

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

June 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.

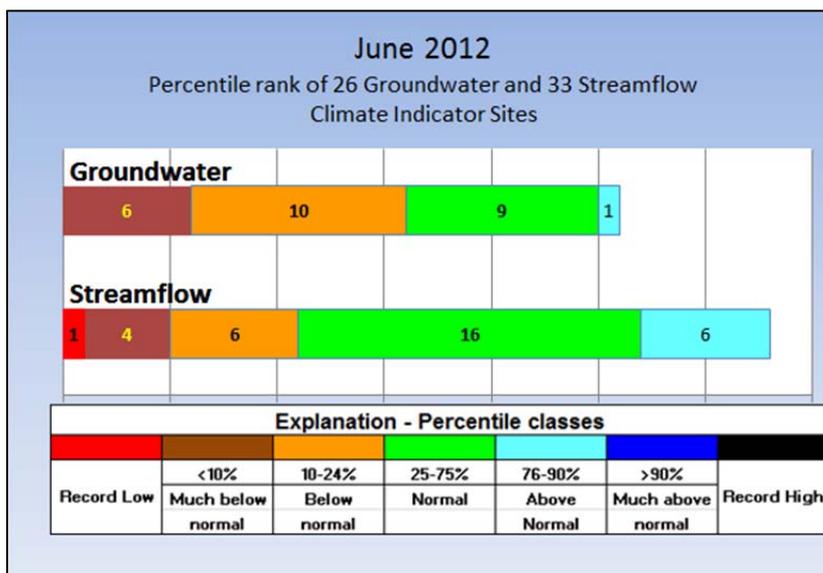
The sites used in this water summary were carefully selected to show the response of streamflow and groundwater levels to weather conditions. Ideally, these sites will show no effects from human influences. The streamflow and groundwater data are ranked in comparison to the historical record and summarized.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

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Since the year began, precipitation has been below normal and there have been many record high temperature records set at weather stations in Maryland, Delaware, and the District of Columbia. Persistent higher-than-normal temperatures and lack of rainfall are affecting streamflow and groundwater levels throughout the region. Despite the hot, dry conditions pervading the region, in some areas groundwater and streamflow were at normal to above-normal levels as a result of several intense precipitation events associated with strong thunderstorms during the month.

Groundwater levels are showing the strain of the hot, dry weather leaving 62 percent, or 16 of the 26 wells, at below-normal levels; groundwater levels at 6 of these wells were ranked below the 10th percentile. Most of the below-normal groundwater levels occurred on the Delmarva Peninsula (which includes the Eastern Shore of Maryland and all of Delaware), and in north-central Maryland.

The monthly mean streamflow on the Nanticoke River in Sussex County, Delaware was at the lowest level since record-keeping began in 1943 for the second consecutive month. There were an additional four streams with monthly mean streamflow ranked below the 10th 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.

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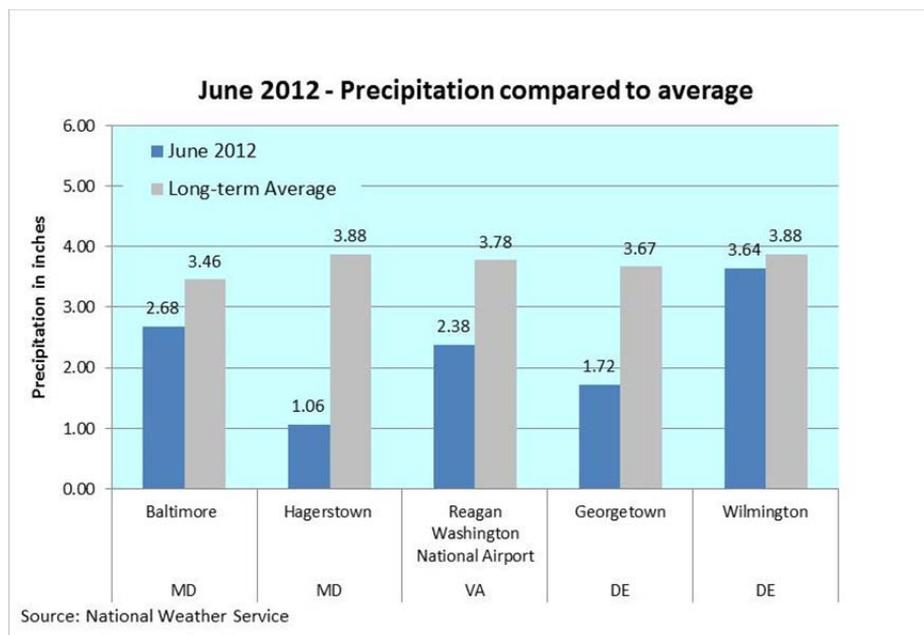
June 2012 Precipitation and Weather

June 2012 precipitation was below the long-term average for the climate normal period* at National Weather Service stations in Maryland, Delaware, and the District of Columbia. Precipitation in Hagerstown, Maryland was lowest, at 1.06 inches. The highest monthly rainfall total was in Wilmington, Delaware, at 3.64 inches.

According to the National Weather Service (NWS) web site, June 2012 was the 17th consecutive month with a monthly average temperature above the 1981--2010 monthly normal at the weather station in Baltimore, Maryland. The maximum temperature of 103 degrees Fahrenheit on June 29th was the second-warmest temperature ever recorded for Baltimore in the month of June. The warmest June temperature, 105 degrees Fahrenheit, was recorded in 1934.

At Ronald Reagan Washington National Airport, a new record-high temperature for Washington, D.C. was set on June 29. The recorded high temperature of 104 degrees Fahrenheit exceeded the previous June record of 102 degrees Fahrenheit recorded in June 1874.

Several daily record-high temperatures were also set throughout the Mid-Atlantic region during the month.



**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.*

The precipitation deficit and warmer-than-average temperatures experienced in the Mid-Atlantic region since the year began continued through June. The Middle Atlantic River Forecast Center web site shows that the precipitation deficit since January 1 is greater than 5 inches in 19 counties in Maryland, as well as all 3 counties in Delaware.

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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Drought Status

As of the end of June, the Maryland Department of the Environment had designated central Maryland and the Eastern Shore as being in a drought-watch status. 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 June 26 showed 31 percent of the State of Maryland in moderate drought and an additional 29 percent as being abnormally dry. The area experiencing the most intense drought conditions continues to be along the shores of the Chesapeake Bay and on the Delmarva Peninsula. In Delaware, 83 percent of the State is abnormally dry or in a drought status, with 19 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 streamflow gages in the region.

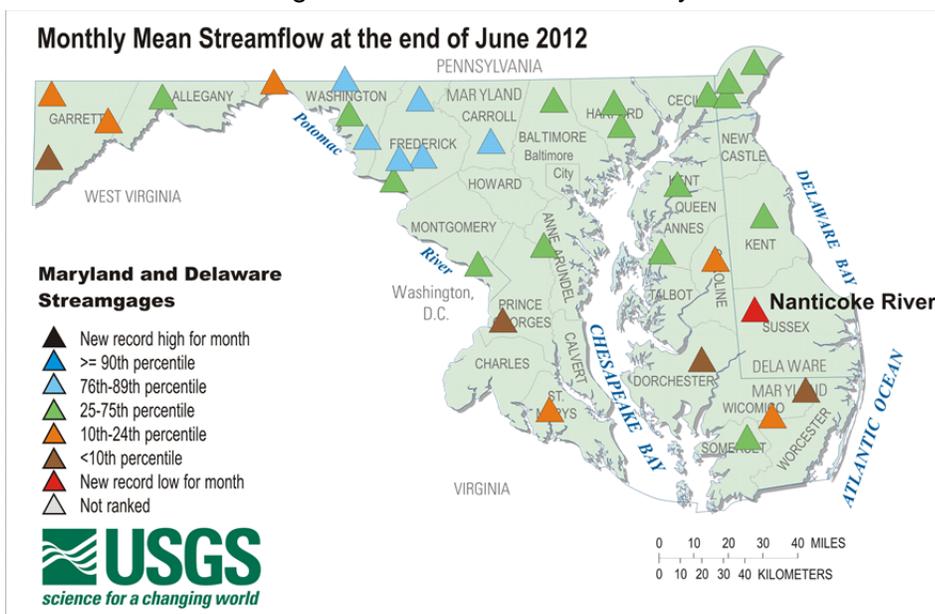
The streamflow locations chosen for the monthly water summary were selected based on the following criteria:

- 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.

Streamflow for June 2012

Although June precipitation was below normal throughout the region, localized summer weather patterns are evident in the monthly mean streamflows in Maryland, Delaware, and the District of Columbia that ranged from above normal to below normal across the region. Normal is considered between the 25th and 75th percentiles. At 16 USGS streamflow-gaging stations (48 percent) used to monitor climatic response in Maryland, Delaware, and the District of Columbia, the monthly mean streamflow was in the normal range. These were in central Maryland and central and northern Delaware

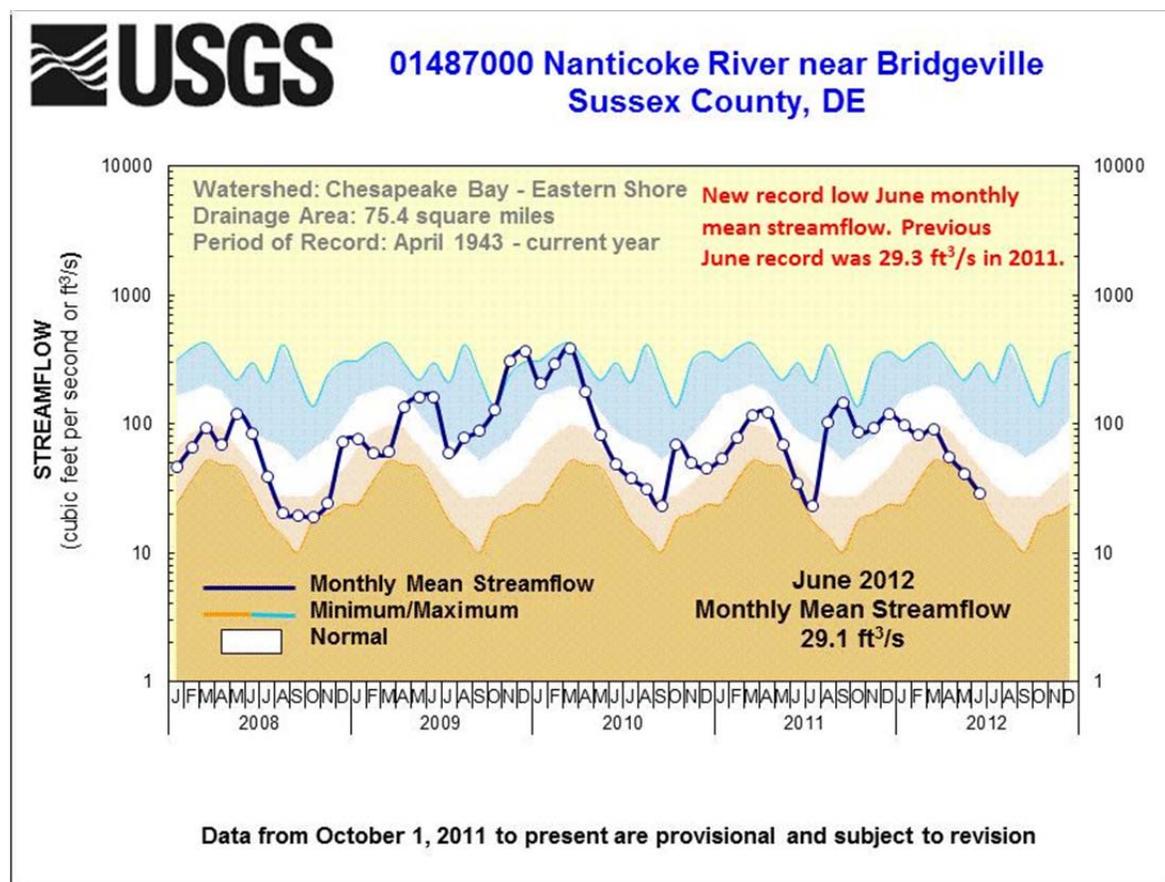
Streams with above-normal streamflow were in Carroll, Frederick, and Washington Counties in Maryland. Below-normal streamflow was recorded in the southern Delmarva Peninsula, and in southern and western Maryland. In Sussex County, Delaware the Nanticoke River set a record low for the second consecutive month.



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 was at its lowest recorded level since record-keeping began in 1943. The June 2012 monthly mean streamflow of 29.1 cubic feet per second (ft³/s) broke the previous record low of 29.3 ft³/s set in 2011. Also for the second consecutive month, monthly mean streamflow at two sites on the southern Delmarva Peninsula (Pocomoke River and Chicamacomico River) was below the 10th percentile. Piscataway Creek and the Youghiogheny River also had monthly mean streamflows below the 10th percentile in June 2012.



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

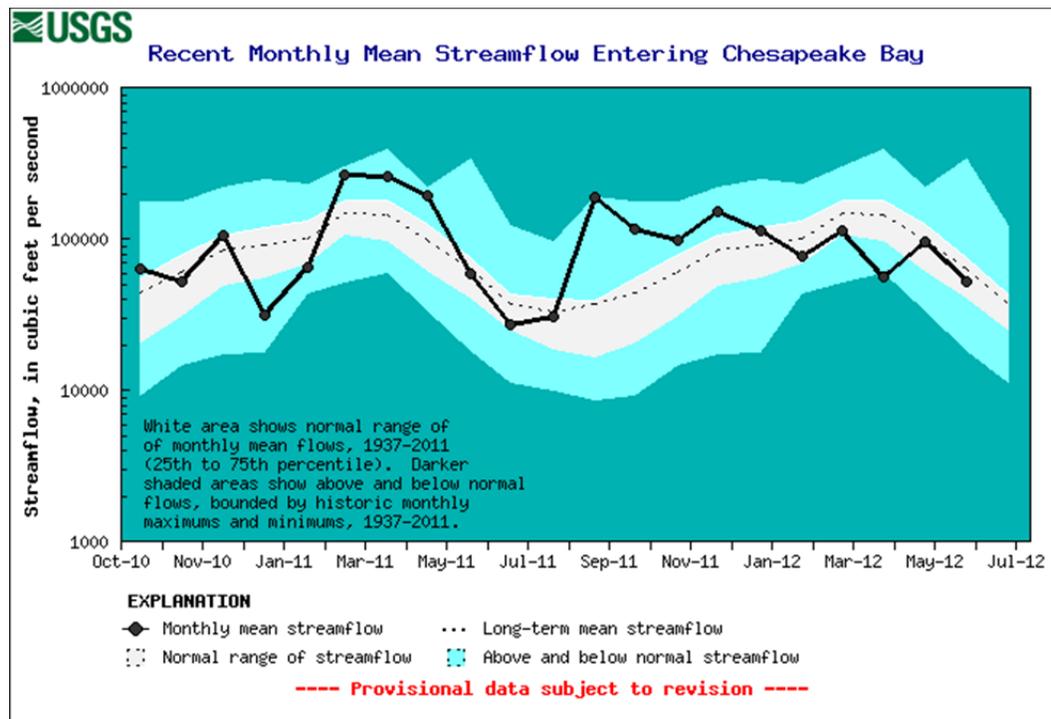
The dark line in the 5-year hydrograph represents the current monthly mean streamflow and the white band shows the normal range (25th to 75th percentile) based on the period of record. The maximum monthly mean streamflow is at the top of the blue shaded section, and the lowest monthly mean streamflow is at the top of the dark orange area.

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Estimated Streamflow to the Chesapeake Bay

The total freshwater streamflow to the Bay was in the normal range for the second consecutive month in June 2012. Although total streamflow is following the historical trend downward, this is expected to happen until sometime in September when the growing season wanes.

The estimated monthly mean streamflow entering Chesapeake Bay (provisional and subject to revision) for June 2012 was 52,900 ft³/s. Average (mean) monthly streamflow for June is 64,400 ft³/s. These statistics are based on a 75-year period of record.



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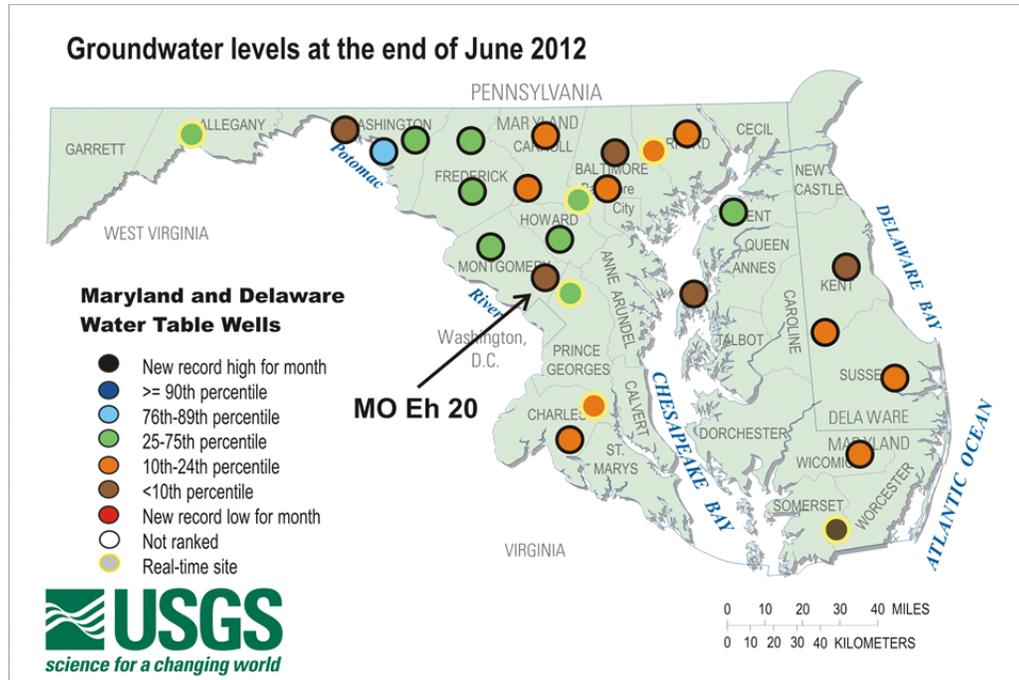
Groundwater

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.

June 2012 Groundwater Levels

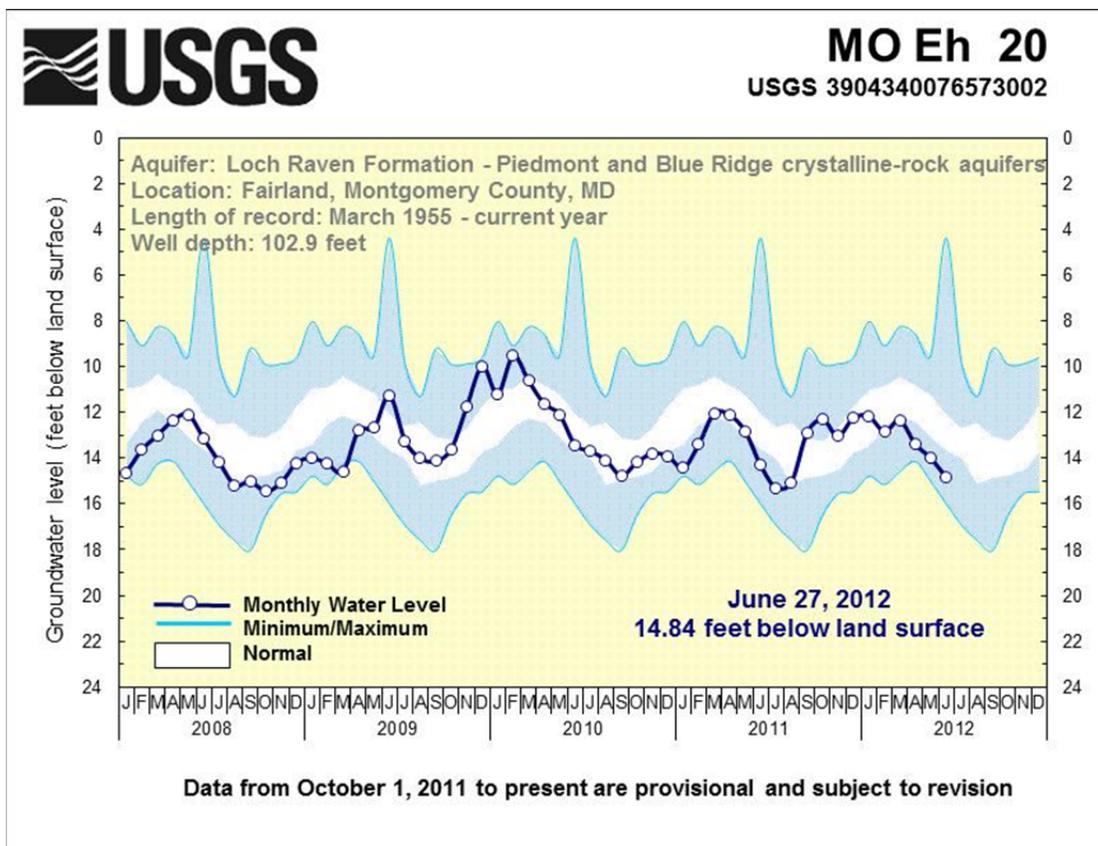
In June, groundwater levels in Maryland and Delaware were below normal at 62 percent or 16 of the 26 wells used to monitor climatic conditions. Normal is considered between the 25th and 75th percentiles. Groundwater levels were below the 10th percentile in six wells located in Baltimore, Montgomery, Queen Anne's, Somerset, and Washington Counties in Maryland, and Kent County in Delaware. Groundwater levels were normal at nine wells and above normal at an observation well in Washington County, Maryland.



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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The USGS observation well in Montgomery County (MO Eh 20) was used as an example to show how the groundwater level continues to decline at a rate that is consistent with seasonal declines observed in past years, but a few months earlier than usual. Thirteen of the 26 USGS observation wells located throughout Maryland and the 3 observation wells in Delaware show a similar pattern.



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 at the end of June in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) was at 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 to 90.5 percent of normal storage capacity at the end of June 2012, with 9.58 billion gallons of water.

June 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	91%	5.07	
Duckett	90%	4.51	
Total	90.5%	9.58	