

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

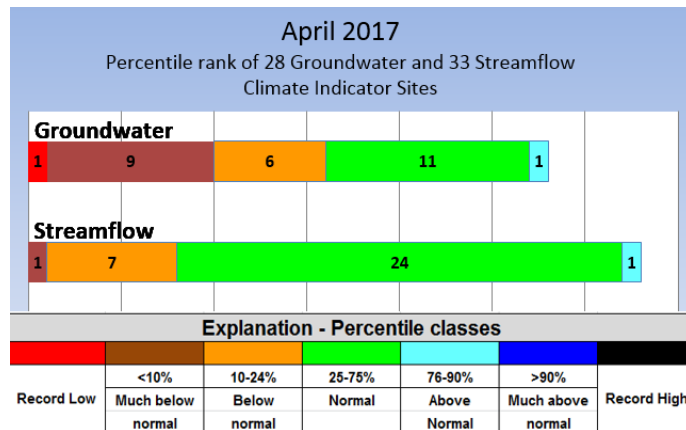
USGS April 2017 Water Conditions Summary

At sites used to monitor the response of water resources to changes in weather conditions in Maryland, Delaware, and the District of Columbia in April 2017, 39 percent of groundwater levels and 73 percent of monthly mean streamflows were in the normal range. Groundwater levels were below normal in 57 percent of the observation wells. The groundwater level at an observation well in Montgomery County, Maryland was at a record monthly low for the fourth consecutive month. Since March, groundwater levels decreased at 9 wells and increased at 19 wells. Monthly mean streamflows decreased at 12 streamgages and increased at 21 streamgages in April.

In April, groundwater levels at 11 of 28 USGS observation wells were in the normal range (25th-75th percentiles). Groundwater levels were below normal at 16 wells, with 10 wells below the 10th percentile, and one of these wells was at a record April low. One well had an above normal groundwater level.

Monthly mean streamflows were in the normal range at 24 of 33 USGS streamgages. Streamflow was between the 10th and 24th

percentiles at 7 streamgages, and below the 10th percentile at 1 streamgage. Freshwater flows to the Chesapeake Bay were in the normal range. 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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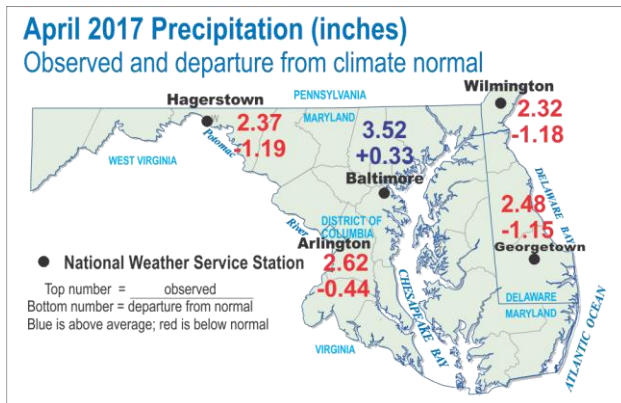
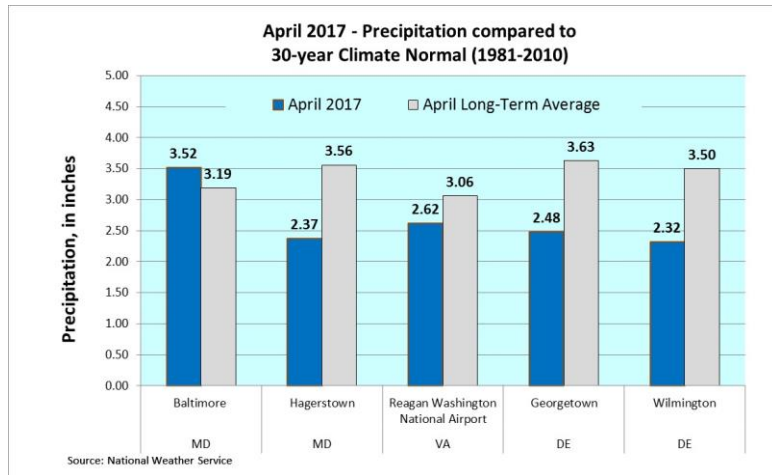
Weather Conditions

Data from five Mid-Atlantic National Weather Service (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 and 2010. During drought periods, the status from the National Drought Mitigation Center (U.S. Drought Monitor) is included.

April 2017 Precipitation

April precipitation was below normal at four Mid-Atlantic NWS weather stations in Maryland and above normal at one weather station.

The precipitation map shows the April precipitation and the departure from climate normal as red text for below normal and blue text for above normal. Precipitation was lowest in Wilmington, Delaware with 2.32 inches, and highest in Baltimore, Maryland with 3.52 inches.



National Weather Service Stations

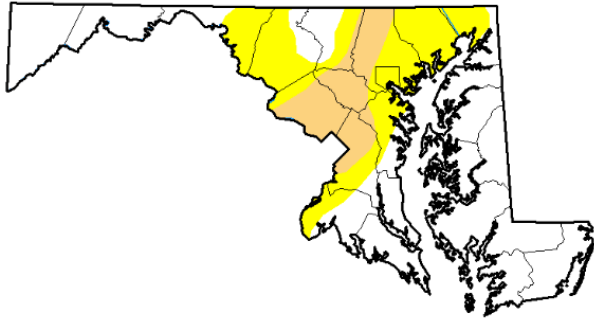
- Baltimore =**
Baltimore/Washington International Thurgood Marshall Airport (BWI)
- Georgetown =**
Georgetown, Sussex County Airport
- Hagerstown =**
Hagerstown Regional Airport
- Arlington =**
Ronald Reagan Washington National Airport
- Wilmington =**
New Castle Airport

Source: National Weather Service
 MD and DC: <http://www.weather.gov/climate/index.php?wfo=lmx>
 DE: <http://www.weather.gov/climate/index.php?wfo=phi>
 MARFC: [http://www.weather.gov/marfc/Precipitation Departures](http://www.weather.gov/marfc/Precipitation_Departures)

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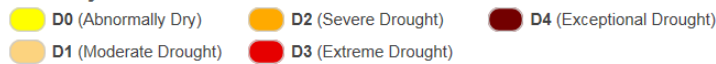
Drought Status

According to the U.S. Drought Monitor, as of May 2, 2017, 13.07 percent of Maryland was in D1 or moderate drought status and, 27.41 percent of the State was considered abnormally dry. There is currently no drought status in Delaware. For the most recent drought status, visit: <http://droughtmonitor.unl.edu/Home/RegionalDroughtMonitor.aspx?northeast>



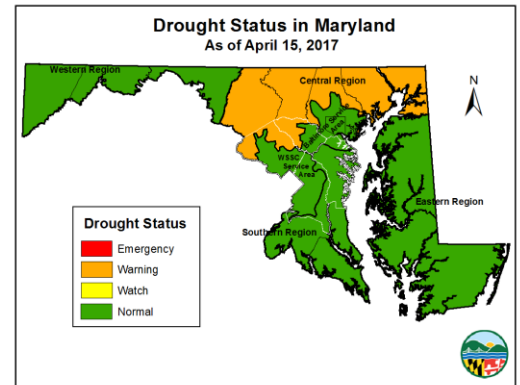
Week	None	D0	D1	D2	D3	D4
Current 2017-05-02	59.51	27.41	13.07	0.00	0.00	0.00

Intensity:



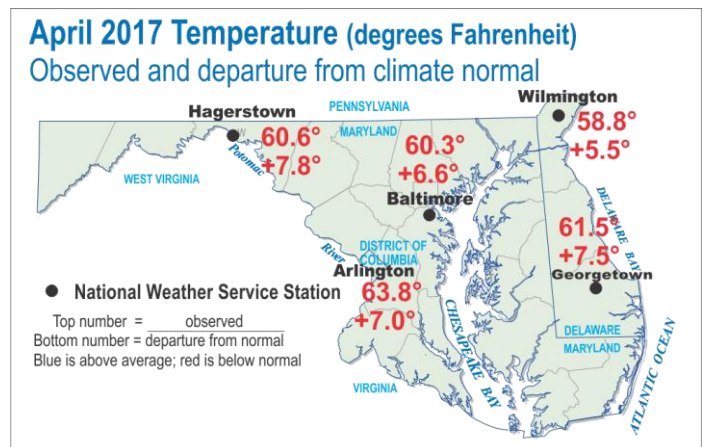
The drought status as of April 15, 2017, set by the Maryland Department of the Environment (MDE), shows that the central region of the State is in a drought warning. Check the MDE website for an updated status at the end of April.

<http://mde.maryland.gov/programs/water/droughtinformation/Pages/index.aspx>



April 2017 Temperatures

April temperatures at the five Mid-Atlantic NWS stations were 5.5 to 7.8 degrees Fahrenheit above average, with temperatures ranging from 58.8 degrees Fahrenheit in Wilmington, Delaware, to 63.8 degrees Fahrenheit in Arlington, Virginia near the District of Columbia. The highest departure from average for April was in Hagerstown, Maryland, with 7.8 degrees above normal. The temperature in Hagerstown, Maryland (60.6 degrees) was higher than the temperatures in Baltimore, Maryland (60.3 degrees) and Wilmington, Delaware (58.8 degrees), which is unusual because temperatures are often cooler in the mountainous regions of Maryland.



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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:

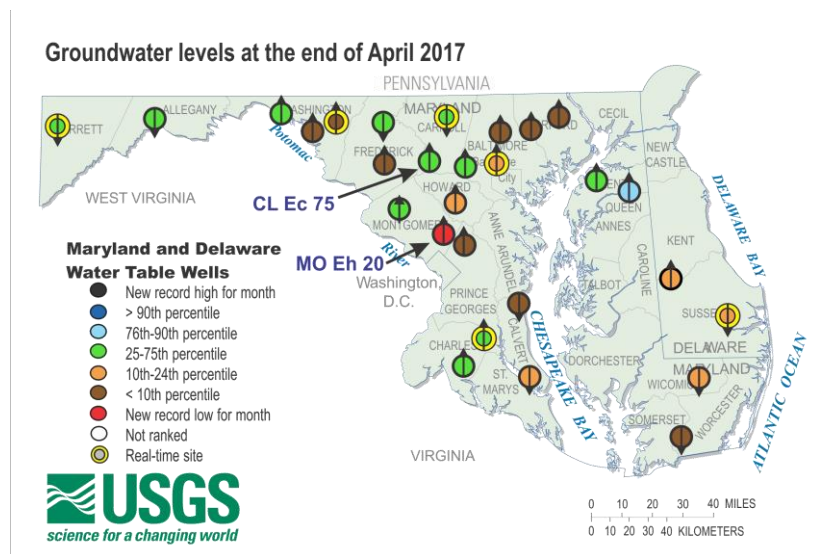
- Located in a surficial or unconfined (water-table) aquifer
- Open to a single, known hydrogeologic unit/aquifer
- Groundwater hydrograph generally reflects response to weather
- No indicated nearby pumpage, and likely to remain uninfluenced by pumpage or changes related to human activities
- Minimum 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 data collected during the historical droughts of 2002 and the 1960s. There are 11 wells that have over 60 years of groundwater data, which allows comparison to both of these drought periods. Of the 28 USGS observation wells used for this summary, 23 have more than 30 years of groundwater data as of 2017.

April 2017 Groundwater Levels

Between March and April, groundwater levels decreased at 9 of 28 wells and increased at 19 wells. The April groundwater level at MO Eh 20 in Montgomery County, Maryland was at a record low for the fourth consecutive month. On the groundwater map, arrows on the well symbol indicate whether the groundwater level increased, decreased, or was unchanged over the past month.

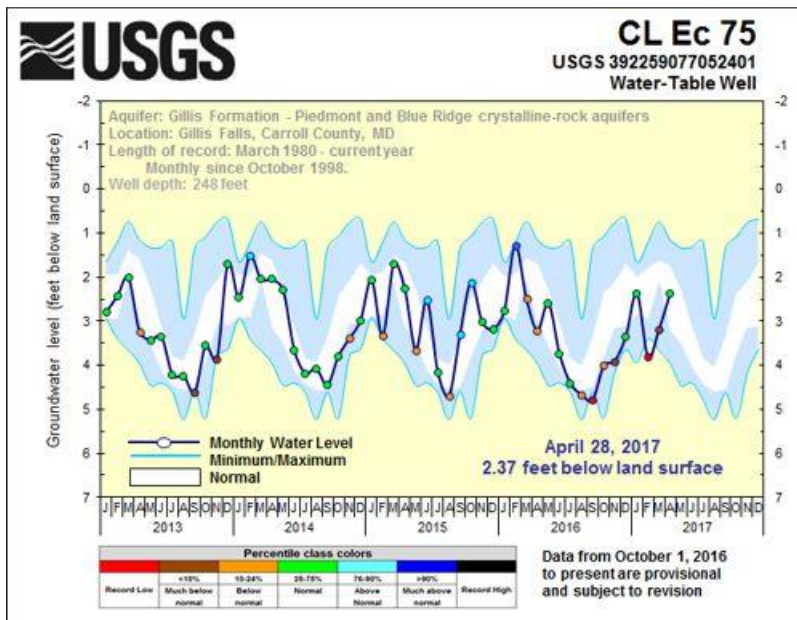
At 11 USGS observation wells, the groundwater levels were within the normal range. Groundwater levels were below normal at 16 wells, in the 10th-24th percentiles at 6 wells, below the 10th percentile at 9 wells, and at a record low at 1 well. Groundwater levels were above normal at the observation well in Queen Anne's County, Maryland for the second consecutive month. Many of the low groundwater levels were in central Maryland, which is consistent with the current drought status reported by the U.S. Drought Monitor.



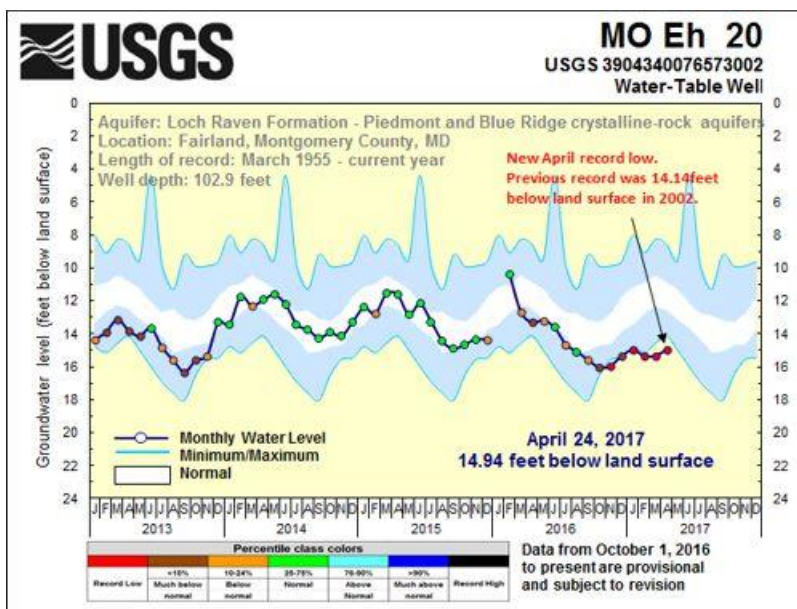
To access the clickable groundwater map, go to:
http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties/

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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 CL Ec 75, in Carroll County, Maryland, went from below normal in March to normal in April. Normal April groundwater levels at this well range from 1.74 to 3.15 feet below land surface.



The groundwater level at USGS observation well MO Eh 20, in Montgomery County, Maryland, has been below normal for the last 8 consecutive months and set a record April low at 14.94 feet below land surface. The April 2017 groundwater level exceeded the April record low from 2002 by 0.80 feet. Normal April groundwater levels at this well range from 10.92 to 12.60 feet below land surface.

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 used most commonly 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:

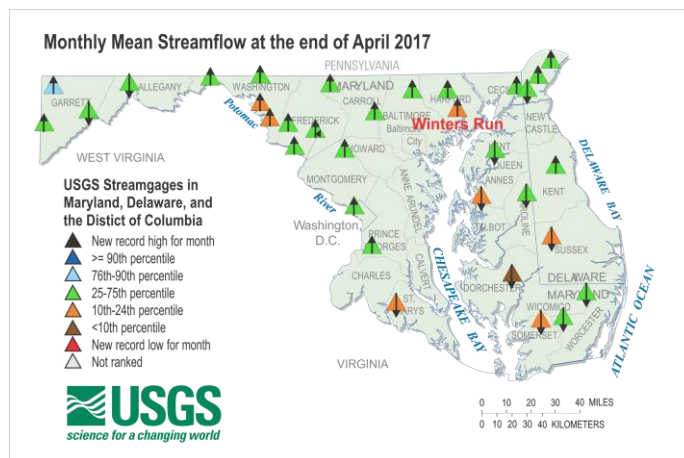
- Minimum period of record is 10 years of continuous data
- Watershed areas greater than 5 square miles
- Streamflow is not regulated, such as by a dam or diversion, and it has relatively natural flow
- Streamflow data reflect a response to weather conditions
- Most of the surrounding area and watershed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

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

April 2017 Streamflow

Streamflow decreased at 12 streamgages and increased at 21 streamgages used to monitor response to weather conditions in Maryland, Delaware, and the District of Columbia between March and April.

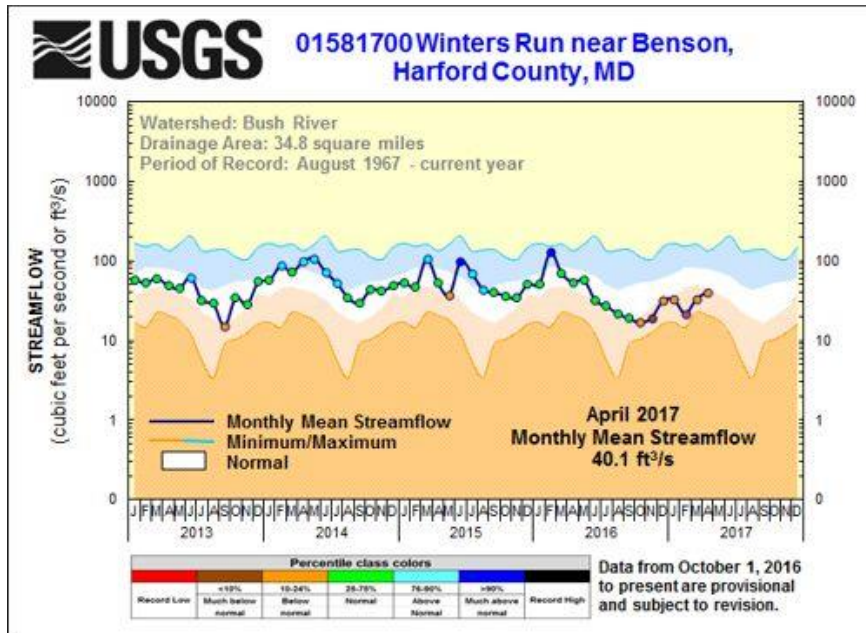
Monthly mean streamflows were in the normal range at 73 percent or 24 of 33 selected USGS streamgages. Streamflow at the remaining 8 streamgages was below normal with 7 streamflows between the 10th and 24th percentiles, and 1 streamflow in the less than 10th percentile.



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 streamgage, 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 bottom of the tan area. Each monthly mean streamflow (each circle) is colored according to the percentile rank compared to the historical data for the month.



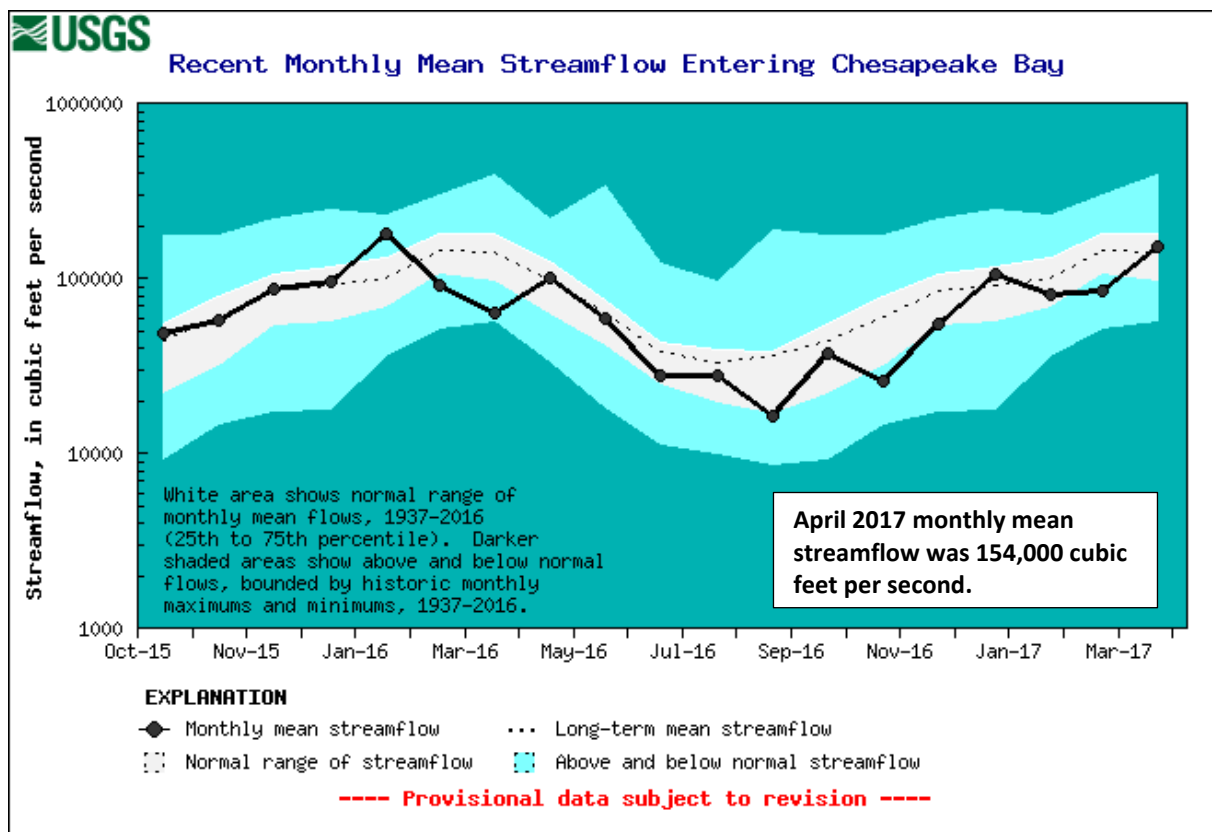
At Winters Run near Benson, in Harford County, Maryland, the monthly mean streamflow increased since March but remained between the 10th - 24th percentiles at the end of April. April monthly mean streamflow was 40.1 cubic feet per second (ft³/s). The normal range is between 43.3 ft³/s and 78.8 ft³/s for April.

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 April 2017 was 154,000 ft³/s. This value, which is provisional and subject to revision, is considered to be in the normal range. Normal April streamflow entering the Bay is between 95,700 and 179,000 ft³/s, the 25th and 75th percentiles, respectively, of all April values. Average (mean) monthly streamflow for April is 142,000 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, and 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/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 April 2017, available reservoir storage in the Baltimore Reservoirs was 75.85 billion gallons, or 100 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 at the end of April 2017 was 5.92 billion gallons, which is about 56 percent of normal storage capacity for the two Patuxent reservoirs. Normal storage refers to the volume that is useable for water supply. The full capacity of the two Patuxent reservoirs is 12.09 billion gallons, which is higher than normal storage (10.6 billion gallons), and therefore, full capacity values can exceed 100 percent of normal storage.

