

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

December 2013 – Ninety-six percent of groundwater levels and 100 percent of 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.

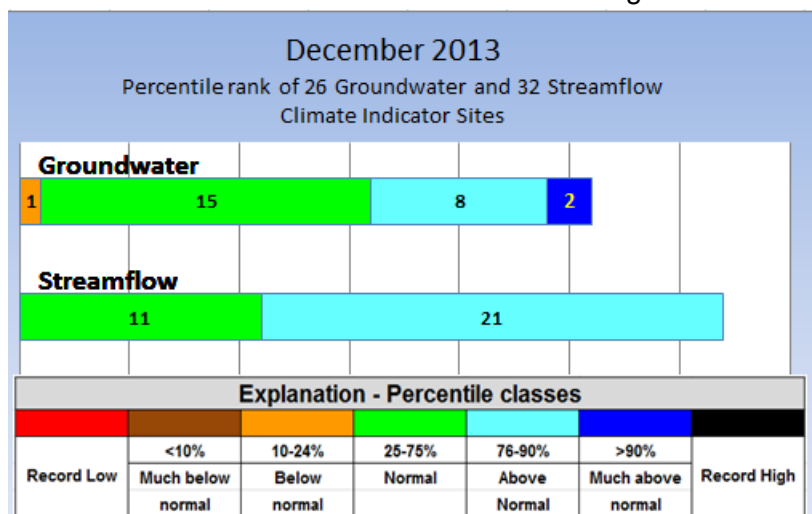
The sites used in this water summary were carefully selected to show the response of streamflow and groundwater levels to weather conditions. Ideally, these sites will show no effects from human influences. The streamflow and groundwater data are ranked in comparison to the historical record and summarized.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

USGS December 2013 Water Conditions Summary

Fifty-eight percent of the December groundwater levels and 34 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 75th percentiles).

Groundwater levels were in the normal range in 15 of the 26 USGS observation wells used to monitor climatic conditions in Maryland and Delaware. Ten wells had above normal groundwater levels, two of which were above the 90th percentile, and the groundwater level in one well was below normal.

Monthly mean streamflow in December was normal at 11 of the 32 streamgages used as climate indicator sites, and above normal at the remaining 21 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.

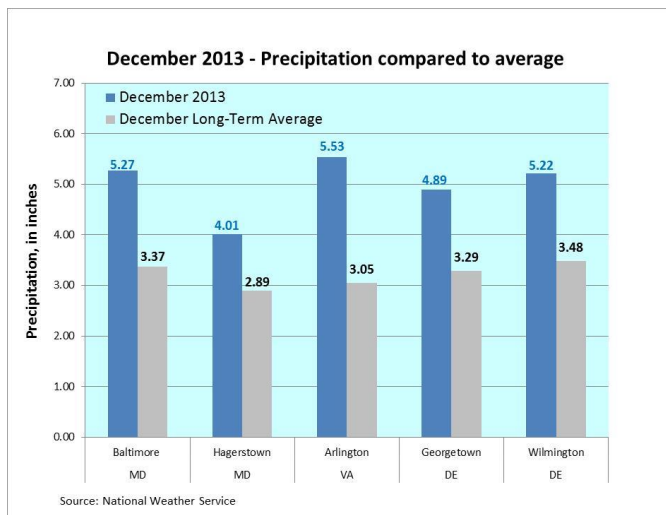
For example, a groundwater level in the 90th percentile is equal to or greater than 90 percent of the values recorded for that month.

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December 2013 Precipitation and Weather

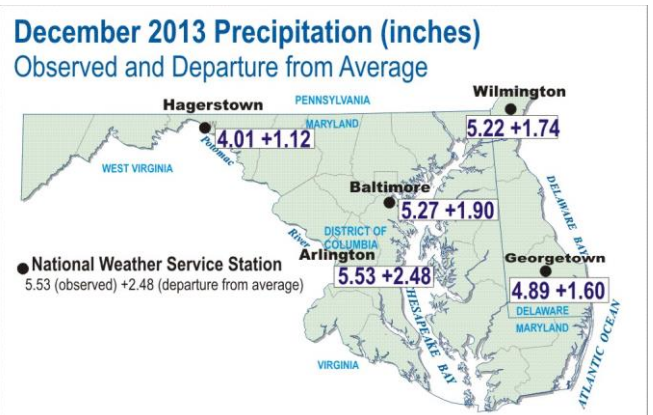
December precipitation at the five National Weather Service (NWS) stations in Maryland, Delaware, and Arlington, Virginia (adjacent to the District of Columbia) was above the long-term average. Of the five weather stations, the greatest amount of precipitation was in Arlington, Virginia, at Ronald Reagan Washington National Airport with 5.53 inches of rain, which is 2.48 inches above the long-term average. The least amount of precipitation in December was 4.01 inches in Hagerstown, Maryland.

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 in December.



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 highest and lowest December temperature data of the five weather stations was in Delaware, where it ranged from 0.9 degrees Fahrenheit above the long-term average in Wilmington to 3.3 degrees Fahrenheit above the long-term average in Georgetown. Temperatures at the remaining weather stations were greater than 2 degrees Fahrenheit above the long-term 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=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

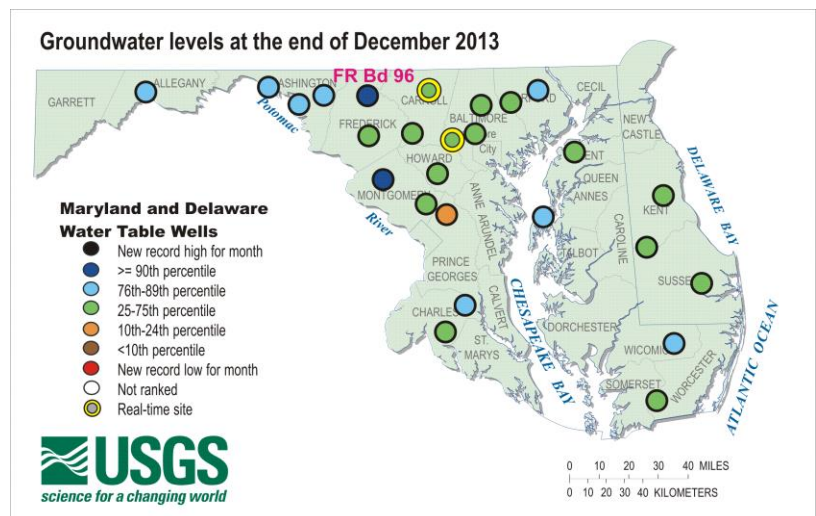
The USGS monitors groundwater levels in unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in climatic conditions. Twenty-six groundwater wells were selected based on the following criteria:

- 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.

December 2013 Groundwater Levels

Groundwater levels in December ranged from below normal in Prince George's County to above the 90th percentile in Frederick and Montgomery Counties in Maryland. Groundwater levels were normal (between the 25th and 75th percentiles) in 15 of the 26 wells used to monitor climatic conditions in Maryland and Delaware.

Groundwater levels in all three wells in Delaware were in the normal range for the second consecutive month.

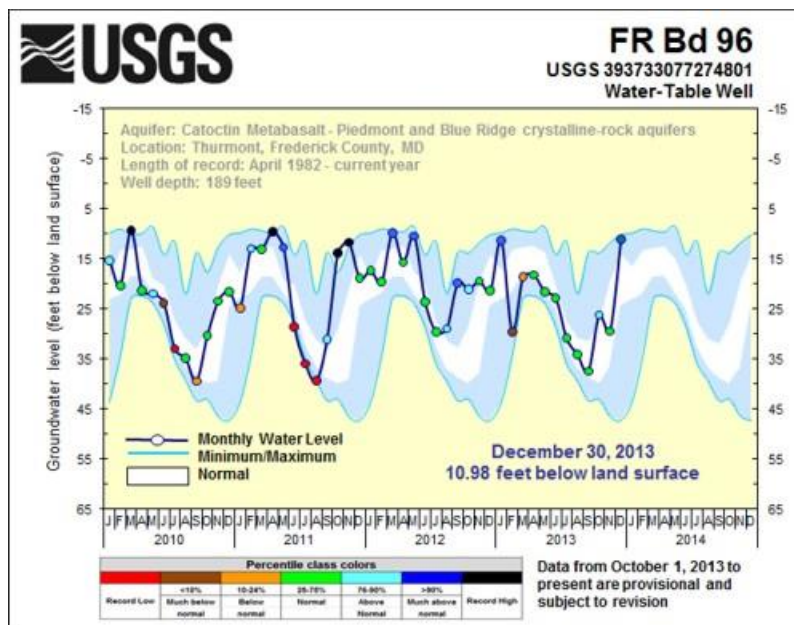


To access the clickable groundwater map, go to:

http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties/

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The groundwater level in observation well FR Bd 96 in Frederick County, Maryland went from normal in November to a near record monthly high in December. The groundwater level in an observation well in adjacent Montgomery County also rose abruptly in December.



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

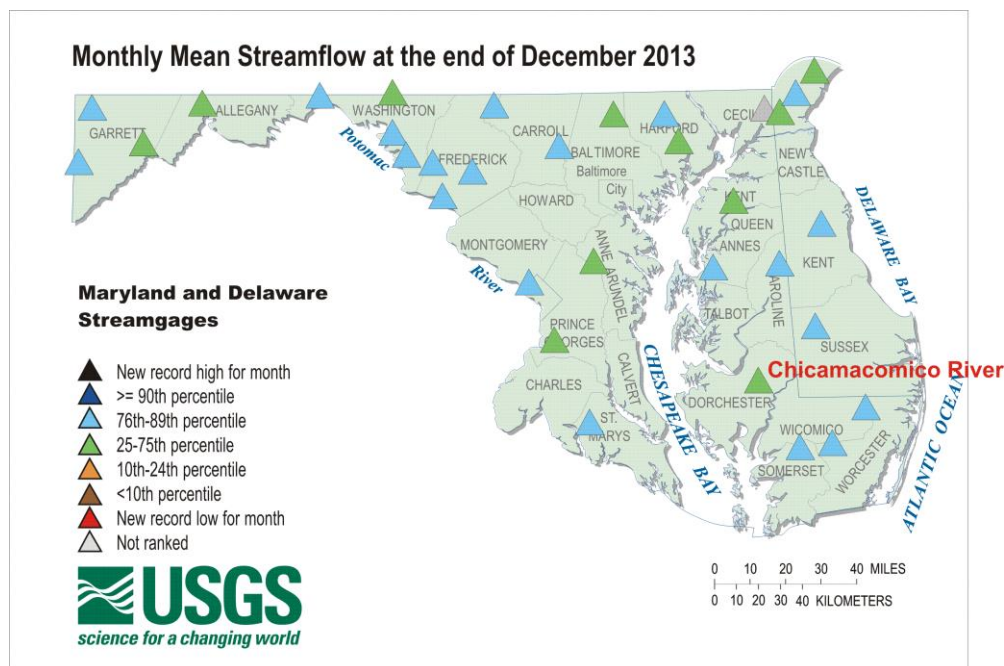
Streamflow data are used for many purposes. A few of the most obvious uses are to assess water supply and the risk of droughts and floods. Streamflow data are also used to calculate loads of chemical constituents and assess how biological communities are affected by hydrologic conditions. The USGS operates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

December 2013 Streamflow

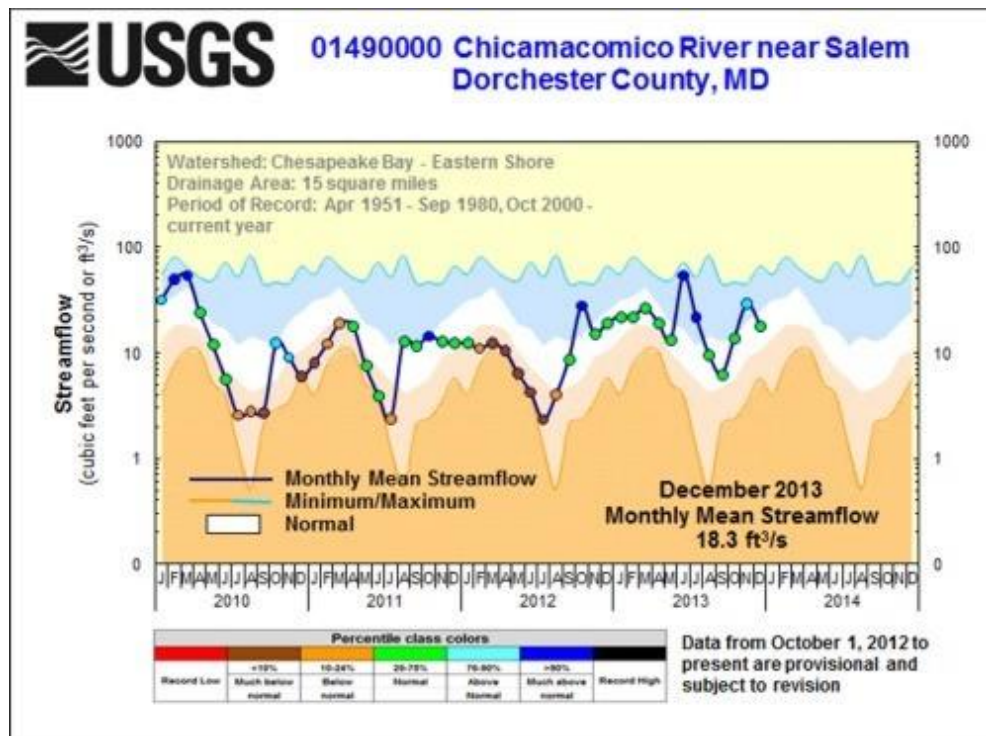
Monthly mean streamflows were normal at 11 of the 32 USGS streamgages used to monitor climatic response in Maryland, Delaware, and the District of Columbia. Normal is considered to be between the 25th and 75th percentiles. Streamflow was between the 76th and 89th percentiles at the remaining 21 USGS streamgages. The last time the distribution of percentiles for all 32 streamgages was between the 25th and 89th was in December 2012.



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

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The streamflow-gaging station on the Chicamacomico River in Dorchester County, Maryland was one of two stations out of the 32 streamflow-gaging stations where the monthly mean streamflow dropped in December. Streamflow rose at the other 30 streamflow gaging stations. The other site with a drop in streamflow was the Christina River in Delaware, but since the November level had been very high, a drop in monthly mean streamflow was expected.



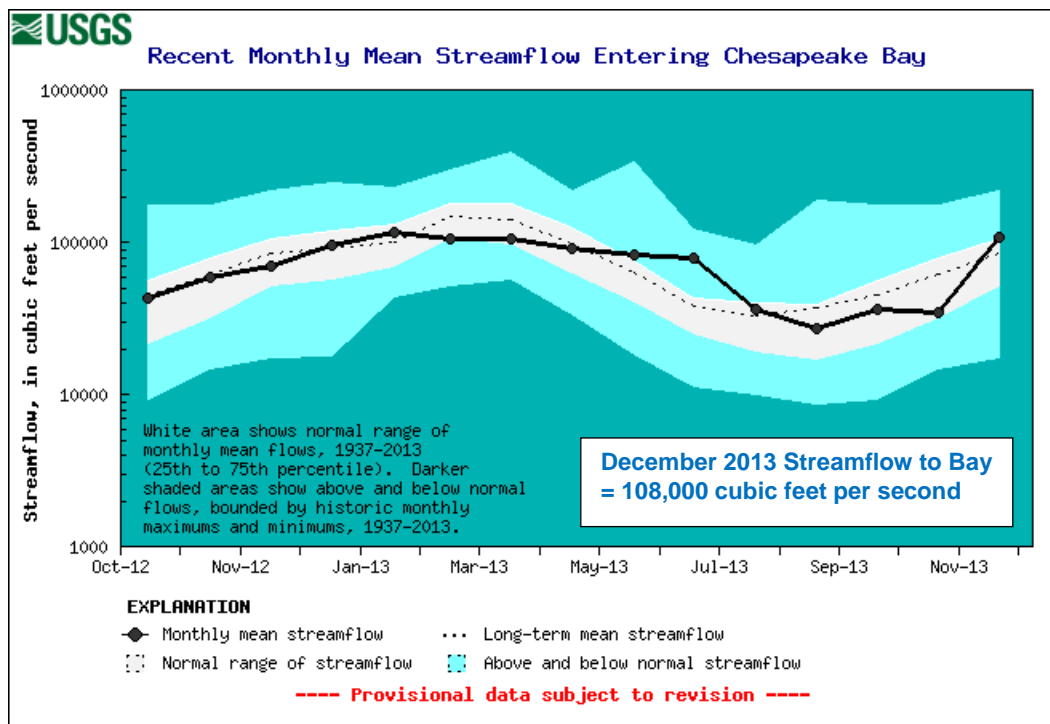
Five-year hydrographs can be viewed at:
<http://md.water.usgs.gov/surfacewater/streamflow/>

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 December 2013, at 108,000 cubic feet per second (ft³/s; provisional, and subject to revision). The average (mean) monthly streamflow for December is 85,100 ft³/s. The normal range for average (mean) monthly streamflow for December is between 50,800 ft³/s and 107,000 ft³/s, the 25th and 75th percentiles of all December 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 December in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) increased 2 percent to 100 percent of available storage capacity, with 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, was at 95 percent of normal storage capacity in December, with 10.13 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.

December 2013	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	104	5.80	
Duckett	86	4.33	
Total	95	10.13	