

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

February 2014 – One hundred percent of groundwater and streamflow levels were in the normal to above 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.

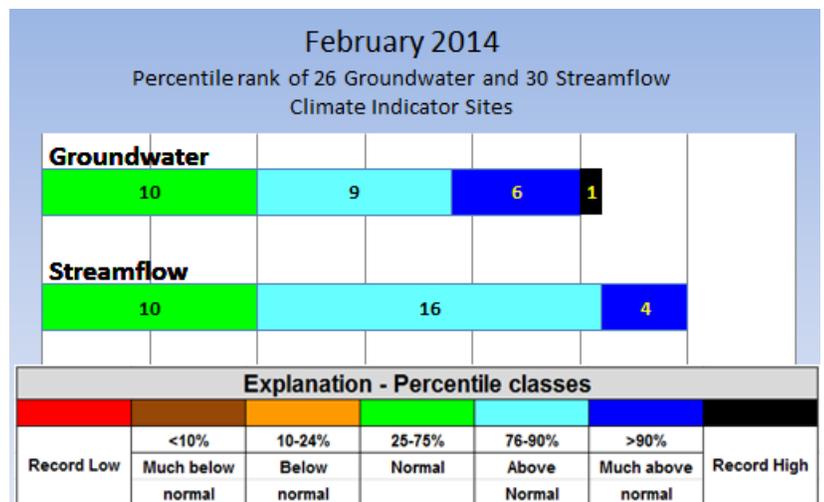
The sites used in this water summary were carefully selected to show the response of streamflow and groundwater levels to weather conditions. Ideally, these sites will show no effects from human influences. The streamflow and groundwater data are ranked in comparison to the historical record and summarized.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

USGS February 2014 Water Conditions Summary

One hundred percent of the groundwater levels and 100 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 (between the 25th and 75th percentiles) to above normal range in February.

Groundwater levels were in the normal range in 10 of the 26 USGS observation wells used to monitor climatic conditions in Maryland and Delaware. Sixteen wells had above normal groundwater levels, and one had a record February high.

Monthly mean streamflow in February was normal at 10 of the 30 streamgages used as climate indicator sites, and above normal at 20 other streamgages. February data were incomplete at three additional sites in the climate network, likely due to ice accumulation, and monthly means could not be calculated.



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.

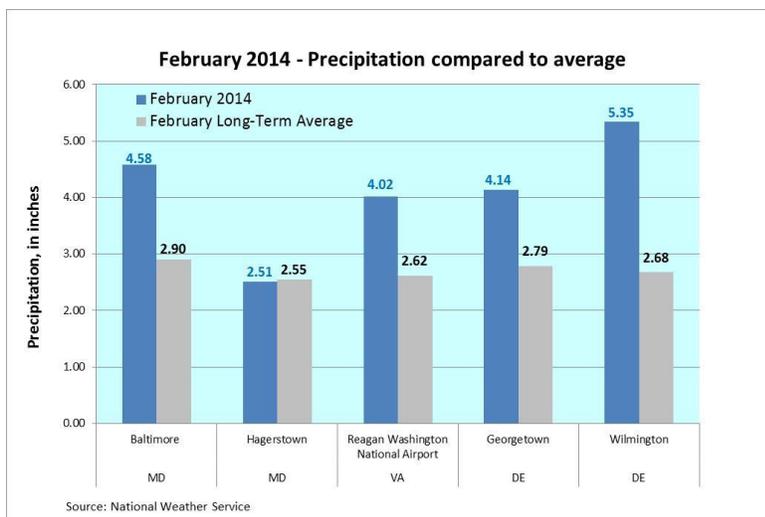
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February 2014 Precipitation and Weather

February weather was cold and snowy. Wilmington, Delaware had 19 inches of snow, which is 10.7 inches more than the February average. Snowfall in Baltimore, Maryland in February was 14.2 inches, with 9.6 inches falling on February 13. The bar graph below shows the water equivalent of snow for comparison, although relatively little rain fell in February.

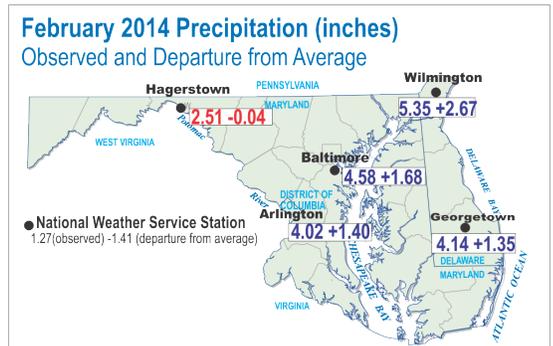
Of the five National Weather Service (NWS) stations in Maryland, Delaware, and Arlington, Virginia (adjacent to the District of Columbia), the weather station in Hagerstown, Maryland, was the only site with below normal precipitation. Of the five weather stations, Wilmington, Delaware had the greatest amount of precipitation/water equivalent with 5.35 inches. The lowest amount of precipitation in February was in Hagerstown, Maryland, with 2.51 inches, which is 0.04 inches below the long-term average.

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 February.



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



February temperatures were 1-3 degrees Fahrenheit below the long-term average at the five NWS stations in the Mid-Atlantic region. Temperatures in Hagerstown, Maryland and Wilmington, Delaware were more than 3 degrees Fahrenheit below the long-term average for the second consecutive month.

*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>

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Groundwater

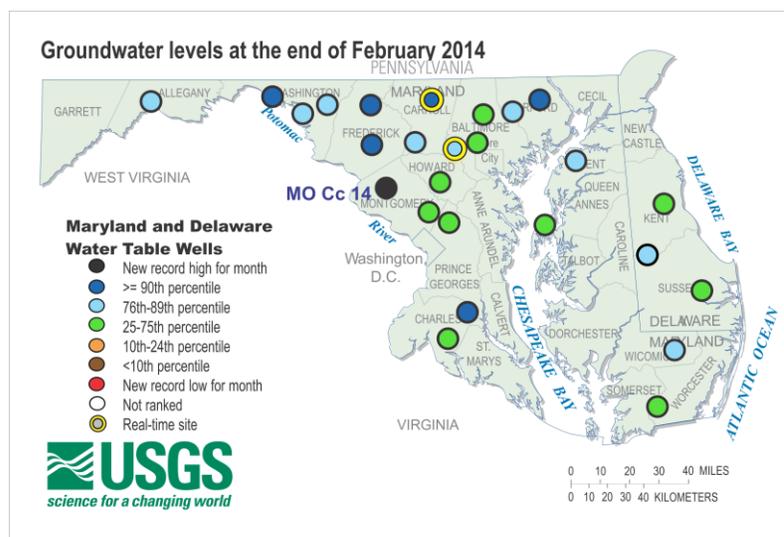
The USGS monitors groundwater levels in unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in climatic conditions. Twenty-six groundwater wells were selected based on the following criteria:

- 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.

February 2014 Groundwater Levels

February groundwater levels were normal (between the 25th and 75th percentiles) in 10 of the 26 wells used to monitor climatic conditions in Maryland and Delaware. The remaining 16 wells had above normal groundwater levels in February. There were six wells in Maryland with groundwater levels above the 90th percentile. The groundwater level in a monitoring well in Montgomery County, Maryland set a February record high.

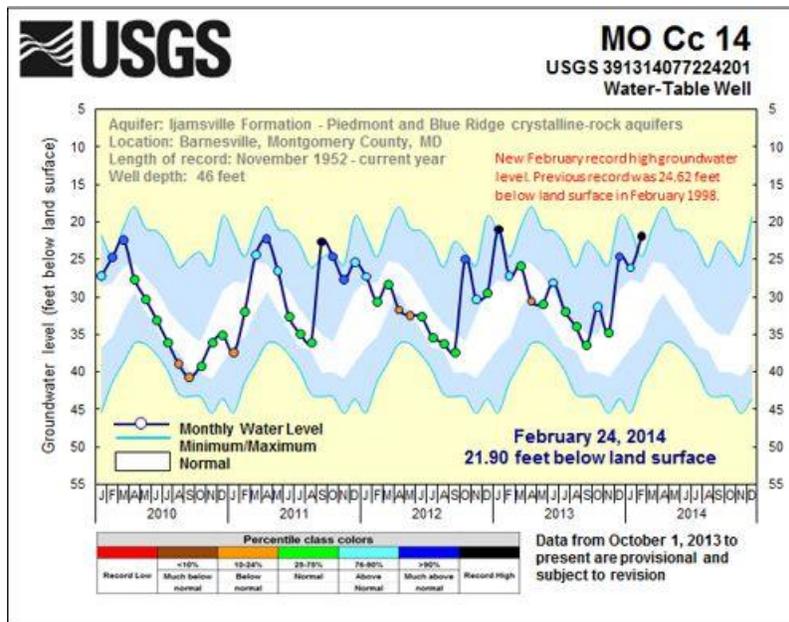
Groundwater levels in Delaware were normal in two wells and above normal in one well in Kent County in February. The well in Kent County has been at normal to above normal levels since the fall of 2012, or during the last 18 months.



To access the clickable groundwater map, go to:
http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties/

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The groundwater level in observation well MO Cc 14 in Montgomery County, Maryland reached a record February high. The groundwater level was 2.72 feet higher than the previous record of 24.62 feet below land surface, set in February 1998.



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.

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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.

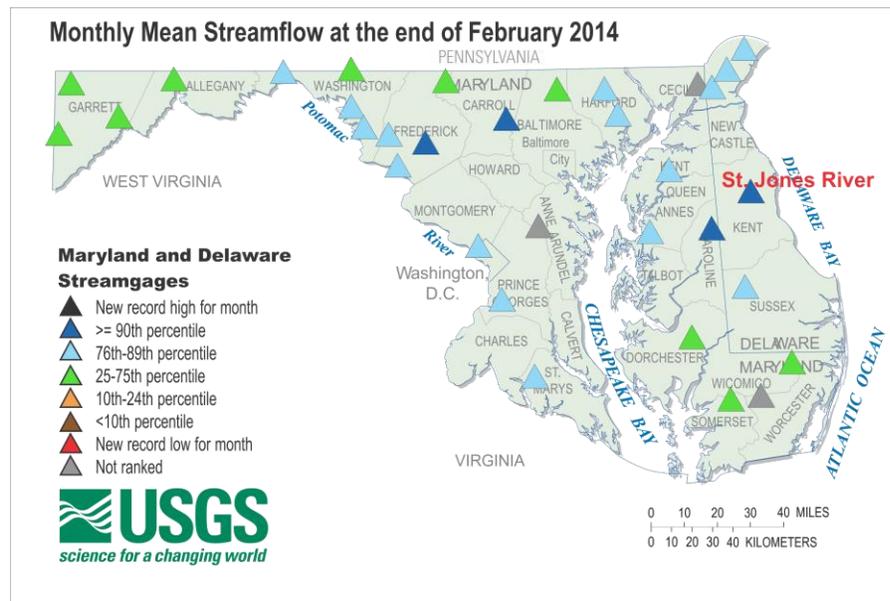
The streamflow locations chosen for the monthly water summary were selected based on the following criteria:

- 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.

February 2014 Streamflow

Temperatures were extremely cold for the second 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 is presented herein is provisional, and should be considered subject to change until an analysis of ice effects can be completed.

Monthly mean streamflows were normal at 10 of the 30 USGS streamgages used to monitor climatic response in Maryland, Delaware, and the District of Columbia in February. Normal is

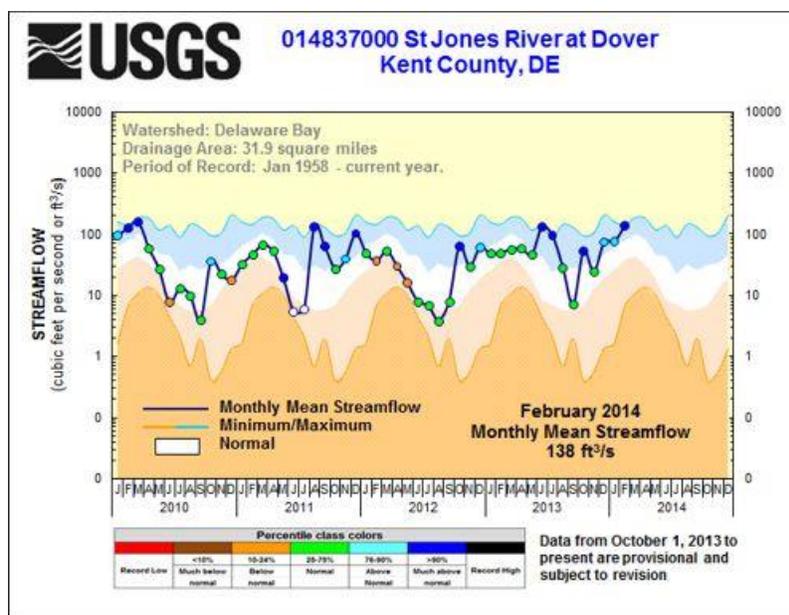


considered to be between the 25th and 75th percentiles. Streamflow was between the 76th and 89th percentiles at the remaining 16 USGS streamgages and above the 90th percentile at 4 streamgages in Delaware and Maryland. February monthly mean streamflow could not be calculated at three streamgages because of incomplete data due to equipment problems or icing conditions.

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

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The monthly mean streamflow on the St. Jones River at Dover, Delaware was 5 cubic feet per second (ft³/s) less than the February record high of 143 ft³/s, set in 1998. The historical monthly values for this site rarely exceed about 110 ft³/s, which suggests that ice effects may have artificially raised the reported streamflow values. An analysis of ice effects for the station will determine whether the provisional data can be approved for February, or whether estimates of daily mean discharge need to be applied to the record to better reflect the actual hydrologic conditions.



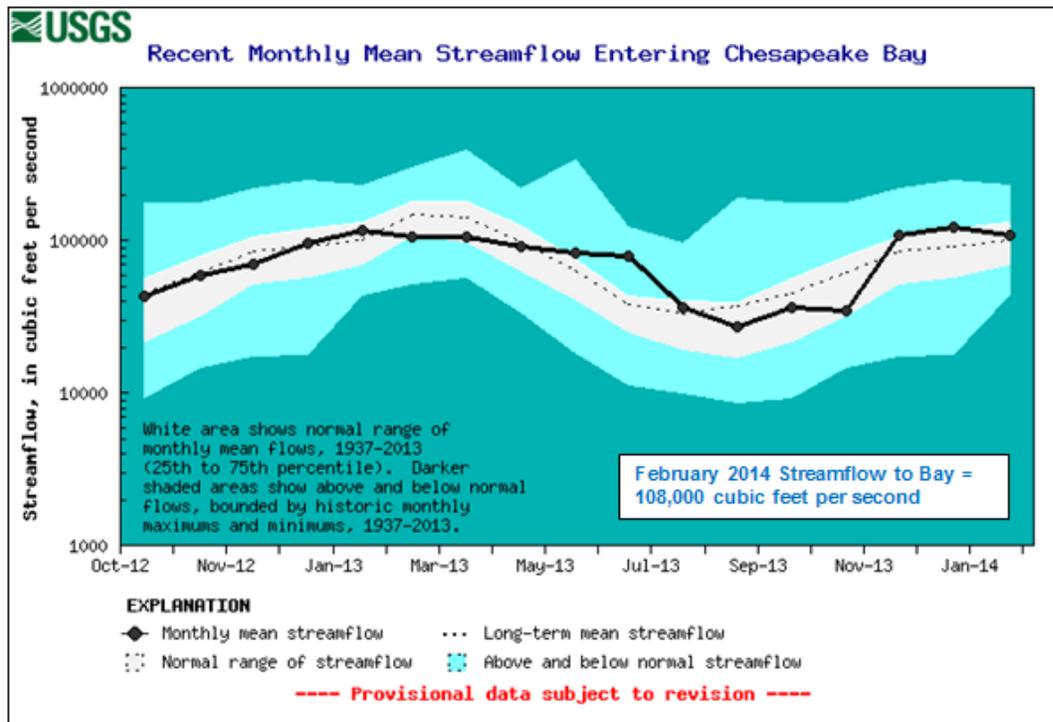
Five-year hydrographs can be viewed at:
<http://md.water.usgs.gov/surfacewater/streamflow/>

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.

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Estimated Streamflow to the Chesapeake Bay

The estimated monthly mean freshwater streamflow to Chesapeake Bay was in the above normal range in February 2014 at 108,000 ft³/s (provisional, and subject to revision). The average (mean) monthly streamflow for February is 102,000 ft³/s. The normal range for average (mean) monthly streamflow for February is between 69,400 ft³/s and 132,000 ft³/s, the 25th and 75th percentiles of all February 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 February in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) remained the same as December and January values with 100 percent of available storage capacity, or a total of 75.85 billion gallons of water.

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 106 percent of normal storage capacity in February, with 11.29 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.

February 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	110	6.16	
Duckett	102	5.13	
Total	106	11.29	