

Water Supply Outlook

May 2, 2023

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Interstate Commission on the Potomac River Basin (ICPRB)

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The ICPRB, through its Section for Cooperative Water Supply Operations on the Potomac (CO-OP), coordinates water supply operations during times of drought and recommends releases of stored water. These operations ensure adequate water supplies for Washington metropolitan area water users and for environmental flow levels. The water supply outlooks are published by CO-OP on a monthly basis between April and October. They are meant to provide an update on the possibility of low-flow conditions in the Potomac basin.

Summary/Conclusions

The probability of releases from the Washington metropolitan area's backup water supply reservoirs is above normal for the summer and fall of 2023. The use of Jennings Randolph and Little Seneca reservoirs is generally triggered by low flows brought about by a combination of low summer precipitation and low groundwater levels. The Potomac Basin experienced a dry weather period in the middle of April, but by the end of the month, a positive development occurred in the form of over 2.00 inches of rain, bringing the monthly average precipitation to 3.0 inches, which is 0.3 inches below normal. This rainfall resulted in increased stream flows at Little Falls, which rose from below historical minimum levels to above normal levels. However, groundwater levels in many monitoring wells remain below normal, and the 12-month cumulative basin precipitation is 2.4 inches below normal. The Middle Atlantic River Forecast Center predicts fair water resources and supplies for the Potomac Basin, but the recent dry period and the above-normal precipitation forecast provide mixed messages about the likelihood of low-flows this season, and ICPRB staff will continue to monitor the developing water supply conditions in the basin. Currently, the Potomac River flow is adequate to meet the water demands of the Washington metropolitan area without requiring releases from upstream reservoirs. However, if low-flow conditions occur, the area is well-protected from water supply shortages due to carefully designed hydrological drought-contingency plans.

ICPRB's Low Flow Outlook

There is a 12 to 23 percent conditional probability that natural Potomac flow will drop below 600 to 700 million gallons per day (MGD) at Little Falls through December 31 of this year; at these flow levels, water supply releases from Jennings Randolph and Little Seneca reservoirs may occur. Releases occur when predicted flow is less than demand plus a required environmental flow-by. Drinking water demand ranges from 400 to 700 MGD during the summer months and the minimum flow-by at Little Falls is 100 MGD. Note that natural flow is defined as observed flow at the Little Falls gage plus total Washington metropolitan Potomac withdrawals, with an adjustment made to remove the effect of North Branch reservoir releases on stream flow.

The conditional probability is estimated by analyzing the historical stream flow records and considering recent stream flow values, precipitation totals for the prior 12 months, current groundwater levels, and the current Palmer Drought Index. Past years in which watershed conditions most closely resemble current conditions are weighted more heavily in the determination of conditional probability. The historical, or unconditional, probability is based on an analysis of the historical record without weighing for current conditions. The 12 to 23 percent conditional probability compares to the 8 to 15 percent historical probability and is considered the more reliable indicator.

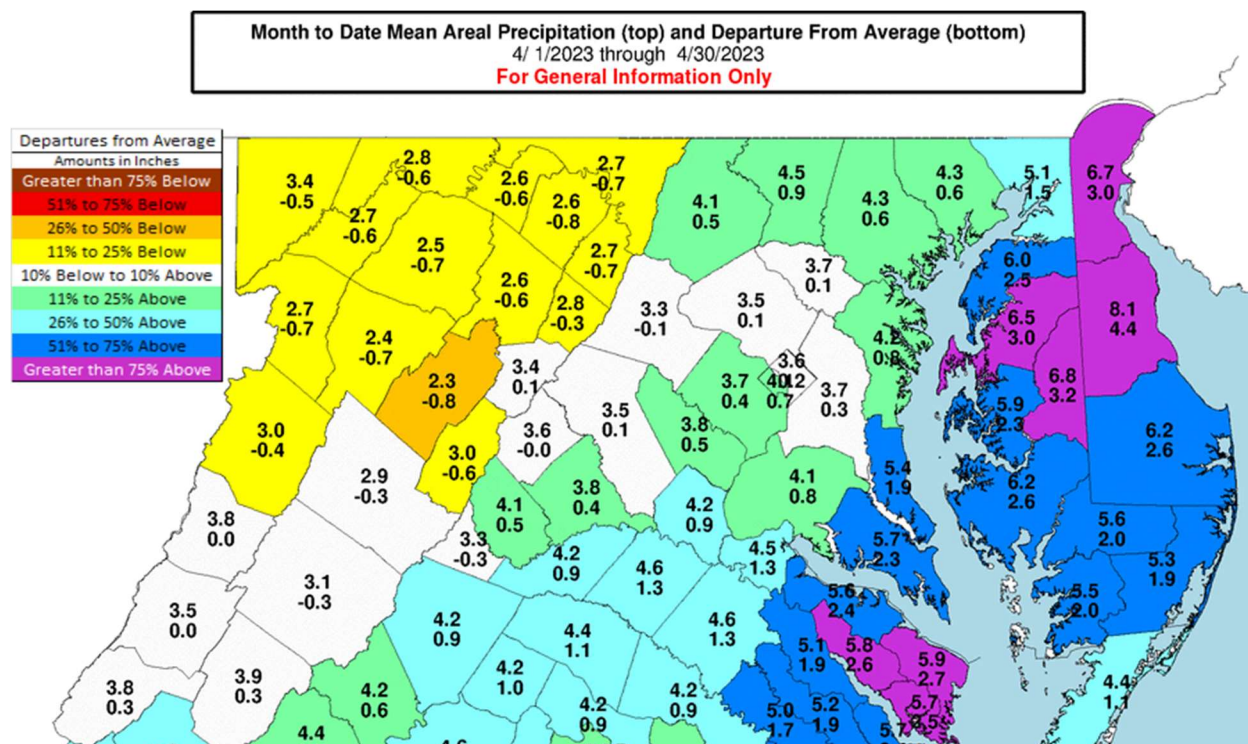
Outlook for natural Potomac River flow at Little Falls – Watershed conditions as of May 1, 2023

Low flow threshold (MGD)	Low flow threshold (cfs)	Historical probability of lower flow May 1 through December 31	Conditional probability of lower flow May 1 through December 31
1200	1858	68%	77%
1000	1548	49%	61%
800	1238	25%	33%
700	1084	15%	23%
600	929	8%	12%

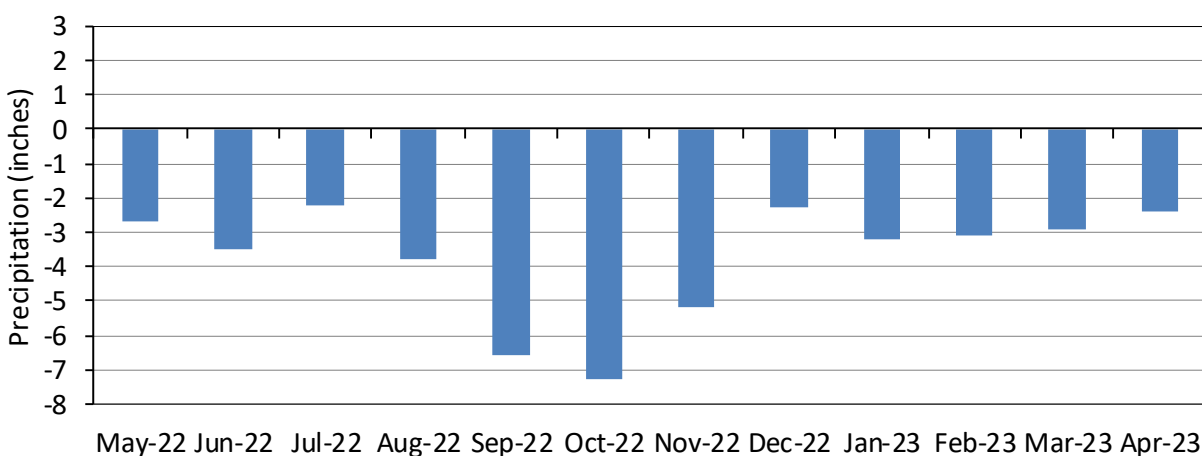
Past Precipitation:

According to the National Weather Service's Middle Atlantic River Forecast Center (MARFC), the Potomac basin upstream of Washington, D.C. received 3.0 inches of precipitation in April, which is 0.3 inches below normal. As of April 30, the 12-month cumulative basin precipitation is 2.4 inches below normal (see graph). However, recent heavy rainfall at the end of April has helped reduce the precipitation deficit observed in previous months.

Source: https://www.weather.gov/marfc/Precipitation_Departures



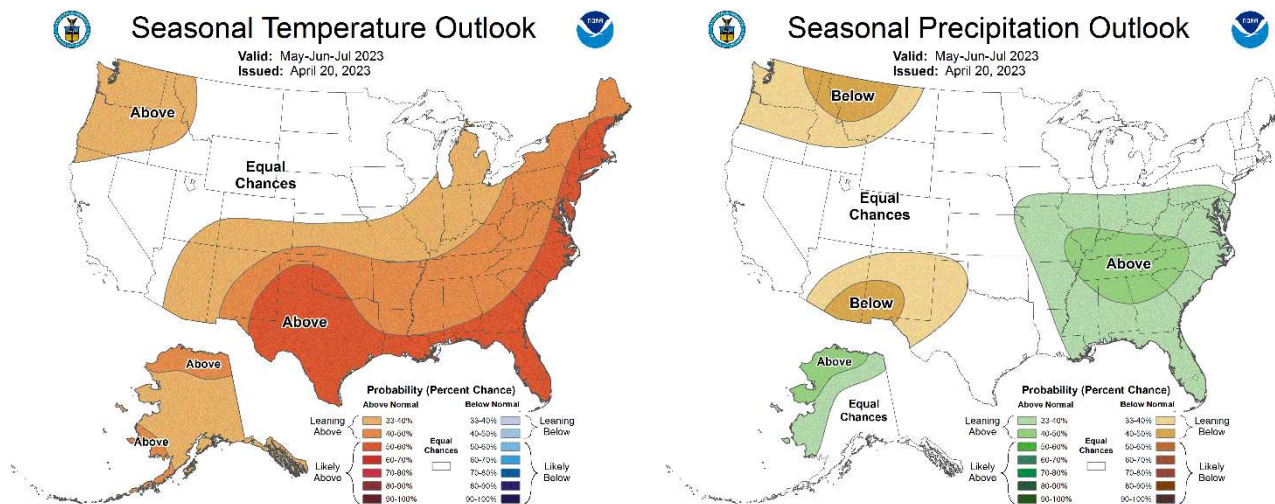
12-month cumulative departure from normal, through April 2023



Precipitation and Drought Outlook for May, June, and July 2023

The Middle Atlantic River Forecast Center (MARFC) predicts "good" water resources and supplies in the northern parts of the Mid-Atlantic Region and "fair" elsewhere (including the Potomac Basin). May's outlook is for normal temperatures and precipitation in the Potomac Basin. The 90-day outlook (May-July, shown below) calls for above-normal temperatures and precipitation.

Sources: <https://www.weather.gov/marfc/WRO>, <https://www.weather.gov/hun/climateforecast>

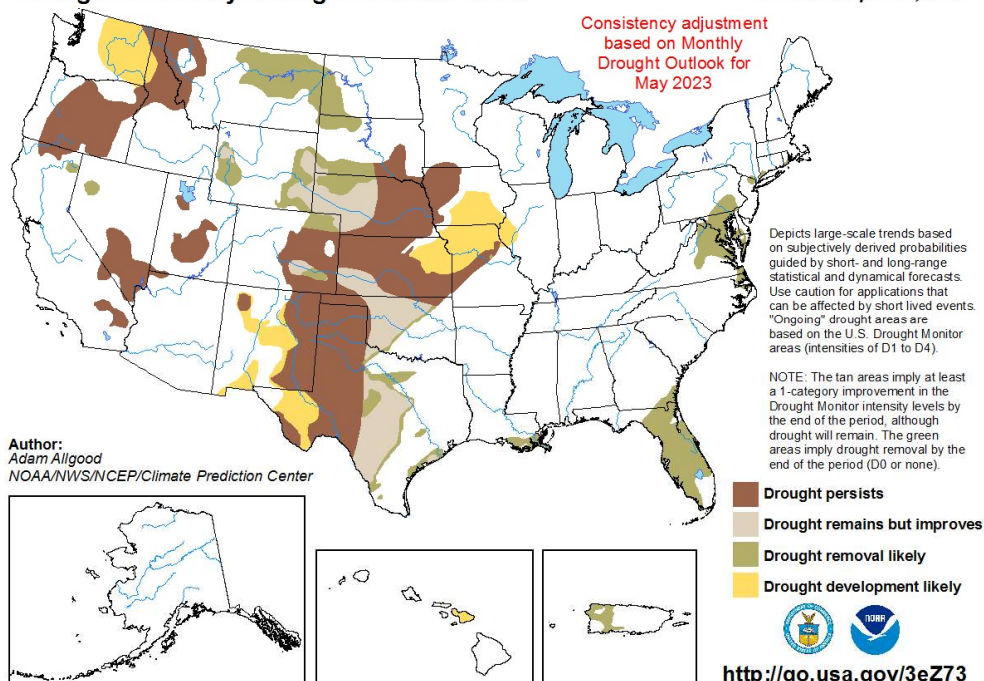


As of April 30, the Climate Prediction Center's U.S. Seasonal Drought Outlook reports drought removal likely in the Potomac basin. The caption says that the green areas imply drought removal by the end of the period (D0 or none).

Source: https://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php

U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period

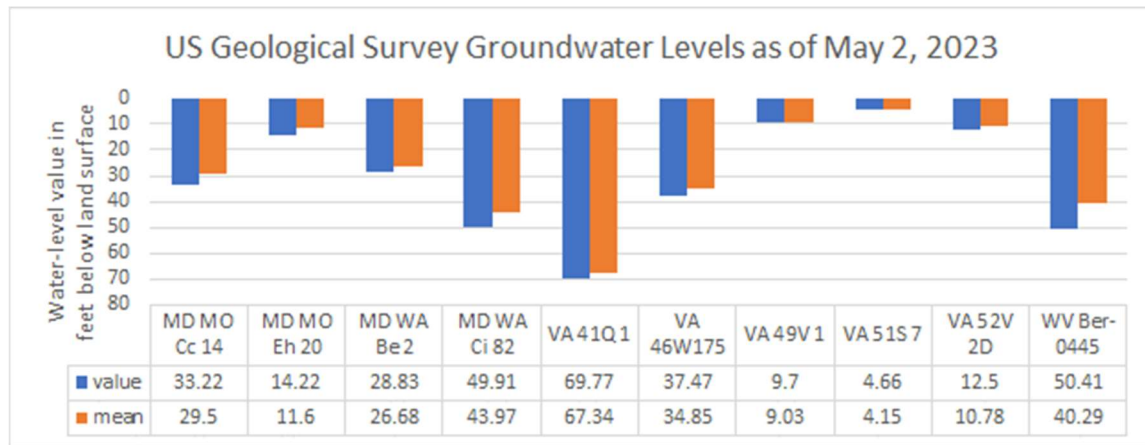
Valid for May 1 - July 31, 2023
Released April 30, 2023



Groundwater – Current Conditions

Based on data from the U.S. Geological Survey (USGS), the depth to groundwater level (measured in feet) for ten wells used in the ICPRB water supply outlook probability of low flows indicate slightly below normal depths, as can be seen in the comparison plot (graph shown below) of current values and estimated monthly means for May. The National Water Dashboard provides a larger set of data for 31 stations within the geographic extent (37.9408,-79.6900), (40.0274,-76.7938). Of these, 9.7% of wells are considered "Normal," with water levels falling between the 25th and 75th percentiles of historical records; 9.7% of wells are categorized as "Below Normal," with water levels between the 10th and 24th percentiles; and 6.5% of wells are classified as "Much Below Normal," with water levels below the 10th percentile. Additionally, about 29.0% of wells are experiencing an increase in water levels, while 32.3% are experiencing a decrease in water levels.

Source: <https://dashboard.waterdata.usgs.gov/>



Reservoir Storage – Current Conditions:

As of now, there have been no water supply releases from the CO-OP shared system in the current year. Whitewater releases at Jennings Randolph are planned for the weekends of May 13-14 and 27-28, 2023.

Source: <https://www.nab-wc.usace.army.mil/nab/northBranch.html>

Reservoir storage as of May 2, 2023

Facility	Percent Full	Current usable storage, BG	Total usable capacity, BG
WSSC Water's Patuxent reservoirs ¹	55	5.59	10.2
Fairfax Water's Occoquan Reservoir ²	100	8.05	8.05
Little Seneca Reservoir ³	100	3.9	3.9
Jennings Randolph water supply ⁴	100	13.1	13.1
Jennings Randolph water quality ⁴	100	16.3	16.3
Savage Reservoir ⁵	93	5.9	6.3

¹ Bathymetric study conducted December 2015 with revisions in December 2016, and unusable storage corrected June 2017. Note that 1.37 BG is not considered usable capacity because it is reserved for storm inflow (T. Supply, personal communication, August 3, 2018).

² Bathymetric study conducted in 2020.

³ Usable capacity consistent with Ortt, *et al.* (2011).

⁴ 2013 revised stage-storage curve provided by Bill Haines, US Army Corps of Engineers, Baltimore District.

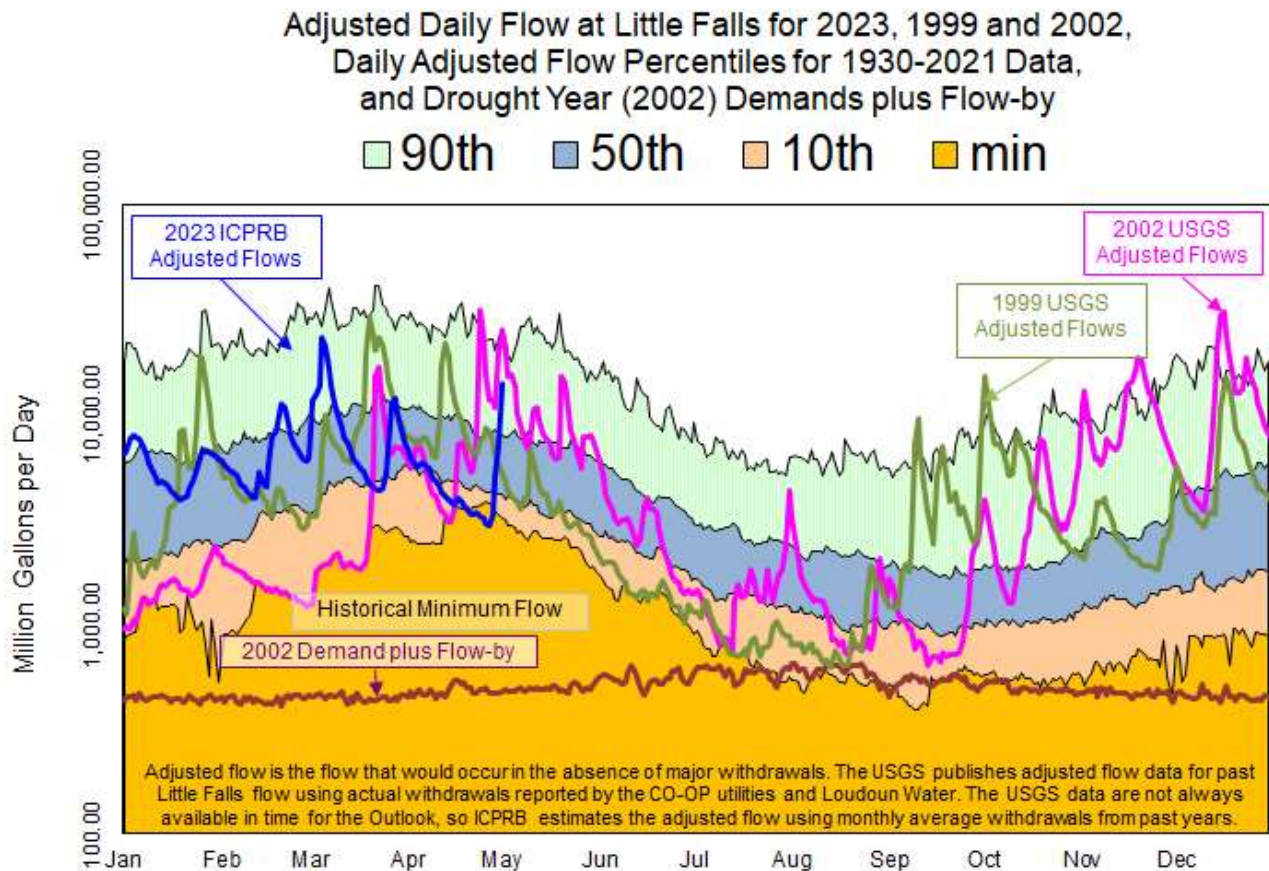
⁵ 1998 revised stage-storage curve provided by Bill Haines, US Army Corps of Engineers, Baltimore District.

Potomac River Flow

The Potomac's adjusted flow at Little Falls was 14.0 BGD on May 1, which is above the 50th percentile flow of 8.0 BGD but below the 90th percentile of 26.2 BGD for this time of year. The adjusted flow is calculated by considering the flow that would occur if there were no major withdrawals from the Washington metropolitan area but does include releases from upstream reservoirs. Over the past four months, the adjusted flow averaged 6.4 BGD, with April at 4.5 BGD. Streamflow is currently above normal. See the figure on the next page for details.

Environmental Flow-by

In April, the average observed flow of Potomac at Little Falls was comfortably above the minimum recommended level of 100 MGD. However, between April 21 and 28, the daily flow at Little Falls hit a new historical low for this time of year.



Little Falls flow statistics are based on 1930 through 2021 USGS published gage flow, "USGS 01646502 POTOMAC RIVER (ADJUSTED) NEAR WASH, DC". To create this flow record, the USGS has added historical water supply withdrawals from the Potomac as reported by U.S. Army Corps of Engineers, Washington Suburban Sanitary Commission, Fairfax County Water Authority, city of Rockville, and Loudoun Water to the Little Falls gage flow record.

Drought Status

As of now, the drought status is normal in Maryland's Western, Central, and Southern regions, as well as most of Virginia and Pennsylvania. However, the Eastern region in Maryland and the Northern Coastal Plain, York James, Eastern Shore, Chowan, and Southeast regions in Virginia are under a drought watch. On April 25, the Virginia Department of Environmental Quality issued a Drought Watch Advisory. According to the Metropolitan Washington Council of Governments (MWCOG)'s water supply and drought response awareness plan, the current drought stage is normal.

Sources: <https://mde.maryland.gov/programs/Water/droughtinformation/Currentconditions/Pages/index.aspx>,
<https://www.deq.virginia.gov/water/water-quantity/drought>,
<https://www.deq.virginia.gov/Home/Components/News/News/183/16>,
<https://www.dep.pa.gov/Business/Water/PlanningConservation/Drought/Pages/default.aspx>,
<https://www.mwcog.org/documents/2022/05/02/regional-drought-and-water-supply-status--drinking-water-drought-wise-water-use-campaign/>

Drought Monitor and Soil Moisture

The NOAA Climate Prediction Center's U.S. Drought Monitor map (see first figure below) indicates the presence of abnormally dry (D0) and moderate drought (D1) conditions in the Potomac basin. Over the past month dry conditions have been spreading upriver toward the North Branch of the Potomac basin. The Palmer Drought Severity Index by Division map (see second figure on next page) indicates severe to moderate drought conditions in parts of the basin.

Sources: <https://droughtmonitor.unl.edu/CurrentMap.aspx>,

https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/palmer.gif

