

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

March 2015 Highlights: Groundwater, streamflow, and freshwater streamflow to the Chesapeake Bay were all normal to above normal at sites monitored by the U.S. Geological Survey across Maryland, Delaware, and the District of Columbia.

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 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 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 continues to collect water data and quality-assures the data using standardized techniques across the country. The uniformity of the dataset enables multi-state comparisons and other comparative statistical analyses that better inform policy makers of the possible water-resources conditions they might encounter in the future.

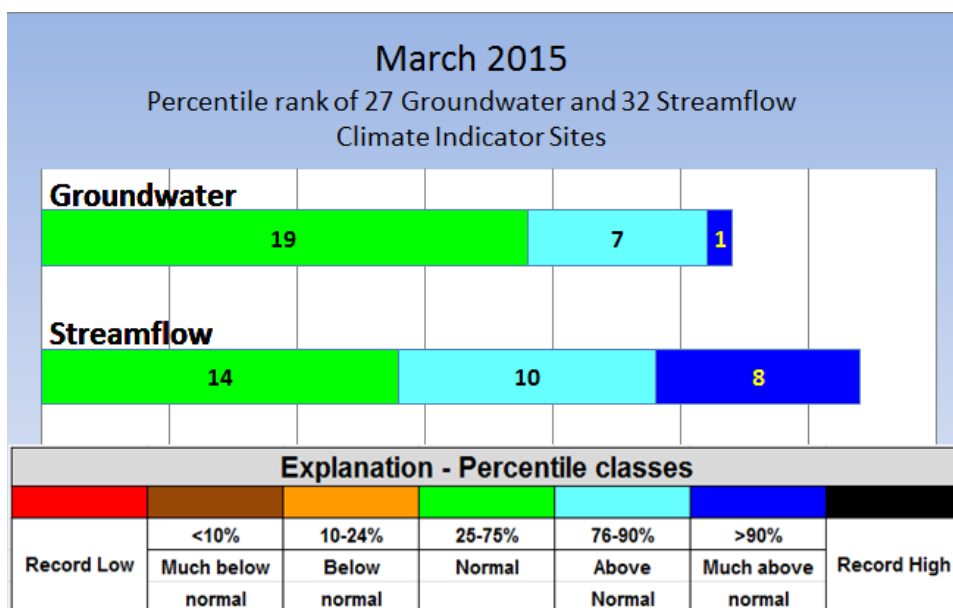
The sites used in this water summary were carefully selected to show the response of streamflow and groundwater levels to weather conditions. Ideally, these sites will show no effects from human influences. The streamflow and groundwater data are ranked in comparison to the historical record and summarized.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

USGS March 2015 Water Conditions Summary

March groundwater and streamflow levels were normal to above normal at all sites used to monitor the response of water resources to changes in climatic conditions in Maryland, Delaware, and the District of Columbia. Seventy percent of groundwater levels and 44 percent of monthly mean streamflows were normal (between the 25th and 75th percentiles).

Groundwater levels were normal in 19 of 27 USGS monitoring wells and above normal in the 8 remaining wells.

March monthly mean streamflows were normal at 14 of the 32 streamgages. Streamflow was above normal at the remaining 18 streamgages. There were insufficient data to calculate a monthly mean at one site in March.



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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March 2015 Precipitation and Weather

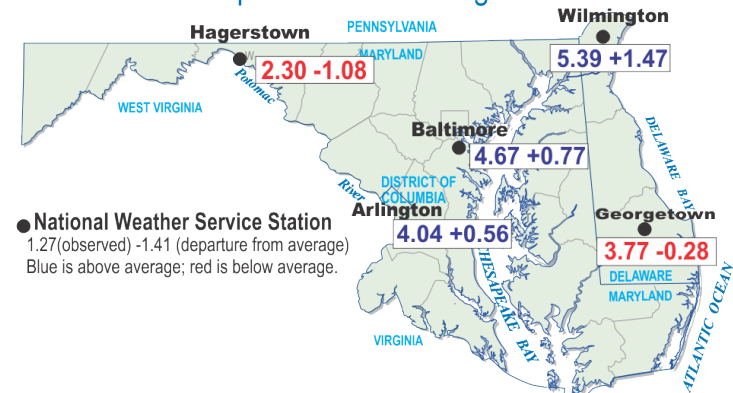
March precipitation ranged from 1.08 inches below to 1.47 inches above the long-term average at the five National Weather Service (NWS) Mid-Atlantic weather stations. The highest amount of monthly precipitation was in Wilmington, Delaware with 5.39 inches, and the lowest was in Hagerstown, Maryland with 2.30 inches. Some of the precipitation in March was in the form of snow, hail, or ice as temperatures were below normal. Baltimore had 7.7 inches of snow and Arlington, Virginia had 4.9 inches (4.8 inches fell on March 6, breaking the record of 4.4 inches set in 1888).

National Weather Service Stations

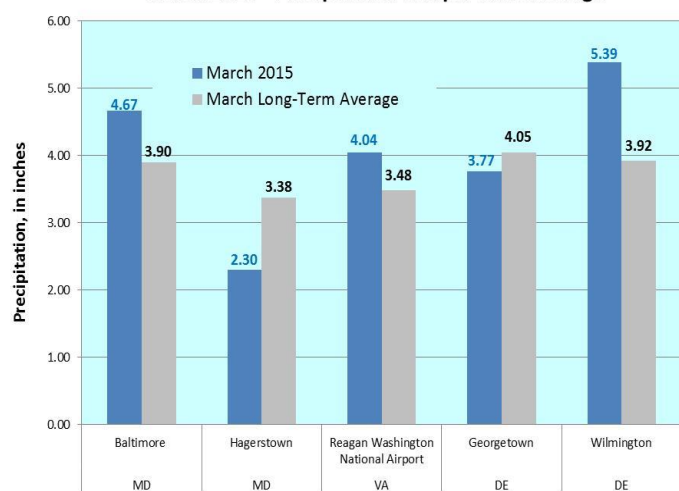
Baltimore =
Baltimore/Washington International
Thurgood Marshall Airport (BWI)
Georgetown =
Georgetown, Sussex County Airport
Hagerstown =
Hagerstown Regional Airport
Arlington =
Ronald Reagan Washington National Airport
Wilmington =
New Castle Airport

The NWS Middle Atlantic River Forecast Center's (MARFC) 365-day precipitation data for Maryland, Delaware, and the District of Columbia ranged from below average to above average, with 14 of the 23 counties in Maryland and all 3 counties in Delaware in the normal range. In Maryland, precipitation was below normal in Allegany County and above normal in 8 counties. Montgomery County had the highest surplus of precipitation with 8.0 inches, and Allegany County had the largest deficit with 7.6 inches over the 365-day period from March 2014 to March 2015. See the links below to view the NWS MARFC data.

March 2015 Precipitation (inches) Observed and Departure from Average



March 2015 - Precipitation compared to average



Source: National Weather Service

March air temperatures were below the long-term average at all five NWS Mid-Atlantic weather stations ranging from 1.5–5.2 degrees Fahrenheit below average. In March, the temperatures in Wilmington, Delaware averaged 37.8 degrees Fahrenheit, the lowest of the five weather stations. Typically, the average temperatures are colder in western Maryland than in Delaware. The warmest March temperature was 45.3 degrees Fahrenheit in Arlington, Virginia near the District of Columbia.

Sources: National Weather Service and Middle Atlantic River Forecast Center (MARFC)
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.erh.noaa.gov/marfc/Precipitation/Departures/>

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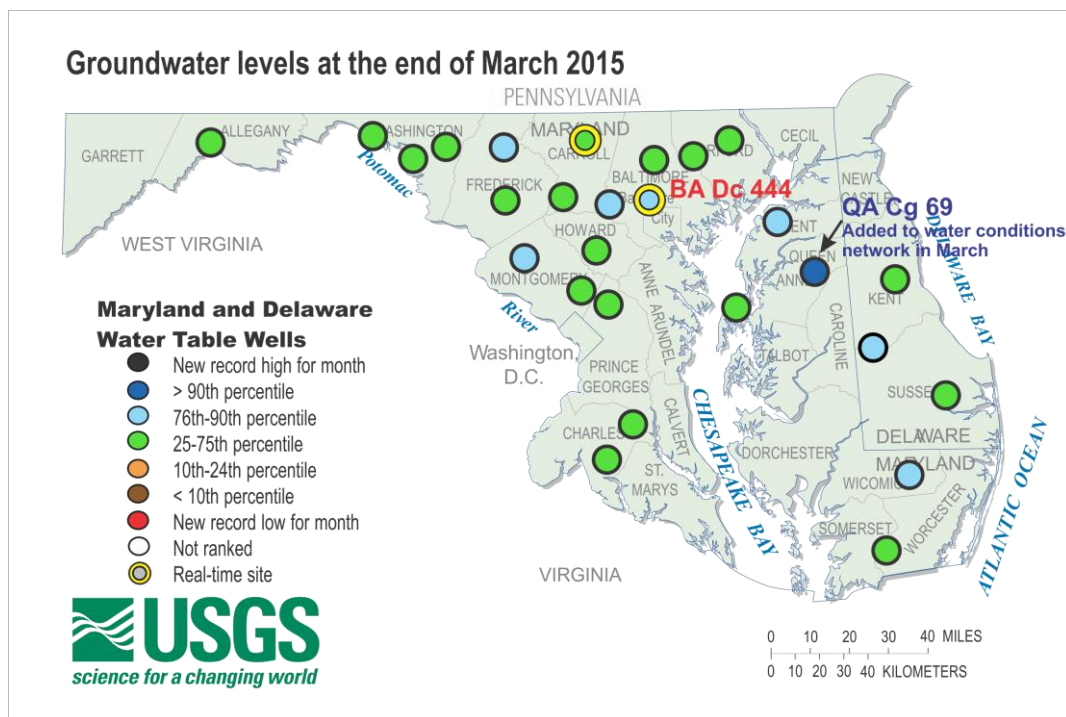
Groundwater

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 a casing – dug wells are generally not used;
- Water levels show no apparent hydrologic connection to nearby streams;
- Well has never gone dry; and
- Long-term accessibility likely.

March 2015 Groundwater Levels

In March, groundwater levels were normal (between the 25th and 75th percentiles) to above normal in all of the 27 USGS wells used to monitor climatic conditions in Maryland and Delaware. Nineteen groundwater levels were in the normal range and 8 were above normal. An additional observation well in Queen Anne's County, QA Cg 69, has been added to the climatic indicator observation well network. Data collection began at this well in August of 2003.

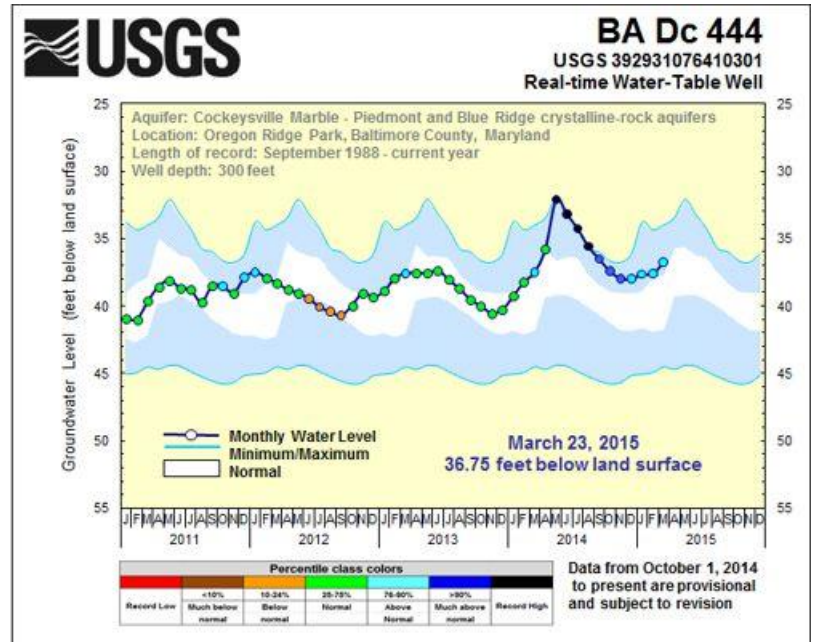


To access the clickable groundwater map, go to:
http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties/

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In Baltimore County, Maryland, the groundwater level in USGS observation well BA Dc 444 was 36.75 feet below land surface, which is above normal (76th– 90th percentiles). The groundwater level at this observation well has been above normal for the last 11 months, but following the historical trend of rising and falling water levels over the year.

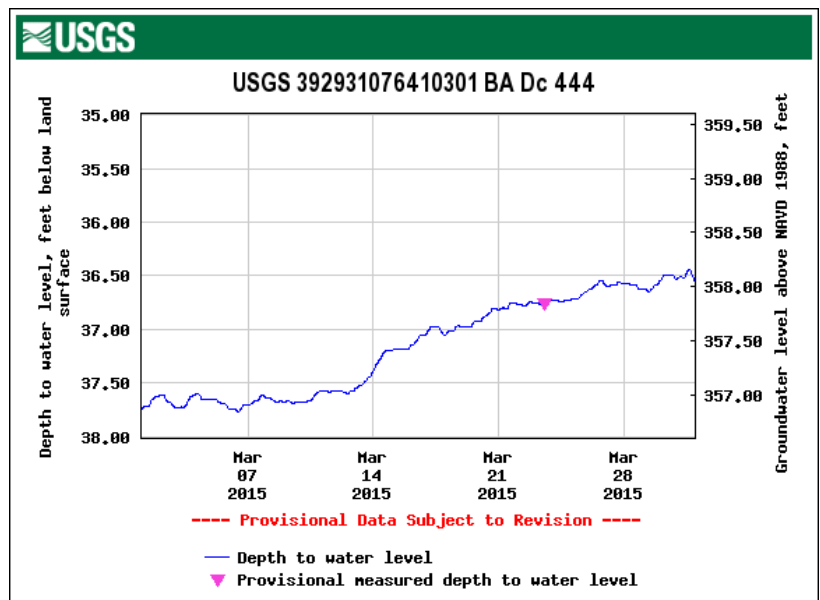
The 5-year hydrograph shows groundwater levels as a dark blue line, the minimum and maximum monthly values, and the normal range (between the 25th and 75th percentiles) as a white band based on the period of record. The maximum water level is at the top of the upper blue section and the minimum water level is at the bottom of the lower blue section in the graph. Each monthly measurement is colored according to the percentile rank in which it falls for the month.



Five-year groundwater hydrographs can be viewed at:

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

The real-time groundwater level for observation well BA Dc 444 showed an upward trend during March. This well is one of two real-time wells in Maryland, where data is collected every 15 minutes. The other real-time well is located in Carroll County (CL Ad 47).



Link to real-time data for BA Dc 444:

http://nwis.waterdata.usgs.gov/nwis/uv?site_no=392931076410301

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Streamflow

Streamflow data are used for many purposes. A few of the most common 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 assess how biological communities are affected by hydrologic conditions. The USGS operates the most extensive network of streamgages in the region.

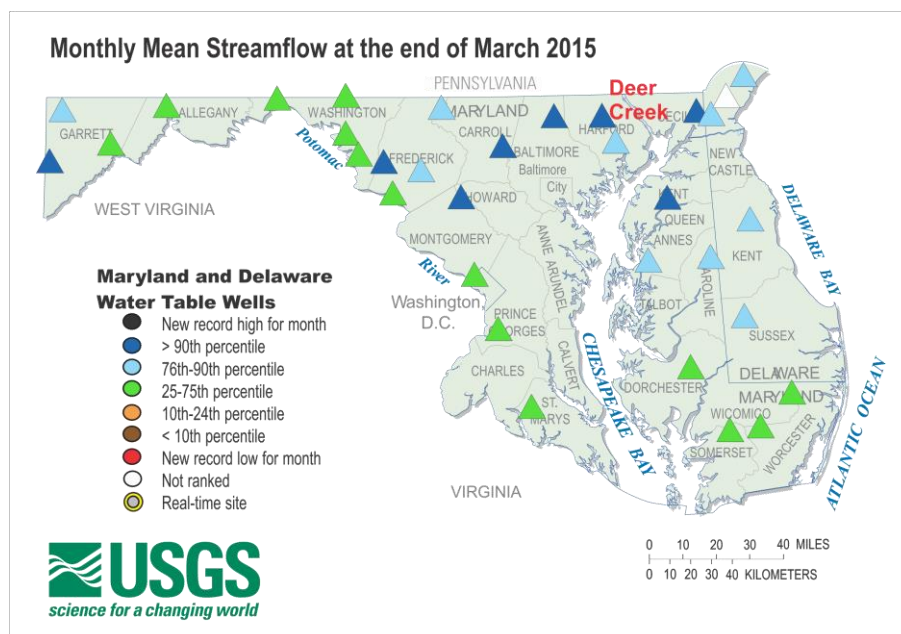
The streamflow locations chosen for the monthly water summary were selected based on the following criteria:

- 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.

March 2015 Streamflow

March monthly mean streamflows were all normal to above normal at USGS streamgages used to monitor climatic response in Maryland, Delaware, and the District of Columbia. Streamflow was normal (between the 25th and 75th percentiles) at 14 of the 32 USGS streamgages, between the 76th and 90th

percentiles at 10 USGS streamgages, and above the 90th percentile at 8 USGS streamgages.

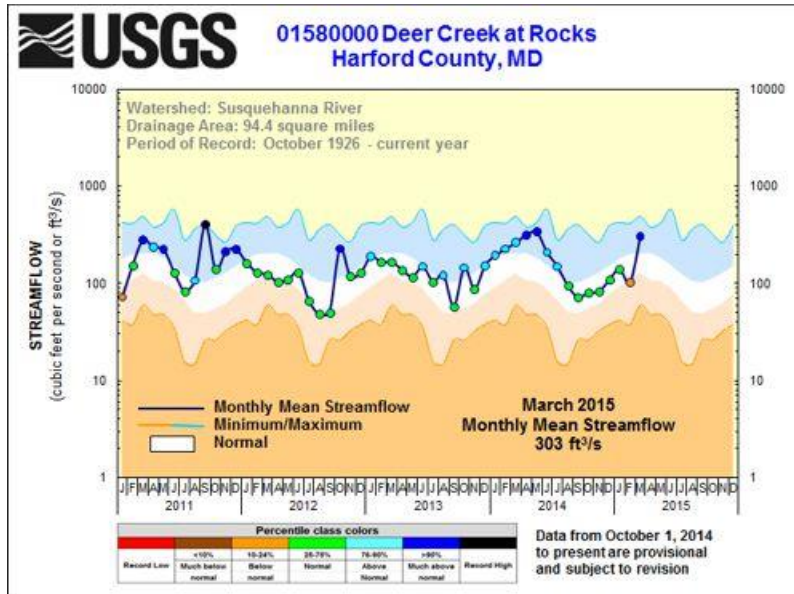


In Delaware, monthly mean streamflow was above normal at four USGS streamgages. Data were unavailable at one site due to equipment problems.

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

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The monthly mean streamflow on Deer Creek in Harford County, Maryland rose from below normal in February to above normal in March 2015. The monthly mean streamflow typically climbs at this time of year with the average peak in March at Deer Creek.



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 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 top of the dark orange area. Each monthly mean measurement is colored according to the percentile rank in which it falls for the month.

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

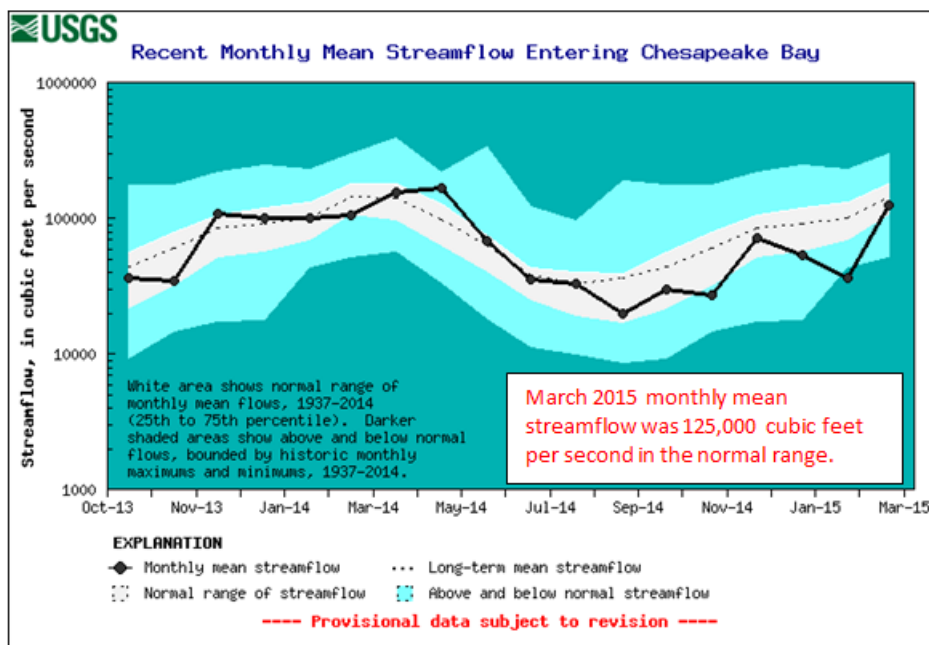
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Estimated Streamflow to the Chesapeake Bay

The USGS estimates monthly mean freshwater streamflow to the Chesapeake Bay using streamflow measurements from the Susquehanna, Potomac, and James Rivers. In March 2015, the monthly mean freshwater flow to the Chesapeake Bay recovered from the February record low and was 125,000 cubic feet per second (ft³/s; provisional, and subject to revision) which is in the normal range.

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. Generally, as river flow increases, it brings more nutrient and sediment pollution to the Bay.

Runoff from winter and spring rains delivers pollution loads that affect the summer water-quality conditions in the Bay. The river flow also affects the salinity levels that are important for fish, crabs, and oysters.



March 2015 monthly mean streamflow was 125,000 ft³/s, which is just below the long-term March average (mean) of 147,000 ft³/s. The normal range for average (mean) monthly streamflow for March is between 105,000 ft³/s and 183,000 ft³/s, the 25th and 75th percentiles of all March values. These provisional statistics are based on a 78-year period of record.

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

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Reservoir Levels

Available reservoir storage at the end of March 2015 in the Baltimore reservoirs (Loch Raven, Liberty, and Prettyboy) was 100 percent of available storage capacity, or a total of 75.85 billion gallons of water. Snowmelt contributed to the full reservoirs in March. The Baltimore City Environmental Services Division manages the Baltimore reservoirs.

Total normal storage in the Triadelphia and Duckett Reservoirs, which serve parts of Howard, Montgomery, and Prince George's Counties in suburban Maryland around the District of Columbia, was 97.96 percent of normal storage capacity at the end of March 2015, with 10.46 billion gallons of water. Not all of the water in the Patuxent Reservoirs is usable; for operational purposes, percent of normal storage capacity is used, but this value can exceed 100 percent of the usable storage. The Washington Suburban Sanitary Commission (WSSC) manages the Patuxent reservoirs.

March 2015	Percent available/normal storage	Volume (billion gallons)
Baltimore Reservoirs		
Baltimore City – Environmental Services Division		
Liberty	100.00%	36.80
Loch Raven	100.00%	21.20
Prettyboy	100.00%	17.85
Total	100.00%	75.85
Patuxent Reservoirs		
Washington Suburban Sanitary Commission (WSSC)		
Triadelphia	103.91%	5.82
Duckett	92.00%	4.64
Total	97.96%	10.46