COMMONWEALTH of VIRGINIA

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September 27, 2010

MEMORANDUM

TO: The Honorable Robert F. McDonnell and Members of the Virginia General Assembly

FROM: David K. Paylor

SUBJECT: Status of Virginia's Water Resources: A Report on Virginia's Water Resources Management Activities (2010)

Pursuant to VA. CODE ANN. § 62.1-44.40, the Virginia Department of Environmental Quality ("DEQ") forwards the attached 2010 Annual Report on the Status of Virginia's Water Resources. The purpose of this report is to provide a summary of the status of the Commonwealth's water resource supply. The report also provides a summary of DEQ's water supply and resource planning accomplishment for 2010. DEQ offers this report in electronic format on the DEQ website at: http://www.deq.virginia.gov/regulations/reports/html.

We look forward to continued service to the Virginia General Assembly. Should you require further information concerning this report, please do not hesitate to contact Jeff Reynolds, Water Policy Manager, at (804)698-4376.

STATUS OF VIRGINIA'S WATER RESOURCES
A Report on Virginia's Water Resources Management Activities

A report to the Honorable Robert F. McDonnell, Governor
and the General Assembly of Virginia

Virginia Department of Environmental Quality
Office of Surface and Groundwater Supply Planning

October 2010

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ACRONYMS

DEQ: DEPARTMENT OF ENVIRONMENTAL QUALITY

EPA: ENVIRONMENTAL PROTECTION AGENCY

FERC: FEDERAL ENGERY REGULATORY COMMISSION

GWCP: GROUNDWATER CHARACTERIZATION PROGRAM

GWMA: GROUNDWATER MANAGEMENT AREA

MGD: MILLION GALLONS PER DAY

NOIRA: NOTICE OF INTENDED REGULATORY AMENDMENT

NURE: NATIONAL URANIUM RESOURCE EVALUATION

PDC: PLANNING DISTRICT COMMISION

SWCB: STATE WATER CONTROL BOARD

SWI: SURFACE WATER INVESTIGATIONS PROGRAM

TMDL: TOTAL MAXIMUM DAILY LOAD

USGS: UNITED STATES GEOLOGICAL SURVEY

VDH: VIRGINIA DEPARTMENT OF HEALTH

VWPP: VIRGINIA WATER PROTECTION PROGRAM

VWUDS: VIRGINIA WATER USE DATA SYSTEM

STATUS OF VIRGINIA'S WATER RESOURCES
A REPORT ON VIRGINIA'S WATER RESOURCES MANAGEMENT PROGRAM ACTIVITIES–
OCTOBER 2010

I. EXECUTIVE SUMMARY

This annual report, submitted to the Governor and the Virginia General Assembly in accordance with Chapter 3.2 of Title 62.1 of the Code of Virginia, describes the status of the Commonwealth's surface and groundwater resources, provides an overview of climate conditions and impacts on water supplies in the Commonwealth, and provides an update on the Commonwealth's Water Resources Management Program for Calendar Year 2009. Quantity rather than quality is the focus of this report. Quality issues are addressed in the State's Water Quality Assessment Report which can be found at http://www.deq.virginia.gov/wqa/homepage.html

Virginia's estimated 51,021 miles of streams and rivers are part of nine major watersheds. Annual state-wide rainfall averages almost 43 inches. The total combined flow of all freshwater streams in the state is estimated at about 25 billion gallons per day. The 248 publicly owned lakes in the Commonwealth have a combined surface area of 130,344 acres. Additionally, many hundreds of other small privately owned lakes and ponds are distributed throughout the state. Other significant water features of Virginia include approximately 236,900 acres of tidal and coastal wetlands, 808,000 acres of freshwater wetlands, 120 miles of Atlantic Ocean coastline, and more than 2,300 square miles of estuaries. A summary of Virginia's surface water resources is provided in Appendix 1.

Precipitation across the State has been below normal except in the far southwest portion of the State. Because of the limited precipitation, streamflow has continued to decline. Streamgages in about half the State (primarily central and eastern portions) are recording flows below normal based on August flow statistics.

Groundwater levels continue to generally align with surface-water levels with most wells recording levels in the normal to below normal range. Because of significant recharge during the winter, eight out of nineteen wells are recording water levels in the normal range. Five wells are recording water levels well below normal.

The Office of Surface and Groundwater Supply Planning resides within the Water Division of the Virginia Department of Environmental Quality (DEQ). The Office consists of four programs, including Surface Water Investigations, Groundwater Characterization, Water Supply Planning, and Water Withdrawal Permitting (*See* Section III for summaries of programs). The Office of Surface and Groundwater Supply Planning collaborates with other state and federal programs to support local water resources planning. Significant programmatic highlights of the Office of Surface and Groundwater Supply Planning for 2009 include:

- Analysis of 189 surface water, 422 groundwater, and 62 Total Maximum Daily Load (TMDL) data sites (Section III.A.);
- Ten observation wells in southeast Virginia equipped with real time data collection platforms (Section III.B.);
- Additional new real time wells installed in Northumberland and New Kent Counties (Section III.B.);
- Development of Virginia Spring Database and continued geophysical logging activities (Section III.B.);
- Receipt of three (3) local water supply programs and funding of 18 regional water supply plan development projects (Section III.C.);
- Funding of four (4) wellhead protection implementation grant projects (Section III.C.);
- Management of 254 active groundwater withdrawal permits and 123 active permit applications (Section III.D.);
- Management of 67 active Virginia water protection permits and 12 active permit applications (Section III.D.);
- Development of electronic reporting option leads to improved reporting under Water Withdrawal Reporting Regulation (Section IV.);
- Public water supplies continue to account for the greatest percentage of the total water use in Virginia (Section IV.);
- Observation of decreased demands on surface and groundwater resources (Section V.);
- The Proposed Expansion of the Eastern Virginia Groundwater Management Area (Section VII.);
- Acknowledgement of the need for a secure source of funding for surface and groundwater supply planning (Section VII.);

Virginia's public health, environment, and economic growth depend on the availability of quality water resources. To assure water resources are available for future generations and the continued growth of Virginia, effective water resource management must continue to be premised on a process that improves the quality and quantity of water available to the Commonwealth.

II. CLIMATOLOGICAL CONDITIONS

This section of the report provides an overview of the climatological conditions affecting the status and condition of Virginia's Water Resources in the calendar year 2009 as well as current conditions in October 2010.

A. 2009 Climatic Conditions: VA State Climatologist Submittal 08/31/2010

As in July, the predominant source of rainfall throughout the Commonwealth in August was thunderstorm activity. Most of the thunderstorms were widely scattered, but some outbreaks covered larger areas. In either case, rainfall totals for August were highly variable, with one location becoming inundated while a nearby spot remained virtually untouched.

Average total accumulations for the three southwestern-most Drought Regions (Big Sandy, New River and Roanoke) were well above normal for August, and five other Regions ended at normal or above average accumulations. Statewide, the average was above normal. These averages belie the fact that many individual locations received scant moisture. Two Regions in Tidewater were especially dry, Southeast Virginia and York-James, with less than two-thirds and less than one-half normal, respectively. Taken together, rainfall for the entire summer [climatological summer = June through August] averaged well below normal across Virginia (79% statewide). Only three Regions reached near normal values while the York-James Region was below 50%.

Unusually high temperatures for August (and the entire summer) led to higher rates of evapotranspiration, with even more moisture loss than the already high rates of a typical summer. In many portions of the state, this summer was the hottest on record. Based on preliminary data across the state, the average summer temperature was the highest seen in Virginia in at least 116 years.
With the high point of the hurricane season upon us, the likelihood of receiving significant moisture across a large portion of the Commonwealth from tropical systems and their remnants is increasing. Activity in the tropics increased markedly during August and numerous opportunities for tropical moisture are presenting themselves. This is in keeping with forecasts of an active hurricane season.

B. 2010 Climatic Conditions to Date: 09/15/2010 Drought Monitoring Task Force Report

Precipitation across the State has been below normal except in the far southwest portion of the State. Because of the limited precipitation, streamflow has continued to decline to levels that can be supported by groundwater discharge. Streamgages in about half the State (primarily central and eastern portions) are recording flows below normal based on August flow statistics.

Groundwater levels continue to generally align with surface-water levels with most wells recording levels in the normal to below normal range. Because of significant recharge during the winter, eight out of nineteen wells are recording water levels in the normal range. Five wells are recording water levels well below normal.

III. PROGRAM SUMMARIES

The Office of Surface and Groundwater Supply Planning consists of four programs: Surface Water Investigations, Groundwater Characterization, Water Supply Planning, and Water Withdrawal Permitting.

A. Surface Water Investigations Program

DEQ and the United States Geological Survey (USGS) are the primary agencies responsible for collecting hydrologic data in Virginia. The two agencies work cooperatively to provide a comprehensive picture of real-time and historical hydrologic conditions in the Commonwealth. The mission of the Surface Water Investigations Program (SWI) is to collect systematic and reliable hydrologic data regarding the quantity of surface water and elevation of groundwater in the Commonwealth. This is accomplished through a network of real-time satellite telemetry gaging stations and is essential for the successful planning and management of the Commonwealth's water resources.

In 2009, SWI field personnel monitored 74 surface water gages (Figure 1) on an eight week schedule, servicing the real-time satellite equipment and measuring streamflow ("discharge"). Over 500 discharge measurements were made by SWI personnel for the gaging station network in 2009. Stream depth, width and velocity are measured in the waterway to determine discharge. From these measurements, a rating curve is developed by correlating discharge with water level in the stream ("gage height"). The gage height is recorded by a data logger located in a permanent gage house every 15 minutes, saved and transmitted to the USGS database hourly by satellite telemetry, converted into discharge, then updated on the USGS website (http://waterdata.usgs.gov/va/nwis/rt).

Under the Clean Water Act the EPA requires that each state develops a list of impaired water bodies and then to conduct a TMDL or "Total Maximum Daily Load" analysis to determine the maximum amount of a pollutant causing impairment to a body of water can have and still meet water quality standards. A TMDL calculation must account for seasonal variation in flow because of the affect it has on water quality. The SWI program is a major component of the Commonwealth's TMDL program, because it is able to provide flow data. In 2009, SWI measured flow at 62 miscellaneous TMDL sites.

The SWI office also provides reliable information on the elevation of the groundwater in the Commonwealth to help determine its avalability. Field personnel monitor 42 real-time groundwater stations (Figure 1). They measure the groundwater elevation and service the satellite data collection platforms on a 6-8 week schedule. There are also 163 quarterly taped and 35 yearly taped groundwater wells that are not real-time. Some of the sites were drilled by DEQ personnel while most were reclaimed from abandoned or discontinued public, private, or industry owned wells. The wells are maintained by SWI personnel. The USGS provided water level data for an additional 227 wells. These data are available online at http://groundwaterwatch.usgs.gov/StateMaps/VA.html.

The groundwater and streamflow data are published in an annual report. In the 2009 report, SWI and USGS analyzed a total of 189 streamflow data sites and 422 groundwater sites. These data were

reviewed, approved, and published with final stream discharge and groundwater elevation available through the USGS Water Data website at http://wdr.water.usgs.gov/wy2007/search.jsp.

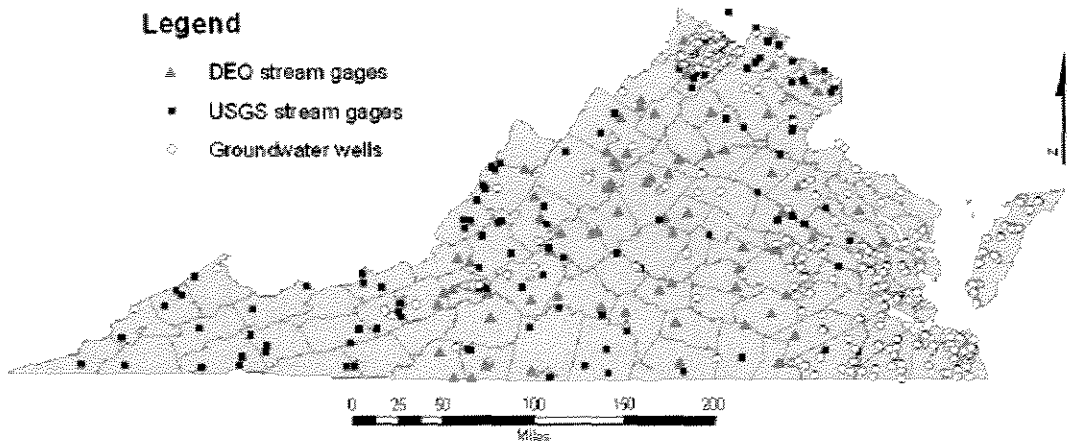


Figure 1: State-wide stream gages and observation wells.

III.B Groundwater Characterization Program

DEQ established the Groundwater Characterization Program (GWCP) in response to water supply impacts experienced by many localities, businesses, and domestic well users during the drought of 2002. The organizational objective of the GWCP is to protect Virginia's environment and promote the health and well being of its citizens by collecting, evaluating, and interpreting technical information necessary to manage groundwater resources of the Commonwealth. The GWCP staff works to assure that necessary information is available to support resource management decisions and water supply planning activities, assess groundwater availability, facilitate drought monitoring, and provide technical support for the expansion or creation of groundwater management areas. The GWCP staff conducts outreach and education efforts concerning a wide range of groundwater related issues. Providing educational outreach to members of the Commonwealth is seen as one of the most important opportunities in gaining awareness of the wide range of viewpoints and issues affecting the region.

Long term goals for the GWCP include expansion of the State Observation Well Network west of the fall line and in Virginia's Northern Neck peninsula, and publication of regional groundwater resources reports. Funding for the expansion of the State Observation Well Network remains a challenge but DEQ continues to look for opportunities to collaborate with local governments and the USGS Virginia Water Science Center on this effort. The GWCP continues to maintain and provide data from 11 real time State Observation Wells established from this expansion effort. During the 2009 calendar year, ten (10) observation wells in the southeastern portion of the Coastal Plain were equipped with real time data collection platforms as part of an ongoing investigation with the USGS that is designed to monitor and evaluate the regional re-equilibration of the potentiometric surface in the Potomac Aquifer subsequent to the closing of the International Paper Company in Franklin Virginia. Real time data collected from these wells will provide valuable information regarding aquifer recovery in this highly stressed portion of the Potomac Aquifer. Additional new real time wells were installed in Northumberland and New Kent Counties for the purpose of monitoring groundwater levels in the

Potomac Aquifer in the Northern Neck and Middle Peninsula. Information obtained from observation well networks is used to help guide groundwater management decisions, aid in the development of a conceptual regional hydrogeologic framework for the Coastal Plain, and aid in the development of regional groundwater resources reports. The regional report format will present Virginia groundwater resources based on regional and sub-regional groundwater flow systems rather than by political boundaries, will document and describe the geologic controls on the occurrence, movement, availability, and quality of groundwater in Virginia, and will summarize current groundwater withdrawal rates and trends. Draft reports for Valley and Ridge/Cumberland Plateau, and Piedmont/Blue Ridge are under development with an anticipated draft completion date of December 2010. When completed, the regional reports will be made available to the public via the GWCP web site (http://www.deq.virginia.gov/gwcharacterization/homepage.html).

Groundwater Resources Reports

Eighteen Groundwater Resources Reports, completed in the late 1970's and early 1980's by the State Water Control Board, are currently available on the GWCP web page. These reports document the availability, utilization rates, and water quality of groundwater resources within selected counties and political sub-regions of Virginia. To this day, these groundwater resource reports are the only readily available published source of information pertaining to the occurrence, movement, and availability of groundwater for a large number of the investigated areas.

Statewide Water Well Construction and Geochemical Databases

Water well construction information is vital for understanding and describing local and regional groundwater systems. In 2007 and 2008, the GWCP compiled a GIS database of approximately 35,000 historic well construction records. Each record describes in varying detail the location and physical properties of the well and the water-bearing properties of the geologic material in which the well is completed. These records include information from the State Water Control Board (SWCB), DEQ, USGS, The Virginia Department of Geology and Mineral Resources (VDGMR), and the Virginia Department of Health (VDH). Considerable effort was invested to cull duplicate records and rectify a substantial number of wells with questionable coordinate information. Incorporation of new electronic well construction data from cooperating drillers into the GWCP dataset, as well as the incorporation of new public water supply well records forwarded to the DEQ by VDH, is ongoing. The current coverage of wells incorporated into the Statewide Well Construction Database is displayed in Figure 2.

In 2008, a geochemical database of groundwater samples was compiled and geo-referenced by GWCP staff. This database contains information about the natural geochemical conditions of groundwater throughout the Commonwealth from approximately 23,000 groundwater samples originating from approximately 12,400 wells. Sample data originated from SWCB, USGS, VDH, and National Uranium Resource Evaluation (NURE) data, and has been consolidated and normalized to standard concentrations and uniform reporting units. The current coverage of the geochemical database sample locations is displayed in Figure 3.

The long-term success of the water well construction and geochemical databases as repositories for well construction, hydrogeologic, and geochemical information and as tools for facilitating hydrogeologic analysis within the Commonwealth is dependant on the continued addition of historic and new geo-referenced water well construction records. Currently, the absence of accurate well-head location requirements (coordinates) for domestic water well completion reporting forms means that the

thousands of residential wells drilled annually have no readily usable spatial representation. Consequently, there is no efficient way to analyze the residential demands on local groundwater systems or of effectively analyzing the local geologic controls on these systems. Such a reporting requirement along with the option of electronic form submittal would provide a means for such analyses. The GWCP continues to endorse this reporting requirement by educating private well drillers about the importance of voluntarily reporting well coordinate information, and by encouraging the electronic submittal of water well completion reports to VDH so that the data can be more easily converted into a database format. The GWCP has also initiated an effort to actively pursue and incorporate existing georeferenced well construction information that is currently stored and managed electronically by drillers within the Commonwealth.

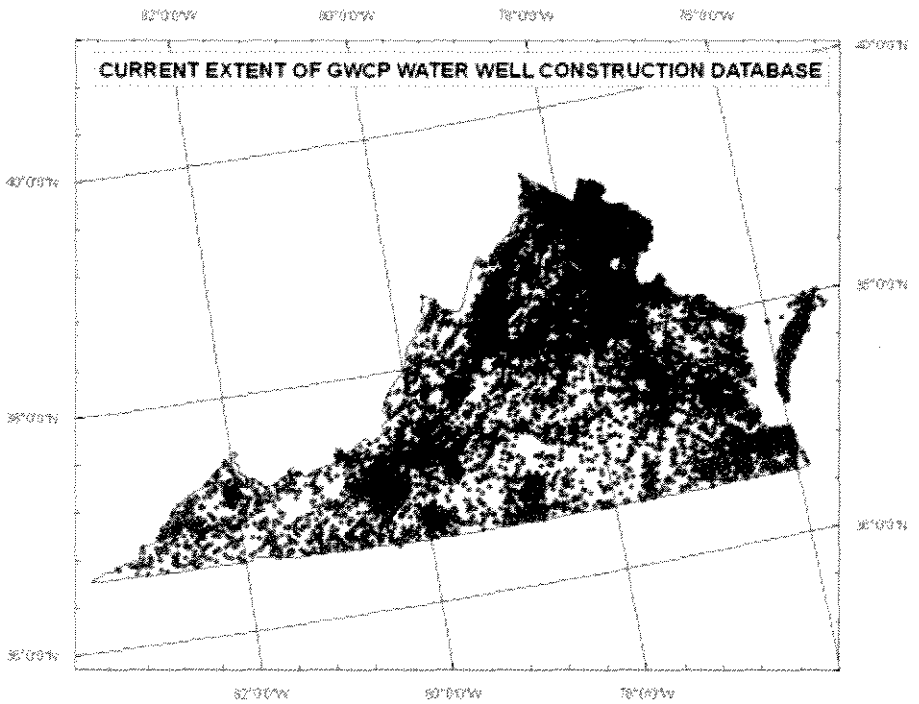


Figure 2: Current extent of GWCP well construction database.

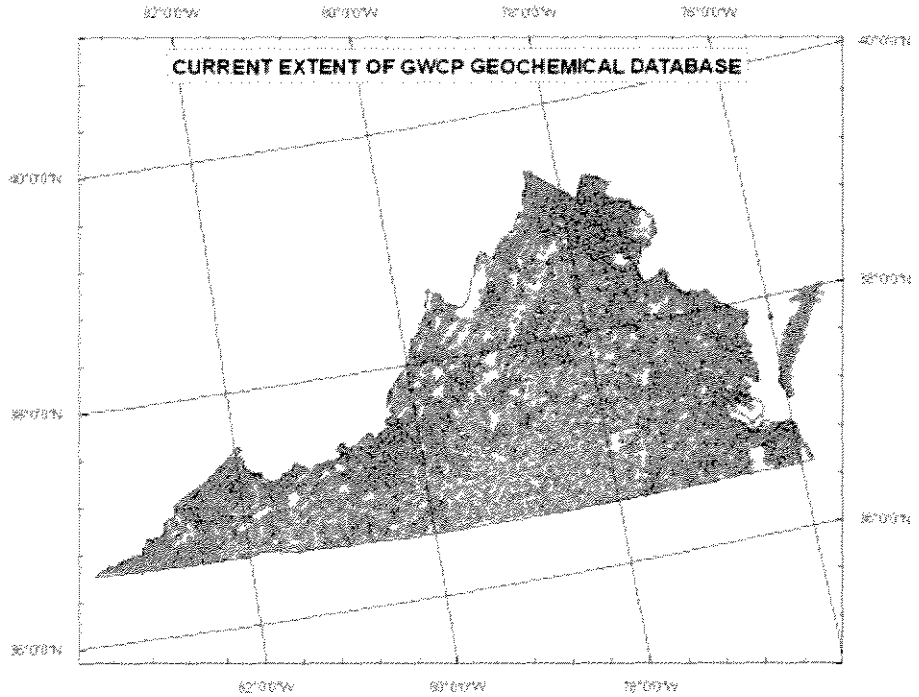


Figure 3: Current extent of GWCP geochemical database.

Virginia Spring Database

GWCP staff have initiated an effort to locate, characterize, and publish a database of springs throughout Virginia with an emphasis on the predominantly carbonate terrains of western Virginia. Springs are important water resources for municipalities, agriculture, and private landowners. Locations and discharge measurements of springs are important components of any hydrogeologic analysis and are increasingly sought after by resource managers. No comprehensive analysis of springs has been undertaken by the Commonwealth since 1930. A spring database structure was formalized in 2007 capable of meshing various historic datasets with more recent field measurements. The new spring database captures site location information, field measurements such as spring discharge, pH, specific conductance, total dissolved solids, dissolved oxygen and temperature, laboratory water quality analyses, scanned images of historic documents, and site photos. Since its inception in 2006, the spring database has grown from a little over 200 springs to 909 spring locations associated with over 2100 field measurements, and analyses from 331 water quality sampling events. Data sharing agreements have been worked out with sister agencies in the Virginia Department of Conservation and Recreation's Karst Program, Virginia Division of Mines Minerals and Energy, and the USGS in order to accelerate the acquisition of spring data and to prevent duplication of work. A quick and easy-to-use spring reporting form was developed for field personnel of sister agencies to inventory springs encountered during field work.

Geophysical Logging Activities

The GWCP, in cooperation with the USGS, operates a geophysical logging truck used for evaluating wells throughout the Commonwealth. The truck is equipped with borehole geophysical probes used for analyzing the structural, hydrogeologic, and geophysical properties of the host geologic formation(s) penetrated by the well. Borehole geophysical logging provides a means for acquiring

important information pertaining to well construction and condition, and is an effective technique for acquiring the geologic and hydrogeologic data required to better understand local and regional groundwater systems. In 2009, 20 wells were evaluated with geophysical and camera logs in the Commonwealth. Data from these logs were used to help bring non-permitted wells into compliance by documenting and describing groundwater resource conditions and through better management of local supply wells.

Technical Assistance and Education

GWCP staff frequently participate as speakers and educators at groundwater related events. Educational and speaking opportunities for the 2009 calendar year included the Virginia Water Well Association Annual Driller Conference, the Virginia Tech Advanced Operator Short School, the Great Valley Forum, the VDMR Annual Geologic Symposium, and numerous local groundwater related events. In addition to formal educational opportunities, GWCP staff routinely provide data and technical assistance to citizens, private businesses, and municipalities with groundwater resource related questions and concerns.

C. Water Supply Planning Program

November 2, 2009 marked the 4th anniversary of the implementation of the Local and Regional Water Supply Planning Regulation (9VAC 25-780). Ten local governments have elected to develop local water supply planning programs, including the counties of Amelia, Charles City, King George, New Kent, and Stafford, the City of Richmond, and the towns of Chincoteague, Hillsboro, Port Royal, and Warrenton. The remaining localities have committed to regional water supply planning (Figure 4). King George County formally submitted their local water supply planning programs by the applicable November 2, 2009 deadline.

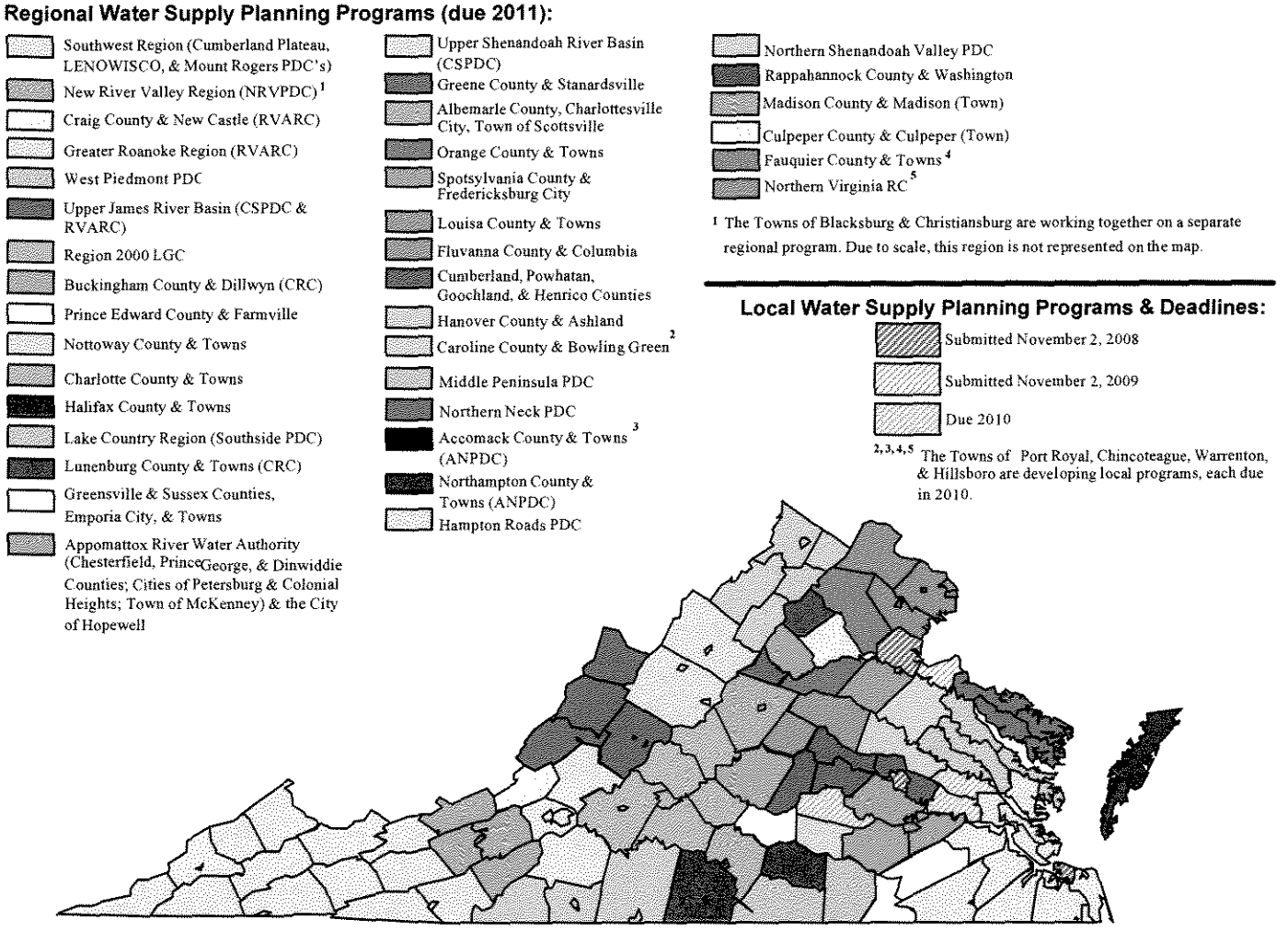


Figure 4: Local and regional water supply plan development status as of August 1, 2010.

Solid shading represents regional water supply planning partnerships with program submission deadlines of November 2, 2011 (Total = 38). Dashed shading indicates localities that have not regionalized, with local program submission deadlines of November 2, 2008, 2009, or 2010 (Total =10). The City of Norfolk is denoted by pink dashed shading as they submitted a local water supply program by November 2, 2008 and are also participating in the Hampton Roads PDC regional water supply plan

Based on the status of state-wide water supply plan development, it is anticipated that 13 regional draft plans will be submitted to DEQ for review and nine local and regional water supply programs will be formally submitted to the SWCB in 2010. All remaining regional water supply programs are due to the SWCB in 2011. (Appendix 3, Table 16).

Water Supply Planning Grant Funding Status

Since January 2006, DEQ's Water Supply Planning program has provided grants totaling $1,388,418 to partially fund water supply plan development efforts for a total of 59 local government authorities. DEQ awarded $90,000 in Fiscal Year 2010 to assist 18 regional water supply plan development projects.

Due to the state budget shortfall, Fiscal Year 2011 grant funds available to localities for initiation or continuation of water supply plan development activities were reduced to $80,000.

Wellhead Protection Implementation Grants

Since December 2005, DEQ and VDH have collaborated to provide grants totaling $638,702 to fund wellhead protection implementation projects at ten municipalities with groundwater based community water supplies. Localities benefiting from this funding are Accomack-Northampton PDC, James City Service Authority, Town of Lovettsville, Town of Stanley, Wythe County, Rye Valley Service Authority, Town of Burkeville, Augusta County Service Authority, Rockingham County, and the Town of New Market. The funding source is a combination of Federal Clean Water Act and Safe Drinking Water Act dollars. The projects are managed by DEQ.

D. Water Withdrawal Permitting Program

Groundwater Withdrawal Permitting Efforts

The Virginia Groundwater Act of 1973 recognized the duty of the SWCB to manage groundwater resources and declare management areas. Subsequently, two Groundwater Management Areas (GWMAs) were declared; the Eastern Virginia GWMA and the Eastern Shore GWMA (see Figure 5).

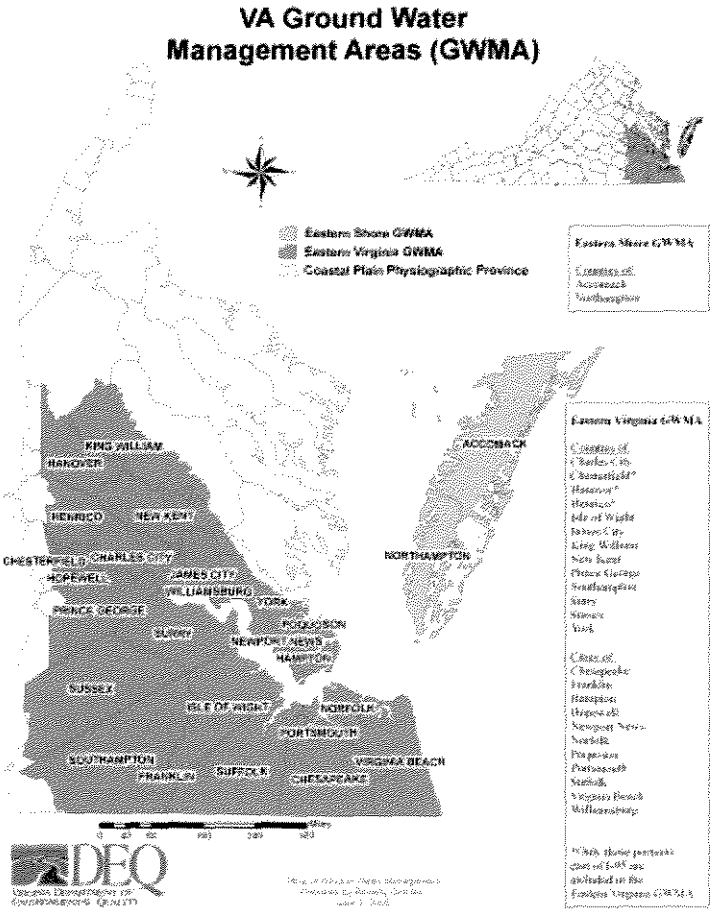


Figure 5: Groundwater Management Areas of Virginia

The permitting program operates under regulations developed pursuant to the Groundwater Management Act of 1992. Groundwater Withdrawal Permits are required in the management areas for any withdrawal in excess of 300,000 gallons in any month. Permit applications for new withdrawals or for increases to existing withdrawals are evaluated for sustainability, considering the combined impacts from all existing lawful withdrawals.

Applications for new or expanded withdrawals are recommended for denial in areas where the groundwater resource is predicted or identified through monitoring to be below resource protection limits established by regulation. Technical evaluations of impacts and resource sustainability are being conducted by Groundwater Modeling contractors. Groundwater Modeling contractors work closely

with Groundwater Permitting Program staff on proposed withdrawals to discuss technical requirements prior to application submission. Permit Program staff meet with all prospective permit applicants to discuss the permitting process and technical requirements prior to application submission. Through an ongoing collaborative effort with modeling contractors, Permit Program staff provides technical support to applicants by reviewing and providing comments on all proposals for field data collection in support of permit development. The areal extent of the two existing GWMAs results in regional permitting programs in the Tidewater and Piedmont Regional Offices. There are 254 active permits (Figure 6) and 123 active applications in process within GWMAs.

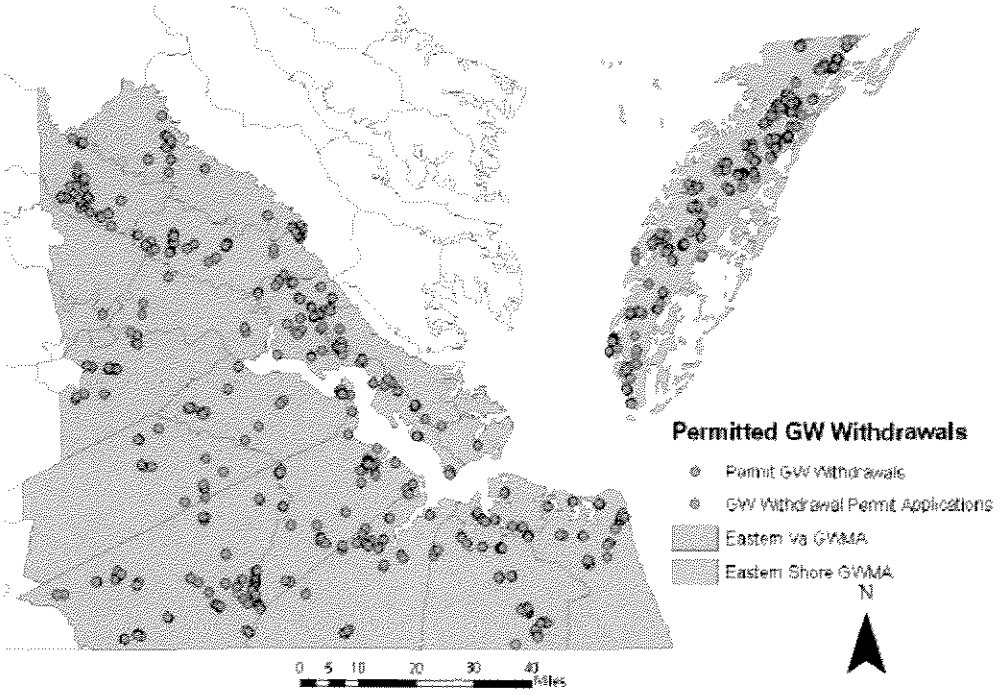


Figure 6: Permitted Groundwater Withdrawals Within Virginia's Groundwater Management Areas.

DEQ is required by the Groundwater Management Act of 1992 "to conserve, protect and beneficially utilize the groundwater of this Commonwealth and to ensure the public welfare, safety and health (VA Code§ 62.1-254.)" The confined aquifers of the Coastal Plain Aquifer System have historically yielded high rates of groundwater satisfying much of the area's industrial, commercial, municipal, and agricultural demands. Large withdrawals from these sand aquifers produce overlapping cones of depression and some interference among wells has occurred. In addition, decades of water level observations in these aquifers indicate a declining trend in water levels: water levels are falling at a rate of about 2 feet per year in the Middle Potomac aquifer.

On the regulatory front, DEQ proposed several changes to the Groundwater Withdrawal Regulations. The proposed revisions include: expansion of the Eastern Virginia Groundwater Management Area

(EVGWMA) to include the entire coastal plain (proposed expansion area shown in Figure 27 on page 39), and a number of revisions to improve the clarity and efficiency of the permitting process. The Notice Of Intended Regulatory Action for both proposed regulations were published concurrently in the Virginia Register on July 6, 2009. Three public meetings were held in August 2009 on the Eastern Shore, Williamsburg, and Spotsylvania County. A Regulatory Advisory Panel (RAP) was formed in 2010 and met six times. The draft regulatory language was adopted as a proposed regulation and authorized for public comment by the SWCB at the June 21, 2010 meeting.

Virginia Water Protection Permit Program Surface Water Withdrawal Permitting Efforts

Water withdrawal projects involve planning, coordination, modeling, and engineering long before any permits are obtained. DEQ's Office of Wetlands and Water Protection administers the Virginia Water Protection (VWP) Permit Program, and the Office of Surface and Groundwater Supply Planning assists that program and the public with such planning, coordination, and modeling.

Projects involving surface water impacts from surface water withdrawals, related permanent structures, fill, excavation, or back-flooding are regulated under the Virginia Water Protection Permit Program. The VWP Permit Program issues VWP permits for surface water impacts through use of the Joint Permit Application process. The regulation concerning water withdrawals and associated activities permitted under the VWP Permit Program is 9 VAC 25-210 *et seq*. The issuance of Virginia Water Protection Permits for surface water withdrawal activities is authorized under the VA Code §§62.1-44.15.20 and 62.1-44.15.22.

The VWP Permit Program serves as Virginia's Section 401 certification program for federal Section 404 permits issued under the authority of the Clean Water Act. The VWP program is also a separate regulatory program under State Water Control Law; thus, a federal permit action is not a pre-requisite of a VWP permit action. Section 404 permits are often required for the construction of dams and intake structures and for impacts to wetlands and streams. Application is made through the Joint Permit Application process for concurrent federal and state project review; although federal and state agencies may issue permits independently. As of the date of this report, there are 67 active VWP permits and 10 VWP applications for surface water withdrawals in process state-wide (Figure 7).

2009 surface water withdrawal planning and permitting efforts included:

- DEQ issued a VWP permit in 2009 to Iluka Resources for a water intake on the Meherrin River to be used for their Brink Mine.
- DEQ reissued a VWP permit in December 2009 to the Roanoke River Service Authority for a withdrawal from Lake Gaston.
- DEQ reissued a VWP permit in January 2010 to Stafford County for the operation of Smith Lake on Aquia Creek.
- DEQ continued to develop a VWP permit for a combined water supply system for the Amherst County Service Authority in 2009. A final permit was issued in May 2010.
- A Joint Permit Application was received in 2009 for the Traditions at Stonehouse Golf Club in James City County. The VWP permit was issued in June 2010.
- DEQ issued a VWP permit to Williamsburg National Golf Club for a water withdrawal from Powhatan Creek. The VWP permit was issued in February 2010.

- An application for permit reissuance for Dominion Power's Clover Power Station was received in 2009, and the permit was reissued in February 2010.
- DEQ received a Joint Permit Application from American Electric and Power Company in 2009 for the Claytor Hydroelectric Project. DEQ expects to issue a permit for the project in late 2010 or early 2011.

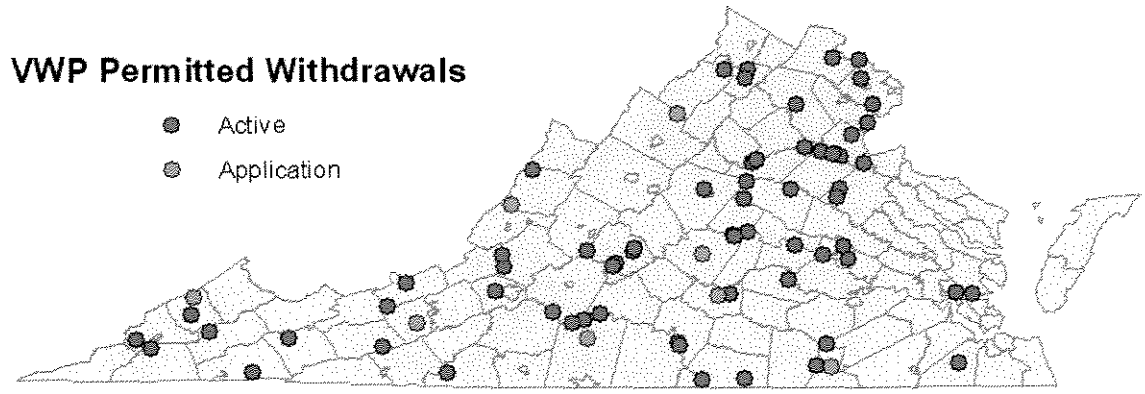


Figure 7: Current Virginia Water Protection (VWP) Active Permits and Applications for Surface Water Withdrawals across the Commonwealth

IV. SUMMARY OF WATER WITHDRAWALS IN 2009

The Virginia Water Withdrawal Reporting Regulation (9 VAC 25-200-10 *et seq*.) requires that individuals or facilities that withdraw water at volumes greater than 10,000 gallons per day (gpd)(one million gallons per month for crop irrigators) must measure and report annually to DEQ the monthly volume of water withdrawn. The Virginia Water Use Data System (VWUDS) contains withdrawal data collected since 1982 under this regulation. In 2008 DEQ began offering operators of withdrawals an electronic reporting option through a website in addition to the existing hard copy mailing method. DEQ received 2,412 water withdrawal reports electronically for 2009, which is 61% of the total number of reports received. This is about 100 more total submissions than received in 2008 and approximately 500 more than 2007. DEQ staff anticipates this number will continue to increase, resulting in a streamlined and convenient reporting process. Improvements to the website are planned that include features to allow operators to input withdrawals as they occur throughout the year and to view withdrawal reporting information from previous years.

The information presented below represents reported water withdrawals by category as set forth by the water withdrawal reporting regulation. The categories of water withdrawals identified in the VWUDS database include agriculture, commercial, irrigation, manufacturing, mining, power fossil, hydropower, nuclear power, and public water supply. Withdrawals of less than 10,000 gallons per day are exempt from the reporting requirements and are not included in this report.

Appendix 4 lists the top 20 individual non-power generating water withdrawals ranked by the amount of their 2009 reported withdrawals. Figures for power generation, including fossil fuel, nuclear, and hydro are not provided in this report. Hydropower withdrawals are largely non-consumptive water uses and are no longer tracked in VWUDS. However, fossil fuel and nuclear power utilize water for cooling and are considered consumptive. Improvements in the VWUDS database are anticipated in calendar year 2010. Water use information for these two categories will be available in future reports. The sum of all reported withdrawals (Figure 8) in Virginia in 2009 is equal to approximately 1.25 billion gallons per day, down by approximately 22 million gallons per day from the 2008 total. The relative contribution of surface and groundwater sources to 2009 non-power generation shows that large water demands are primarily met by surface water sources. Users of groundwater sources outnumber surface water users; however, the amount of groundwater withdrawn from aquifers is less than is withdrawn from streams and reservoirs. Figure 9 and figure 10 display the 2009 total withdrawals by locality (county or city) for groundwater and surface water, respectively.

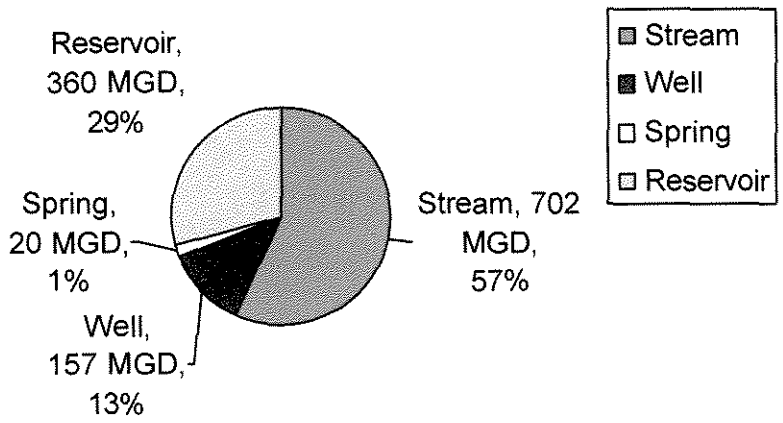


Figure 8: Total Water Withdrawals by Source in 2009

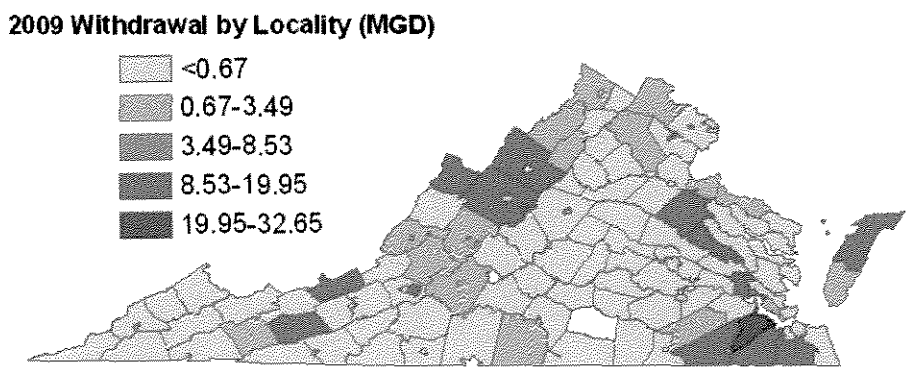


Figure 9: 2009 Total Groundwater Withdrawals by Locality (County or City)

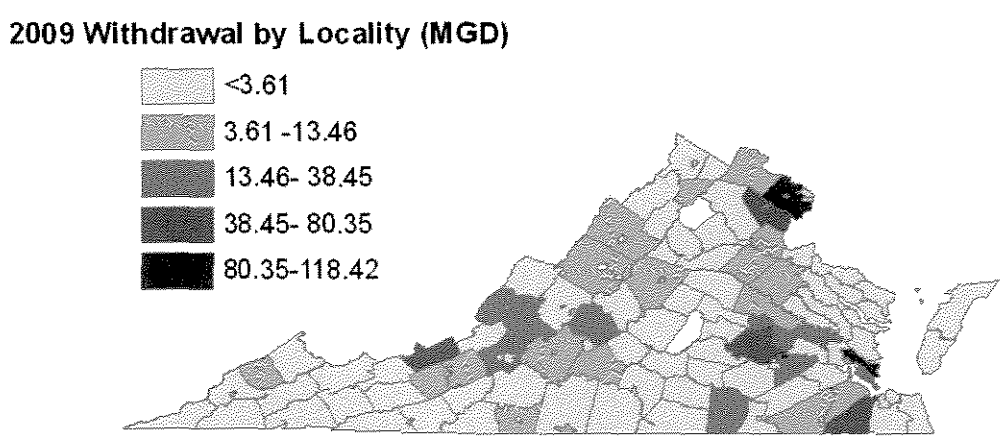
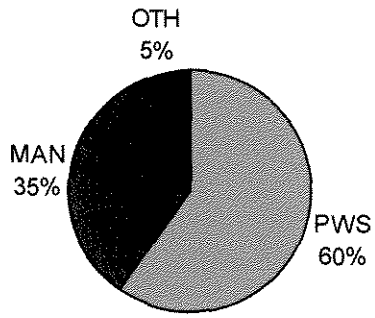


Figure 10: 2009 Total Surface Water Withdrawals by Locality (County or City)

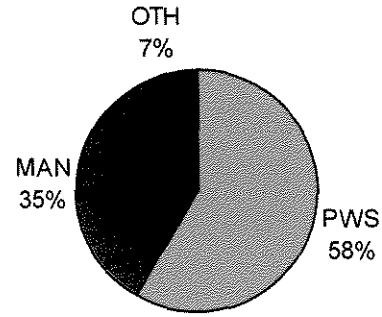
Figure 11 summarizes 2009 water withdrawals in Virginia by category along with the average water use from 2005 – 2009 by category. Figure 11(a) shows the total water withdrawals in 2009 by category with public water supplies accounting for the greatest percentage (60%) of the total groundwater and surface water withdrawals in Virginia. Manufacturing uses in 2009 comprised 35% of the total groundwater and surface water withdrawals. Figure 11(d) shows the average total water withdrawals by category over the past five years (2005 – 2009). A comparison of 2009 (Figure 11(a)) versus the five-year average water withdrawals (Figure 11(d)) shows a similar pattern of use, with the percentage of 2009 total withdrawals for public water supply being 2% higher than the five-year average percentage of total withdrawals for public water supply.

Figure 11(b) and (e) show groundwater withdrawals by category, illustrating that the distribution of 2009 groundwater withdrawals by category is similar to the average distribution of groundwater withdrawals over the past five years. Public water supply withdrawals account for a slightly higher percentage of the total groundwater withdrawals in 2009 when compared with the five year average. A larger percentage of groundwater withdrawals are used for agriculture and irrigation than the percentage of surface water withdrawals used for these purposes. However, the actual volume of surface water used for irrigation is more than twice the volume of groundwater used for irrigation. Figure 11(c) and (f) show the distribution of surface water withdrawals by category, illustrating that the pattern of water use in 2009 closely resembles water use over the past five years. Public water supply and manufacturing constitute 63% and 33% of the 2009 total surface water withdrawal, respectively.

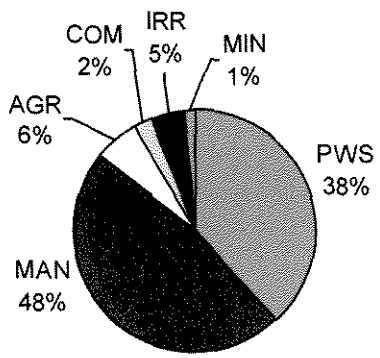
Figure 11: (a)-(c) 2009 Water Use by Category and (d)-(f) Average Water Use from 2005-2009 by Category (AGR=agricultural, COM=commercial, IRR=irrigation, MAN=manufacturing, MIN=mining, PWS=public water supply)



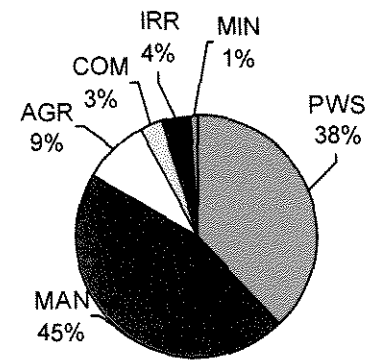
(a) 2009 Total Water Withdrawals by Category (2009 Total Withdrawals = 1,247 MGD)
OTH: IRR 2%, MIN 1%, AGR 1%, COM 1%



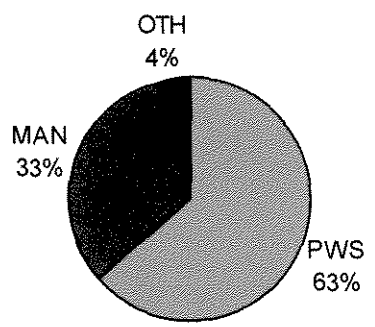
(d) Average Total Water Use by Category for 2005-2009 (Avg. Total Use = 1,355 MGD)
OTH: IRR 2%, MIN 2%, AGR 2%, COM 1%



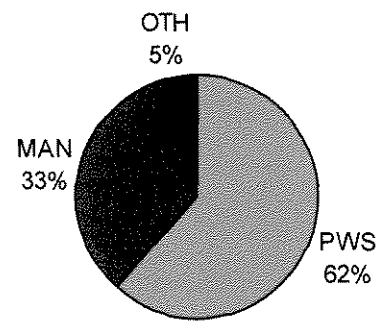
(b) 2009 Groundwater Use by Category (2008 Groundwater Use = 183 MGD)



(e) Average Groundwater Use by Category for 2005-2009 (Avg. Groundwater Use = 199 MGD)



(c) 2009 Surface Water Use by Category (2009 Surface Water Use = 1,063 MGD)
OTH: IRR 2%, MIN 1.5%, COM 0.5%



(f) Average Surface Water Use by Category for 2005-2009 (Avg. Surface Water Use = 1,156 MGD)
OTH: IRR 1.5%, MIN 2%, AGR 0.5%, COM 1%

V. RECENT TRENDS IN WATER WITHDRAWALS IN VIRGINIA

A summary of the water withdrawal data from the VWUDS for the years 2005 through 2009 is presented in Table 1. The data are aggregated by category of use and by source water type.

Table 1: Virginia Water Use Summary 2005-2009

	Category	2005 MGD	2006 MGD	2007 MGD	2008 MGD	2009 MGD	Average MGD	Difference between 2009 and average water withdrawals quantified in millions of gallons per day (MGD)	% change in 2009 water withdrawals from average water withdrawals
Ground Water	Agriculture	20.9	21.9	22.6	15.0	10.8	18.3	-7.5	-41%
	Irrigation	4.4	7.9	6.9	9.5	8.3	7.4	0.9	12%
	Commercial	6.5	6.1	6.3	6.2	4.4	5.9	-1.5	-25%
	Mining	2.5	2.0	2.1	1.6	2.3	2.1	0.3	12%
	Manufacturing	93.3	92.3	83.9	93.4	87.2	90.0	-2.8	-3%
	Other	0.3	0.3	2.7	0.4	0.5	0.8	-0.4	-42%
	Public Water Supply	73.4	76.9	81.1	73.2	70.3	75.0	-4.7	-6%
	Total GW	201.4	207.4	205.6	199.2	180.6	199.5	-15.6	-8%
Surface Water	Agriculture	5.7	6.8	1.0	5.8	0.8	4.0	-3.2	-81%
	Irrigation	14.9	13.8	23.0	22.3	19.1	18.6	0.5	3%
	Commercial	10.5	14.7	11.8	7.4	5.5	10.0	-4.5	-45%
	Mining	27.3	20.1	17.7	17.2	17.7	20.0	-2.3	-11%
	Manufacturing	422.2	394.1	395.1	377.7	346.5	387.1	-40.6	-10%
	Other	4.7	4.1	2.6	1.5	1.2	2.8	-1.7	-59%
	Public Water Supply	752.4	753.4	752.2	637.3	672.2	713.5	-41.3	-6%
	Total SW	1237.7	1207.0	1203.3	1069.3	1062.9	1156.0	-93.1	-8%
TOTAL	Agriculture	26.6	28.7	23.6	20.8	11.6	22.3	-10.7	48%
	Irrigation	19.4	21.7	30.0	31.8	27.4	26.0	1.4	5%
	Commercial	17.0	20.9	18.1	13.6	9.9	15.9	-6.0	-38%
	Mining	29.8	22.0	19.8	18.8	20.0	22.1	-2.0	-9%
	Manufacturing	515.5	486.4	479.0	471.1	433.8	477.2	-43.4	-9%
	Other	5.0	4.4	5.2	1.9	1.6	3.6	-2.0	-55%
	Public Water Supply	825.8	830.3	833.3	710.5	742.5	788.5	-46.0	-6%
	Total	1439.0	1414.4	1408.9	1268.5	1243.5	1354.9	-108.7	-8%

VI. CATEGORIES OF WATER WITHDRAWALS IN VIRGINIA

The information in this section illustrates the water use for individual categories over the last five years (2005 – 2009). Two issues should be considered while interpreting the data presented on the following pages:

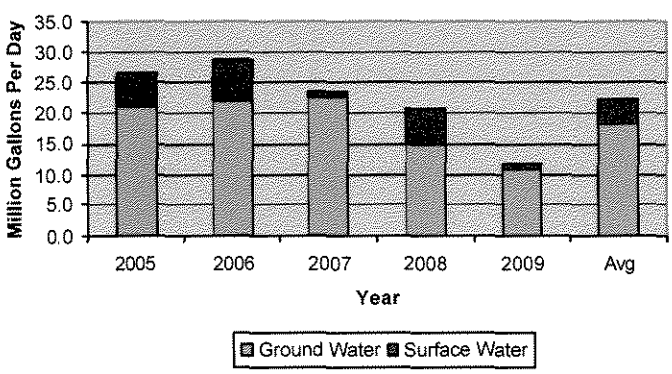
Transfers of water: Water withdrawn in the Commonwealth may be used by the withdrawing entity or locality, or it may be *transferred* to another entity/locality. The water use presented in this report is compiled from database records that detail water withdrawn by a locality or entity (withdrawals), water transferred to another locality (*releases*), and water purchased from another locality (*receipts*). In theory, the total amount of water reported as *released* should equal the total reported as *received*. In reality, reported receipts in the state are 20-25% less than the amount reported as released. This discrepancy is most likely a result of low reporting rates from facilities that purchase water. In order to avoid double counting, this report will generally refer to "water use" as synonymous with "water withdrawn", and any reporting or illustration of water transfers will be clearly marked as "water transferred." The information for categories of water withdrawals with significant transfers of water includes a table presenting the amount of water purchased along with the seller and purchaser of the water. A summary of how water transfers are stored in the database can be found in Appendix 5.

Further inquiries into specific users, certain aspects of the VWUDS database or reporting requirements may help to explain some of the apparent trends. Specific questions about the data presented in this report can be directed to the Office of Surface and Groundwater Supply Planning.
http://www.deq.virginia.gov/watersupplyplanning/WaterUseData.html

A. Agricultural Water Withdrawals in Virginia

Agriculture includes operations such as commodity farms, fish farms, and hatcheries. Figure 12 shows the state-wide total of groundwater and surface water use for agriculture from 2005-2009. Groundwater is the major source of water for agriculture. There are no major transfers of water for agricultural purposes, so the water withdrawals also represent water use. Reported use in 2009 was substantially lower than previous years due partially to Coursey Springs Fish Hatchery being close for renovations. The total reported 2009 agricultural withdrawal was below the historical average by approximately 48% continuing a declining trend since 2006. Table 2 shows the largest agricultural water withdrawals in 2009. The withdrawals listed in this table account for 94% of all agricultural water use in the state. A substantial portion of reported withdrawals now include sub-category information in VWUDS. All sub-categories of agriculture are listed in Table 3. In 2009 the largest agricultural withdrawals reported occurred in the counties of Highland, Rockbridge, Clark and Warren Counties in the Valley region; Sussex, Surry and Charles City counties in the Piedmont region; Northampton County in the Tidewater region; Wythe County in the Southwest region; and Lunenburg County in the South Central region of the State (Figure 13) .

Figure 12: 2005-2009 Agricultural Water Withdrawals by Source Type, Absolute Change in Withdrawals in Million Gallons per Day (MGD), and Percent Change in Withdrawals



Source Type	2005 MGD	2006 MGD	2007 MGD	2008 MGD	2009 MGD	Avg. MGD	Abs. change[1] (MGD)	% change[2]
Total GW	20.9	21.9	22.6	15.0	10.8	17.6	-7.5	-41%
Wells	0.4	0.5	0.5	0.6	0.6	0.5	0.1	16%
Springs	20.5	21.4	22.1	14.5	10.2	17.1	-10.2	-60%
Total SW	5.7	6.8	1.0	5.8	0.8	4.0	-3.2	-81%
Streams	5.7	6.8	1.0	5.8	0.8	4.0	-3.2	-81%
Reservoirs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%
TOTAL GW+SW	26.6	28.7	23.6	20.8	11.6	21.6	-10.7	-48%

[1] Abs change = difference between 2009 water withdrawals and average water withdrawals (MGD)

[2] % change = percent change in 2009 water withdrawals from average water withdrawals

Table 2: Top Water Withdrawals for Agriculture in 2009

Owner Name	Facility	City/County	Type	Source	Avg. MGD[3]	2009 MGD
Virginia Trout Company Inc	Terry Place Plant	Highland	GW	Blue Spring	3.7	4.0
Commonwealth of Virginia	Wytheville Fish Hatchery	Wythe	GW	Boiling and West Springs	3.8	3.3
Virginia Trout Company Inc	Monterey Plant	Highland	GW	Vandevender Spring	2.3	2.4
Commonwealth of Virginia	Front Royal Fish Station	Warren	SW	Passage Creek	0.8	0.7
Commonwealth of Virginia	Montebello Fish Station	Nelson	SW/GW	Mill Creek, Spring	0.4	0.5

[3] Avg. MGD = Average water withdrawals from 2005-2009 (MGD)

Figure 13: 2009 Agricultural Water Withdrawals in Million Gallons per Day (MGD) by Withdrawal Point.

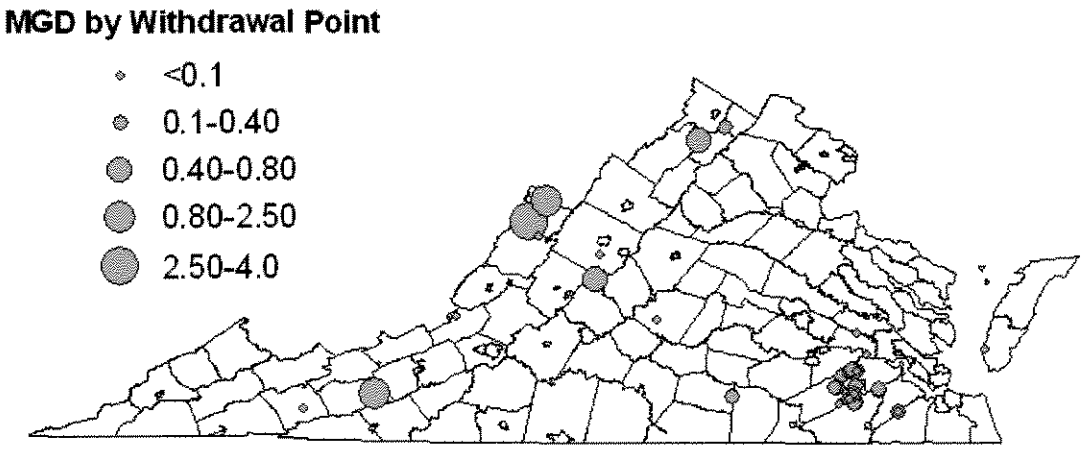


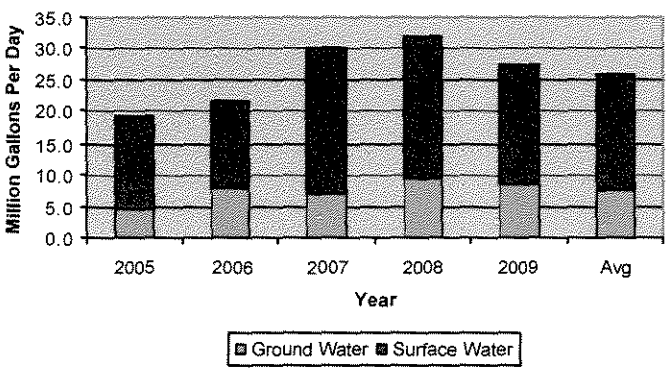
Table 3: Sub-Categories of Agriculture

General Sub-Category	Sub-Category Group	Specific Sub-Category
Agricultural Production-Livestock	Animal Specialties	Animal aquaculture
		Animal specialties not elsewhere classified
		Fur-bearing animals and rabbits
		Horses and other equines
	Dairy Farms	Dairy farms
	General Farms, Primarily Animal	General farms, primarily animal
	Livestock, Except Dairy and Poultry	Beef cattle feedlots
		Beef cattle, except feedlots
		General livestock not classified
		Hogs
		Sheep and goats
	Poultry and Eggs	Broiler, fryer, and roaster chickens
		Chicken eggs
		Poultry and eggs not classified
		Poultry hatcheries
		Turkeys and turkey eggs
Agricultural Services	Animal Services, Except Veterinary	Animal specialty services
		Livestock services, except veterinary
	Crop Services	Cotton ginning
		Crop harvesting
		Crop planting and protecting
		Crop preparation services for market
	Farm Labor and Management Services	Farm labor contractors
		Farm management services
	Landscape and Horticultural Services	Landscaping counseling and planning
		Lawn and garden services
		Ornamental shrub and tree services
	Soil Preparation Services	Soil preparation services
	Veterinary Services	Veterinary services for livestock
		Veterinary services, specialties
Fishing, Hunting, and Trapping	Commercial Fishing	Finfish
		Miscellaneous marine products
		Shellfish
	Fish Hatcheries and Preserves	Fish hatcheries and preserves
	Hunting, Trapping, Game Propagation	Hunting, trapping, game propagation
Forestry	Forest Products	Forest products
	Forestry Services	Forestry services
	Timber Tracts	Timber tracts

B. Irrigation Water Withdrawals in Virginia

Irrigation withdrawals are used to promote growth in crops such as tobacco, corn, soybeans, turf grass, and ornamental nursery products. Figure 14 shows the state-wide total of groundwater and surface water withdrawals for irrigation from 2005-2009. Surface water is the major source of water for irrigation. There are no major transfers of water for irrigation, so the water withdrawals also represent water use. Reported water withdrawals for irrigation in 2008 increased by 5% from the average withdrawals over the past five years but decreased by 5% from 2008. Table 4 shows the top water withdrawals by specific source for irrigation in 2009. The majority of irrigation water withdrawals in 2009 occurred on the Eastern Shore where irrigation users in Accomack County accounted for 30% of the state-wide water withdrawals for irrigation. The majority of Accomack farms grow tomatoes, cucumbers, soybeans, and corn. Elsewhere in the state, localities with the largest irrigation withdrawals are the City of Chesapeake and the counties of Nelson, King William, Caroline, and Westmoreland (Figure 15). Table 5 lists all sub-categories of irrigation.

Figure 14: 2005-2009 Irrigation Water Withdrawals by Source Type, Absolute Change in Withdrawals in MGD, and Percent Change in Withdrawals



Source type	2005 MGD	2006 MGD	2007 MGD	2008 MGD	2009 MGD	Avg. MGD	Abs. change[1] (MGD)	% change[2]
Total GW	4.4	7.9	6.9	9.5	8.3	7.4	0.9	12%
Wells	1.4	1.7	3.2	2.6	2.4	2.3	0.1	5%
Springs	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0%
Reservoirs[3]	2.9	6.1	3.7	6.9	5.9	5.1	0.8	15%
Total SW	14.9	13.8	23.0	22.3	19.0	18.6	0.4	2%
Streams	8.7	7.1	13.9	14.6	11.8	11.2	0.6	5%
Reservoirs	6.3	6.7	9.2	7.6	7.3	7.4	-0.2	-2%
TOTAL GW+SW	19.4	21.7	30.0	31.8	27.4	26.0	1.3	5%

[1]Abs change = difference between 2009 water withdrawals and average water withdrawals (MGD); [2]% change = percent change in 2009 water withdrawals from average water withdrawals; [3]GW Reservoirs = irrigation ponds recharged by GW

Table 4: Top Water Withdrawals by Specific Source for Irrigation in 2009

Owner Name	Facility	City/County	Type	Source	Avg. MGD[1]	2009 MGD
Robert C Darby and Sons	Arbuckle Farms	Accomack	GW	6 Dug Ponds	2.4	3.4
E Phillip and David L Hickman		Accomack	SW/GW	13 Farm Ponds, 1 Dug Pond	2.6	2.4
Saunders Brothers, Inc.		Nelson	SW/GW	6 surface water sources, 1 groundwater source	0.9	0.9
John Yaros		Northampton	SW	14 surface water sources	0.9	0.9
Eagle Tree Farms		Westmoreland	SW	Pee Dee Creek, Rappahannock River	0.8	0.8

[1]Avg. MGD = Average water withdrawals from 2005-2009 (MGD)

Figure 15: 2009 Irrigation Water Withdrawals in MGD by Withdrawal Point

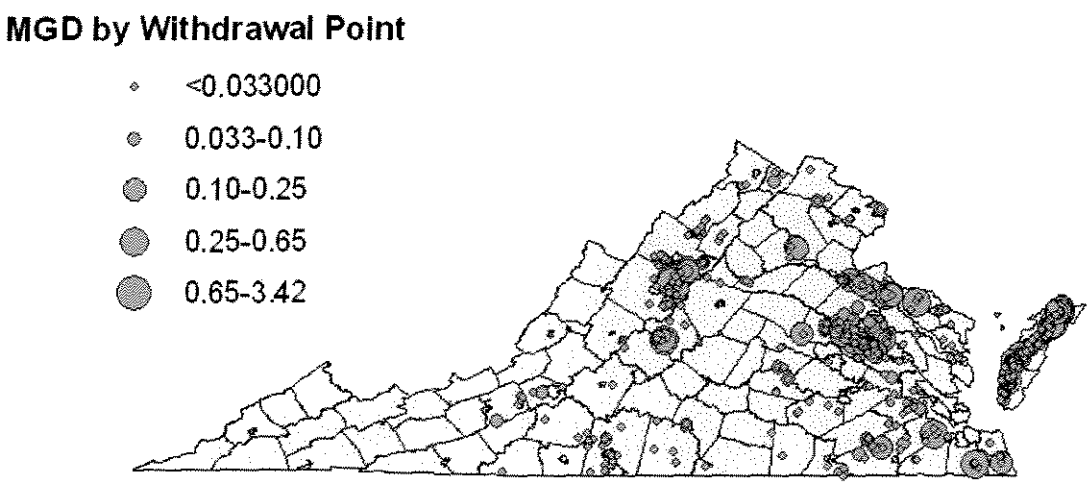


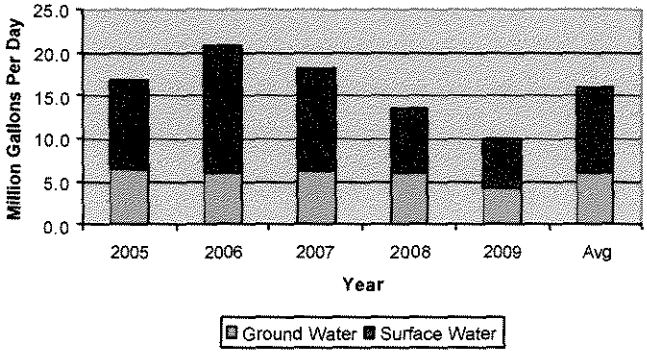
Table 5: Sub-Categories of Irrigation

General Sub-Category	Sub-Category Group	Specific Sub-Category
Agricultural Production-Crops	Cash Grains	Wheat
		Rice
		Corn
		Soybeans
		Cash grains not elsewhere classified
	Field Crops, Except Cash Grains	Cotton
		Tobacco
		Sugarcane and sugar beets
		Irish potatoes
		Field crops, except cash grains not elsewhere classified
	Vegetables and Melons	Vegetables and melons
	Fruits and Tree Nuts	Berry crops
		Grapes
		Tree nuts
		Citrus fruits
		Deciduous tree fruits
		Fruits and tree nuts not elsewhere classified
	Horticultural Specialties	Ornamental nursery products
		Food crops grown under cover
	General Farms, Primarily Crop	General farms, primarily crop

C. Commercial Water Withdrawals in Virginia

Commercial operations include golf courses, local and federal installations, hotels, and laundromats. Figure 16 shows the state-wide total of groundwater and surface water withdrawals for commercial purposes from 2005-2009. Surface water is typically the major water source for commercial operations. Total water withdrawals for commercial operations in 2009 decreased by 38% from the average withdrawals over the past five years. Commercial withdrawals across the Commonwealth have been declining since reaching a peak of more than 20 mgd in 2006. Top water withdrawals for commericial operations are listed in Table 6. In addition to water withdrawals, the total commercial water use in some counties also includes water transferred from elsewhere in the state (table 7, Figure 17). Sports and recreation clubs (*i.e.* private golf courses) represent 32% of the 2008 commercial use, while hotels/motels, and public golf courses each represent 21% and 18% of withdrawals, respectively (Table 8, Figure 18).

Figure 16: 2005-2009 Commercial Water Withdrawals by Source Type, Absolute Change in Withdrawals in MGD, and Percent Change in Withdrawals



Source Type	2005 MGD	2006 MGD	2007 MGD	2008 MGD	2009 MGD	Avg. MGD	Abs. change[1] (MGD)	% change[2]
Total GW	6.4	6.1	6.3	6.2	4.4	5.9	-1.5	-25%
Wells	5.4	5.1	6.2	5.3	4.4	5.3	-0.9	-16%
Springs	1.0	1.1	0.1	0.9	0.0	0.6	-0.6	-97%
Total SW	10.5	14.7	11.8	7.4	5.5	10.0	-4.5	-45%
Streams	4.5	8.1	3.6	3.1	2.5	4.4	-1.8	-42%
Reservoirs	6.0	6.7	8.2	4.3	3.0	5.6	-2.7	-47%
TOTAL GW+SW	16.9	20.9	18.1	13.6	9.9	15.9	-6.0	-38%

[1]Abs change = difference between 2009 water withdrawals and average water withdrawals (MGD)

[2]% change = percent change in 2009 water withdrawals from average water withdrawals

Table 6: Top Water Withdrawals for Commercial Operations in 2009

Owner Name	Facility	City/County	Type	Source	Avg. MGD[3]	2009 MGD
Wintergreen Partners, Inc.	Lake Monocan	Nelson	SW	Lake Monocan	1.0	1.0
Commonwealth of Virginia	James River Correctional Facility	Goochland	SW	James River, Beaverdam Creek	0.8	0.8
Colonial Williamsburg, Inc.	Colonial Williamsburg Hotel	Williamsburg	GW	6 wells	0.5	0.6
Colonial Downs Racetrack	Colonial Downs	New Kent	GW	NKD Wells	0.4	0.3
United States Navy	Dalhgren Naval Support Center	King George	SW	4 wells	0.3	0.3

[3]Avg. MGD = Average water withdrawals from 2005-2009 (MGD)

Table 7: Top Water Transfers for Commercial Operations in 2009

Source	Purchaser Owner Name	Purchaser Facility	Purchaser Location	2009 MGD
Commonwealth of Virginia-College of William and Mary	City of Williamsburg	Williamsburg Service Area	City of Williamsburg	0.39
Wintergreen Partners, Inc.-Lake Monocan	Nelson County Service Authority	Wintergreen Mt Service Area	Nelson County	0.37
Commonwealth of Virginia- James River Correctional Facility WTP	County of Goochland	Goochland Courthouse Service Area	Goochland County	0.15
York County	City of Newport News	Newport News Service Area	Newport News, City of	0.10

Figure 17: 2009 Commercial Water Withdrawals and Purchases in Million Gallons per Day (MGD)

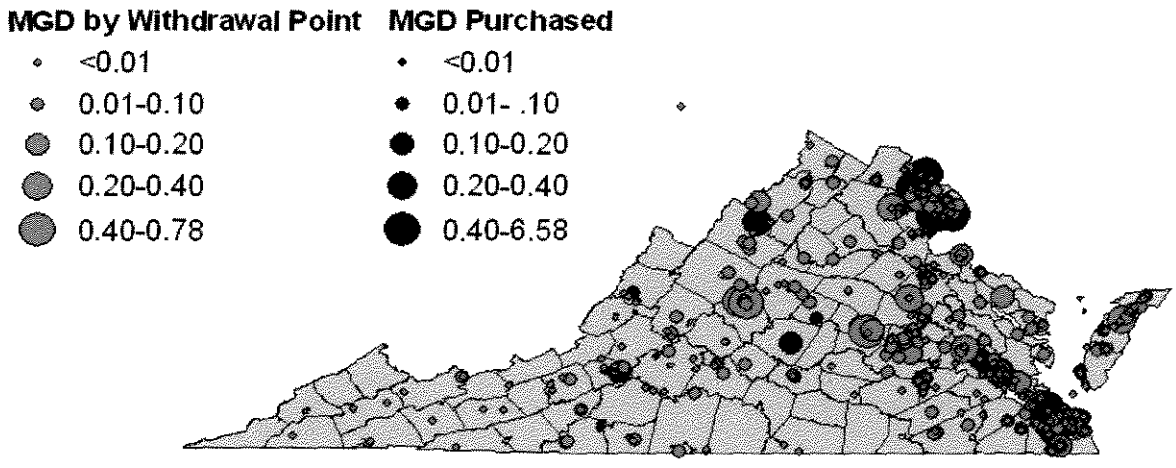
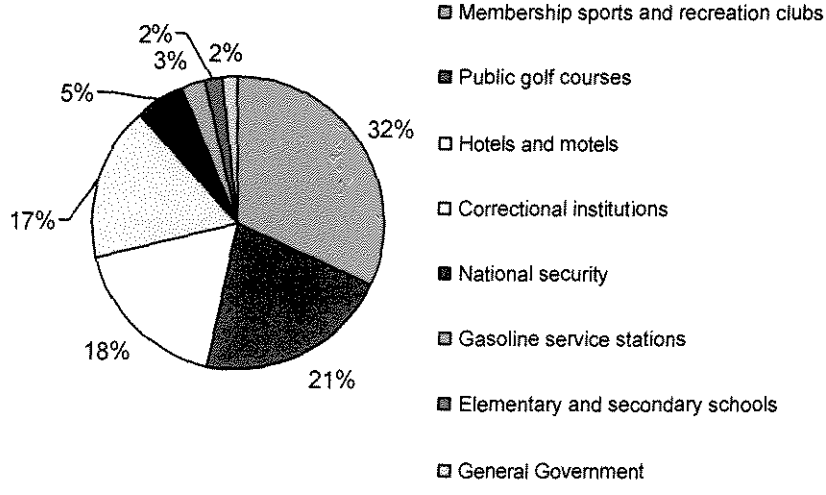


Table 8: 2005-2009 Commercial Water Withdrawals by Sub-Category

General Sub-Category	Specific Sub-Category	2005 MGD	2006 MGD	2007 MGD	2008 MGD	2009 MGD	Avg. MGD
Amusement and Recreation Services	Membership sports and recreation clubs	3.9	4.7	5.2	3.5	2.3	3.9
Hotels and Other Lodging Places	Hotels and motels	2.3	2.1	1.4	2.2	1.3	1.9
Amusement and Recreation Services	Public golf courses	2.5	5.9	3.1	2.5	1.5	3.1
Justice, Public Order, and Safety	Correctional institutions	1.6	1.6	1.6	1.4	1.2	1.5
National Security and Intl. Affairs	National security	2.0	2.4	3.0	0.4	0.4	1.6
Automotive Dealers/Service Stations	Gasoline service stations	0.1	0.1	0.1	0.2	0.2	0.1
Educational Services	Elementary and secondary schools	0.2	0.2	0.2	0.2	0.1	0.2
Executive, Legislative and General	General Government	0.0	0.1	0.2	0.2	0.1	0.1

(This table includes only the sub-categories that had > 0.1 MGD of withdrawals in 2009)

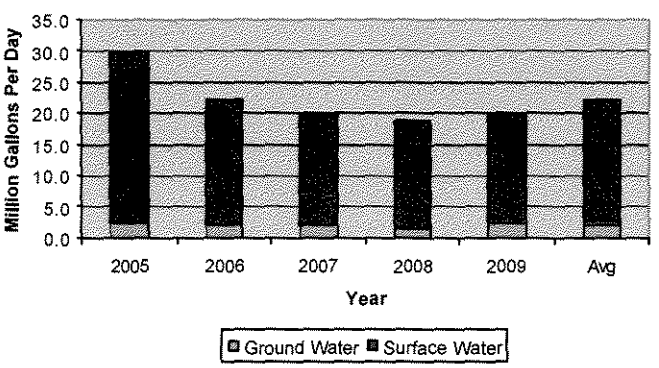
Figure 18: 2009 Commercial Water Withdrawals by Sub-Category



D. Mining Water Withdrawals in Virginia

Mining includes operations such as sand, rock, and coal mining. Figure 19 shows the state-wide total of groundwater and surface water withdrawals for mining from 2005-2009. The major source of water for mining is surface water. There are no major transfers of water for mining purposes, so the water withdrawals also represent water use. For 2009, mining water withdrawals decreased by 9% from the five-year withdrawal average. The localities with the highest mining related water withdrawals for 2009 included Hanover, King George, Giles, and Prince William Counties (Table 9, Figure 20). Crushed and broken granite activities accounted for 49% of the 2009 water withdrawals for mining. Crushed and broken limestone activities and construction sand and gravel activities each comprise 18% of the 2009 water withdrawals for mining. Table 10 and Figure 21 represent mining withdrawals by sub-category.

Figure 19: 2005-2009 Mining Water Withdrawals by Source Type, Absolute Change in Withdrawals in Million MGD, and Percent Change in Withdrawals



Source Type	2005 MGD	2006 MGD	2007 MGD	2008 MGD	2009 MGD	Avg. MGD	Abs. change[1] (MGD)	% change[2]
Total GW	2.5	2.0	2.1	1.5	2.3	2.1	0.2	11%
Wells	2.5	2.0	2.1	1.5	2.3	2.1	0.2	11%
Springs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%
Total SW	27.3	20.1	17.7	17.0	17.7	20.0	-2.2	-11%
Streams	16.3	13.1	9.3	10.4	8.3	11.5	-3.2	-28%
Reservoirs	11.0	7.0	8.4	6.6	9.5	8.5	1.0	11%
TOTAL GW+SW	29.7	22.0	19.8	18.5	20.0	22.0	-2.0	-9%

[1]Abs change = difference between 2009 water withdrawals and average water withdrawals (MGD)

[2]% change = percent change in 2009 water withdrawals from average water withdrawals

Table 9: Top Water Withdrawals for Mining in 2009

Owner Name	Facility	City/County	Type	Source	Avg. MGD[3]	2009 MGD
Martin Marietta Materials	Doswell Quarry	Hanover	SW	Quarry	1.6	2.2
Mid-Atlantic Materials, Inc.	King George Plant	King George	SW	Rappahannock River	1.4	2.0
APG Lime Corporation	Kimballton Plant 2	Giles	SW	Stoney Creek	1.4	1.7
Vulcan Constructions Materials	Manassas Plant	Prince William	SW	Pump Silting Basin #1	1.3	1.6
Boxley Materials Company	Blue Ridge Plant	Bedford	GW	Quarry Sump	1.2	1.3
Vulcan Construction Materials	Richmond Quarry	Henrico	SW/GW	James River, Well	1.1	1.3

[3]Avg. MGD = Average water withdrawals from 2005-2009 (MGD)

Figure 20: 2009 Mining Water Withdrawals in MGD by Withdrawal Point

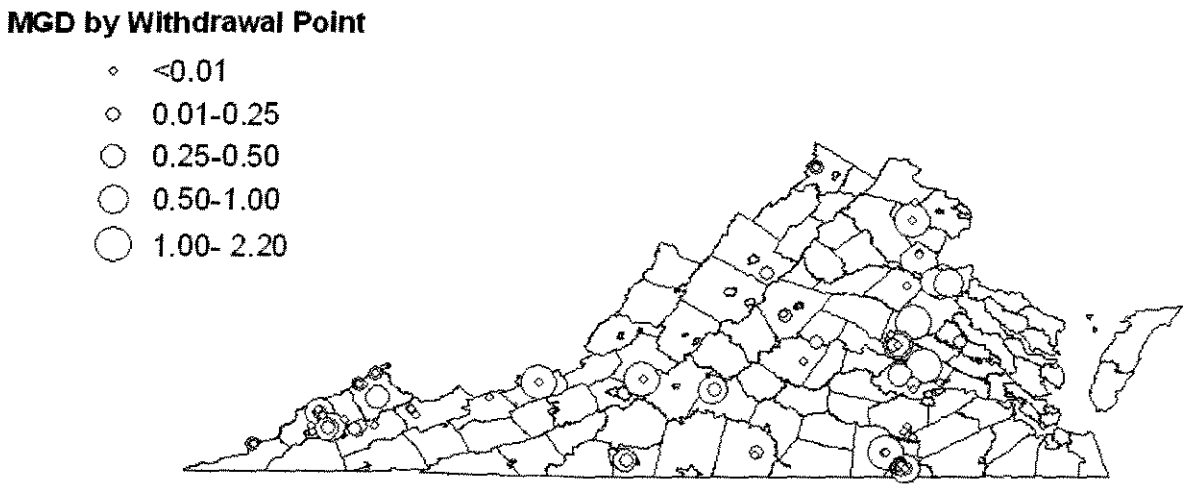
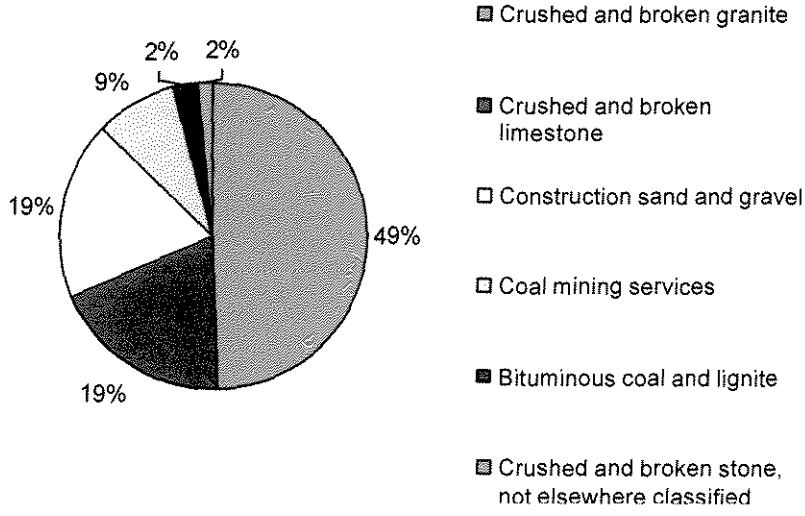


Table 10: 2005-2009 Mining Water Withdrawals by Sub-Category

General Sub-Category	Specific Sub-Category	2005 MGD	2006 MGD	2007 MGD	2008 MGD	2009 MGD	Avg. MGD
Nonmetallic Minerals, Except Fuels	Crushed and broken granite	10.67	9.93	9.55	8.63	9.42	9.64
Nonmetallic Minerals, Except Fuels	Crushed and broken limestone	4.69	3.80	2.16	3.26	3.64	3.51
Nonmetallic Minerals, Except Fuels	Construction sand and gravel	7.47	3.66	4.28	1.13	3.54	4.02
Coal Mining	Coal mining services	5.12	2.81	2.22	4.47	1.67	3.26
Coal Mining	Bituminous coal and lignite	0.33	0.36	0.46	0.46	0.46	0.41
Nonmetallic Minerals, Except Fuels	Crushed and broken stone, not elsewhere classified	0.96	0.88	0.47	0.43	0.32	0.61
Coal Mining	Bituminous coal - underground	0.14	0.20	0.23	0.18	0.09	0.17
Nonmetallic Minerals, Except Fuels	Clay and related minerals	0.01	0.01	0.02	0.03	0.04	0.02
Nonmetallic Minerals, Except Fuels	Industrial sand	0.02	0.02	0.05	0.01	0.02	0.02

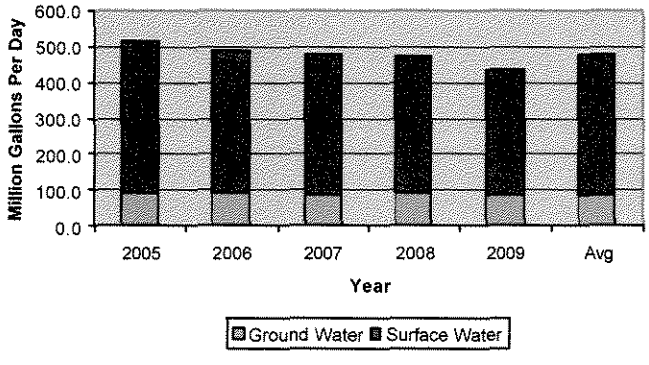
Figure 21: 2009 Mining Water Withdrawals by Sub-Category



E. Manufacturing Water Withdrawals in Virginia

Manufacturing includes operations such as paper mills, food processors, drug companies, furniture, and concrete companies. Figure 22 shows the state-wide total of groundwater and surface water withdrawals for manufacturing from 2005-2009. Surface water is the major source of water for manufacturing. There are no major transfers of water for manufacturing purposes, so the water withdrawals also represent water use. Water withdrawals for manufacturing decreased 9% in 2009 compared with the average withdrawals over the past five years. Table 11 and Figure 23 outline the largest manufacturing water withdrawals in 2009. Chemical preparations represent 24% of the 2009 commercial withdrawals, while paperboard mills and petroleum refining represent 21% and 15%, respectively (Table 12 and Figure 24).

Figure 22: 2005-2009 Manufacturing Water Withdrawals by Source Type, Absolute Change in Withdrawals in MGD, and Percent Change in Withdrawals



Source Type	2005 MGD	2006 MGD	2007 MGD	2008 MGD	2009 MGD	Avg. MGD	Abs. change[1] (MGD)	% change[2]
Total GW	93.3	92.3	83.9	93.4	87.2	90.0	-2.8	-3%
Wells	92.7	91.7	82.8	93.1	87.2	89.5	-2.3	-3%
Springs	0.6	0.5	1.1	0.3	0.0	0.5	-0.5	-94%
Total SW	422.2	394.1	395.0	377.7	346.5	387.1	-40.6	-10%
Streams	419.6	391.4	392.3	374.8	344.0	384.4	-40.4	-11%
Reservoirs	2.6	2.7	2.8	2.9	2.6	2.7	-0.2	-6%
TOTAL GW+SW	515.5	486.4	479.0	471.1	433.8	477.1	-43.4	-9%

[1]Abs change = difference between 2009 water withdrawals and average water withdrawals (MGD)

[2]% change = percent change in 2009 water withdrawals from average water withdrawals

Table 11: Top Water Withdrawals for Manufacturing in 2009

Owner Name	Facility	City/County	Manufacturing Sub-Category	Type	Source	Avg. MGD[3]	2009 MGD
Honeywell International, Inc.	Hopewell Plant	City of Hopewell	Chemicals & Allied Products	SW	James River	115.5	99.3
Western Refining Yorktown, Inc.	Yorktown Refinery	York County	Petroleum & Coal Products	SW	York River	61.1	64.1
Duke Energy Generation Services of Narrows	Celco Plant	Giles County	Chemicals & Allied Products	SW	New River	59.5	58.0
Meadwestvaco Corporation	Covington Plant	Alleghany County	Paper & Allied Products	SW	Jackson River	38.8	37.9
International Paper Corp.	Franklin Mill	Isle of Wight County	Paper & Allied Products	SW/GW	Blackwater River, 16 Wells	35.5	32.2
Dupont E I DeNemours & Co.	Spruance Plant	Chesterfield County	Chemicals & Allied Products	SW	James River	28.5	26.8

[3]Avg. MGD = Average water withdrawals from 2005-2009 (MGD)

Figure 23: 2009 Manufacturing Water Withdrawals in MGD by Withdrawal Point

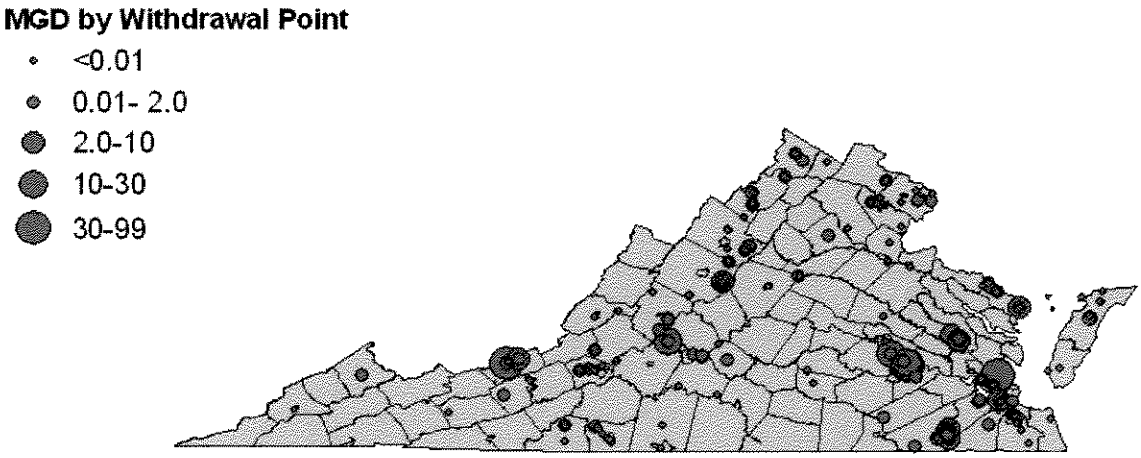
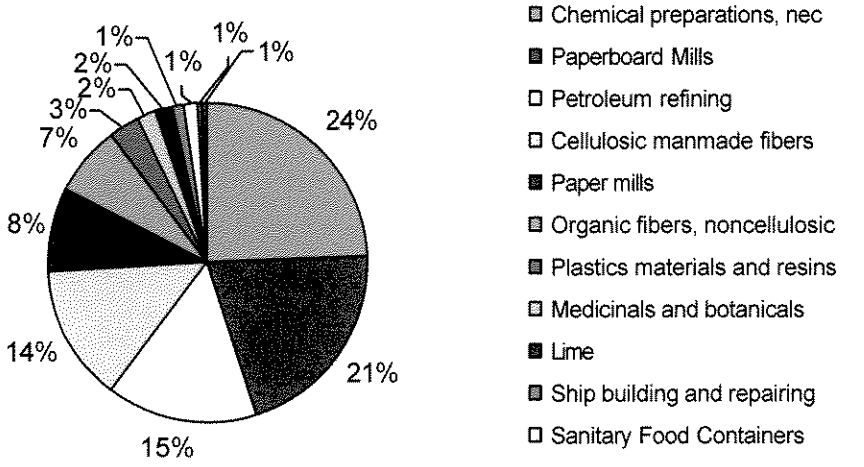


Table 12: 2005-2009 Manufacturing Water Withdrawals by Sub-Category

General Sub-Category	Specific Sub-Category	2005 MGD	2006 MGD	2007 MGD	2008 MGD	2009 MGD	Avg MGD
Chemicals and Allied Products	Chemical preparations, nec	133.2	126.0	120.1	119.6	102.9	120.3
Paper and Allied Products	Paperboard Mills	81.5	79.4	81.6	83.7	86.3	82.5
Petroleum and Coal Products	Petroleum refining	59.1	60.0	60.6	62.0	64.1	61.1
Chemicals and Allied Products	Cellulosic manmade fibers	60.2	60.3	59.6	59.4	58.0	59.5
Paper and Allied Products	Paper mills	39.2	38.9	40.1	40.8	35.4	38.9
Chemicals and Allied Products	Organic fibers, noncellulosic	32.7	33.4	32.2	33.5	30.2	32.4
Chemicals and Allied Products	Plastics materials and resins	21.3	19.4	20.2	15.6	12.8	17.9
Chemicals and Allied Products	Medicinals and botanicals	8.4	8.9	8.1	8.7	8.6	8.5
Stone, Clay, and Glass Products	Lime	7.0	6.9	0.0	5.6	6.7	5.3
Transportation Equipment	Ship building and repairing	8.6	6.5	8.3	11.8	5.2	8.1
Food and Kindred Products	Sanitary Food Containers	6.12	5.25	5.71	5.51	5.17	5.6
Food and Kindred Products	Malt beverages	1.0	1.0	1.9	3.1	2.3	1.8
Food and Kindred Products	Animal and marine fats and oils	2.55	1.35	2.44	2.56	2.19	2.2

Notes: This table includes only the sub-categories that had > 2 MGD of withdrawals in 2009.

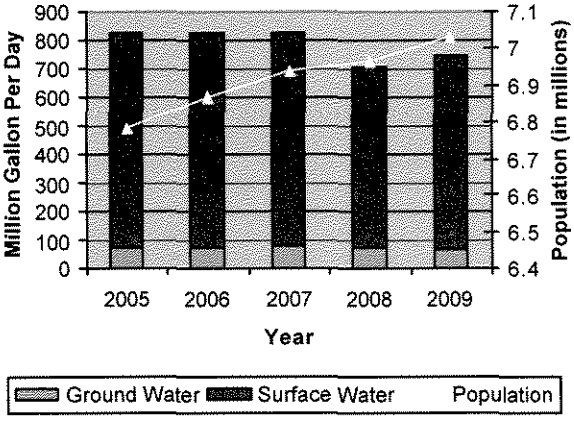
Figure 24: 2009 Manufacturing Water Withdrawals by Specific Sub-Category



F. Public Water Supply Water Withdrawals in Virginia

Public water supply includes municipal and private water purveyors. Figure 25 shows the state-wide total of groundwater and surface water withdrawals for public water supply from 2005-2009. Surface water is the major source of water for public water supply. For 2009, water withdrawals for public water supply decreased by 6% from the five- year withdrawal average (Figure 25) but increased when compared to 2008 withdrawals. Table 13 lists the top 2009 water withdrawals for public water supply. There are several major transfers of water that occur for public water supply. Therefore, the total water withdrawals for public water supply in each locality includes the water withdrawals in that locality, as well as water transferred into that locality from elsewhere in the state or from out of state and minus the water sold to other localities (Table 14, Figure 26). The VWUDS database does not keep track of water withdrawals by private households; therefore, all of the water withdrawals for public water supply were reported from public water systems. Table 15 shows the number of water systems in the state in 2009 and the population served by these systems.

Figure 25: 2005-2009 Public Water Supply Water Withdrawals by Source Type, Absolute Change in Withdrawals in MGD, and Percent Change in Withdrawals



Source Type	2005 MGD	2006 MGD	2007 MGD	2008 MGD	2009 MGD	Avg. MGD	Abs. change[1] MGD	% change[2]
Total GW	73.4	76.9	81.1	73.2	70.3	75.0	-4.7	-6%
Wells	55.1	60.1	66.5	59.2	59.7	60.1	-0.4	-1%
Springs	18.4	16.8	14.7	10.5	10.3	14.1	-3.9	-27%
Other GW	0.0	0.0	0.0	3.5	0.4	--	--	--
Total SW	752.4	753.4	752.2	637.3	672.2	713.5	-41.3	-6%
Streams	373.9	360.7	360.8	290.3	334.7	344.1	-9.4	-3%
Reservoirs	378.5	392.7	391.4	347.0	337.5	369.4	-31.9	-9%
TOTAL GW+SW	825.8	830.3	833.3	710.5	742.5	788.5	-46.0	-6%

[1]Abs change = difference between 2009 water withdrawals and average water withdrawals (MGD)

[2]% change = percent change in 2009 water withdrawals from average water withdrawals

Table 13: Top Water Withdrawals for Public Water Supply in 2009

Owner Name	Facility	City/County	Type	Source	Avg. MGD[3]	2009 MGD
Fairfax County Water Authority	Potomac River WTP	Fairfax	SW	Potomac River Intake	88.9	88.5
City of Richmond	Richmond WTP	City of Richmond	SW	James River and Kanawa Canal	69.8	63.7
City of Norfolk	Western Branch Reservoir	Suffolk	SW	Western Branch Reservoir	62.6	60.8
Fairfax County Water Authority	Occoquan Reservoir	Prince William	SW	Occoquan Reservoir	63.9	56.1
Appomattox River Water Authority	Lake Chesdin WTP	Chesterfield	SW	Lake Chesdin	29.8	29.0
City of Virginia Beach	Virginia Beach Service Area	Brunswick County	SW	Lake Gaston	29.5	27.7
City of Newport News	Lee Hall WTP and ROF	Newport News	SW	Lee Hall Reservoir	26.7	25.3
Henrico County	Chickahominy River	Newport News	SW	Chickahominy River	19.7	23.7

[3]Avg. MGD = Average water withdrawals from 2005-2009 (MGD)

Table 14: Top Water Transfers for Public Water Supply in 2009

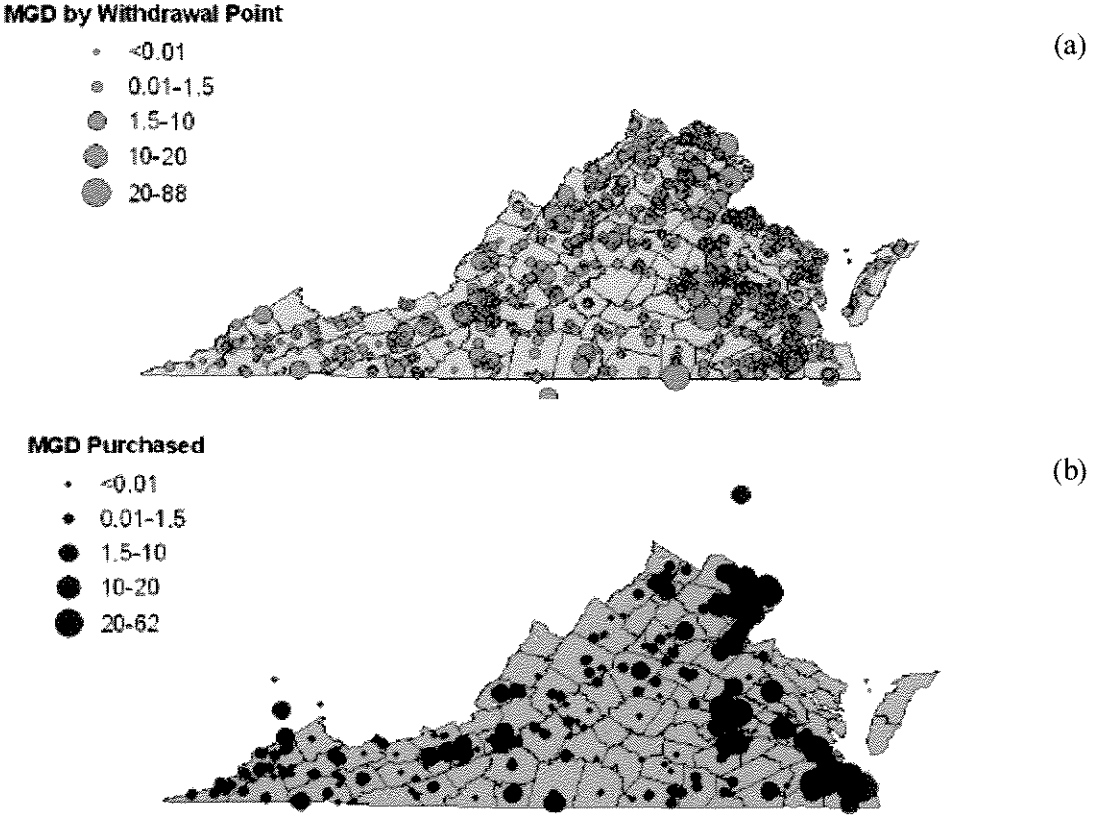
Source	Purchaser Owner Name	Purchaser Facility	Purchaser Location	2009 MGD
From City of Norfolk	City of Virginia Beach	Virginia Beach Service Area	City of Virginia Beach	45.55
From US Government-Dalecarlia WTP	Arlington County	Arlington County Service Area	Arlington County	23.20
From City of Richmond	Henrico County	County Contract Service Area	Henrico County	19.76
From Fairfax County Water Authority	Prince William County Service Authority	OWDT Service Area	Prince William County	19.22
From Appomattox Water Authority	Chesterfield County	Chesterfield County Service Authority	Chesterfield County	18.46
From Fairfax County-Potomac River WTP	Loudon County Sanitation Authority	Lower Broad Run Service Area	Loudon County	16.86
From US Government-Dalecarlia WTP	Falls Church	Falls Church Service Area	City of Falls Church	16.60

Table 15: Number of Public Water Systems and Population Served by Public Water Systems in Virginia in 2009

	Total	Groundwater	Surface water
# systems	2,879	2,492	387
population served	7,032,751	779,408	6,253,343

Source: www.epa.gov/ogwdw000/databases/pdfs/data_factoids_2009.pdf, page 6.

Figure 26: 2009 Public Water Supply (a) Water Withdrawals and (b) Water Purchases in MGD



VII. WATER RESOURCES - WHAT'S ON THE HORIZON

Although Virginia has historically enjoyed plentiful water resources relative to demand, the growth of the Commonwealth's economy and population presents challenges for maintaining both the quality and quantity of these resources. This challenge is compounded by traditional behaviors and perceptions oriented toward the promotion of water resource consumption. Our water resources are used for a variety of important and sometimes competing in-stream and off-stream uses, resulting in the necessary expansion of water resource regulation and management to protect and preserve a limited resource. Over the past decade, increased demand and competition for water coupled with reduced rainfall have established a greater sense of urgency in Virginia's approach to resource management. As Virginia nears the margins of the state's ability to satisfy water demand, resource management priorities must incorporate a focus on influencing consumer perceptions and behavior. This task requires promoting a shift in consumer behavior from consumption to conservation and re-use. Continued efforts to conserve Commonwealth water resources will ensure the sustainability of all beneficial water demands for the state's welfare, environment, and economy.

1) **KEY WATER RESOURCE SIGNALS** - Based on water division activities to date, the following are important water resource signals observed across the Commonwealth:

- A general trend of increased demands on the surface and groundwater resources of the Commonwealth has been observed over the past decade through the state water withdrawal reporting process and local water supply planning activities. However, data from 2008 and 2009 indicate water withdrawals are down, perhaps due to the economic downturn

- Groundwater levels along the fall line and portions of southeast Virginia are reaching critically low levels. The fall line is described as the boundary between the Piedmont and Coastal Plain physiographic provinces. It loosely mirrors interstate 95 in the Commonwealth.

- In several locations, current local demands for groundwater to support desired growth in established Groundwater Management Areas can no longer be sustained by the coastal plain aquifer system. This statement is based on groundwater model scenarios showing violations of the regulatory criteria for proposed withdrawals and field observations that show water levels are lower than predicted by the model, including some approaching aquifer tops.

- DEQ estimates that approximately 90% of all existing surface water withdrawals in Virginia are excluded by statute from Virginia Water Protection permit requirements. Amendments to the VWP regulation in 2007 require these excluded or grandfathered users provide DEQ with total annual withdrawal, maximum daily withdrawal, and month of maximum daily withdrawal information. DEQ is in the process of collecting and analyzing this information and anticipates this data will provide a more comprehensive view of current resource allocation in Virginia's watersheds. Significantly less water may be available in certain watersheds for new and expanded uses than previously assumed. DEQ anticipates the need for increased storage and the expanded use of conjunctive systems to meet future water demands in some areas of the Commonwealth.

2) **WATER RESOURCE MANAGEMENT OPPORTUNITIES** - Based on the observed water resource management signals mentioned in the previous section, DEQ is exploring the following partnership/collaboration opportunities with local, state, federal, and non-profit organizations to increase its knowledge of Commonwealth water resources and their ability to sustain social and environmental demands:

- Groundwater levels in the undesignated portion of Virginia's coastal plain are continuing to decline. Impacts from groundwater withdrawals are propagating along the fall line into the undesignated portion of Virginia's coastal plain and have the potential to interfere with wells in these areas without assigned mitigation responsibilities. Given current groundwater declines, the entire coastal plain aquifer system must be managed to maintain a sustainable future supply of groundwater. This will require applicable amendments to the Eastern Virginia Groundwater Management Area Regulation (9VAC25-600) and the Groundwater Withdrawal Regulation (9VAC25-610) 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 currently underway. The Proposed Expansion Area includes the following additional counties and city: Caroline, King and Queen, Gloucester, Mathews, Middlesex, Essex, Spotsylvania (part), Stafford (part), Prince William (part), King George, Westmoreland, Richmond, Lancaster, Northumberland, Fairfax (part), Arlington (part); and Alexandria City (Figure 27).

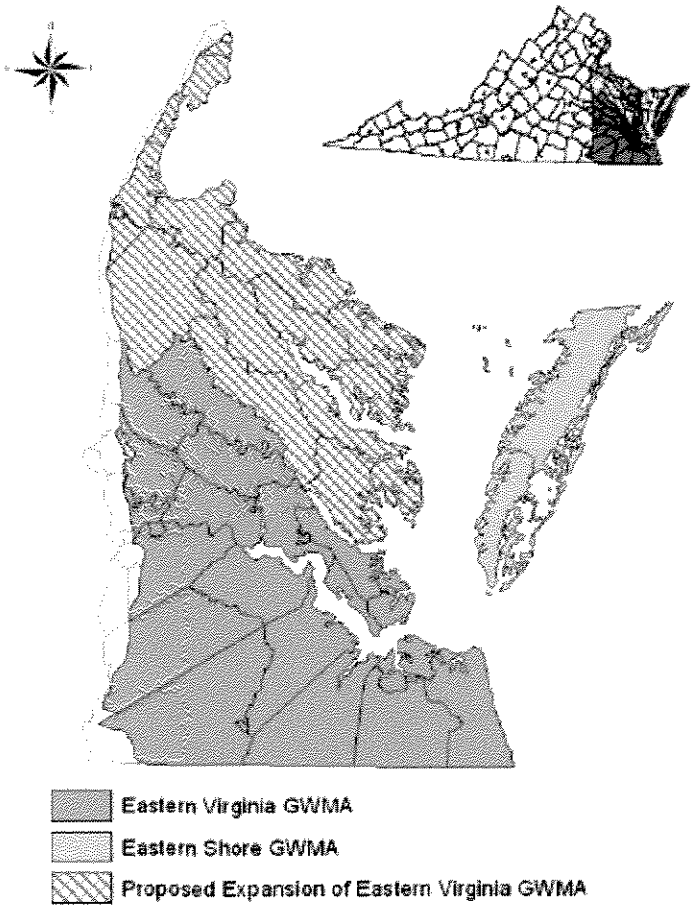


Figure 27: Proposed Expansion of the Eastern Virginia Groundwater Management Area.

- Significant data gaps exist in the State Observation Well Network west of the fall line and in Virginia's Northern Neck. DEQ has ongoing local government collaborations to identify existing wells that meet established criteria for inclusion in the network. Two new real time wells were added to the observation well network in Northumberland and New Kent counties. DEQ anticipates these opportunities will increase as water supply plans are drafted and local resource managers look for reliable data to support resource management decisions.

- Conversion of two real time observation well sites to comprehensive groundwater observation stations took place in 2009. The conversion of existing observation well sites in representative areas of the Blue Ridge and Valley and Ridge provides an economically feasible way to obtain depth integrated hydraulic head values in complex fractured rock and Karst

groundwater systems. By recording the vertical and temporal distribution of isolated hydraulic head values in representative crystalline rock and Karst environments, a unique opportunity is created for studying the response of these stratified system components to groundwater inputs and outputs (i.e. precipitation, evapotranspiration, pumping, and stream base flow).

- In 2010, International Paper (IP) announced the closing of its Franklin Paper Mill. International Paper has been the largest permitted groundwater user with average daily withdrawals of over 30 MG. Since the facility announced its closing in 2010, water level observations in aquifers have shown a slow and irregular recovery.

- Major watersheds lack established science-based in-stream flow targets to protect fish and wildlife habitat, recreational uses, and navigation uses specific to individual watersheds. Essential to determining water availability is defining the unique set of beneficial water uses within each watershed and assigning the requisite in-stream flow necessary to sustain those uses in each watershed. DEQ staff is collaborating with EPA, The Nature Conservancy, Virginia Department of Game and Inland Fisheries, and USGS staff to initiate a peer review process that synthesizes the best available in-stream flow science to support sustained management of Virginia's diverse water resources and uses.

- Accounting of surface water used and available for future use is becoming increasingly important as availability diminishes due to increased demands and more frequent drought events. Water resources are vital to performing water quality and quantity functions, necessitating a need for greater accounting accuracy as the Commonwealth reaches the margins of the resource's ability to meet demand. In 2009, DEQ staff continued to refine a surface water modeling system for the purpose of analyzing cumulative impacts of off-stream uses on in-stream resources, as well as downstream users. This system went into operation in summer of 2008 and has been successfully used since then to evaluate the effects of proposed withdrawals and optimization alternatives for the management of existing withdrawals and release schedules. Limitations in the accuracy of current un-metered water use reporting may require future regulatory changes to adequately account for water use and availability.

- Complete and consistent data on the location and construction of wells especially residential, commercial, industrial, and irrigation wells that do not currently fall under the regulatory authority of DEQ, throughout the Commonwealth is needed to address the increasing complexity of groundwater management issues. Timely, accurate, and easily accessible information supports resource characterization efforts that enable managers to understand how the resource responds to stresses from both demand and climatic events. Such information also facilitates local government implementation and maintenance of their local and regional water supply plans.

3) **WATER RESOURCE MANAGEMENT INVESTMENT CHALLENGES** - To effectively manage water resources for current and future generations, continued financial investment is necessary for responsible management, policy development and implementation, and improved local government and public participation:

- The number of long term monitoring data stations for surface water flow, groundwater levels, and water resource use has consistently declined over the last twenty years. Sustained funding to support surface water flow and groundwater level data collection and analysis is essential to

the overall mission of the agency to accurately account for the Commonwealth's water resources. Such surface and groundwater data are an integral part of many DEQ programs including numerous permitting programs, establishment of TMDLs, water supply planning, and overall resource characterization.

- Investment in regional water supply program development and implementation is necessary to build long-term local government stewardship of local and regional water resources. A secure source of funding for planning grants to local governments should be identified and implemented as a fundamental element to the success of initial water supply plan implementation and long-term plan maintenance.

- An estimated 20,000 wells are drilled in Virginia each year by approximately 400 water well drillers. Resources required to obtain well location (latitude/longitude to sub meter accuracy) and enter well construction information into a geo-referenced database have historically not been available. Members of the Virginia Water Well Association have expressed interest in implementing a grass roots program to obtain sub-meter coordinates at the time the well is drilled, as well as entering construction information into a data base that can be made available to resource managers. Funding is required to obtain commercially available hardware, software, and Global Positioning System units for distribution to water well contractors cooperating with the Commonwealth to obtain well locations and other information used by groundwater resource managers.

VIII. Appendices

Appendix 1: Virginia's Water Resources Data

State Population (2005 Estimate) - 7,567,465

State Surface Area – 42,769 square miles

Major River Basins (with Current Estimates of Flow):

Potomac/Shenandoah (5,808 square miles) – 1,842 MGD
Rappahannock (2,891 square miles) – 1,131 MGD
York (2,701 square miles) – 1,099 MGD
James (10,253 square miles) – 5,558 MGD
Chesapeake Bay/Small Coastal (1,712 square miles) – 97 MGD
Chowan River/Albemarle Sound (4,122 square miles) – 1,777 MGD
Roanoke (6,378 square miles) – 2,277 MGD
New (4,703 square miles) - 3,296 MGD
Tennessee/Big Sandy (4,202 square miles) – 2,618 MGD

Perennial River Miles (freshwater) - 50,537 miles

Publicly Owned Lakes and Reservoirs

Larger than 5,000 acres	5	109,838 acres
Smaller than 5,000 acres	243	52,392 acres
Total	248	162,230 acres

Freshwater Wetlands - 808,000 acres

Tidal and Coastal Wetlands - 236,900 acres

Estuary - 2,557 Square Miles

Atlantic Ocean Coastline - 120 Miles

State-wide Average Annual Rainfall - 42.8 inches

Average Freshwater Discharge of All Rivers - Approximately 25 billion gallons per day

Average Freshwater Discharge into the Chesapeake Bay – Approximately 9.73 billion gallons per day

Appendix 2: Drought Monitoring Task Force Report

VIRGINIA DROUGHT MONITORING TASK FORCE
Drought Status Report
September 7, 2010

Statewide precipitation for the current water year, October 1, 2009 August 31, 2010 was in the normal range (109% of normal) with all drought evaluation regions greater than 100% normal except the Big Sandy Region (99%). Normal precipitation is defined as the mean precipitation for a thirty year period of record. Precipitation greater than 85% and less than 115% of normal is considered to be in the normal range. Statewide precipitation is now within the normal range (90%) for the calendar year, due to a greater than normal statewide precipitation during the month of August. Statewide precipitation is 79% of normal since June 1st with all drought evaluation regions except the Roanoke, New River, and Big Sandy Region having less than 85% of normal. The York-James is now the only region with a particularly pronounced deficit since June 1st (<50%). Appendix A contains precipitation tables for periods dating from July 1, 2009 through August 31, 2010 provided by the Climatology Office of the University of Virginia.

The National Weather Service Climate Prediction Center 6-10 day climatologic outlooks call for below normal precipitation and temperatures for the entire Commonwealth. Below normal precipitation and below normal temperatures are also anticipated over the 8-14 day period. The one month outlook calls for equal chances of below normal, normal and above normal precipitation for the entire Commonwealth with the above normal temperatures. The three month outlook calls for equal chances of below normal, normal and above normal temperatures and precipitation for the entire Commonwealth.

The latest NOAA U.S. National Drought Monitor indicates "abnormally dry" to "moderate drought" conditions exist in approximately 65% of the Commonwealth. Southwest Virginia and some portions of the Blue Ridge are the only areas that are not in an "abnormally dry" or "moderate drought" condition. Approximately 30% of Virginia is experiencing "severe drought" conditions, as designated in the U.S. National Drought Monitor. The Seasonal Drought Outlook for the United States from now through November 2010 forecasts "some improvement" in the drought conditions in those portions of the state that are classified as "severe drought", including portions of Northern Virginia, the Piedmont and the Coastal Plain (Appendix D).

The number of public water supply systems under some sort of drought related restriction has been increasing. While the Virginia Department of Health (VDH) has not reported any impacts to public water supplies that have compromised their ability to provide the needs of their customers, 18 systems are under voluntary water conservation requirements and 2 systems are under mandatory water conservation requirements. Of the 41 systems listed in the VDH report, one is rated as having a "Better" overall water supply situation, four are rated as having a "Worse" overall water supply situation and all other systems are rated as being in a "Stable" situation (Appendix F).

The Virginia Department of Forestry (VDOF) continues to report an above normal rate of wildfire occurrence, with 122 fires reported in the month of July alone. The DOF is becoming increasingly concerned about the potential for a significant fall fire season.

The Department of Game and Inland Fisheries reports that trout hatcheries are not experiencing problems with fish production (at this time) as a result of lower water supply flows. Currently, spring flows are normal for this time of year, and while some faculties are having to recirculate water, this is

normal for late August/early September. Stream levels are dropping and there are reports of a few boat ramps not being accessible due to low lake/river levels.

Reports from the Climatology Office of the University of Virginia, the Virginia Department of Environmental Quality, the United States Geological Survey, the Virginia Department of Forestry and the Virginia Department of Agriculture and Consumer Services, follow.

Virginia Department of Forestry
Wildfire Conditions

Summertime wildfire activity has remained at more elevated levels than what would be considered normal for Virginia. For the month of July 2010, the VDOF responded to 122 wildfires which burned 543 acres. The leading cause of wildfire continues to be human carelessness.

Observed fire behavior over the last few weeks indicates that wildfire occurrence, rates of spread and fire intensity is much greater than would normally be expected during this time of the year. The low fuel moisture conditions overall make suppression operations more difficult and lead to increased long term monitoring which can place a drain on firefighter resources. This has not been a significant problem up to this point, however it can have significant problem if the drought conditions persist moving in to our normal fall wildfire season

At least 26 counties across the Commonwealth have enacted local burning bans due to the increased risk of wildfire. The Department of Forestry's Cumulative Severity Index (CSI), which is a detailed measure of soil moisture conditions taken at six location across the Commonwealth indicate the driest conditions that we have seen within the last ten years.

The DOF is becoming increasingly concerned about the potential for a significant fall fire season. The official fall wildfire season runs from October 15 – November 30. Current predictions of warmer and drier than normal conditions through December indicate that little relief is expected through the end of the year and that the fall wildfire season could more troublesome than any we have faced in the last ten years. The agency has begun early contingency planning to be better prepared for higher than normal levels of wildfire activity headed into October.

Report of the Climatology Office of the University of Virginia

As in July, the predominant source of rainfall throughout the Commonwealth in August was thunderstorm activity. Most of the thunderstorms were widely scattered, but some outbreaks covered larger areas. In either case, rainfall totals for August were highly variable, with one location becoming inundated while a nearby spot remained virtually untouched.

Average total accumulations for the three southwestern most Drought Regions (Big Sandy, New River and Roanoke) were well above normal for August and five other Regions ended at normal or above. Statewide, the average was above normal. Again, these averages belie the fact that many individual locations received scant moisture.

Nonetheless, two Regions in Tidewater were especially dry, Southeast Virginia and York-James, with less than two-thirds and less than one-half normal, respectively. Taken together, rainfall for the entire summer [climatological summer = June through August] averaged well below normal across Virginia (79% statewide). Only three Regions reached near normal values, and the York-James Region was below 50%.

In addition, the unusually high temperatures for August (and the entire summer) led to higher rates of evapotranspiration, with even more moisture loss than the already high rates of a typical summer. In many portions of the state, this summer was the hottest on record. Although, based only on preliminary

data at this time, averaged across the state, the summer temperature is the highest seen in Virginia in at least 116 years.

With the high point of the hurricane season upon us, the likelihood of receiving significant moisture across a large portion of the Commonwealth from tropical systems and their remnants is increasing. Activity in the tropics increased markedly during August and numerous opportunities for tropical moisture are presenting themselves. This is in keeping with forecasts of an active hurricane season.

United States Geological Survey
Streamflow and Ground Water Levels

Precipitation has been varied but substantial across most of the State with the exception of southeast Virginia. The majority of stream gages across the State are recording flows in the normal to below normal based on August flow statistics. The driest portions of the State analyzed by hydrologic units are the southeast and east Coastal Plain locations.

Groundwater levels mimic surface-water levels with most wells recording levels in the normal to below normal range. The exception is the far southeast well which is well below normal. Groundwater levels will continue to decline until leaf-off in late September to October where evapotranspiration is reduced substantially.

Virginia Department of Environmental Quality
Conditions of Major Reservoirs

Levels of large reservoirs statewide are within normal ranges but have generally been declining throughout the summer. Four large multi-purpose reservoirs are identified as drought indicators in the *Virginia Drought Assessment and Response Plan* (Plan); Smith Mountain Lake, Lake Moomaw, Lake Anna and Kerr Reservoir. All four of these reservoirs are at levels above any defined drought status, however, they have all dropped closer to drought watch status since the July DMTF report. Below is a summary of large reservoir conditions:

- Lake Moomaw on the Jackson River is at 1566.99 feet ASL, and is dropping at a rate of ~2 ft per day. Approximately 42.6% of conservation storage remains. Lake Moomaw is 2 ft above the Drought Watch level.
- Kerr Reservoir is currently approximately 1.6 ft below the Guide Curve and is anticipated to drop an additional 0.8 ft by September 14th. Drought Watch status is reached at greater than 3 ft below the Guide Curve.
- Smith Mountain Lake is currently at elevation 793.8 ft which is 1.2 ft below full pond. The Drought Watch stage for Smith Mountain Lake is elevation 793 feet and below.
- As of September 7th, Lake Anna was at elevation 248.7 feet (1.3 feet below full) and dropped approximately 1.0 feet since July 10th. The Drought Watch stage for Lake Anna Lake is elevation 248 feet and below.

Virginia Department of Agriculture and Consumer Services
Status of Agricultural Drought

Overview
According to the USDA Crop Weather Report released on August 29, 2010, 60% of topsoil moisture ranged from short to very short. Some areas of the state saw scattered showers, but many areas continue to suffer from dry conditions. Many areas of the state saw some rain in early August, it was

not significant enough to reverse the effects the lack of rain have already had on the agricultural this summer community. As of August 31, 2010, forty-one localities have requested the Governor's assistance in obtaining federal disaster designation due to drought conditions. Those localities include: Albemarle, Amelia, Amherst, Appomattox, Bedford, Brunswick, Campbell, Caroline, Charlotte, Clarke, Culpeper, Cumberland, Dinwiddie, Essex, Franklin, Frederick, Goochland, Hanover, Isle of Wight, King and Queen, King George, Lancaster, Louisa, Lunenburg, Mecklenburg, Middlesex, Nelson, Northampton, Northumberland, Nottoway, Patrick, Pittsylvania, Powhatan, Prince Edward, Pulaski, Richmond (County), Rockbridge, Southampton, Suffolk, Surry, and Westmoreland.

USDA/Farm Service Agency (FSA) has completed 38 of the 41 requested Loss Assessment Reports (LARs) which indicate that these localities have experienced at least a 30% loss in a major commodity due to drought. VDACS is in the process of working with the Governor's Office to obtain federal disaster designations due to drought conditions on behalf of these localities. VDACS has requested that the USDA/FSA prepare official loss assessment reports (LARs) for the remaining three localities (Amelia, Northampton, and Suffolk).

Impact on Dairies/Livestock/Poultry
Shenandoah Valley Area: The hot and dry summer has financially squeezed the Valley's livestock owners causing unplanned cattle sales to climb. Recent rains have made pastures and hayfields green, however, many producers had to graze hayfields early and re-growth will be slow and may not be enough before cooler fall temperatures arrive. Fall pastures will be less than normal and this along with decreased stored feeds may well lead to less cattle being wintered this year.

Producers in the Valley are reporting that severe heat stress and high humidity is jeopardizing the appetite and milk production in dairy herds. Continued heat and humidity continues to have impact on dairy milk production and cow reproduction. Cow comfort continues to be challenging.

Southwest Virginia: Southwest Virginia has not experienced the dryness that most of the state has. Producer will have plenty of feed this year unlike many dairymen located in other portions of the state.

Southern Virginia: Southern Virginia producers report that most dairymen will have a serious feed shortage this year. Although some areas in Amelia have received rain, for the most part Franklin and Pittsylvania counties have been very dry. Most dairymen had already cut their corn for silage by mid-July. Some dairymen in Franklin County replanted their corn after cutting what corn crop they did have, so with the recent rains in early August, they may be able to produce another silage crop. In the dry areas such as the counties of Nottoway, Dinwiddie, Goochland and surrounding counties, there is likely to be no last cutting of hay. Cattle at the livestock markets are up dramatically since there is very little pasture and farmers are already short on feed.

Impact on Nurseries/Christmas Trees:
Scattered rain across the state has provided some relief; however, in many areas, the nursery industry continues to experience an increase in irrigation requirements due to inadequate rainfall and extreme high temperatures. Nursery and Christmas tree growers have lost seedlings that were planted both this year and last year due to drought conditions.

Impact on Crops
Shenandoah Valley: The Shenandoah Valley area reports that the early corn crop suffered from the lack of rain in May and June but the Valley received adequate rain in July and most of the late corn yields appear to be good compared to other areas of the state. With the exception of the Dayton area where the corn crop has suffered significantly from the lack of rain, corn is 60 -65% of the normal yield. Most dairymen will have enough corn to make silage to feed but none to pick for shelled corn. Due to the rain in July and August the fall hay is also expected to be good but there was no second cutting of hay for most of the area. Many dairymen have been feeding the hay they had cut due to lack of pasture. The soybean crop seems to have suffered the least of the feed crops.

South Central Area: Significant rainfall covered the south-central region during the August 17–19 period. Dry weather and high temperatures experienced over the summer will have some negative effects on yield and quality of tobacco, but the recent rainfall coupled with the high percentage of the crop that was exposed to irrigation will mitigate the impact. Extensive irrigation has made this an expensive crop for the farmers to produce. A source of concern now is that the crop is maturing later due to the drought. Harvesting the crop prior to frost will be a challenge.

Recent rainfall will have a positive impact on soybean yields, but overall yields will still be significantly lower than average.

Northeast: The rains that came during the first half of August have potentially salvaged the soybean crop. The full season beans are growing nicely, developing pods, and beginning to fill them with beans. The double crop beans are growing now, but in some cases they are still just coming out of the stubble. The bean crop needs to continue getting timely rainfalls throughout the remainder of August and into September. In addition, the beans will need a late frost in order to have enough time to develop. The immediate concern is the infestations of corn ear worms and army worms. Due to the corn dying early, the worms moved into the soybean fields two to three weeks ahead of normal. Producers will most likely have to spray multiple times to control the worms, which will cost approximately $10 per acre. This will dramatically increase the cost of production and make it even more economically challenging to make this crop profitable.

Eastern Shore: The Eastern Shore has been hard hit by not only the drought, but also the heat. The corn harvest will be off by more than 40–50%, and potatoes were whipsawed by early wet weather that delayed planting, and then severe heat, which gave many growers quality issues. Weather factors have reduced the marketable crops by 40–50%.

Southeast: Many areas in Southeast Virginia have received rainfall during the month of August. In some places, it has rained up to three inches this month. However, other areas received only one or two tenths of an inch. Some areas have had a total of only one inch of rain since May 24, 2010. While the rainfall is much welcomed by everyone, for most crops it is too late. The plants look healthier, but any fruit that will appear on the plant at this late date will likely not mature due to our frost dates. Crops receiving rainfall have perked up and some new growth is forming. How much the rain helps the crop will depend on the stage of the crop.

Some cotton is already blooming, but this may be the only cotton crop that can be harvested this year. Growers can wait and hope for any second crop to mature, but it might be better to pick early what is there rather than hope for more only to have a hurricane take it all.

Earworms are a problem now and they are eating any healthy soybean plants they can find.

Southwest: This region of the state have experienced both high temperatures and at time excessive rain at time. The heat may have as much influence or more on apple sizing as the drought. Several vegetable growers that were unable to irrigate their crops experienced losses this summer. Currently, cabbage growers are concerned that they are getting too much rain. The sale of cabbage has slowed somewhat, and the cabbage heads are getting too large for the market.

Shenandoah Valley Area: Recent moisture will help late planted corn in the Valley and late planted soybeans, but many late soybeans did not have enough moisture to germinate so stands are much less than normal.
Corn harvest for silage is three weeks earlier than normal where there is some corn. Most of the shelled corn yields are from zero to 20 bushels in the Northern Valley.

Northern Virginia and Winchester: Northern Virginia and Winchester areas report extremely dry conditions and until mid August the area had received virtually no rain. Corn is short in height and much of it has already been chopped. Early corn seems to have faired well but late corn has suffered and is in very poor condition. Many dairymen in the Northern Virginia area will have to purchase feed to make it through the winter.

Tidewater: The Tidewater area has suffered severely from the drought conditions. Corn crops are waist to head high with yields estimated at less than two bushels per acre, unless the corn had been irrigated. Most of the farmers in Tidewater with crop insurance have had their corn crops looked at by adjusters. Many cut their corn crops mid June to be able to salvage some feed value for silage.

Impact on Creeks, Rivers, and Wells

In the northern and central parts of the state, low to non-existing surface water flow is occurring. Farm ponds are drying up. In the Southwest, ground water appears very close to normal. Streams that had slowed or stopped are picking up again.

APPENDIX A

Precipitation Departures by Drought Evaluation Region

PRELIMINARY PRECIPITATION SUMMARY

Prepared: 08/31/10

	DROUGHT REGION	OBSERVED	Aug 1, 2010 NORMAL	- Aug 31, 2010 DEPARTURE	% OF NORM.
1	Big Sandy	5.13	3.83	1.30	134%
2	New River	5.24	3.31	1.93	158%
3	Roanoke	6.43	3.72	2.71	173%
4	Upper James	2.97	3.33	-0.36	89%
5	Middle James	4.19	3.82	0.37	110%
6	Shenandoah	2.70	3.33	-0.63	81%
7	Northern Virginia	4.27	3.85	0.42	111%
8	Northern Piedmont	3.41	3.82	-0.41	89%
9	Chowan	4.27	4.31	-0.04	99%
10	Northern Coastal Plain	4.34	3.86	0.48	112%
11	York-James	1.70	4.87	-3.17	35%
12	Southeast Virginia	3.19	5.12	-1.93	62%
13	Eastern Shore	4.78	3.87	0.91	123%
	Statewide	4.36	3.83	0.53	114%

	DROUGHT REGION	OBSERVED	Jul 1, 2010 NORMAL	- Aug 31, 2010 DEPARTURE	% OF NORM.
1	Big Sandy	8.87	8.31	0.56	107%
2	New River	8.08	7.10	0.98	114%
3	Roanoke	9.69	8.11	1.58	119%
4	Upper James	6.63	7.37	-0.74	90%
5	Middle James	6.05	8.23	-2.18	74%
6	Shenandoah	6.08	7.09	-1.01	86%
7	Northern Virginia	7.73	7.62	0.11	101%
8	Northern Piedmont	5.73	8.22	-2.49	70%
9	Chowan	5.96	8.82	-2.86	68%
10	Northern Coastal Plain	5.80	8.31	-2.51	70%
11	York-James	5.07	9.97	-4.90	51%
12	Southeast Virginia	6.92	10.19	-3.27	68%
13	Eastern Shore	6.86	7.87	-1.01	87%
	Statewide	7.14	8.17	-1.03	87%

	DROUGHT REGION	OBSERVED	Jun 1, 2010 NORMAL	- Aug 31, 2010 DEPARTURE	% OF NORM.
1	Big Sandy	13.64	12.45	1.19	110%
2	New River	10.65	10.95	-0.30	97%
3	Roanoke	11.78	12.00	-0.22	98%
4	Upper James	8.48	11.08	-2.60	77%
5	Middle James	7.92	11.74	-3.82	67%
6	Shenandoah	7.91	10.80	-2.89	73%
7	Northern Virginia	9.07	11.48	-2.41	79%
8	Northern Piedmont	8.14	12.23	-4.09	67%
9	Chowan	8.48	12.47	-3.99	68%
10	Northern Coastal Plain	7.81	11.87	-4.06	66%
11	York-James	6.00	13.38	-7.38	45%
12	Southeast Virginia	10.16	13.80	-3.64	74%
13	Eastern Shore	8.39	10.85	-2.46	77%
	Statewide	9.50	11.96	-2.46	79%

	DROUGHT REGION	OBSERVED	May 1, 2010 NORMAL	- Aug 31, 2010 DEPARTURE	% OF NORM.
1	Big Sandy	19.09	17.27	1.82	111%
2	New River	14.46	15.16	-0.70	95%
3	Roanoke	16.42	16.33	0.09	101%
4	Upper James	12.29	15.36	-3.07	80%
5	Middle James	11.97	15.98	-4.01	75%
6	Shenandoah	10.96	14.64	-3.68	75%
7	Northern Virginia	13.71	15.82	-2.11	87%
8	Northern Piedmont	11.81	16.45	-4.64	72%
9	Chowan	13.89	16.56	-2.67	84%
10	Northern Coastal Plain	10.21	16.03	-5.82	64%
11	York-James	10.89	17.65	-6.76	62%
12	Southeast Virginia	14.36	17.66	-3.30	81%
13	Eastern Shore	10.50	14.37	-3.87	73%
	Statewide	13.67	16.22	-2.55	84%

	DROUGHT REGION	OBSERVED	Apr 1, 2010 NORMAL	- Aug 31, 2010 DEPARTURE	% OF NORM.
1	Big Sandy	21.78	21.03	0.75	104%
2	New River	16.31	18.71	-2.40	87%
3	Roanoke	18.18	20.13	-1.95	90%
4	Upper James	13.99	18.76	-4.77	75%
5	Middle James	13.73	19.32	-5.59	71%
6	Shenandoah	12.32	17.56	-5.24	70%
7	Northern Virginia	15.31	19.12	-3.82	80%
8	Northern Piedmont	13.35	19.74	-6.39	68%
9	Chowan	15.33	19.99	-4.66	77%
10	Northern Coastal Plain	11.80	19.12	-7.32	62%
11	York-James	11.84	20.95	-9.11	57%
12	Southeast Virginia	15.55	20.91	-5.36	74%
13	Eastern Shore	11.69	17.29	-5.60	68%
	Statewide	15.38	19.64	-4.26	78%

	DROUGHT REGION	OBSERVED	Mar 1, 2010 NORMAL	- Aug 31, 2010 DEPARTURE	% OF NORM.
1	Big Sandy	24.65	25.28	-0.63	98%
2	New River	20.38	22.38	-2.00	91%
3	Roanoke	23.31	24.40	-1.09	96%
4	Upper James	18.09	22.55	-4.46	80%
5	Middle James	18.86	23.38	-4.52	81%
6	Shenandoah	17.03	20.76	-3.73	82%
7	Northern Virginia	19.05	22.78	-3.73	84%
8	Northern Piedmont	18.27	23.55	-5.28	78%
9	Chowan	19.92	24.36	-4.44	82%
10	Northern Coastal Plain	17.95	23.40	-5.45	77%
11	York-James	17.46	25.64	-8.18	68%
12	Southeast Virginia	21.85	25.11	-3.26	87%
13	Eastern Shore	17.92	21.60	-3.68	83%
	Statewide	20.08	23.68	-3.60	85%

	DROUGHT REGION	OBSERVED	Feb 1, 2010 NORMAL	- Aug 31, 2010 DEPARTURE	% OF NORM.
1	Big Sandy	27.42	28.86	-1.44	95%
2	New River	22.80	25.31	-2.51	90%
3	Roanoke	25.97	27.71	-1.74	94%
4	Upper James	20.41	25.40	-4.99	80%
5	Middle James	22.09	26.50	-4.41	83%
6	Shenandoah	19.91	23.17	-3.26	86%
7	Northern Virginia	23.09	25.45	-2.36	91%
8	Northern Piedmont	20.80	26.52	-5.72	78%
9	Chowan	23.17	27.53	-4.36	84%
10	Northern Coastal Plain	21.25	26.54	-5.29	80%
11	York-James	21.15	29.17	-8.02	72%
12	Southeast Virginia	25.60	28.61	-3.01	89%
13	Eastern Shore	21.80	24.79	-2.99	88%
	Statewide	23.05	26.81	-3.76	86%

	DROUGHT REGION	OBSERVED	Jan 1, 2010 NORMAL	- Aug 31, 2010 DEPARTURE	% OF NORM.
1	Big Sandy	31.66	32.59	-0.93	97%
2	New River	27.30	28.52	-1.22	96%
3	Roanoke	31.04	31.63	-0.59	98%
4	Upper James	24.73	28.68	-3.95	86%
5	Middle James	26.47	30.16	-3.69	88%
6	Shenandoah	23.72	26.02	-2.30	91%
7	Northern Virginia	25.79	28.73	-2.94	90%
8	Northern Piedmont	24.72	30.04	-5.32	82%
9	Chowan	27.19	31.64	-4.45	86%
10	Northern Coastal Plain	24.95	30.29	-5.34	82%
11	York-James	25.58	33.31	-7.73	77%
12	Southeast Virginia	29.92	32.77	-2.85	91%
13	Eastern Shore	24.82	28.35	-3.53	88%
	Statewide	27.25	30.45	-3.20	90%

	DROUGHT REGION	OBSERVED	Dec 1, 2009 NORMAL	- Aug 31, 2010 DEPARTURE	% OF NORM.
1	Big Sandy	37.35	36.23	1.12	103%
2	New River	34.59	31.23	3.36	111%
3	Roanoke	38.60	34.88	3.72	111%
4	Upper James	32.12	31.63	0.49	102%
5	Middle James	34.63	33.33	1.30	104%
6	Shenandoah	28.97	28.61	0.36	101%
7	Northern Virginia	32.04	31.83	0.21	101%
8	Northern Piedmont	31.22	33.32	-2.10	94%
9	Chowan	35.13	34.66	0.47	101%
10	Northern Coastal Plain	32.86	33.57	-0.71	98%
11	York-James	32.53	36.70	-4.17	89%
12	Southeast Virginia	37.73	35.95	1.78	105%
13	Eastern Shore	33.34	31.59	1.75	106%
	Statewide	34.40	33.57	0.83	102%

	DROUGHT REGION	OBSERVED	Nov 1, 2009 NORMAL	- Aug 31, 2010 DEPARTURE	% OF NORM.
1	Big Sandy	39.60	39.51	0.09	100%
2	New River	39.59	34.26	5.33	116%
3	Roanoke	46.78	38.24	8.54	122%
4	Upper James	37.01	34.99	2.02	106%
5	Middle James	43.20	36.84	6.36	117%
6	Shenandoah	32.82	31.66	1.16	104%
7	Northern Virginia	35.97	35.24	0.73	102%
8	Northern Piedmont	37.28	37.12	0.16	100%
9	Chowan	44.77	37.77	7.00	119%
10	Northern Coastal Plain	41.61	36.71	4.90	113%
11	York-James	41.78	40.07	1.71	104%
12	Southeast Virginia	48.12	39.02	9.10	123%
13	Eastern Shore	40.90	34.53	6.37	118%
	Statewide	41.03	36.80	4.23	112%

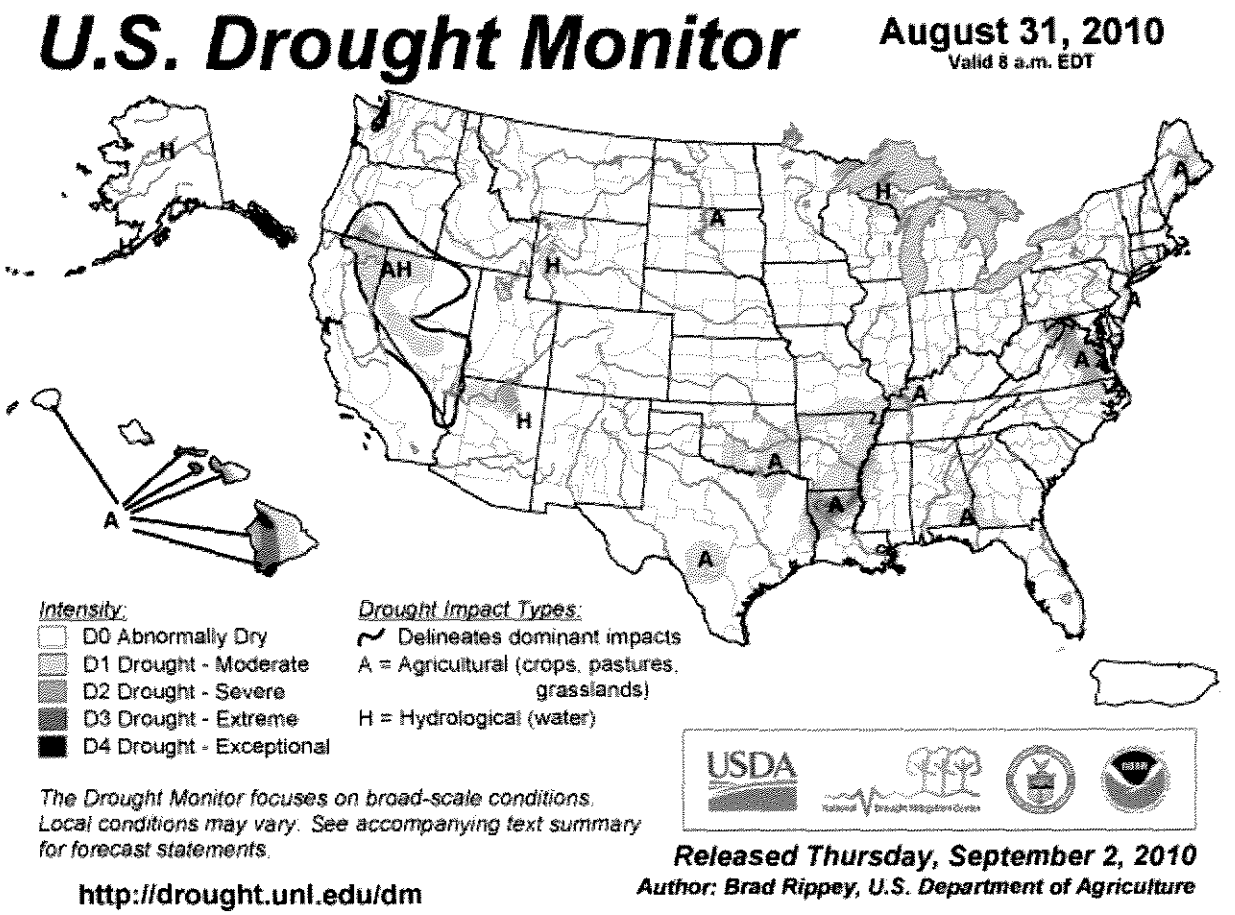
	DROUGHT REGION	OBSERVED	Oct 1, 2009 NORMAL	- Aug 31, 2010 DEPARTURE	% OF NORM.
1	Big Sandy	42.64	42.39	0.25	101%
2	New River	42.28	37.43	4.85	113%
3	Roanoke	49.34	41.95	7.39	118%
4	Upper James	39.80	38.24	1.56	104%
5	Middle James	46.25	40.68	5.57	114%
6	Shenandoah	35.57	34.85	0.72	102%
7	Northern Virginia	40.79	38.72	2.07	105%
8	Northern Piedmont	40.70	41.11	-0.41	99%
9	Chowan	46.82	41.35	5.47	113%
10	Northern Coastal Plain	45.82	40.22	5.60	114%
11	York-James	44.87	43.60	1.27	103%
12	Southeast Virginia	50.43	42.68	7.75	118%
13	Eastern Shore	45.27	37.74	7.53	120%
	Statewide	44.04	40.30	3.74	109%

	DROUGHT REGION	OBSERVED	Sep 1, 2009 NORMAL	- Aug 31, 2010 DEPARTURE	% OF NORM.
1	Big Sandy	47.82	45.85	1.97	104%
2	New River	46.30	40.84	5.46	113%
3	Roanoke	52.40	46.18	6.22	113%
4	Upper James	43.07	41.74	1.33	103%
5	Middle James	49.42	44.81	4.61	110%
6	Shenandoah	37.79	38.52	-0.73	98%
7	Northern Virginia	43.03	42.79	0.24	101%
8	Northern Piedmont	43.58	45.39	-1.81	96%
9	Chowan	51.13	45.78	5.35	112%
10	Northern Coastal Plain	48.90	44.31	4.59	110%
11	York-James	50.79	48.50	2.29	105%
12	Southeast Virginia	57.73	47.11	10.62	123%
13	Eastern Shore	51.74	41.35	10.39	125%
	Statewide	47.68	44.30	3.38	108%

	DROUGHT REGION	OBSERVED	Aug 1, 2009 NORMAL	- Aug 31, 2010 DEPARTURE	% OF NORM.
1	Big Sandy	52.31	49.68	2.63	105%
2	New River	50.81	44.15	6.66	115%
3	Roanoke	56.75	49.90	6.85	114%
4	Upper James	46.45	45.07	1.38	103%
5	Middle James	52.95	48.63	4.32	109%
6	Shenandoah	40.83	41.85	-1.02	98%
7	Northern Virginia	47.00	46.64	0.36	101%
8	Northern Piedmont	46.73	49.21	-2.48	95%
9	Chowan	54.98	50.09	4.89	110%
10	Northern Coastal Plain	54.16	48.17	5.99	112%
11	York-James	56.26	53.37	2.89	105%
12	Southeast Virginia	67.18	52.23	14.95	129%
13	Eastern Shore	56.34	45.22	11.12	125%
	Statewide	51.85	48.13	3.72	108%

	DROUGHT REGION	OBSERVED	Jul 1, 2009 NORMAL	- Aug 31, 2010 DEPARTURE	% OF NORM.
1	Big Sandy	57.91	54.16	3.75	107%
2	New River	54.87	47.94	6.93	114%
3	Roanoke	61.10	54.29	6.81	113%
4	Upper James	51.34	49.11	2.23	105%
5	Middle James	56.43	53.04	3.39	106%
6	Shenandoah	43.77	45.61	-1.84	96%
7	Northern Virginia	48.65	50.41	-1.76	97%
8	Northern Piedmont	49.65	53.61	-3.96	93%
9	Chowan	58.99	54.60	4.39	108%
10	Northern Coastal Plain	59.02	52.62	6.40	112%
11	York-James	62.24	58.47	3.77	106%
12	Southeast Virginia	71.17	57.30	13.87	124%
13	Eastern Shore	62.12	49.22	12.90	126%
	Statewide	55.91	52.47	3.44	107%

APPENDIX B


U.S. Drought Monitor
August 31, 2010
Valid 8 a.m. EDT
Intensity:
D0 Abnormally Dry
D1 Drought - Moderate
D2 Drought - Severe
D3 Drought - Extreme
D4 Drought - Exceptional
Drought Impact Types:
Delineates dominant impacts
A = Agricultural (crops, pastures, grasslands)
H = Hydrological (water)
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.
http://drought.unl.edu/dm
USDA
Released Thursday, September 2, 2010
Author: Brad Rippey, U.S. Department of Agriculture

APPENDIX C

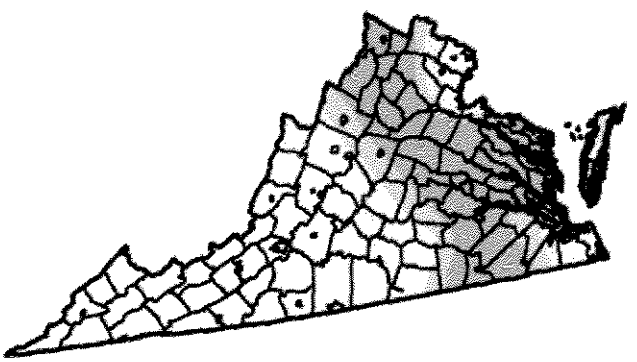
U.S. Drought Monitor

Virginia

August 31, 2010
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3	D4
Current	35.3	64.7	41.8	30.6	0.0	0.0
Last Week (08/24/2010 map)	26.1	73.9	41.8	30.4	0.0	0.0
3 Months Ago (06/08/2010 map)	100.0	0.0	0.0	0.0	0.0	0.0
Start of Calendar Year (01/05/2010 map)	100.0	0.0	0.0	0.0	0.0	0.0
Start of Water Year (10/06/2009 map)	86.9	13.1	0.4	0.0	0.0	0.0
One Year Ago (09/01/2009 map)	93.2	6.8	0.0	0.0	0.0	0.0



Intensity:

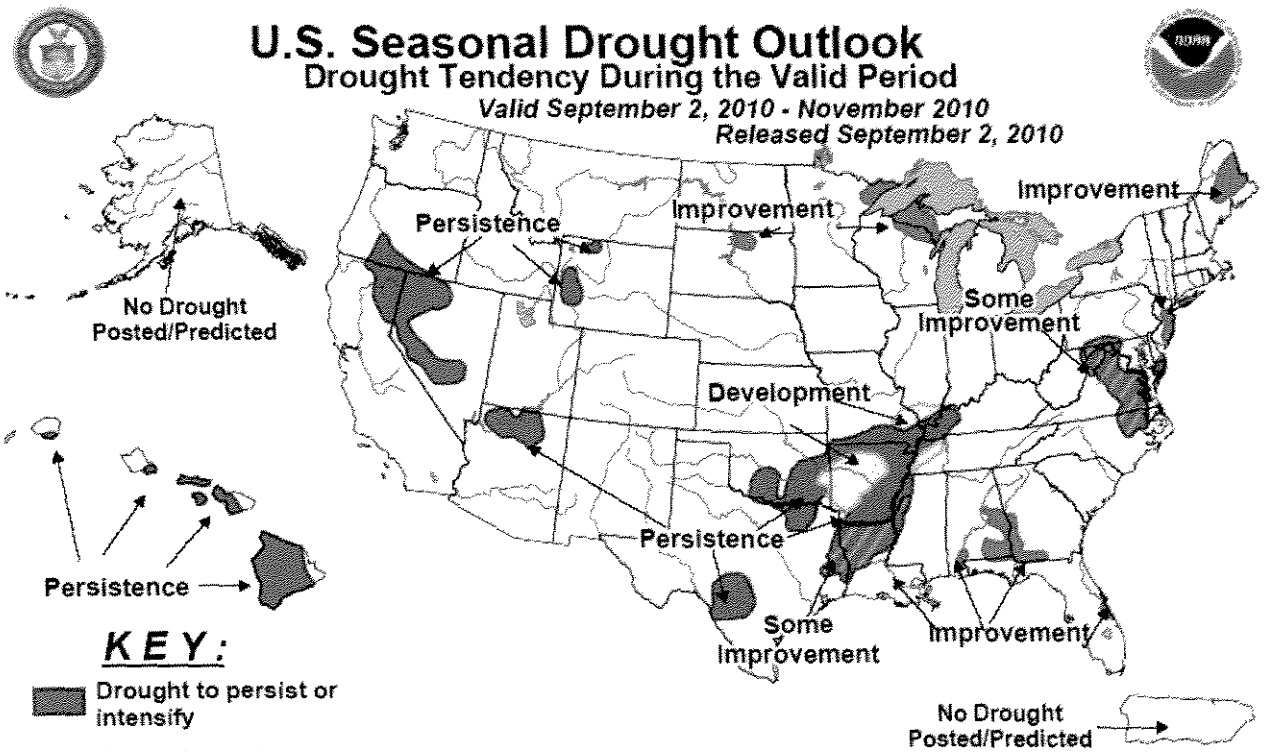
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements

http://drought.unl.edu/dm

Released Thursday, September 2, 2010
Author: Brad Rippey, U.S. Department of Agriculture

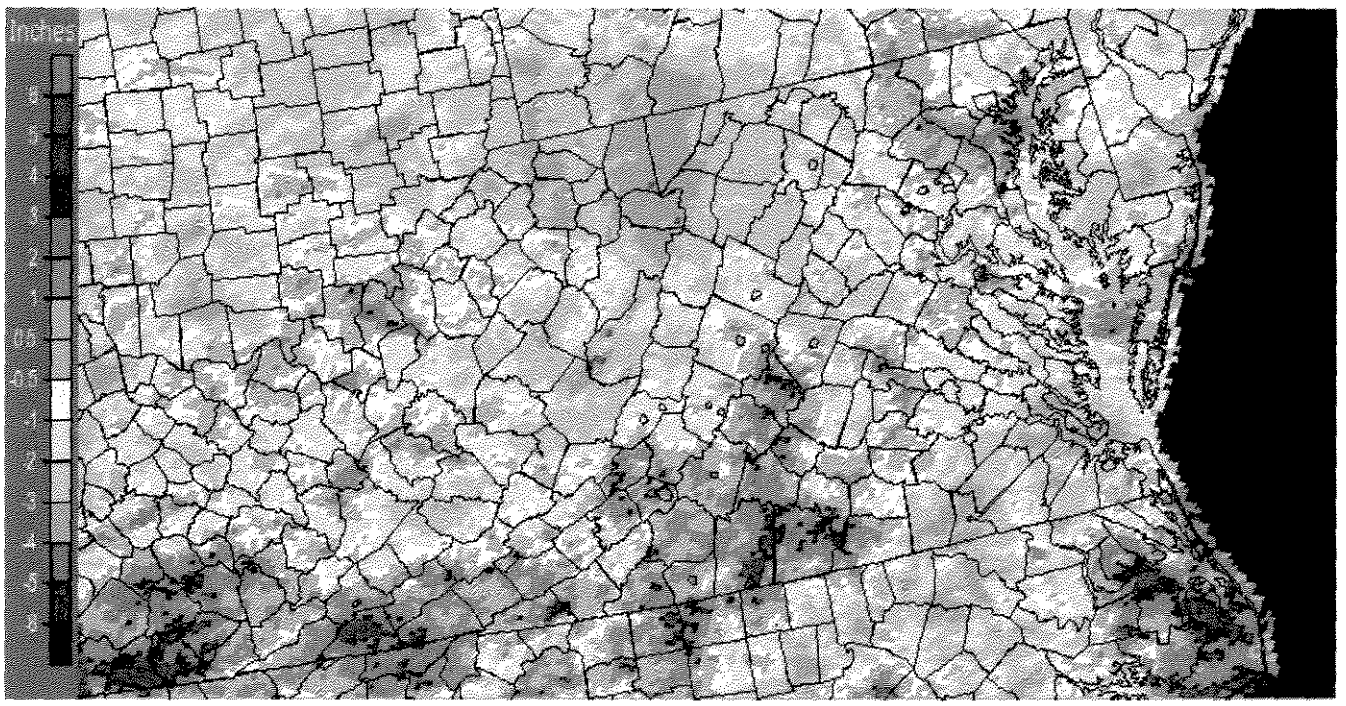
APPENDIX D


U.S. Seasonal Drought Outlook
Drought Tendency During the Valid Period
Valid September 2, 2010 - November 2010
Released September 2, 2010
No Drought Posted/Predicted
Persistence
Improvement
Improvement
Some Improvement
Development
Persistence
Persistence
Some Improvement
Improvement
No Drought Posted/Predicted
KEY:
Drought to persist or intensify
Drought ongoing, some improvement
Drought likely to improve, impacts ease
Drought development likely
Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.

APPENDIX E

30-Day Departure from Normal Precipitation

Virginia: Current 30-Day Departure from Normal Precipitation
Valid at 9/7/2010 1200 UTC- Created 9/7/10 18:17 UTC



APPENDIX F
Condition of Public Water Supplies
August 24, 2010

ODW Drought Situation Report

Date: 8/24/10

	Restriction totals
Mandatory	2
Voluntary	18
Total	20

N-None
M-Mandatory
V-Voluntary

B-Better
S-Stable/Same
W-Worse

PWSID	Waterworks	Source Name	Restrictions	Situation	Population Served
3053280	DCWA Central (Dinwiddie County)	Appomattox River Water Authority (ARWA)	V	**S tending towards W** - 08/19/2010 - Voluntary restrictions as of 7/12/2010 (but.....DCWA expects ARWA to announce mandatory restrictions in the next couple weeks, if rainfall doesn't increase lake levels quickly)	6,800
3081550	GCWSA - Jarratt	Nottoway River	N	**S** - 08/19/10 - Waterworks production rate reduced due to lower demand; river level sufficient to allow plant operation at 1.9 mgd. Chief operator noted that river is getting low.	7,190
3093120	Isle of Wight County	Suffolk	V	**W** - 08/20/10 - Obtains water from Suffolk. Follows Suffolk's lead on conservation.	1,284
3149700	Puddledock Road	ARWA	V	**S**- 08/19/2010 - Voluntary restrictions as of 7/12/2010.	9,723
3550050	Chesapeake - Western Branch system	City of Portsmouth	V	**S** -08/20/2010 This portion of the city is consecutive to (receives water from) the city of Portsmouth. City Council voted to go to voluntary conservation city-wide - it took effect on 24 Oct 2007. Still following Portsmouth's lead on conservation.	36,642

3550051	Chesapeake	Northwest River, City of Norfolk Raw Water (Lake Gaston)	N	**S** -08/20/2010 Through the first 7 months surplus rainfall for 2010 is 13.24 inches.There are no water restrictions in Chesapeake. Chlorides are slightly elevated 69 ppm. the normal range between 30-50 mg/l. Continuing to purchase raw water from Norfolk (7.5 MGD average). NWR averages 4.3 MGD. The Intown Lakes remain full and there are no irregularities in the tidal patterns in NWR.	103,504
3550052	Chesapeake - South Norfolk system	City of Norfolk	V	**S** -08/20/2010-This portion of the city is consecutive to (receives water from) the city of Norfolk. City Council voted to go to voluntary conservation city-wide - it took effect on 24 Oct 2007. Still following Norfolk's lead on conservation.	38,709
3570150	Colonial Heights	ARWA	V	**S** - 08/19/10 - Voluntary restrictions currently in place. Generally follow ARWA recommendations on water restrictions.	17,286
3595250	Emporia	Meherrin River	N	**S** - 08/19/10 - Reservoir level sufficient for normal operation. Power plant & ILUKA also withdrawing from river.	5,600
3670800	Virginia-American Water Company (Hopewell)	Appomattox & James Rivers	N	**S** - 08/19/2010 - Level at intakes normal and sufficient to supply plant. August rainfall on track to meet monthly average and year-to-date totals slightly below average. Still experiencing taste and odor issues.	28000 - Primary / 45463 Total including Consecutive System (Ft. Lee)
3700500	Newport News	Chickahomony River, Skiffs Creek, Diascand, Little Creek, Harwoods Mill, Lee Hall	N	**S - 8/23/10** - Total reservoir capacity at 76%. Chickahominy pumps operating. At current delivery rate of about 46 MGD, there is about 186 days of stored water available.	414,000

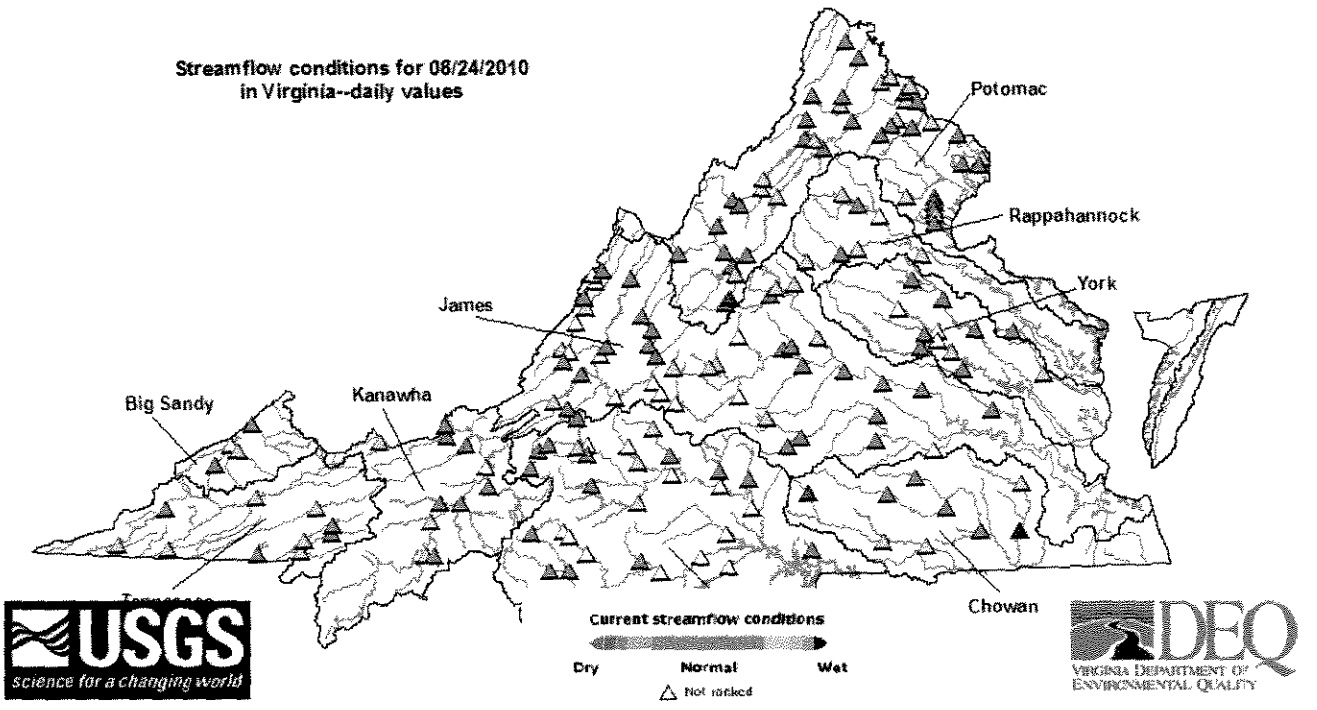
3710100	Norfolk	Lake Prince, Lake Burnt Mills, Western Branch reservoir, Nottoway River, Blackwater River, 4 western wells; Little Creek reservoir, Lakes Smith, Lawson, Whitehurst, and Wright. Lake Gaston.	V	**S** - As of 08/16/10, reservoirs at 86.3% (nearly even with 85.8% on 07/19/10). Historic reservoir capacity is 86.9% at this time of year. Avg. pumping from Lake Gaston = 50.0 MGD. Total Reservoir Storage = 13,048 MG. Approx. 650 days of storage remaining under current demand with 50 MGD pumping from Lake Gaston, and approx. 190 days of storage remaining under current demand with no pumping from Lake Gaston. Current demand is approx. 70 MGD. Called for voluntary conservation 11/1/07.	261,250 - Primary / 755,617 - Total including consecutive systems (Va Beach + military bases).
3730750	Petersburg	ARWA	V	**S** - 08/19/10 - Voluntary restrictions requested 7/12/2010. Generally follow ARWA recommendations on water restrictions.	33,740
3740600	Portsmouth	Lakes Cohoon, Meade, Kilby, and Speights Run	V	**W** - As of 08/13/10, reservoirs at 76% (down from 83% on 07/16/10). Median reservoir capacity is 93% for the month and historical average capacity is 90% (period of 1969-2008). The emergency wells are off. Estimated days of storage remaining at current pumpage and rainfall is 173 days (avg. pumpage is 16.6 MGD). Called for voluntary conservation on 10/10/07.	100,400 - Primary / 120,400 Total including consecutive systems (military bases)
3800805	Suffolk	Lone Star Lakes, Cumps Mill Pond	V	**W** 8/20/2010-Will follow Portsmouth's lead and the region as far as conservation. Average reservoir levels : Southern Lakes at 71.33% capacity, for the Northern Lakes at 73.15% and Crumps Mill Pond at 41.24%. The Southern Lakes are for	62,562

				emergency use only. Overall they are at 61.91% capacity as of July 30, 2010.The reservoirs for the period (May-June 2010) capacity 77.71%. The operator states that they were in better condition last year when compared to 2009 (96.66%) for the same period. No conservation measures implemented at this time but will continue to monitor.	
3810900	Virginia Beach	Norfolk	V	**S** - 08/16/10 - Obtains water from Norfolk. Called for voluntary conservation on 9/19/07.	423,743
3830850	Williamsburg	Waller Mill Reservoir	N	**8/20/2010**: 5" below primary spillway - about 86% of usable capacity. 301 days of usable storage based on drawdown rate of the past week of 2.5".	16,400
4041035	APPOMATTOX RIVER WATER AUTHORITY	Surface water; Lake Chesdin	V	**W**- Wholesaler to Chesterfield County, Prince George County, Dinwiddie County; Cities of Petersburg and Colonial Heights. Reservoir is at 58" below top of dam. Voluntary restrictions continue.	200,000
4041845	CHESTERFIELD CO CENTRAL WATER SYSTEM	Surface water; Swift Creek reservoir; purchases finished water	V	**B-** Purchases water from the City of Richmond and the Appomattox River Water Authority. Swift Creek Reservoir is at 1.3 feet below top of dam.Voluntary restrictions continue.	286,000
4057800	TAPPAHANNOCK, TOWN OF	Groundwater wells	N	**S**	2,100
4073311	GLOUCESTER CO WATER TREATMENT PLT	Surface water, Beaverdam reservoir; 2 deep groundwater wells	N	**S**-Reservoir is full.	8,870
4075283	EASTERN GOOCHLAND CENTRAL WATER SYSTEM	Purchased surface water	N	**S**-purchases water from Henrico County	2,500
4075735	JAMES RIVER CORRECTIONAL CTR	Surface water; James River	N	**S**- Conservation at all DOC facilities	9,300
4085398	HANOVER SUBURBAN WATER SYSTEM	Surface water; North Anna River; some groundwater wells;	N	**S (see Richmond)**	71,000

		purchases finished water			
4085770	SPRING MEADOWS-MEADOW GATE	Groundwater wells	N	**S**	2,300
4087125	HENRICO COUNTY WATER SYSTEM	Surface water; James River	N	**S (see Richmond)**	289,000
4101900	WEST POINT, TOWN OF	Groundwater wells	N	**S**	3,000
4127110	DELMARVA PROPERTIES	Groundwater wells	N	**S**-New Kent Co. encourages conservation at all county owned waterworks.	7,700
4145675	POWHATAN COURTHOUSE	Groundwater wells	N	**S**	2,600
4193280	COLONIAL BEACH, TOWN OF	Groundwater wells	N	**S**	3,300
4760100	RICHMOND, CITY OF	Surface water; James River	N	**S**- water levels do not affect intake; James River Regional Flow Management Plan set restrictions based on James River level for counties of Henrico, Chesterfield, Goochland, and Hanover counties, which purchase water from the City. Voluntary restrictions not yet necessary, but may become necessary if no substantive rainfall events.	197,000
5011050	Town of Appomattox	Wells	V	**S**	1,708
6033085	Caroline Utility	Groundwater	M	**S** - Mandatory water use restriction of High-Level 3 went into effect 7/13/2010 and remain in effect as of 8/23/2010.	3600 primary 3000 consec
6061200	Marshall	Groundwater	M	**S** - The WSA Alert Messaging Service maintains the Water Use Restriction Notice as of 8/23/2010. The mandatory water use restriction is not directly drought related but depends on water source development.	2,134
6107150	Town of Hamilton	Groundwater	V	**S** - 8/23/10 Voluntary water use restrictions initiated 7/6/2010	2,000

6107400	Town of Lovettsville	Groundwater	V	**S** 8/23/10 Voluntary water use restrictions remain in place; however there is no problem with water supply.	1,280
6107600	Town of Purcellville	Surfce water/groundwater	V	**S** - 8/23/10 All sources returned to service. Voluntary water conservation initiated 7/2/10.	6,300
6107650	Town of Round Hill	Groundwater	V	S - 8/23/10 - No water supply problems.Voluntary water use restrictions effective 7/6/10.	3,156

APPENDIX G
USGS Streamflow Conditions for August 24, 2010

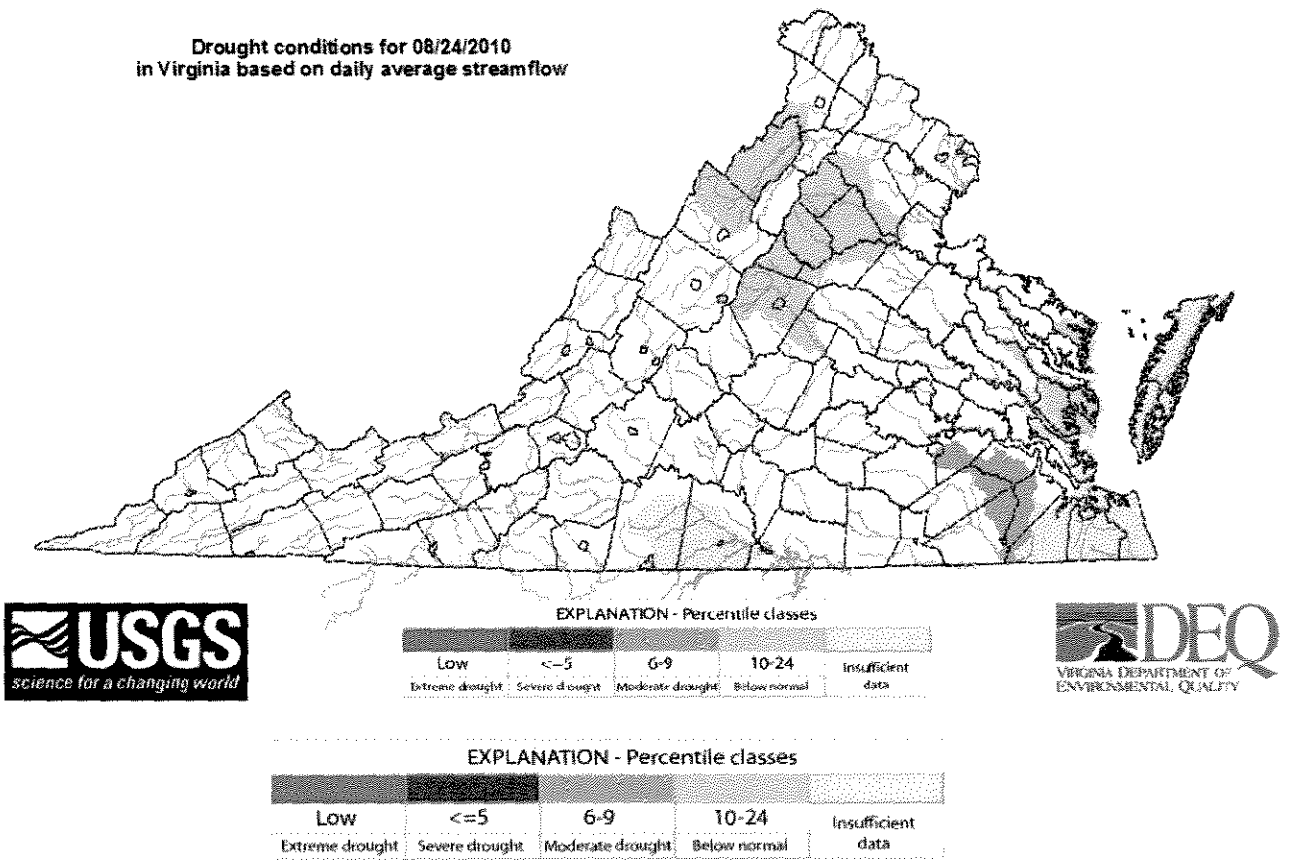


Current streamflow conditions

Dry **Normal** **Wet**

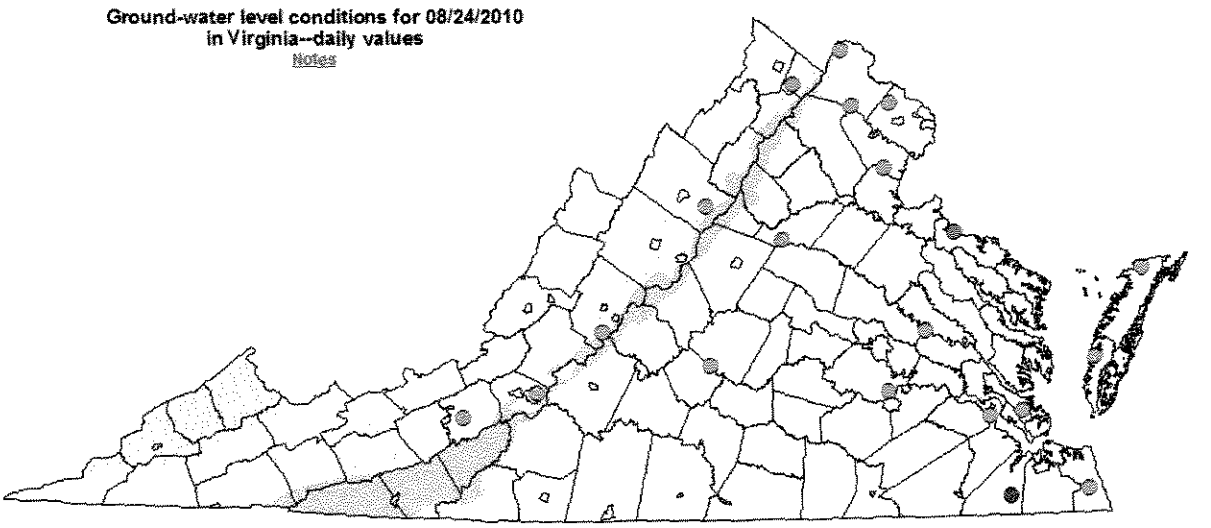
△ Not ranked

APPENDIX H
Drought Watch -- USGS State Information on Drought
Map of below normal daily average streamflow



EXPLANATION - Percentile classes
Low
Extreme drought
<=5
Severe drought
6-9
Moderate drought
10-24
Below normal
Insufficient
data

APPENDIX I
Virginia Climate Response Network
August 24, 2010



Explanation - Percentile classes (symbol color based on most recent daily value.)									
New Low	<5	5-10	10-24	25-75	76-90	90-95	>95	New High	Not Ranked
	Well Below Normal		Below Normal	Normal	Above Normal	Well Above Normal			

Appendix 3: Anticipated Water Supply Planning Formal Program Submissions for 2010 - 2011

Table 16. Summary of local and regional water supply plan development status for those entities formally submitting water supply planning programs to SWCB in 2010 and 2011.

DEQ Region	Lead Agency	Participating Counties	Participating Cities	Participating Towns	Status of Planning Process
Blue Ridge - Roanoke				Blacksburg and Christiansburg	Representatives from the Towns are preparing the regional water supply plan. A draft is expected by Fall 2010 for team review. Formal submission of the regional water supply program to the SWCB will occur in 2011.
Blue Ridge - Roanoke	New River Valley Planning District Commission	Floyd, Giles, Montgomery, and Pulaski	Radford	Dublin, Glen Lyn, Pembroke, Floyd, Narrows, Pearisburg, Pulaski, and Rich Creek	Project support is also being provided by Giles County PSA, Floyd-Floyd County Public Service Authority, Blacksburg, Christiansburg, and VPI-PSA. The Planning District Commission received funding in FY07, FY08, and FY09 to develop the regional water supply plan and incorporate DEQ comments into a revised draft. The project is on schedule to formally submit the regional water supply program to the SWCB in 2011.
Blue Ridge – Lynchburg & Roanoke	West Piedmont Planning District Commission	Henry, Patrick, and Pittsylvania	Danville and Martinsville	Stuart, Gretna, Hurt, Chatham, and Ridgeway	Project support is also being provided by the Henry County PSA and Pittsylvania County SA. The PDC received funding in FY07 and FY08 to develop their water supply plan. The project is on schedule to submit a draft plan to DEQ for team review in Summer 2010 and formally submit the regional water supply program to the SWCB in 2011.
Blue Ridge - Roanoke	Roanoke Valley-Alleghany Regional Commission	Craig		New Castle	Project support is also being provided by the Craig-New Castle PSA. The PDC received funding in FY10 to develop the regional water supply plan. A draft of the plan is being reviewed by DEQ Water Supply Plan (WSP) planner for subsequent team review. The project is on schedule to formally submit the regional water supply program to the SWCB in 2011.

Table 16, continued. Summary of local and regional water supply plan development status for those entities formally submitting water supply planning programs to SWCB in 2010 and 2011.

DEQ Region	Lead Agency	Participating Counties	Participating Cities	Participating Towns	Status of Planning Process
Blue Ridge - Roanoke	Roanoke Valley-Alleghany Regional Commission	Bedford, Botetourt, Franklin, and Roanoke	Bedford, Roanoke, and Salem	Boones Mill, Buchanan, Fincastle, Rocky Mount, Troutville, and Vinton	The plan builds on a regional water plan developed in 2003. The PDC received funding in FY07 and FY08 to develop the regional water supply plan. A draft is being reviewed by DEQ WSP planner for subsequent team review. The project is on schedule to formally submit the regional water supply program to the SWCB in 2011.
Blue Ridge – Roanoke	Cumberland, LENONWISCO, & Mount Rogers Planning District Commissions	Bland, Buchanan, Carroll, Dickenson, Grayson, Lee, Russell, Scott, Smyth, Tazewell, Washington, and Wise	Bristol, Galax, and Norton	39 participating towns	The region received grant funding in FY07, FY08, and FY09. The project is on schedule to submit a draft plan to DEQ for team review in 2010 and formally submit the regional water supply program to the SWCB in 2011.
Blue Ridge - Lynchburg	Buckingham County	Buckingham		Dillwyn	Buckingham received FY09 and FY10 grant funding to develop the existing sources, existing uses, water demand management, and drought response & contingency portions of the regional plan. The project is on schedule to complete the remaining sections of the plan (existing resources, water demand projections, statement of need, and alternatives) and formally submit the regional water supply program to the SWCB in 2011.
Blue Ridge - Lynchburg	Charlotte County	Charlotte		Charlotte Court House, Drakes Branch, Keysville, and Phoenix	Charlotte received FY06 grant funding to develop a partial, draft regional water supply plan (sections 70-110, and 130). The County and its consultant are working on the regional drought response and contingency plan (section 120). The project is on schedule to formally submit the regional water supply program to the SWCB in 2011.

Table 16, continued. Summary of local and regional water supply plan development status for those entities formally submitting water supply planning programs to SWCB in 2010 and 2011.

DEQ Region	Lead Agency	Participating Counties	Participating Cities	Participating Towns	Status of Planning Process
Blue Ridge - Lynchburg	Halifax County Service Authority	Halifax		Halifax, Scottsburg, South Boston, and Virgilina	Halifax received FY09 and FY10 grant funding to develop the sources, uses, resources, water demand management, and drought response & contingency portions of the regional plan. The project is on schedule to complete the remaining sections of the plan (water demand projections, statement of need, and alternatives) and formally submit the regional water supply program to the SWCB in 2011.
Blue Ridge - Lynchburg	Lunenburg County & Commonwealth Regional Commission	Lunenburg		Kenbridge, Victoria	Lunenburg received FY08, FY09, and FY10 grant funding to develop a draft regional water supply plan (sections 70 – 130). The project is on schedule to formally submit the regional water supply program to the SWCB in 2011.
Blue Ridge - Lynchburg	Nottoway County	Nottoway		Blackstone, Burkeville, and Crewe	Nottoway received FY07 grant funding to develop a draft regional water supply plan (sections 70 – 130). Nottoway received funding in FY09 to incorporate DEQ comments into a revised draft. The DEQ water supply planning team reviewed and provided comments on the draft regional plan. Nottoway is currently addressing DEQ comments into a final draft plan. Public hearings were held in December 2009 & January 2010. The project is on schedule to submit the regional water supply program to the SWCB by 2011.
Blue Ridge - Lynchburg	Prince Edward County	Prince Edward		Farmville	Prince Edward received grant funding in FY08 to develop a draft water supply plan (sections 70 – 130). Project partners and their consultant are finalizing the regional drought response and contingency plan. The project is on schedule to submit the regional water supply program to the SWCB by 2011.

Table 16, continued. Summary of local and regional water supply plan development status for those entities formally submitting water supply planning programs to SWCB in 2010 and 2011.

DEQ Region	Lead Agency	Participating Counties	Participating Cities	Participating Towns	Status of Planning Process
Blue Ridge - Lynchburg	Region 2000 Local Government Council	Amherst, Appomattox, Bedford, Campbell, and Nelson	Bedford and Lynchburg	Altavista, Amherst, Appomattox, Brookneal, and Pamplin	Region 2000 received WSP grant funding in FY06 and FY08. Project support is also provided by the Amherst County SA, Bedford County PSA, Campbell County Utilities and Service Authority, and Nelson County SA. A community stakeholder workshop to present the draft regional water supply plan occurred in July 2008. A draft regional plan was submitted to DEQ for team review in March 2009 and DEQ staff are currently testing the Upper James WSP model with the draft plan data. The project is on schedule to formally submit the regional water supply program to the SWCB in 2011.
Blue Ridge - Lynchburg	Southside Planning District Commission	Mecklenburg and Brunswick		Alberta, Brodnax, Lawrenceville, La Crosse, South Hill, Boydton, Chase City, and Clarksville	Southside PDC received grant funding in FY06, FY07, FY08, and FY10 to develop their regional water supply plan. The PDC hosted drought management workshops in 2008 with DEQ staff, local administrators, and water personnel to develop their regional drought response and contingency plan as well as a drought management ordinance (Section 120). The project is on schedule to submit a draft plan to DEQ for team review in 2010 and formally submit the regional water supply program to the SWCB in 2011.
Piedmont & Blue Ridge - Lynchburg		Cumberland, Goochland, Henrico, and Powhatan			Cumberland and Powhatan received grant funding in FY09 to complete the water demand management and drought response and contingency planning sections of the regional plan. While discussions continue on viability of the Cobbs Creek Reservoir project, each individual locality is expected to make continued progress and formal program submission(s) to the SWCB are anticipated in 2011.
Piedmont (covered by Blue Ridge – Roanoke Planner)	Amelia County	Amelia			The County received grant funding in FY09 and FY10 to develop the local water supply plan. The draft is currently under review and is on schedule for formal submission to the SWCB by November 2010.

Table 16, continued. Summary of local and regional water supply plan development status for those entities formally submitting water supply planning programs to SWCB in 2010 and 2011.

DEQ Region	Lead Agency	Participating Counties	Participating Cities	Participating Towns	Status of Planning Process
Piedmont (covered by Blue Ridge – Lynchburg Planner)	Appomattox River Water Authority	Chesterfield, Dinwiddie, Prince George	Colonial Heights Petersburg Hopewell	McKenney	The Authority received FY07 grant funding to develop a draft regional water supply plan. Mission H2O filed comments on the Appomattox River Water Authority draft plan. Hopewell joined the region in 2009. American Water Company is coordinating with ARWA to develop the City of Hopewell sections of the plan. The project is on schedule to formally submit the regional water supply program to the SWCB in 2011.
Piedmont (covered by Blue Ridge – Roanoke Planner)	Charles City County	Charles City			The County received funding in FY10 to develop the local water supply plan. The draft is being reviewed by DEQ WSP planner. The project is on schedule for formal submission to the SWCB by November 2010.
Piedmont (covered by Central Office Planner)	Hanover County	Hanover		Ashland	Hanover County received FY 10 and FY 11 grant funding to develop a draft regional water supply plan with the Town of Ashland. The project is on schedule to formally submit the regional plan to the SWCB to meet their 2011 deadline.
Piedmont (covered by Blue Ridge – Lynchburg Planner)	Middle Peninsula Planning District Commission	Essex, King and Queen, King William, Matthews, and Middlesex		Tappahannock, Urbanna, and West Point	The PDC received grant funding in FY08, FY09, and FY10 to develop their regional water supply plan. A draft plan was submitted to DEQ for team review in 2010. The PDC and their consultant are currently addressing DEQ comments and finalizing the plan. The project is on schedule to formally submit the regional water supply program to the SWCB in 2011.
Piedmont (covered by Blue Ridge – Lynchburg Planner)	New Kent	New Kent			New Kent received grant funding in FY10 to finalize their local water supply plan. A draft plan was submitted to DEQ for team review in 2010. The County and their consultant are currently addressing DEQ comments and finalizing the plan. The project is on schedule to formally submit the local water supply program to the SWCB by the 2010 deadline.

Table 16, continued. Summary of local and regional water supply plan development status for those entities formally submitting water supply planning programs to SWCB in 2010 and 2011.

DEQ Region	Lead Agency	Participating Counties	Participating Cities	Participating Towns	Status of Planning Process
Piedmont (covered by Central Office Planner)	Northern Neck Planning District Commission	Lancaster, Northumberland, Richmond, and Westmoreland		Colonial Beach, Irvington, Kilmarnock, Montross, Warsaw and White Stone	The Northern Neck PDC received grant funding in FY10 to finalize the regional plan. A draft was submitted for team review in 2010. The PDC and their consultant are currently addressing DEQ comments and finalizing the plan. The project is on schedule to formally submit to the SWCB to meet their 2011 deadline.
Piedmont (covered by Valley Planner)	Greensville County Water and Sewer Authority	Greensville and Sussex	Emporia	Jarratt, Stony Creek, Wakefield, and Waverly	The Greensville County WSA received grant funds in FY07, 08, and 09 to develop a draft regional water supply plan (sections 70 – 130) and incorporate DEQ comments into a revised draft. The regional water supply program was submitted to the SWCB in July 2010.
Tidewater (covered by Blue Ridge – Lynchburg & Valley Planners)	Hampton Roads Planning District Commission	Gloucester, Isle of Wight, James City, Surry, Southampton, and York	Chesapeake, Franklin, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Virginia Beach, Suffolk and Williamsburg	Boykins, Capron, Branchville, Ivor, Courtland, Windsor, Newsoms, Surry, Smithfield, Claremont, and Dendron	The Hampton Roads PDC received grant funds in FY06. The project is on schedule to submit a draft plan to localities in fall 2010 and formally submit their local water supply program to the SWCB by the 2011 deadline.
Tidewater (covered by Blue Ridge – Roanoke Planner)	Town of Chincoteague			Chincoteague	The DEQ WSP planner is reviewing the draft water supply plan. The project is on schedule to formally submit their local water supply program to the SWCB by the 2010 deadline.
Tidewater (covered by Blue Ridge – Roanoke Planner)	Accomack-Northampton Planning District Commission	Accomack		13 participating towns	The PDC received funding in FY07, FY09 and FY10 to develop the regional water supply plan. A draft is currently being reviewed by the DEQ WSP planner with subsequent team review. The project is on schedule to formally submit the regional water supply program to the SWCB by 2011.

Table 16, continued. Summary of local and regional water supply plan development status for those entit ies formally submitting water supply planning programs to SWCB in 2010 and 2011.

DEQ Region	Lead Agency	Participating Counties	Participating Cities	Participating Towns	Status of Planning Process
Tidewater (covered by Blue Ridge – Roanoke Planner)	Accomack-Northampton Planning District Commission	Northampton		Cape Charles, Cheriton, Eastville, Exmore, and Nassawadox	The PDC received funding in FY07, FY09, and FY10 to develop the regional water supply plan. A draft is currently being reviewed by the DEQ WSP planner with subsequent team review. The project is on schedule to formally submit the regional water supply program to the SWCB by 2011.
Northern	Culpeper County	Culpeper		Culpeper	The project is on schedule to formally submit the regional water supply program to the SWCB by 2011.
Northern	Town of Hillsboro			Hillsboro	Town officials are working with staff on their local water supply program, which is due to the SWCB in 2010.
Northern	King George County	King George			King George County submitted their regional water supply program to the SWCB in 2009.
Northern	Town of Port Royal			Port Royal	Town officials are working with staff on their local water supply program, which is due to the SWCB in 2010.
Northern	Town of Warrenton			Warrenton	A draft water supply plan was reviewed by DEQ. The town is currently addressing DEQ comments and finalizing the program for submittal to the SWCB in 2010.
Northern	Caroline County	Caroline		Bowling Green	The County received funding in FY09 and FY10 to develop a draft regional water supply plan with the Town of Bowling Green. The project is on schedule to formally submit the regional water supply program to the SWCB by 2011.
Northern	Orange County	Orange		Orange and Gordonsville	The County and Towns completed response to DEQ comments in December 2009, and are now proceeding with public briefings with local officials and preparing for public hearings on the regional plan in Fall 2010. The project is on schedule to formally submit the regional water supply program to the SWCB by 2011.

Table 16, continued. Summary of local and regional water supply plan development status for those entities formally submitting water supply planning programs to SWCB in 2010 and 2011.

DEQ Region	Lead Agency	Participating Counties	Participating Cities	Participating Towns	Status of Planning Process
Northern	Fauquier County	Fauquier		Remington and The Plains	The County received FY10 grant funding to develop a draft regional water supply plan with the two towns. The project is on schedule to formally submit the regional water supply program to the SWCB by the 2011 deadline.
Northern	Louisa County	Louisa		Louisa and Mineral	A draft of the regional plan was completed in 2009. The draft is being reviewed by DEQ WSP planner for subsequent team review. The project is on schedule to formally submit the regional water supply program to the SWCB in 2011.
Northern	Madison County	Madison		Madison	The project is on schedule to formally submit the regional water supply program to the SWCB by the 2011 deadline.
Northern	Rappahannock County	Rappahannock		Washington	The project is on schedule to formally submit the regional water supply program to the SWCB by the 2011 deadline.
Northern	Spotsylvania County	Spotsylvania	Fredericksburg		The project is on schedule to formally submit the regional water supply program to the SWCB by the 2011 deadline.
Northern	Northern Virginia Regional Commission	Arlington, Fairfax, Loudon, and Prince William	Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park	13 participating towns	NVRC staff is preparing the Plan. The project is on schedule to formally submit the regional water supply program to the SWCB in 2011.
Valley	Fluvanna County	Fluvanna		Columbia	Fluvanna received FY09 and FY10 grant funding to develop a draft regional water supply plan. The program has been adopted by Fluvanna and Columbia. The project is on schedule to formally submit the regional water supply program to the SWCB in advance of the 2011 deadline.

Table 16, continued. Summary of local and regional water supply plan development status for those entities formally submitting water supply planning programs to SWCB in 2010 and 2011.

DEQ Region	Lead Agency	Participating Counties	Participating Cities	Participating Towns	Status of Planning Process
Valley	Rivanna Water and Sewer Authority	Albemarle	Charlottesville	Scottsville	The region received grant funding in FY07 to complete a partial draft water supply plan (sections 70-100). The project is on schedule to formally submit the regional water supply program to the SWCB by 2011.
Valley & Blue Ridge – Roanoke	Central Shenandoah Planning District Commission	Alleghany, Bath, Highland, and Rockbridge	Covington, Buena Vista, and Lexington	Clifton Forge, Glasgow, Goshen, Iron Gate, and McDowell	The PDC received grant funding in FY09 and FY10 to develop their regional water supply plan. The project is on schedule to submit a draft plan to DEQ in 2010 and formally submit the regional water supply program to the SWCB by 2011.
Valley	Greene County	Greene		Stanardsville	A draft plan was submitted to DEQ for team review in December 2009. The county and their consultant are currently addressing DEQ comments and finalizing the plan. The project is on schedule to formally submit the regional water supply program to the SWCB in 2011.
Valley	Central Shenandoah Planning District Commission	Augusta and Rockingham	Harrisonburg, Staunton, and Waynesboro	Bridgewater, Broadway, Elkton, Craigsville, Dayton, Grottoes, Mount Crawford, and Timberville	The PDC received grant funding in FY06, 07, and 08 to develop their regional water supply plan. The project is on schedule to submit a draft plan to DEQ in 2010 and formally submit the regional water supply program to the SWCB by 2011.

Appendix 4: TOP 20 WATER USERS IN 2009 (NON-POWER GENERATION)

Owner	System	Category*	Total (MGD)
Honeywell International, Inc.	Hopewell Plant	MAN	99.33
Fairfax County Water Authority	Potomac River WTP	PWS	88.48
Western Refining Yorktown Inc	Yorktown Refinery	MAN	64.10
Richmond, City of	Richmond (City) WTP	PWS	63.73
Norfolk, City of	Western Branch Reservoir	PWS	60.75
Duke Energy Generation Services of Narrows	Celco Plant	MAN	58.04
Fairfax County Water Authority	Occoquan Reservoir	PWS	56.09
Meadwestvaco Corporation	Covington Plant	MAN	37.93
International Paper Corp.	Franklin Mill	MAN	32.20
Appomattox River Water Authority	Lake Chesdin WTP	PWS	29.01
Virginia Beach, City of	Virginia Beach Service Area	PWS	27.66
Dupont E I De Nemours & Co	Spruance Plant	MAN	26.80
Newport News, City of	Lee Hall WTP And ROF	PWS	25.33
Newport News, City of	Chickahominy River	PWS	23.72
Henrico County	Henrico County WTP	PWS	22.91
Newport News, City of	Hardwood's Mill WTP	PWS	21.37
Smurfit-Stone Container Corp.	West Point Plant	MAN	19.34
Virginia American Water Co	Hopewell District	PWS	19.09
Smurfit-Stone Container Corp.	Hopewell Plant	MAN	17.83
Portsmouth, City of	Lake Kilby WTP	PWS	15.09
		TOTAL	**808.8**

*Category: MAN= Manufacturing, PWS= Public Water Supply

Appendix 5: Water Transfers in the VWUDS Database

Water use is tracked in the VWUDS database by recording different actions: WL = withdrawal, RL = release, DL = delivery, SR = System Release, and SD = System Delivery. Withdrawals from a water source (groundwater or surface water), in general, account for the largest portion of a locality's actual water use. Additionally, a locality may buy water from (or sell water to) another locality, or a portion of their water use for the year may come from water already stored at a water treatment plant. Therefore, the actual water use in a particular locality is equal to

Water Use = Withdrawals – Water Sold + Water Bought + Water Released from WTP
(i.e., Use = WL – RL + DL + SR)

Currently it is difficult to give an accurate estimate of actual water use in a locality because not all transfers are consistently reported to the VWUDS database. For example, in several instances, there are localities who have reported water releases (RL), but there are no corresponding data indicating the water has been received and used by another locality (DL). Or, some localities reportedly sell water (RL), but have no reported means of receiving water (WL or DL or SR).