

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

**September 2015 Highlights: Seventy-four percent of groundwater and 82 percent of streamflow levels were normal at sites monitored by the U.S. Geological Survey across Maryland, Delaware, and the District of Columbia.**

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

USGS water data are 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 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 continues to collect water data and quality-assures the data using standardized techniques across the country. The uniformity of the dataset enables multi-state comparisons and other comparative statistical analyses that better inform policy makers of the possible water-resources conditions they might encounter in the future.

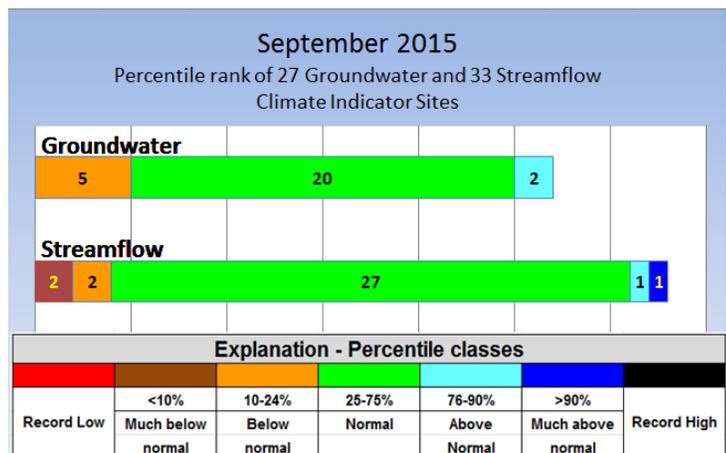
The sites used in this water summary were carefully selected to show the response of streamflow and groundwater levels to weather conditions. Ideally, these sites will show no effects from human influences. The streamflow and groundwater data are ranked in comparison to the historical record and summarized.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

## USGS September 2015 Water Conditions Summary

In September, 74 percent of the groundwater levels and 82 percent of the monthly mean streamflows were normal at sites used to monitor the response of water resources to changes in climatic conditions in Maryland, Delaware, and the District of Columbia.

Groundwater levels were normal (between the 25<sup>th</sup> and 75<sup>th</sup> percentiles) in 20 of 27 USGS monitoring wells in Maryland and Delaware. Of the remaining wells, the groundwater levels were above normal in two wells and below normal in five wells.

September monthly mean streamflow levels were normal at 27 of 33 streamgages in Maryland and Delaware. Streamflow was above normal at two streamgages and below normal at four streamgages.

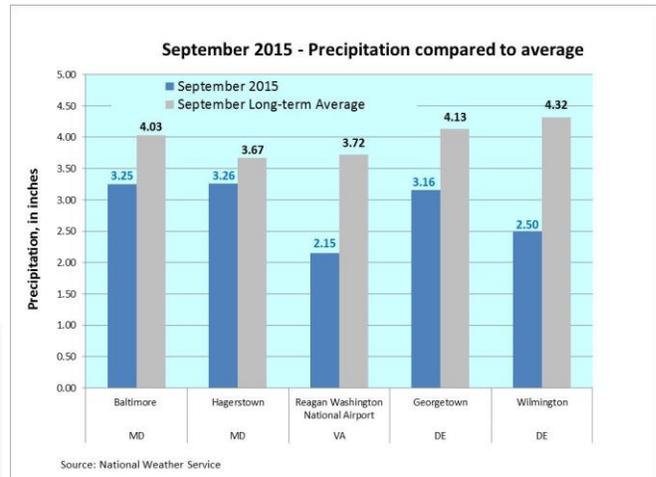


A **percentile** is a value on a scale from 0 to 100 that indicates the percent of a distribution that is equal to or below it. A percentile between 25 and 75 is considered normal. For example, a groundwater level in the 90th percentile is equal to or greater than 90 percent of the values recorded for that month.

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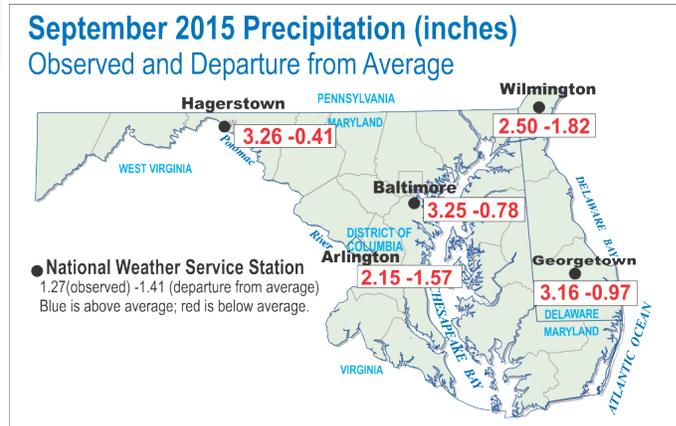
## September 2015 Precipitation and Weather

Precipitation was below the long-term average at all five of the National Weather Service (NWS) Mid-Atlantic weather stations in Delaware and Maryland for the second consecutive month. The lowest precipitation (also for the second consecutive month) was 2.15 inches (average is 3.72 inches) at the NWS weather station in Arlington, Virginia near the District of Columbia. The highest precipitation of the five Mid-Atlantic weather stations was in Hagerstown, Maryland with 3.26 inches, which was 0.41 inches below average. The weather station with the largest deviation from average was in Wilmington, Delaware, which was 1.82 inches below the long-term September average.



National Weather Service Stations	
<b>Baltimore</b>	= Baltimore/Washington International Thurgood Marshall Airport (BWI)
<b>Georgetown</b>	= Georgetown, Sussex County Airport
<b>Hagerstown</b>	= Hagerstown Regional Airport
<b>Arlington</b>	= Ronald Reagan Washington National Airport
<b>Wilmington</b>	= New Castle Airport

The NWS Middle Atlantic River Forecast Center's (MARFC) 365-day precipitation data for Maryland, Delaware, and the District of Columbia showed that precipitation in all of the counties in Maryland and Delaware was in the normal to above normal range. The highest departure from average was in Harford County, Maryland, with 10.4 inches above average.



For the sixth consecutive month, average air temperatures were normal to above the long-term average at the five NWS Mid-Atlantic weather stations in September. At Hagerstown, Maryland, temperatures were the lowest of the five weather stations (September average temperature was 70.9 degrees Fahrenheit), and this station had the largest departure from average with 5.2 degrees Fahrenheit above average. The warmest September average temperature was 74.9 degrees Fahrenheit in Arlington, Virginia near the District of Columbia, which was 3.9 degrees Fahrenheit above average.

Sources: National Weather Service and Middle Atlantic River Forecast Center (MARFC)  
 MD and DC: <http://www.weather.gov/climate/index.php?wfo=lwx>  
 DE: <http://www.weather.gov/climate/index.php?wfo=phi>  
 MARFC: [http://www.weather.gov/marfc/Precipitation\\_Departures](http://www.weather.gov/marfc/Precipitation_Departures)

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## Groundwater

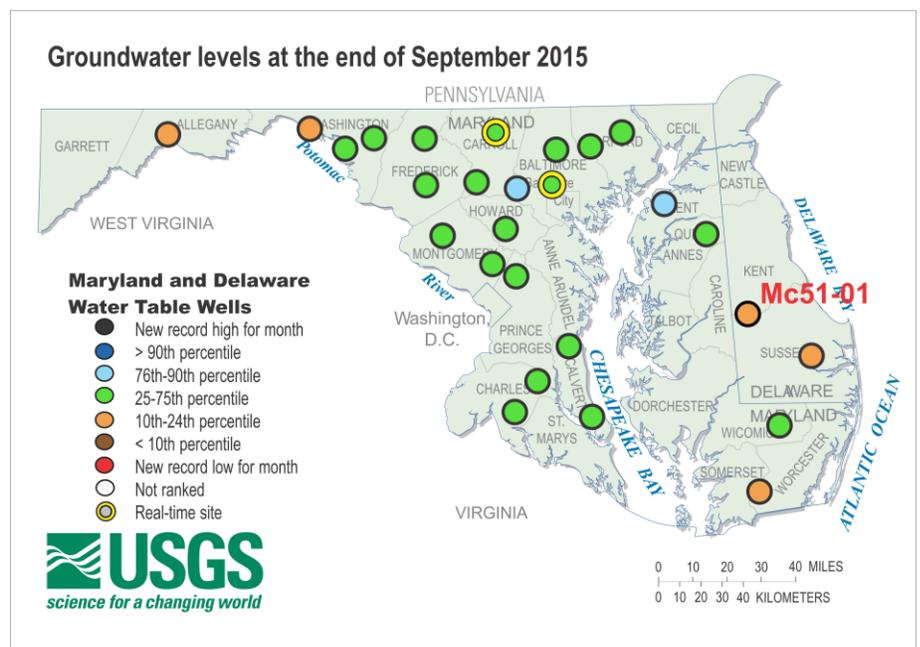
The USGS monitors groundwater levels in unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in climatic conditions. Twenty-seven groundwater wells were selected based on the following criteria:

- 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 a casing – dug wells are generally not used;
- Water levels show no apparent hydrologic connection to nearby streams;
- Well has never gone dry; and
- Long-term accessibility likely.

## September 2015 Groundwater Levels

In Maryland, groundwater levels were below normal (10<sup>th</sup>-24<sup>th</sup> percentiles) at three USGS observation wells, and above normal (76<sup>th</sup>-90<sup>th</sup> percentiles) in two USGS observation wells in September. Seventy-four percent (19 of the 25 wells) of the groundwater levels were in the normal range (between the 25<sup>th</sup> and 75<sup>th</sup> percentiles) at USGS wells used to monitor climatic conditions in Maryland. Data are provisional and subject to revision.

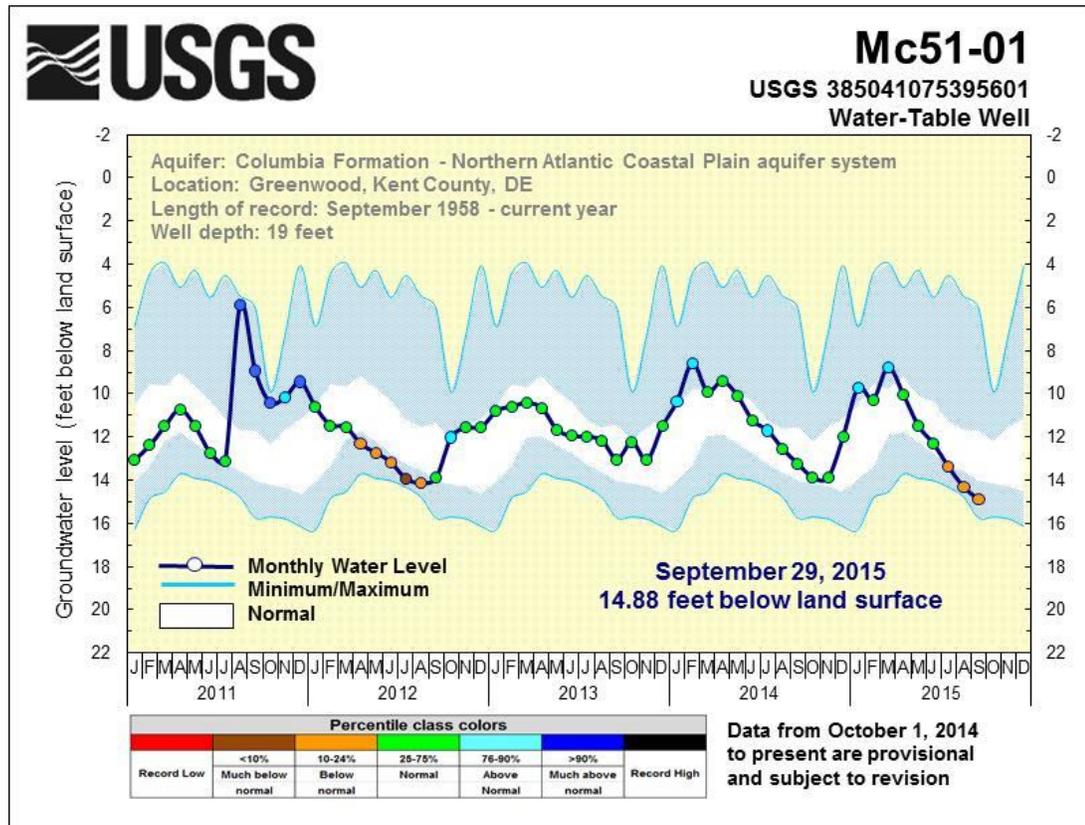
In Delaware, groundwater levels were below normal in two observation wells in Kent and Sussex Counties. A third well, Kent County observation well Jd42-03, has been abandoned and therefore, it can no longer be used to assess water conditions.



To access the clickable groundwater map, go to:  
[http://md.water.usgs.gov/groundwater/web\\_wells/current/water\\_table/counties/](http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties/)

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

The groundwater level in observation well Mc51-01 in Kent County, Delaware has been dropping since April and was below normal in September. This is the third consecutive month that groundwater levels have been below normal at this well. Groundwater levels typically decline at this time of year, with the lowest average groundwater levels occurring at the end of December at this observation well; however, the rate at which the groundwater level is dropping is steeper than the historical trend. Prior to the July 2015 measurement, the last time groundwater levels were below normal was in 2012.



Five-year groundwater hydrographs can be viewed at:  
[http://md.water.usgs.gov/groundwater/web\\_wells/current/water\\_table/counties](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 25<sup>th</sup> and 75<sup>th</sup> percentiles) as a white band based on the period of record. The maximum water level is at the top of the upper blue section and the minimum water level is at the bottom of the lower blue section in the graph. Each monthly measurement is colored according to the percentile rank in which it falls for the month.

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

## Streamflow

Streamflow data are used for many purposes. A few of the most common 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 assess how biological communities are affected by hydrologic conditions. The USGS operates the most extensive network of streamgages in the region.

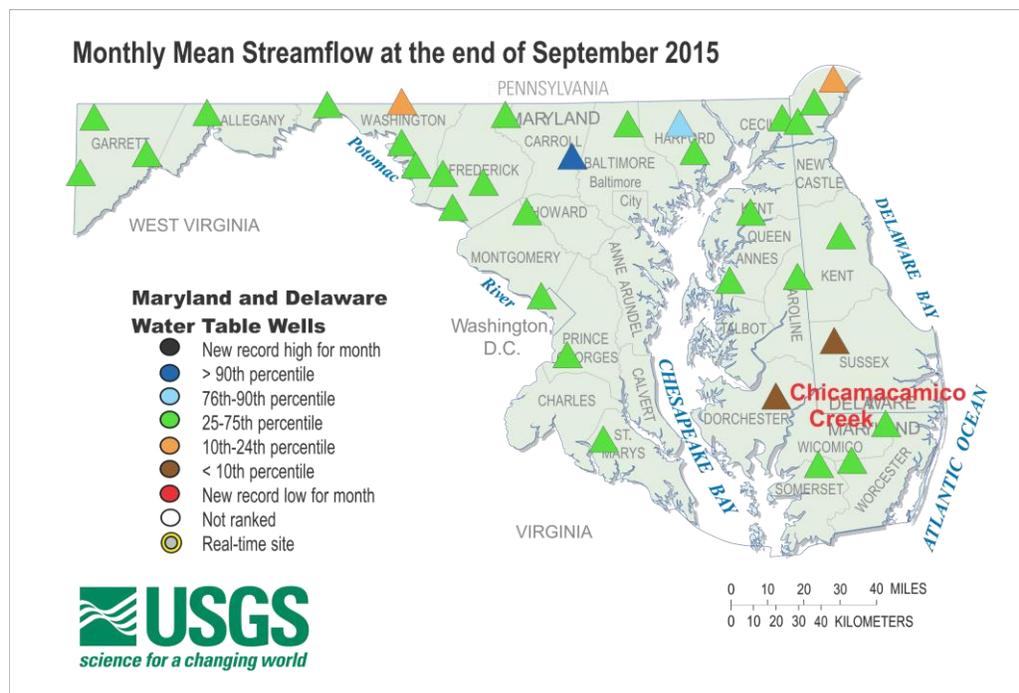
The streamflow locations chosen for the monthly water summary were selected based on the following criteria:

- 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.

## September 2015 Streamflow

September monthly mean streamflows were normal (green on map) in 82 percent of the USGS streamgages used to monitor climatic response in Maryland, Delaware, and the District of Columbia. Streamflow was below normal at 12 percent of the streamgages, with values in the less than 10<sup>th</sup> percentile (brown on map) at the Chicamaco River in Maryland and the Nanticoke River In Delaware. Streamflow at all the surrounding streamgages was normal in September. Streamflow at the streamgage on Brandywine Creek in Delaware and the Conococheague Creek in Maryland was below normal, between the 10<sup>th</sup> and 24<sup>th</sup> percentiles (orange) in September.

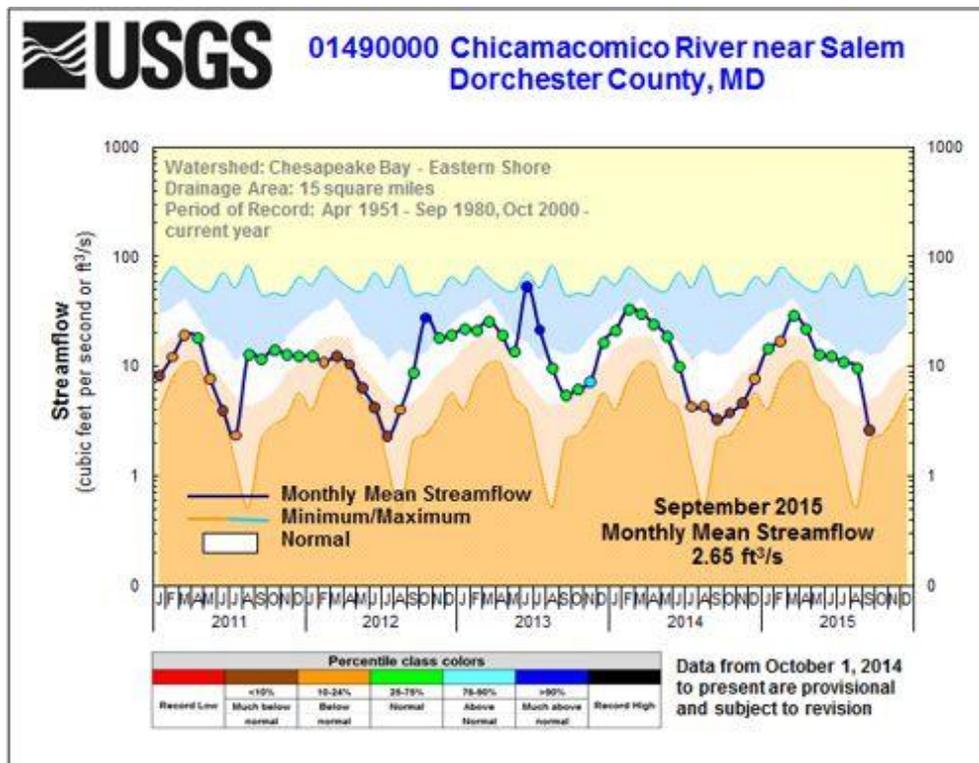
Monthly mean streamflow was above normal (greater than the 90<sup>th</sup> percentile) at the streamgage on Beaver Run (shown in blue), and at Deer Creek, the streamflow was between the 76<sup>th</sup> and 90<sup>th</sup> percentiles (shown in cyan).



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

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

The monthly mean streamflow on the Chicamacomico River near Salem in Dorchester County, Maryland dropped from normal in August to below normal (<10<sup>th</sup> percentile) in September. Monthly mean streamflow typically decreases at this time of year with the lowest levels occurring between August and October streamflow at this gage dropped significantly through August, and remained low through September, resulting in a near-record low monthly mean.



The dark line in the 5-year hydrograph represents the monthly mean streamflow for this period and the white band shows the normal range (25<sup>th</sup> to 75<sup>th</sup> percentiles) 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. Each monthly mean measurement is colored according to the percentile rank in which it falls for the month.

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## Reservoir Levels

Available reservoir storage at the end of September 2015 in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) rose 2.52 percent to 99.37 percent of available storage capacity, or a total of 75.37 billion gallons of water. The Baltimore City Environmental Services Division manages the Baltimore reservoirs.

Total normal storage in the Triadelphia and Duckett Reservoirs, which serve parts of Howard, Montgomery, and Prince George’s Counties in suburban Maryland around the District of Columbia, was 65.77 percent of normal storage capacity at the end of September 2015, with 7.00 billion gallons of water, a 13.45-percent drop since August. Not all of the water in the Patuxent Reservoirs is usable; for operational purposes, percent of normal storage capacity is used, but this value can exceed 100 percent of the usable storage. The Washington Suburban Sanitary Commission (WSSC) manages the Patuxent reservoirs.

September 2015	Percent available/normal storage	Volume (billion gallons)
<b>Baltimore Reservoirs</b> <b>Baltimore City – Environmental Services Division</b>		
Liberty	98.70%	36.32
Loch Raven	100.00%	21.20
Prettyboy	100.00%	17.85
Total	99.37%	75.37
<b>Patuxent Reservoirs</b> <b>Washington Suburban Sanitary Commission (WSSC)</b>		
Triadelphia	69.27%	3.88
Duckett	62.26%	3.12
Total	65.77%	7.00