

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

June 2011

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 and predict how water resources respond to changes in climate. Scientists at the USGS have measured water in streams and groundwater levels in wells to assess water resources for over 125 years.

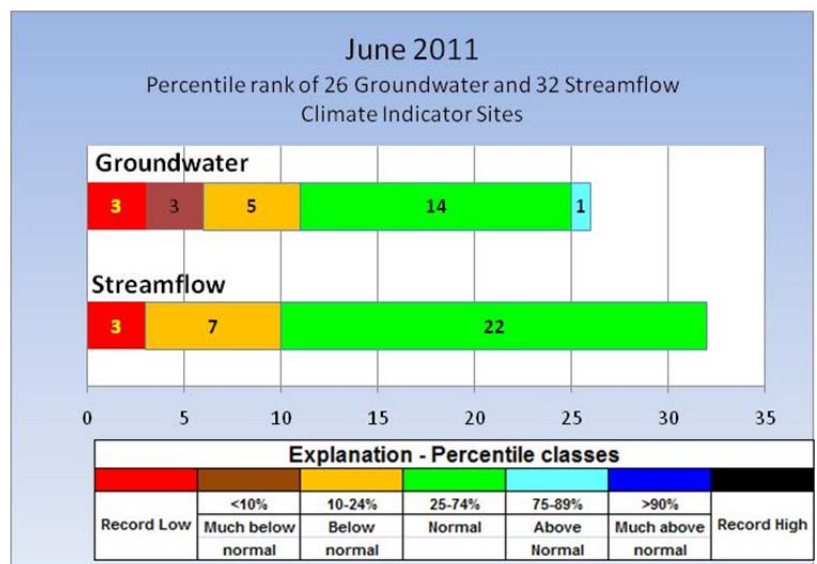
In addition to providing the most extensive dataset of historical streamflow and groundwater data available to the public, the USGS collects water data and quality-assures the data by employing standardized techniques across the country. The uniformity of the dataset allows for multi-state comparisons and other comparative statistical analyses that inform policy makers of the possibilities and limitations 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 precipitation. 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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Lack of precipitation led to monthly record low groundwater levels and streamflow on the southern Delmarva Peninsula and in Frederick County, Maryland. In June, monthly record low groundwater levels were set in Frederick, Somerset, and Wicomico Counties.

Despite these low groundwater levels, 15 of the 26 wells monitored by the USGS to assess the response to climatic conditions in Maryland, Delaware, and the District of Columbia region were at normal to above normal levels.



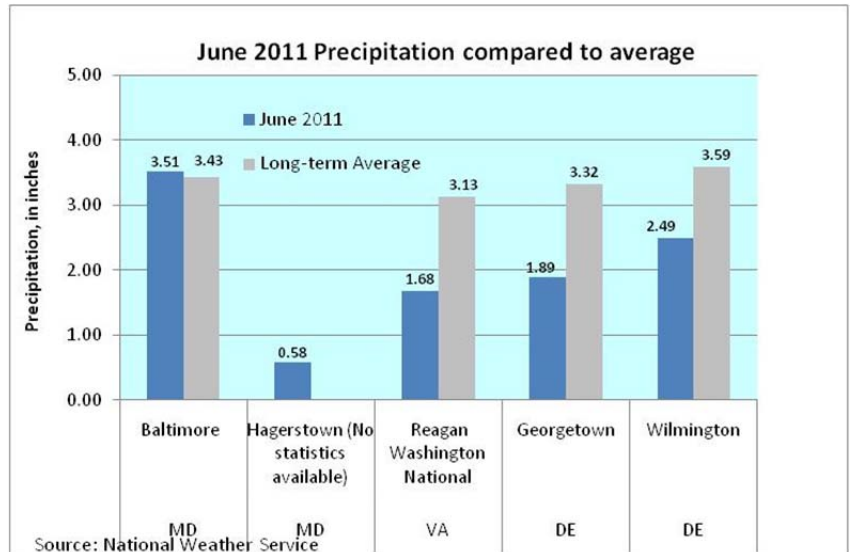
Monthly mean streamflow was normal at 22 of the 32 sites in June. However, the remaining 10 sites were below normal and 3 of them set a record low. Two of the record lows were on the lower Delmarva Peninsula, where groundwater levels were also low. Many of the previous record lows streamflow levels were set in 1986.

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. 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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Precipitation

Precipitation was below normal for the second consecutive month at National Weather Service (NWS) stations in Maryland, Delaware, and the District of Columbia, except for the station in Baltimore, which was only 0.08 above the long-term average. Deficits from the long-term average were 1.43 inches at Georgetown, Delaware and 1.45 inches at Ronald Reagan Washington National Airport in Virginia. In May, the deficit at these locations was over 2 inches. The NWS station in Hagerstown does not have enough record to calculate statistics, but with only 0.58 inches of precipitation, it is likely much below normal.



Average June temperatures were above normal for the third consecutive month at all five weather stations. The highest average temperature was 78.8 degrees Fahrenheit at Reagan Washington National Airport where the temperature was 4.2 degrees Fahrenheit above the long-term average. The lowest average temperature was at Georgetown, Delaware at 72.8 degrees Fahrenheit, which was 1.9 degrees Fahrenheit above the long-term average.

The Middle Atlantic River Forecast Center's maps for departure from the average precipitation in June showed the largest precipitation deficit (2.9 inches) in Frederick County. Baltimore and Harford Counties were over 2 inches below average. Cecil County was the only county with above normal precipitation in June. Most of Maryland and Delaware were more than an inch below average.

The Middle Atlantic River Forecast Center's 365-day precipitation data shows that only Worcester County was below normal, with an 11.6-inch deficit. The remaining counties in Maryland and Delaware were within the normal range.

The "year-to-date" departure from the average precipitation map shows that three counties on the southern Delmarva were more than 7 inches below normal: Somerset, Wicomico, and Worcester Counties.

Sources:

National Weather Service

MD and DC: <http://www.weather.gov/climate/index.php?wfo=lwz>

DE: <http://www.erh.noaa.gov/phi/>

Middle Atlantic River Forecast Center (MARFC): <http://www.erh.noaa.gov/marfc/Maps/precip.shtml>

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Streamflow

Streamflow data are used to assess water supply and the risk of droughts and floods, which can affect the health and well-being of people and animals, and have economic consequences. The USGS operates the most extensive network of stream-gaging stations in the region. The data provided by this network are used for monitoring water quantity, and with water chemistry to interpret water-quality data.

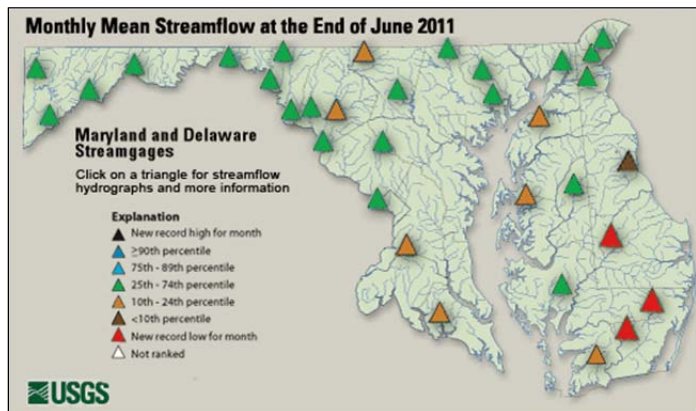
The streamflow locations chosen for the monthly water summary were selected based on the following criteria:

- At least 10 years of continuous data;
- Watersheds greater than 5 square miles;
- Streamflow is not regulated, or has relatively natural flow;
- Streamflow data reflects climatic conditions; and
- The surrounding area and watershed are not urban.

Streamflow for June 2011

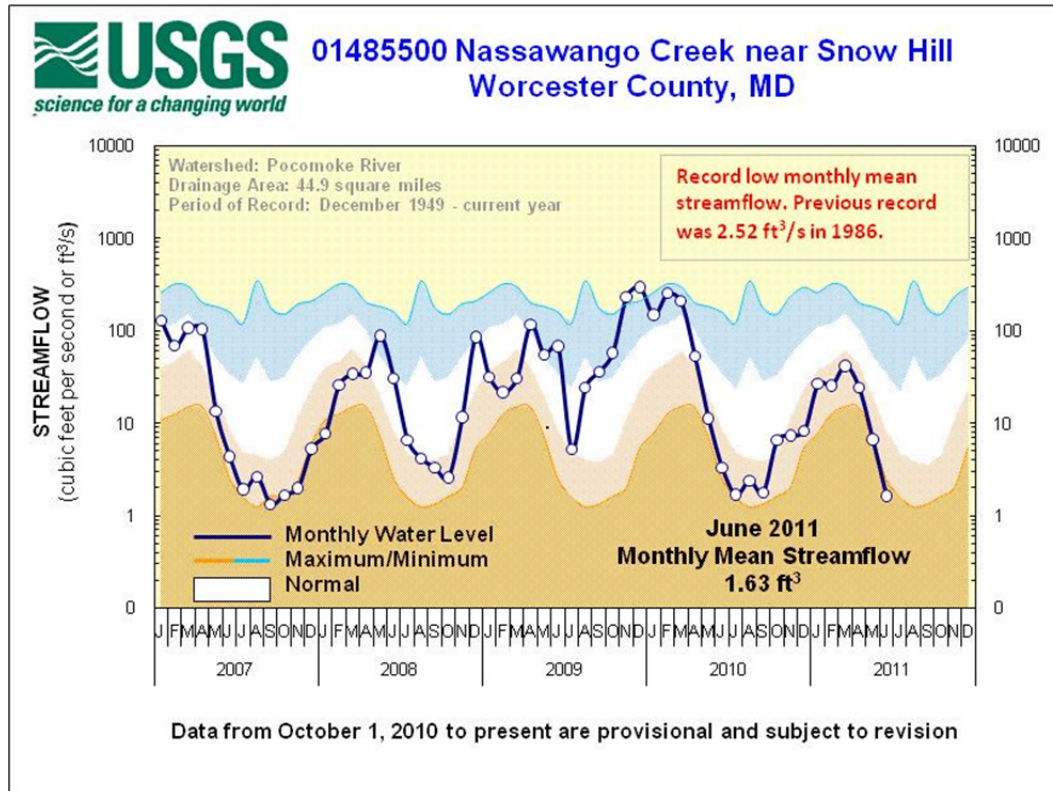
Monthly mean streamflow on the Nanticoke River, Nassawango Creek, and the Pocomoke River on the southern Delmarva Peninsula was at the lowest June levels on record. This region has received several months of below average precipitation over the last 12 months, resulting in the low streamflow.

For the second consecutive month, the Nassawango Creek in Worcester County, Maryland set a new low monthly mean streamflow record, exceeding the record set in 1986. Record-keeping began at this site in 1949. Streamflow has been below normal on the Nassawango Creek since last summer.



Although record lows were set at the three southern Delmarva Peninsula streams in June 2011, more than half (22 of the 32 streams) of the streams in the remaining parts of Maryland, Delaware, and the District of Columbia were in the normal range.

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Five-year streamflow 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 74th percentile) based on the period of record. The maximum monthly streamflow is at the top of the blue shaded section, and the lowest monthly streamflow is at the top of the dark orange area.

In June, preliminary daily streamflow was below the historical daily minimum for 27 days; after these data are finalized, the values may be a new daily record lows. Streamflow for the remaining three days of June was near the minimum, with the highest flow of 3.1 ft³/s (cubic feet per second), on June 19th. Mean monthly streamflow for Nassawango Creek was between 15 and 51 ft³/s. Groundwater levels were also low in the southern Delmarva Peninsula area.

Also at the southern end of Maryland, the Pocomoke River set a monthly record low for the second straight month, exceeding the previous record from 1985. The Nanticoke River was also at a record low in June.

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Groundwater

Consideration of climate variations can be a key factor in ensuring the proper management of groundwater resources, although groundwater systems tend to respond more slowly to variability in climatic conditions than do surface-water systems. The USGS monitors groundwater levels in unconfined aquifers, providing essential information on the availability of groundwater resources as water level measurements are an indication of changes in storage in aquifers.

Twenty-six groundwater wells were selected for indicating climatic conditions based on the following criteria:

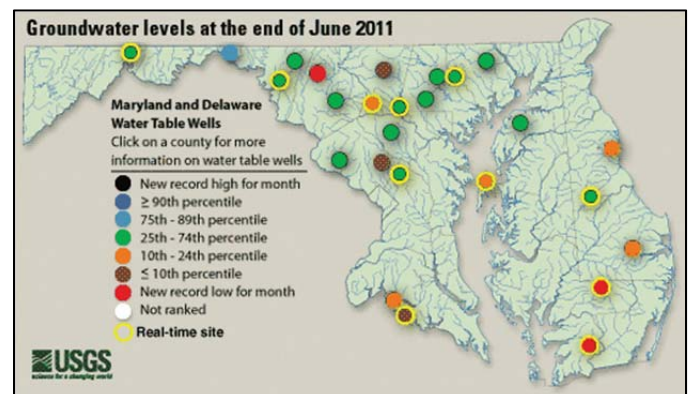
1. Located in an unconfined (water-table) aquifer;
2. Open to a single, known hydrogeologic unit/aquifer;
3. Groundwater hydrograph reflects climatic conditions;
4. No indicated nearby pumpage and likely to remain uninfluenced by pumpage;
5. Minimum period of record is 10 years of continuous/monthly records;
6. Minimally affected by irrigation, canals, and other potential sources of artificial recharge;
7. Well has casing--dug wells not used;
8. Water levels show no apparent hydrologic connection to nearby streams;
9. Well has never gone dry; and
10. Long-term accessibility likely.

June 2011 Groundwater Levels

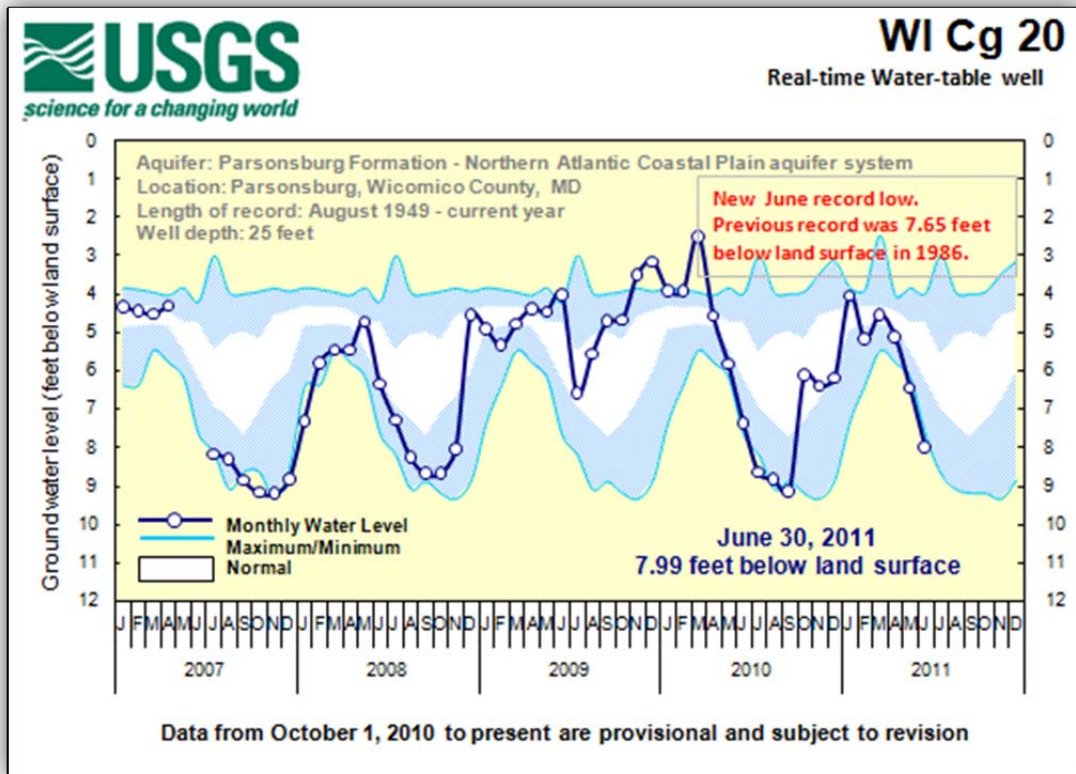
Groundwater levels were at the lowest values since record-keeping began in three wells. These wells were in Frederick, Somerset, and Wicomico Counties. The record low groundwater level in Wicomico County was the lowest value since record-keeping began in 1949, and lower than the previous record set in 1986. This is the second consecutive month the groundwater level was at a record low in well WI Cg 20. Three streamflow levels were also at record low levels in June on the southern Delmarva Peninsula.

Groundwater in wells in Carroll, Charles, and Montgomery Counties were in the lowest 10th percentile. Other wells in Carroll, Charles, and Queen Anne's Counties were below normal.

Despite the low water levels, more than half, or 14 of the 26 wells used by the USGS to assess climatic conditions in the region of the wells were in the normal range.



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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 line, the maximum and minimum monthly values, and the normal range (between the 25th and 74th 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

Regional water-supply reservoirs remained nearly full at the end of June. Storage in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) dropped from 100 percent of available storage capacity to 98 percent, with 73.87 billion gallons.

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 100 percent to 96 percent of normal storage, with 10.16 billion gallons at the end of June.

June 2011	Percent available/ normal storage	Volume (billion gallons)	Source
Baltimore Reservoirs			Baltimore City – Environmental Services Division
Liberty	95%	35.10	
Loch Raven	99%	21.02	
Prettyboy	99%	17.75	
Total	98%	73.87	
Patuxent Reservoirs			Washington Suburban Sanitary Commission (WSSC)
Triadelphia	100%	5.63	
Duckett	90%	4.53	
Total	96%	10.16	