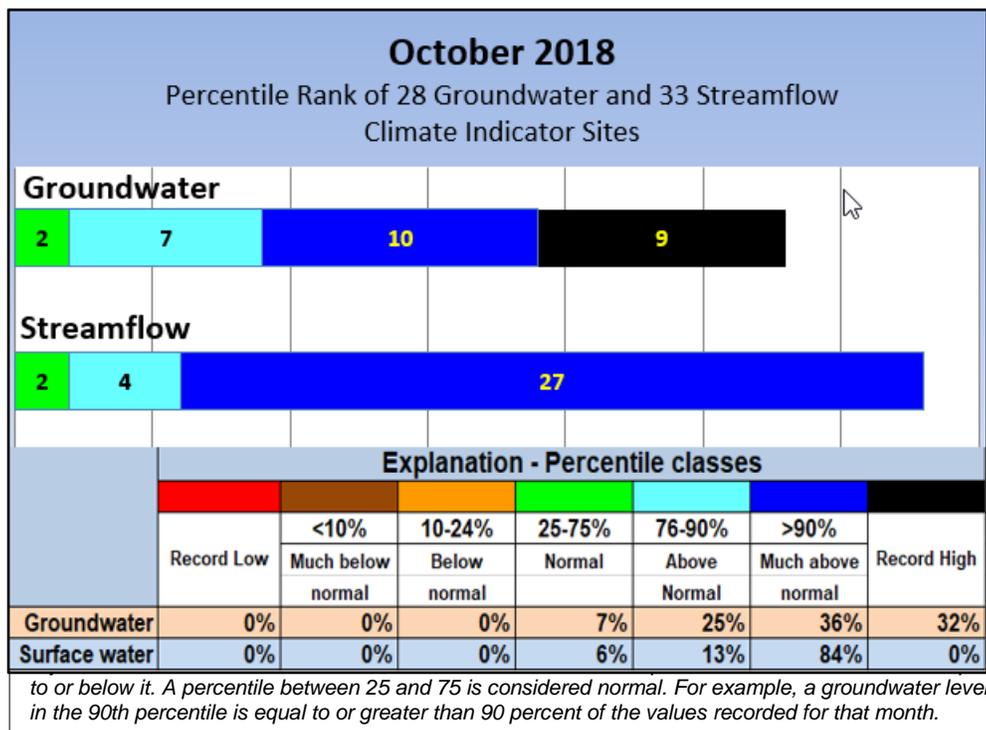


U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

USGS October 2018 Water Conditions Summary

Hydrologic data from 28 wells and 33 streamgages were used to monitor the monthly groundwater and streamflow response to weather conditions in Maryland, Delaware, and the District of Columbia. In October 2018, groundwater levels were at record October highs at nine wells. Groundwater levels and streamflow ranged from normal to above normal in October. The freshwater flow to the Chesapeake Bay was above normal, after 2 months of record highs.

The number of groundwater and surface-water sites, and the percentage of the total number of groundwater and surface-water sites that fall within each percentile range, are shown in the graph for October 2018.



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 weather, 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 can 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 32 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 data to give a more complete picture of the region's water resources and the monthly freshwater flow to the Chesapeake Bay. Hydrologic and weather data have not been reviewed and are therefore provisional and subject to revision.

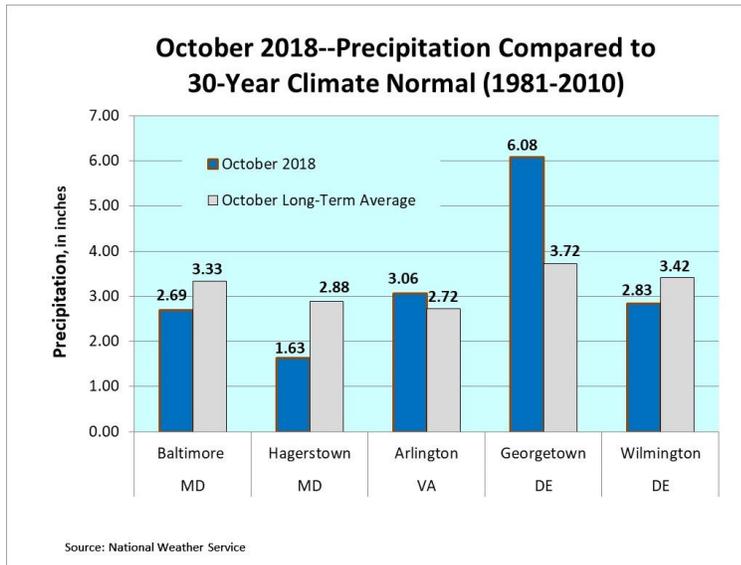
Precipitation

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

Monthly data from five Mid-Atlantic National Weather Service (NWS) stations were used to show the relation between monthly precipitation and monthly groundwater levels and streamflows. The NWS uses averages of data over the 30-year climate normal period from 1981 through 2010.

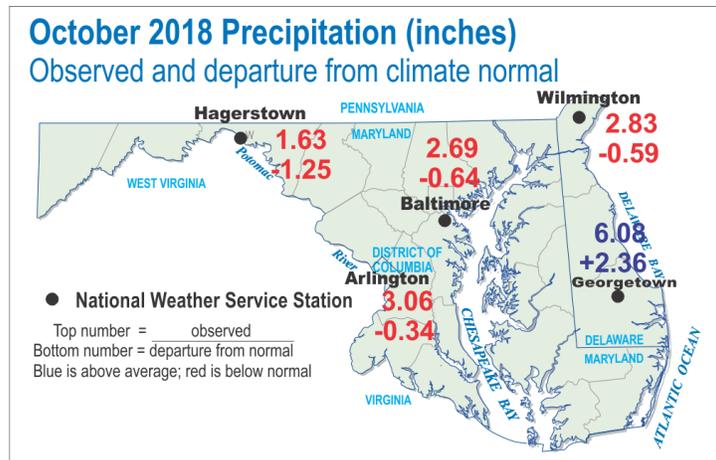
October 2018 Precipitation

Precipitation was below normal at the three of the five Mid-Atlantic NWS weather stations. At the weather station in Georgetown, Delaware, precipitation was 2.36 inches above the October average value. The long-term average October 2018 precipitation for the five Mid-Atlantic NWS weather stations is shown next to the October 2018 precipitation in the graph and map below.



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
 DC and MD: <http://w2.weather.gov/climate/index.php?wfo=lwx>
 DE: <http://www.weather.gov/climate/index.php?wfo=phi>
 MARFC: http://www.weather.gov/marfc/Precipitation_Departures

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Groundwater

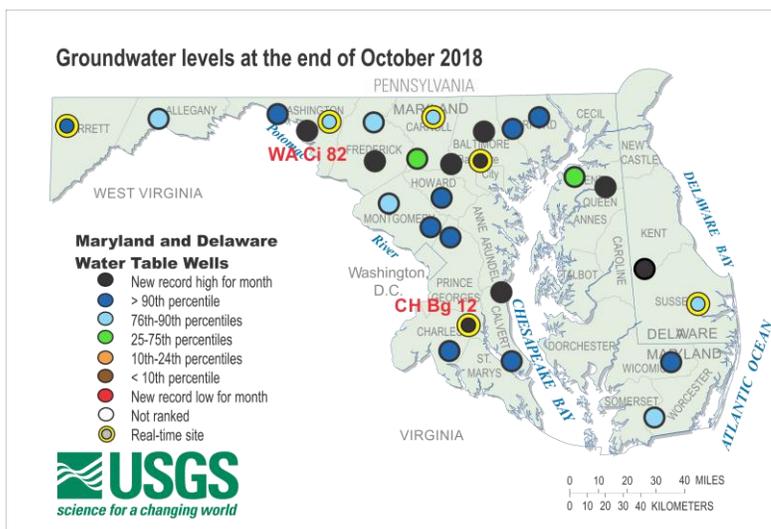
The USGS monitors groundwater levels in surficial or unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in weather conditions. The groundwater wells used for the monthly water summary were selected based on the following criteria:

- 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 1999-2002 and the 1960s. There are 12 wells that have over 60 years of groundwater data, and 26 wells that have more than 30 years of groundwater data as of October 2018.

October 2018 Groundwater Levels

Groundwater levels were above normal at 26 wells of 28 wells (93 percent), including 9 record highs, 10 wells with groundwater levels greater than the 90th percentile, and 7 wells in the 76th-90th percentile range. Groundwater levels were normal (25th to 75th percentile) at 2 wells (7 percent). Between September and October, groundwater levels decreased at 16 wells (57 percent) and increased at 12 wells (43 percent).

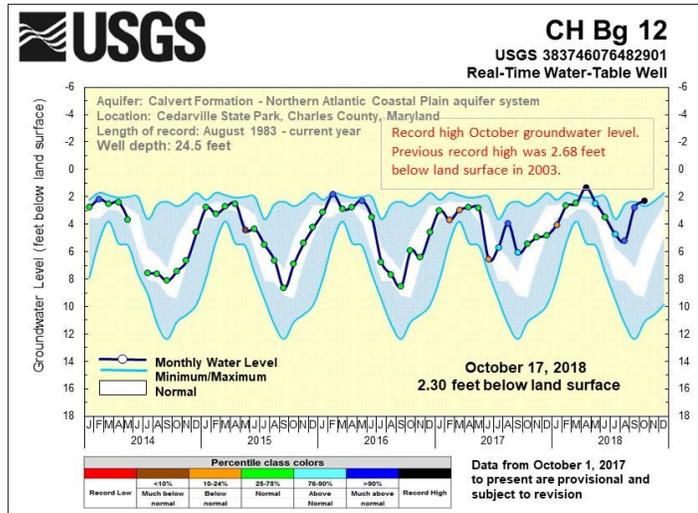


To access the clickable groundwater map, go to:
http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties/

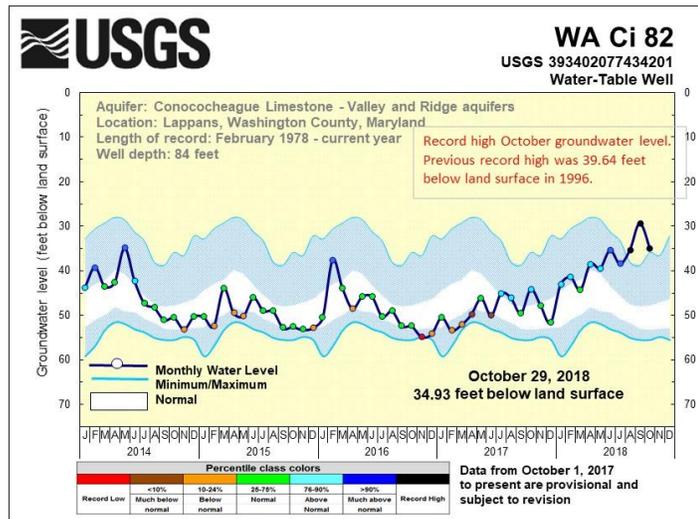
U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

In the 5-year hydrographs for the selected wells, 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 CH Bg 12, in Charles County, Maryland, was 2.30 feet below land surface, which is an October record high. The previous record was 2.68 feet below land surface in 2003. Monthly record-keeping at this well began in August 1983. Normal October groundwater levels at this well range from 5.00 to 9.25 feet below land surface.



The groundwater level at USGS observation well WA Ci 82, in Washington County, Maryland, was 34.93 feet below land surface, which is an October record high. The previous record was 39.64 feet below land surface in 1996. Monthly record-keeping at this well began in February 1978. Normal October groundwater levels at this well range from 47.54 to 53.21 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 most commonly used for assessing water supply and to determine the risk of droughts and floods. Streamflow data also are used to calculate loads of chemical constituents, and to assess how biological communities are affected by hydrologic conditions.

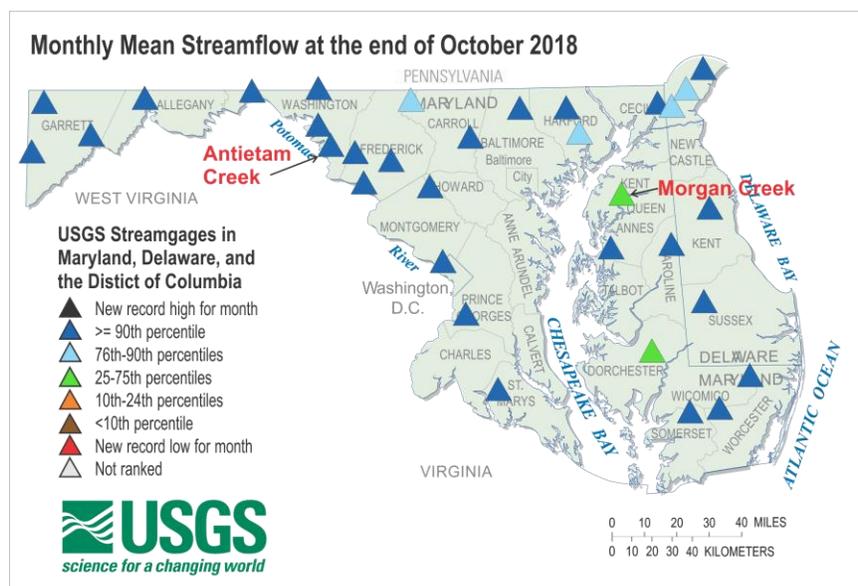
The USGS streamgages chosen for the monthly water summary were selected based on the following criteria:

- 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 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, 27 have more than 60 years of data, allowing for comparison to data from the historical droughts of 1999--2002 and the 1960s. All 33 streamgages have at least 30 years of monthly mean streamflow data.

October 2018 Streamflow

Monthly mean streamflows were normal to above normal at all 33 streamgages. Streamflow at 31 streamgages was above normal. Streamflow at two streamgages was in the normal range. Monthly mean streamflow increased at 33 streamgages (100 percent) between September and October.



To access the clickable streamflow map, go to:

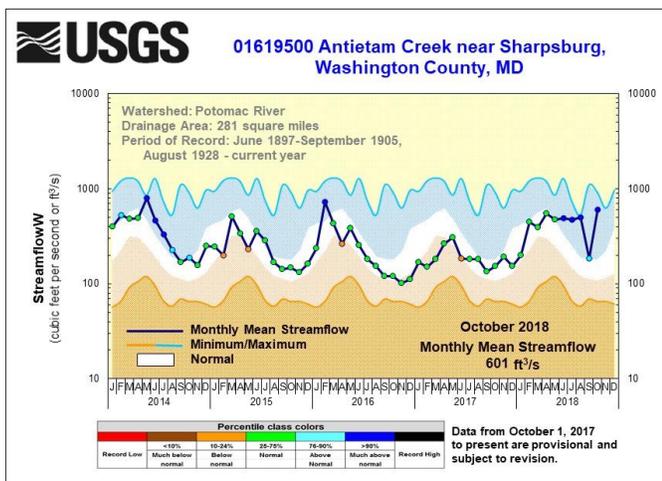
<http://md.water.usgs.gov/surfacewater/streamflow/>

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

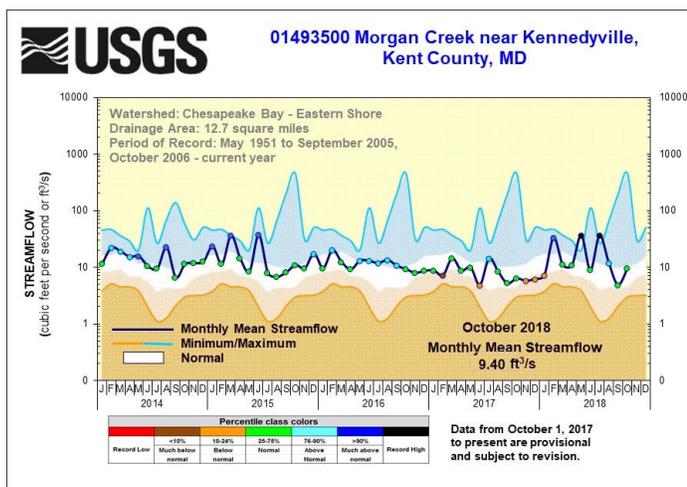
In the hydrograph for the selected streamgages, the dark line in the 5-year hydrograph represents the monthly mean streamflow for this period, and the white band shows the normal range (25th-75th percentiles) based on the period of record. The maximum monthly mean streamflow is at the top of the blue 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.

Monthly mean streamflow at Antietam Creek near Sharpsburg, Washington County, Maryland, was 601 cubic feet per second (ft³/s), which is above the 90th percentile. Streamflow had been above normal at this streamgage over the previous 5 months.

The normal monthly mean streamflow range for October is between 109 ft³/s and 181 ft³/s. Record-keeping at this streamgage began in June 1897.



At Morgan Creek near Kennedyville, in Kent County, Maryland the monthly mean streamflow was 9.40 ft³/s, which is in the normal range (between 4.57 and 10.33 ft³/s). Record-keeping at this streamgage began in May 1951.



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

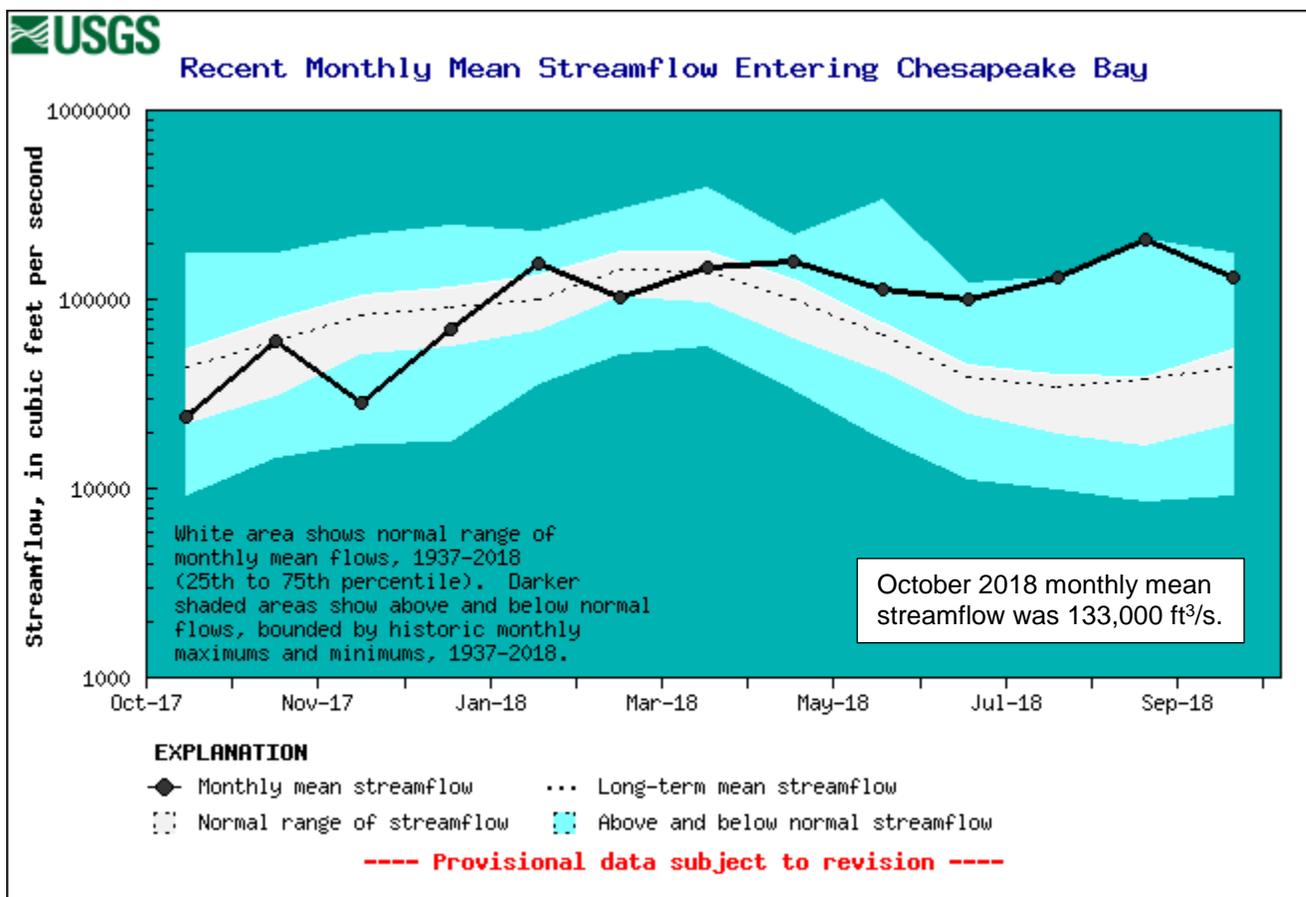
U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

Estimated Streamflow to the Chesapeake Bay

Estimated streamflow entering the Chesapeake Bay is computed on a monthly and annual basis using streamflow measurements from the Susquehanna, Potomac, and James Rivers. Data are presented in tables and graphs, typically grouped by water year — the natural, annual water cycle used by hydrologists. A water year is the 12-month period beginning October 1 and ending September 30. The water year is designated by the calendar year in which it ends and includes 9 of the 12 months. For example, the year beginning October 1, 2017 and ending September 30, 2018, is called “water year 2018.”

The health of the Chesapeake Bay largely is driven by changes in streamflow and the amount of pollution it contains. Runoff in the Chesapeake Bay watershed carries pollutants, such as nutrients and sediment, to rivers and streams that drain to the Bay. Scientists can use estimated streamflow entering the Chesapeake Bay to assess the health of the Bay and make ecological forecasts.

The estimated monthly mean streamflow entering Chesapeake Bay during October 2018 was 133,000 ft³/s, which is above normal. This value is provisional and subject to revision. Normal October streamflow entering the Bay is between 22,100 and 55,700 ft³/s, the 25th and 75th percentiles, respectively, of all October values. Average (mean) monthly streamflow for October is 44,400 ft³/s. These statistics are based on an 82-year period of record.



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