

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

**May 2014 – Record high groundwater levels in Baltimore County, Maryland, and record high monthly mean streamflow at four USGS streamgages 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.

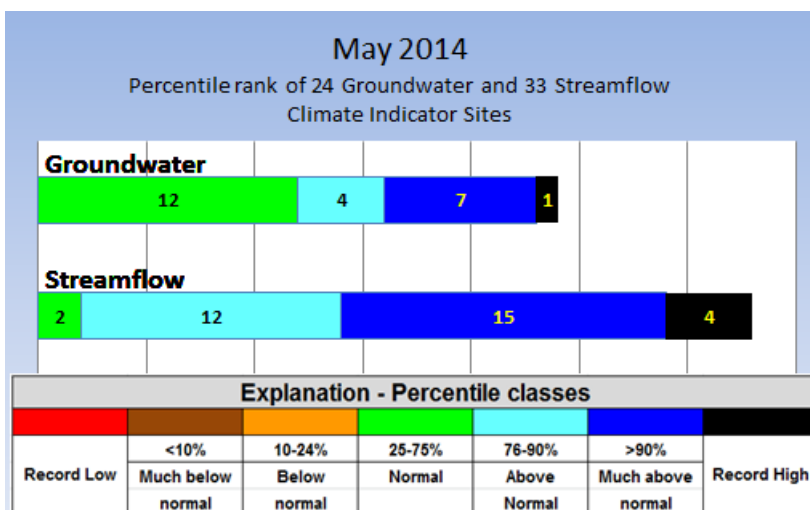
In addition to providing the most extensive set of historical streamflow and groundwater data available to the public, the USGS collects water data and quality-assures the data by employing standardized techniques across the country. The uniformity of the dataset allows for multi-state comparisons and 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 May 2014 Water Conditions Summary

Heavy rains at the end of April, along with above average April rainfall and near average rainfall in May led to a record high groundwater level in one well and record high monthly mean streamflows at four gaged streams.

Fifty percent of the groundwater levels and 94 percent of the monthly mean streamflow values at sites used to monitor the response of water resources to changes in climatic conditions in Maryland, Delaware, and the District of Columbia were above normal (greater than the 76<sup>th</sup> percentile) in May.



Groundwater levels were in the normal range in 12 of the 24 USGS observation wells used to monitor climatic conditions in Maryland and Delaware. The remaining 12 wells had above normal (above the 75<sup>th</sup> percentile) groundwater levels with one record high.

Record high monthly mean streamflows were set at two streams in Delaware and two streams in Maryland in May. Another 15 sites had monthly mean streamflows above the 90<sup>th</sup> percentile.

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.

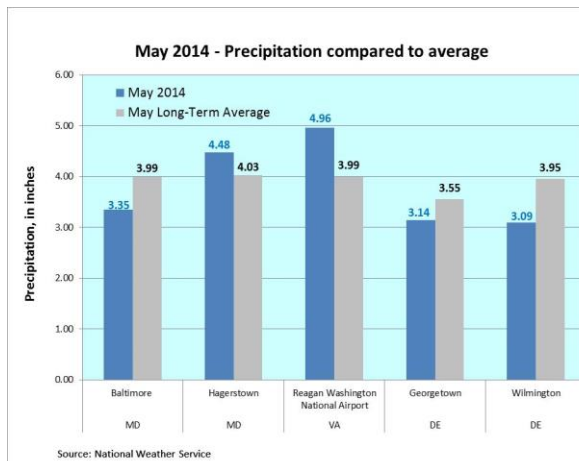
For example, a groundwater level in the 90<sup>th</sup> percentile is equal to or greater than 90 percent of the values recorded for that month.

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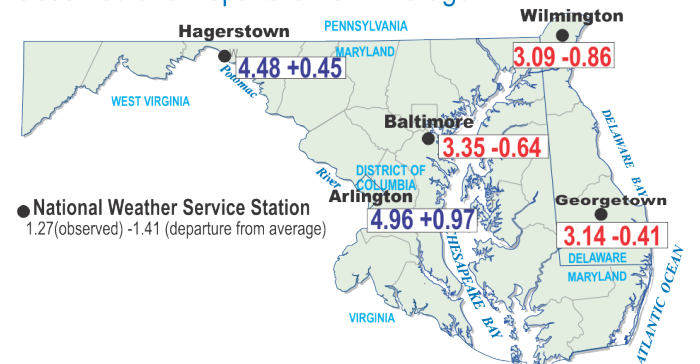
## May 2014 Precipitation and Weather

Although May precipitation was within an inch of the long-term monthly average for the region, April precipitation was more than double the long-term average at National Weather Service (NWS) stations in Baltimore, Maryland, Wilmington, Delaware, and Arlington, Virginia. At the NWS station in Baltimore, 4.62 inches of rain fell during the last 3 days of April, which is more than the monthly average rainfall. The total rainfall in Baltimore during April was 8.60 inches. The high rainfall in April caused flooding of streams and recharge of groundwater. This led to the very high streamflow and groundwater levels observed in May. May precipitation was less than an inch below the long-term average at the weather stations in Delaware and in Baltimore, Maryland.

The NWS Middle Atlantic River Forecast Center's 365-day precipitation data showed that all counties in Maryland, Delaware, and the District of Columbia were classified as average to above average. Thirteen counties and the District of Columbia were more than 10 inches over the 365-day average from May 2013 to May 2014. See the links below to view the NWS data.



### May 2014 Precipitation (inches) Observed and Departure from Average



May air temperatures ranged from 1.4 degrees Fahrenheit above the long-term average in Wilmington, Delaware to 2.5 degrees Fahrenheit above the long-term average in Arlington, Virginia among the five NWS stations in the Mid-Atlantic region.

### 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 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=lmx>  
 DE: <http://www.weather.gov/climate/index.php?wfo=phi>  
 Middle Atlantic River Forecast Center (MARFC): <http://www.erh.noaa.gov/marfc/Precipitation/Departures/>

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

## Groundwater

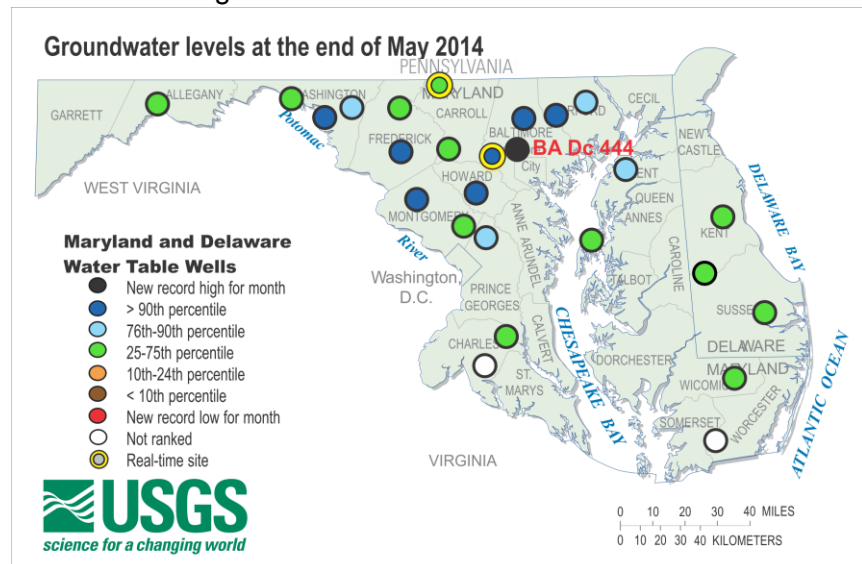
The USGS monitors groundwater levels in unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in climatic conditions. Twenty-six groundwater wells were selected based on the following criteria:

- 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.

## May 2014 Groundwater Levels

Groundwater levels were normal (between the 25<sup>th</sup> and 75<sup>th</sup> percentiles) in 12 of the 24 wells used to monitor climatic conditions in Maryland and Delaware in May. The 12 remaining wells had above normal groundwater levels and the groundwater level at one observation well in Baltimore County, Maryland, was at the highest May level since 1997. Groundwater levels in the surrounding wells were above the 90<sup>th</sup> percentile.

Groundwater levels in Delaware were normal at the three observation wells in May. The wells in Kent County have been at normal to above normal levels since the fall of 2012, or during the last 20 months.

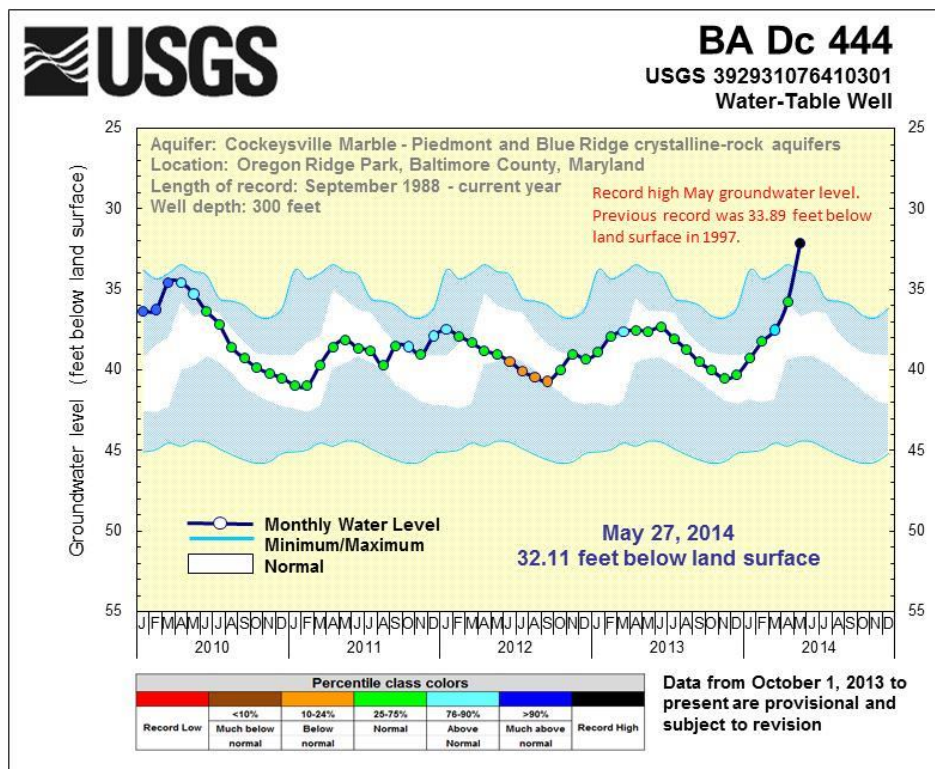


To access the clickable groundwater map, go to:

[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 BA Dc 444 in Baltimore County, Maryland, set a new record high for May at 32.11 feet below land surface. The previous record was 33.89 feet below land surface in 1997. Data collection began at this site in 1988.



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.

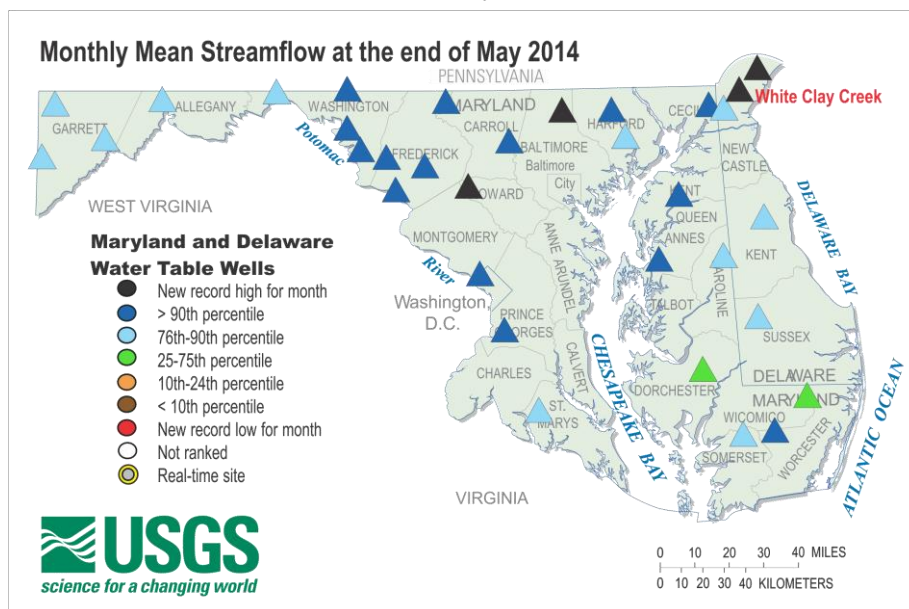
The streamflow locations chosen for the monthly water summary were selected based on the following criteria:

- 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.

## May 2014 Streamflow

Monthly mean streamflows at 33 USGS streamgages used to monitor climatic response in Maryland, Delaware, and the District of Columbia were above normal in May. Normal is considered to be between the 25<sup>th</sup> and 75<sup>th</sup> percentiles. Record high May monthly mean streamflows were set at Brandywine Creek and White Clay Creek in Delaware, and at Little Falls in Baltimore County, and the Patuxent River in Montgomery County, Maryland.

Streamflow was above the 90<sup>th</sup> percentile at 15 USGS streamgages and between the 76<sup>th</sup> and 90<sup>th</sup> percentiles at 12 USGS streamgages. Monthly mean streamflow was normal at two streams in the southern Delmarva Peninsula in Maryland.



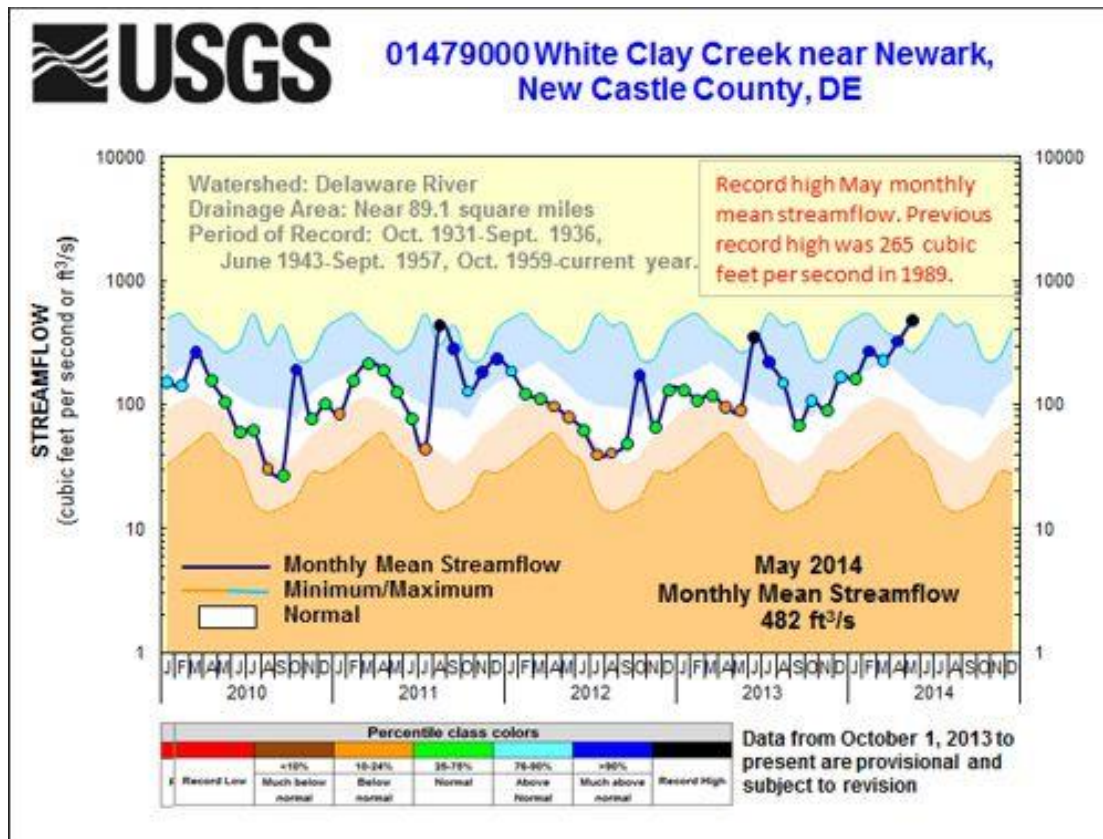
To access the clickable streamflow map, go to:  
<http://md.water.usgs.gov/surfacewater/streamflow/>



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

The monthly mean streamflow at White Clay Creek near Newark, in New Castle County, Delaware, set a new May record high monthly mean flow of 482 cubic feet per second (ft<sup>3</sup>/s), breaking the previous record of 265 ft<sup>3</sup>/s set 25 years ago in 1989.

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.

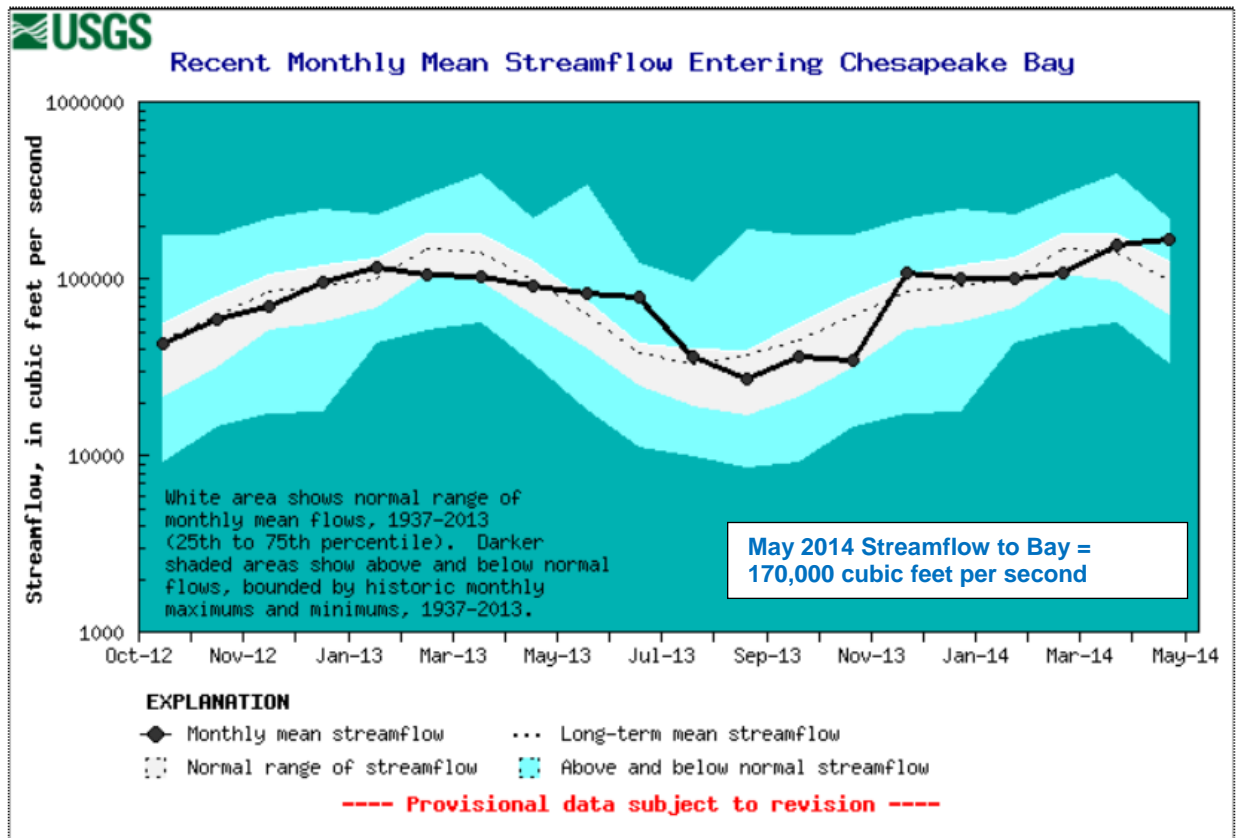


Five-year hydrographs can be viewed at:  
<http://md.water.usgs.gov/surfacewater/streamflow/>

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## Estimated Streamflow to the Chesapeake Bay

The estimated monthly mean freshwater streamflow to Chesapeake Bay was above normal in May 2014 at 170,000 ft<sup>3</sup>/s (provisional, and subject to revision). The average (mean) monthly streamflow for May is 98,300 ft<sup>3</sup>/s. The normal range for average (mean) monthly streamflow for May is between 62,300 ft<sup>3</sup>/s and 127,000 ft<sup>3</sup>/s, the 25<sup>th</sup> and 75<sup>th</sup> percentiles of all May 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/>

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## Reservoir Levels

Available reservoir storage at the end of May in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) remained at 100 percent of available storage capacity, or a total of 75.85 billion gallons of water. The Baltimore reservoirs have been full since December 2013.

Total normal 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 104.5 percent of normal storage capacity in May, with 11.07 billion gallons of water. Not all of the water in the reservoir is usable; for operational purposes, percent of normal storage capacity is used, but this value can exceed 100 percent of the usable storage.

May 2014	Percent available/ normal storage	Volume (billion gallons)	Source
<b>Baltimore Reservoirs</b>			<b>Baltimore City – Environmental Services Division</b>
Liberty	100	36.80	
Loch Raven	100	21.20	
Prettyboy	100	17.85	
Total	100	75.85	
<b>Patuxent Reservoirs</b>			<b>Washington Suburban Sanitary Commission (WSSC)</b>
Triadelphia	105	5.88	
Duckett	104	5.19	
Total	104.5	11.07	