

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

**October 2015 Highlights: Eighty-five percent of groundwater and 70 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.

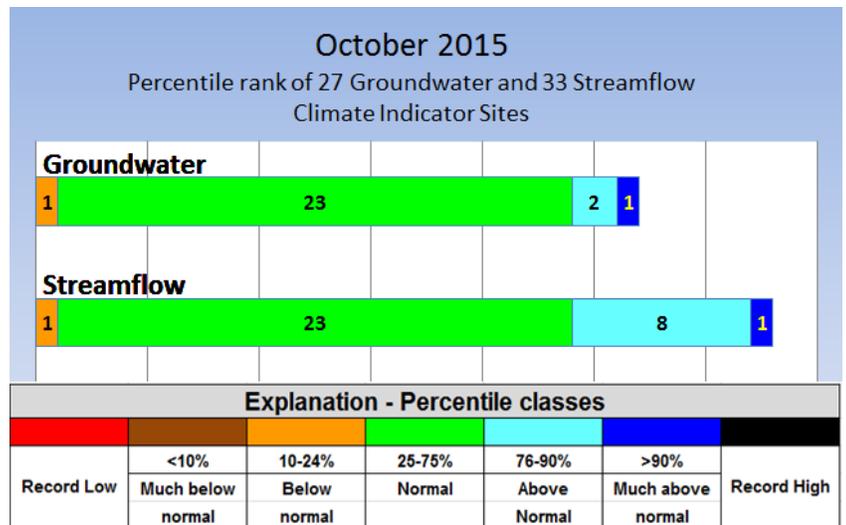
The sites used in this water summary were carefully selected to show the response of streamflow and groundwater levels to weather conditions. Ideally, these sites will show no effects from human influences. The streamflow and groundwater data are ranked in comparison to the historical record and summarized.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

## USGS October 2015 Water Conditions Summary

In October, 85 percent of the groundwater levels and 70 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 23 of 27 USGS monitoring wells in Maryland and Delaware. Of the remaining wells, the groundwater levels were above normal in three wells and below normal in one well.

October monthly mean streamflow levels were normal at 23 of 33 streamgages in Maryland and Delaware. Streamflow was above normal at nine streamgages and below normal at one streamgage.



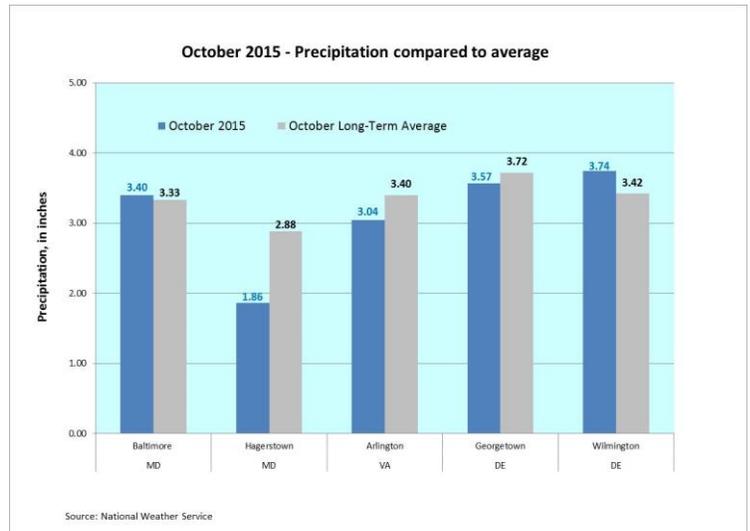
A **percentile** is a value on a scale from 0 to 100 that indicates the percent of a distribution that is equal to or below it. A percentile between 25 and 75 is considered normal. For example, a groundwater level in the 90th percentile is equal to or greater than 90 percent of the values recorded for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

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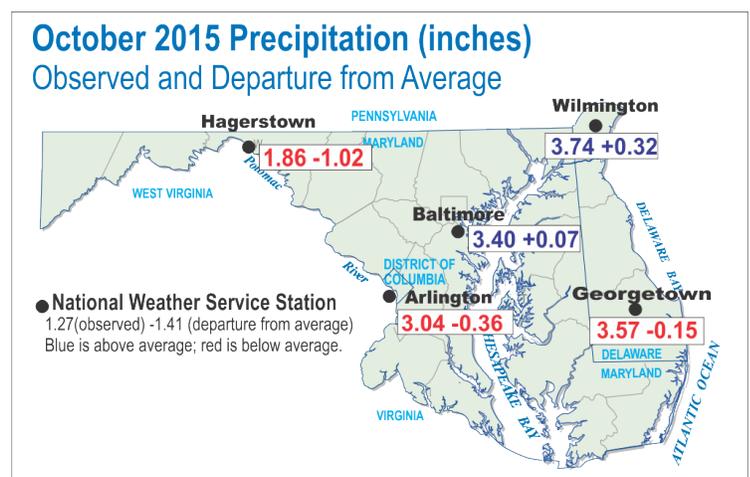
## October 2015 Precipitation and Weather

Precipitation was below the long-term average at three of the National Weather Service (NWS) Mid-Atlantic weather stations in Delaware and Maryland for the third consecutive month. Precipitation was above normal in Baltimore, Maryland and Wilmington, Delaware. The lowest precipitation and the largest deviation from average was in Hagerstown, Maryland with 1.86 inches, which was 1.02 inches below the long-term average. The highest precipitation of the five Mid-Atlantic weather stations was Wilmington, Delaware with 3.74 inches, which was 0.32 inches above 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 8.9 inches above average. The largest precipitation deficit was in Allegany County, which was approximately 5 inches below average.



After sixth consecutive months of average to above average air temperatures, four of the five Mid-Atlantic weather stations had temperatures below the long-term average in October. The exception was at the Hagerstown, Maryland weather station, which was 55.2 degrees Fahrenheit, and 0.4 degrees above average. The warmest October average temperature was 58.9 degrees Fahrenheit in Arlington, Virginia near the District of Columbia, which was 0.6 degrees Fahrenheit below 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

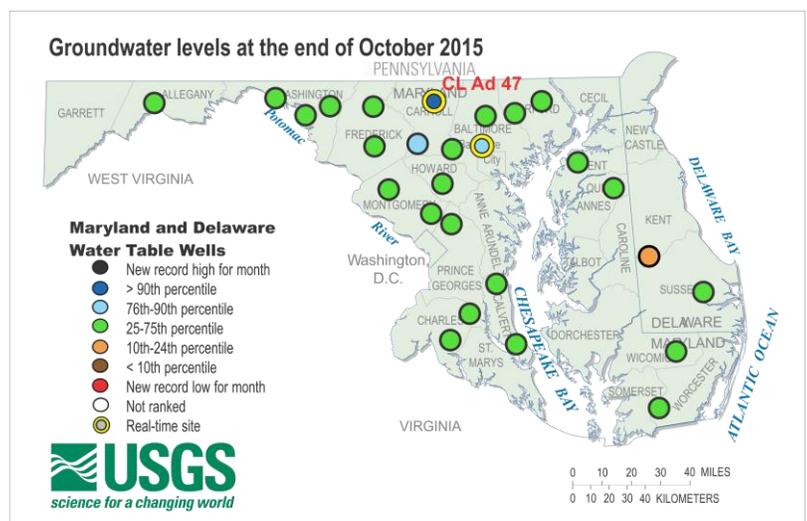
The USGS monitors groundwater levels in unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in climatic conditions. Twenty-seven groundwater wells were selected based on the following criteria:

- 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.

## October 2015 Groundwater Levels

In Maryland, eighty-five percent (22 of 25 wells) of the groundwater levels were normal (25<sup>th</sup>-75<sup>th</sup> percentiles, shown in green on map) in October at USGS wells used to monitor climatic conditions in Maryland. There were two wells with groundwater levels ranking between the 76<sup>th</sup>-90<sup>th</sup> percentiles (shown in cyan on map) and the observation well in Carroll County had a groundwater level above the 90<sup>th</sup> percentile (shown in blue on map). Data are provisional and subject to revision.

In Delaware, the groundwater level was normal in the USGS observation well in Sussex County and below normal in the well in Kent County (shown in orange on map).

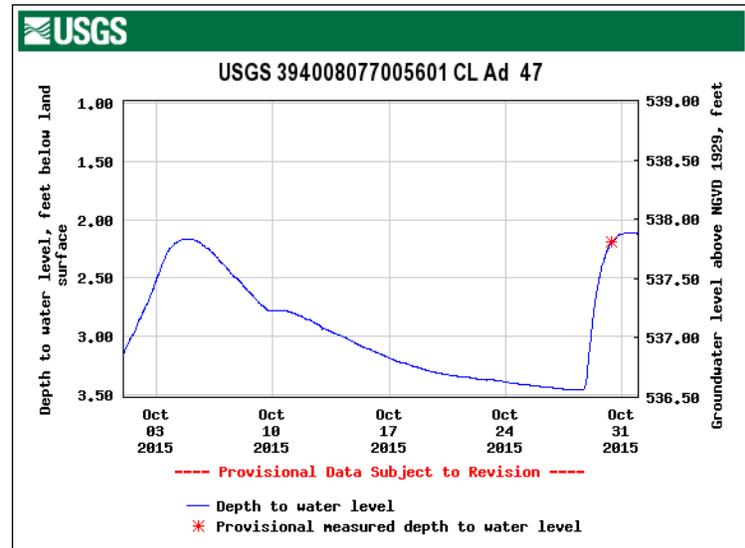
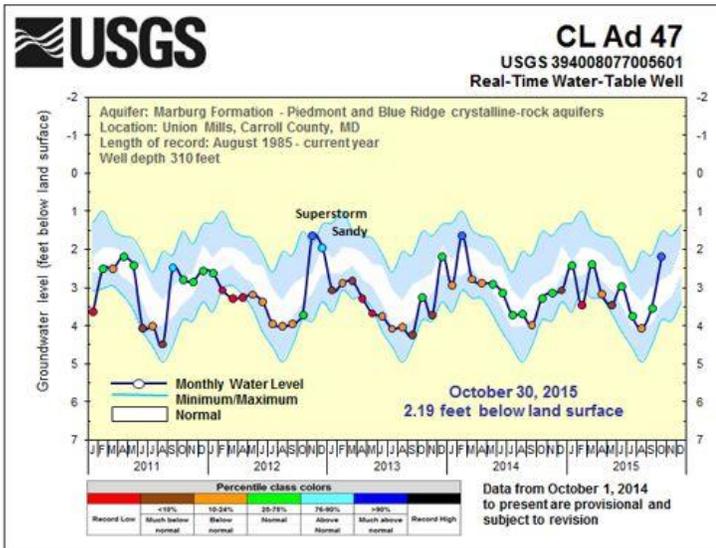


To access the clickable groundwater map, go to:

[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 CL Ad 47 in Carroll County, Maryland rose from normal in September to above normal in October. The hydrographs below show data from a single hand-held measurement at the end of the month on the left and the continuous real-time measurement on the hydrograph on the right. The groundwater level at this well was below normal (3.14 feet below land surface) in mid-October, before a precipitation event (1.03 inches of rain was recorded at the closest NWS Station in Hagerstown, Maryland on October 28, 2015) and subsequent recharge that caused the groundwater level to rise in late October.



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)

Real-time groundwater hydrographs can be viewed at:  
<http://waterdata.usgs.gov/md/nwis/current/?type=gw>

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.

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## 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.

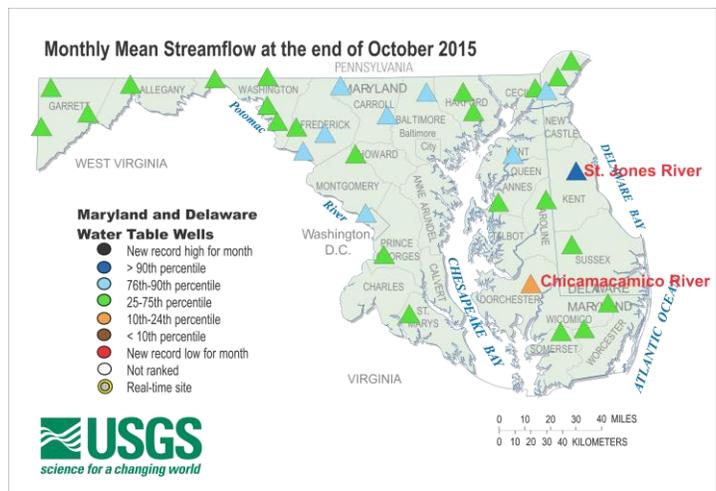
The streamflow locations chosen for the monthly water summary were selected based on the following criteria:

- 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.

## October 2015 Streamflow

October monthly mean streamflows were normal (shown in green on map) in 70 percent (at 23 out of 33) of the USGS streamgages used to monitor climatic response in Maryland, Delaware, and the District of Columbia. Streamflow at the Chicamaco River in Maryland remains below normal, although the level had come up to the 10<sup>th</sup>-24<sup>th</sup> percentile since September, when the monthly mean streamflow was less than the 10<sup>th</sup> percentile.

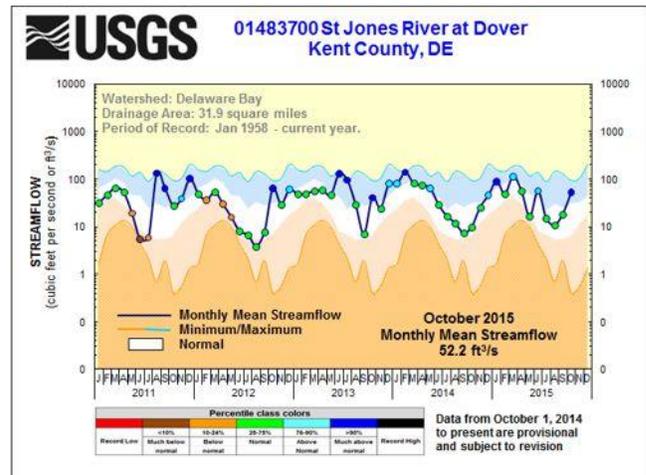
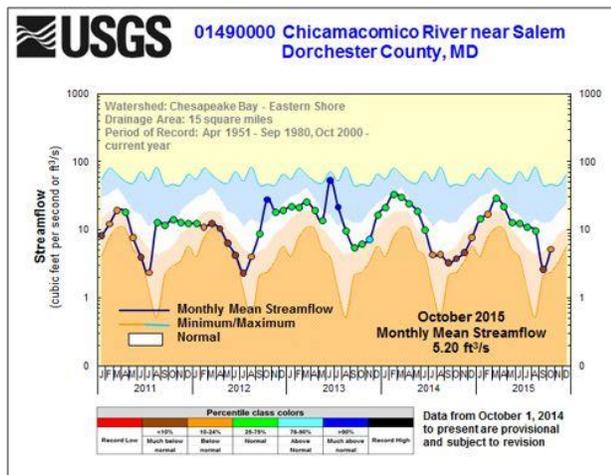
Monthly mean streamflow was above normal (76<sup>th</sup> to 90<sup>th</sup> percentile - shown in cyan) at 8 streamgages: 6 streamgages in Maryland, 1 streamgage in Delaware, and 1 streamgage in the District of Columbia. The St. Jones River in Kent County, Delaware had monthly mean streamflow above the 90<sup>th</sup> percentile (shown in blue on map).



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 is still below normal (10<sup>th</sup>-24 percentile), yet the value rose from the less than 10<sup>th</sup> percentile in September. At the St. Jones River, monthly mean streamflow also rose to the greater than 90<sup>th</sup> percentile after being normal in September. Monthly mean streamflow typically begins to increase at this time of year when plants become dormant during the cold fall and winter seasons.



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 (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 October 2015 in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) rose to 100 percent of available storage capacity, or a total of 75.85 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 64.50 percent of normal storage capacity at the end of October 2015, with 6.84 billion gallons of water. 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.

October 2015	Percent available/normal storage	Volume (billion gallons)
<b>Baltimore Reservoirs</b>		
<b>Baltimore City – Environmental Services Division</b>		
Liberty	100.00%	36.80
Loch Raven	100.00%	21.20
Prettyboy	100.00%	17.85
<b>Total</b>	<b>100.00%</b>	<b>75.85</b>
<b>Patuxent Reservoirs</b>		
<b>Washington Suburban Sanitary Commission (WSSC)</b>		
Triadelphia	63.74%	3.57
Duckett	65.26%	3.27
<b>Total</b>	<b>64.50%</b>	<b>6.84</b>