

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

USGS July 2017 Water Conditions Summary

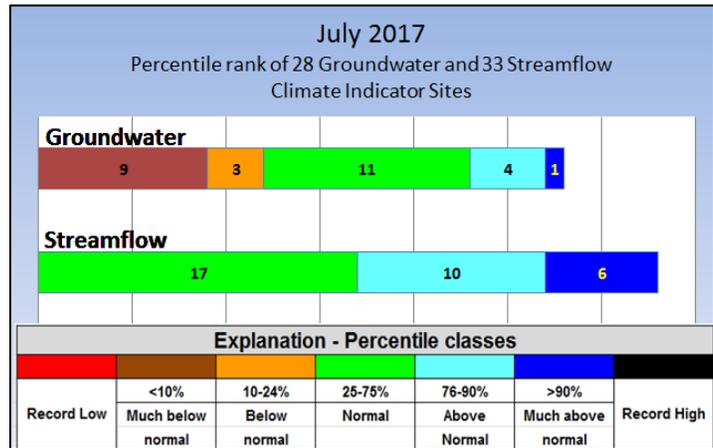
At sites used to monitor the response of water resources to changes in weather conditions in Maryland, Delaware, and the District of Columbia in July 2017, 39 percent of groundwater levels and 52 percent of monthly mean streamflows were in the normal range. Since June, groundwater levels decreased at 20 wells and increased at 8 wells. Monthly mean streamflows decreased at 11 streamgages and increased at 22 streamgages.

In July, groundwater levels at 11 of 28 USGS observation wells were in the normal range (25th-75th percentiles). Groundwater levels were above normal in 5 observation wells and below normal in 12 wells, with 9 wells below the 10th percentile.

Monthly mean streamflows were in the normal range at 17 of 33 USGS streamgages. Streamflow was above normal at 16 streamgages.

July 2017 freshwater flows to the Chesapeake Bay were in the normal range. Precipitation was above the long-term average at all five National

Weather Service (NWS) Mid-Atlantic weather stations. Hydrologic and weather data have not been reviewed, and are therefore provisional and subject to revision.



*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.*

Why is it important for the USGS to collect and analyze water-resources data?

USGS water data are valuable to the public, researchers, water managers, planners, and agricultural users, especially during extreme conditions like floods and droughts. The USGS is known for its consistent measurement techniques and the most extensive set of historical groundwater and streamflow data available to the public. Since these long-term data were collected during wet and dry periods, they can be used to assess how water resources respond to changes in temperature and precipitation, and to evaluate how current data compare to the historical data. The uniformity of the dataset enables multi-state comparisons and other comparative statistical analyses that better inform policy makers of possible water-resources conditions they might encounter in the future.

The sites used in this water summary were carefully selected to include long-term datasets, and show the response of streamflow and groundwater levels to weather conditions, rather than the effects of human influences. Of the USGS sites presented in this summary, 13 wells and 29 streamgages have more than 50 years of data. The current streamflow and groundwater data are ranked in comparison to the historical record and summarized. In addition to groundwater and streamflow data, this summary includes precipitation and temperature data, reservoir levels, and freshwater streamflow to the Chesapeake Bay to give a more complete picture of the region's water resources.

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Weather Conditions

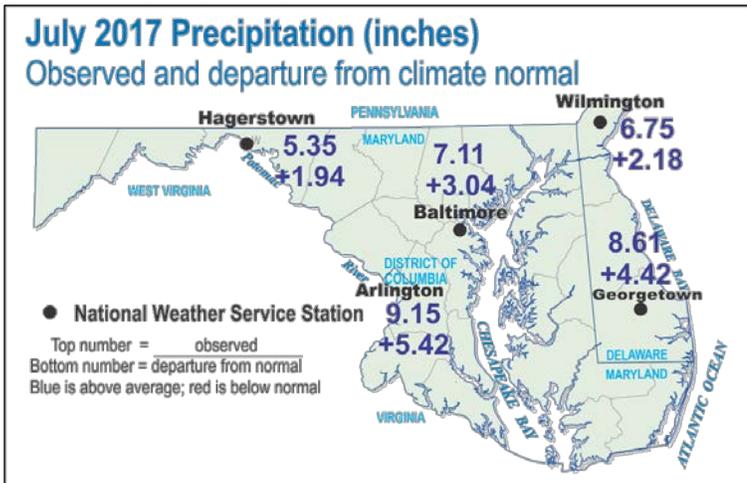
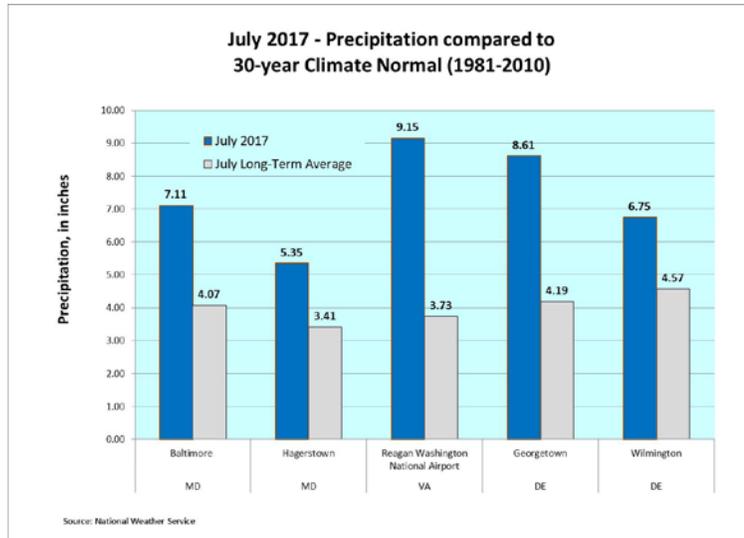
Data from five Mid-Atlantic NWS stations are used to present monthly precipitation and temperature data. The NWS uses averages of data over the 30-year climate normal period between 1981 through 2010.

During drought periods, the status from the National Drought Mitigation Center (U.S. Drought Monitor) and the Maryland Department of the Environment (MDE) is included. There is currently no drought in Maryland, Delaware, or the District of Columbia.

July 2017 Precipitation

July precipitation was above the long-term average and more than double the amount at two of the five Mid-Atlantic NWS weather stations. The precipitation graph and map show July precipitation and the departure from the 30-year climate normal. Most of the rain occurred over 2 days.

July precipitation was lowest in Hagerstown, Maryland with 5.35 inches, and highest in Arlington, Virginia with 9.15 inches, which also had the largest departure from the climate normal, where precipitation was 5.42 inches above the 30-year climate normal.



National Weather Service Stations

- Baltimore** = Baltimore/Washington International Thurgood Marshall Airport (BWI)
- Georgetown** = Georgetown, Sussex County Airport
- Hagerstown** = Hagerstown Regional Airport
- Arlington** = Ronald Reagan Washington National Airport
- Wilmington** = New Castle Airport

Source: National Weather Service
MD and DC: <http://www.weather.gov/climate/index.php?wfo=lxw>
DE: <http://www.weather.gov/climate/index.php?wfo=phi>

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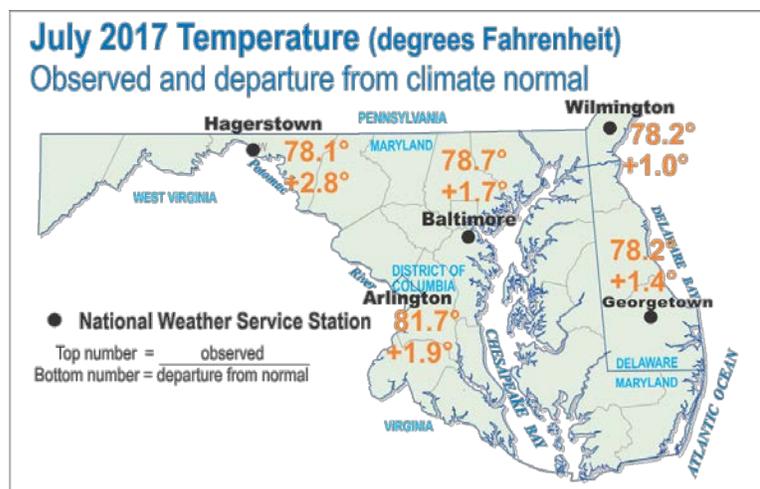
The NWS precipitation departures for July 2017 are shown on the map above for Delaware, the District of Columbia, Maryland, Virginia, and West Virginia. This region includes parts of the Potomac and Susquehanna River Basins and other rivers, most of which eventually flow to the Chesapeake and Delaware Bays.

Precipitation in July 2017 was above average in all counties in Maryland and Delaware, and greater than the 75th percentile in 70 percent of the counties in Maryland and Delaware.

The NWS precipitation data and maps can be accessed here:
http://www.weather.gov/marfc/Precipitation_Departures

July 2017 Temperatures

July temperatures at the five Mid-Atlantic NWS stations were above the climate normal and ranged from 78.1 to 81.7 degrees Fahrenheit. The highest departure from average for July for the fourth consecutive month was in Hagerstown, Maryland, at 2.8 degrees above normal.



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Groundwater

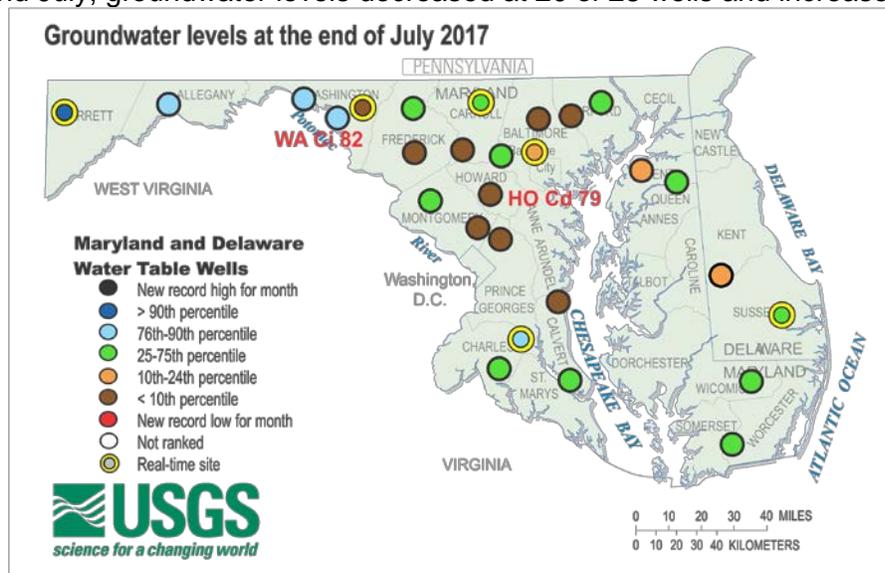
The USGS monitors groundwater levels in surficial or unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in weather conditions. The groundwater wells used for the monthly water summary were selected based on the following criteria:

- Located in a surficial or unconfined (water-table) aquifer
- Open to a single, known hydrogeologic unit/aquifer
- Groundwater hydrograph generally reflects response to weather
- No indicated nearby pumpage, and likely to remain uninfluenced by pumpage 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 a casing – dug wells are generally not used
- Water levels show no apparent hydrologic connection to nearby streams
- Well rarely goes dry
- Long-term accessibility likely, such as on public land

In the Maryland, Delaware, and District of Columbia region, it is useful to compare current data to historical data, such as data from the droughts of 2002 and the 1960s. There are 11 wells that have over 60 years of groundwater data, and 23 wells have more than 30 years of groundwater data as of 2017.

July 2017 Groundwater Levels

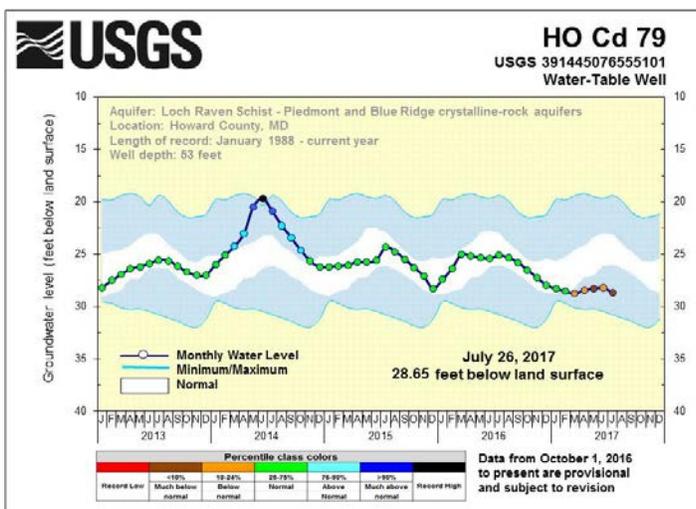
Thirty-nine percent, or 11 USGS observation wells, had groundwater levels within the normal range in July. Groundwater levels were above normal at 5 observation wells and below normal at 12 wells, including 3 wells in the 10th-24th percentile range, and 9 wells below the 10th percentile. Between June and July, groundwater levels decreased at 20 of 28 wells and increased at 8 wells.



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

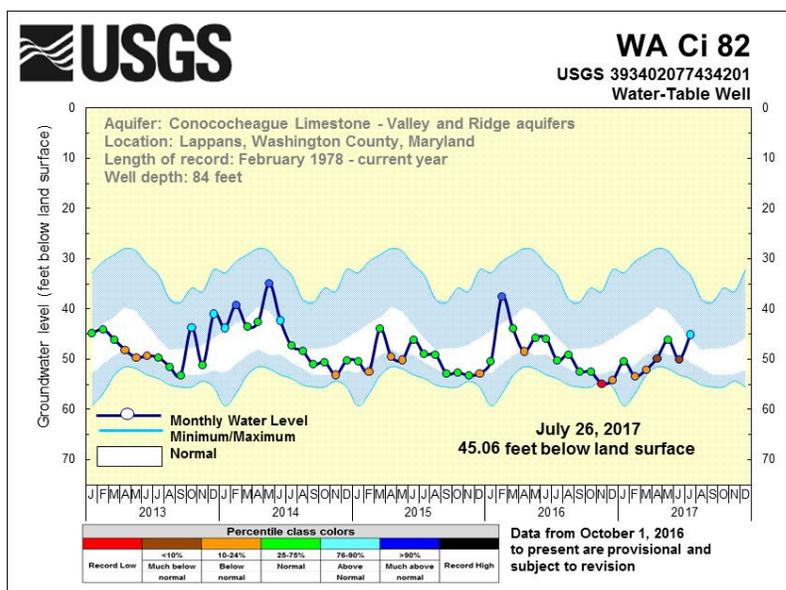
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In the two 5-year hydrographs presented below, groundwater levels are shown as a dark blue line. Each monthly measurement is colored according to the percentile rank compared to the historical values at the site for the month. The normal range is displayed as a white band, and is based on the period of record. The maximum water level is at the top of the upper blue section, and the minimum water level is at the bottom of the lower blue area in the graph.



The groundwater level at observation well HO Cd 79, in Howard County, Maryland, dropped between June and July, and was below normal at 28.65 feet below land surface. Groundwater levels at this well have been below normal for the past 5 consecutive months. Normal July groundwater levels at this well range from 23.17 to 26.11 feet below land surface. Record-keeping at this well began in January 1988.

The groundwater level at USGS observation well WA Ci 82, in Washington County, Maryland, rose between June and July. The groundwater level was 45.06 feet below land surface. The July normal range of groundwater levels is between 45.62 and 50.75 feet below land surface. Record-keeping at this well began in February 1978.



Five-year groundwater hydrographs can be viewed at:
http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties

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Streamflow

Streamflow data are most commonly used for assessing water supply and to determine 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 streamgages chosen for the monthly water summary were selected based on the following criteria:

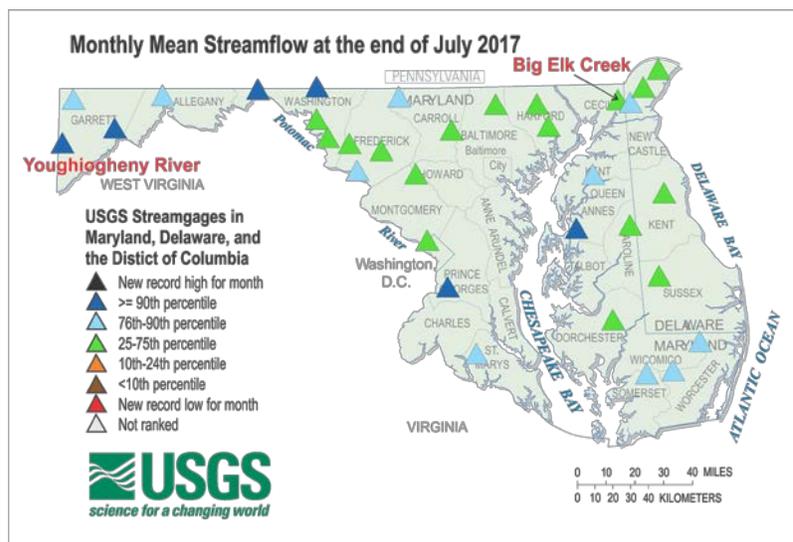
- Minimum period of record is 10 years of continuous data
- Watershed areas greater than 5 square miles
- Streamflow is not regulated, such as by a dam or diversion, and it has relatively natural flow
- Streamflow data reflect a response to weather conditions
- Most of the surrounding area and watershed are not urban

Of the 33 streamgages used in this summary, 22 have more than 60 years of data, allowing for comparison to data from the historical droughts of 2002 and the 1960s. All 33 streamgages have at least 30 years of monthly mean streamflow data.

July 2017 Streamflow

Monthly mean streamflows were in the normal range at 52 percent or 17 of 33 selected USGS streamgages. Streamflow was above normal at 16 streamgages, including 10 streamgages between the 76th and 90th percentiles, and 6 streamgages above the 90th percentile.

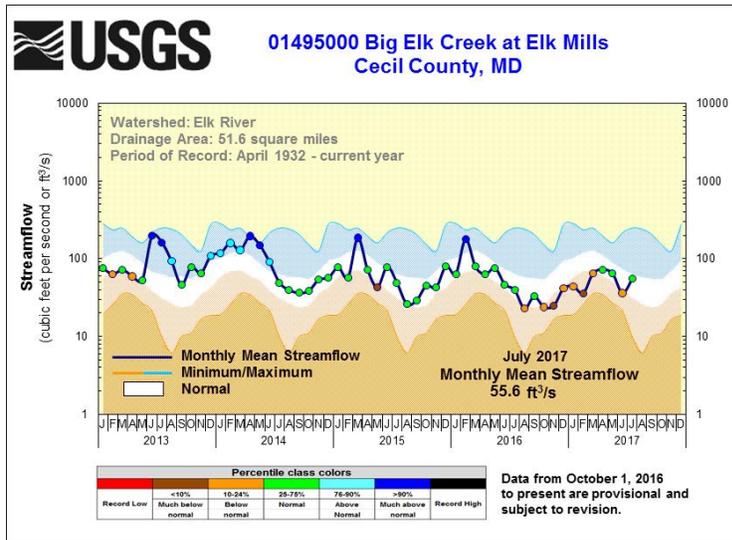
Streamflow decreased at 11 streamgages and increased at 22 streamgages between June and July.



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

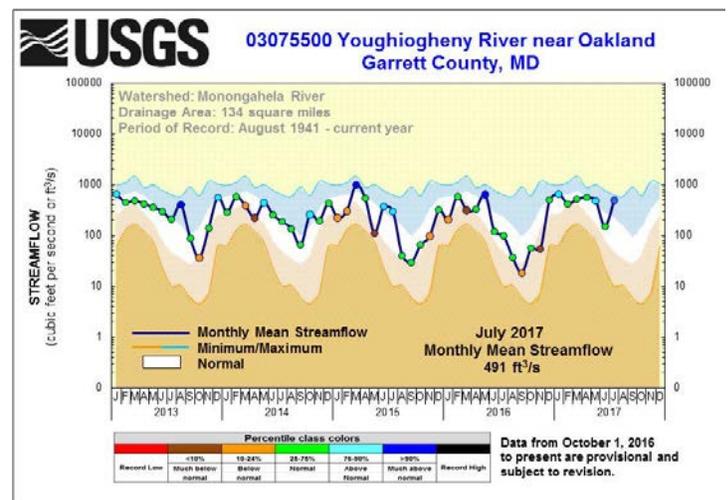
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In the hydrograph for the selected streamgauge, the dark line in the 5-year hydrograph represents the monthly mean streamflow for this period, and the white band shows the normal range (25th-75th percentiles) based on the period of record. The maximum monthly mean streamflow is at the top of the blue shaded section, and the lowest monthly mean streamflow is at the bottom of the tan area. Each monthly mean streamflow is colored according to the percentile rank compared to the historical data for the month.



At Big Elk Creek at Elk Mills in Cecil County, Maryland, the monthly mean streamflow increased between June and July, and was at 55.6 cubic feet per second (ft³/s), which is in the normal range. The normal range for July is between 31.5 ft³/s and 63.6 ft³/s. Record-keeping at this streamgauge began in April 1932.

At Youghiogheny River near Oakland, in Garrett County, Maryland, the monthly mean streamflow increased between June and July and was in the 90th percentile at the end of July. July monthly mean streamflow was 491 ft³/s. The normal range is between 49.0 ft³/s and 244 ft³/s for July. Record-keeping at this streamgauge began in August 1941.



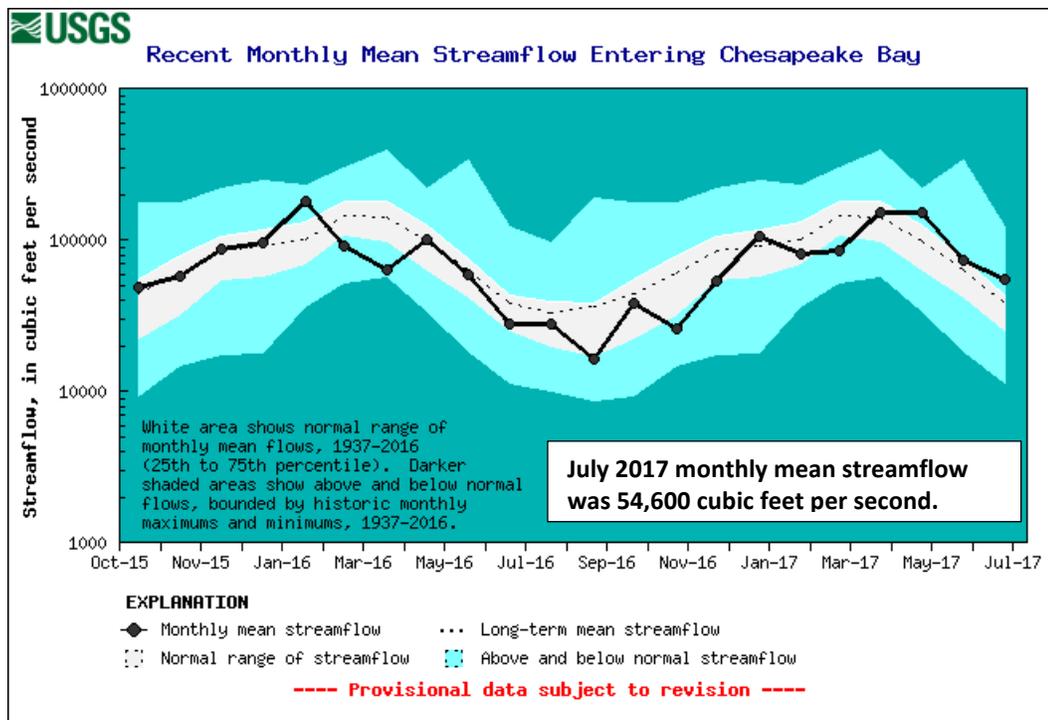
Five-year hydrographs can be viewed at:
<http://md.water.usgs.gov/surfacewater/streamflow/>

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

Estimated Streamflow to the Chesapeake Bay

The estimated monthly mean streamflow entering Chesapeake Bay during July 2017 was 54,600 ft³/s. This value, which is provisional and subject to revision, is considered to be in the above normal range. Normal July streamflow entering the Bay is between 25,000 and 43,800 ft³/s, the 25th and 75th percentiles, respectively, of all July values. Average (mean) monthly streamflow for July is 38,600 ft³/s. These statistics are based on an 80-year period of record.

Runoff in the Chesapeake Bay watershed carries pollutants, such as nutrients and sediment, to rivers and streams that drain to the Bay. The amount of water flowing into the Chesapeake Bay from its tributaries has a direct impact on how much pollution is in the estuary. It also affects the salinity levels that are important for the survival of fish, crabs, and oysters, with regard to the location and size of breeding and reproductive zones. Generally, as river flow increases, more nutrient and sediment pollution enters the Bay.



More information on freshwater flow to the Bay can be found here:
<http://md.water.usgs.gov/waterdata/chesinflow/>

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Baltimore and Patuxent Reservoir Levels

Baltimore City’s Department of Public Works provides finished drinking water from three reservoirs (Loch Raven, Liberty, and Prettyboy) to 1.8 million people daily in Baltimore City and parts of Baltimore, Anne Arundel, and Howard Counties in Maryland. Carroll and Harford Counties in Maryland also receive raw water from the Baltimore reservoirs. At the end of July 2017, available reservoir storage in the Baltimore Reservoirs was 74.15 billion gallons, or 97.76 percent of available storage capacity (total or full storage is 75.85 billion gallons of water).

The Triadelphia and Duckett Reservoirs serve 1.8 million residents in parts of Charles, Howard, Montgomery, and Prince George’s Counties in suburban Maryland around the District of Columbia, and are managed by the Washington Suburban Sanitary Commission (WSSC).

The stored water quantity for the Triadelphia and Duckett Reservoirs at the end of July 2017 was 6.81 billion gallons, which is about 64 percent of normal storage capacity for the two Patuxent reservoirs. The storage numbers were updated in July 2017 by the WSSC. Normal storage refers to the volume that is useable for water supply. The full capacity of the two Patuxent reservoirs is 11.93 billion gallons, which is higher than normal storage (10.57 billion gallons); therefore, full capacity values can exceed 100 percent of normal storage.

Note: Water storage in the Triadelphia Reservoir was drawn down for anticipated construction during the summer of 2017.

