

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

March 2014 – Eighty-eight percent of groundwater levels and ninety-seven percent of monthly mean streamflow values were normal or above normal 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.

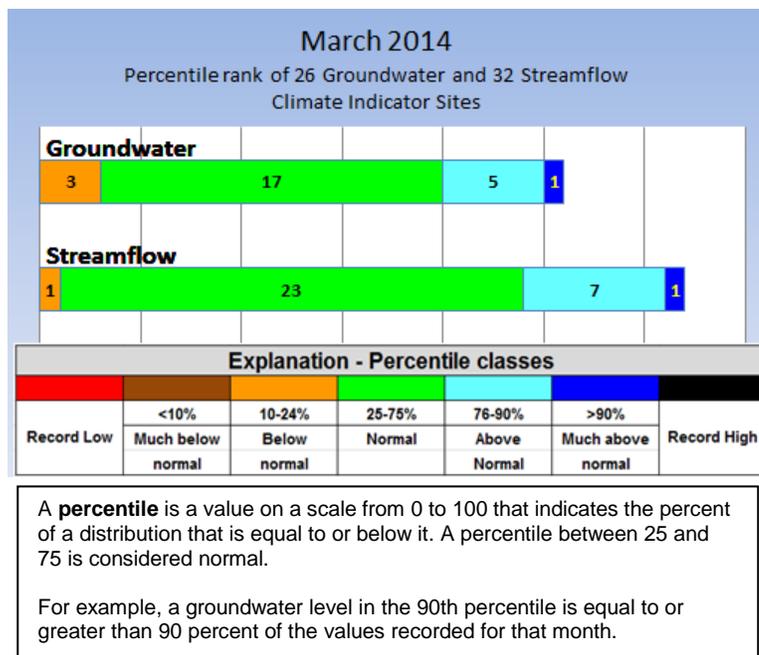
The sites used in this water summary were carefully selected to show the response of streamflow and groundwater levels to weather conditions. Ideally, these sites will show no effects from human influences. The streamflow and groundwater data are ranked in comparison to the historical record and summarized.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

USGS March 2014 Water Conditions Summary

Eighty-eight percent of the groundwater levels and 97 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 normal (between the 25th and 75th percentiles) or above normal (greater than the 76th percentile) in March.

Groundwater levels were in the normal range in 17 of the 26 USGS observation wells used to monitor climatic conditions in Maryland and Delaware. Six wells had above normal groundwater levels, with one well above the 90th percentile. There were three wells with below normal groundwater levels, below the 25th percentile.

Monthly mean streamflow in March was normal at 23 of the 32 streamgages used as climate indicator sites, and above normal at 8 other streamgages, including one site above the 90th percentile. There was only one site with below normal streamflow, or less than the 25th percentile, in March.



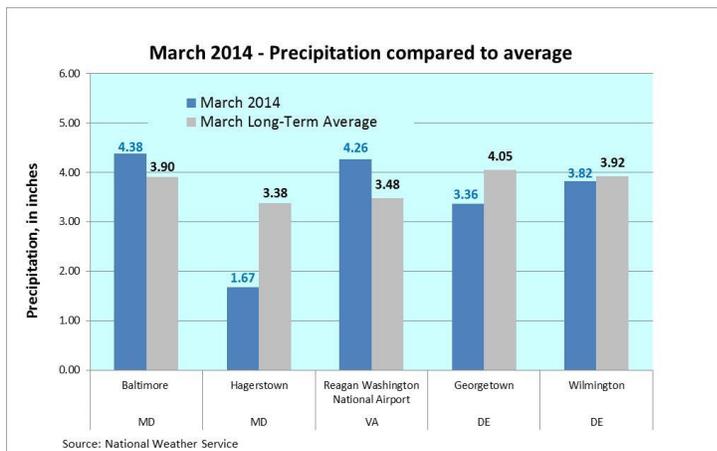
U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

March 2014 Precipitation and Weather

The weather in March was not as snowy as in February, but snowfall in Baltimore, Maryland was 12.1 inches. The amount of precipitation, including water equivalent for snow, was close to the normal monthly values. Because temperatures in the region were very cold for March, much of the precipitation was in the form of snow.

March precipitation was lowest at the weather station in Hagerstown, Maryland, (1.67 inches) of the five National Weather Service (NWS) stations in Maryland, Delaware, and Arlington, Virginia (adjacent to the District of Columbia). The highest amount of March precipitation was in Baltimore, Maryland, with 4.38 inches.

The NWS Middle Atlantic River Forecast Center's 365-day precipitation data show that all counties in Maryland and Delaware were in the average to above average range for the 365-day period ending in March.

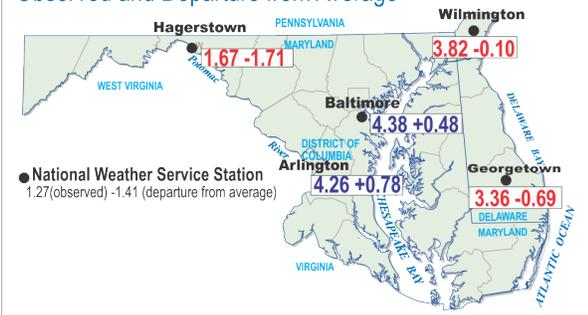


National Weather Service Stations

- 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

March temperatures were more than 3 degrees Fahrenheit below the long-term average at the five NWS stations in the Mid-Atlantic region. Temperatures in Baltimore, Maryland were 5.1 degrees Fahrenheit below the long-term average.

March 2014 Precipitation (inches) Observed and Departure from Average



*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=lsx>
- DE: <http://www.erh.noaa.gov/phi/>
- Middle Atlantic River Forecast Center (MARFC): <http://www.weather.gov/marfc/Precipitation/Departures>

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

Groundwater

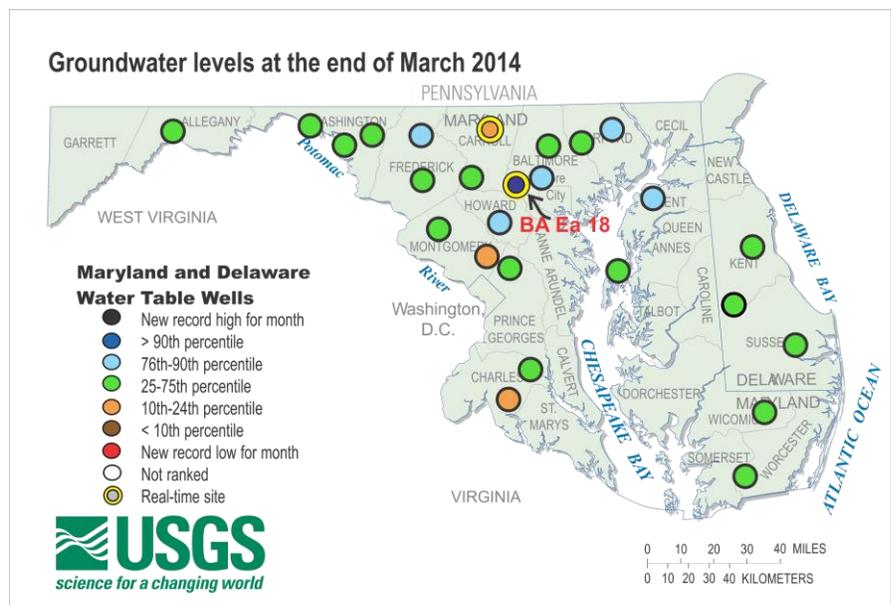
The USGS monitors groundwater levels in unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in climatic conditions. Twenty-six groundwater wells were selected based on the following criteria:

- 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.

March 2014 Groundwater Levels

Groundwater levels were normal (between the 25th and 75th percentiles) in 17 of the 26 wells used to monitor climatic conditions in Maryland and Delaware in March. Six of the remaining wells had above normal groundwater levels, with USGS observation well BA Ea 18 above the 90th percentile. There were three wells in Maryland with below normal groundwater levels.

Groundwater levels in Delaware were normal at the three observation wells in March. The well in Kent County has been at normal to above normal levels since the fall of 2012, or during the last 18 months.

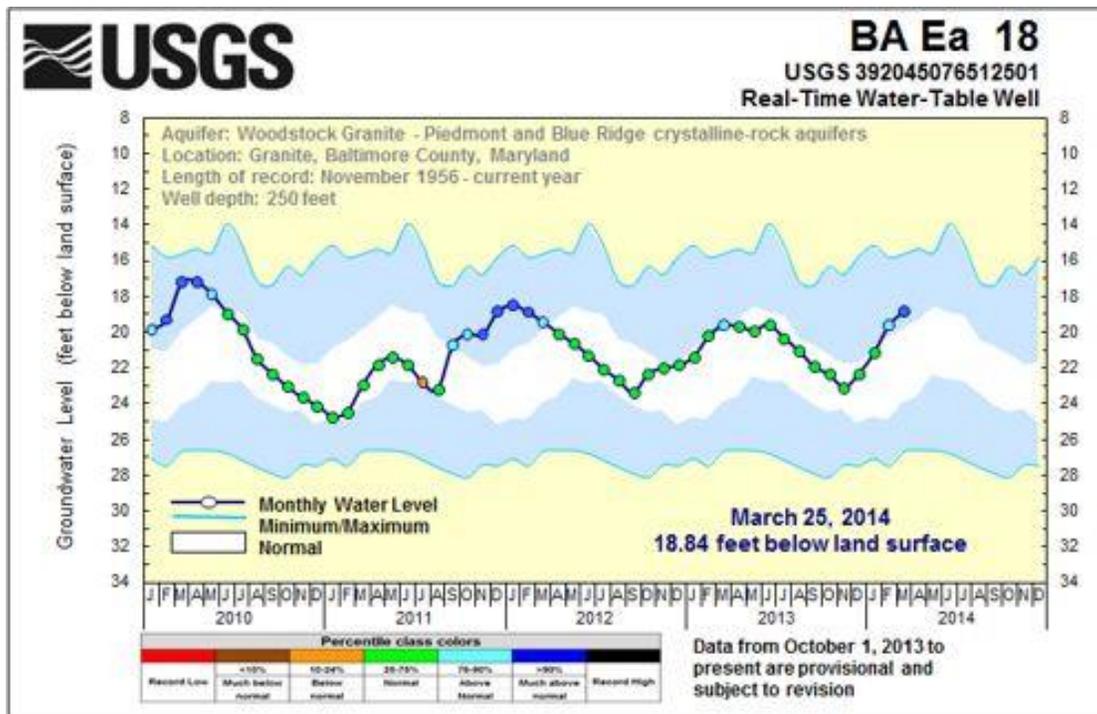


To access the clickable groundwater map, go to:

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 BA Ea 18 in Baltimore County, Maryland rose above the 90th percentile in March. The groundwater level has been following the historical trend, although it is higher than the median (middle of the white band in the hydrograph below). Groundwater levels in this well respond slowly to climatic conditions and because it is a deep well, it is used as one of the key indicators of the groundwater response to climate in the region.



Five-year groundwater hydrographs can be viewed at:
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:

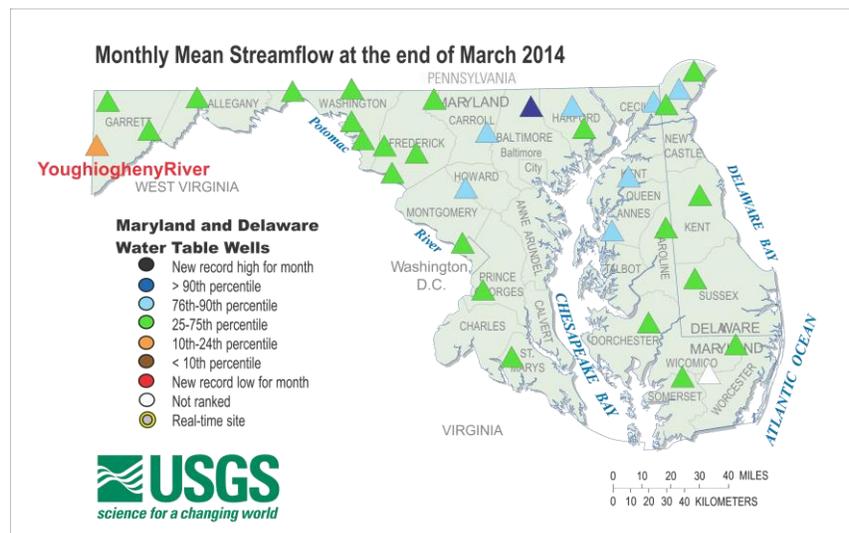
- Minimum period of record is 10 years of continuous data;
- Watershed areas greater than 5 square miles;
- Streamflow is not regulated, or has relatively natural flow;
- Streamflow data reflect climatic conditions; and
- The surrounding area and watershed are not urban.

March 2014 Streamflow

Monthly mean streamflows were normal at 23 of the 32 USGS streamgages used to monitor climatic response in Maryland, Delaware, and the District of Columbia in March. Normal is considered to be between the 25th and 75th percentiles. Streamflow was between the 76th and 90th percentiles at seven USGS streamgages and above the 90th percentile at the Little Falls streamgage in Baltimore County, Maryland.

Temperatures were unusually cold for the third consecutive month, which could have affected the accuracy of stream stage measurements, and therefore the accuracy of reported streamflow values. The formation of ice dams can back water up in a stream, resulting in streamflow

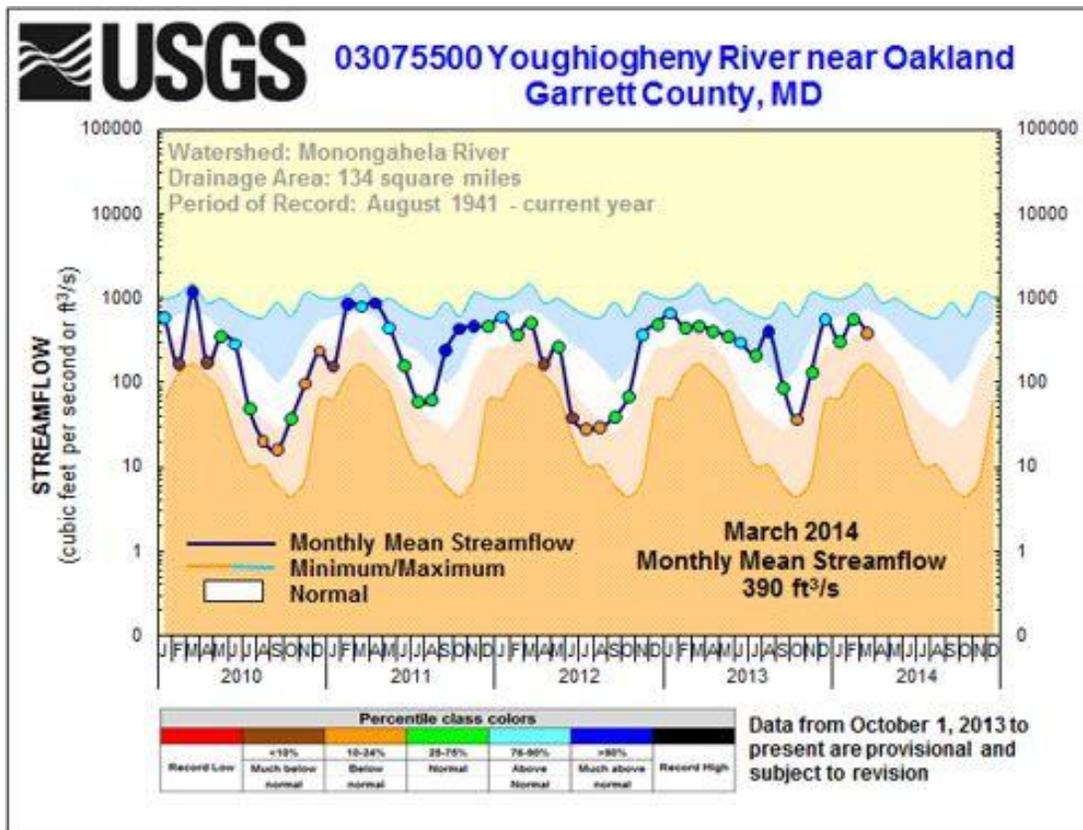
measurements that are higher than actual flows. Also, the freezing of intake pipes and orifice lines can result in flat hydrograph lines that do not change with either rising or falling flow conditions. All of the streamflow data that are presented herein are provisional, and should be considered subject to change until an analysis of ice effects can be completed.



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 Youghiogheny River in Garrett County, Maryland was 390 cubic feet per second (ft³/s), which is just below normal for March.



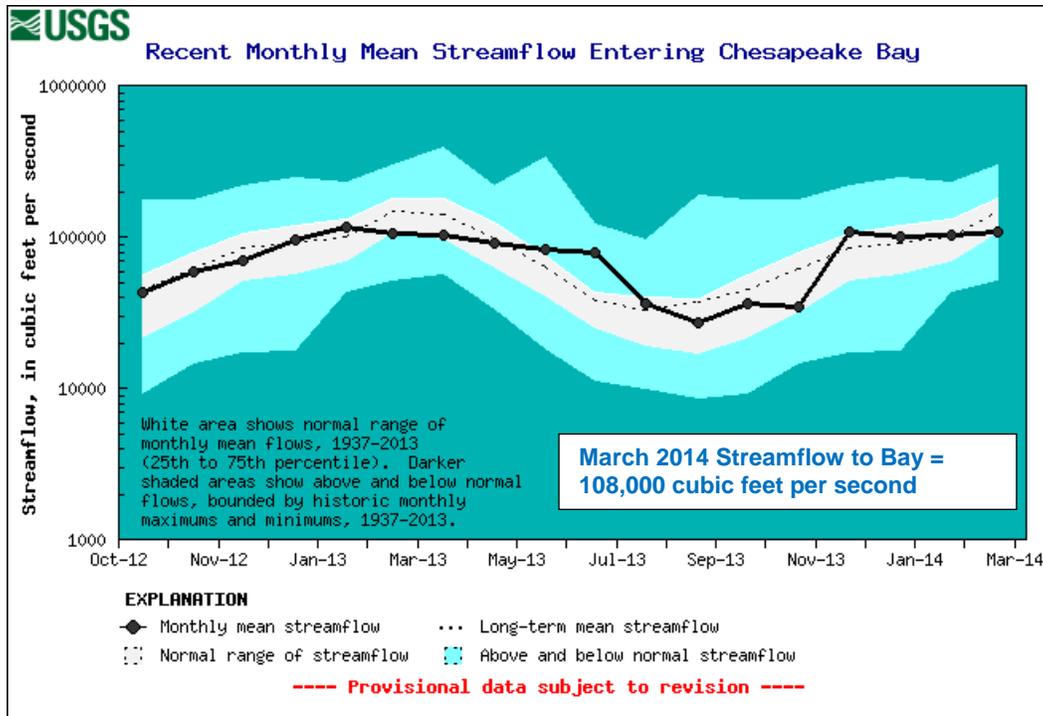
Five-year hydrographs can be viewed at:
<http://md.water.usgs.gov/surfacewater/streamflow/>

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 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.

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

Estimated Streamflow to the Chesapeake Bay

The estimated monthly mean freshwater streamflow to Chesapeake Bay was in the normal range in March 2014 at 108,000 ft³/s (provisional, and subject to revision). The average (mean) monthly streamflow for March is 148,000 ft³/s. The normal range for average (mean) monthly streamflow for March is between 105,000 ft³/s and 183,000 ft³/s, the 25th and 75th percentiles of all March 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

Available reservoir storage at the end of March 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, went from 98 percent of normal storage capacity in January to 111 percent of normal storage capacity in March, with 11.77 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.

March 2014	Percent available/ normal storage	Volume (billion gallons)	Source
Baltimore Reservoirs			Baltimore City – Environmental Services Division
Liberty	100	36.80	
Loch Raven	100	21.20	
Prettyboy	100	17.85	
Total	100	75.85	
Patuxent Reservoirs			Washington Suburban Sanitary Commission (WSSC)
Triadelphia	113	6.33	
Duckett	109	5.44	
Total	111	11.77	