

July 2011--Record High Heat, and Record Low Monthly Streamflow and Groundwater Levels

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

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.

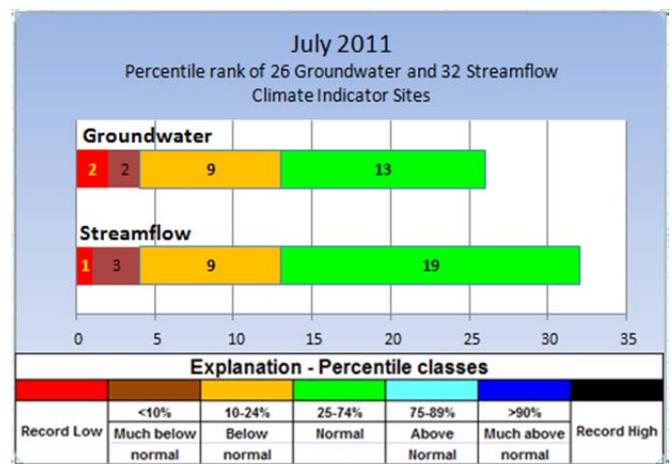
The sites used in this water summary were carefully selected to show the response of streamflow and groundwater levels to precipitation. Ideally, these sites will show no effects from human influences. The streamflow and groundwater data are ranked in comparison to the historical record and summarized.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

USGS July 2011 Water Conditions Summary

In July, groundwater levels in two wells and monthly mean streamflow at one site were at monthly record low levels. Precipitation was near normal throughout the region, but temperatures indicated that in Baltimore, July 2011 was the hottest July and the hottest month on record according to the National Weather Service. July 2011 also had the most number of days (24) with temperatures 90 degrees Fahrenheit or greater.

The southern Delmarva region continued to experience low streamflow and groundwater levels. Nassawango Creek and a well in Wicomico County were at record low levels again in July.

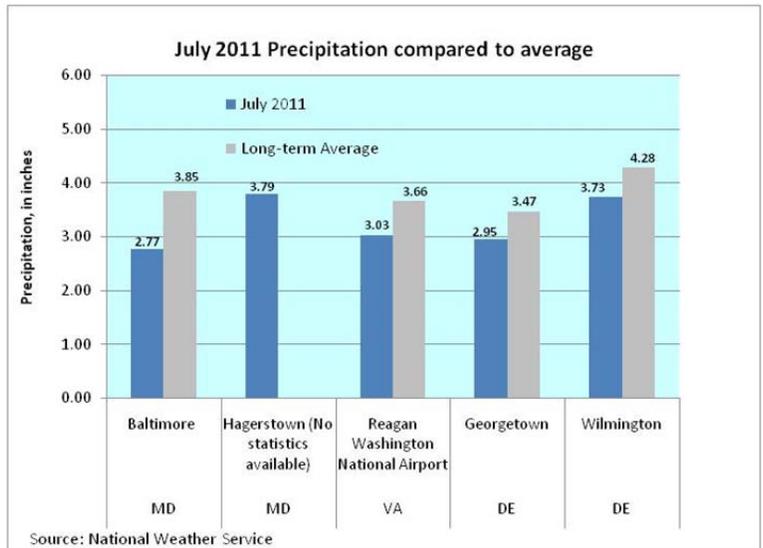
More than half of the streams and half of the wells were at normal levels for July. Groundwater levels at 13 of the 26 wells monitored by the USGS to assess the response to climatic conditions in Maryland, Delaware, and the District of Columbia region were at normal levels. Monthly mean streamflow was normal at 19 of the 32 sites in July. However, the remaining 13 sites were below normal and one of them set 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. For example, a groundwater level in the 90th percentile is equal to or greater than 90 percent of the values recorded for that month.

Precipitation

Precipitation was slightly below, but close to, the long-term average at National Weather Service (NWS) stations in Maryland, Delaware, and the District of Columbia. The NWS station in Hagerstown had the highest July rainfall of the five weather stations, but this station does not have a long enough period to calculate statistics. This is the fourth consecutive month with below average precipitation at the four weather stations with statistical record.



In July, The Middle Atlantic River Forecast Center's maps for departure from the average precipitation in July showed the largest precipitation deficit (2.5 inches) in Allegany County, Maryland. Howard and Anne Arundel Counties were the only counties in Maryland with above average precipitation.

The Middle Atlantic River Forecast Center's 365-day precipitation data show all counties in the Maryland and Delaware region in the normal range. However, the "year-to-date" departure from the average precipitation map shows that four counties on the southern Delmarva Peninsula were more than 6 inches below normal: Somerset, Wicomico, and Worcester Counties in Maryland, and Sussex County 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.erh.noaa.gov/marfc/Maps/precip.shtml>

Streamflow

Streamflow data are used to assess water supply and the risk of droughts and floods. 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 to interpret water-quality data.

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

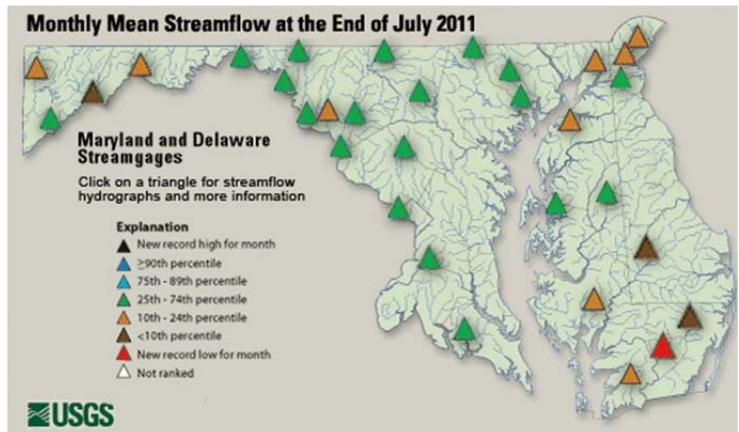
- At least 10 years of continuous data;
- Watersheds greater than 5 square miles;
- Streamflow is not regulated, or has relatively natural flow;
- Streamflow data reflects climatic conditions; and
- The surrounding area and watershed are not urban.

Streamflow for July 2011

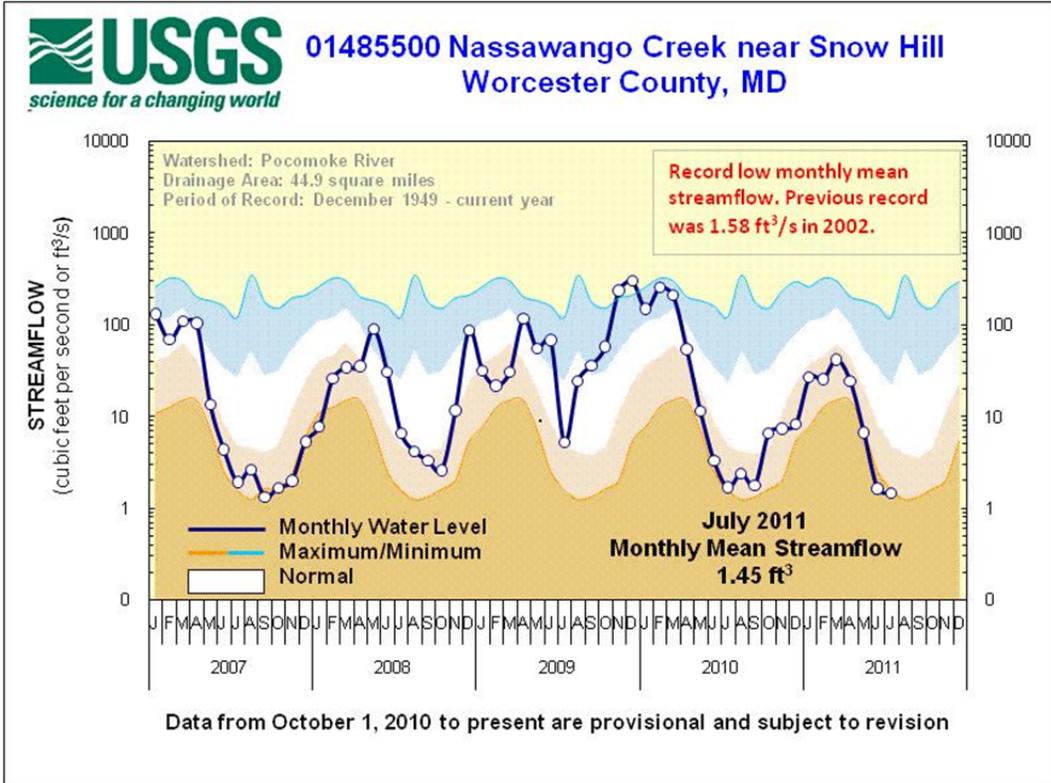
Monthly mean streamflow was at a record monthly low for the third consecutive month on the Nassawango Creek in Worcester County, Maryland. The July record low beats the previous record set in 2002 of 1.58 cubic feet per second (ft³/s). Record-keeping began at this site in 1949. Streamflow has been below normal on the Nassawango Creek since last summer.

Streamflow on the Nanticoke and Pocomoke Rivers, also on the southern Delmarva Peninsula, were in the lowest 10th percentile in July. This region has received several months of below average precipitation over the last 12 months, resulting in the low streamflow.

Although streamflow was low on the southern Delmarva Peninsula in July 2011, more than half of the streams in the remaining parts of Maryland, Delaware, and the District of Columbia were in the normal range.



To access the clickable streamflow map, go to:
<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.

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

Estimated Streamflow Entering Chesapeake Bay

The estimated monthly mean streamflow entering Chesapeake Bay for July 2011 was 27,100 cubic feet per second (cfs). This value, which is provisional and subject to revision, is considered to be in the **normal range**. Normal July streamflow entering the Bay is between 24,800 and 43,800 cfs, the 25th and 75th percentiles, respectively, of all July values. Average (mean) monthly streamflow for July is 38,100 cfs. These statistics are based on a 74-year period of record.

For more information, go to: <http://md.water.usgs.gov/waterdata/chesinflow/>

Groundwater

Consideration of climate variations can be a key factor in ensuring the proper management of groundwater resources. The USGS monitors groundwater levels in unconfined aquifers, providing essential information on the availability of groundwater resources because 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:

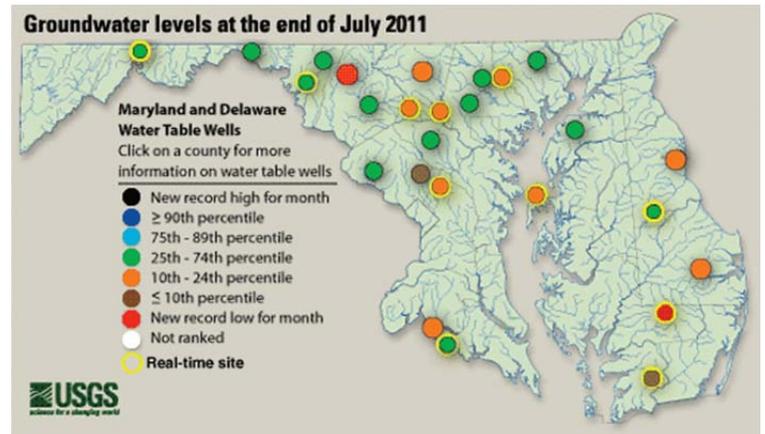
1. Located in an unconfined (water-table) aquifer;
2. Open to a single, known hydrogeologic unit/aquifer;
3. Groundwater hydrograph reflects climatic conditions;
4. No indicated nearby pumpage and likely to remain uninfluenced by pumpage;
5. Minimum period of record is 10 years of continuous/monthly 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.

July 2011 Groundwater Levels

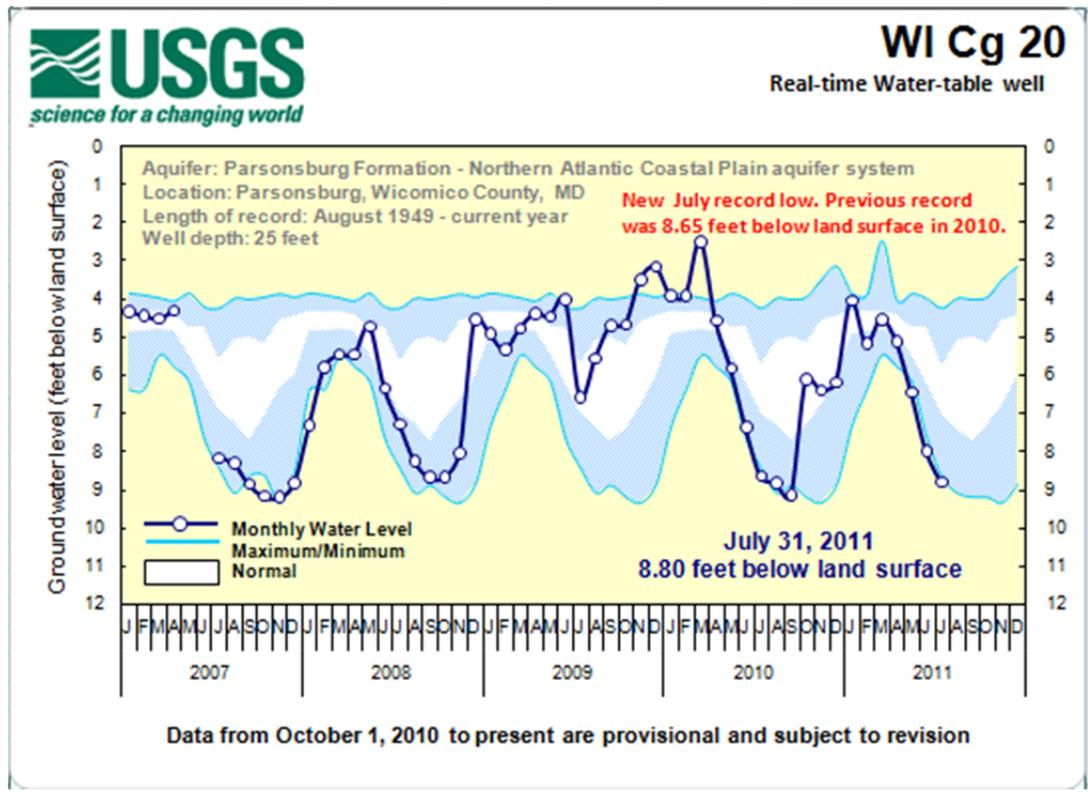
Groundwater levels were at the lowest values since record-keeping began in two wells for the second consecutive month. These wells were in Frederick and Wicomico Counties in Maryland. The record low groundwater level in Wicomico County was the lowest July value since record-keeping began in 1949, and lower than the previous record (8.65 feet below land surface) set last year. This is the third consecutive month that the groundwater level was at a record low in well WI Cg 20.

Streamflow on the lower Delmarva Peninsula was also at record low levels in July, as indicated by Nassawango Creek in Worcester County, Maryland.

Groundwater in wells in Montgomery and Somerset Counties in Maryland were in the lowest 10th percentile. Despite the low water levels, half of the 26 wells used by the USGS to assess climatic conditions in the region of the wells were in the normal range.



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



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.

Reservoir Levels

Storage in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) dropped to 95 percent of available storage capacity, or 72.10 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 96 percent in June 2011 to 85 percent of normal storage capacity, with 9.01 billion gallons at the end of July.

July 2011	Percent available/ normal storage	Volume (billion gallons)	Source
Baltimore Reservoirs			Baltimore City – Environmental Services Division
Liberty	93%	34.10	
Loch Raven	97%	20.46	
Prettyboy	98%	17.54	
Total	95%	72.10	
Patuxent Reservoirs			Washington Suburban Sanitary Commission (WSSC)
Triadelphia	90%	5.02	
Duckett	80%	3.99	
Total	85%	9.01	