

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

July 2012 – Nassawango Creek sets all-time record low monthly mean streamflow. Three more streams at monthly record lows – Delmarva Peninsula and Southern Maryland

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.

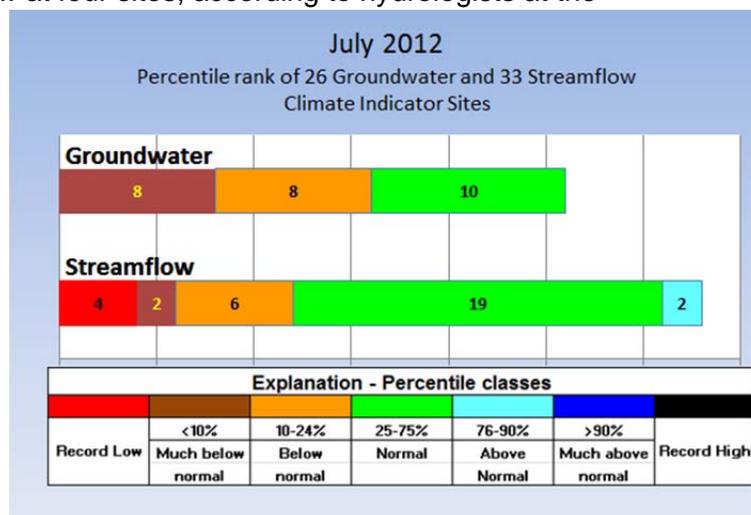
The sites used in this water summary were carefully selected to show the response of streamflow and groundwater levels to weather conditions. Ideally, these sites will show no effects from human influences. The streamflow and groundwater data are ranked in comparison to the historical record and summarized.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

USGS July 2012 Water Conditions Summary

Although precipitation was close to normal in July, it has been below normal all year and there have been many record high temperature records set at weather stations in Maryland, Delaware, and the District of Columbia. These conditions are primarily affecting streamflow and groundwater levels in the southern Maryland and Delmarva Peninsula regions where monthly mean streamflow was at a new July record low at four sites, according to hydrologists at the U.S. Geological Survey in Baltimore, Maryland. In many parts of the region, groundwater levels and streamflow were normal and some were even above normal.

Groundwater levels were below normal at 16 well sites for the second consecutive month, with 8 of the sites ranking in the lowest 10th percentile.

Monthly mean streamflow on Nassawango Creek in Worcester County, Maryland, was at the lowest level since record-keeping began in 1949. Another three streams had record low monthly mean streamflow and two others ranked below the 10th percentile.



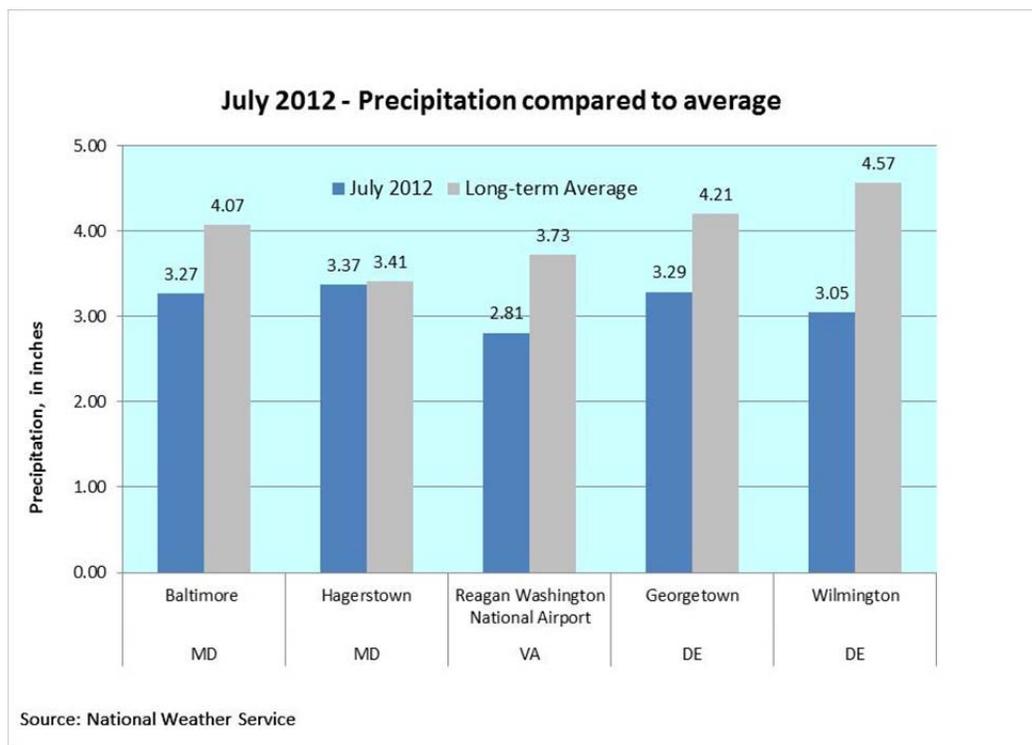
A **percentile** is a value on a scale from 0 to 100 that indicates the percent of a distribution that is equal to or below it. A percentile between 25 and 75 is considered normal.

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

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

July 2012 Precipitation and Weather

For the seventh consecutive month (since the start of 2012), precipitation was below the long-term average for the climate normal period* at National Weather Service (NWS) stations in Maryland, Delaware, and the District of Columbia. Although July rainfall was close to normal at all five NWS stations, there were many record high temperatures set in Delaware, Maryland, and the District of Columbia, and this has likely affected groundwater and streamflow levels.



**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.*

Since the year began, precipitation has been below the long-term average and temperatures have been warmer than average in the Mid-Atlantic region. The Middle Atlantic River Forecast Center web site shows that the highest precipitation deficit since January 1 is in Kent County, Delaware (a 10-inch deficit). All counties on the Delmarva Peninsula in Maryland and Delaware have a rainfall deficit greater than 5 inches for the year to date.

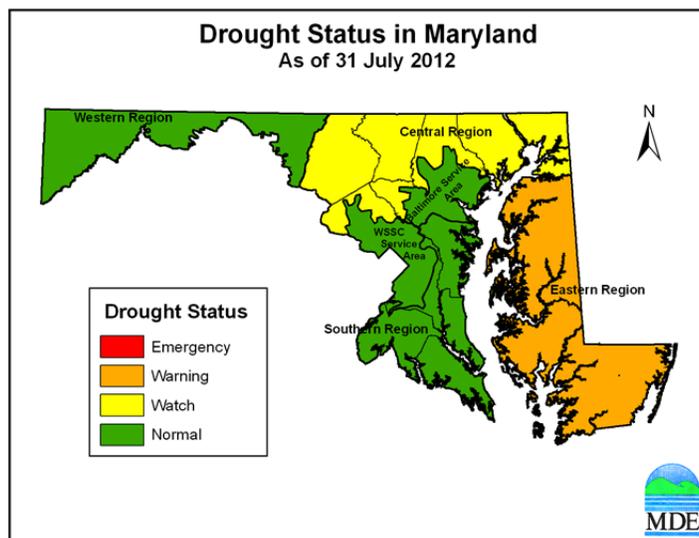
Sources:
National Weather Service
MD and DC:
<http://www.weather.gov/climate/index.php?wfo=lwx>
DE: <http://www.erh.noaa.gov/phi/>
Middle Atlantic River Forecast Center (MARFC):
<http://www.weather.gov/marfc/Precipitation/Departures>

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

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. At the end of July, the drought status in Maryland in the Eastern Region has moved from a watch to a warning.

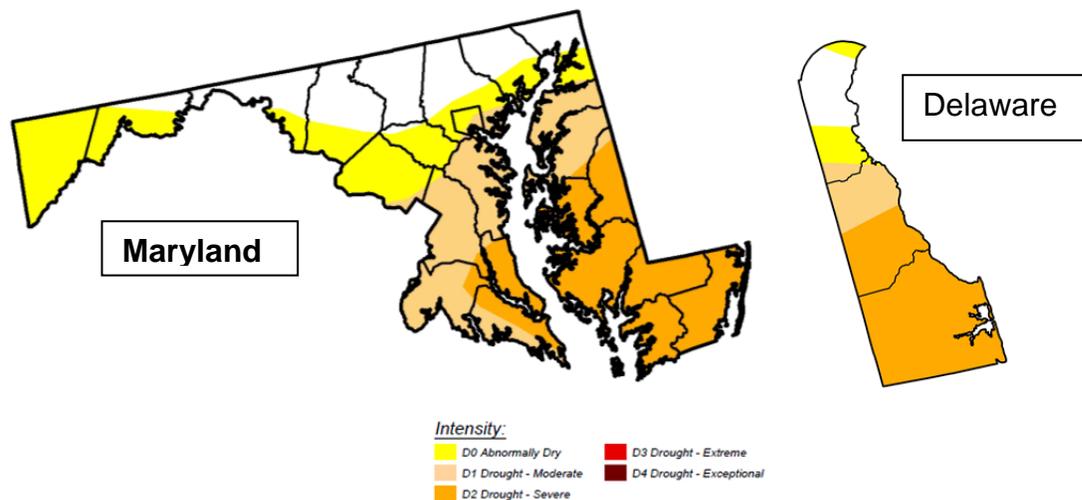
A drought warning calls for voluntary water use restrictions with the goal of reducing water use by 10% - 15%. Citizens who live or work in the Eastern region are encouraged to reduce their water use as much as possible. For more information about conserving water, please visit MDE's [water conservation webpages](#).



The Central Region remains in a drought watch and the Western and Southern Regions are Normal. 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 July 31 showed 29 percent of the State of Maryland in severe drought, up from 20 percent the previous week. The area experiencing the most intense drought conditions continue to be along the shores of the Chesapeake Bay and on the Delmarva Peninsula. While conditions have become more severe on the Delmarva Peninsula, the region of Maryland with no drought status has increased from 18 percent to 24 percent. In Delaware, 86 percent of the State is abnormally dry or in a drought status, with 64 percent of the State in severe drought status.

U.S. Drought Monitor: July 31, 2012



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://droughtmonitor.unl.edu>

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

Streamflow

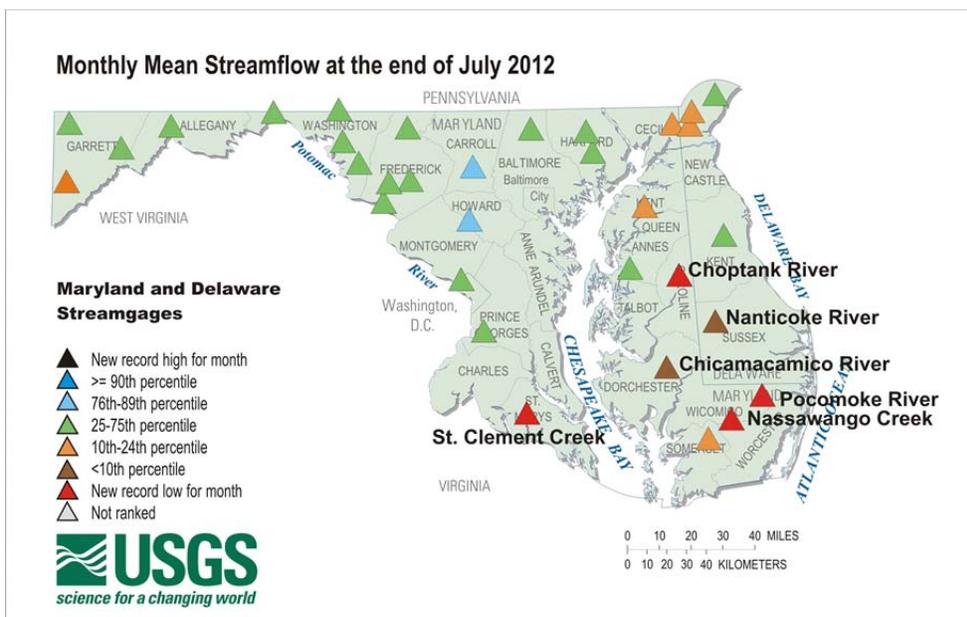
Streamflow data are used for many purposes. A few of the most obvious uses are to assess water supply and the risk of droughts and floods. Streamflow data are also used to calculate loads of chemical constituents and to assess how biological communities are affected by hydrologic conditions. The USGS 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 July 2012

The monthly mean streamflows in Maryland, Delaware, and the District of Columbia ranged from above normal to record-setting low levels across the region. Despite near normal rainfall at NWS Stations, there were four streams with record low monthly mean streamflow (see table). These are shown as red triangles on the map and except for the Choptank River, they are south of the weather station in Georgetown, Delaware. There were two additional streams in the lowest 10th percentile in the region.



Record low monthly mean streamflow in cubic feet per second (ft ³ /s)								
Station number	Streamflow-gaging station name	County	Year record-keeping began	July 2012 (ft ³ /s)	Previous July record low (ft ³ /s)	Year	Previous all-time record low (ft ³ /s)	Year
1491000	Choptank River near Greensboro, MD	Caroline	1948	8.25	9.49	1977		
1485500	Nassawango Creek near Snow Hill, MD	Worcester	1949	1.18	1.45	2011	1.24	2002
1485000	Pocomoke River near Willards, MD	Worcester	1949	4.05	4.06	2010		
1661050	St. Clement Creek near Clements, MD	St Mary's	1968	0.14	0.46	1999		

At 19 (48 percent) of the USGS streamflow-gaging stations used to monitor climatic response in Maryland, Delaware, and the District of Columbia, the monthly mean streamflow was in the normal range. Normal is considered between the 25th and 75th percentiles. Streams with above-normal streamflow were in Carroll and Montgomery Counties in Maryland.

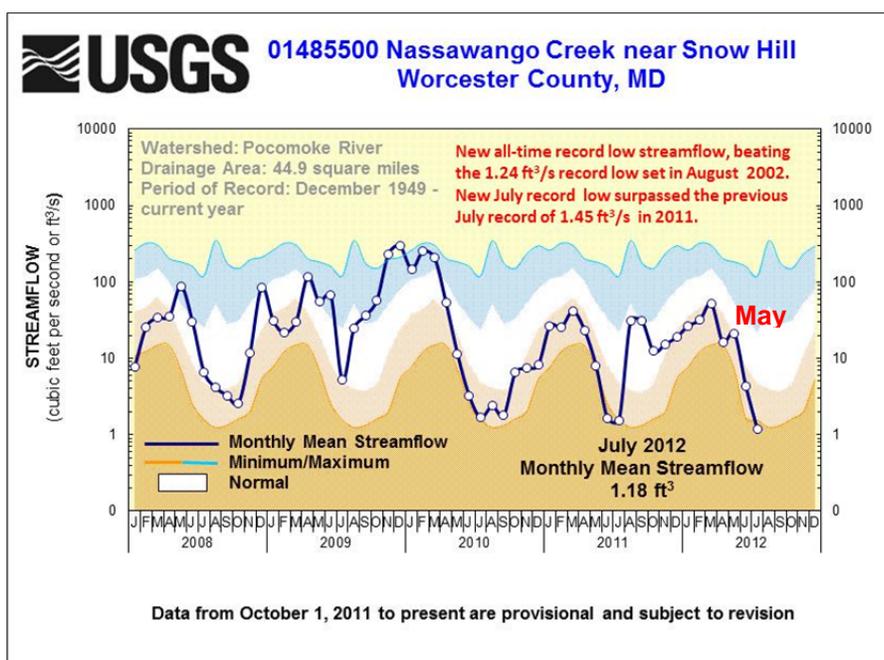
U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

Monthly mean streamflow on the Nassawango Creek in Worcester County, Maryland set a new all-time record low with 1.18 cubic feet per second (ft³/s), beating the record low of 1.24 ft³/s set in August 2002. It is the lowest monthly mean streamflow at this site since record-keeping began in 1949.

The July 2012 monthly mean streamflow was also a new monthly record low, which broke the previous record low of 1.45 ft³/s set in 2011. Since the year began, streamflow on Nassawango Creek was only in the normal range during May, and has been below normal during all other months.

The table shows that except for October, all monthly record lows were set in 2002 or more recent. The all-time record for both high and low streamflow on Nassawango Creek is listed in bold type. Preliminary data show that there were 13 days in July 2012 where new daily record lows were set.

Record low monthly mean streamflow at Nassawango Creek near Snow Hill, Maryland		
Record Low		
Month	Year	ft ³ /s
Jan	2008	7.71
Feb	2002	12.4
Mar	2006	14.9
Apr	2006	14.8
May	2011	6.63
Jun	2011	1.63
Jul	2012	1.18
Aug	2002	1.24
Sep	2007	1.33
Oct	1998	1.62
Nov	2007	1.99
Dec	2007	5.32



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

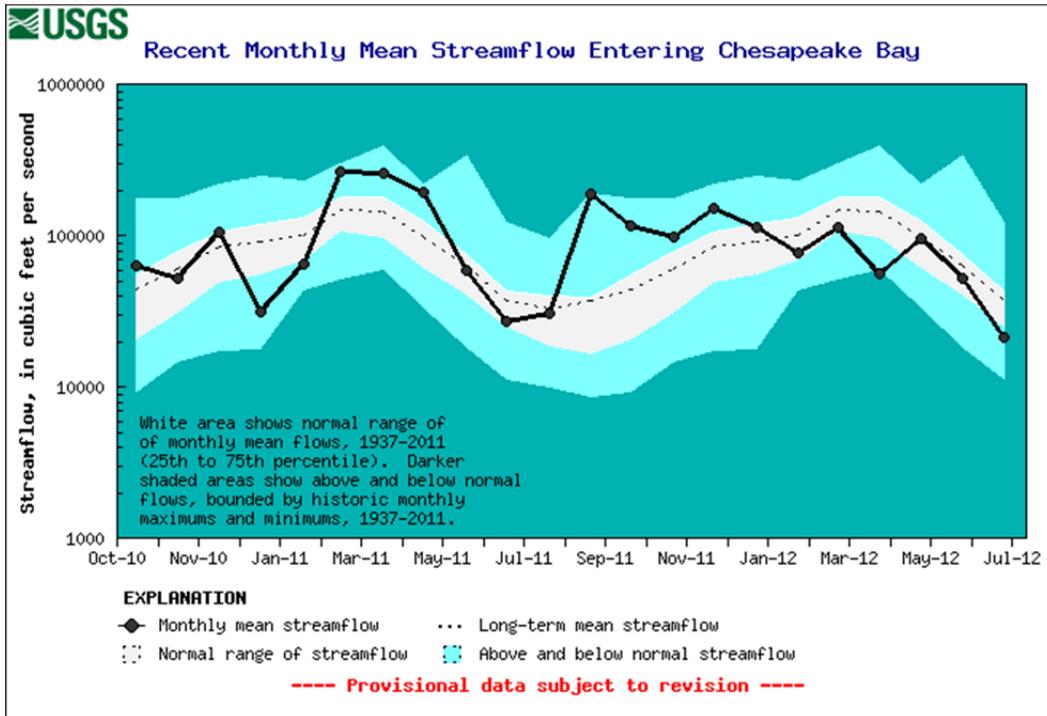
The dark line in the 5-year hydrograph represents the monthly mean streamflow for this period and the white band shows the normal range (25th to 75th percentile) based on the period of record. The maximum monthly mean streamflow is at the top of the blue shaded section, and the lowest monthly mean streamflow is at the top of the dark orange area. Monthly mean streamflow has dropped at a quicker rate than normal for several months.

The nearby Pocomoke River shows a similar trend and also set a record low monthly mean streamflow, and the flow has been below normal since the year began. Streamflow was above normal at both of these sites last fall after record-setting rainfall in the region.

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

Estimated Streamflow to the Chesapeake Bay

The total freshwater streamflow to Chesapeake Bay dropped below normal in July 2012. The estimated monthly mean streamflow entering the Bay during July 2012 was 21,500 ft³/s (provisional and subject to revision). Average (mean) monthly streamflow for July is between 24,800 and 43,400 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/>

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

Groundwater

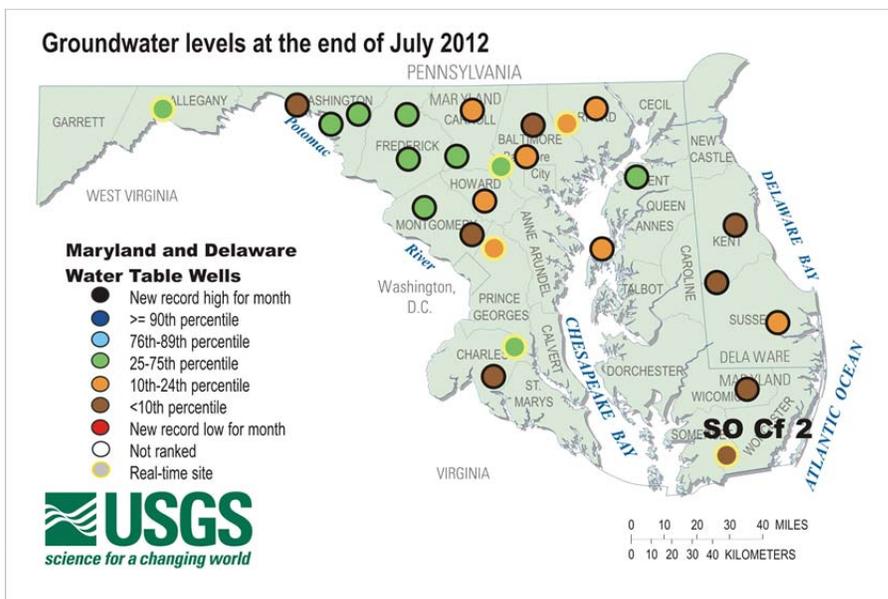
The USGS monitors groundwater levels in unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in climatic conditions. Twenty-six groundwater wells were selected based on the following criteria:

- 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.

July 2012 Groundwater Levels

Groundwater levels used to monitor climatic conditions in Maryland and Delaware were in the lowest 10th percentile at eight wells, but there were no record low groundwater levels in July. Although the same percentage, or 62 percent of the groundwater levels were below normal in July, this is an increase of two wells in the lowest 10th percentile compared to June conditions. These wells are in central Maryland and most of the Delmarva Peninsula, including Delaware.

Groundwater levels were normal in 10 of the 26 wells in July. Normal is considered between the 25th and 75th percentiles. Since June, there was some improvement in groundwater levels in wells in Carroll, Charles, and Queen Anne's Counties in Maryland, although groundwater levels in six wells have decreased across Maryland and Delaware from June to July.

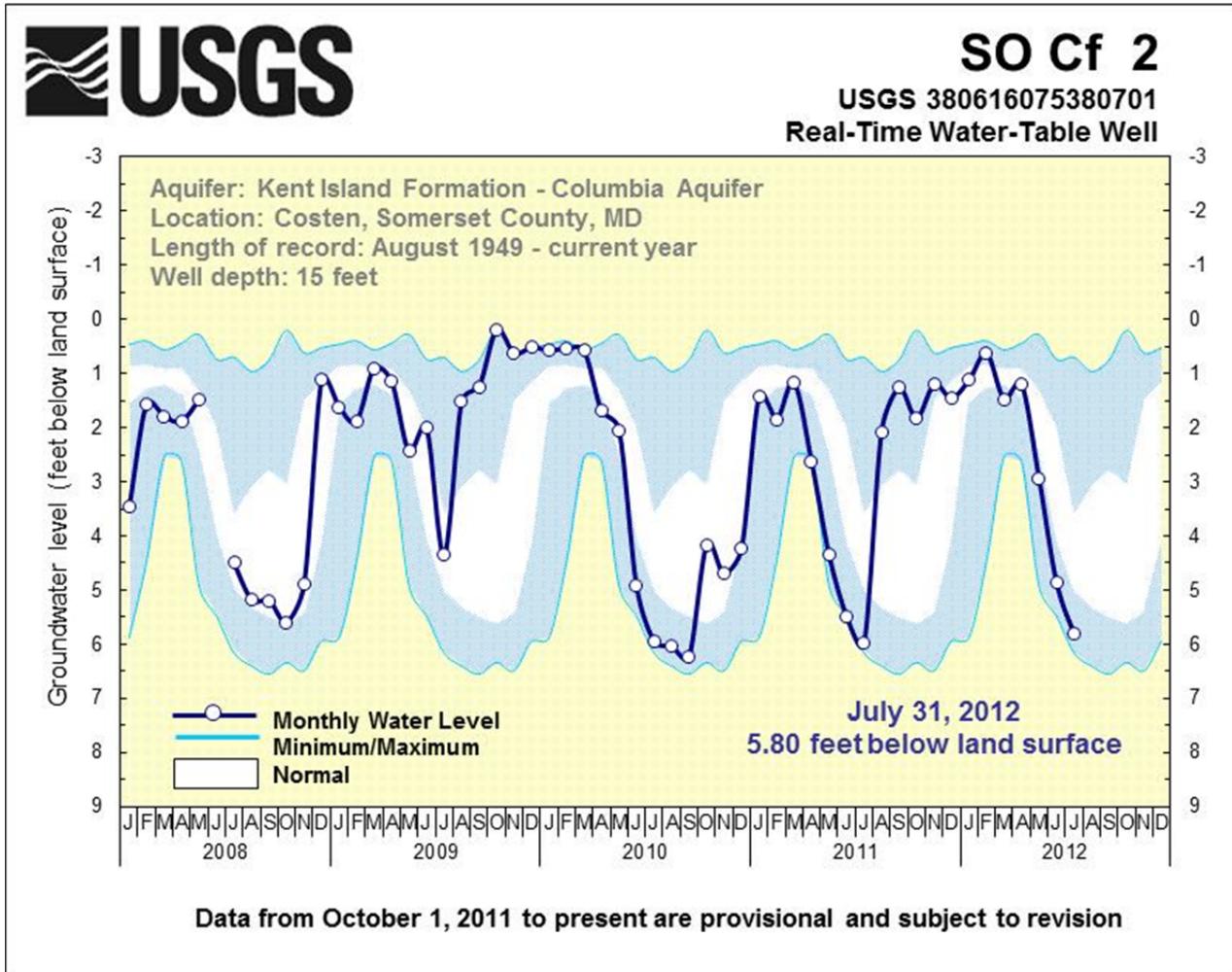


To access the clickable groundwater map, go to:

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

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

Data from the USGS observation well in the shallow groundwater systems in Somerset County, Maryland (SO Cf 2) show how the groundwater level continues to decline at a rate greater than the historical seasonal trend. The July 2012 groundwater level in this well is in the lowest 10th percentile. The monitoring well in Wicomico County also had groundwater levels in the lowest 10th percentile and is consistent with streams in Wicomico and Worcester Counties setting record low monthly mean streamflows in July.



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.

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

Reservoir Levels

Reservoir storage at the end of July in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) was at 99 percent of available storage capacity and contained 74.78 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 87.5 percent of normal storage capacity at the end of July 2012, with 9.30 billion gallons of water.

July 2012	Percent available/ normal storage	Volume (billion gallons)	Source
Baltimore Reservoirs			Baltimore City – Environmental Services Division
Liberty	98%	35.88	
Loch Raven	100%	21.20	
Prettyboy	99%	17.70	
Total	99%	74.78	
Patuxent Reservoirs			Washington Suburban Sanitary Commission (WSSC)
Triadelphia	90%	5.02	
Duckett	85%	4.28	
Total	87.5%	9.30	