

U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

September 2012 – Groundwater and streamflow levels recover from low levels in spring and summer

Why is it important for the USGS to collect and analyze water-resources data?

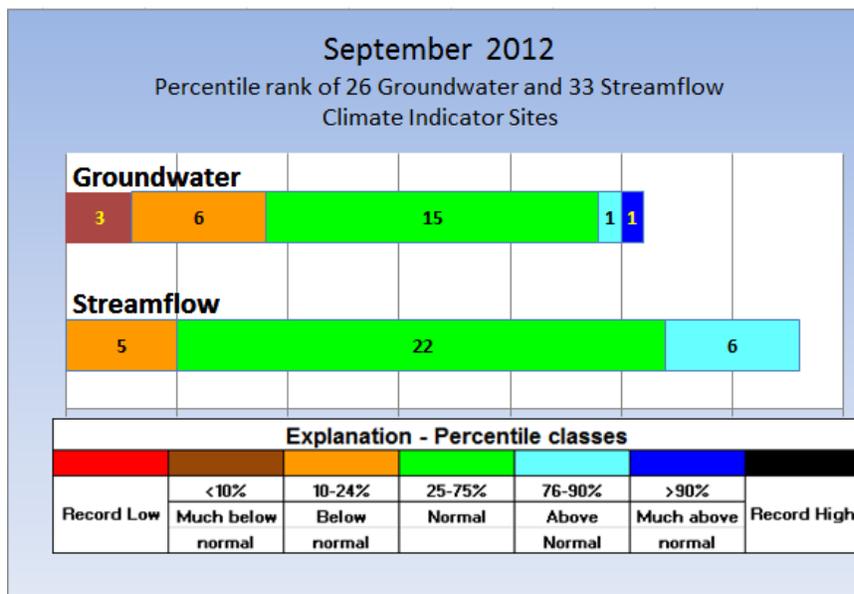
USGS water data is valuable to the public, researchers, water managers, planners, and agricultural users, especially during floods and droughts. These data can be used to assess how water resources respond to changes in climate. Scientists at the USGS have measured streamflow and groundwater levels in wells to assess water resources for over 125 years.

In addition to providing the most extensive set of historical streamflow and groundwater data available to the public, the USGS collects water data and quality-assures the data by employing standardized techniques across the country. The uniformity of the dataset allows for multi-state comparisons and other comparative statistical analyses that better inform policy makers of the possible water resource conditions they might encounter in the future.

The sites used in this water summary were carefully selected to show the response of streamflow and groundwater levels to weather conditions. Ideally, these sites will show no effects from human influences. The streamflow and groundwater data are ranked in comparison to the historical record and summarized. Precipitation and reservoir data are also presented to give a more complete picture of the region’s water resources.

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Groundwater levels were normal in 15 of the 26 USGS monitoring wells. Groundwater levels at nine wells were below normal and above normal at two wells in Frederick and Washington Counties in Maryland.



Monthly mean streamflow was normal at 22 of 33 streamflow-gaging stations. For the remaining streams, the number of stations with above and below normal monthly mean streamflow were about the same. There has been considerable improvement across the region, but especially on the southern Delmarva Peninsula, since the beginning of spring 2012.

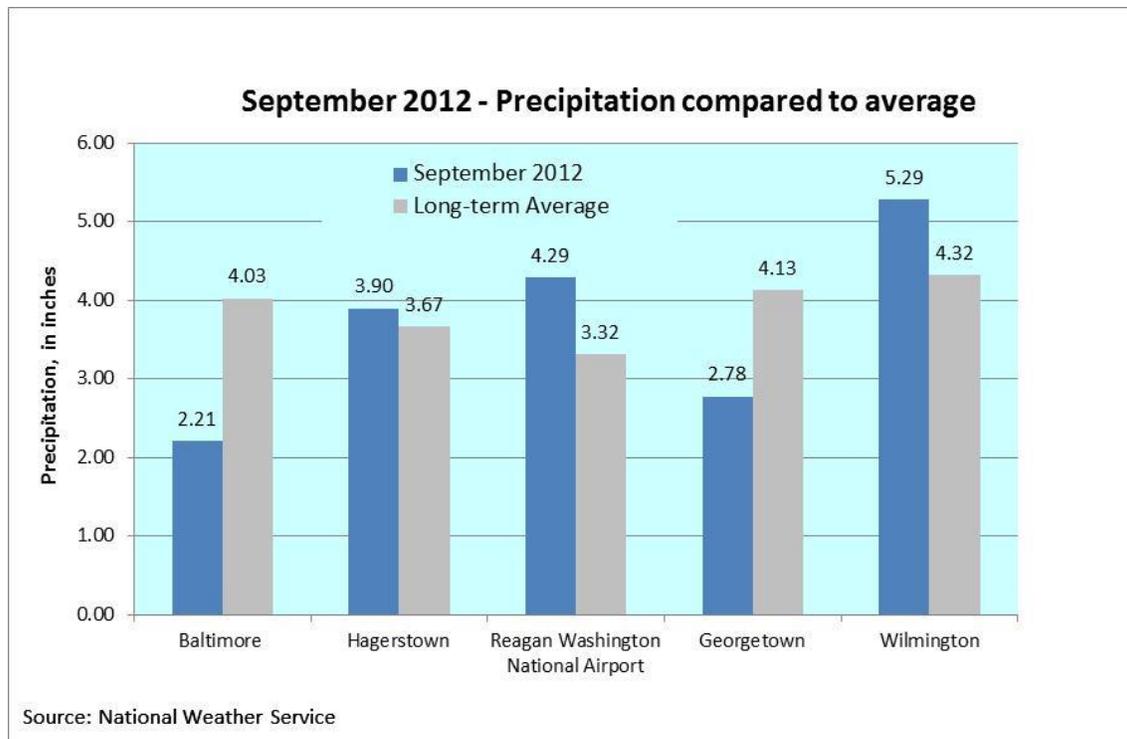
A **percentile** is a value on a scale from 0 to 100 that indicates the percent of a distribution that is equal to or below it. A percentile between 25 and 75 is considered normal.

For example, a groundwater level in the 90th percentile is equal to or greater than 90 percent of the values recorded for that month.

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September 2012 Precipitation and Weather

Precipitation at National Weather Service (NWS) stations in September varied widely across Maryland, Delaware, and the District of Columbia. Rainfall at the weather stations in Baltimore, Maryland and Georgetown, Delaware was below the long-term average for the climate normal period*. The highest amount of rainfall was in Wilmington, Delaware, with 5.29 inches. Rainfall at Ronald Reagan Washington National Airport, near the District of Columbia, was 4.29 inches. Rainfall at Hagerstown, Maryland was also above the long-term average. Temperatures were just slightly above the long-term average throughout the region.



**Note from the National Weather Service: September 2011 was the first month to incorporate the new 1981--2010 climate normals that were calculated by the National Climatic Data Center. The new normals replaced the 1971--2000 normals.*

The Middle Atlantic River Forecast Center web site shows that the highest precipitation deficit in Maryland since January 1 is in Charles County, Maryland, with more than an 11-inch deficit. Kent County, Delaware also has a rainfall deficit greater than 11 inches since January 1.

Sources:
National Weather Service
MD and DC: <http://www.weather.gov/climate/index.php?wfo=lsx>
DE: <http://www.erh.noaa.gov/phi/>
Middle Atlantic River Forecast Center (MARFC): <http://www.weather.gov/marfc/Precipitation/Departures>

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Drought Status

September rainfall has helped with drought recovery and MDE has no drought designation for Maryland as of the end of September. The Maryland Department of the Environment (MDE) sets the drought status for Maryland based on the following water-supply criteria: groundwater levels, streamflow, precipitation, and reservoir levels. For more details about the Maryland drought status, visit MDE's website:

<http://www.mde.state.md.us/programs/Water/DroughtInformation/Pages/water/drought/index.aspx>

The U.S. Drought Monitor web site map (http://droughtmonitor.unl.edu/DM_northeast.htm) issued on October 2, 2012 showed less than 1 percent of the State of Maryland in severe drought, however, 28 percent of the state is still in some drought status. In Maryland, the Eastern Shore, where much of the land is used for farming, had the most severe drought conditions in the State during the spring and summer, but this area received enough rainfall in September to reduce the drought status.

Delaware did not get as much drought relief from rainfall as Maryland in September. As of October 2, the area in Delaware designated as abnormally dry to some level of drought status was 76 percent, with 44 percent of the area in severe drought status.

The dry conditions during the growing season left almost the entire Delmarva Peninsula and southern Maryland declared as crop disaster losses in 2012 by the U.S. Department of Agriculture Farm Service Agency. For more details, visit this website:

http://www.fsa.usda.gov/Internet/FSA_File/disaster_map_cropyr_2012.pdf.



Total All Crop Approved Designations

October 3, 2012

- Primary Counties: 2,182
- Contiguous Counties: 403

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Streamflow

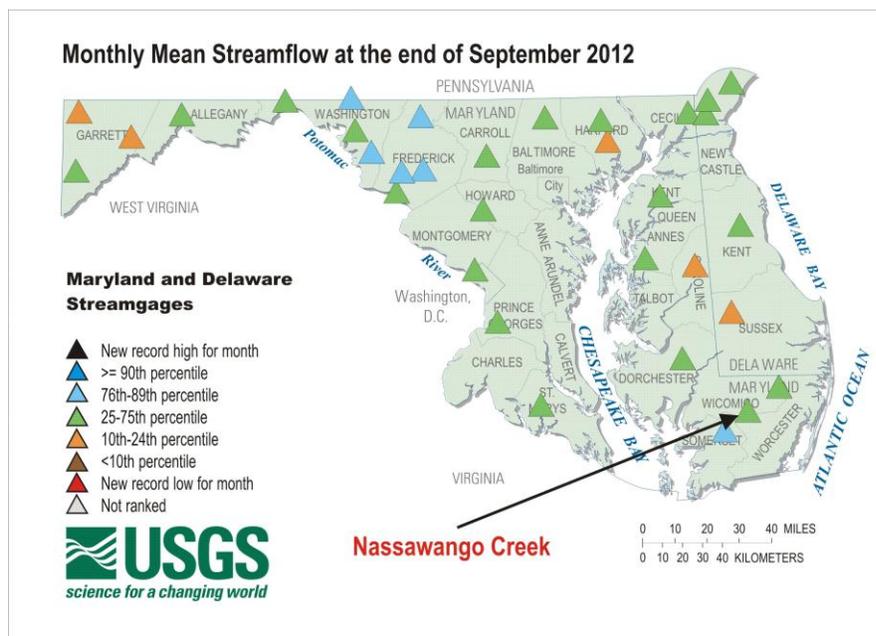
Streamflow data are used for many purposes. A few of the most obvious uses are to assess water supply and the risk of droughts and floods. Streamflow data are also used to calculate loads of chemical constituents and to assess how biological communities are affected by hydrologic conditions. The USGS operates the most extensive network of streamflow gages in the region.

The streamflow locations chosen for the monthly water summary were selected based on the following criteria:

- Minimum period of record is 10 years of continuous data;
- Watershed areas greater than 5 square miles;
- Streamflow is not regulated, or has relatively natural flow;
- Streamflow data reflect climatic conditions; and
- The surrounding area and watershed are not urban.

Streamflow for September 2012

In September, monthly mean streamflow was in the normal range at 22 of the 33 USGS streamflow-gaging stations used to monitor climatic response in Maryland, Delaware, and the District of Columbia. Normal is considered to be between the 25th and 75th percentiles.



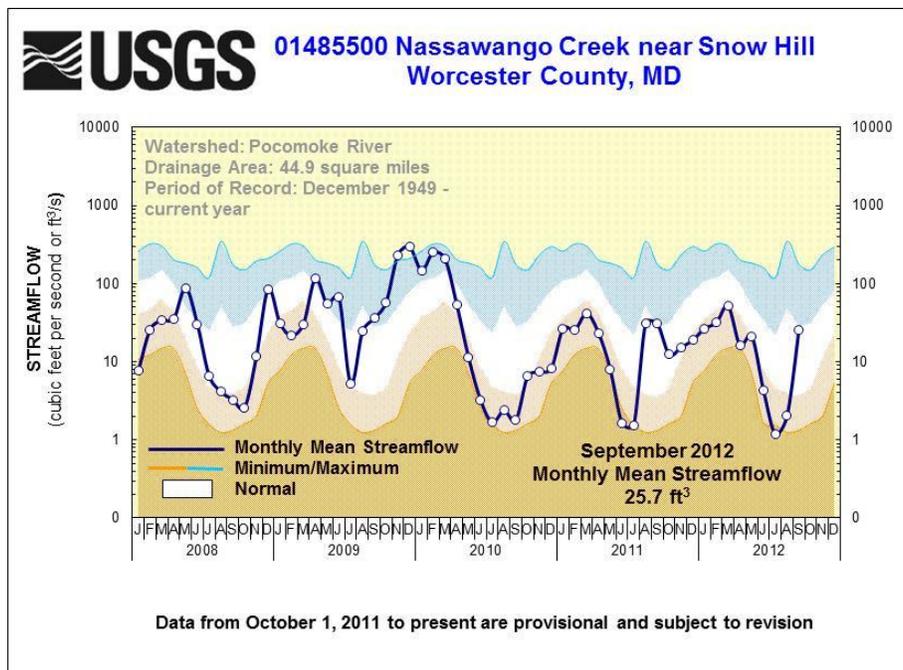
There were 5 sites with below normal monthly mean streamflow in September; there had been 11 sites below normal in August, so this was an improvement. None of the streamflow-gaging stations were in the lowest 10th percentile.

Monthly mean streamflow was above normal at six USGS streamflow-gaging stations, mostly in Frederick and Washington Counties in Maryland.

To access the clickable streamflow map, go to:
<http://md.water.usgs.gov/surfacewater/streamflow/>

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Monthly mean streamflow on Nassawango Creek in Worcester County, Maryland went from a record low in July 2012 to normal and nearly above normal in September. Streamflow has been low on Nassawango Creek during the summer for the last 3 years.



Five-year hydrographs can be viewed at:

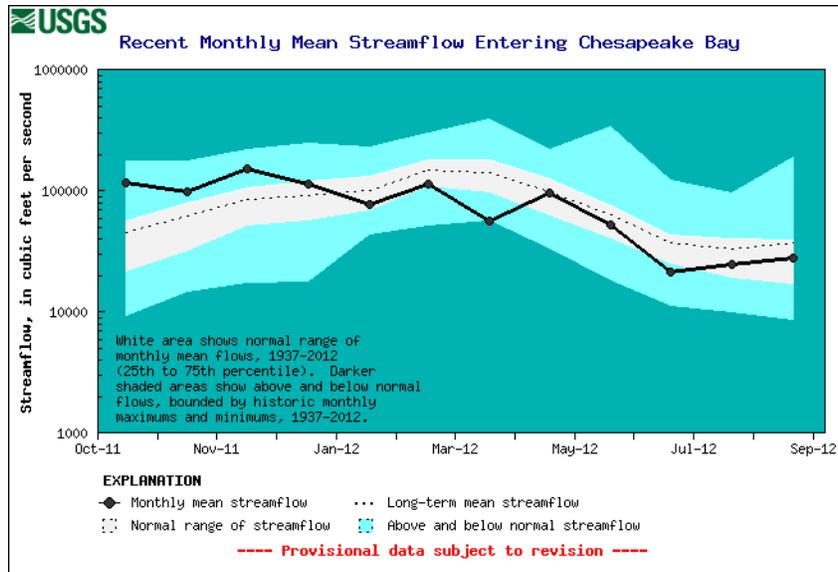
<http://md.water.usgs.gov/surfacewater/streamflow/>

The dark line in the 5-year hydrograph represents the monthly mean streamflow for this period and the white band shows the normal range (25th to 75th percentile) based on the period of record. The maximum monthly mean streamflow is at the top of the blue shaded section, and the lowest monthly mean streamflow is at the top of the dark orange area.

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Estimated Streamflow to the Chesapeake Bay

The total freshwater streamflow to Chesapeake Bay remained in the normal range in September 2012. The estimated monthly mean streamflow entering the Bay during September 2012 was 27,800 cubic feet per second (ft³/s; provisional and subject to revision). The normal range for average (mean) monthly streamflow for September is between 17,000 ft³/s and 39,100 ft³/s. These statistics are based on a 76-year period of record.



Data and more information on the freshwater flow to the Bay can be found here:
<http://md.water.usgs.gov/waterdata/chesinflow/recent/>

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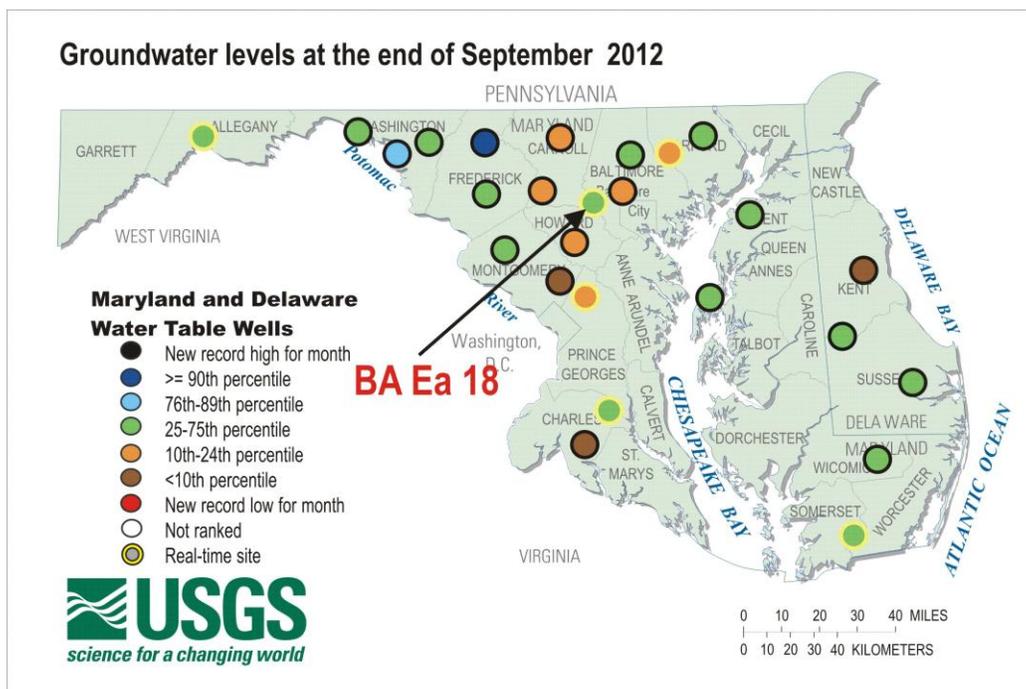
Groundwater

The USGS monitors groundwater levels in unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in climatic conditions. Twenty-six groundwater wells were selected based on the following criteria:

- Located in an unconfined (water-table) aquifer;
- Open to a single, known hydrogeologic unit/aquifer;
- Groundwater hydrograph reflects changes in climatic conditions;
- No indicated nearby pumpage and likely to remain uninfluenced by pumpage, regulated streamflow, or changes related to human activities;
- Minimum period of record is 10 years of continuous/monthly records;
- Minimally affected by irrigation, canals, drains, pipelines, and other potential sources of artificial recharge;
- Well has casing--dug wells not used;
- Water levels show no apparent hydrologic connection to nearby streams;
- Well has never gone dry; and
- Long-term accessibility likely.

September 2012 Groundwater Levels

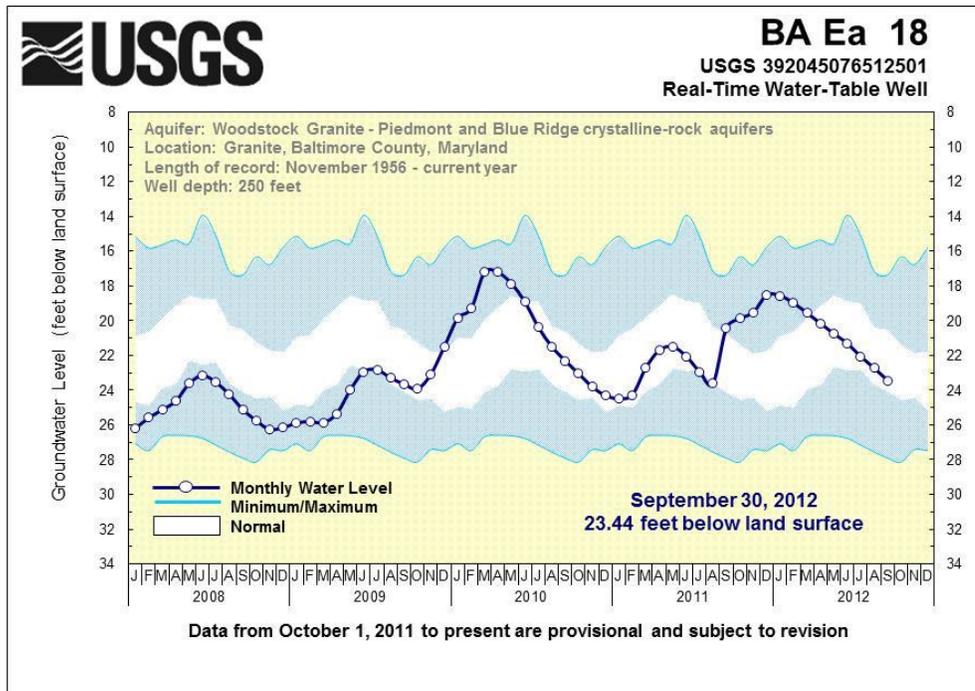
Groundwater levels used to monitor climatic conditions in Maryland and Delaware showed improvement in September and were normal in 15 of 26 wells. Normal is considered to be between the 25th and 75th percentiles. There were below normal groundwater levels in 9 wells in the following counties: Baltimore, Carroll, Charles, Harford, Howard, Montgomery, and Prince George's County in Maryland, and Kent County, Delaware. Only wells in Frederick and Washington Counties had above normal groundwater levels in September.



To access the clickable groundwater map, go to:
http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties/index.html

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The groundwater level in USGS observation well BA Ea 18 in Baltimore County, Maryland is decreasing at the expected rate based on 56 years of monthly data. This well is one of the deeper wells in the network for monitoring response to climatic conditions. Other wells with depths greater than 200 feet are in Baltimore, Carroll, Frederick, Harford, and Washington Counties and they showed a similar trend.



Five-year groundwater hydrographs can be viewed at:

http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties

The 5-year hydrograph shows groundwater levels as a dark blue line, the minimum and maximum monthly values, and the normal range (between the 25th and 75th percentiles) as a white band based on the period of record. The maximum water level is at the top of the blue section and the minimum water level is at the bottom of the blue section in the graph.

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Reservoir Levels

Reservoir storage at the end of September in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) dropped 1 percent to 96 percent of available storage capacity, and totaled 72.33 billion gallons of water.

Storage in the Triadelphia and Duckett Reservoirs, which serve parts of Howard, Montgomery, and Prince George’s Counties in suburban areas around the District of Columbia, dropped to 66 percent of normal storage capacity at the end of September 2012, with 6.79 billion gallons.

September 2012	Percent available/normal storage	Volume (billion gallons)	Source
Baltimore Reservoirs			Baltimore City – Environmental Services Division
Liberty	92%	33.70	
Loch Raven	99%	20.93	
Prettyboy	99%	17.70	
Total	96%	72.33	
Patuxent Reservoirs			Washington Suburban Sanitary Commission (WSSC)
Triadelphia	69%	3.85	
Duckett	62%	3.12	
Total	66%	6.97	