.

Internship Opportunities in the Rivanna Watershed

The Rivanna River Basin Commission is seeking interns for the spring 2010 academic semester (and possibly beyond) in several areas of work: stormwater tools for local governments; rainwater harvesting; the Rivanna River Corridor Plan; support for the Commission's Technical Advisory Committee; development of Web and graphic resources for the Commission; and planning support for the full Commission. The Commission provides guidance for the stewardship and enhancement of water and other natural resources in the Rivanna River Basin, including Albemarle, Fluvanna, and Greene counties and the City of Charlottesville. For more information, contact Leslie Middleton at 706G Forest Street, Charlottesville, VA 22903; (434) 975-0224 (office) or (434) 293-5770 (cell); e-mail: lmiddleton@embarqmail.com.

Stormwater Management Runoff-reduction Method

In October 2009 the Virginia Department of Conservation and Recreation 9DCR) made available a method to account for the runoff-reduction capabilities of stormwater-management practices, both conventional and low-impact-development (LID). Developed by the Center for Watershed Protection and the Chesapeake Stormwater Network, the method is accompanied by a compliance spreadsheet that allows site designers to experiment with 14 different categories of practices. The final outcome from the spreadsheet is a post-construction pollutant load for total phosphorus, as well as an adjusted curve number that can be applied to larger storm events. For more information, visit the DCR Web site at www.dcr.virginia.gov/lr2f.shtml. Supporting BMP specifications can be found on the Virginia Stormwater BMP Clearinghouse at www.vwrrc.vt.edu/swc/NonProprietaryBMPs.html

Nutrients and Sediments in Some Big Rivers and Lakes

Trends in Streamflow and Nutrient and Suspended-Sediment Concentrations and Loads in the Upper Mississippi, Ohio, Red, and Great Lakes River Basins, 1975–2004 (SIR 2008-5213) is a July 2009 publication from the U.S. Geological Survey's National Water-Quality Assessment Program. The report assesses how levels of nutrients and suspended sediments concentrations have changed during recent years and whether actions to reduce nutrients and sediments have been successful. In Virginia, the New River, Big Sandy River, and Upper Tennessee River basins are all part of the Ohio River basin. The report is available online at http://pubs.usgs.gov/sir/2008/5213/, or phone (888) 275-8747 (ASK-USGS).

Tracking Water Use

The Water Footprint Network is a non-profit organization in the Netherlands that seeks to raise awareness of the amount of water used in the consumption of goods and services. The organization's Web site includes "footprint calculators" for individuals, corporations, and countries, as well as information on the footprints of various products. Online at www.waterfootprint.org, or contact the organization at Water Footprint Network, c/o University of Twente, P.O. Box 217, 7500 AE Enschede, The Netherlands.

Other "water footprint" sources include the following:

H2O Conserve (several organizations): http://www.h2oconserve.org/home.php?pd=index

Texas Water Resources Institute, Fall 2009 *Texas H2O*, "What's Your Water Footprint?" online at http://twri.tamu.edu/news/2009/10/06/whats-your-water-footprint/.

Clean Water Act Jurisdiction: Regulators' Comments on the *Rapanos* Case

Congressionally Requested Report on Comments Related to Effects of Jurisdictional Uncertainty on Clean Water Act Implementation, an April 2009 report (16 pages) from the U.S. EPA's Office of the Inspector General, compiles comments from EPA headquarters, six EPA regional offices, seven U.S. Army Corps of Engineers' district offices, and six states on how the U.S. Supreme Court's 2006 *Rapanos* decision has affected enforcement of the Clean Water Act, particularly the determination of whether specific water bodies or wetlands fall under CWA jurisdiction. The report is available online at www.epa.gov/oig/reports/2009/20090430-09-N-0149.pdf. (For an analysis of the *Rapanos* decision, please see the Jan. 2007 *Water Central*, p.1; and for a summary of the December 2008 guidance document from the EPA and the Corps on implementing the decision, please see the December 2008 *Water Central*, p. 7.).

Emerging Contaminants Information from Arizona and Elsewhere

The Arizona Laboratory for Emerging Contaminants at the University of Arizona assists faculty, student, and staff researchers in the area of organic and inorganic micro-pollutants, including pharmaceuticals, personal-care products, and other relatively new water pollutants. The Web site, at www.alec.arizona.edu/index.html, has useful links to news and research about emerging contaminants.

For other news and references about emerging contaminants, please see the *Water Central* News Grouper's Emerging Contaminants bookmarks at http://delicious.com/araflo/EmergContam.

Collaborators Sought for Water Quality Database

Fernanda Dalcanale, a Ph.D. student at Colorado State University, is looking for students and researchers interested in collaborating on the Water Quality Knowledge and Information Network, a water-quality database. If interested, contact Ms. Dalcanale at dalcanale@wqin.org. The network is available online at http://wqin.no-ip.org/?q=node/3.

Energy and Climate Notices

•The **Climate Change Database Clearinghouse**, from **the** Center for Coastal Resources Management at the Virginia Institute of Marine Science, is an online bibliography of available datasets, organized by category (for example, Biological Data/Fish and Shellfish, or Physical Data/Water-related). Available at http://ccrm.vims.edu/climate_change/index.html.

•The **Winter 2009 and Spring 2009 issues of *On Tap***, from the National Environmental Services Center (NESC) at West Virginia University, focus on the connections between water and energy, including ways that water utilities can save energy. Issues of *On Tap* are available online at www.nesc.wvu.edu/ontap.cfm, or contact NESC at (800) 624-8301 or info@mail.nesc.wvu.edu.

•In June 2009, Deutsche Asset Management in New York City unveiled its "**carbon counter**," a 70-foot-tall electronic banner that shows the amount of human-generated greenhouse gases in the atmosphere. The amount is calculated by scientists at Massachusetts Institute of Technology (MIT) from measurements made by the NASA and the National Oceanic and Atmospheric Administration. The carbon-counter Web site is www.dbcca.com/dbcca/EN/.

•On September 22-24, 2009, National Public Radio broadcast three stories on recent **developments in the natural gas industry**, including the increased production of gas following development of the technique of combining horizontal drilling and hydraulic fracturing. Audio and transcripts are available online at www.npr.org/templates/story/story.php?storyId=113043935&ps=rs.

•In September, the **U.S. Fish and Wildlife Service (FWS) released its draft Strategic Plan for Climate Change**, detailing how the federal agency intends to respond to climate-change impacts in

national wildlife refuges and other FWS lands. The agency took public comment on the draft until November 23, 2009. The complete plan and various summary documents are available at www.fws.gov/home/climatechange/strategic_plan.html; or phone the FWS' Customer Service Center at (800) 344-WILD (344-9453).

•"**State and Local Governments Plan for Development of Most Land Vulnerable to Rising Sea Level along the U.S. Atlantic Coast**," an article published on October 27 in *Environmental Letters*, examines the amount of coastal lands that are developed, under conservation protection, or somewhere between these categories in states from Florida to Massachusetts. The article then assesses the likelihood of lands in each category being protected (by such actions as walls or dikes) as sea level rises A link to the article, along with more in-depth reports and maps for each state, is available at http://risingsea.net/ERL/index.html.

•The **U.S. EPA's Watershed Academy** now has an online module titled "The Effect of Climate Change on Water Resources and Programs." The module provides basic information on climate change, the water-related effects of climate change in the United States, and the implications for EPA's National Water Program. EPA's Watershed Academy Web has over more than 50 modules on various aspects of water resources science, law, and management. To view the new module, go to http://epa.gov/watertrain/climate_water/; the entire Watershed Academy is also available from this link.

Upcoming Conferences and Workshops

For a regularly updated, online list of Virginia water-related educational events, please see the Water Center's "Quick Guide to Virginia Water Conferences, Meetings, and Other Events," at www.vwrrc.vt.edu/VAConfQuickGuide.html.

Events In Virginia

•Continuing through Fall 2010 (see below for locations): **Virginia Household Water Quality Program Drinking Water Clinics.** For more information, contact the Virginia Cooperative Extension Office in the specific location. Also, see the Virginia Household Water Quality Program Web site at www.wellwater.bse.vt.edu/events.php, or contact the program coordinator, Erin James, at (540) 231-9058, wellwater@vt.edu.
Spring 2010: Floyd and Montgomery counties.
Summer 2010: Frederick and Loudoun counties.
Fall 2010: Fluvanna, Louisa, and Nelson counties.

•Dec. 9, 8:30 a.m.-4 p.m., University of Mary Washington-Stafford Campus, Fredericksburg: **Incentivizing Restoration through a Chesapeake Bay Economy.** A symposium to begin the process of creating a bioregional marketplace called the Chesapeake Exchange. More information: Eldon James, (540) 775-5422, ejames7@earthlink.net; Web site: http://www.rappriverbasin.org/symposium.htm.

•Dec. 15, 12 noon-2 p.m., online**: Erosion/Sediment Control Webcast.** Conducted by the Center for Watershed Protection. Register by Dec. 8, Cost: $99. More information: http://www.cwp.org/Webcasts/2009_schedule.html.

•January 13-April 17, 2010 (mostly Wednesday evenings; some Saturday field trips): **Virginia Master Naturalist Training Course, Piedmont Region.** There will be 13 sessions to be held primarily at the Prince Edward County Extension Office and at Bear Creek Lake State Park. Cost of the course is $100.00. Sponsored by the Central Piedmont chapter, VMN. More information: Catherine Fleischman, (804) 375-3121, stelladog1@aol.com; Web site: http://www.virginiamasternaturalist.org/.

•Mar. 7-9, 2010, Richmond: **Virginia Water Conference 2010.** Annual conference of the Virginia Lakes and Watersheds Association. More information: Stuart Stein, (703) 870-7000, sstein@gky.com.

•Mar. 25-27, 2010, Blacksburg: **8th Biennial Conference on University Education in Natural Resources.** Organized by the Virginia Tech College of Natural Resources. More information: John Seiler at (540) 231-5461, jseiler@vt.edu; Sarah Karpanty at (540) 231-4586, karpanty@vt.edu; or Bryan Murphy at (540) 231-6959, murphybr@vt.edu; Web site: http://www.cpe.vt.edu/cuenr/index.html

•Apr. 26, 2010, James Madison University's Festival Conference Center, Harrisonburg: "**Water and the Developing Landscape: Stormwater Regulations, Explanations & Opportunities."** Organized by Shenandoah Valley Pure Water Forum. More information: Nesha McRae, Va. Dept. of Conservation and Recreation, (540) 332-9238, nesha.mcrae@dcr.virginia.gov.

Events Elsewhere

•Apr. 11-14, 2010, San Francisco, Calif.: **Redefining Water in the City—2010 International Low Impact Development Conference.** Organized by the American Society of Civil Engineers. More information: (800) 548-2723; Web site: http://content.asce.org/conferences/lid10/.

•Apr. 11-15, 2010, Denver, Colo.: **Groundwater for a Thirsty World: annual conference of the National Groundwater Association**. More information: Dawn Reeves at (800) 551-7379, dreeves@ngwa.org; Web site: http://ngwa.confex.com/ngwa/2010gws/cfp.cgi.

•Apr. 25-29, 2010, Denver, Colo.: **7th National Water Quality Monitoring Conference.** Organized by the National Water Quality Monitoring Council. More information: Doug Glysson, Council Executive Secretary, (703) 648-5019, gglysson@usgs.gov; Web site: http://acwi.gov/monitoring/conference/index.html.

Also Out There…

(Brief descriptions of some interesting articles *Water Central* has recently discovered.)

Stuck in the mud: State finds lax oversight of erosion control - *Lynchburg News & Advance*, 11/22/09. One of three articles in the November 22, 2009, *Lynchburg News & Advance* that describe the water-quality importance of erosion/sediment controls at development projects and the difficulties that local governments are having in maintaining adequate monitoring and enforcement in rapidly developing areas. The articles report on the results of the review by the Virginia Department of Conservation and Recreation of local E/S programs in Virginia, which is required for each program once every five years (information on the DCR local program review is available online at www.dcr.virginia.gov/soil_and_water/eslpr.shtml). Other articles include "Erosion control inspectors say education critical" and "Developers point to obstacles in controlling runoff." Click on the title above to access the articles, or contact the paper at (800) 275-8830.

•**"Clean Water Laws are Neglected, at a Cost in Suffering"**—A long, investigative article in the *New York Times* (9/12/09) examines the extent of Clean Water Act violations and Safe Drinking Water Act violation and the level of enforcement by states and the U.S. EPA. As part of the article, the *Times* has an interactive map to identify (by state of zip code) wastewater-discharging facilities that have had permit violations. One section of the report focuses on West Virginia and regulation in that state of water resources impacts of coal mining. This article is part of a series on water pollution in the United States; the series is online at http://projects.nytimes.com/toxic-waters.

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.

2010 William R. Walker Graduate Research Fellow Award Applications

Graduate students from all Virginia's colleges and universities are invited to submit an application to the Water Center for the 2010 William R. Walker Graduate Research Fellow Award. The award of up to $2,500 is intended for individuals preparing for a professional career in water resources. Individuals pursuing graduate work in a field different from their undergraduate field of emphasis, or individuals returning to graduate school after work experience, are eligible to apply. **The application deadline is March 31, 2010.** For more information, please visit www.vwrrc.vt.edu/walker_fellowship.html, or contact Tamim Younos at tyounos@vt.edu or (540)231-8039.

New Publication

"NSF-REU Proceedings of Research in Interdisciplinary Watershed Sciences and Engineering," edited by Tammy Parece, Tamim Younos, Vinod K. Lohani, SR47-2009 (November 2009) is available at our Web site at http://www.vwrrc.vt.edu/special_reports.html:

Grant Received

"Nutrient Criteria for Virginia's Freshwater Streams and Rivers" is a collaborative effort between the Virginia Department of Environmental Quality (DEQ) and the multi-institute Academic Advisory Committee. The grant of $25,000 from the DEQ is for the period October 1, 2009, to June 15, 2010. For more information: Tamim Younos at tyounos@vt.edu or (540) 231-8039.

2009 Virginia Water Research Conference Addresses Impacts of Changing Climates on Water Resources

Article and photos by Patrick Fay, communications manager for the Virginia Water Resources Research Center.

On October 15-16, about 140 water scientists, managers, policy makers, and students gathered in Richmond for the 2009 Virginia Water Research Conference. Hosted by the Virginia Water Resources Research Center and the Inger and Walter Rice Center for Environmental Life Sciences at Virginia Commonwealth University (VCU), the conference addressed environmental, political, and economic changes facing stakeholders, researchers, and managers of water resources.

The conference featured 70 oral and poster presentations as well as a plenary session featuring Preston Bryant, Jr., Virginia Secretary of Natural Resources, and Virginia Burkett, Chief Scientist for Global Change Research with the U.S. Geological Survey.

The majority of papers focused on environmental challenges, including several sessions devoted to stormwater policy, management, and research. "The underpinning for much of the discussion is that stormwater challenges will be exacerbated by most predicted climate-change scenarios in Virginia," observed Stephen Schoenholtz, director of the Water Center. "I thought that the opening plenary session very effectively met our goal of providing an informative, provocative overview of some of the key issues we face in Virginia in relation to climate change."

When asked about how this conference could benefit individual communities in Virginia and beyond, Dr. Schoenholtz replied, "My hope is that people who attended the conference will head back to their communities and their jobs with a new idea or two, and ultimately that their new ideas will translate into actions that improve the management of our water resources."

The Water Center also uses its annual conference to reach out to undergraduate and graduate students from schools in Virginia and other states. Students were invited to give oral or poster presentations, and oral presentations were judged in a "Best Student Presentation" competition. In the undergraduate student presentation category, the winner was Andrew Snyder-Beattie (Department of Economics, Mary Washington University) for his presentation of "The Taste and Economics of Desalinated Water" (co-authored by Dr. Andrea Dietrich, Department of Civil and Environmental Engineering, Virginia Tech). In the graduate student presentation category, the winners were Michael Patrick Brandt (Center for Environmental Studies, VCU) for his presentation of "Factors Limiting Benthic Algal Abundance in Virginia Streams of the Coastal Plain" (co-authored by Dr. Paul Bukaveckas, also at VCU's Center for Environmental Studies); and Kristin Gilroy (Department of Civil Engineering, University of Maryland) for her presentation of: "Effect of Location of Bioretention Facilities on Controlling Urban Storm Runoff Rate" (co-authored by Dr. Richard McCuen, also at Maryland's Department of Civil Engineering).

The Water Center also supports students through the William R. Walker Graduate Fellowship award. During this year's conference, the Walker Award for 2009 was presented to John Petrie, Ph.D. student in the Department of Civil and Environmental Engineering at Virginia Tech.

Proceedings of the conference will be available in January 2010 on the Water Center's Web site, www.vwrrc.vt.edu.

FOR THE RECORD

TRACKING THE 2010 VIRGINIA GENERAL ASSEMBLY

Following Bills and Contacting Legislators

The 2010 Virginia General Assembly session convenes January 13. For current information about the General Assembly (including lists and summaries of all bills, budget information, member information, committee schedules, and more) visit the Legislative Information System (LIS) Web site at http://leg1.state.va.us. You may also check on a bill's status by phone: for the House of Delegates, (877) 391-3228 (toll-free; in Virginia only), or (804) 698-1500; for the Senate, (888) 892-6948 (toll-free; in Virginia only) or (804) 698-7410.

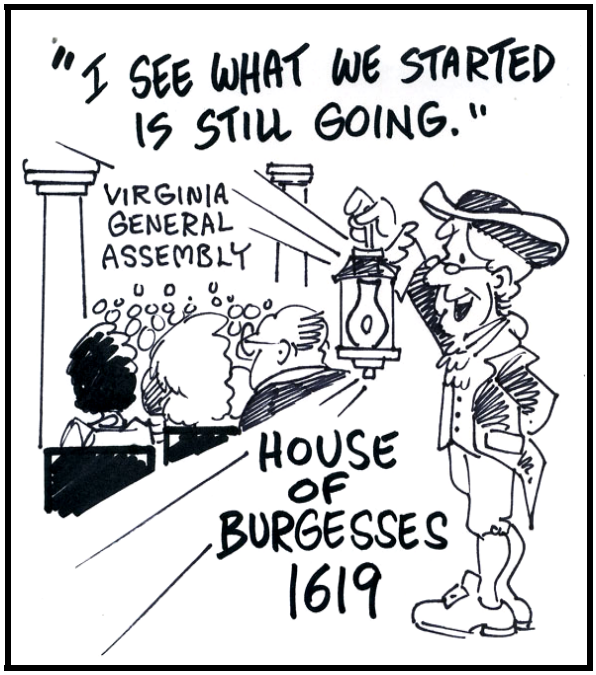
According to the "Citizen Participation" information at the General Assembly's Web site (http://legis.state.va.us), when the General Assembly is in session the House of Delegates and Senate jointly operate a telephone message center to accept calls from citizens wishing to express an opinion on legislation. The messages are relayed to members' offices as requested. Phone the Constituent Viewpoint operators toll-free at (800) 889-0229 (outside Richmond) or 698-1990 (Richmond area).

Water Central's Water Bills and News Services

Beginning in late January, *Virginia Water Central* will post water-related legislation (from information provided by the Virginia LIS) on the Water Center's Web site at www.vwrrc.vt.edu/legislation.html, with occasional updates during the session. Inventories of water-related bills in General Assembly sessions back to 1998 are available at this Web site. *Water Central* will publish a final inventory of water-related legislation in the first newsletter issue following the close of the General Assembly.

In 2009, the *Virginia Water Central* "News Grouper" posted links to online news articles about the water-related legislation in the 2009 General Assembly at http://delicious.com/araflo/09VaGenAssembly. The Grouper will post articles on the 2010 session as they become available in the news media (the Web address will be http://delicious.com/araflo/10VaGenAssembly).

Please contact the *Water Central* editor, Alan Raflo (540-231-5463, or araflo@vt.edu) if you have questions about these services or suggestions for how they might work better for you.



Virginia Water Central

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Water Central is available online at www.vwrrc.vt.edu/watercentral.html. 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.

1. Would you rate the **content** of this issue as good, fair, or poor?

2. Would you rate the **appearance** as good, fair, or poor?

3. Would you rate the **readability** of the articles as good, fair, or poor?

4. What **length** is about right: 8 pages? 16 pages? 24 pages? 48 pages? Other:_____

5. What **frequency** is about right? 4 issues per year? 6 issues per year? Other:_____

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