

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

June 2013 – Three record high monthly mean streamflows and one record high groundwater level 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 resource conditions they might encounter in the future.

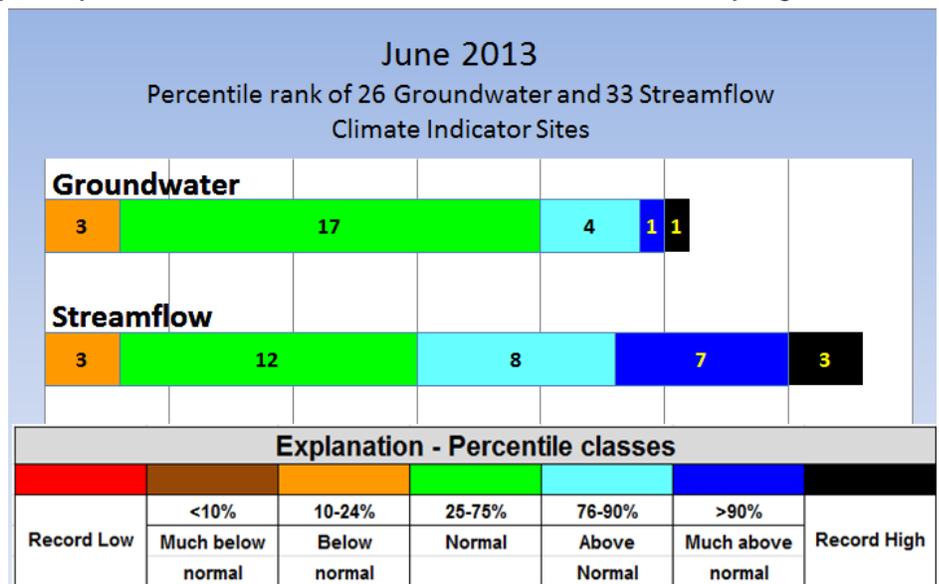
The sites used in this water summary were carefully selected to show the response of streamflow and groundwater levels to weather conditions. Ideally, these sites will show no effects from human influences. The streamflow and groundwater data are ranked in comparison to the historical record and summarized.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

USGS June 2013 Water Conditions Summary

Excessive rainfall on the Delmarva Peninsula in June caused monthly mean streamflow to be at the highest June level since record-keeping began at three streams, and the groundwater level in the USGS Wicomico County, Maryland observation well also was at a record monthly high.

About 90 percent of the monthly groundwater levels and monthly mean streamflows 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).

More than 50 percent of the groundwater levels have been normal to above normal since September 2012. Streamflow levels have been normal to above normal since May 2012.



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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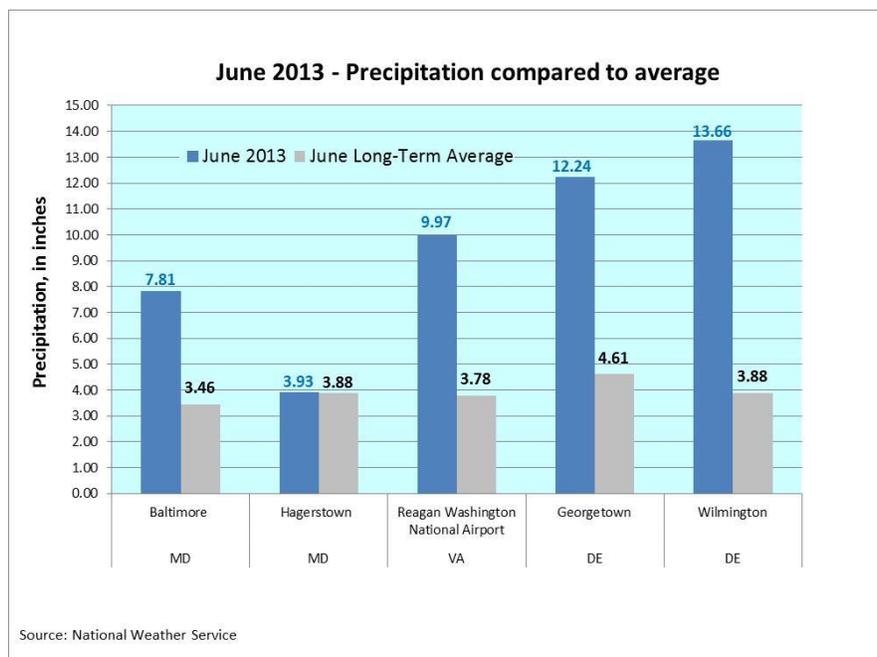
June 2013 Precipitation and Weather

June rainfall was above the long-term average at all five of the National Weather Service (NWS) stations in Maryland, Delaware, and the District of Columbia and several record highs were set. In Wilmington, Delaware, June rainfall was 13.66 inches, which is a record high June (monthly) rainfall, breaking the record of 9.90 inches in 2003 and among the top 5 highest of any month of the year. Average June rainfall in Wilmington is 3.88 inches. Several daily record highs were set at the Wilmington weather station, such as rainfall associated with Tropical Storm Andrea on June 8 was 3.36 inches which surpassed the June 8th record of 1.78 inches in 1916. There were four additional days with more than an inch of rain on a single day.

At Georgetown, Delaware, there were five days with more than 2 inches of rain that set new daily high rainfall record each day, including 2.18 inches of rainfall from Tropical Storm Andrea. June rainfall in Georgetown, Delaware was 12.24 inches, which is likely a record June high, but the National Weather Service does not provide this analysis for this weather station.

June rainfall makes up for the 2013 deficit at the five weather stations caused by below average rainfall from February through May. Rainfall was more than double the June long-term average at Ronald Reagan Washington National Airport (9.97 inches) and Baltimore-Washington International Thurgood Marshall Airport (7.81 inches). For the second consecutive month, rainfall at the weather station in Hagerstown, Maryland was the lowest of the five NWS weather stations in the region with 3.93 inches.

June temperatures were more than 1 degree Fahrenheit above the long-term average at all five weather stations, according to the NWS. 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=lxw>
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

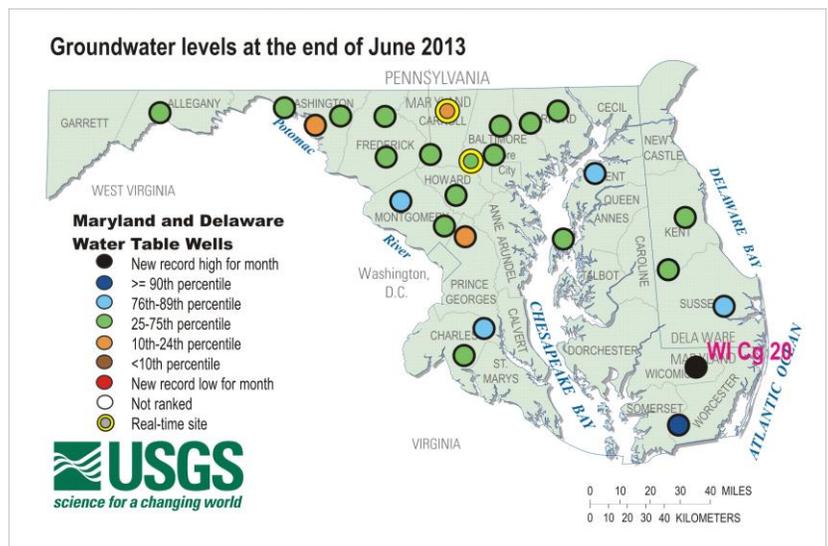
The USGS monitors groundwater levels in unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in climatic conditions. Twenty-six groundwater wells were selected based on the following criteria:

- 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 not used;
- Water levels show no apparent hydrologic connection to nearby streams;
- Well has never gone dry; and
- Long-term accessibility likely.

June 2013 Groundwater Levels

Observation well (WI Cg 20) in Wicomico County, Maryland set a new record high for June and the observation well in nearby Somerset County was in the 90th percentile. Rainfall at the closest NWS weather station in Georgetown, Delaware was 12.24 inches in June, which caused groundwater levels to rise. Groundwater levels were below normal in certain wells in Carroll, Prince George's, and Washington Counties in Maryland. Seventeen of the 26 remaining wells had groundwater levels in the normal range.

Since September 2012, more than 50 percent of the groundwater levels used to monitor climatic conditions in Maryland and Delaware have been in the normal range. Normal is considered to be between the 25th and 75th percentiles.

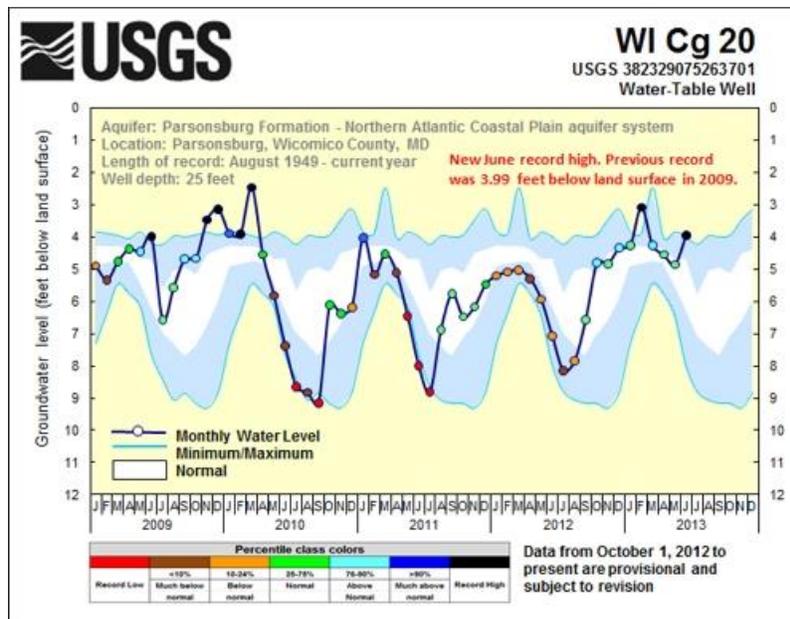


To access the clickable groundwater map, go to:

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

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USGS observation well WI Cg 20, in Wicomico County, Maryland was at a record June high, exceeding the previous record set in 2009. The record before that was 4.02 feet below land surface in 1979. Since January 2009, there have been seven monthly record high groundwater levels (see black dots on graph below) set at this well and five monthly record lows (red dots on graph below). Record-keeping began in 1949, but many of the record highs and lows have been set during the last 15 years. Last year, the groundwater level was below normal for eight consecutive months starting in January, but it has been normal to above normal since September 2012.



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 blue section and the minimum water level is at the bottom of the 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.

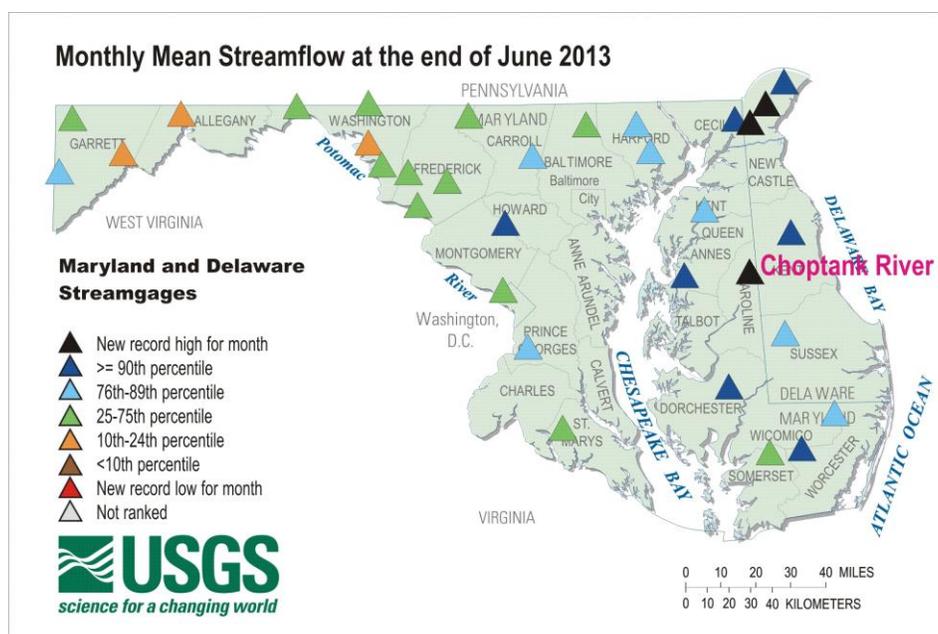
The streamflow locations chosen for the monthly water summary were selected based on the following criteria:

- 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.

June 2013 Streamflow

Monthly mean streamflow was at record high June levels at 3 of the 33 USGS streamgages used to monitor climatic response in Maryland, Delaware, and the District of Columbia. The June record highs monthly mean streamflows were set at Choptank River in Caroline County, Maryland, and Christina River and White Clay Creek in New Castle County, Delaware. All three sites are on the Delmarva Peninsula. Six other sites on the Delmarva Peninsula were in the 90th percentile range in June. The high streamflow levels are a result of more than 12 inches of rain that the region received. Normal June rainfall is 3-4 inches.

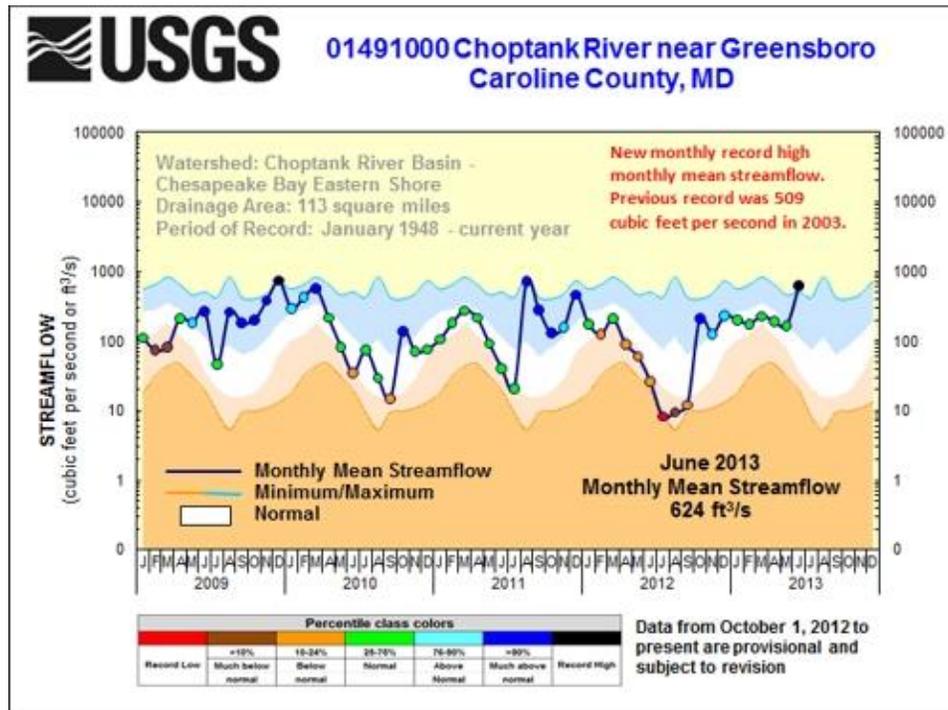
Monthly mean streamflow was normal at 12 streamgages. Normal is considered to be between the 25th and 75th percentiles. Monthly mean streamflows were below normal at three streamgages in western Maryland.



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

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Monthly mean streamflow on the Choptank River in Caroline County, Maryland was at a record June high, exceeding the previous record set in 2003. Streamflow had been normal for the prior 5 months, but the abundance of rain on the Delmarva Peninsula led to the record-setting high streamflows. There had been a record high in December 2009 and near-record streamflow in fall 2011 at this site.



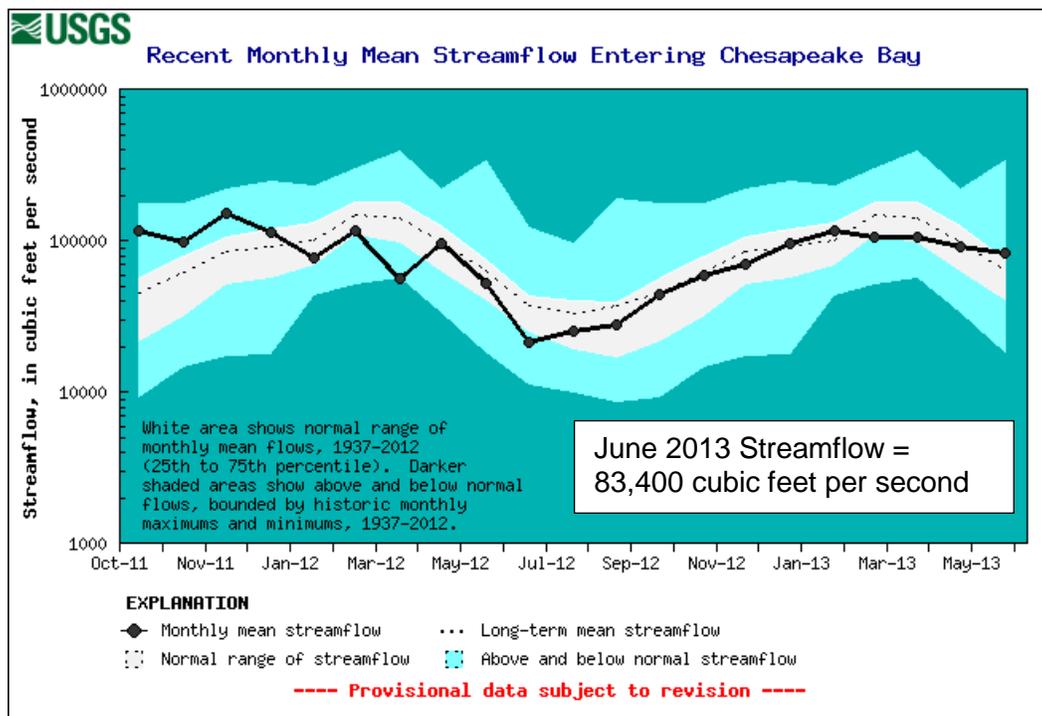
Five-year hydrographs can be viewed at:
<http://md.water.usgs.gov/surfacewater/streamflow/>

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 percentile) 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.

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Estimated Streamflow to the Chesapeake Bay

The estimated monthly mean freshwater streamflow to Chesapeake Bay was above normal in June 2013, at 83,400 cubic feet per second (ft³/s; provisional and subject to revision). Average (mean) monthly streamflow for June is 64,300 ft³/s. The normal range for average (mean) monthly streamflow for June is between 40,500 ft³/s and 75,000 ft³/s, the 25th and 75th percentiles of all June values. These provisional statistics are based on a 76-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 June in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) remained at 100 percent of available storage capacity, with a total of 75.80 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, was 99 percent of normal storage capacity, with 10.55 billion gallons in June.

June 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	17.80	
Total	100	75.80	
Patuxent Reservoirs			Washington Suburban Sanitary Commission (WSSC)
Triadelphia	104	5.82	
Duckett	94	4.73	
Total	99	10.55	