

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

**November 2013 – Sixty-nine percent of groundwater levels and 81 percent of streamflow levels were in the normal range in the Maryland-Delaware-District of Columbia region.**

## 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 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 resources conditions they might encounter in the future.

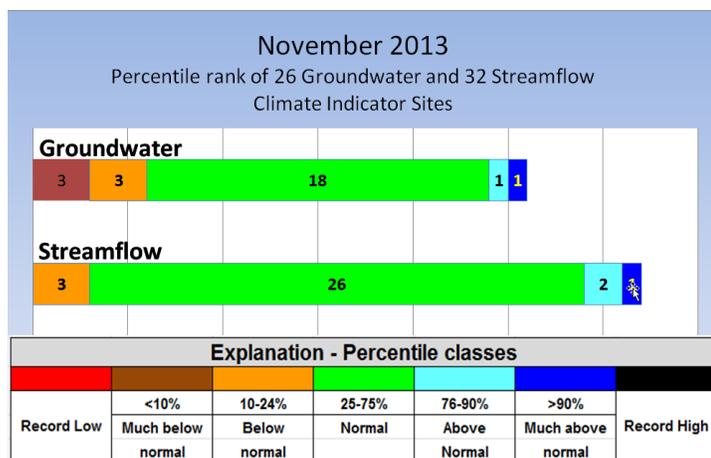
The sites used in this water summary were carefully selected to show the response of streamflow and groundwater levels to weather conditions. Ideally, these sites will show no effects from human influences. The streamflow and groundwater data are ranked in comparison to the historical record and summarized.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

## USGS November 2013 Water Conditions Summary

Sixty-nine percent of the November monthly groundwater levels and 81 percent of the monthly mean streamflow at sites used to monitor the response of water resources to changes in climatic conditions in Maryland, Delaware, and the District of Columbia were in the normal range (between the 25th and 75<sup>th</sup> percentiles).

Groundwater levels were in the normal range in 18 of the 26 USGS observation wells used to monitor climatic conditions in Maryland and Delaware. Two wells had above normal groundwater levels, and six wells had below normal groundwater levels.

Monthly mean streamflow in November was normal at 26 of the 32 streamgages used as climate indicator sites, above normal at 3 streamgages, and below normal at 3 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.

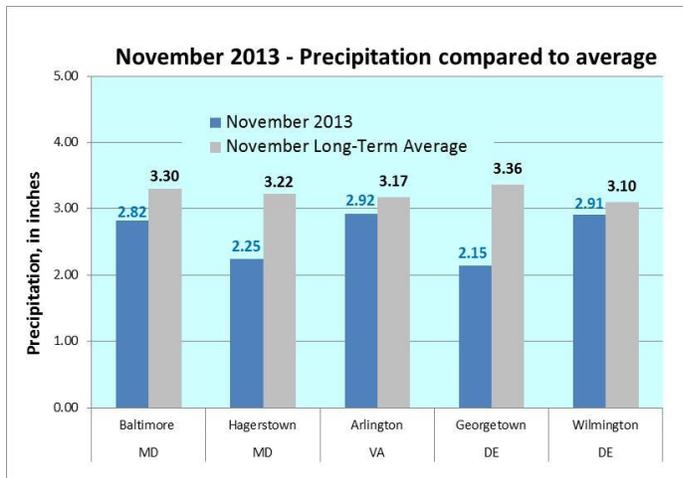
For example, a groundwater level in the 90th percentile is equal to or greater than 90 percent of the values recorded for that month.

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## November 2013 Precipitation and Weather

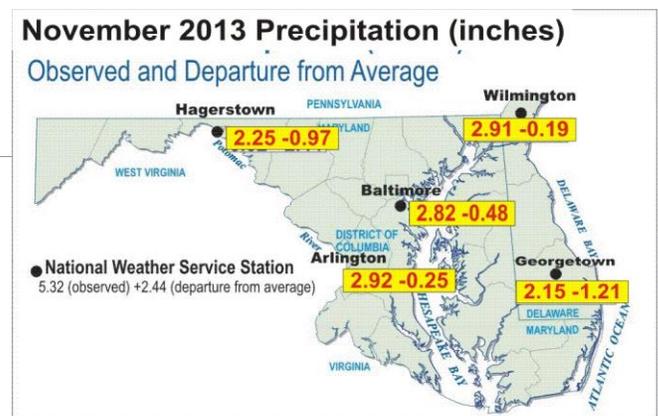
Precipitation at the National Weather Service (NWS) stations in Maryland, Delaware, and Arlington, Virginia (adjacent to the District of Columbia) was over 2 inches, but below the long-term average.

The National Weather Service's Middle Atlantic River Forecast Center's 365-day precipitation data show that all counties in the Maryland and Delaware region were in the average range during November.



### 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



November mean (or average) temperatures ranged from 41.1 degrees Fahrenheit in Hagerstown, Maryland to 46.6 degrees Fahrenheit in Arlington, Virginia. Temperatures at all five weather stations were more than 2 degrees below the long-term average for November.

\*The NWS normal (long-term average) period used for determining records is from 1981–2010.

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

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## Groundwater

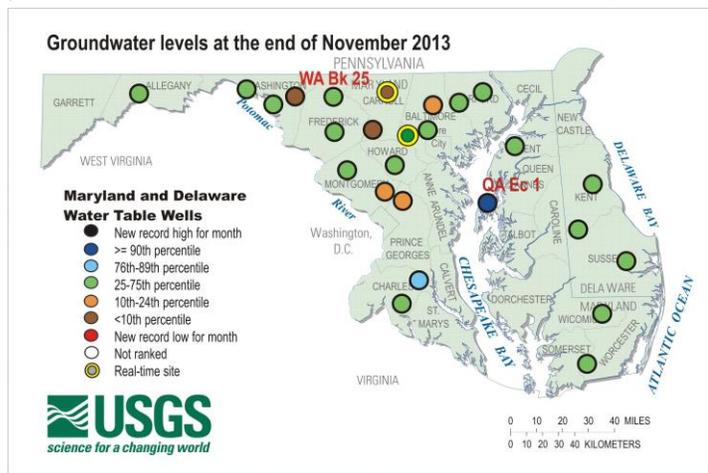
The USGS monitors groundwater levels in unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in climatic conditions. Twenty-six groundwater wells were selected based on the following criteria:

- 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 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 2013 Groundwater Levels

Groundwater levels in November were in the normal range (between the 25th and 75th percentiles) in 18 of the 26 wells used to monitor climatic conditions in Maryland and Delaware. All three wells in Delaware were in the normal range.

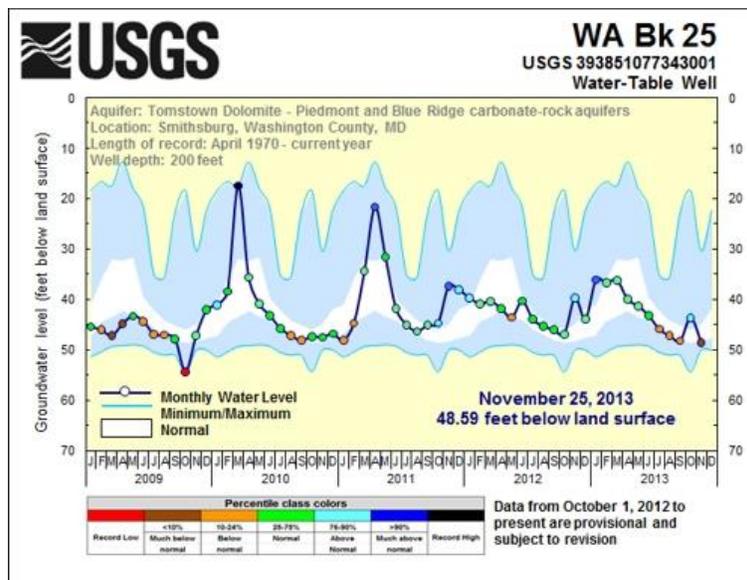
In Maryland, three wells had groundwater levels below the 10<sup>th</sup> percentile. These wells were in Carroll and Washington Counties in Maryland. Groundwater levels were below normal (between the 10<sup>th</sup> and 25<sup>th</sup> percentiles) in Baltimore, Montgomery, and Prince George's Counties. November groundwater levels were above normal in Charles and Queen Anne's Counties. The groundwater level in the observation well in Queen Anne's County was above the 90<sup>th</sup> percentile.



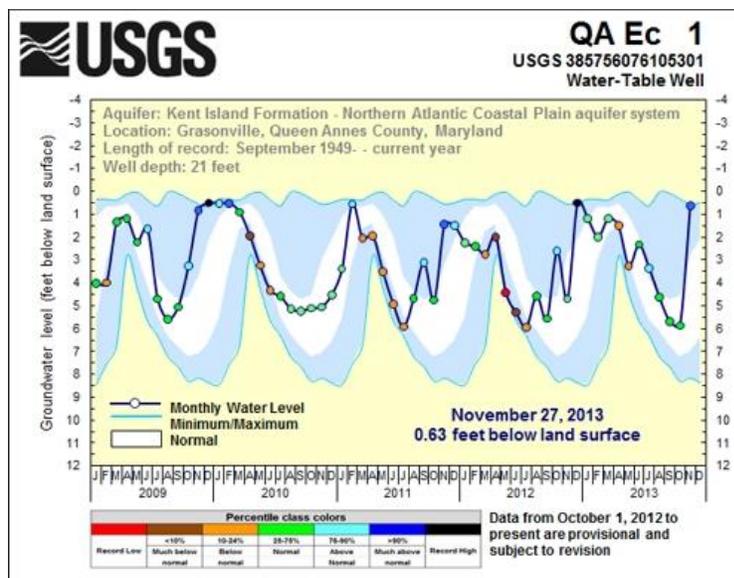
[http://md.water.usgs.gov/groundwater/web\\_wells/current/water\\_table/counties/](http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties/)

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

The groundwater level in observation well WA Bk 25 in Washington County, near Smithsburg, Maryland went from above normal in October to below normal in November. Groundwater data have been collected at this well since 1970.



The groundwater level in the observation well in Queen Anne's County rose significantly from a normal level to almost a record high level in November.



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)

These 5-year hydrographs show 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 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 assess how biological communities are affected by hydrologic conditions. The USGS operates the most extensive network of streamflow gages in the region.

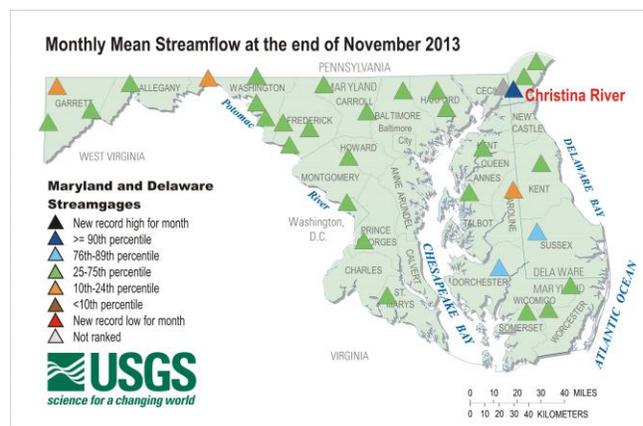
The streamflow locations chosen for the monthly water summary were selected based on the following criteria:

- 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.

## November 2013 Streamflow

Monthly mean streamflows were normal at 26 of the 32 USGS streamgages used to monitor climatic response in Maryland, Delaware, and the District of Columbia. Normal is considered to be between the 25th and 75th percentiles.

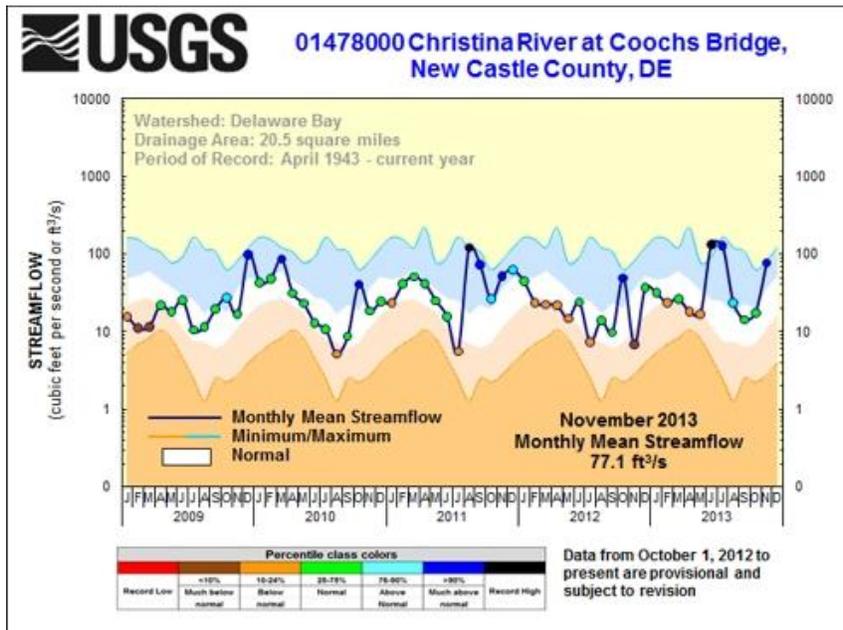
Streamflow was above normal in Dorchester County in Maryland and New Castle and Sussex Counties in Delaware, and below normal in Garrett, Washington, and Caroline Counties in Maryland.



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

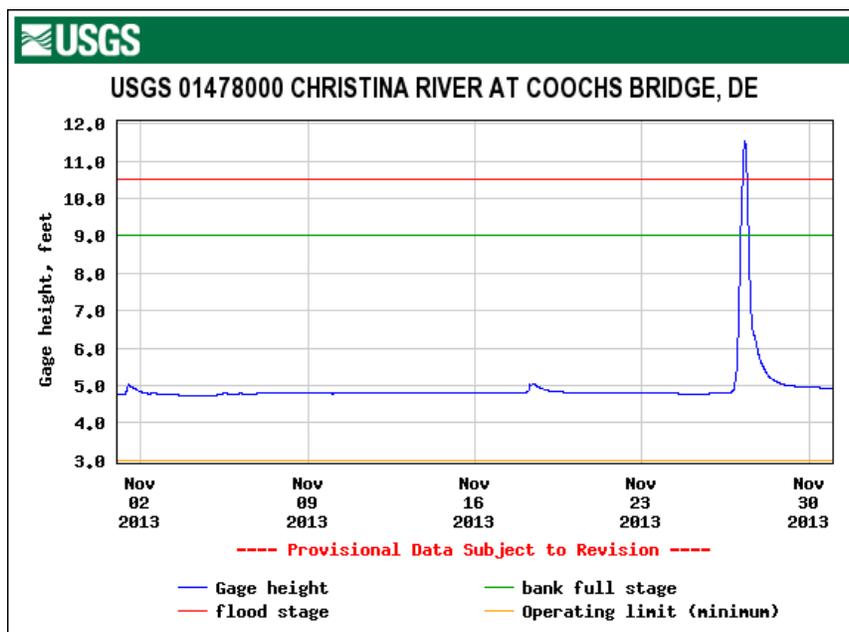
## U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

Monthly mean streamflow at the Christina River in New Castle County, Delaware was above the 90<sup>th</sup> percentile in November. Streamflow had been normal for the previous 3 months at this site. The nearest weather station in Wilmington, Delaware received 2.91 inches of rain in November, which is 0.19 inches below the long-term average. There is not enough precipitation data in the area to determine with certainty why the streamflow rose abruptly when precipitation at the weather station in Wilmington was slightly below normal.



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 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.

Five-year hydrographs can be viewed at:  
<http://md.water.usgs.gov/surfacewater/streamflow/>

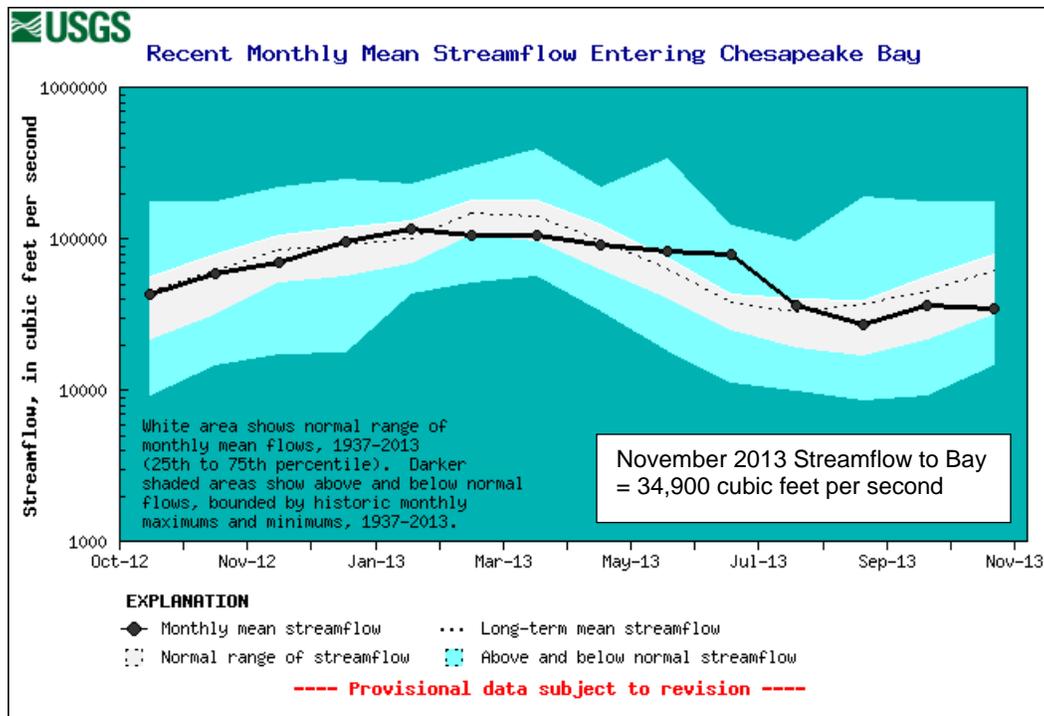


Streamflow on the Christina River at Cooches Bridge in Delaware was near the long-term daily median for most of the month, until November 27<sup>th</sup> when the instantaneous discharge reached 1,260 cubic feet per second (ft<sup>3</sup>/s). This discharge corresponds to a gage height above flood stage, which is 10.5 feet (880 ft<sup>3</sup>/s). The daily discharge, which is used to calculate the monthly mean, reached 400 ft<sup>3</sup>/s on November 27. The rise in discharge on this date was enough to bring the monthly mean Streamflow to the 90<sup>th</sup> percentile for November.

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## Estimated Streamflow to the Chesapeake Bay

The estimated monthly mean freshwater streamflow to Chesapeake Bay was in the normal range in November 2013, at 34,900 cubic feet per second (ft<sup>3</sup>/s; provisional, and subject to revision). The average (mean) monthly streamflow for November is 61,700 ft<sup>3</sup>/s. The normal range for average (mean) monthly streamflow for November is between 31,800 ft<sup>3</sup>/s and 79,200 ft<sup>3</sup>/s, the 25th and 75th percentiles of all November values. These provisional statistics are based on a 77-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/>

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

### Reservoir Levels

Reservoir storage at the end of November in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) was at 98 percent of available storage capacity, with a total of 73.95 billion gallons of water.

Total 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, was at 78 percent of normal storage capacity in November, with 8.20 billion gallons of water.

November 2013	Percent available/ normal storage	Volume (billion gallons)	Source
<b>Baltimore Reservoirs</b>			<b>Baltimore City – Environmental Services Division</b>
Liberty	95	34.90	
Loch Raven	100	21.20	
Prettyboy	100	17.85	
Total	98	73.95	
<b>Patuxent Reservoirs</b>			<b>Washington Suburban Sanitary Commission (WSSC)</b>
Triadelphia	77	4.29	
Duckett	78	3.91	
Total	78	8.20	