# Water Supply Outlook

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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 backup water supply reservoirs in the Washington metropolitan area is higher than usual during the summer and fall of 2023. Typically, the use of Jennings Randolph and Little Seneca reservoirs is triggered by low flows resulting from a combination of low summer rainfall and groundwater levels. Recent data shows below-average rainfall in the Mid-Atlantic over the past few months, resulting in an unusual dry spell. In May, precipitation in the Potomac basin was 2.4 inches below normal, with a cumulative deficit of 6.5 inches for the past 12 months as of May 31. Groundwater levels in monitoring wells also remain below average. While intermittent showers and thunderstorms are expected as summer approaches, their occurrence may be unpredictable. The latest update from the Middle Atlantic River Forecast Center suggests no significant indications of heavy rainfall in the coming weeks, signaling a continuation of dry conditions in most areas. The ICPRB staff will carefully monitor the changing water supply conditions in the basin, particularly the USGS Gage stream flows at Point of Rocks, Maryland, where a threshold for daily water supply monitoring is established. Currently, the water flow in the Potomac River is sufficient to meet the water demands of the Washington metropolitan area without requiring releases from upstream reservoirs. However, in the event of low-flow conditions, the area is well-prepared to prevent water supply shortages with hydrological drought-contingency plans.

### ICPRB's Low Flow Outlook

There is a 19 to 34 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 19 to 34 percent conditional probability compares to the 8 to 15 percent historical probability and is considered the more reliable indicator.

Low flow threshold (MGD)	Low flow threshold (cfs)	Historical probability of lower flow June 1 through December 31	Conditional probability of lower flow June 1 through December 31
1200	1858	68%	88%
1000	1548	49%	70%
800	1238	25%	48%
700	1084	15%	34%
600	929	8%	19%

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

#### **Past Precipitation**

According to the National Weather Service's Middle Atlantic River Forecast Center (MARFC), the Potomac basin upstream of Washington, D.C. received 1.7 inches of precipitation in May, which is 2.4 inches below normal. As of May 31, the 12-month cumulative basin precipitation is 6.5 inches below normal (see graph).

Source: https://www.weather.gov/marfc/Precipitation\_Departures



12-month cumulative departure from normal, through May 2023



Jun-22 Jul-22 Aug-22 Sep-22 Oct-22 Nov-22 Dec-22 Jan-23 Feb-23 Mar-23 Apr-23 May-23

### Precipitation and Drought Outlook for June, July, and August 2021

The Middle Atlantic River Forecast Center (MARFC) predicts "fair" water resources and supplies. June's outlook is mostly for normal temperatures and precipitation in the Potomac basin. The 90-day outlook (Jun-Aug, shown below) calls for above-normal temperatures and precipitation.

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



As of May 31, the Climate Prediction Center's U.S. Seasonal Drought Outlook reports minimal drought conditions in the Potomac basin, with small areas remaining green indicating drought removal by the end of the period (D0 or none).

Source: https://www.cpc.ncep.noaa.gov/products/expert\_assessment/sdo\_summary.php



## 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 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 33 stations within the geographic extent (38.0578, -79.7707), (40.0943, -76.7608). Of these, 12.1% of wells are considered "Normal," with water levels falling between the 25th and 75th percentiles of historical records; 3.0% of wells are categorized as "Below Normal," with water levels between the 10th and 24th percentiles; 6.1% of wells are classified as "Much Below Normal," with water levels below the 10th percentile; and 9.1% are at an all-time low for this day-of-year. Additionally, about 42.4% of wells are experiencing an increase in water levels, while 9.1% are experiencing a decrease in water levels.

#### Source: https://dashboard.waterdata.usgs.gov/



## US Geological Survey Groundwater Levels as of May 31, 2023

### Reservoir Storage - Current Conditions

As of now, there have been no water supply releases from the CO-OP shared system in the current year. The Patuxent reservoirs are below their typical combined storage level due to sediment removal efforts, and dredging may begin in a week or so. A whitewater release from Savage Reservoir is planned for Saturday, June 3, 2023.

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

#### Reservoir storage as of May 31, 2023

Facility	Percent Full	Current usable storage, BG	Total usable capacity, BG
WSSC Water's Patuxent reservoirs <sup>1</sup>	39	4.06	10.2
Fairfax Water's Occoquan Reservoir <sup>2</sup>	100	8.05	8.05
Little Seneca Reservoir <sup>3</sup>	99	3.8	3.9
Jennings Randolph water supply⁴	100	13.1	13.1
Jennings Randolph water quality₄	99	16.2	16.3
Savage Reservoir⁵	91	5.7	6.3

<sup>1</sup> 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).

<sup>2</sup> Bathymetric study conducted in 2020.

<sup>3</sup> Usable capacity consistent with Ortt, *el al.* (2011).

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

<sup>5</sup> 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 2.7 BGD on May 30, which is below the 10th percentile flow of 2.8 BGD but above the historical minimum of 1.9 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 five months, the adjusted flow averaged 6.7 BGD, with May at 7.8 BGD. See the figure below 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 late April, Maryland's Western, Central, and Eastern regions remain under a drought watch, while a drought watch advisory is in affect for 28 counties and 11 cities in Virginia. Pennsylvania is in a normal drought status. The Metropolitan Washington Council of Governments (MWCOG) states that the current drought stage is normal, as per their water supply and drought response awareness plan.

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 (refer to the first figure below) shows the existence of abnormally dry (D0) and moderate drought (D1) conditions with short- and long-term (SL) effects in the Potomac basin. Notably, abnormal dryness (D0) has expanded across Delaware, Maryland, and West Virginia, while moderate drought (D1) has intensified in Maryland and eastern Pennsylvania due to significant precipitation deficits over the past 90 days. Recent data from the US Department of Agriculture indicate that 80% of topsoil moisture in Pennsylvania and 78% in Maryland were rated as dry or very dry, representing an increase compared to the previous week. In addition, the Palmer Drought Severity Index by Division map (refer to the second figure on the following page) depicts the presence of moderate to extreme drought conditions in various parts of the basin.



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

https://www.cpc.ncep.noaa.gov/products/analysis\_monitoring/regional\_monitoring/palmer.gif



