



# News Release

U.S. Department of the Interior  
U.S. Geological Survey

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## Wettest Year Leads to Record-High Water Levels Including Third Highest Flow to Chesapeake Bay in December and 2003

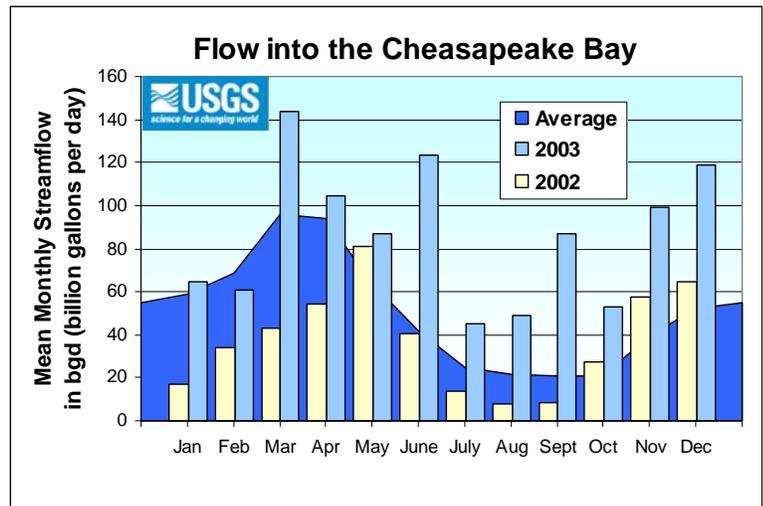
Only one year after the region's most severe hydrologic drought, many months of above normal precipitation have made 2003 the wettest year on record in Baltimore, according to the National Weather Service. Abundant precipitation has led to record high streamflow and groundwater levels across Maryland and Delaware, and the third highest flow to the Chesapeake Bay since record-keeping began in 1937 for December and 2003. Monthly mean streamflow at three streams was at its highest December flow since the 1940s. Groundwater levels at ten wells were at their highest December levels in 40 years, and for three of these wells, it was the fourth consecutive month of record high levels, according to hydrologists at the U.S. Geological Survey (USGS).

Although streamflow and surficial groundwater levels are high, water levels in some of the deep aquifers in southern and eastern Maryland continue to decline because the aquifers are being pumped more quickly than they can be recharged.

### Chesapeake Bay

Monthly mean streamflow into the Chesapeake Bay during December was the third highest since record-keeping began in 1937. Flow averaged 118.6 bgd (billion gallons per day), which is more than twice the normal December flow into the Bay. The flow to the Chesapeake Bay graph shows the flow in 2003 was above normal for every month except February and was at near record highs for five of the last six months. In 2002 the flow was below normal for 8 months.

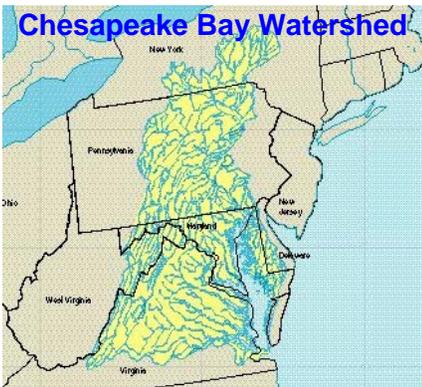
Monthly Flow to the Chesapeake Bay		
Month	2003	2002
June	Second Highest	
July	Third Highest	
August	Fourth Highest	Second Lowest
September	Third Highest	Fourth Lowest
October		
November	Second Highest	
December	Third Highest	



Highest Flows to the Chesapeake Bay	
Year	Flow (bgd)
1972	88.7
1996	87.5
2003	86.4

Flow to the Chesapeake Bay during calendar year 2003 was the third highest annual flow with 86.4 bgd. This flow was only 2.3 bgd below the record set in 1972. Flow has been above average since March 2003, which has contributed to higher amounts of nutrients and sediments entering the Bay.

The Chesapeake Bay watershed (below) covers more than 64,000 square miles in six states (New York, Pennsylvania, Maryland, Delaware, Virginia and West Virginia) and the District of Columbia. The highest percentage of flow to the Bay comes from the Susquehanna River. The following rivers (see table below) contributed various percentages of flow to the Bay in 2003.



Major Rivers Contributing Flow to the Chesapeake Bay	
Susquehanna River	46%
Potomac River	24%
James River	15%
Other Rivers and Streams	15%

More information about streamflow, water quality, and the Chesapeake Bay can be found at <http://chesapeake.usgs.gov/> and [www.chesapeakebay.net](http://www.chesapeakebay.net).

### Precipitation

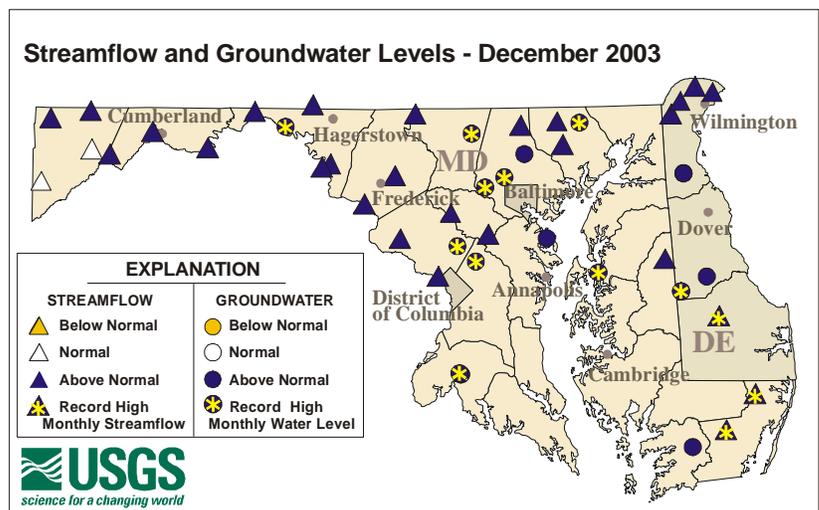
Precipitation during 2003 at the weather station in Baltimore, Maryland was 62.66 inches, which is more than 20 inches above normal and the wettest year since 1889, according to the National Weather Service. Precipitation in Washington, D.C. for 2003 was the second highest on record, only one-half inch below the record set in 1889. Annual precipitation for both regions is about 40 inches. Delaware and surrounding states in the northeast United States have all had above normal precipitation in 2003.

Abundant snow and rainfall has left groundwater and streamflow levels across Maryland and Delaware at very high levels. Since the ground is nearly saturated, when it rains, the water has little place to go except to accumulate in low-lying areas or become runoff and fill our waterways. The high water levels make the region vulnerable to localized flooding.

### Status of Streams and Wells for December 2003

The map to the right shows the wells and streams used by the USGS to monitor water conditions in Maryland, Delaware, and Washington, D.C. In December, all wells and most streams were at above normal levels (dark circles and triangles). Ten wells were at their highest December levels in 40 years (represented by an asterisk). Three streams had the highest monthly mean flow for December since record-keeping began. Only the Savage and Youghiogheny Rivers in western Maryland were at normal levels.

Since the region recovered from the drought last winter, water levels in most of these streams and wells have been at above normal levels.



For news release and images, go to [http://md.water.usgs.gov/publications/press\\_release/current/](http://md.water.usgs.gov/publications/press_release/current/)

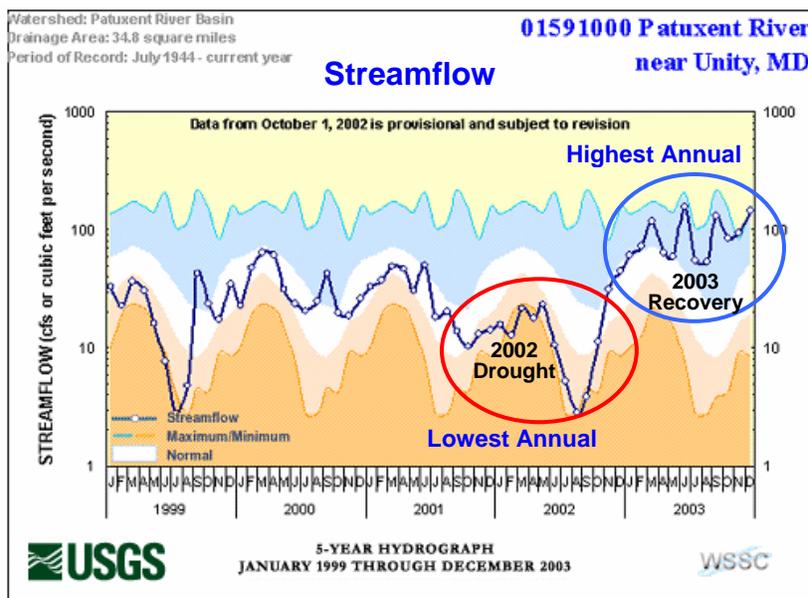
## Streamflow

Three streams were at the highest December flows since the 1940s: Nanticoke River in Delaware, and Nassawango Creek and Pocomoke River in Maryland. Streamflow at most of the stations used to assess water conditions across Maryland and Delaware has been at above normal levels in December and for most of the year, although streams in western Maryland have dropped to the normal range. Five-year monthly streamflow hydrographs from the USGS stream-gaging network can be viewed on the USGS website at <http://md.water.usgs.gov/surfacewater/streamflow/>. Current and historical streamflow data can be monitored on the web at: <http://waterdata.usgs.gov/>.

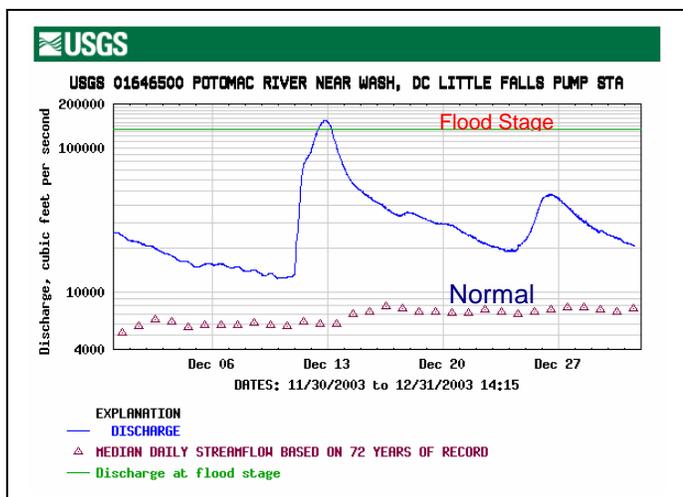
Annual streamflow records were also broken. Six streams had the highest annual flows since record-keeping began (see table below). All streams had at least the fourth highest flow in 2003.

Annual Mean Monthly Streamflow	
<b>Highest annual flow</b>	
Patuxent River	
Choptank River	
Nanticoke River	
Piscataway Creek	
Pocomoke River	
White Clay Creek	
<b>Second highest</b>	
Antietam Creek	
Conococheague Creek	
Nassawango Creek	
Savage River	
Wills Creek	
Winters Run	
Youghiogheny River	
<b>Third highest</b>	
Brandywine Creek	
<b>Fourth highest</b>	
Deer Creek	
Monocacy River	

The Patuxent River in Maryland went from the lowest annual mean monthly flow in 2002 to the highest in 2003 since record-keeping began in 1944.



Daily streamflow on the Potomac River near Washington, D.C. in December averaged 22.1 bgd, which is about 3 times higher than normal December flow. The average flow for 2003 was 16.9 bgd, which is 55 percent above normal. More information on the Potomac River is available at: <http://md.water.usgs.gov/monthly/poto.html>



Streamflow on the Potomac River (shown at left) has been above normal (triangles) for the entire month and for most of the year. Flood stage (green line) was reached on December 12, which was also a new record daily maximum.

Current streamflow, groundwater levels, and water-quality information for the Nation can be viewed on the USGS National Water Information System (NWIS) website: <http://waterdata.usgs.gov/nwis>

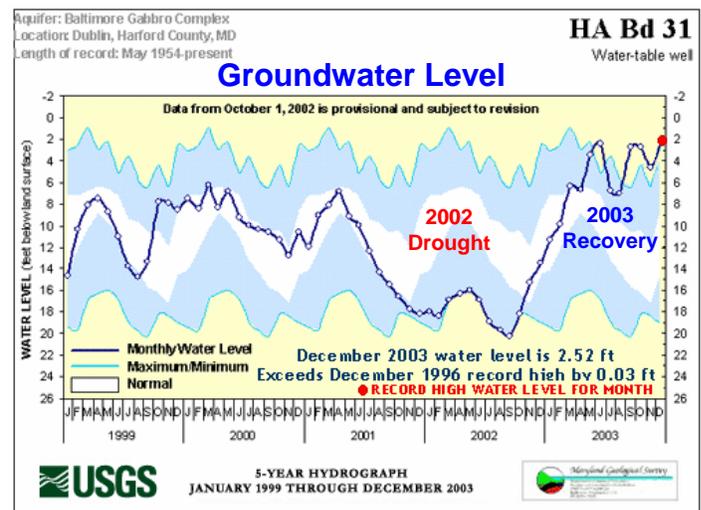
## Groundwater-Unconfined or Shallow Aquifers

Ten of the 15 wells used by the USGS to monitor unconfined or shallow aquifer response to climatic conditions in the bi-state region were at their highest December levels in more than 40 years. Wells in Baltimore, Carroll, Charles, Harford, Prince Georges, and Queen Annes Counties, Maryland, and Kent County in Delaware reached the highest December level in 40 years. The remaining five wells were within about a foot of setting a December record high water level. This is the fourth consecutive month of record-setting high levels for wells in Harford, Queen Annes, and Prince Georges Counties. The well in Carroll County set new monthly record highs for 6 out of the last 12 months.

By last December, the region had recovered from the severe hydrologic drought of 2002. Water levels are expected to rise through the winter and spring months as groundwater resources are recharged. Recharge typically begins in October when most plants are dormant and temperatures are lower. This year, water levels are already at high levels typically seen during the winter and spring. Winter's cold temperatures can cause the ground to freeze and recharge will subside until warmer temperatures and melting occurs in the spring.

The 5-year hydrograph shown to the right for a well in Harford County shows that the water level in the well, measured in depth below land surface, is at a record-setting high for December 2003 and has been for the last four consecutive months. The water level is close to the all-time record set in May 1998. Water levels recovered from the record-setting low during the 2002 drought a year ago, and have been above normal for the past 10 months.

For 5-year hydrographs of groundwater levels for the climatic indicator wells, visit: <http://md.water.usgs.gov/groundwater/>.



## Groundwater-Confined or Deep Aquifers

Although water is plentiful at the surface (streams, reservoirs, and shallow groundwater reserves are full), some of the deep confined aquifers used for water supply by many people living in southern and eastern Maryland continue to decline. The water levels continue to decline because they are being pumped more quickly than deep groundwater is recharged and since the confined aquifers are deep, water levels in confined aquifers take longer to respond to climatic conditions than shallow aquifers. Confined aquifer wells are measured monthly and can be viewed at <http://md.water.usgs.gov/groundwater/>.

## Reservoir Storage

High groundwater levels and above normal streamflow and rainfall helped to keep reservoir storage levels in the Baltimore reservoir system at capacity in December. Storage in the Triadelphia and Duckett Reservoirs on the Patuxent River has decreased to 95 percent of capacity because of releases to allow for spring runoff.

## USGS Water Monitoring

Streamflow and groundwater levels are used to assess the current water conditions and can be used to predict the potential for flooding and drought conditions. These USGS data have been provided to State and local water resource managers and are critical for making appropriate decisions on water regulation. For more information on streamflow and groundwater levels in Maryland, Delaware, and Washington, D.C., visit Water Watch at: <http://md.water.usgs.gov/waterwatch/>.

Groundwater is an important component (in addition to streamflow and reservoir storage) in assessing water resources, however, as groundwater is usually hidden underground, it is difficult to know the status of aquifers in a timely manner. Most wells are measured by hand on a regular basis, commonly monthly. Real-time data collection offers many benefits. Real-time groundwater data are defined as data automatically collected, transmitted, and made available to the public at least once a day. These data can be transmitted by land-line telephone, cellular telephone, radio, satellite telemetry, or a combination of these technologies. The advantages of real-time data collection include timeliness, data quality, data availability, and cost. There are currently five wells in Maryland and one well in Delaware equipped with real-time data collection. Within the next year, several wells in Calvert County, Maryland will also be monitored in real-time. To view real-time groundwater levels, visit the USGS NWISWeb site at <http://waterdata.usgs.gov/>. Select groundwater from the data category, then real-time, then your region of interest, such as Maryland.

The real-time streamflow stations used in this analysis are operated in cooperation with the Maryland and Delaware Geological Surveys, the Maryland State Highway Administration, the U.S. Army Corps of Engineers, the Maryland Department of Natural Resources, the Maryland Department of the Environment, Baltimore County, Baltimore City, and other agencies. The observation wells used in this analysis are operated in cooperation with the Maryland and Delaware Geological Surveys. The real-time wells are operated in cooperation with the Maryland and Delaware Geological Surveys, the Interstate Commission on the Potomac River Basin, and Calvert County, Maryland. The USGS publishes data for 137 streamflow stations and 379 observation wells across Maryland and Delaware.

The USGS serves the Nation by providing reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.

\* \* \* USGS \* \* \*