

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

August 2012 – Less extreme temperatures and above normal rainfall offer some relief to groundwater and streamflow levels

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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After several months of rainfall deficits, the area along the shores of the Chesapeake Bay and on the Delmarva Peninsula that had been experiencing intense drought conditions received enough rainfall to improve the hydrologic conditions and improve the drought status. August weather was wetter and cooler than it had been in June and July. Although there were still many

sites with below normal streamflow and groundwater levels, there are signs of recovery in some streams and wells Maryland, Delaware, and the District of Columbia.

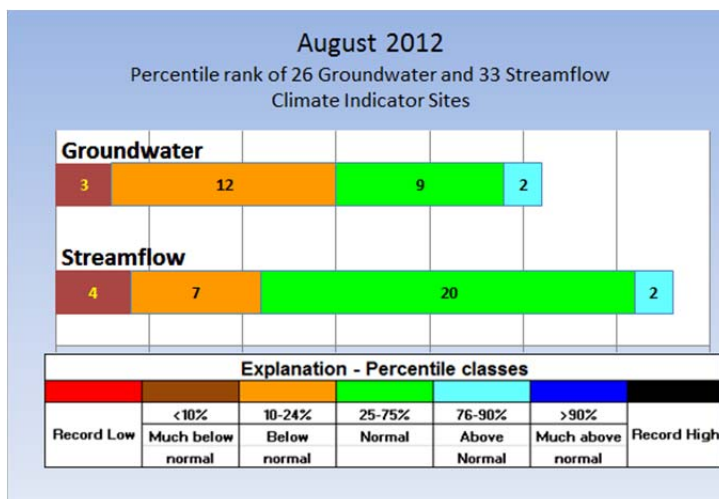
Groundwater levels were below normal in 15 of the 26 USGS monitoring wells, with groundwater levels at three of the sites ranking in the lowest 10th percentile. Groundwater levels at 9 wells were normal and at 2 wells in Frederick and Washington Counties, groundwater levels were above normal.

Monthly mean streamflow was normal at

20 of 33 streamflow gaging stations. Nassawango Creek in Worcester County, and the Choptank River in Caroline County, Maryland had been at record low levels in July, but recovered slightly (lowest 10th percentile) in August. Sites in Queen Anne's and Washington Counties had above normal monthly mean streamflow in August.

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.

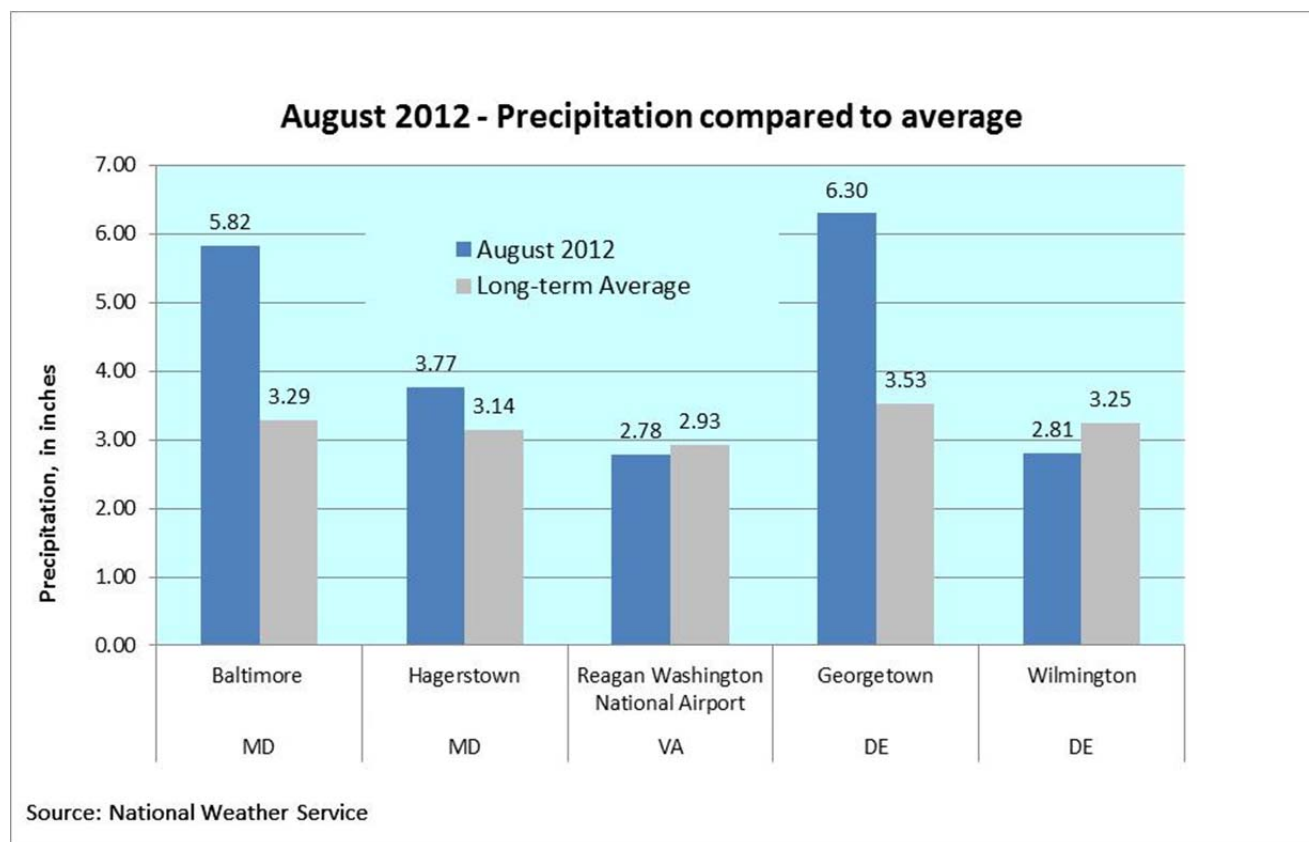
For example, a groundwater level in the 90th percentile is equal to or greater than 90 percent of the values recorded for that month.



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For the first time this year, monthly precipitation was above the long-term average for the climate normal period* at National Weather Service (NWS) stations in Baltimore and Hagerstown, Maryland, and Georgetown, Delaware. In Baltimore and Georgetown, rainfall was more than 2.5 inches above average. Rainfall in Wilmington, Delaware and at the Ronald Reagan Washington National Airport, near the District of Columbia, was slightly below the long-term average.

Temperatures were not as extreme as they had been earlier in the summer, although they were still above average. The lower temperatures combined with near normal to above normal rainfall allowed some of the groundwater and streamflow levels in Delaware, Maryland, and the District of Columbia, to rise.



**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.*

Until August when the weather patterns changed, precipitation had been below the long-term average since the year began and temperatures had been record-setting high in the Mid-Atlantic region during the summer. The Middle Atlantic River Forecast Center web site shows that the highest precipitation deficit since January 1 is in Charles County, Maryland, with more than a 10-inch deficit. Kent County, Delaware also had a rainfall deficit greater than 10 inches since January 1.

Sources:

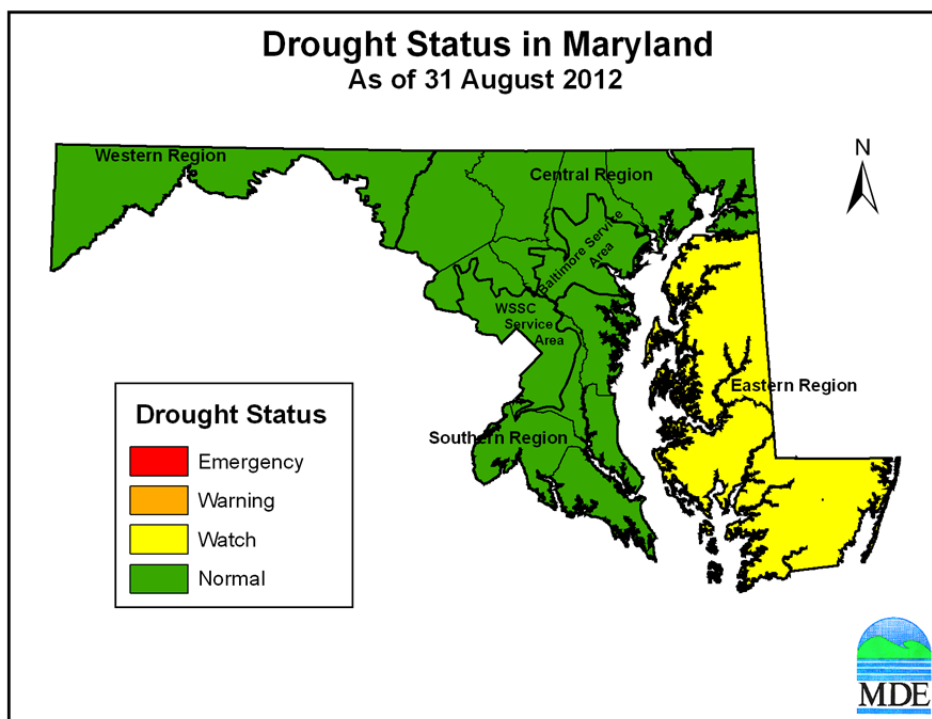
National Weather Service
MD and DC: <http://www.weather.gov/climate/index.php?wfo=lmw>
DE: <http://www.erh.noaa.gov/phi/>
Middle Atlantic River Forecast Center (MARFC): <http://www.weather.gov/marfc/Precipitation/Departures>

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Drought Status

The Maryland Department of the Environment (MDE) sets the drought status for Maryland, based on groundwater levels, streamflow, precipitation, and reservoir levels at specific sites. Rainfall in August allowed for drought recovery and the drought status in Maryland's Eastern Region was reduced to a drought watch and the Central Region is no longer in a drought status at the end of August.

For more details about the Maryland drought status, visit MDE's website:
<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 August 28, 2012 showed 9 percent of the State of Maryland in severe drought, down from 27 percent the previous week. For the entire state of Maryland, 48 percent is in drought status. The agricultural areas of the Delmarva Peninsula, which had the most intense drought conditions in the state, received significant rainfall in August.

In Delaware, the statewide percent area abnormally dry or in a drought status remained the same, but 13 percent of the area in severe drought status was moved to moderate drought. At the end of August, 78 percent of the State was in one of the four levels of 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.

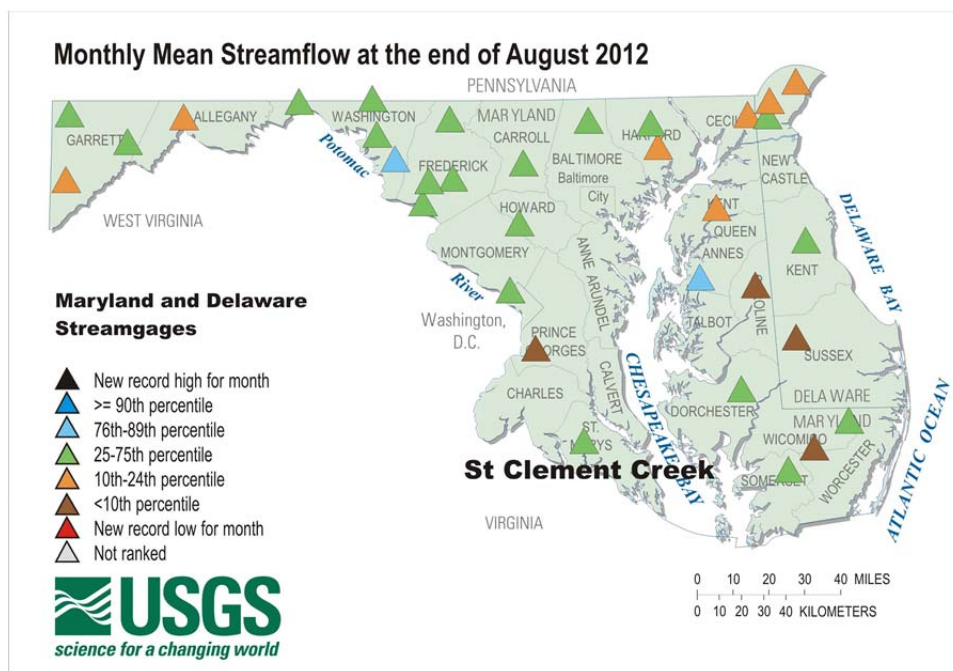
The streamflow locations chosen for the monthly water summary were selected based on the following criteria:

- 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 August 2012

At USGS streamflow-gaging stations used to monitor climatic response in Maryland, Delaware, and the District of Columbia, monthly mean streamflow was in the normal range at 20 of the 33 sites. Normal is between the 25th and 75th percentiles.

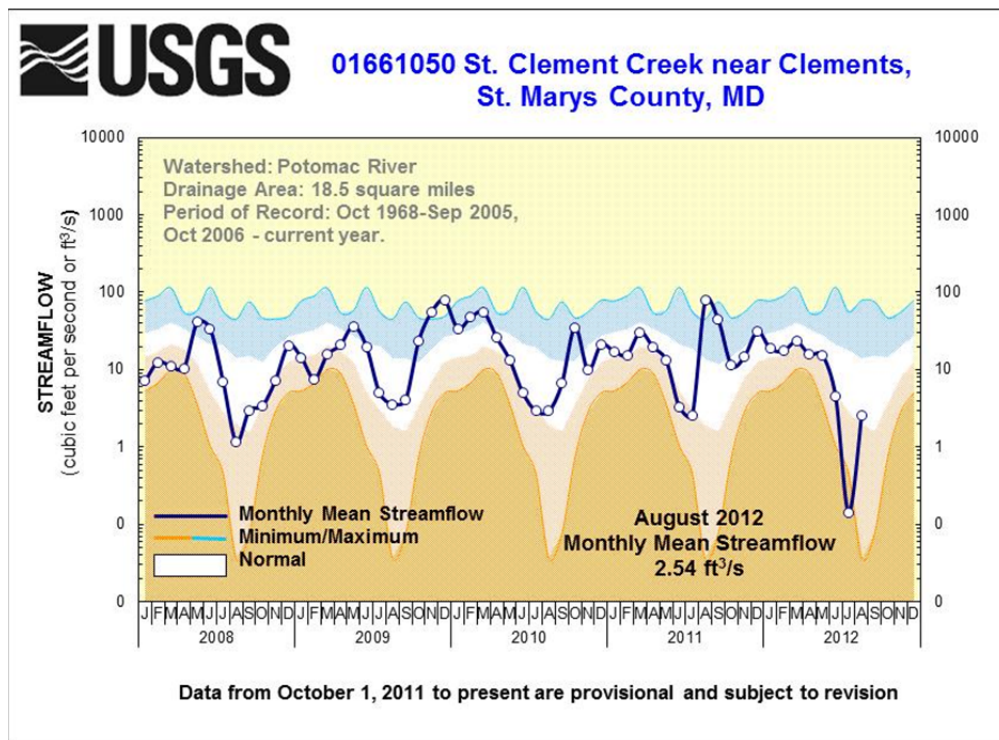
Monthly mean streamflow remains in the lowest 10th percentile at the following four streams: Choptank River, Nassawango Creek, and Piscataway Creek in Maryland, and Nanticoke River in Delaware. Streams with above-normal streamflow were in Queen Anne's and Washington Counties in Maryland.



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

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After setting a record low monthly mean streamflow in July, streamflow rose to the normal range on St. Clement Creek in St. Mary's County, Maryland in August. Monthly mean streamflow on the Pocomoke River also went from record-setting low in July to normal in August.



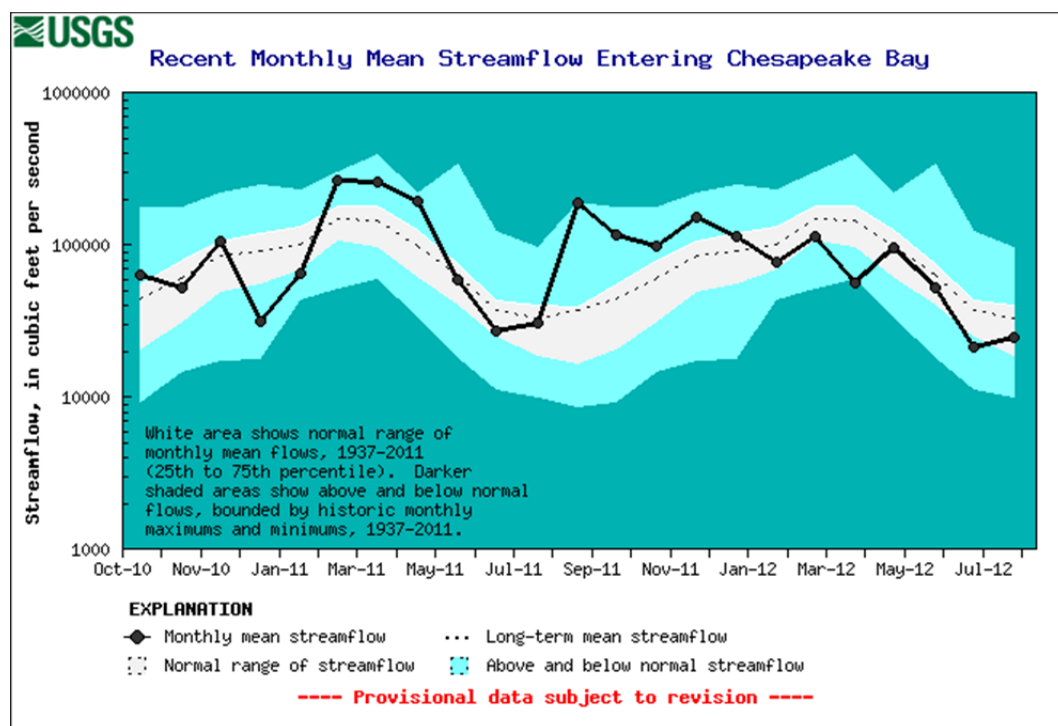
Five-year hydrographs can be viewed at:
<http://md.water.usgs.gov/surfacewater/streamflow/>

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. Monthly mean streamflow has dropped at a quicker rate than normal for several months.

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Estimated Streamflow to the Chesapeake Bay

The total freshwater streamflow to Chesapeake Bay rose to normal in August 2012. The estimated monthly mean streamflow entering the Bay during August 2012 was 25,100 ft³/s (provisional and subject to revision). Average (mean) monthly streamflow for August is between 18,700 ft³/s and 40,300 ft³/s. These statistics are based on a 75-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/recent/>

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Groundwater

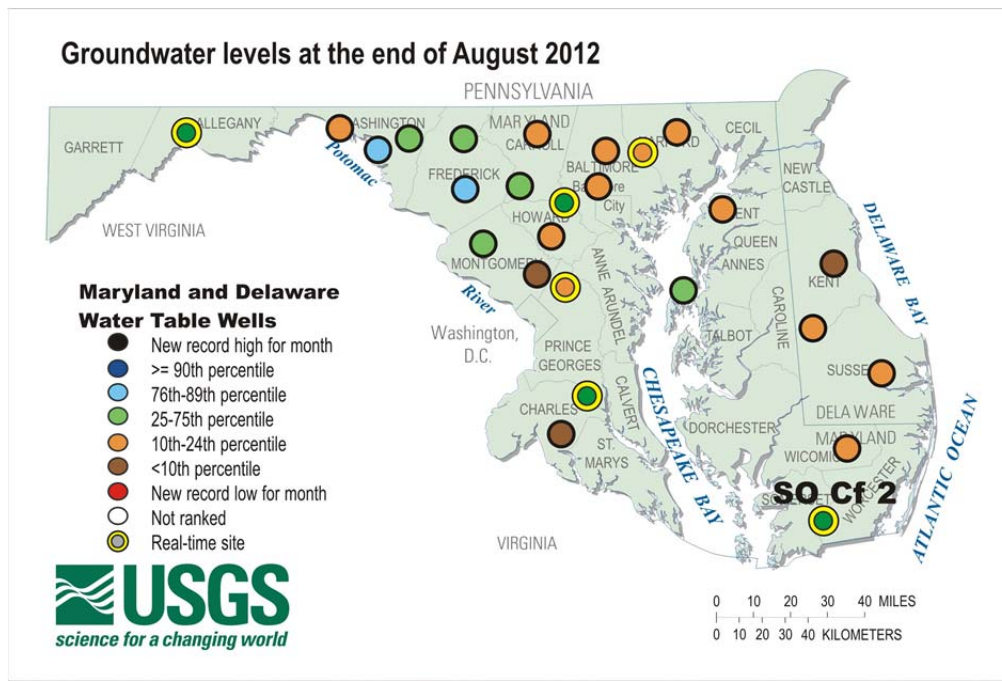
The USGS monitors groundwater levels in unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in climatic conditions. Twenty-six groundwater wells were selected based on the following criteria:

- 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.

August 2012 Groundwater Levels

Groundwater levels used to monitor climatic conditions in Maryland and Delaware were below normal in 15 of the 26 wells and normal in 9 of the 26 wells in August. Normal is between the 25th and 75th percentiles. Only wells in Frederick and Washington Counties had groundwater levels above normal in August.

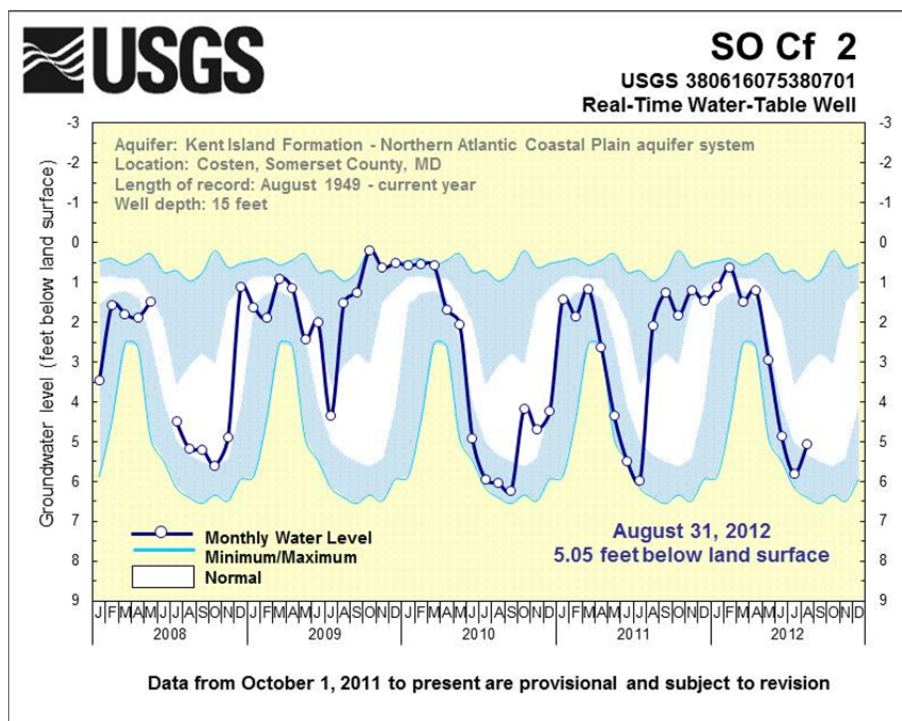
All three USGS monitoring wells in Delaware had groundwater levels below normal in August, but some recovery had occurred in the well in Sussex County.



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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Data from the USGS observation well in the shallow groundwater systems in Somerset County, Maryland (SO Cf 2) show that the groundwater level stopped descending and rose to normal in August. A similar response was seen in the wells in Wicomico and Queen Anne's Counties in Maryland.



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

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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 August in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) dropped 2 percent to 97 percent of available storage capacity and contained 73.62 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 9.5 percent to 78 percent of normal storage capacity at the end of August 2012, with 8.66 billion gallons of water.

August 2012	Percent available/ normal storage	Volume (billion gallons)	Source
Baltimore Reservoirs			Baltimore City – Environmental Services Division
Liberty	94%	34.72	
Loch Raven	100%	21.20	
Prettyboy	99%	17.70	
Total	97%	73.62	
Patuxent Reservoirs			Washington Suburban Sanitary Commission (WSSC)
Triadelphia	78%	4.38	
Duckett	78%	4.28	
Total	78%	8.66	