

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

May 2012

Why is it important for the USGS to collect and analyze water-resources data?

USGS water data is 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.

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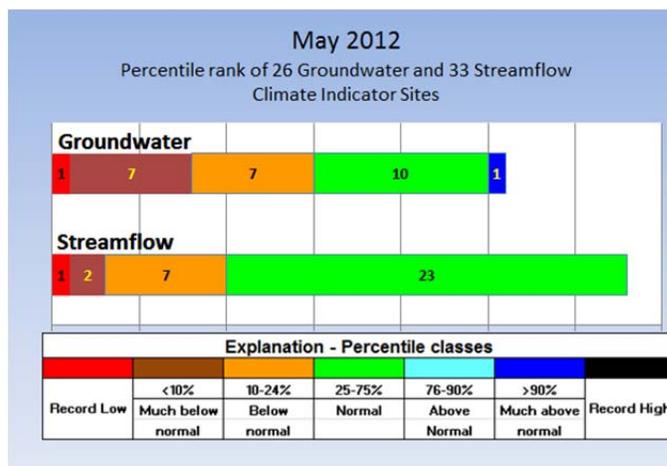
Although precipitation was below the long-term average and temperatures were above the long-term average at most weather stations again in May, many of the groundwater and streamflow levels improved in Maryland, Delaware, and the District of Columbia. Groundwater levels were normal in 38 percent of wells, and streamflows were normal at 70 percent of the streamflow sites used by the USGS to assess the response of streamflow and groundwater levels to climatic conditions in the region. Despite the improvement in some regions, there was a new May record low groundwater level in an observation well in Queen Anne's County, Maryland and a record low monthly mean streamflow on the Nanticoke River in Sussex County, Delaware.

Groundwater levels are still below normal on the Eastern Shore of Maryland and the Delmarva Peninsula, which includes all of Delaware. The groundwater level in the well in Queen Anne's County was at a record low and there were seven other wells with groundwater levels in the lowest 10th percentile. Groundwater levels in central Maryland were also below normal in May.

The below normal streamflow in May was mostly on the Delmarva Peninsula, where rainfall has been below normal for many months. In April, there were 28 sites with below normal monthly mean streamflows; in May, this number decreased to 10 sites, but 1 of these was a record low.

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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May 2012 Precipitation and Weather

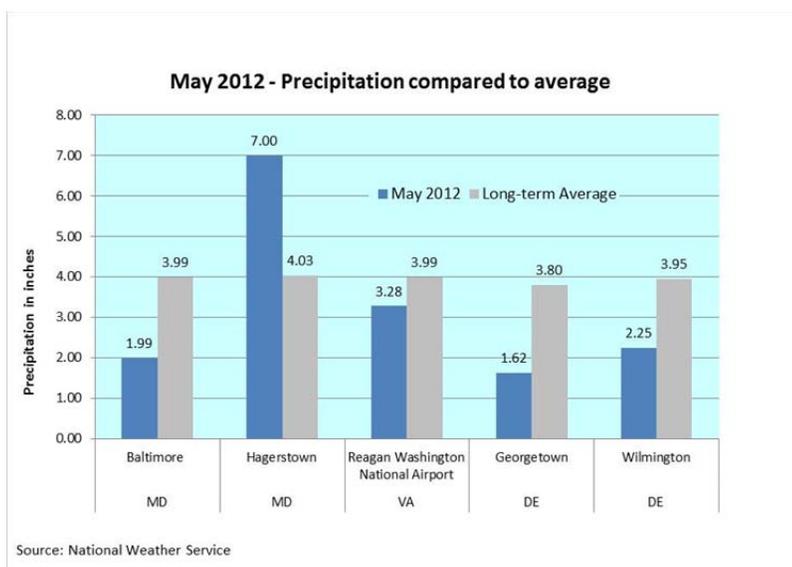
May 2012 precipitation was below the long-term average for the climate normal period* in Baltimore, Maryland, Delaware, and the District of Columbia according to the National Weather Service (NWS) web site. The weather station in Hagerstown Maryland was the only station with above normal precipitation in May with 7 inches, which is 2.97 inches above normal.

The precipitation deficit and warmer than average temperatures continued in the Mid-Atlantic region and have been that way since the year began. The Middle Atlantic River Forecast Center web site shows that the largest precipitation deficit since January 1 is in Anne Arundel County, with 7.20 inches below normal. The county with the next largest deficit is Harford County, which is 6.7 inches below what is expected for this period. There are an additional 12 counties in Maryland with deficits greater than 5 inches for this period. In Delaware, the largest deficit is in Sussex County, with 7.20 inches, followed by Kent County, with 6.80 inches, and New Castle County, with a 5.80-inch deficit.

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>

**Note from the National Weather Service: September 2011 was the first month to incorporate the new 1981--2010 climate normals that were calculated by the National Climatic Data Center. The new normals replaced the 1971--2000 normals.*



At the end of April, the Maryland Department of the Environment put central Maryland, the Eastern Shore, and western parts of the State in a drought watch status. This status has not changed. The assessment is based on groundwater levels, streamflow, precipitation, and reservoir levels at specific sites:

<http://www.mde.state.md.us/programs/Water/DroughtInformation/Pages/Water/Drought/index.aspx>

The U.S. Drought Monitor web site map (http://droughtmonitor.unl.edu/DM_northeast.htm) issued on May 29 showed 28 percent of the State of Maryland with moderate drought and 45 percent as abnormally dry. The region with the highest drought designation continues to be along the Chesapeake Bay and the entire Delmarva Peninsula. In Delaware, 80 percent of the State is in a drought status, with 24 percent of the State in severe drought status.

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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 to assess how biological communities are affected by hydrologic conditions. The USGS operates the most extensive network of streamgages in the region.

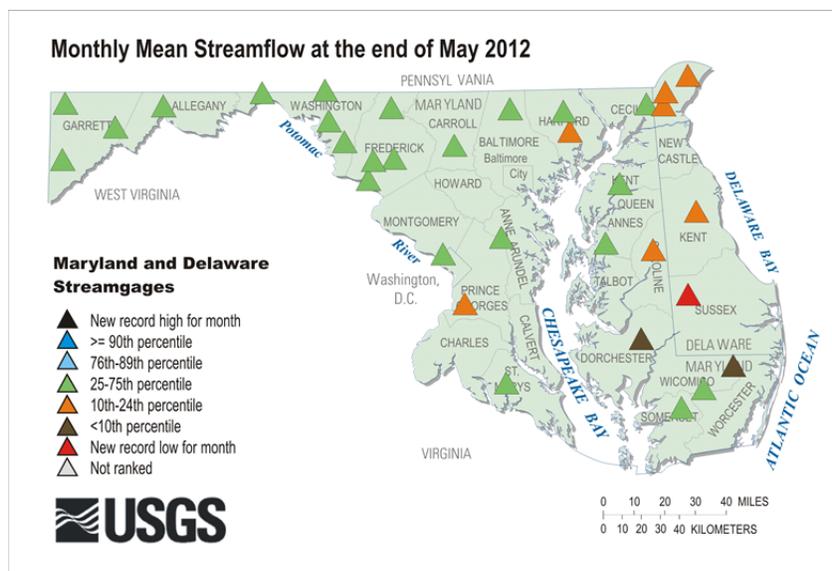
The streamflow locations chosen for the monthly water summary were selected based on the following criteria:

- 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.

Streamflow for May 2012

May 2012 was another month with a combination of below normal precipitation and warmer than normal temperatures, although there was enough precipitation to bring 70 percent (23 sites) of the monthly mean streamflow at USGS streamgaging stations up to the normal level. Normal is considered between the 25th and 75th percentiles. The remaining 10 sites used to monitor climatic response in Maryland, Delaware, and the District of Columbia had below normal streamflow.

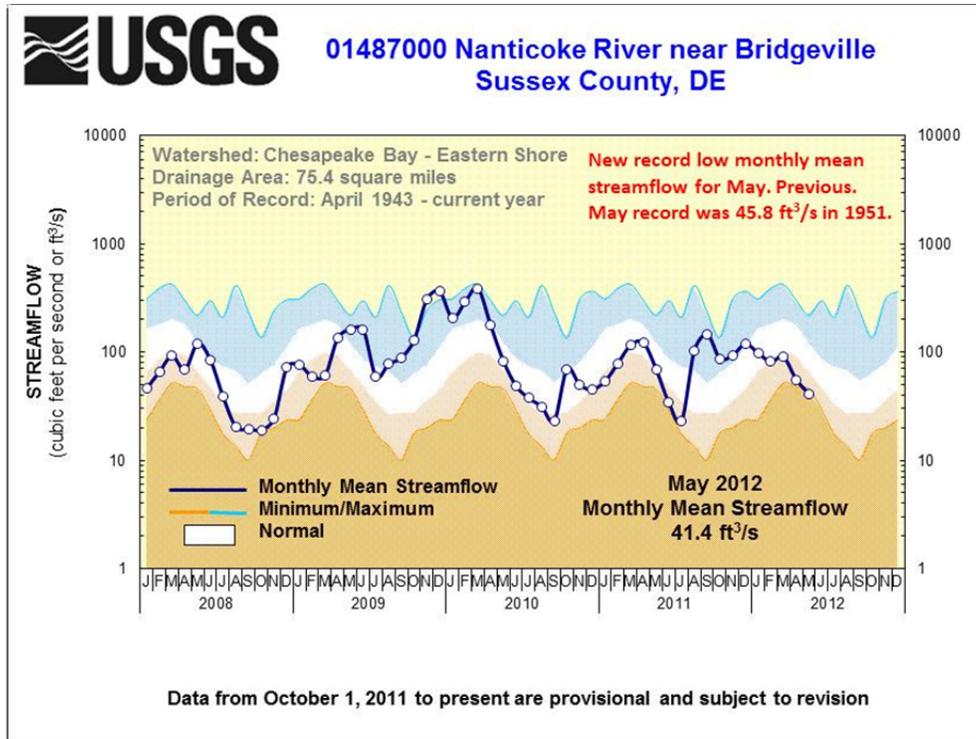
In April 2012, the Pocomoke River had the lowest April monthly mean streamflow since record-keeping began in 1950. In May 2012, the Nanticoke River had the lowest May monthly mean streamflow since record-keeping began in 1943. Monthly mean streamflow at two sites on the southern Delmarva Peninsula (Pocomoke River and Chicamacomico River) was in the lowest 10th percentile.



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

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Monthly mean streamflow on the Nanticoke River in Sussex County, Delaware on the southern Delmarva Peninsula was 41.4 cubic feet per second (ft³/s), which is a new record low for May. The previous record low was 45.8 ft³/s in 1951.



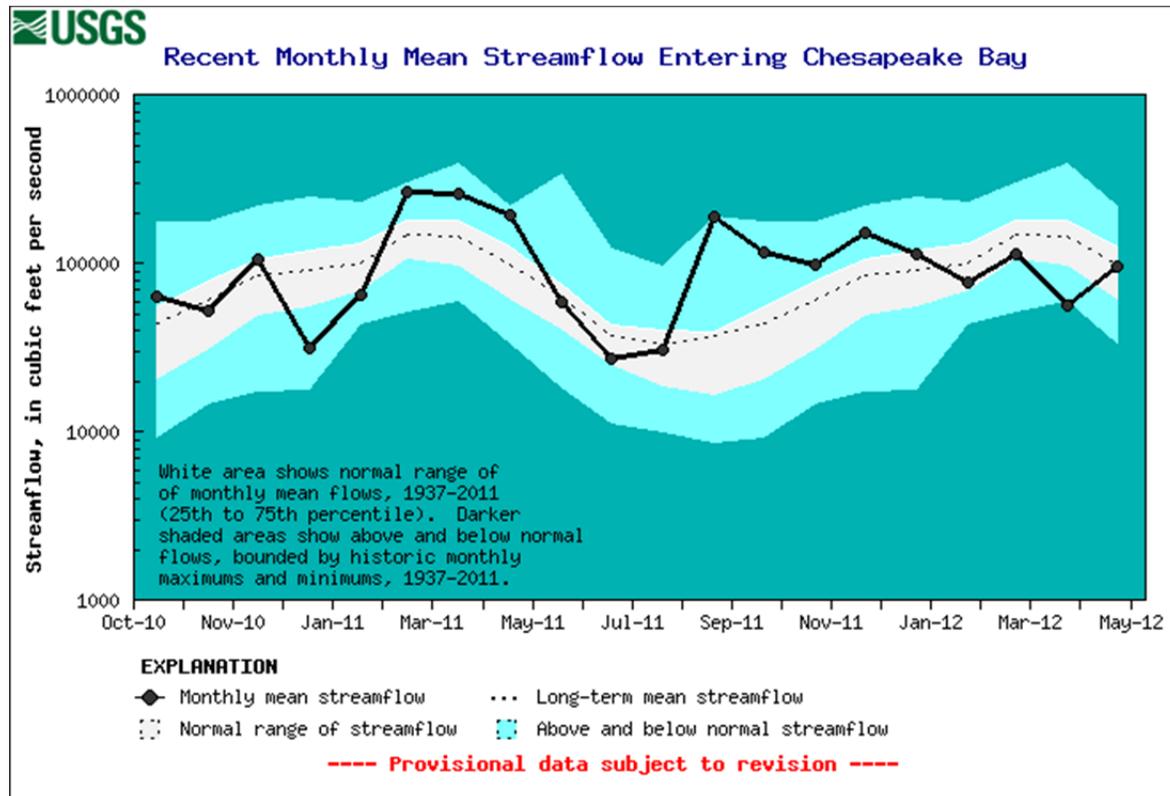
Five-year hydrographs can be viewed at:
<http://md.water.usgs.gov/surfacewater/streamflow/>

The dark line in the 5-year hydrograph represents the current monthly mean streamflow 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

After record-setting low streamflow to the Chesapeake Bay in April 2012, rainfall helped to bring streams and the total flow to the Bay up to normal levels in May. The estimated monthly mean streamflow entering Chesapeake Bay for May 2012 was 96,600 ft³/s. This value, which is provisional and subject to revision, is considered to be in the normal range. Normal May streamflow entering the Bay is between 61,500 and 127,000 ft³/s, the 25th and 75th percentiles, respectively, of all May values. Average (mean) monthly streamflow for May is 98,400 ft³/s. These statistics are based on a 75-year period of record



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Groundwater

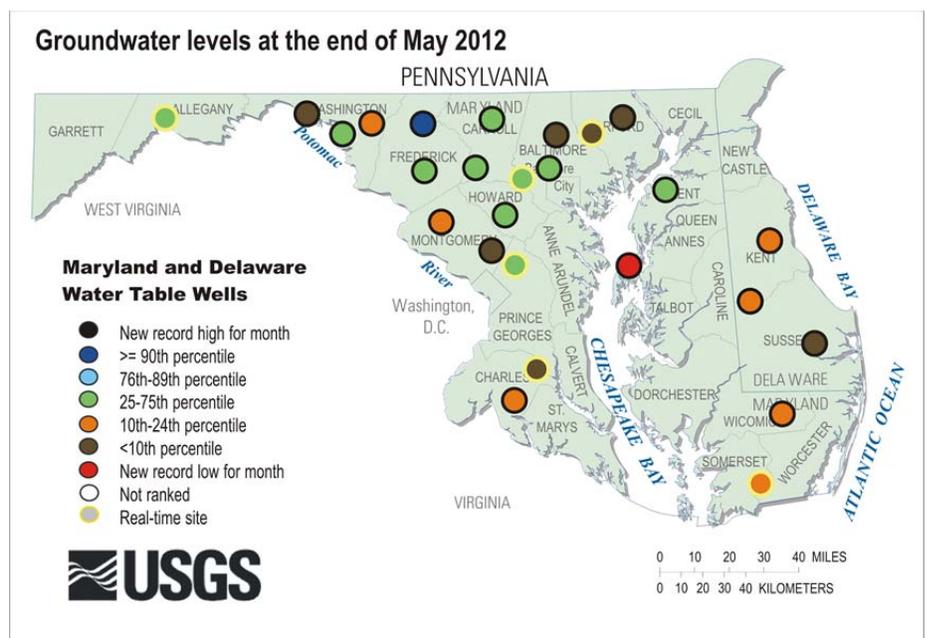
The USGS monitors groundwater levels in unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in climatic conditions. Twenty-six groundwater wells were selected based on the following criteria:

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

May 2012 Groundwater Levels

Groundwater levels across Maryland and Delaware ranged from a record low in Queen Anne's County to the highest 10th percentile in Frederick County. In May, 10 of the 26 observation wells had normal groundwater levels. Normal is considered between the 25th and 75th percentiles. The USGS observation well in Queen Anne's County was at a record low May groundwater level.

Groundwater levels were in the lowest 10th percentile in seven wells across Maryland, including those in the following counties: Baltimore, Charles, Harford, Montgomery, and Washington. One observation well in Sussex County, Delaware was also in the lowest 10th percentile.

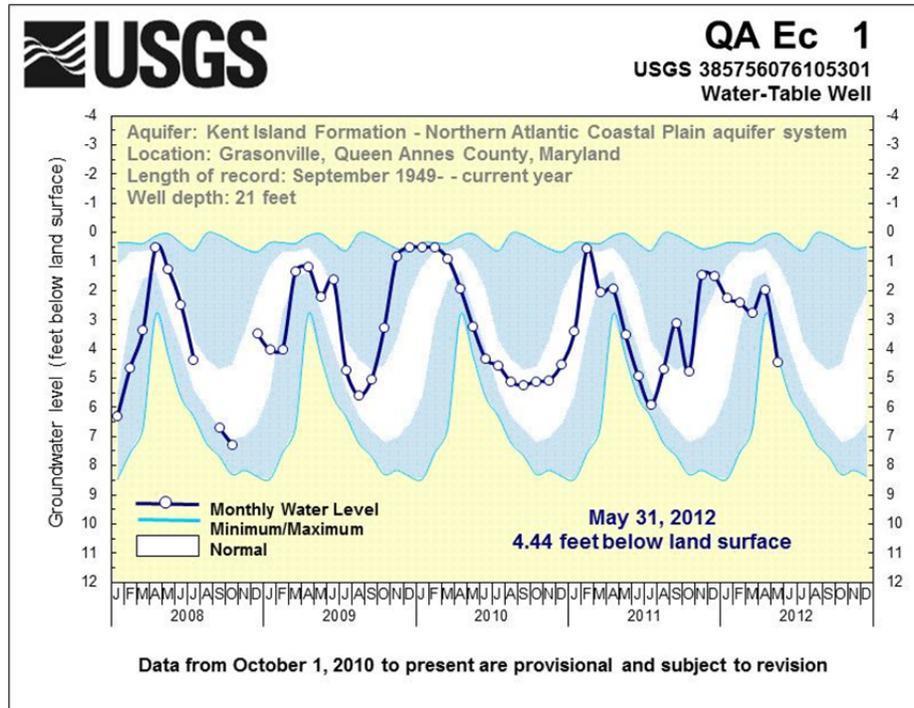


To access the clickable groundwater map, go to:

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

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Preliminary data show that the groundwater level in the USGS observation well in Queen Anne's County (QA Ec 1) dropped to 4.44 feet below land surface, a record low for May. The previous record was set in 1957. Record-keeping began in 1949 at this site.



Five-year groundwater hydrographs can be viewed at:

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

The 5-year hydrograph shows 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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Reservoir Levels

Reservoir storage in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) at the end of May dropped 1 percent to 99 percent of available storage capacity and contained 75.13 billion gallons of water.

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 1 percent to 97 percent of normal storage capacity at the end of May 2012, with 10.30 billion gallons of water.

May 2012	Percent available/ normal storage	Volume (billion gallons)	Source
Baltimore Reservoirs			Baltimore City – Environmental Services Division
Liberty	98%	36.08	
Loch Raven	100%	21.20	
Prettyboy	100%	17.85	
Total	99%	75.13	
Patuxent Reservoirs			Washington Suburban Sanitary Commission (WSSC)
Triadelphia	100%	5.61	
Duckett	94%	4.69	
Total	97%	10.30	