

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

November 2015 Highlights: Eighty-five percent of groundwater and 85 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.

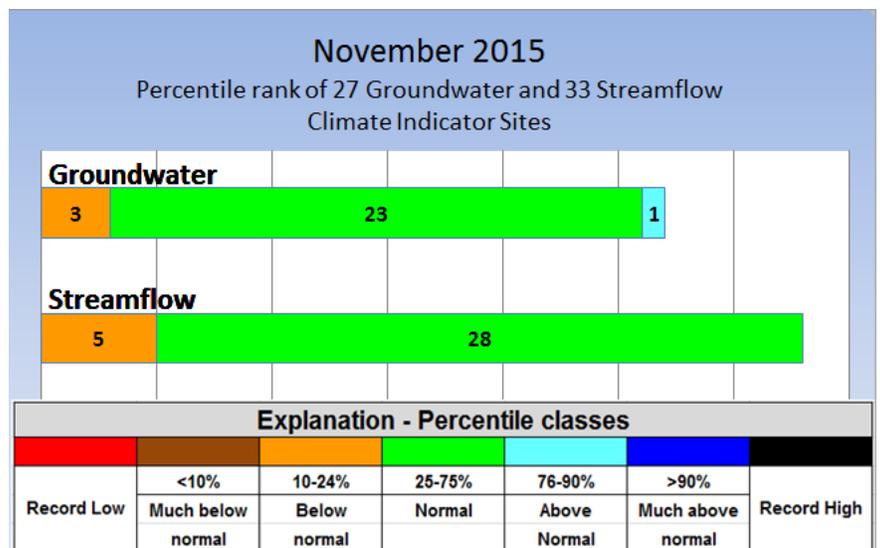
The sites used in this water summary were carefully selected to show the response of streamflow and groundwater levels to weather conditions. Ideally, these sites will show no effects from human influences. The streamflow and groundwater data are ranked in comparison to the historical record and summarized.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

USGS November 2015 Water Conditions Summary

In November, 85 percent of the groundwater levels and 85 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 25th and 75th percentiles) in 23 of 27 USGS monitoring wells in Maryland and Delaware. In the remaining wells, the groundwater levels were above normal in one well and below normal in three wells.

November monthly mean streamflow levels were normal at 28 of 33 streamgages in Maryland and Delaware. Streamflow was below normal at five streamgages.

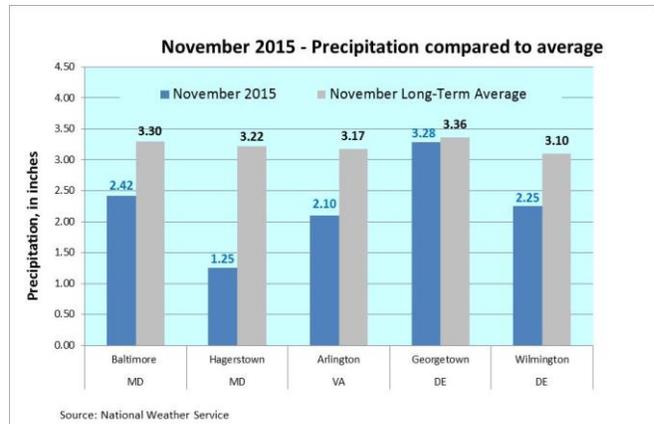


A **percentile** is a value on a scale from 0 to 100 that indicates the percent of a distribution that is equal to or below it. A percentile between 25 and 75 is considered normal. For example, a groundwater level in the 90th percentile is equal to or greater than 90 percent of the values recorded for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

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

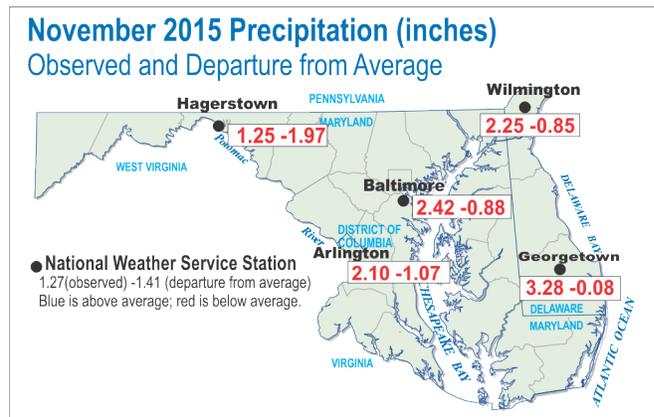
November 2015 Precipitation and Weather

Precipitation was below the long-term average at all five of the National Weather Service (NWS) Mid-Atlantic weather stations in Delaware and Maryland in November. The lowest precipitation and the largest deviation from average for the second consecutive month was in Hagerstown, Maryland with 1.25 inches, which was 1.97 inches below the long-term average. The highest precipitation of the five Mid-Atlantic weather stations was in Georgetown, Delaware with 3.28 inches, which was 0.08 inches below average.



National Weather Service Stations	
Baltimore	= Baltimore/Washington International Thurgood Marshall Airport (BWI)
Georgetown	= Georgetown, Sussex County Airport
Hagerstown	= Hagerstown Regional Airport
Arlington	= Ronald Reagan Washington National Airport
Wilmington	= 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 counties in Maryland and Delaware was in the normal to above normal range. The highest departure from average for the second consecutive month was in Harford County, Maryland, with 7.9 inches above average. The largest precipitation deficit was in Allegany County for the second consecutive month, which was approximately 5 inches below average.



Monthly average air temperatures were 3.7 to 5.8 degrees Fahrenheit above the long term average at the five Mid-Atlantic weather stations in November. The largest departure from average was at the Hagerstown, Maryland weather station, which was 50.7 degrees Fahrenheit, and 5.8 degrees above average. The warmest November average temperature was 53.7 degrees Fahrenheit in Arlington, Virginia near the District of Columbia, which was 4.1 degrees Fahrenheit above average. A daily record high of 80 degrees Fahrenheit was set in Baltimore on November 7 along with a daily high minimum of 63 degrees Fahrenheit, which ties the record of 63 degrees set in 1938. A daily high minimum was also set at the Ronald Reagan Washington National Airport in Arlington, Virginia. The air temperature was 59 degrees Fahrenheit, which tied the records set in 1906 and 1931. Records are from the National Weather Service.

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

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

Groundwater

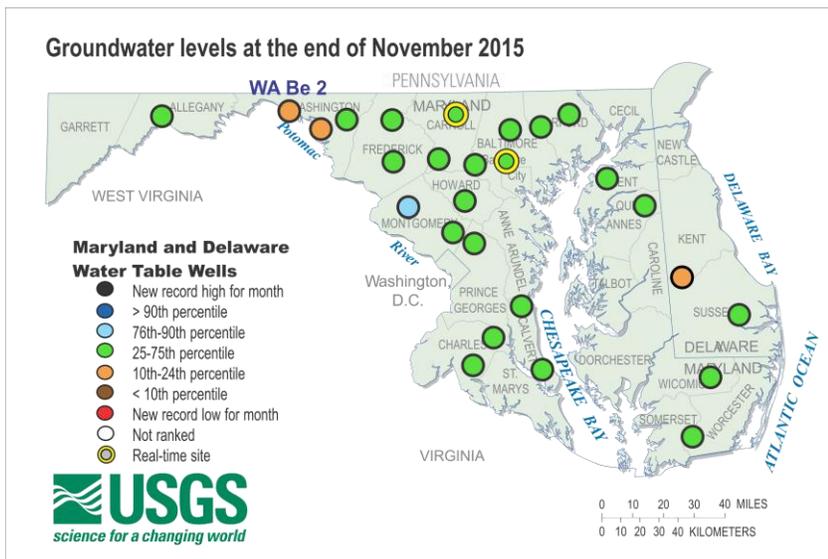
The USGS monitors groundwater levels in unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in climatic conditions. Twenty-seven groundwater wells were selected based on the following criteria:

- 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.

November 2015 Groundwater Levels

In Maryland and Delaware, eighty-five percent (23 of 27 wells) of the groundwater levels were normal (25th-75th percentiles, shown in green on map) in November at USGS wells used to monitor climatic conditions. The only USGS observation well with an above normal groundwater level was in

Montgomery County, Maryland, ranking between the 76th-90th percentiles (shown in cyan on map).

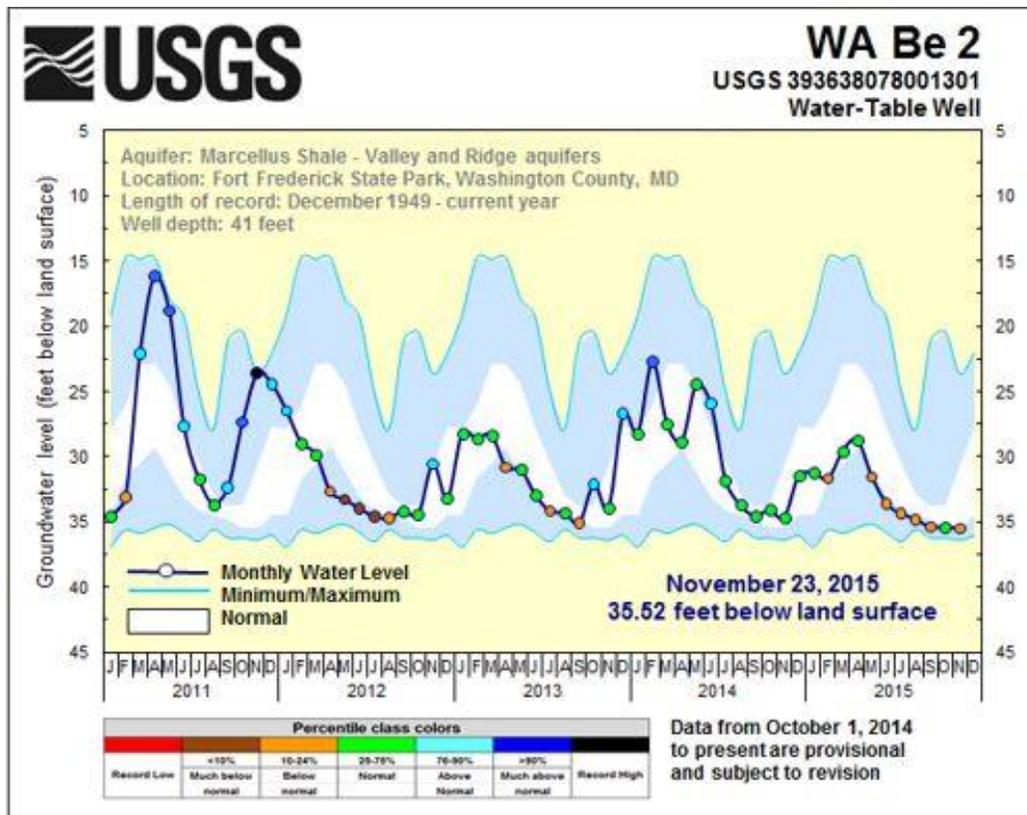


Two USGS observation wells in Washington County, Maryland had below normal groundwater levels (between the 10th and 24th percentiles, shown in orange on map), along with a USGS observation well in Kent County, Delaware. Data are provisional and subject to revision.

To access the clickable groundwater map, go to:
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 WA Be 2 in Washington County, Maryland was below normal in November. The groundwater level at this well was below normal during six of the last seven months. Precipitation at the nearest weather station in Hagerstown, Maryland has been more than an inch below the long-term average for the past two months and below normal since July 2015.



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 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

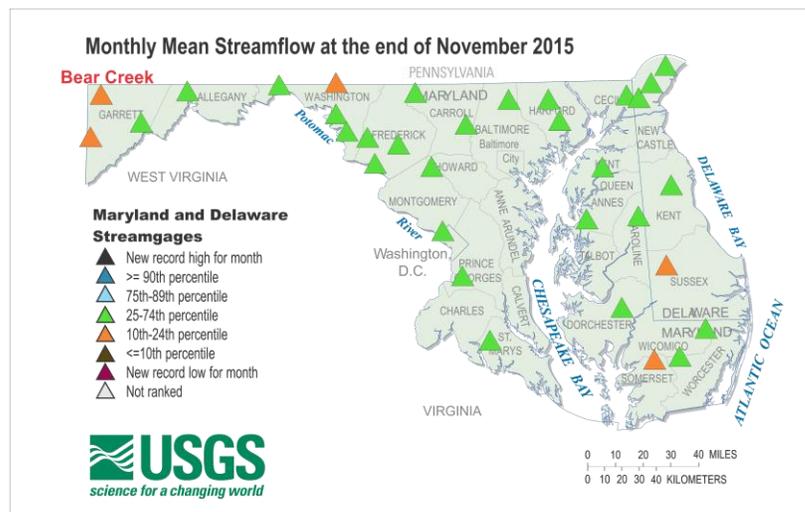
Streamflow data are used for many purposes. A few of the most common uses are to assess water supply and the risk of droughts and floods. Streamflow data are also used to calculate loads of chemical constituents and assess how biological communities are affected by hydrologic conditions. The USGS operates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

November 2015 Streamflow

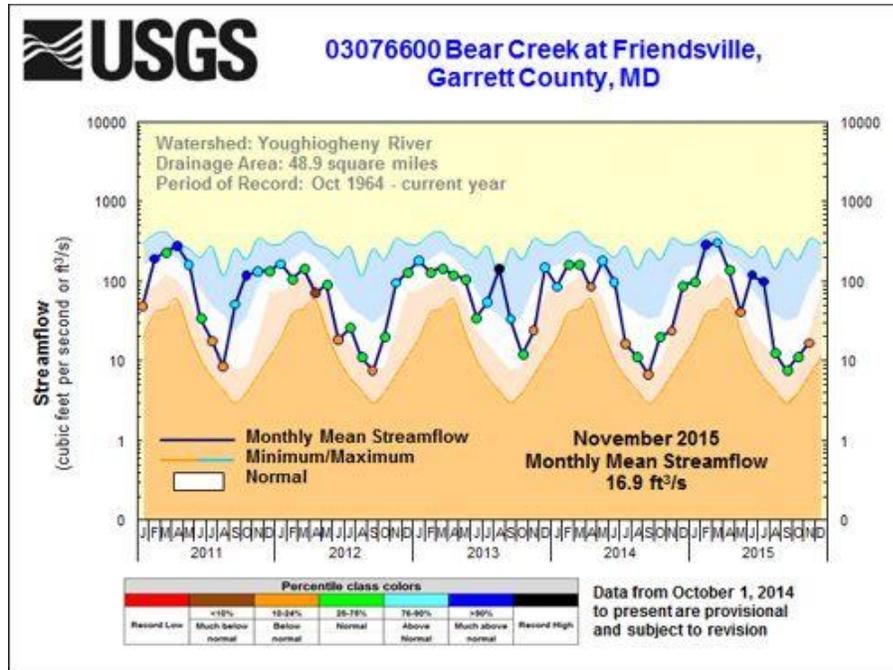
November monthly mean streamflow was normal (shown in green on map) at 85 percent (28 of 33) of the USGS streamgages used to monitor climatic response in Maryland, Delaware, and the District of Columbia. Monthly mean streamflow was below normal (10th-24th percentiles, shown in orange on map) at five streamgages in Maryland and Delaware. Data are provisional and subject to revision.



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 Bear Creek at Friendsville in Garrett County, Maryland is below normal (10th-24th percentiles), yet the level increased since October. Monthly mean streamflow typically begins to increase at this time of year when runoff increases and 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 (25th-75th 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.

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

Reservoir Levels

Available reservoir storage at the end of November 2015 in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) was 99.68 percent of available storage capacity, or a total of 75.61 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 62.47 percent of normal storage capacity at the end of November 2015, with 6.59 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.

November 2015	Percent available/normal storage	Volume (billion gallons)
Baltimore Reservoirs		
Baltimore City – Environmental Services Division		
Liberty	99.35%	36.56
Loch Raven	100.00%	21.20
Prettyboy	100.00%	17.85
Total	99.68%	75.61
Patuxent Reservoirs		
Washington Suburban Sanitary Commission (WSSC)		
Triadelphia	55.88%	3.13
Duckett	69.05%	3.46
Total	62.47%	6.59