

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

**January 2016 Highlights: Eighty-one percent of groundwater levels 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.

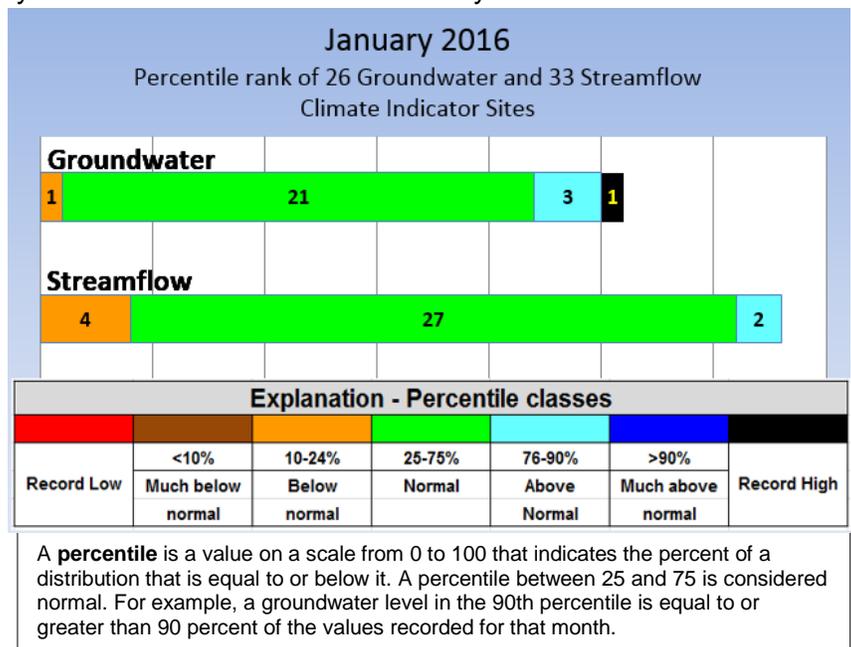
## USGS January 2016 Water Conditions Summary

In January, 81 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.

High snowfall prevented access to eight wells at the end of January, so groundwater measurements were made at the beginning of February and counted as the end of January

measurements. Groundwater levels were normal (between the 25<sup>th</sup> and 75<sup>th</sup> percentiles) in 21 of 26 USGS monitoring wells in Maryland and Delaware. Groundwater levels were above normal in four wells, including a presumed record January high at the observation well in Queen Anne's County, Maryland. One USGS observation well in Baltimore County, Maryland was below normal.

January monthly mean streamflow levels were normal at 27 of 33 streamgages in Maryland, Delaware, and the District of Columbia. Streamflow was above normal at two streamgages and below normal at four streamgages.



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## January 2016 Precipitation and Weather

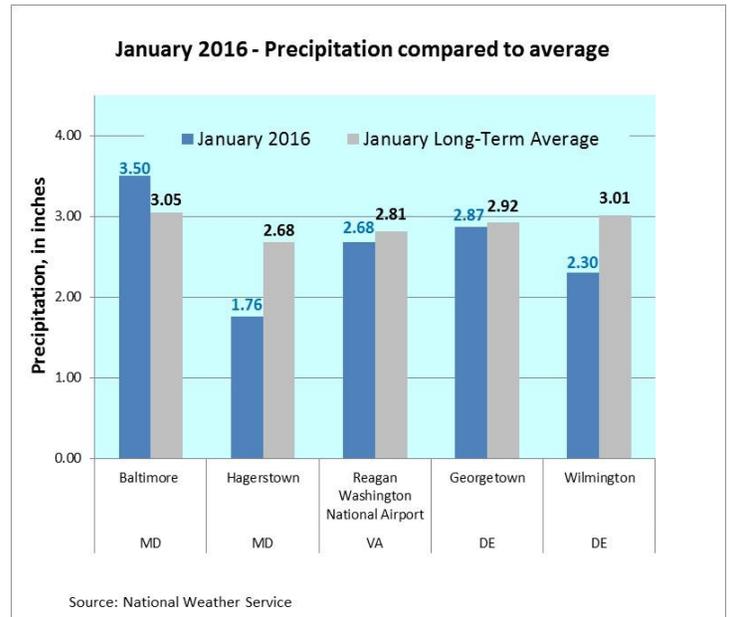
Record-setting snowfall occurred in much of the Mid-Atlantic region in January, including the largest snowstorm on record in Baltimore, Maryland for January 22-23, with 29.2 inches, according to the National Weather Service (NWS). Snowfall records are preliminary for this report. January 23 was the highest, all-time single day snowfall amount, breaking the record of 23.3 inches set on January 28, 1922. Snowfall record-keeping in Baltimore began in 1892.

Records were also set at Reagan Washington National Airport in Arlington, Virginia near the District of Columbia. A new daily record snowfall of 11.3 inches was set on January 23, breaking the record of 11.0 inches set in 1935. The snowstorm total of 17.8 inches for January 22-23, 2016 ties with February 5-6, 2010 for the fourth largest snowstorm on record. Snowfall may have been higher than reported due to measurement difficulties.

Precipitation was below the long-term average at four of the five NWS Mid-Atlantic weather stations in Delaware and Maryland in January. The lowest precipitation for the fourth consecutive month was in Hagerstown, Maryland with 1.76 inches, which was 0.92 inches below the long-term average. The highest precipitation of the five Mid-Atlantic weather stations was in Baltimore, Maryland with 3.50 inches, which was 0.45 inches above average.

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 normal to above normal.

January temperatures were 0.2-1.1 degrees Fahrenheit below normal at four of the five Mid-Atlantic weather stations. Temperatures were 0.2 degrees Fahrenheit above normal at Georgetown, Delaware, which also had the warmest monthly average temperature at 35.2 degrees Fahrenheit. The lowest temperature was in Hagerstown, Maryland at 29.9 degrees Fahrenheit, which was 0.09 degrees Fahrenheit 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

Sources: National Weather Service and Middle Atlantic River Forecast Center (MARFC)  
 MD and DC: <http://www.weather.gov/climate/index.php?wfo=lxw>  
 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)

# 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. The groundwater wells used for the monthly water summary were selected based on the following criteria:

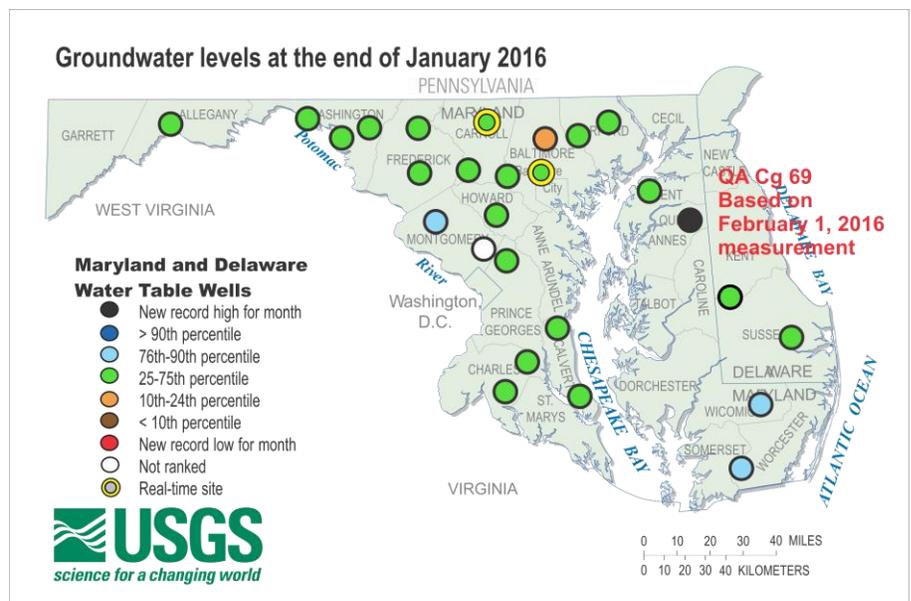
- Located in an unconfined (water-table) aquifer;
- Open to a single, known hydrogeologic unit/aquifer;
- Groundwater hydrograph reflects changes in climatic conditions;
- No indicated nearby pumpage and likely to remain uninfluenced by pumpage, regulated streamflow, or changes related to human activities;
- 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.

## January 2016 Groundwater Levels

In Maryland and Delaware, 81 percent (21 of 26 wells) of the groundwater levels were normal (25<sup>th</sup>-75<sup>th</sup> percentiles, shown in green on map) in January at USGS wells used to monitor climatic conditions. Record-setting high snowfall prevented access to 8 wells, so measurements made at the beginning of February were used and considered for the end of January measurement. There was no groundwater level available in January for the observation well in Montgomery County, Maryland due to the snow cover.

The groundwater level for USGS observation in Queen Anne’s County, Maryland, was measured on February 1, 2016 because of January 2016 blizzard, but based on this value, it would have been a new January record. Groundwater levels in Montgomery, Somerset, and Wicomico Counties in Maryland were above normal falling within the 76<sup>th</sup>-90<sup>th</sup> percentiles (shown in cyan on map).

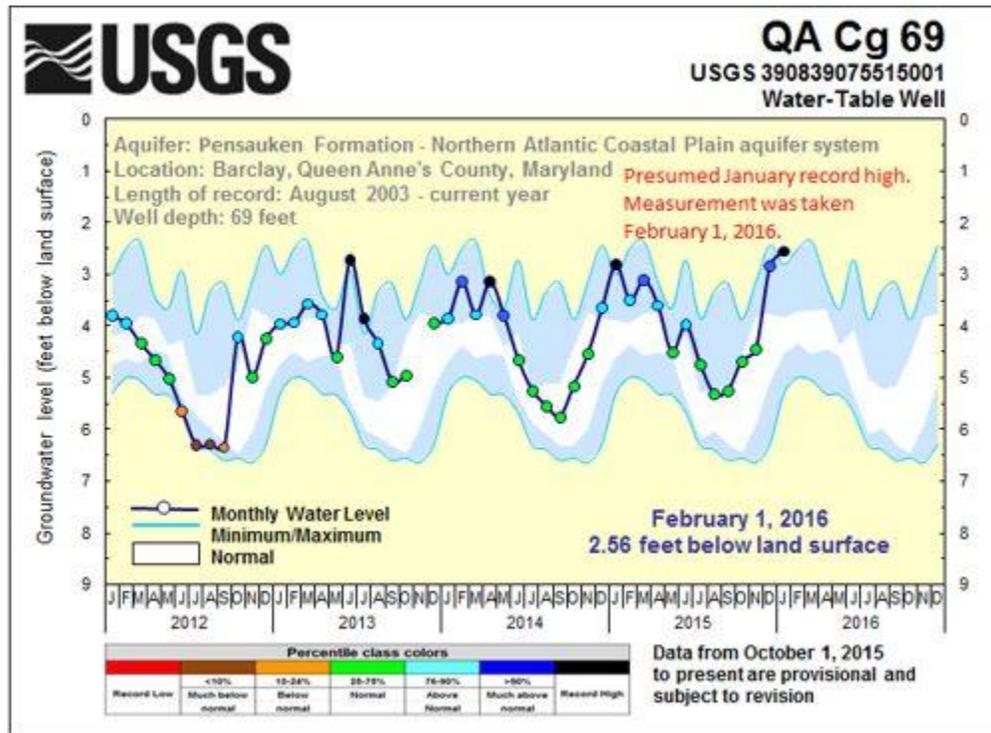
One USGS observation well in Baltimore County, Maryland had below normal groundwater levels (between the 10<sup>th</sup> and 24<sup>th</sup> percentiles, shown in orange on map). Data are provisional and subject to revision.



To access the clickable groundwater map, go to:  
[http://md.water.usgs.gov/groundwater/web\\_wells/current/water\\_table/counties/](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 QA Cg 69 in Queen Anne’s County, Maryland was measured February 1 because of hazardous travel conditions from the January blizzard. It is likely that it would have set a new record January high at 2.56 feet below land surface. The previous January record was 2.81 feet below land surface in January 2015. Record-keeping began in 2003. The groundwater level at this well had been above the 90<sup>th</sup> percentile in December 2015 and normal for the previous 5 months.



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

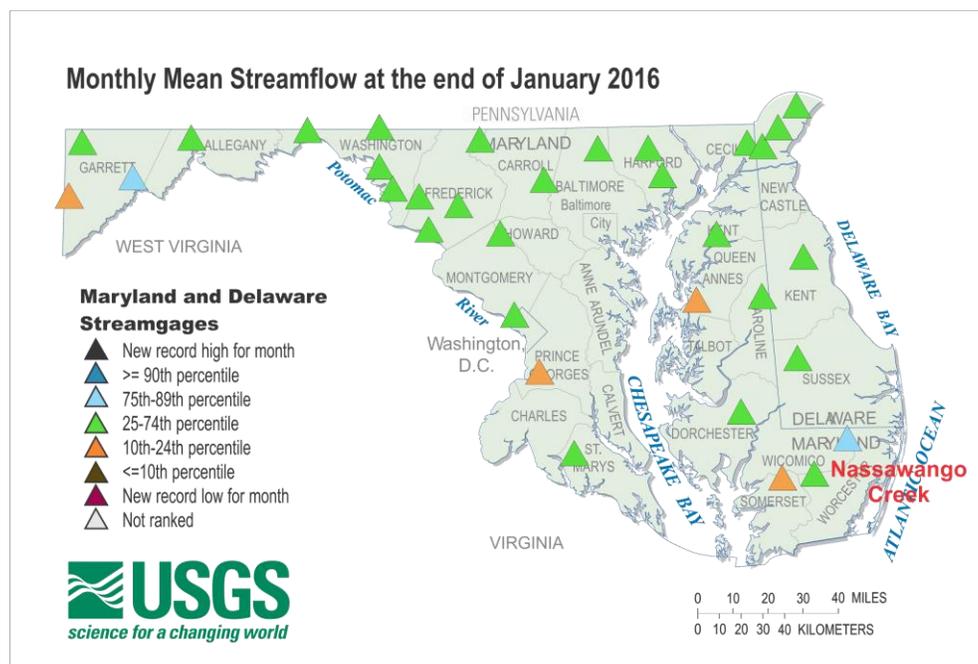
Streamflow data are used for many purposes. A few of the most common uses are to assess water supply and the risk of droughts and floods. Streamflow data are also used to calculate loads of chemical constituents and assess how biological communities are affected by hydrologic conditions. The USGS operates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

## January 2016 Streamflow

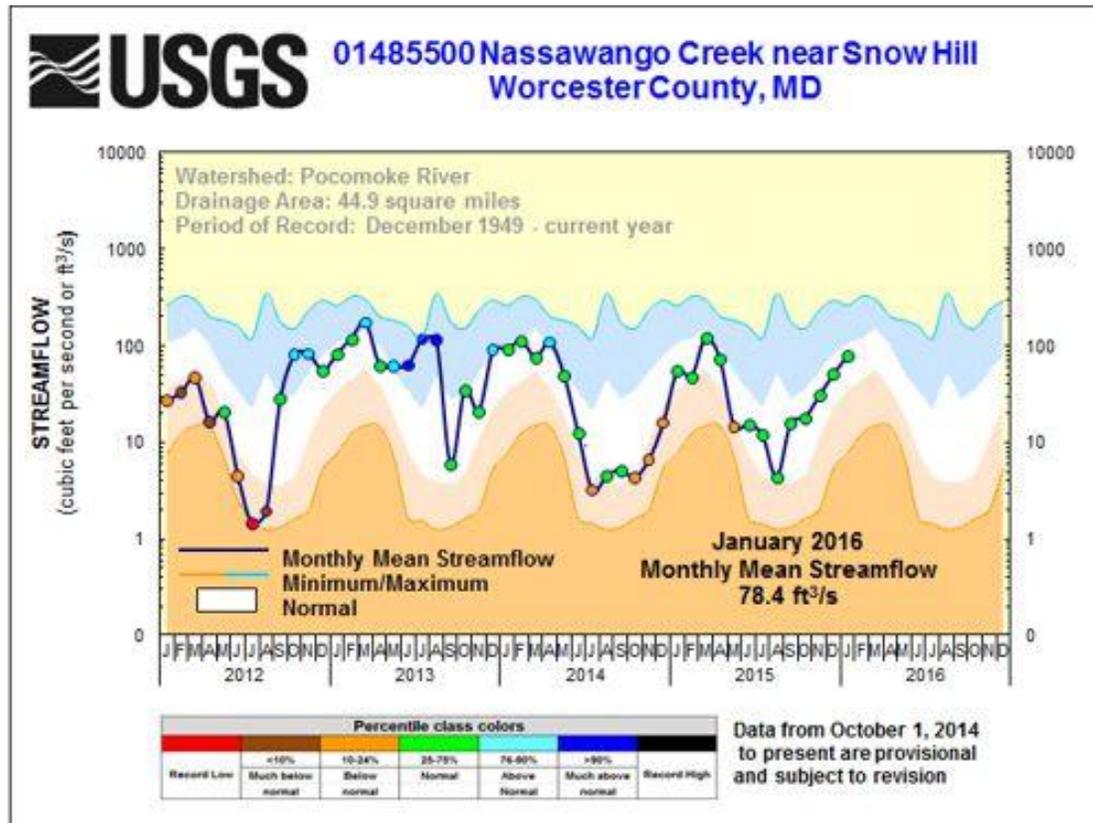
January monthly mean streamflow was normal (shown in green on map) at 82 percent (27 of 33) of the USGS streamgages used to monitor climatic response in Maryland, Delaware, and the District of Columbia. Monthly mean streamflow was below normal (10<sup>th</sup>-24<sup>th</sup> percentiles, shown in orange on map) at four streamgages and above normal (75<sup>th</sup>-89<sup>th</sup> percentiles, shown in cyan on map) at two streamgages in Maryland. 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

Monthly mean streamflows were normal (25<sup>th</sup>-75<sup>th</sup> percentiles) in 82 percent of the USGS streamgages in Maryland, Delaware, and the District of Columbia in January. Nassawango Creek near Snow Hill in Worcester County, Maryland represents a streamgage with monthly mean streamflow following the normal trend. The monthly mean streamflow on Nassawango Creek has been normal for the last 8 months. Monthly mean streamflow typically increases 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/>

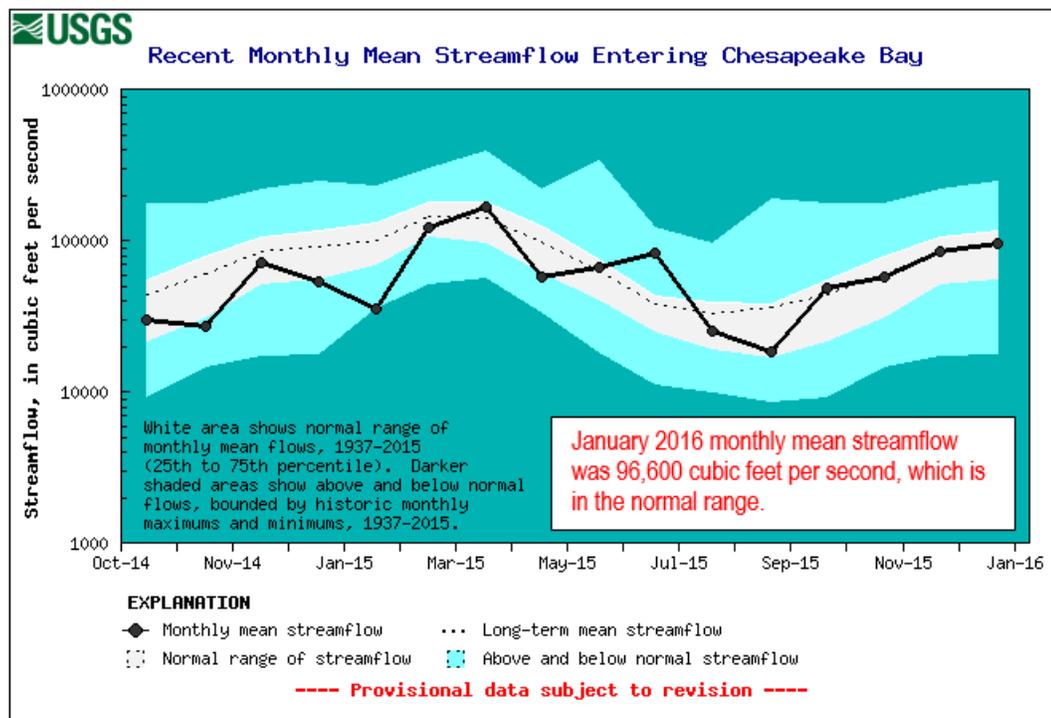
The dark line in the 5-year hydrograph represents the monthly mean streamflow for this period and the white band shows the normal range (25<sup>th</sup>-75<sup>th</sup> percentiles) based on the period of record. The maximum monthly mean streamflow is at the top of the blue shaded section, and the lowest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

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

## Estimated Streamflow to the Chesapeake Bay

The USGS estimates monthly mean freshwater streamflow to the Chesapeake Bay using streamflow measurements from the Susquehanna, Potomac, and James Rivers. In January 2016, the monthly mean freshwater flow to the Chesapeake Bay was 96,600 cubic feet per second (ft<sup>3</sup>/s; provisional, and subject to revision), which is in the normal range. The long-term January average (mean) is 91,000 ft<sup>3</sup>/s, and the normal range is between 55,500 ft<sup>3</sup>/s and 118,000 ft<sup>3</sup>/s, the 25<sup>th</sup> and 75<sup>th</sup> percentiles of all January values. Streamflow to the Bay has also been in the normal range for the previous 5 months. These provisional statistics are based on a 79-year period of record.

Runoff in the Chesapeake Bay watershed carries pollutants, such as nutrients and sediment, to rivers and streams that drain to the Bay. The amount of water flowing into the Chesapeake Bay from its tributaries has a direct impact on how much pollution is in the estuary and it also affects the salinity levels that are important for fish, crabs, and oysters. Generally, as river flow increases, it brings more nutrient and sediment pollution to the Bay.



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

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## Reservoir Levels

Available reservoir storage at the end of January 2016 in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) was 99.89 percent of available storage capacity, or a total of 75.77 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 77.71 percent of normal storage capacity at the end of January 2016, with 8.28 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.

January 2016	Percent available/normal storage	Volume (billion gallons)
<b>Baltimore Reservoirs</b>		
<b>Baltimore City – Environmental Services Division</b>		
Liberty	99.78%	36.72
Loch Raven	100.00%	21.20
Prettyboy	100.00%	17.85
<b>Total</b>	<b>99.89%</b>	<b>75.77</b>
<b>Patuxent Reservoirs</b>		
<b>Washington Suburban Sanitary Commission (WSSC)</b>		
Triadelphia	83.38%	4.67
Duckett	72.04%	3.61
<b>Total</b>	<b>77.71%</b>	<b>8.28</b>