

# Water Supply Outlook

October 5, 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 Washington metropolitan area has an above-normal probability of releases from its backup water supply reservoirs for the fall of 2023.** These releases typically occur in response to low flows resulting from insufficient summer precipitation and low groundwater levels. Due to a dry period, CO-OP Drought Operations occurred from August 25th to September 11th. However, the Potomac basin saw some relief after several rainfall events produced 4.3 inches of precipitation for September, exceeding the monthly average by 0.5 inches. Little Falls' adjusted stream flows reached a low of 533 million gallons per day (MGD), peaked above average, and are now within the 10th to 50th percentile flow range. Groundwater levels have been slower to recover, and many wells used in ICPRB's low-flow outlook are now approaching normal levels. This trend is also reflected in the U.S. Drought Monitor, with reduced areas in the basin in the abnormally dry, moderate drought, and severe drought categories. NOAA's U.S. Seasonal Outlook remains optimistic about drought conditions improving. As flows return to median levels, Point of Rocks has reverted to a flow rate of approximately 2,000 cubic feet per second (cfs). This flow rate coincides with the established Daily Monitoring threshold, and on October 4th, the CO-OP Section resumed its daily drought monitoring and reporting. Currently, the Potomac River's flows are adequate to meet the water demands of the Washington metropolitan area without requiring releases from upstream reservoirs. The region has drought-contingency plans to ensure water supply reliability and prevent shortages.

## ICPRB's Low-Flow Outlook

**There is a 28 to 40 percent conditional probability that natural Potomac flow will drop below 600 to 700 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 the 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. 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 minimum 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 determining conditional probability. The historical, or unconditional, probability is based on analyzing the historical record without weighing current conditions. In the table below, the 28 to 40 percent conditional probability of flows below 600 to 700 MGD compares to the 7 to 14 percent historical probability and is considered the more reliable indicator. This month's conditional probability considers the minimum observed Little Falls flow of 533 MGD, which occurred on September 5th before the month's rainfall. Considering just the indicators for groundwater, precipitation, and the Palmer Drought Index, which include the impacts of recent precipitation, the conditional probability of flows below 600 to 700 MGD ranges from 11 to 25 percent.

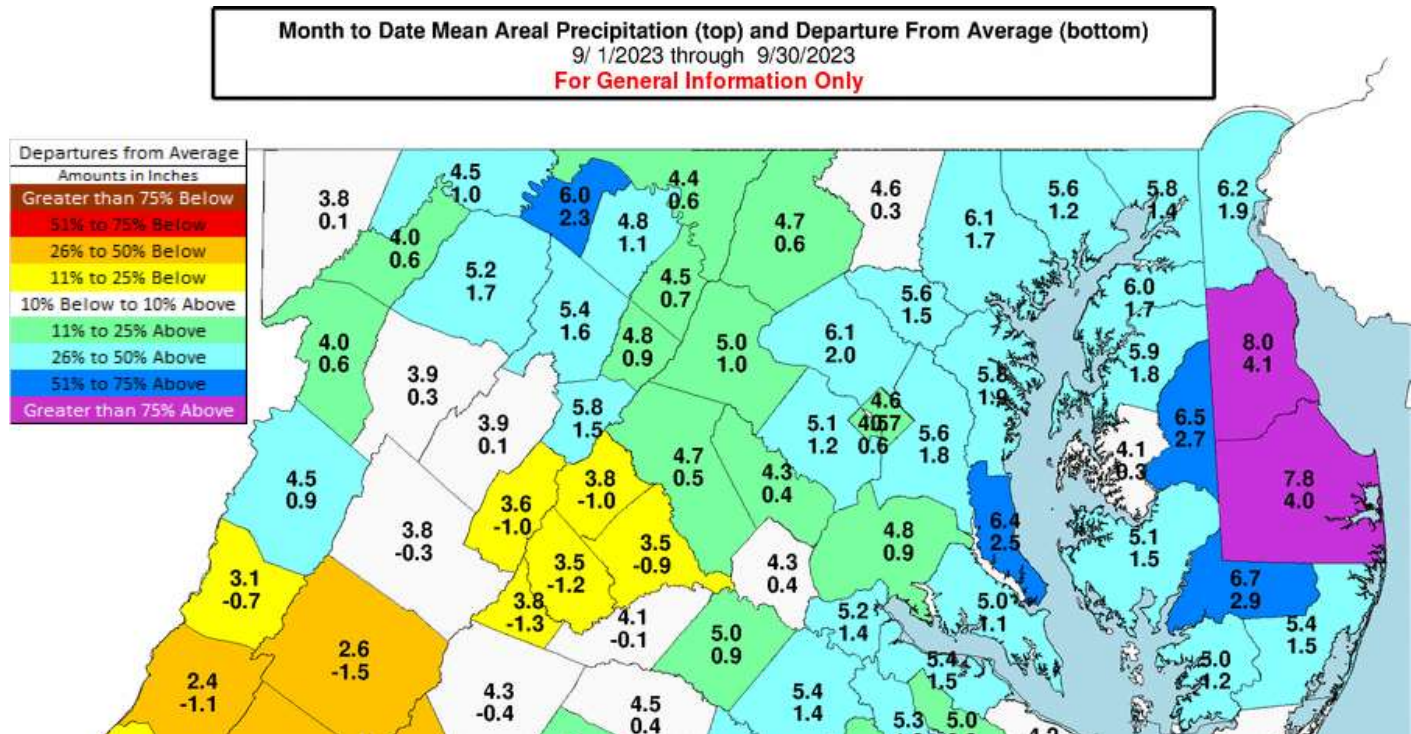
Outlook for natural Potomac River flow at Little Falls – Watershed conditions as of October 3, 2023

<i>Low flow threshold (MGD)</i>	<i>Low flow threshold (cfs)</i>	<i>Historical probability of lower flow September 1 through December 31</i>	<i>Conditional probability of lower flow September 1 through December 31</i>
1200	1858	64%	91%
1000	1548	45%	80%
800	1238	22%	53%
700	1084	14%	40%
600	929	7%	28%

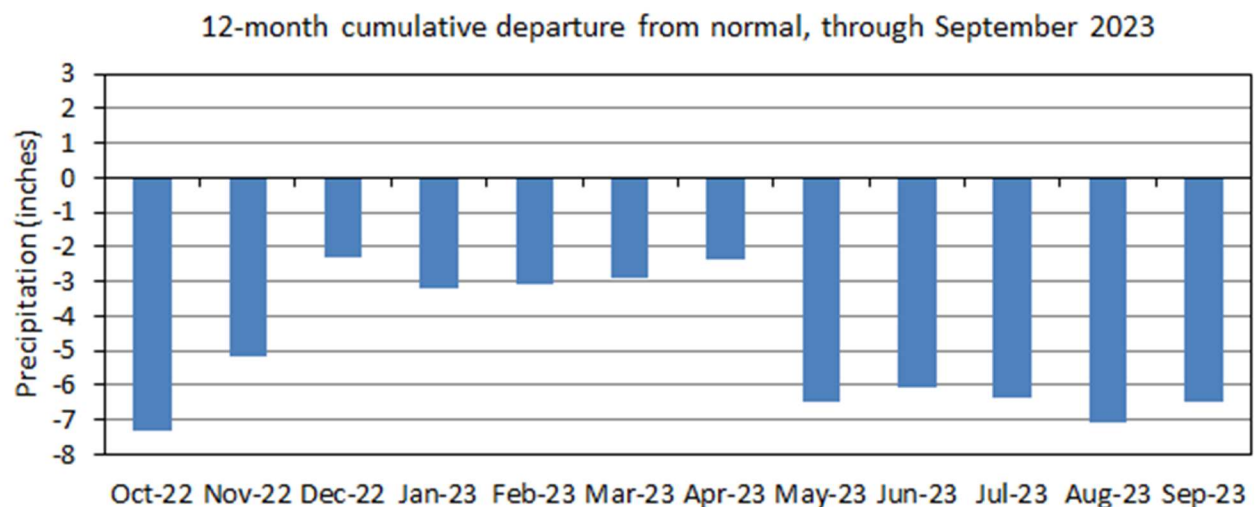
## Past Precipitation

The National Weather Service's Middle Atlantic River Forecast Center (MARFC) reports that the Potomac basin, just upstream of Washington, D.C., received 4.3 inches of rain in September, exceeding the monthly average by 0.5 inches. Over the past 12 months, there has been 6.5 inches less rainfall than the average (as shown in the graph). Fortunately, the slightly above-average rain this past month improved the 12-month deficit by 0.6 inches from August.

Source: [https://www.weather.gov/marfc/Precipitation\\_Departures](https://www.weather.gov/marfc/Precipitation_Departures)



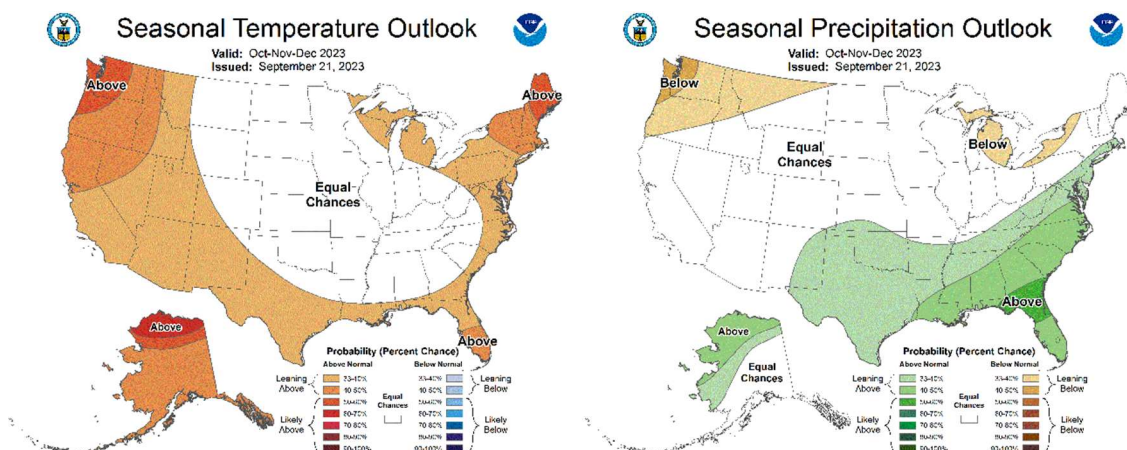
Source: Middle Atlantic River Forecast Center, National Weather Service



## Precipitation and Drought Outlook for October, November, and December

The Middle Atlantic River Forecast Center (MARFC) provides an October outlook that indicates "leaning above-normal" temperatures and "leaning below-normal" precipitation in the Potomac basin. In the next 90 days (Oct-Nov-Dec shown below), MARFC predicts "leaning above-normal" temperatures and "leaning above-normal" precipitation.

Sources: [https://www.cpc.ncep.noaa.gov/products/predictions/long\\_range/seasonal.php?lead=1](https://www.cpc.ncep.noaa.gov/products/predictions/long_range/seasonal.php?lead=1)

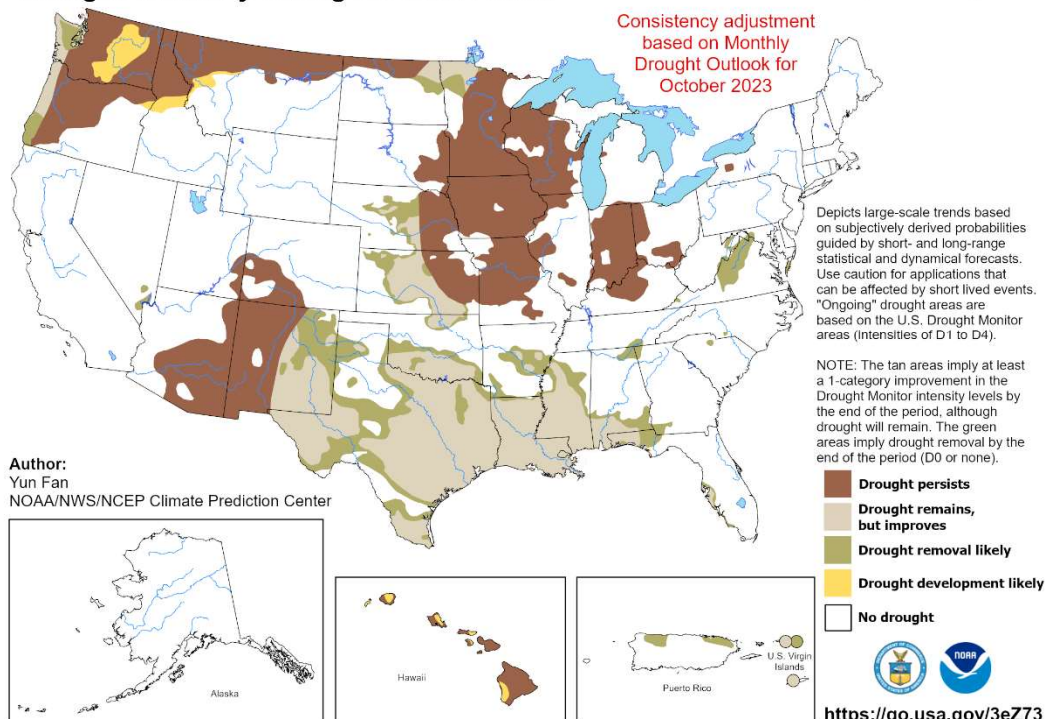


According to the Climate Prediction Center's U.S. Seasonal Drought Outlook released on September 30, "drought removal" in the Potomac basin is likely.

Source: [https://www.cpc.ncep.noaa.gov/products/expert\\_assessment/sdo\\_summary.php](https://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php),  
<https://www.cpc.ncep.noaa.gov/products/Drought/>

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

Valid for October 1 - December 31, 2023  
Released September 30, 2023

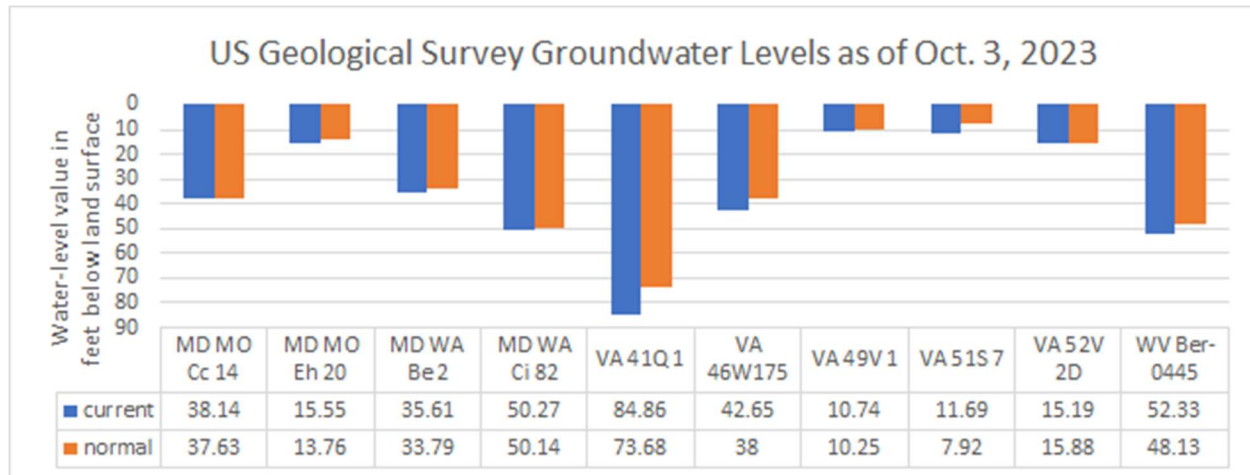




## Groundwater – Current Conditions

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 indicates near normal to below normal depths, as can be seen in the comparison plot (graph shown below) of current values and estimated normal values for October. The National Water Dashboard provides a larger data set of 43 stations within the geographic extent (37.1859, -80.1870), (40.0707, -76.2237). Of these, 18.6% of wells are considered "Normal," with water levels falling between the 25th and 75th percentiles of historical records; 11.6% of wells are categorized as "Below Normal," with water levels between the 10th and 24th percentiles; 9.3% of wells are classified as "Much Below Normal," with water levels below the 10th percentile. Additionally, about 27.9% of wells are experiencing an increase in water levels, while 16.3% are experiencing a decrease in water levels.

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



## Reservoir Storage – Current Conditions

The CO-OP shared reservoir system has not released any water supply storage this year. The US Army Core of Engineers website, <https://www.nab-wc.usace.army.mil/nab/northBranch.html>, displays the 2023 release schedule for Jennings Randolph Lake and Savage River Dam and three-day projections for release rates.

Reservoir storage as of October 3, 2023

Facility	Percent Full	Current usable storage, BG	Total usable capacity, BG
WSSC Water's Patuxent reservoirs <sup>1</sup>	41	4.28	10.53
Fairfax Water's Occoquan Reservoir <sup>2</sup>	100	8.17	8.17
Little Seneca Reservoir <sup>3</sup>	99	3.82	3.87
Jennings Randolph water supply <sup>4</sup>	100	13.10	13.10
Jennings Randolph water quality <sup>4</sup>	38	6.14	16.30
Savage Reservoir <sup>5</sup>	45	2.88	6.33

<sup>1</sup> Values from the 2015 bathymetric study adjusted for 1.37 BG of unusable reserved storm inflow storage (T. Supply, personal communication, Aug. 3, 2018).

<sup>2</sup> Values from the 2020 bathymetric study adjusted for 0.33 BG of dead storage.

<sup>3</sup> Values from Ortt *et al.* (2011) bathymetric study.

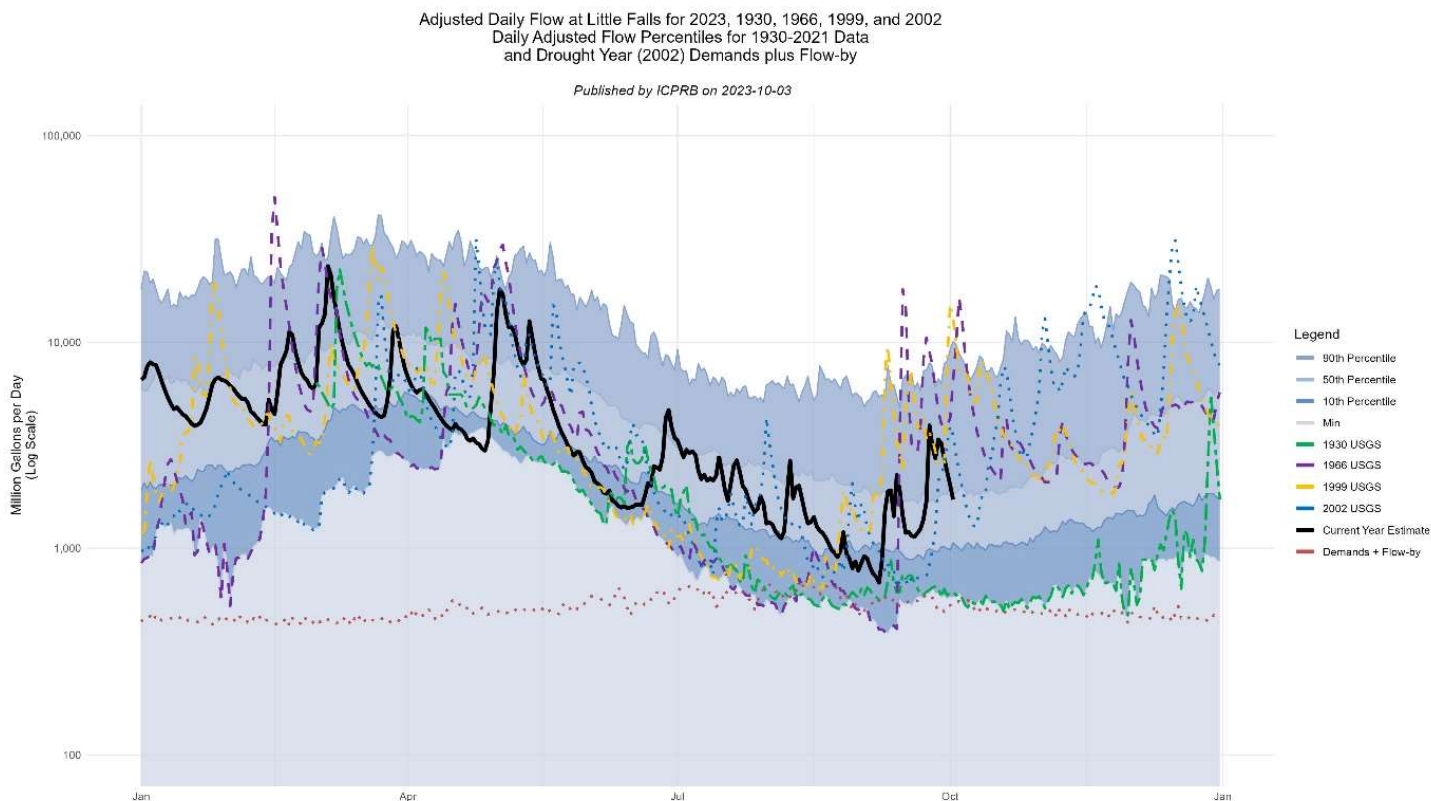
<sup>4</sup> Values from the 2013 revised stage-storage curve (B. Haines, US Army Corps of Engineers, Baltimore District) adjusted for 110 ac-ft (0.04 BG) of dead storage.

<sup>5</sup> Values from the 1998 revised stage-storage curve (B. Haines, US Army Corps of Engineers, Baltimore District) include up to 2000 ac-ft (0.652 BG) of the Town of Westernport water supply storage.

## Potomac River Flow

The estimated adjusted Potomac flow at Little Falls on October 2 was 1.7 billion gallons per day (BGD). For this day of the year, this value was below the 50<sup>th</sup> percentile flow value of 1.9 BGD and above the 10<sup>th</sup> percentile flow value of 1.1 BGD. Adjusted flow, shown in the figure below, is the flow that would occur in the absence of major Washington metropolitan area withdrawals but includes releases from upstream reservoirs. Adjusted flow averaged 4.5 BGD for the past nine months and 1.7 BGD in September.

Source: [https://waterdata.usgs.gov/md/nwis/dv?referred\\_module=sw&site\\_no=01646502](https://waterdata.usgs.gov/md/nwis/dv?referred_module=sw&site_no=01646502),  
[https://waterwatch.usgs.gov/index.php?mt=real&st=potomac&usst=&ushuc=&go=GO&id=wwlmap\\_viewer](https://waterwatch.usgs.gov/index.php?mt=real&st=potomac&usst=&ushuc=&go=GO&id=wwlmap_viewer)



Adjusted flow represents the natural flow that would occur in the absence of major withdrawals. The USGS publishes adjusted flow data for Little Falls based on actual withdrawals reported by the CO-OP utilities and Loudoun Water. However, the USGS data may not always be available in time for the outlook. In such cases, ICPRB estimates the adjusted flow using a 20-day rolling average of past withdrawal data or observed data collected from the utilities.

Little Falls flow statistics are based on the 1930-2021 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 the U.S. Army Corps of Engineers, Washington Suburban Sanitary Commission, Fairfax Water, City of Rockville, and Loudoun Water to the Little Falls gage flow record.

## Environmental Flow-by

The average observed Potomac flow at Little Falls in September was above the environmental flow-by of 100 MGD (155 cfs).

## Drought Status

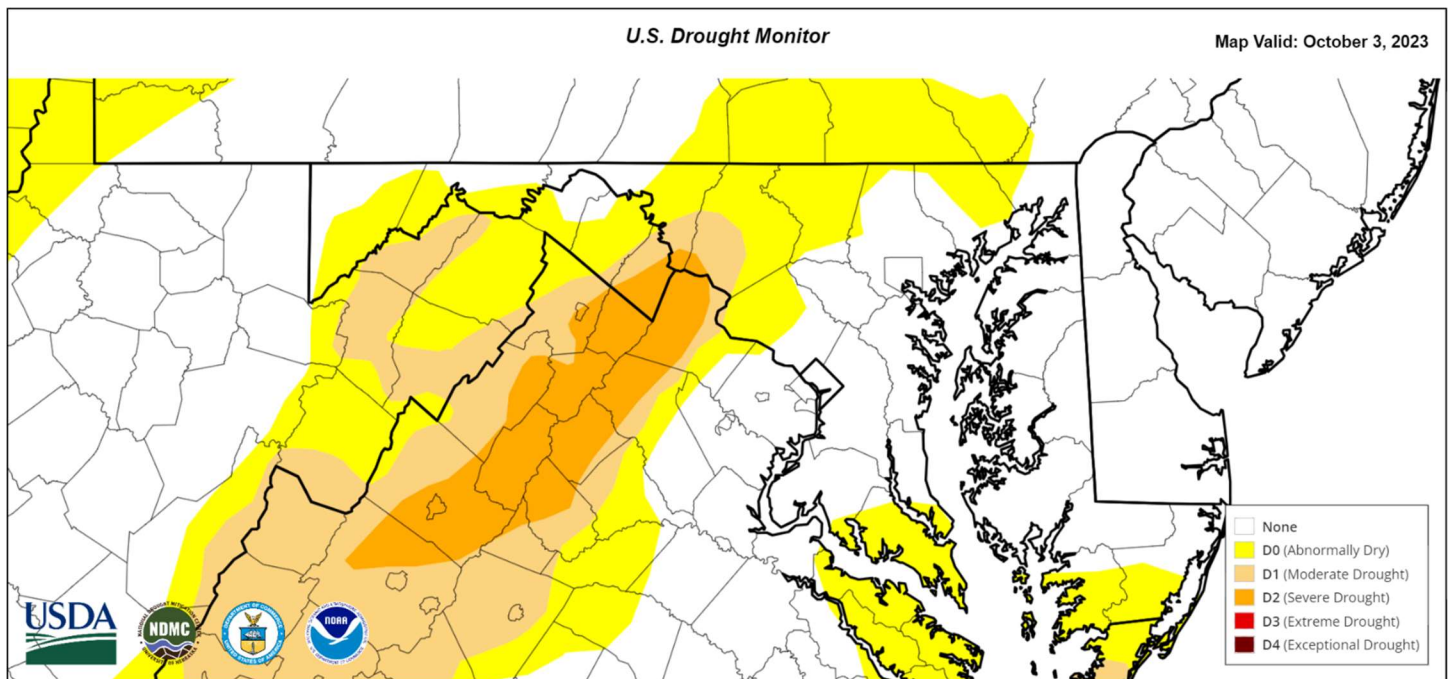
As of September 30th, the Maryland Department of the Environment (MDE) has classified Maryland's drought status as "Watch" for Western Maryland, "Warning" for Central Maryland, and "Normal" for Eastern and Southern Maryland. Meanwhile, the Virginia Department of the Environmental Quality (VDEQ), as of September 21st, maintains a "Drought Watch" status for the Eastern Shore, Northern Virginia, and York James evaluation regions, with a continued "Drought Warning" in the Shenandoah drought evaluation region. In Pennsylvania, on September 22nd, the Department of Environmental Protection (DEP) announced the continuation of a "Drought Watch" for 19 counties, with York County being shifted to a "Drought Warning." The Metropolitan Washington Council of Governments (MWCOC) reports a "Normal" drought stage.

Sources: <https://mde.maryland.gov/programs/Water/droughtinformation/Currentconditions/Pages/index.aspx>,  
<https://www.deq.virginia.gov/our-programs/water/water-quantity/drought>,  
<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/>

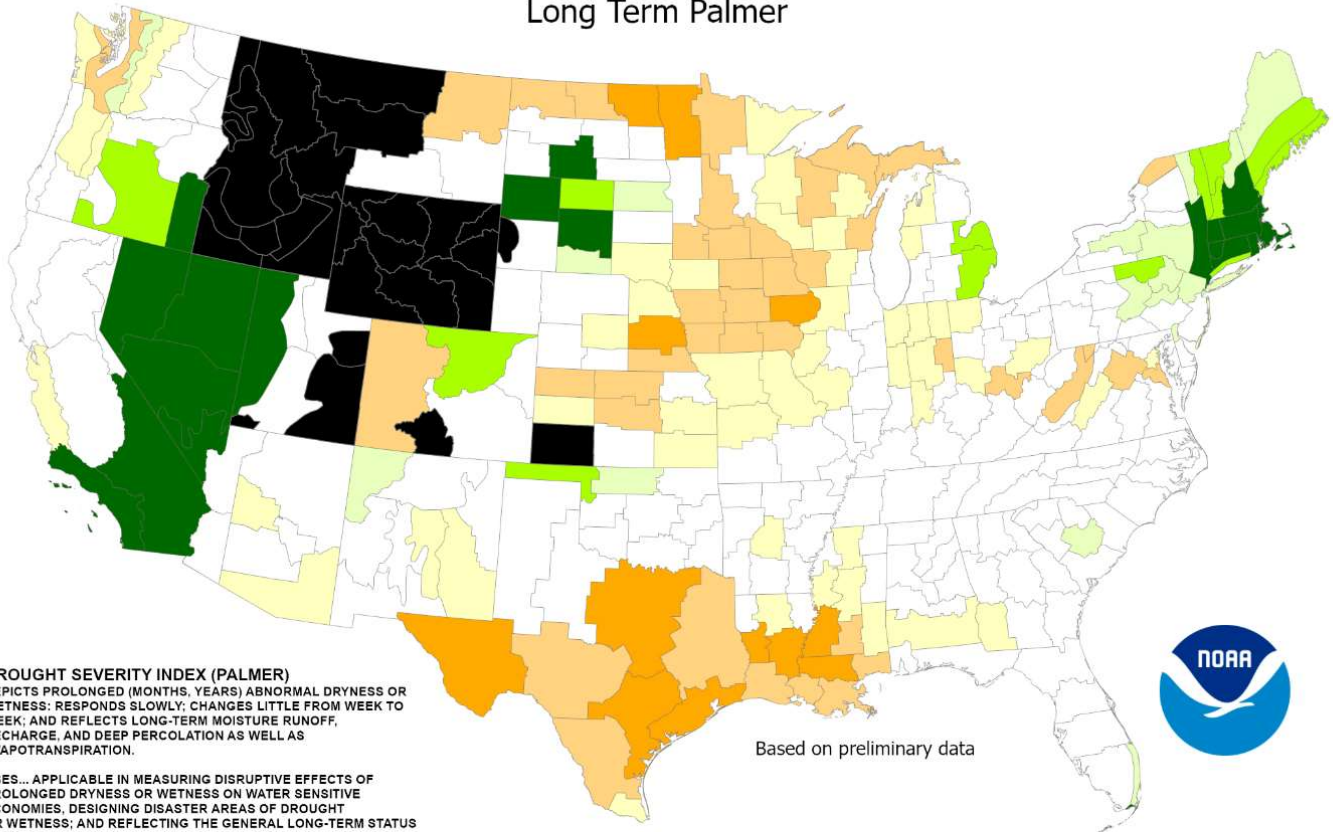
## Drought Monitor and Soil Moisture

The NOAA Climate Prediction Center's U.S. Drought Monitor map (first figure below) shows drought conditions ranging from abnormally dry to severe drought in the Potomac basin. Severe drought coverage (D2) has decreased from 4.79% to 3.17% in the Mid-Atlantic River Forecast Center area between September 19th and October 3rd, with additional improvements in D1 and D0 areas. The Palmer Drought Severity Index map (second figure on the following page) shows moderate to severe drought conditions in parts of the Potomac basin, an improvement from the extreme drought areas reported back in the September Outlook.

Sources: <https://droughtmonitor.unl.edu/CurrentMap.aspx>,  
[https://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/regional\\_monitoring/palmer.gif](https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/palmer.gif)



# Drought Severity Index by Division Weekly Value for Period Ending Sep 30, 2023 Long Term Palmer



Based on preliminary data

## DROUGHT SEVERITY INDEX (PALMER)

DEPICTS PROLONGED (MONTHS, YEARS) ABNORMAL DRYNESS OR WETNESS; RESPONDS SLOWLY; CHANGES LITTLE FROM WEEK TO WEEK; AND REFLECTS LONG-TERM MOISTURE RUNOFF, RECHARGE, AND DEEP PERCOLATION AS WELL AS EVAPOTRANSPIRATION.

USES... APPLICABLE IN MEASURING DISRUPTIVE EFFECTS OF PROLONGED DRYNESS OR WETNESS ON WATER SENSITIVE ECONOMIES, DESIGNING DISASTER AREAS OF DROUGHT OR WETNESS; AND REFLECTING THE GENERAL LONG-TERM STATUS OF WATER SUPPLIES IN AQUIFERS, RESERVOIRS AND STREAMS.

LIMITATIONS... IS NOT GENERALLY INDICATIVE OF SHORT-TERM (FEW WEEKS) STATUS OF DROUGHT OR WETNESS SUCH AS FREQUENTLY AFFECTS CROPS AND FIELD OPERATIONS (THIS IS INDICATED BY THE CROP MOISTURE INDEX).

- 4.0 or less (Extreme Drought)
- 3.0 to -3.9 (Severe Drought)
- 2.0 to -2.9 (Moderate Drought)
- 1.9 to +1.9 (Near Normal)
- +2.0 to +2.9 (Unusual Moist Spell)
- +3.0 to +3.9 (Very Moist Spell)
- +4.0 and above (Extremely Moist)
- Missing/Incomplete