Water Supply Outlook

November 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 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

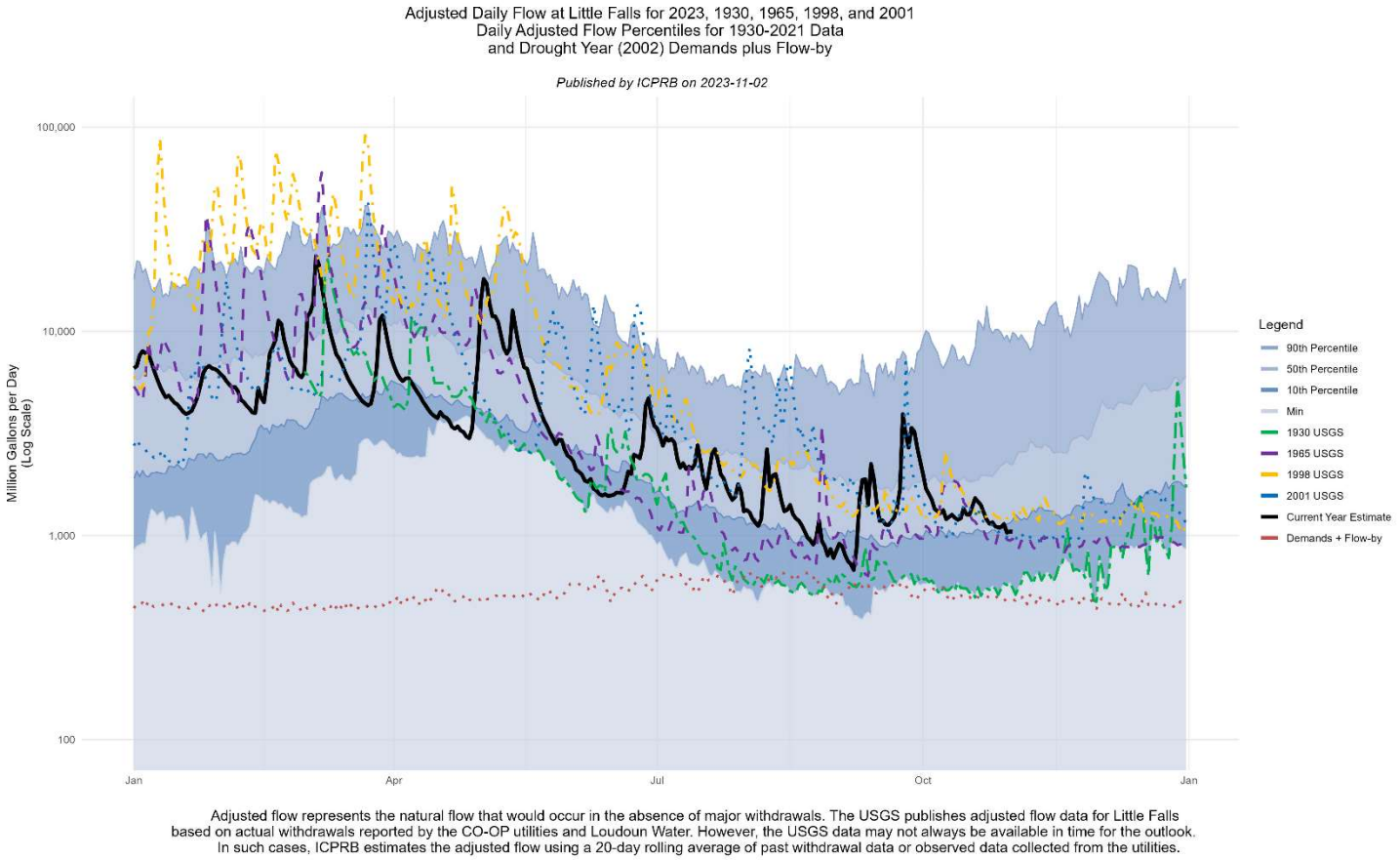
The Potomac's Section for Cooperative Water Supply Operations (CO-OP) has been actively involved in its latest "Drought Monitoring" period since October 4. CO-OP commences drought monitoring when the flow at the U.S. Geological Survey (USGS) stream gauge in Point of Rocks, Maryland, falls below 2,000 cubic feet per second. During this phase, CO-OP issues daily email reports summarizing flow, weather, and demand conditions to stakeholders. These updates are accessible daily via the CO-OP Data Portal (icprbcoop.org). Due to the persistent dry conditions, the publication period for the Water Supply Outlook has been extended into November, even though the ICPRB's Low-Flow Outlook model does not cover this month. Currently, the basin is experiencing a range of dry conditions, including 43.89% classified as abnormally dry (D0), 14.89% as moderate drought (D1), and 21.65% as severe drought (D2), as indicated by the U.S. Drought Monitor report for November 2. With only 1.4 inches of precipitation in October, there is a 1.6-inch deficit from the typical average for the past month. Consequently, both streamflow and groundwater levels have decreased. These inadequate precipitation and depleted groundwater levels can lead to low flow conditions requiring releases from backup water supply reservoirs. For example, the graph of Adjusted Daily Flow at Little Falls, which appears in the section "Potomac River Flow" below, illustrates that this year's river flow closely resembles fall flows observed in the pre-drought years of 1965, 1988, and 2001, leading up to historic CO-OP "Drought Operations" periods with significant reservoir releases. CO-OP begins drought operations when flow in the Potomac River at the U.S. Geological Survey gage at Little Falls dam drops below the total Washington metropolitan area supplier daily withdrawals plus the 100 million gallons per day flow-by, or when CO-OP flow forecasts indicate that there is a significant chance that releases from Jennings Randolph and/or Little Seneca reservoirs will be needed within the next nine days. However, it is important to emphasize that the Potomac River's current flows sufficiently 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 October 31 was 10.5 billion gallons per day (BGD). For this day of the year, this value was below the 50th percentile flow value of 11.5 BGD and above the 10th percentile flow value of 5.8 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 41.9 BGD for the past ten months and 13.0 BGD in October.

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. A noticeable trend emerges as this year's adjusted flow closely aligns with the fall flows observed in those pre-drought years, suggesting that the current dry conditions should be closely monitored.

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



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.

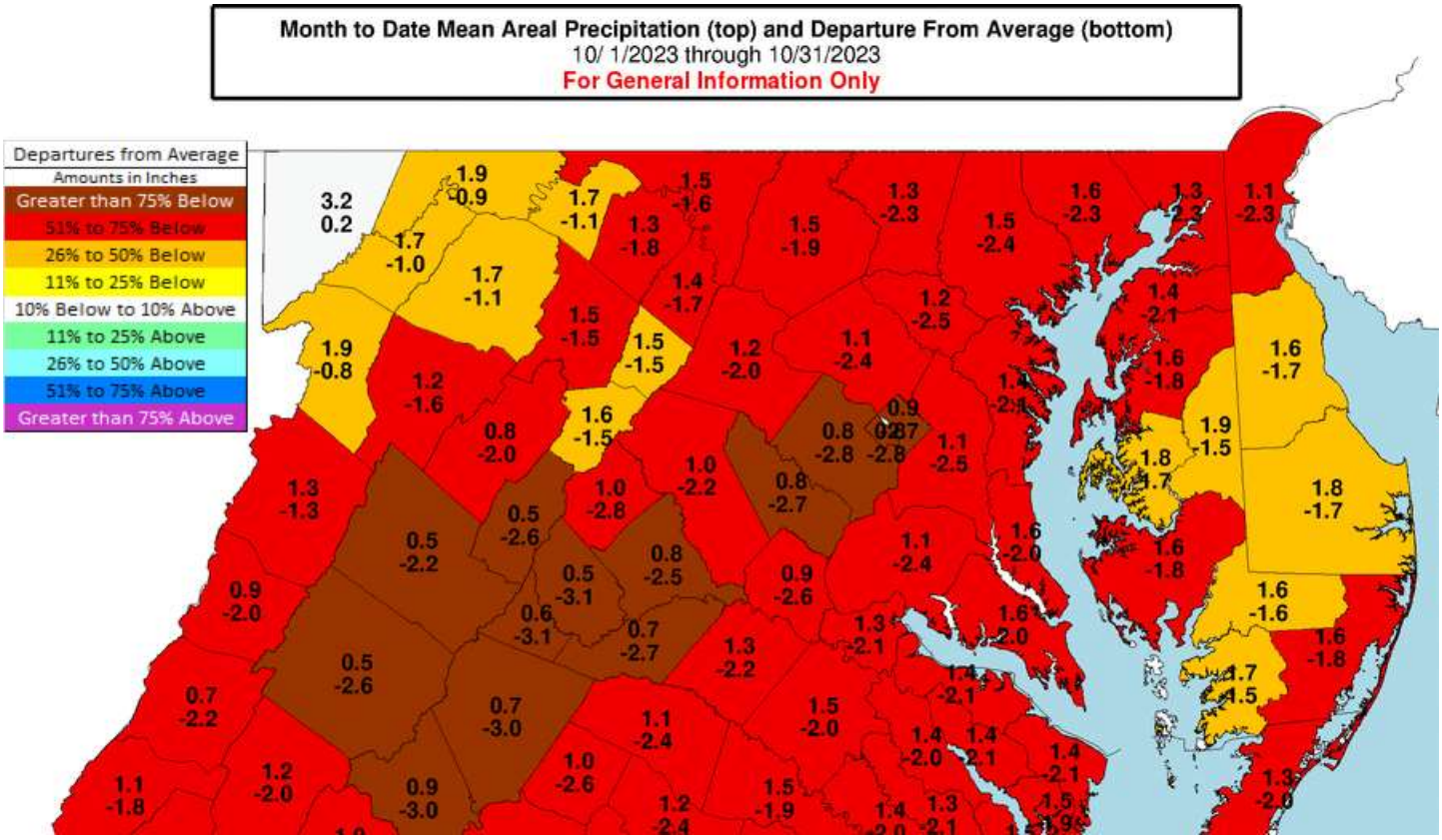
Environmental Flow-by

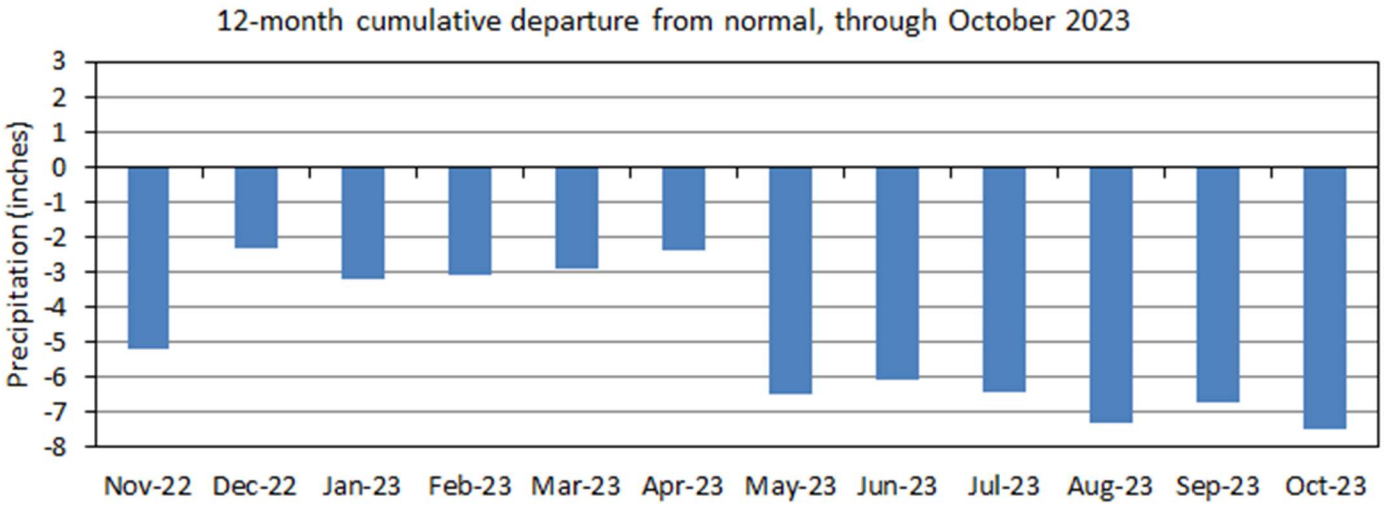
The average observed Potomac River at the U.S. Geological Survey gage at Little Falls dam in October was 948 million gallons per day (MGD), equivalent to 1467 cubic feet per second (cfs). The minimum daily average flow in October at this location was 695 MGD (1075 cfs), which was above the 100 MGD (155 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 1.4 inches of rain in October, which is 1.6 inches below the average for the month. Over the past 12 months, there has been a 7.5-inch rainfall deficit compared to the average (as shown in the graph).

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

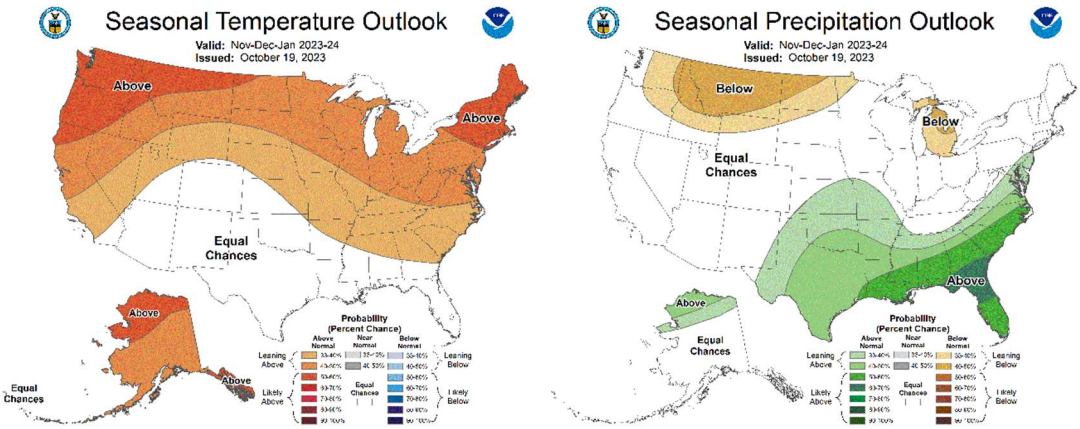




Precipitation and Drought Outlook for November, December, and January

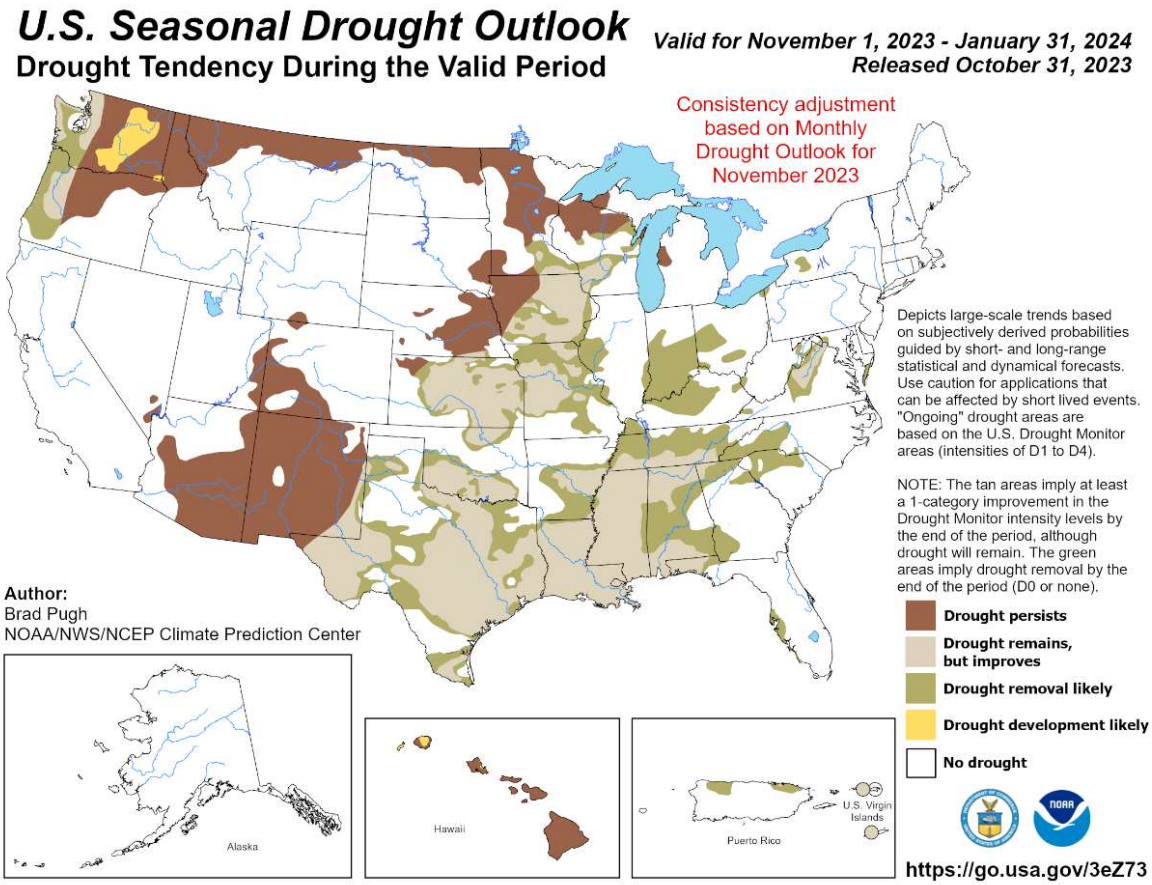
MARFC's November outlook suggests "equal chances" of above or below-normal temperatures throughout the basin and "leaning below-normal" precipitation in the upper half. Over the next 90 days (Nov-Dec-Jan), MARFC predicts "leaning above-normal" temperatures across the entire basin and "leaning above-normal" precipitation in the lower half.

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 October 31 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."

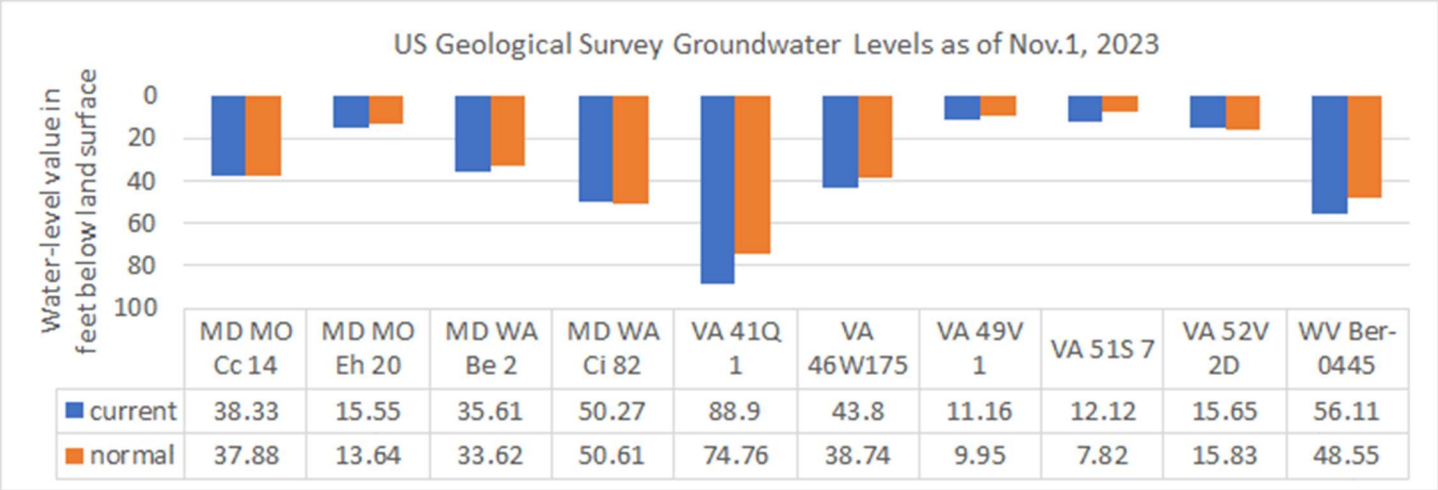
Source: https://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php, https://www.cpc.ncep.noaa.gov/products/Drought/



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 (37.9235, -79.6444) to (39.9603, -76.2712). Among these, 7.9% of wells are "Normal," falling between the 25th and 75th percentiles of historical records; 10.5% are "Below Normal," within the 10th to 24th percentiles; 5.3% are "Much Below Normal," below the 10th percentile; and 7.9% are at an "All-time low for this day-of-year." Furthermore, approximately 36.8% of wells report rising water levels, while 10.5% experience decreasing levels.

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



	MD MO Cc 14	MD MO Eh 20	MD WA Be 2	MD WA Ci 82	VA 41Q 1	VA 46W175	VA 49V 1	VA 51S 7	VA 52V 2D	WV Ber-0445
current	38.33	15.55	35.61	50.27	88.9	43.8	11.16	12.12	15.65	56.11
normal	37.88	13.64	33.62	50.61	74.76	38.74	9.95	7.82	15.83	48.55

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 November 2, 2023

Facility	Percent Full	Current usable storage, BG	Total usable capacity, BG
WSSC Water's Patuxent reservoirs[1]	32	3.32	10.53
Fairfax Water's Occoquan Reservoir[2]	95	7.78	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	3.91	16.30
Savage Reservoir[5]	40	2.51	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

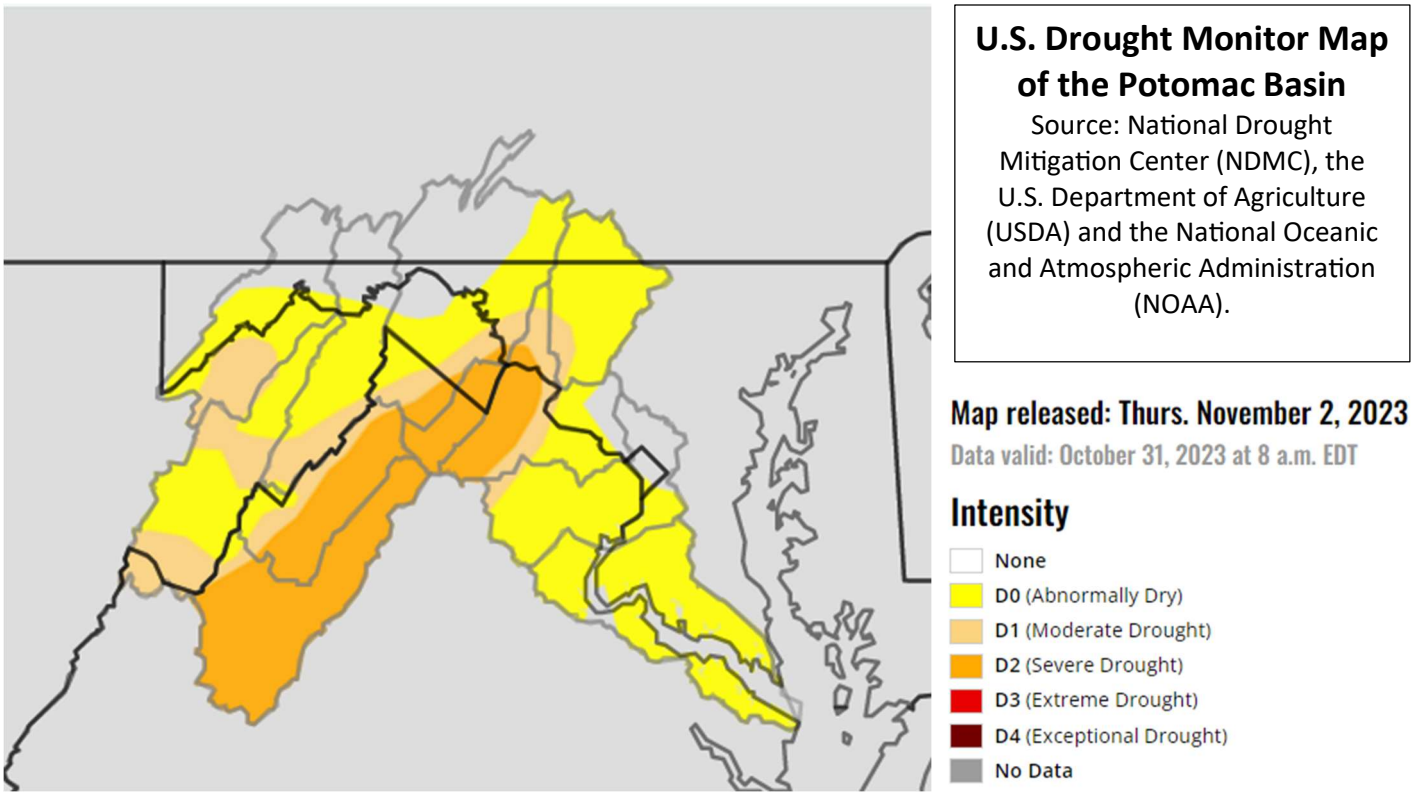
As of October 21, the Maryland Department of the Environment (MDE) has classified Maryland's drought status as "Watch" for Western Maryland, "Warning" for Central Maryland, and "Normal" for Eastern and Southern Maryland. Meanwhile, the Virginia Department of Environmental Quality (DEQ), as of October 31, 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 October 20, the Department of Environmental Protection (DEP) announced six counties returned to “Normal” and 15 counties remained in “Drought Watch” or “Drought Warning." The Metropolitan Washington Council of Governments (MWCOG) reports a “Normal” drought stage.

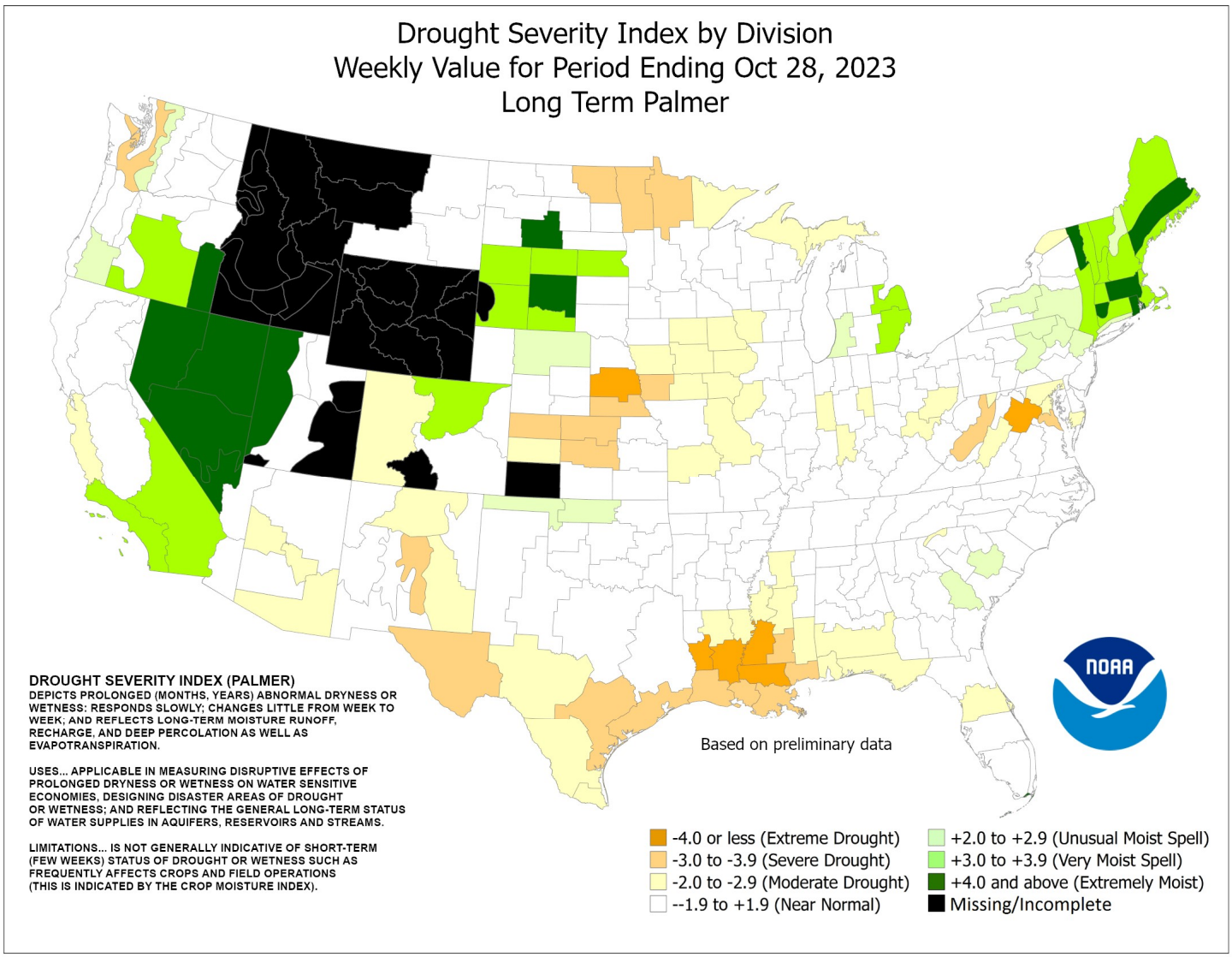
Sources: https://mde.maryland.gov/programs/Water/droughtinformation/Currentconditions/Pages/index.aspx, https://www.deq.virginia.gov/our-programs/water/water-quantity/drought, https://www.dep.pa.gov/Business/Water/PlanningConservation/Drought/Pages/default.aspx, https://www.mwcog.org/documents/2022/05/02/regional-drought-and-water-supply-status--drinking-water-d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

Drought Monitor and Soil Moisture

The NOAA Climate Prediction Center's U.S. Drought Monitor map, released on November 2, indicates drought conditions in the Potomac basin for October 31, ranging from abnormally dry (D0) to severe drought (D2), as shown in the first map below. Specifically, it reveals 43.89% D0, 14.89% D1, and 21.65% 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 it has slowly been increasing since then. The D0 coverage has increased from 32.1% on October 24 to 43.89% on October 31. The Palmer Drought Severity Index, as shown in the second map on the next page, depicts moderate to extreme drought conditions in the Potomac basin.

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 Oct 28, 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
NOAA
-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