

Water Supply Outlook

December 4, 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 drought and recommends releases of stored water. These operations ensure adequate water supplies for Washington metropolitan area water users and environmental flow levels. CO-OP publishes the water supply outlooks monthly 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 Potomac's Section for Cooperative Water Supply Operations (CO-OP) suspended the "Daily Drought Monitoring" effort on November 22. This decision resulted from the flow at the U.S. Geological Survey's gage at Point of Rocks, Maryland, rising above the daily monitoring threshold of 2000 cubic feet per second (cfs) after the basin received an average of about 1.4 inches of rain the day before. While recent rainfall has temporarily relieved dry conditions, it has not been enough to overcome the deficits observed in soil moisture, streamflow, and groundwater levels.

Due to the persistence of below-average precipitation, the publication period for the Water Supply Outlook has been extended into December, a month not covered by the ICPRB's Low-Flow Outlook model. Currently, the basin is grappling with a range of dry conditions, with 33.29% classified as abnormally dry (D0), 28.40% as moderate drought (D1), and 30.12% as severe drought (D2), as indicated by the U.S. Drought Monitor report released on November 30.

In November, the basin received only 2.5 inches of precipitation on average, resulting in a 0.8-inch deficit compared to the typical monthly average. Over the past 12 months, the basin has accumulated a precipitation deficit of approximately 8 inches (approximately 20% of normal). This concerning trend is reflected in the graph of Adjusted Daily Flow at Little Falls, which is displayed in the section titled "Potomac River Flow" below. Prior to the recent rainfall, this year's river flow closely resembled the autumn flows observed in the pre-drought years of 1965, 1988, and 2001, leading up to historic CO-OP "Drought Operations" periods that required significant reservoir releases. Without additional rainfall, the flow will likely return to pre-rainfall levels, requiring the "Daily Drought Monitoring" effort to resume.

However, it is important to emphasize that the Potomac River's current flows meet the total metropolitan area's water demands without needing releases from upstream reservoirs. The region has well-established drought-contingency plans to ensure water supply reliability and prevent shortages.

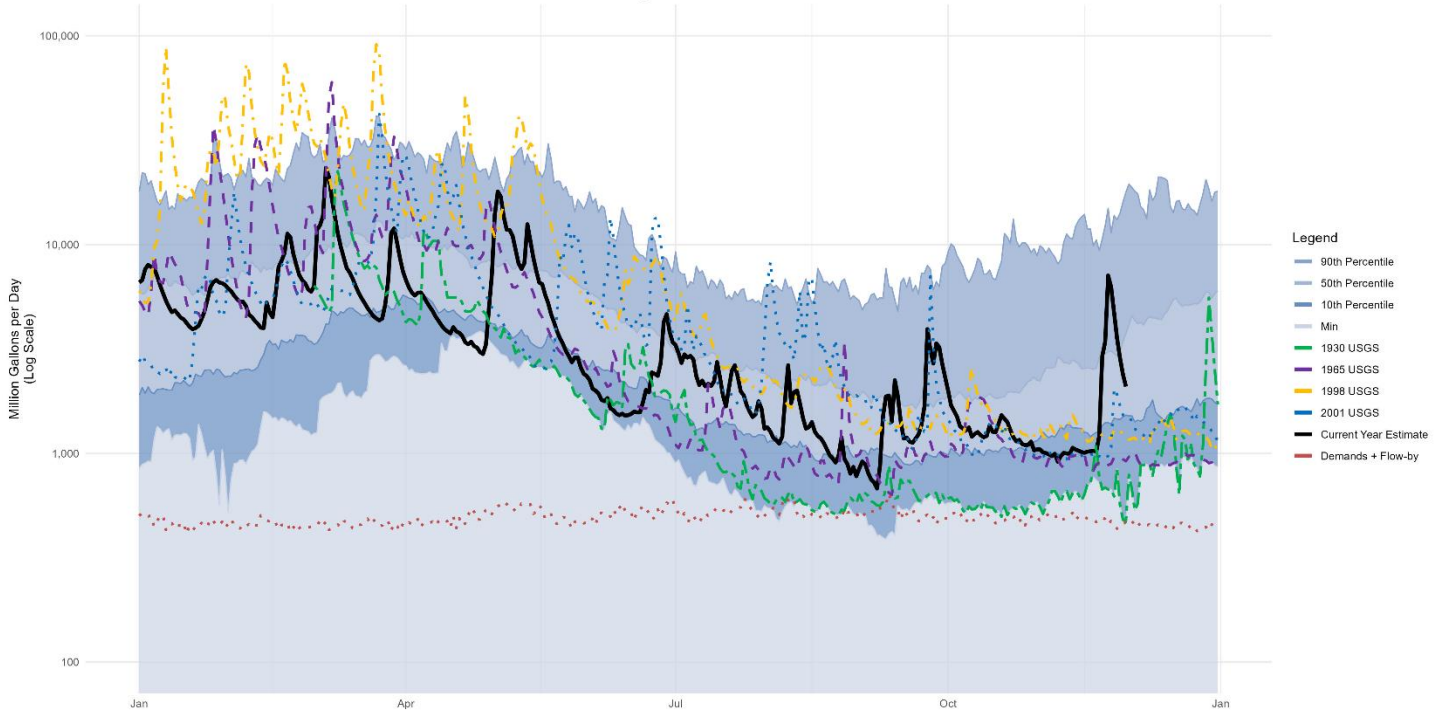
Potomac River Flow

The estimated adjusted Potomac flow at Little Falls on November 30 was 20.9 billion gallons per day (BGD). For this day of the year, this value was below the 50th percentile flow value of 37.6 BGD and above the 10th percentile flow value of 15.3 BGD. Adjusted flow, shown in the graph on the next page, is the flow that would occur in the absence of major Washington metropolitan area withdrawals but includes releases from upstream reservoirs. Adjusted flow averaged 39.7 BGD for the past eleven months and 18.9 BGD in November.

Source: 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

Adjusted Daily Flow at Little Falls for 2023, 1930, 1965, 1998, and 2001
Daily Adjusted Flow Percentiles for 1930-2021 Data
and Drought Year (2002) Demands plus Flow-by

Published by ICPRB on 2023-12-01



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, WSSC Water, Fairfax Water, City of Rockville, and Loudoun Water to the Little Falls gage flow record. This publication has changed the graph of Adjusted Daily Flow at Little Falls to include data from pre-drought years 1965, 1988, and 2001. These years are reference points leading to historic ICPRB CO-OP "Drought Operations" periods with significant reservoir releases.

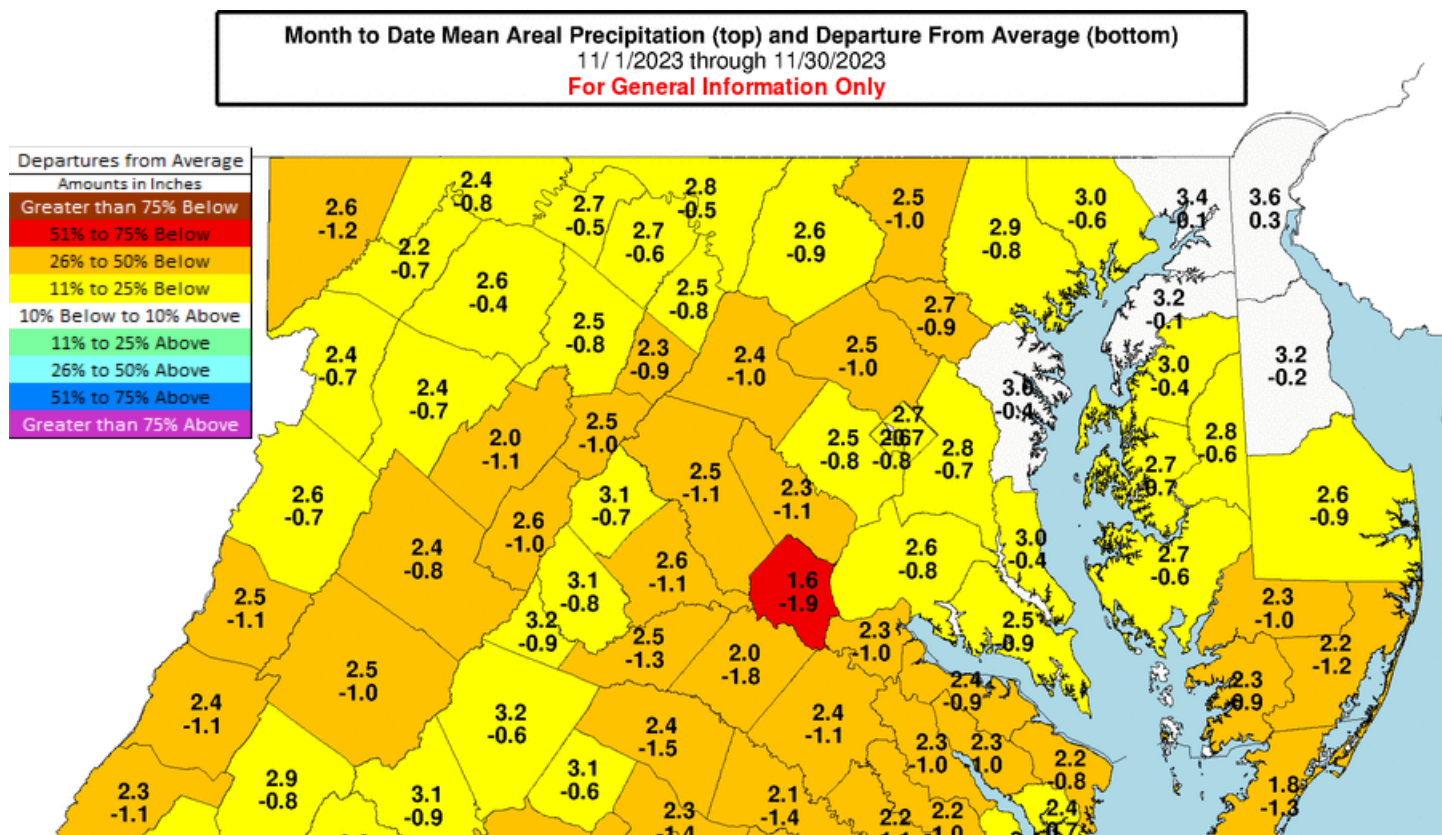
Environmental Flow-by

The average observed Potomac River at the U.S. Geological Survey gage at Little Falls dam in November was 1562 million gallons per day (MGD), equivalent to 2416 cubic feet per second (cfs). The minimum daily average flow in November at this location was 579 MGD (896 cfs), which was above the 100 MGD (155 cfs) environmental flow-by.

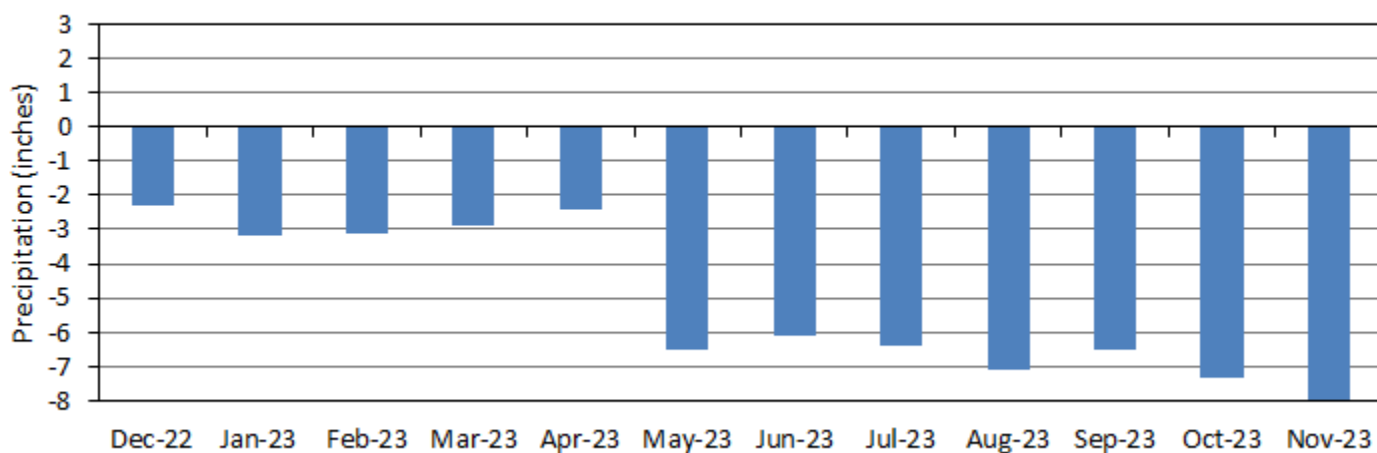
Past Precipitation

The Middle Atlantic River Forecast Center (MARFC) of the National Weather Service reports that the Potomac basin, just upstream of Washington, D.C., received 2.5 inches of rain in November, which is 0.8 inches below the average for the month. Over the past 12 months, there has been an approximate 8-inch rainfall deficit compared to the average (as shown in the graph).

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



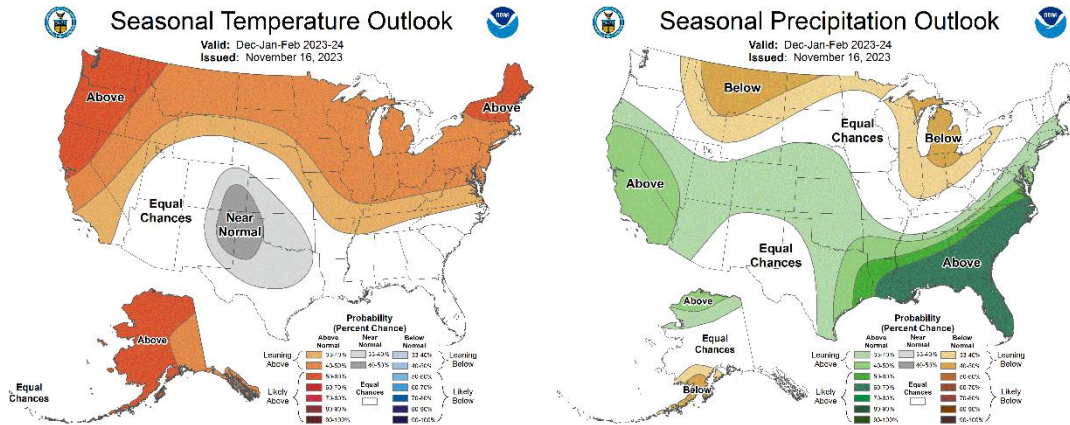
12-month cumulative departure from normal, through November 2023



Precipitation and Drought Outlook for December, January, and February

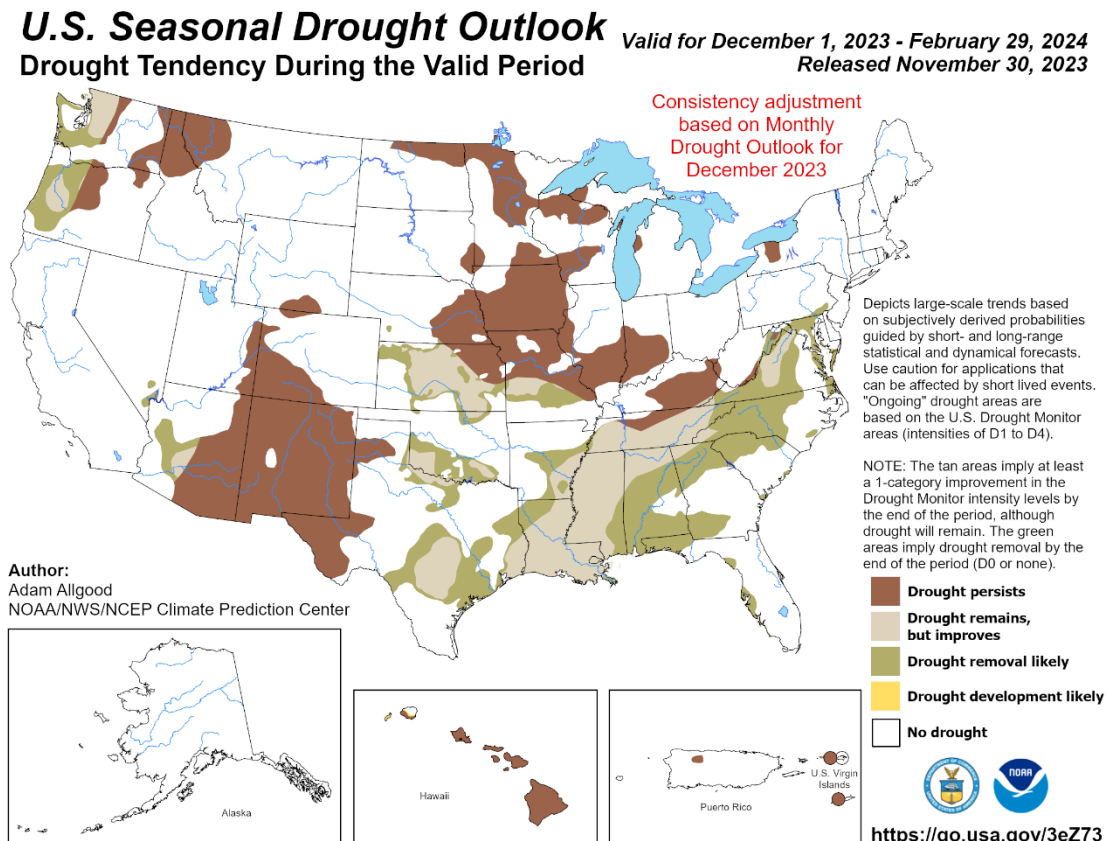
MARFC's December outlook suggests "leaning above" normal temperatures and precipitation in the basin. Over the next 90 days (Dec-Jan-Feb), MARFC predicts "leaning above" normal temperatures across the entire basin and "leaning above" normal precipitation in the lower half of the basin.

Sources: https://www.cpc.ncep.noaa.gov/products/predictions/long_range/seasonal.php?lead=1,
<https://www.cpc.ncep.noaa.gov/products/predictions/30day/>



According to the November 30 release from the Climate Prediction Center's U.S. Seasonal Drought Outlook, the Shenandoah River area shows "Drought remains, but improves," with surrounding areas indicating "Drought removal likely." Some areas in West Virginia are brown, indicating that "Drought persists."

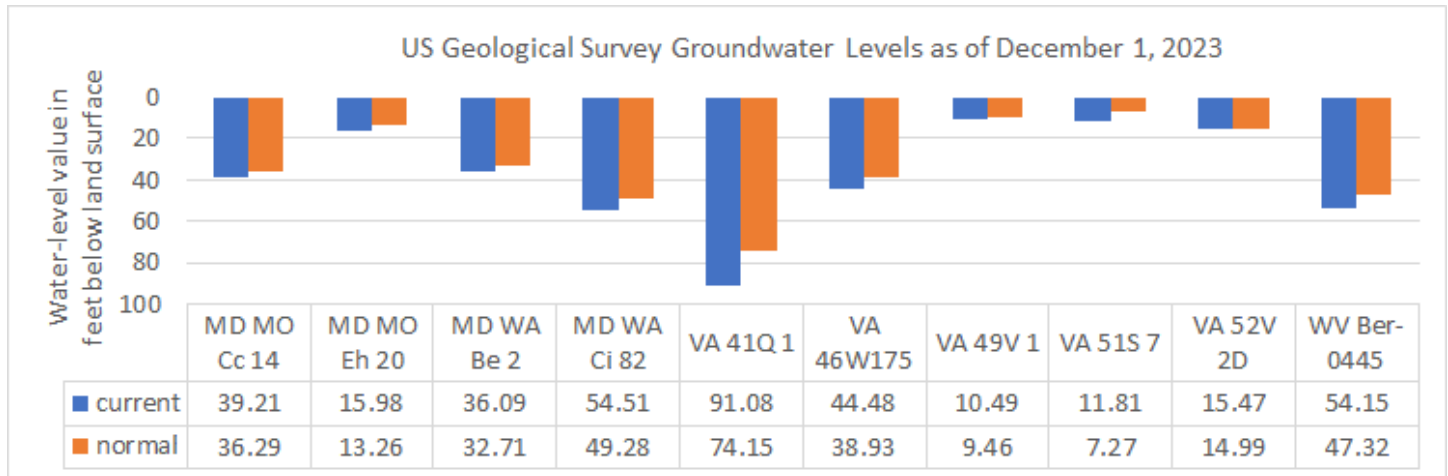
Source: https://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php,
<https://www.cpc.ncep.noaa.gov/products/Drought/>



Groundwater – Current Conditions

Based on U.S. Geological Survey (USGS) data, the depth to groundwater level (measured in feet) for ten wells in the ICPRB water supply outlook shows near-normal to below-normal depths, as depicted in the comparison graph below, displaying current values versus estimated normal values for November. The National Water Dashboard offers a more extensive dataset of 38 stations within the geographic range (37.8749, -79.7223) to (40.2418, -76.1957). Among these, 15.9% of wells are "Normal," falling between the 25th and 75th percentiles of historical records; 4.5% are "Below Normal," within the 10th to 24th percentiles; 4.5% are "Much Below Normal," below the 10th percentile; and 13.6% are at an "All-time low for this day-of-year." Furthermore, approximately 27.3% of wells report rising water levels, while 29.5% experience decreasing 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. Due to dredging in Triadelphia, WSSC Water's Patuxent reservoirs have reduced usable storage. The U.S. Army Corps 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 December 1, 2023

Facility	Percent Full	Current usable storage, BG	Total usable capacity, BG
WSSC Water's Patuxent reservoirs ¹	30	3.16	10.53
Fairfax Water's Occoquan Reservoir ²	100	8.17	8.17
Little Seneca Reservoir ³	100	3.87	3.87
Jennings Randolph water supply ⁴	100	13.10	13.10
Jennings Randolph water quality ⁴	24	3.86	16.30
Savage Reservoir ⁵	47	3.00	6.33

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

² Values from the 2020 bathymetric study adjusted for 0.33 BG of dead storage.

³ Values from Ortt *et al.* (2011) bathymetric study.

⁴ 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.

⁵ 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.

Drought Status

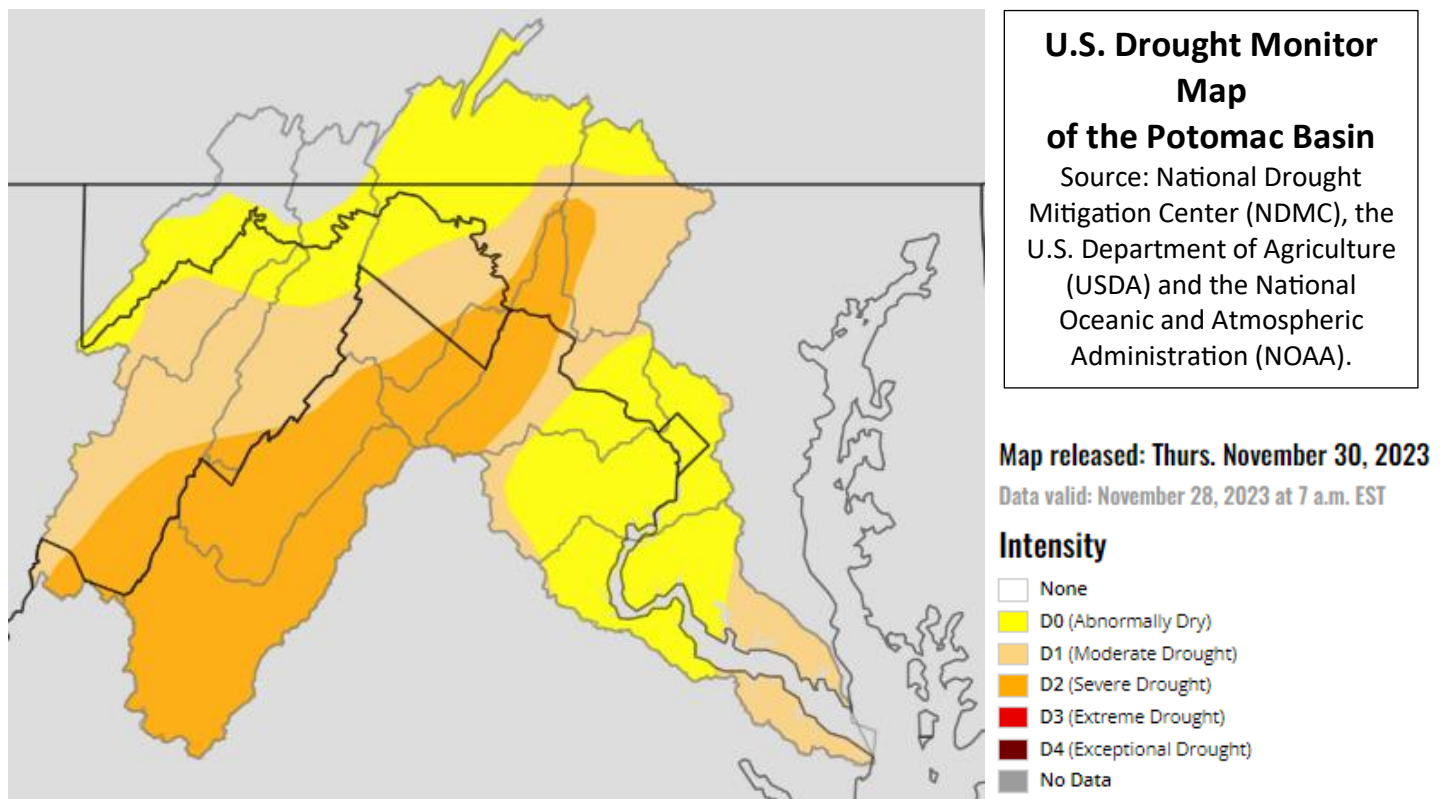
As of November 25, the Maryland Department of the Environment (MDE) has classified Maryland's drought status as "Watch" for Western Maryland, "Warning" for Central Maryland, and "Normal" for Eastern and Southern Maryland. Meanwhile, the Virginia Department of Environmental Quality (DEQ), as of November 27, expanded a "Drought Watch" status to include 55 counties, an expansion of 42 counties from the previous advisory. Seven counties remain under a drought warning advisory in the Shenandoah drought evaluation region. In Pennsylvania, on December 1, the Department of Environmental Protection (DEP) announced that a "Drought Watch" continues for 13 counties and added Westmoreland County to the watch list. Clinton County has been moved to "Drought Warning," and York County remains on the warning list. 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/>

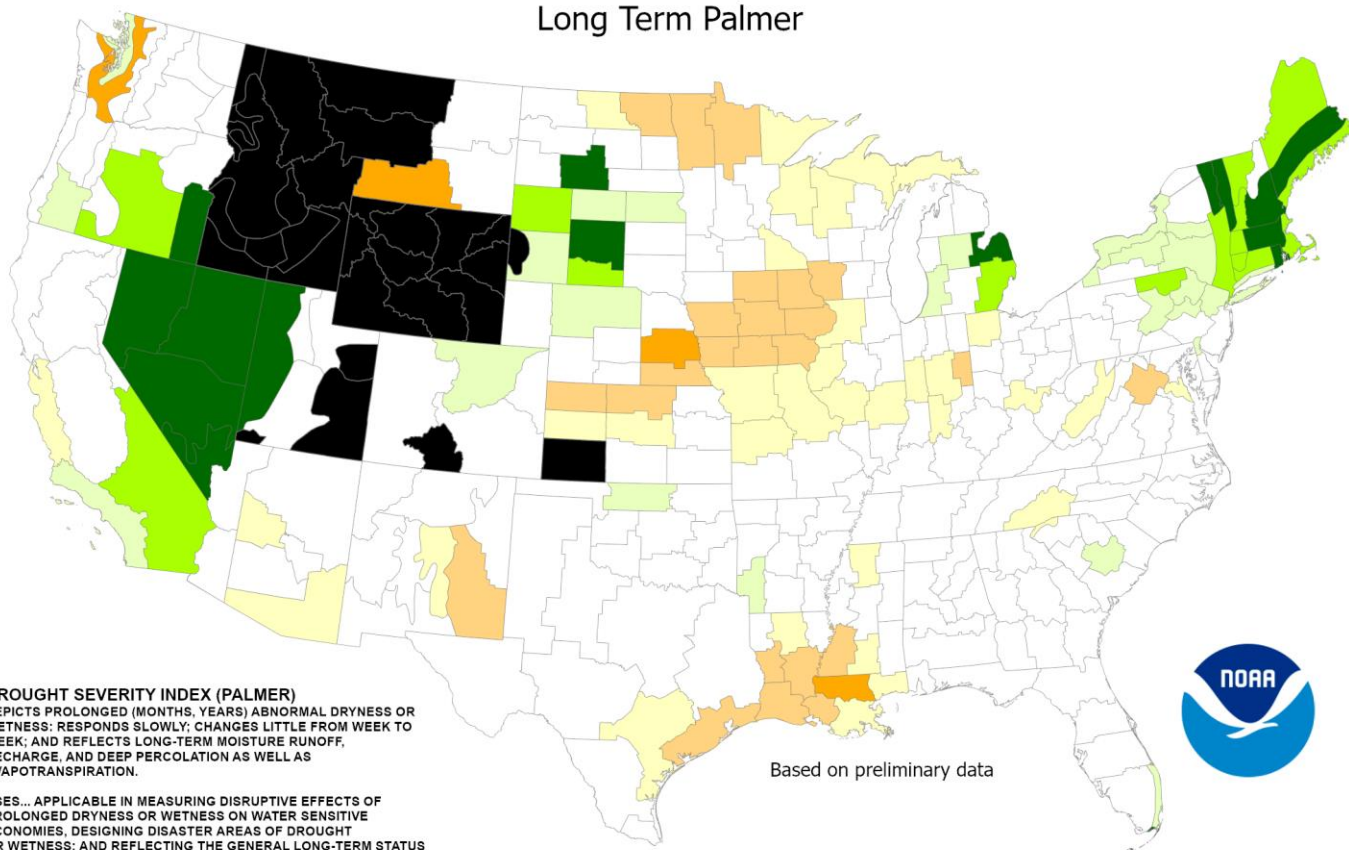
Drought Monitor and Soil Moisture

The NOAA Climate Prediction Center's U.S. Drought Monitor map, released on November 30, indicates drought conditions in the Potomac Basin ranging from abnormally dry (D0) to severe drought (D2), as shown in the first map below. Specifically, it reveals 33.29% D0, 28.40% D1, and 30.12% D2. According to the U.S. Drought Monitor, severe drought (D2) has persisted in the Shenandoah area since June 20, with a notable increase occurring after August 22 and slowly increasing since then. The Palmer Drought Severity Index, as shown in the second map on the next page, depicts moderate to severe drought conditions in the Potomac basin, which is an improvement from the extreme drought conditions reported in the November Water Supply Outlook.

Sources: <https://droughtmonitor.unl.edu/CurrentMap.aspx>,
https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/palmer.gif



Drought Severity Index by Division Weekly Value for Period Ending Nov 25, 2023 Long Term Palmer



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).

Based on preliminary data

- -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