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

October 2013 – Over 90 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?

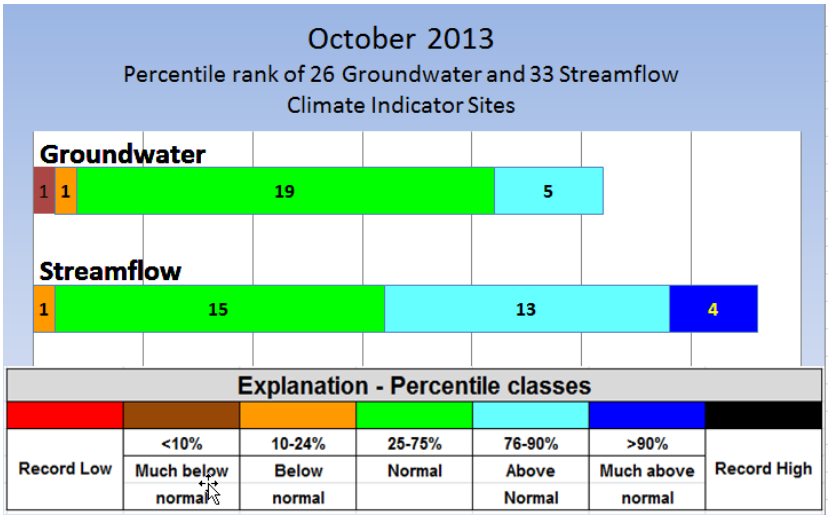
USGS water data are valuable to the public, researchers, water managers, planners, and agricultural users, especially during floods and droughts. These data can be used to assess how water resources respond to changes in climate. Scientists at the USGS have measured streamflow and groundwater levels 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 October 2013 Water Conditions Summary

Ninety-two percent of the October monthly groundwater levels and 97 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 to above normal range (above the 25th 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 90th percentile is equal to or greater than 90 percent of the values recorded for that month.

Groundwater levels were in the normal range in 19 of the 26 USGS observation wells used to monitor climatic conditions in Maryland and Delaware. Five wells had above normal groundwater levels, and two wells had below normal groundwater levels.

Monthly mean streamflow in October was normal at 15 streamgages used as climate indicator sites, above normal at 17 streamgages, and below normal at the streamgage in Garrett County, Maryland.

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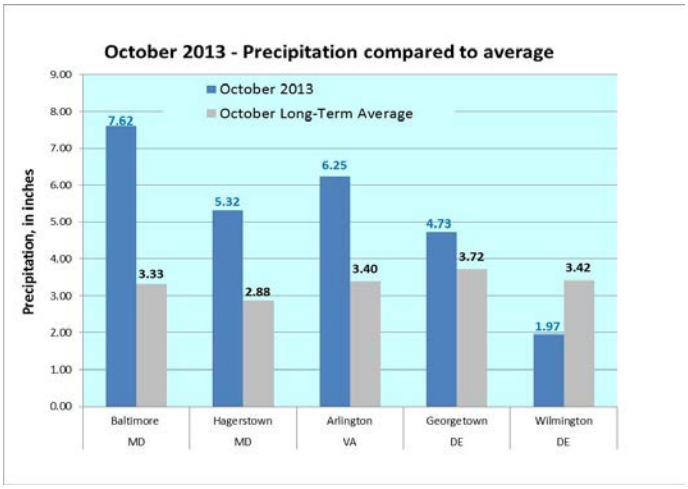
October 2013 Precipitation and Weather

Precipitation at the National Weather Service (NWS) station in Baltimore, Maryland in October was 7.62 inches, which is more than double the October long-term average (3.33 inches). October precipitation was also above average at NWS stations in Arlington, Virginia, Hagerstown, Maryland, and Georgetown, Delaware.

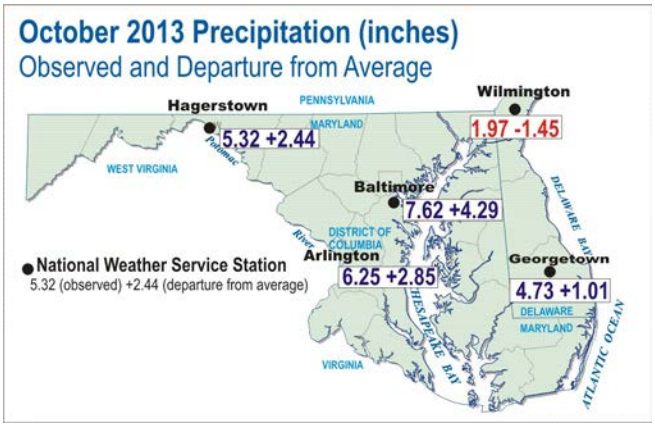
Precipitation was below normal in Wilmington, Delaware for the second consecutive month. October precipitation was 1.97 inches, or 1.45 inches below the long-term average.

The Middle Atlantic River Forecast Center's 365-day precipitation data show that all counties in the Maryland and Delaware region were in the average range.



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



October mean (or average) temperatures ranged from 57.1 degrees Fahrenheit in Hagerstown, Maryland to 62.4 degrees Fahrenheit in Arlington,Virginia. Temperatures at all five weather stations were more than 2 degrees above the long-term average for October. At Georgetown, Delaware, the October average temperature was 3 degrees Fahrenheit above 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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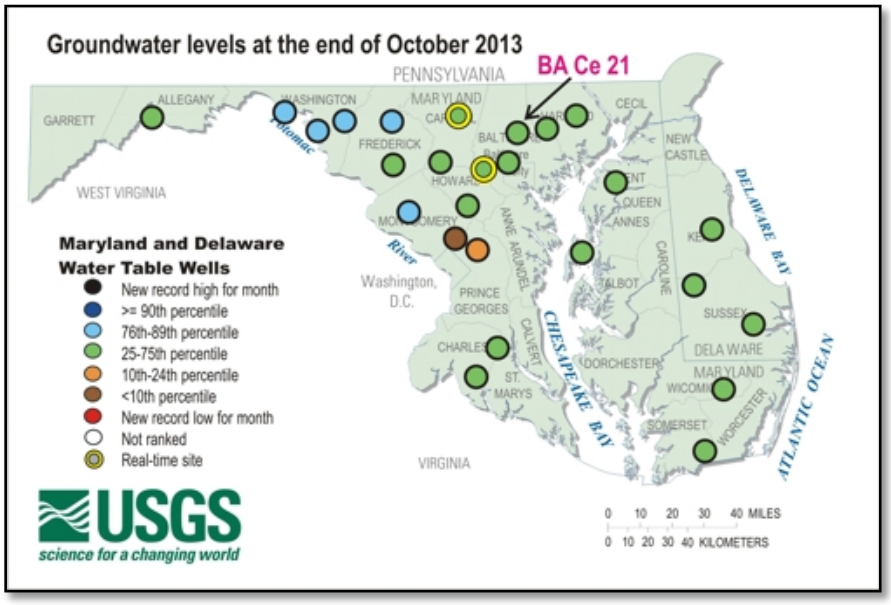
Groundwater

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.

October 2013 Groundwater Levels

Groundwater levels used to monitor climatic conditions in Maryland and Delaware ranged from below normal to above normal across Maryland, Delaware, and the District of Columbia, but 73 percent (or groundwater levels in 19 of 26 wells) were in the normal range (between the 25th and 75th percentiles) in October.



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

In Montgomery County, Maryland the groundwater level in one well was below the 10th percentile and the other climate monitoring well had a groundwater level above the 76th percentile. The well with the groundwater level below the 10th percentile has been below normal for all but 2 months over the last 21 months. At this time, it is not known why the groundwater level in this particular well is lower than normal.

October groundwater levels were normal to above normal in Frederick, Montgomery, and Washington Counties in Maryland. The two wells in Maryland with below normal groundwater levels in October were in the adjacent counties, Montgomery County and Prince George's County.

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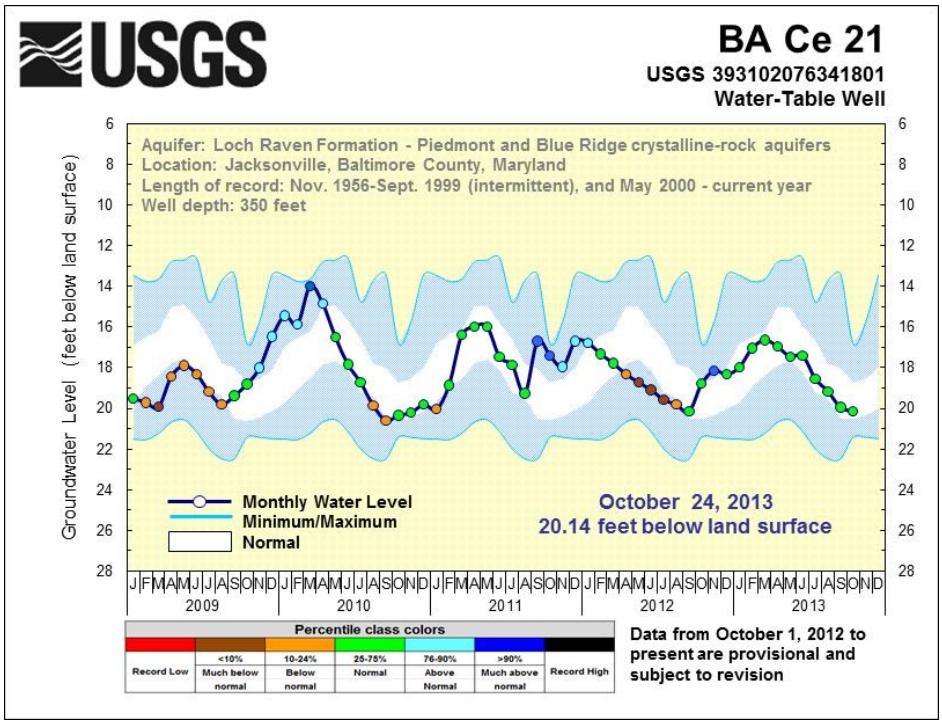
Although rainfall at the NWS station closest to observation well BA Ce 21 in Baltimore County, Maryland (Baltimore/Washington International Thurgood Marshall Airport, or BWI) was 4.29 inches above normal, the groundwater level showed very little response or rise and remained in the normal range. Groundwater levels have been normal at this well for the last 11 consecutive months.



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.

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Streamflow

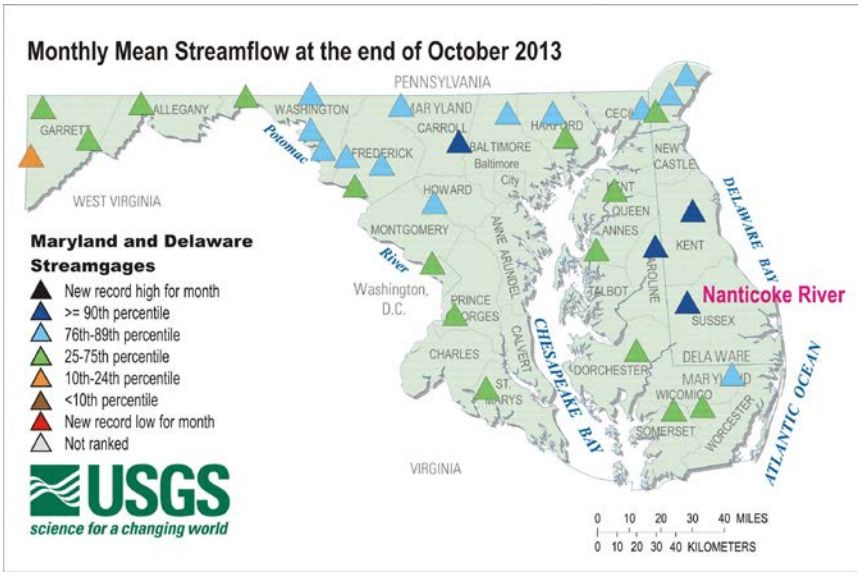
Streamflow data are used for many purposes. A few of the most obvious uses are to assess water supply and the risk of droughts and floods. Streamflow data are also used to calculate loads of chemical constituents and assess how biological communities are affected by hydrologic conditions. The USGS operates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

October 2013 Streamflow

Above normal rainfall through most of Maryland, Delaware, and the District of Columbia kept monthly mean streamflows at normal to above normal levels, except for Garrett County, Maryland, where streamflow on the Youghiogheny River was below normal.



Monthly mean streamflow was normal at 15 of the 33 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 at 13 streamgaging stations was above normal, with 4 of the sites in the 90th percentile.

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

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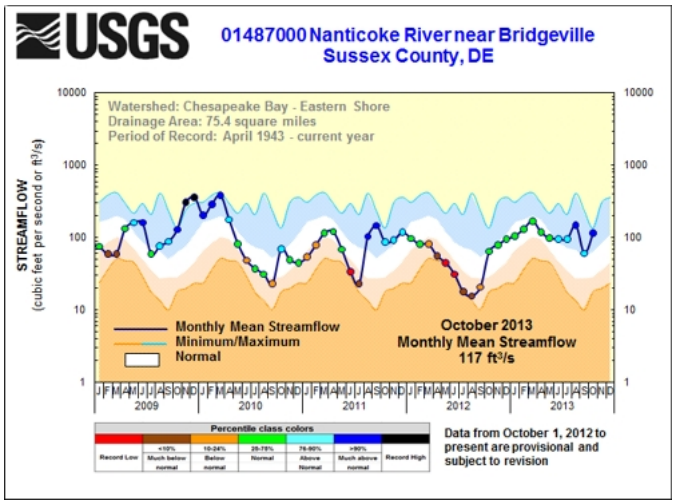
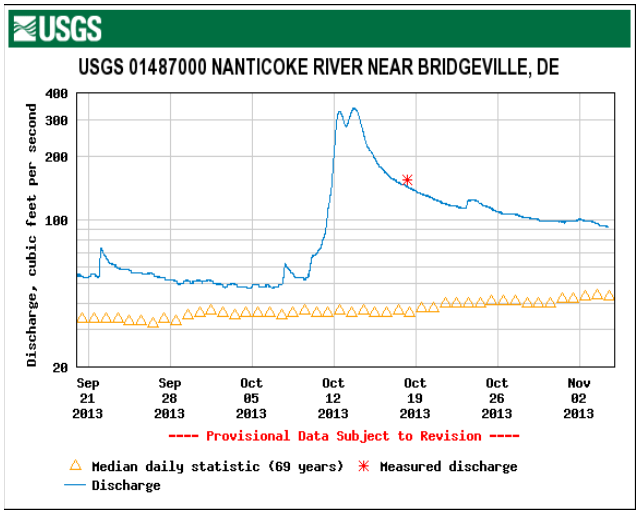
Monthly mean streamflow at the Nanticoke River in Sussex County, Delaware was in the 90th percentile in October. Streamflow has been normal to above normal since September 2012. Streamflow rose in response to the rainfall in mid-October and remained above normal into early November.



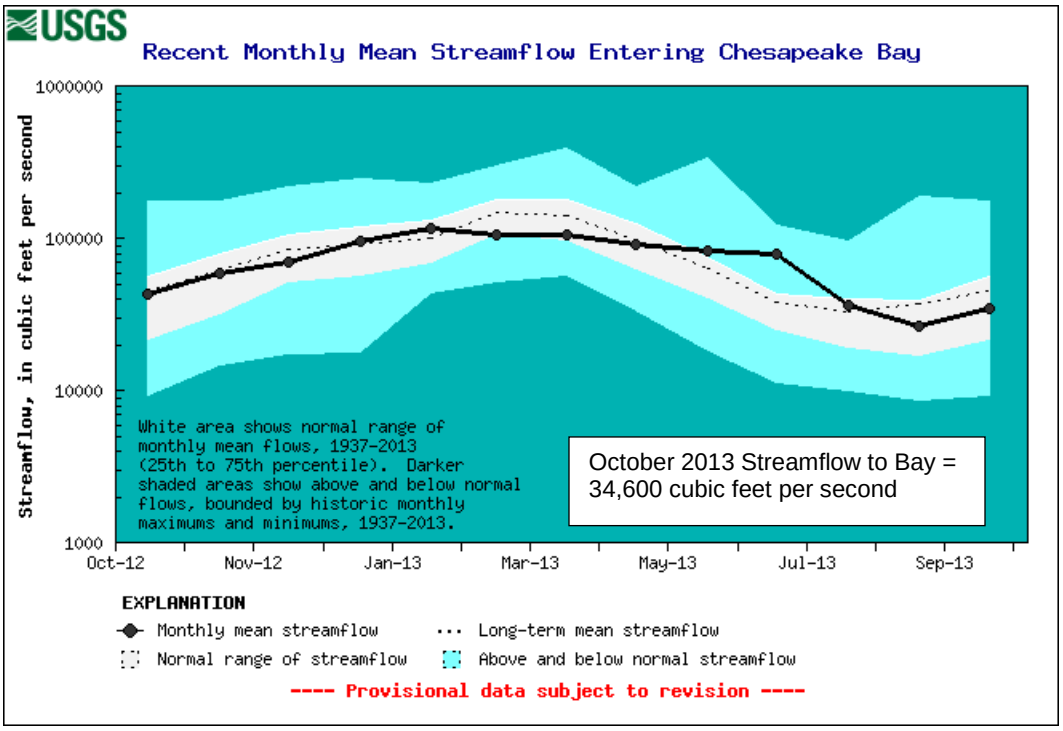


Five-year hydrographs can be viewed at:
http://md.water.usgs.gov/surfacewater/streamflow/

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.

Estimated Streamflow to the Chesapeake Bay

The estimated monthly mean freshwater streamflow to Chesapeake Bay was in the normal range in October 2013, at 34,600 cubic feet per second (ft^3/s; provisional, and subject to revision). The average (mean) monthly streamflow for October is 45,000 ft^3/s. The normal range for average (mean) monthly streamflow for October is between 21,600 ft^3/s and 55,600 ft^3/s, the 25th and 75th percentiles of all September 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

Reservoir storage at the end of October in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) was at 98 percent of available storage capacity, with a total of 74.35 billion gallons of water.

Total 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, dropped from 92 percent of normal storage capacity in August to 70 percent in October, with 8.06 billion gallons of water.

October 2013	Percent available/ normal storage	Volume (billion gallons)	Source
Baltimore Reservoirs			**Baltimore City – Environmental Services Division**
Liberty	96	35.40	
Loch Raven	100	21.20	
Prettyboy	99	17.75	
Total	98	74.35	

Patuxent Reservoirs			**Washington Suburban Sanitary Commission (WSSC)**
Triadelphia	74	4.73	
Duckett	66	3.33	
Total	70	8.06	