Water Supply Outlook

October 4, 2022
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Interstate Commission on the Potomac River Basin (ICPRB)
30 W. Gude Drive, Suite 450
Rockville, MD 20850
Tel: (301) 274-8120

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:

There is a near-average probability of releases from the Washington metropolitan area's backup water supply reservoirs for the remainder of the 2022 fall season. 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 groundwater levels. Streamflow is currently above normal, and groundwater levels range from much below average to average for the Basin monitoring wells. However, at the end of September, the Potomac River flow at the Point of Rocks streamflow gage dropped below 2,000 cubic feet per second (CFS), which generally would have triggered daily drought monitoring by ICPRB. Fortunately for drought conditions, the remnants of Hurricane Ian ended the summer wetter than average for many areas, even though over the summer season, most places were drier than average for the Mid-Atlantic region. The remnants of another tropical system can still pass by or through the Basin through early fall, which could bring additional precipitation. However, the Mid-Atlantic River Forecast Center reports that there are currently no strong indicators of a wet fall. Currently, there is sufficient flow in the Potomac River to meet the Washington metropolitan area's water demands without a release from upstream reservoirs. If low-flow conditions develop, the metro area is well-protected from a water supply shortage owing to carefully designed drought-contingency plans.

ICPRB's Low Flow Outlook:

There is a 2 to 6 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 the predicted flow is less than demand plus a required environmental flow-by. Drinking water demand ranges from 400 to 700 MGD during summer, 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 to remove the effect of North Branch reservoir releases on stream flow.

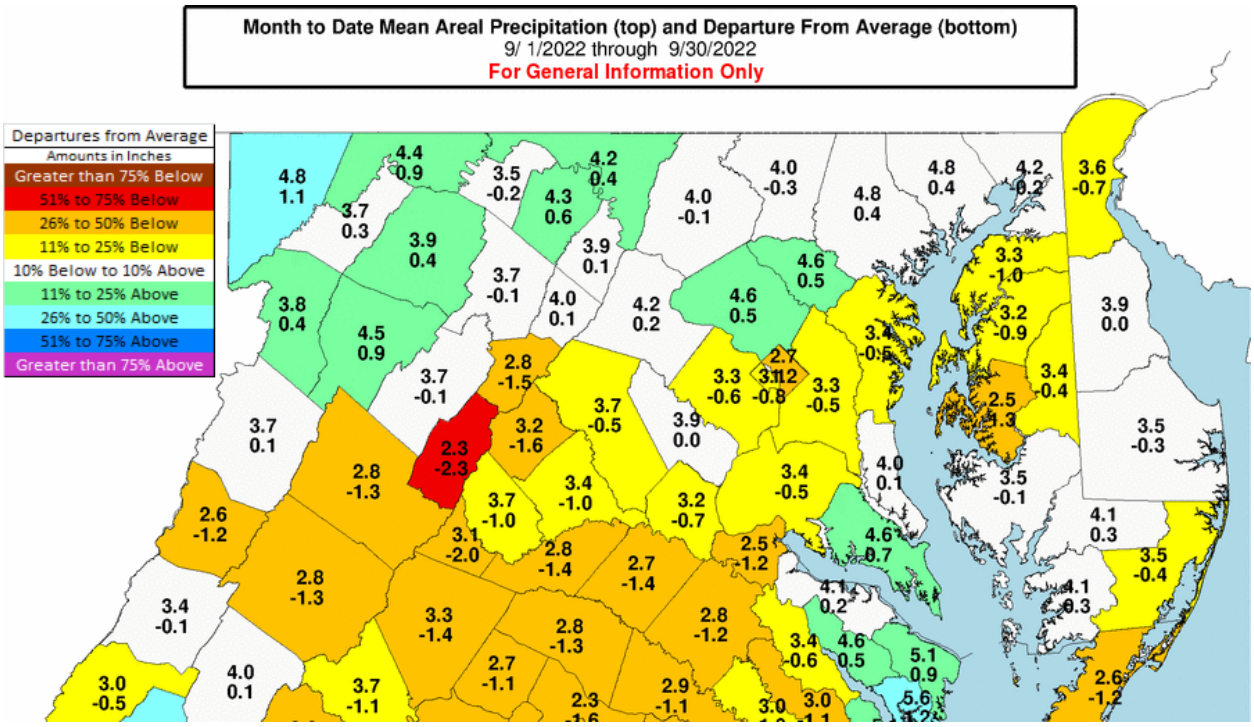
The conditional probability is estimated by analyzing the historical stream flow records and considering recent stream flow values, precipitation totals for the prior 12 months, current groundwater levels, and the current Palmer Drought Index. The historical, or unconditional, probability is based on an analysis of the historical record without weighing for current conditions. Past years in which watershed conditions most closely resemble current conditions are weighted more heavily in determining conditional probability. The 2 to 6 percent conditional probability compares to the 3 to 5 percent historical probability and is considered the more reliable indicator.

Outlook for natural Potomac River flow at Little Falls – Watershed conditions as of October 4, 2022

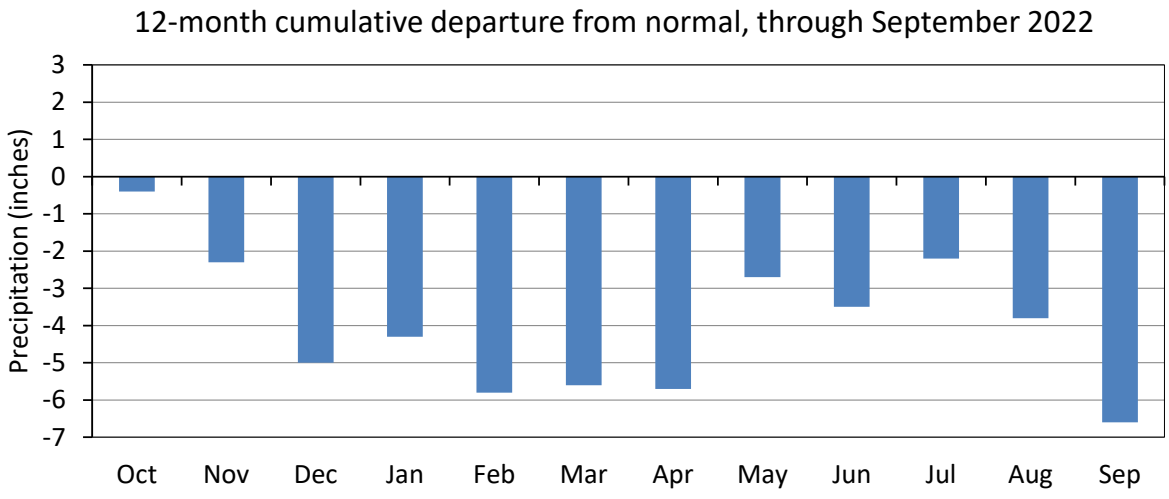
Low flow threshold (MGD)	*Low flow threshold (cfs)*	*Historical probability of lower flow October 1 through December 31*	*Conditional probability of lower flow October 1 through December 31*
1200	1858	49%	64%
1000	1548	28%	36%
800	1238	9%	11%
700	1084	5%	6%
600	929	3%	2%

Past Precipitation:

Data from the National Weather Service's Middle Atlantic River Forecast Center (MARFC) shows that the Potomac basin upstream of Washington, D.C., has received 3.7 inches of precipitation for September, which is 0.1 inches below normal. The 12-month cumulative departure from average is now 6.6 inches below normal as of September 30 (see graph). However, within the first couple of days in October, remnants of Hurricane Ian brought 1.5 inches of precipitation, which is 1.3 inches above normal and greater than 75 percent above average for October.

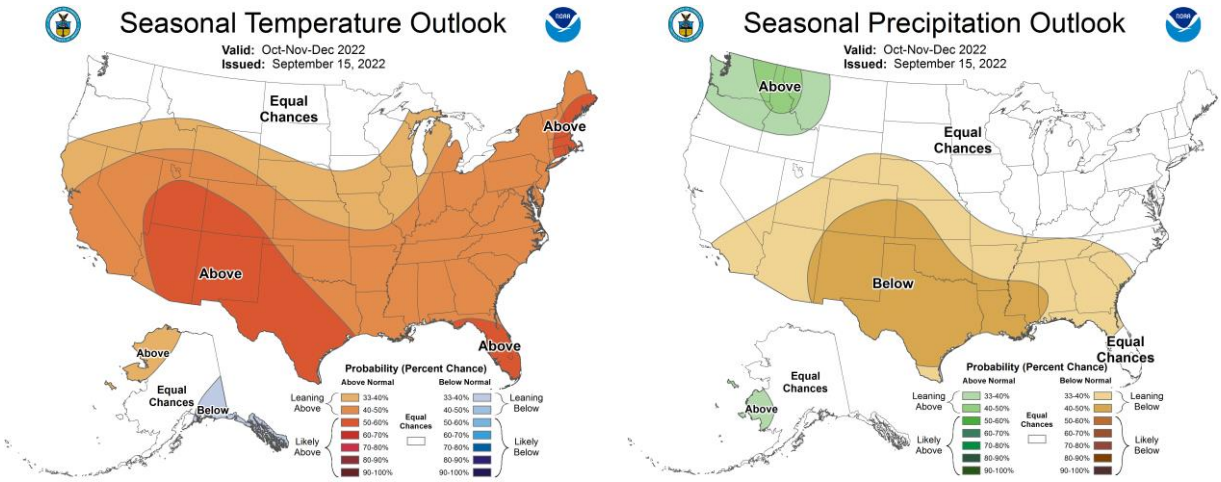


Source: Middle Atlantic River Forecast Center, National Weather Service

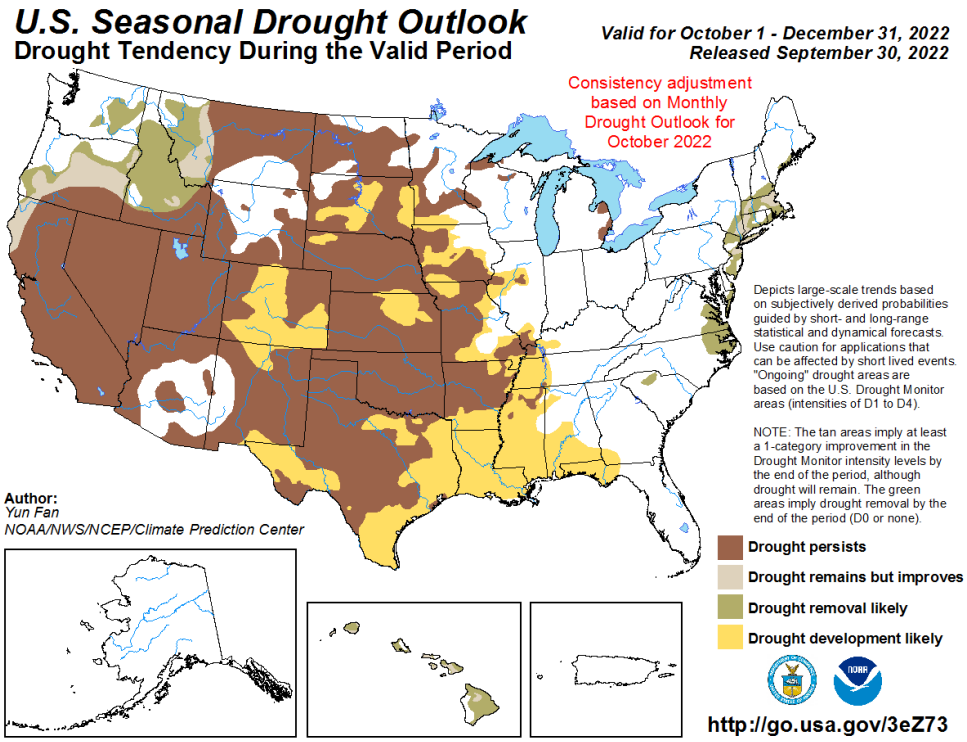


Precipitation and Drought Outlook for October, November and December 2022:

The Middle Atlantic River Forecast Center's (MARFC) outlook for water resources and supplies is good or fair. The National Weather Service Climate Prediction Center's one-month outlook for October calls for below-normal temperatures and above-normal precipitation for the Potomac Basin. The 90-day outlook for October through December calls for above-normal temperatures and equal chances of below or above-normal rainfall.



As of September 30, 2022, the Climate Prediction Center's U.S. Seasonal Drought Outlook reports drought removal likely in the Potomac basin based on a consistency adjustment using the Monthly Drought Outlook for October.



Groundwater – Current Conditions:

The groundwater map, developed by the U.S. Geological Survey (USGS), is currently unavailable. The USGS National Water Dashboard estimates that 28 percent of wells in and around the Potomac basin are "Normal," 13 percent are in the "Below Normal," and 7 percent are in the "Much Below Normal." About 19 percent are increasing, and about 42 percent are decreasing in water levels. The USGS defines "Normal" as between the 25th and 75th percentiles and "Below Normal" as between the 10th and 24th percentile. "Much Below Normal" is defined as below the 10th percentile.

Reservoir Storage – Current Conditions:

No water supply releases from the CO-OP shared system have been made this year.

Reservoir storage as of October 4, 2022

Facility	Percent Full	Current usable storage, BG	Total usable capacity, BG
WSSC Water's Patuxent reservoirs[1]	45	4.7	10.5
Fairfax Water's Occoquan Reservoir[2]	98	8.0	8.2
Little Seneca Reservoir[3]	100	3.9	3.9
Jennings Randolph water supply[4]	100	13.1	13.1
Jennings Randolph water quality[4]	41	6.7	16.3
Savage Reservoir[5]	46	2.9	6.3

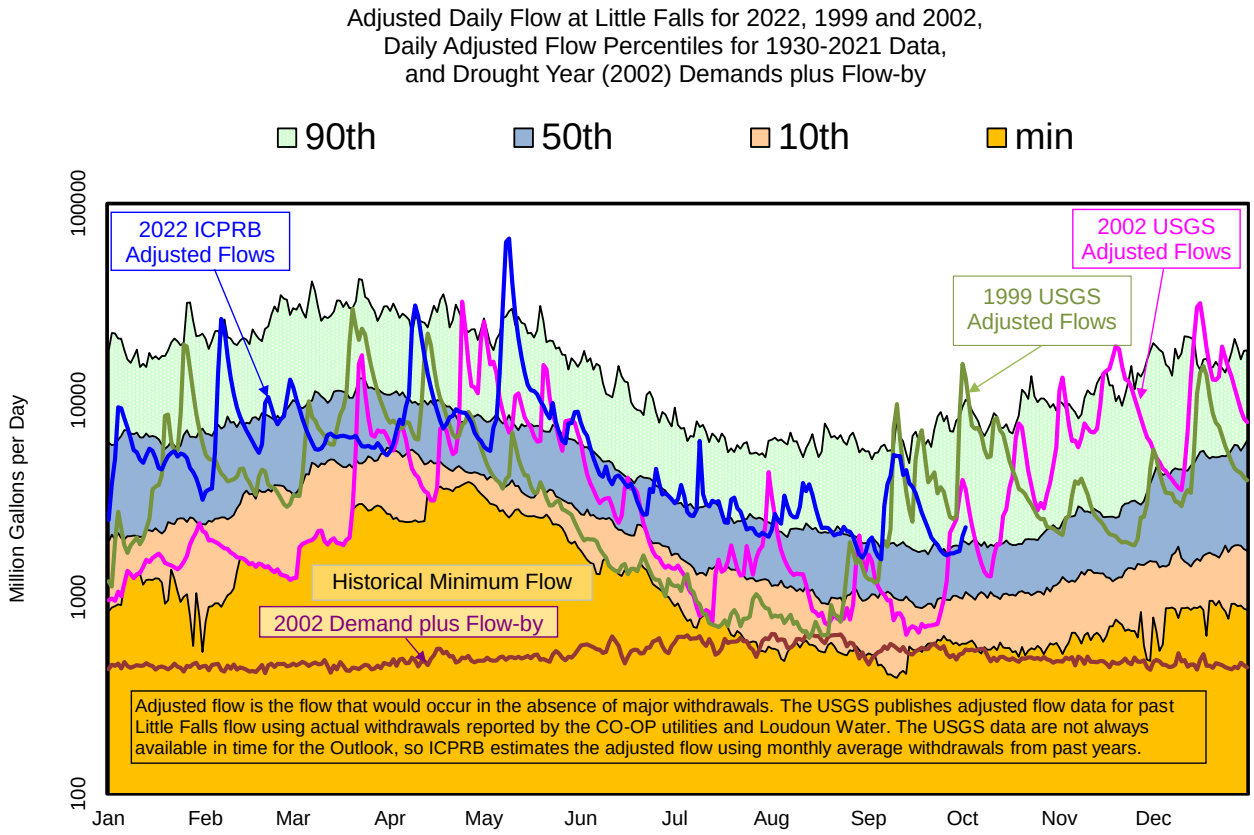
[1] Bathymetric study conducted December 2015 with revisions in December 2016, and unusable storage corrected June 2017. Note that 1.37 BG is not considered usable capacity because it is reserved for storm inflow (T. Supply, personal communication, August 3, 2018).
[2] Bathymetric study conducted in 2020.
[3] Usable capacity consistent with Ortt, *el 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 estimated adjusted Potomac flow at Little Falls on October 1 was 2.26 billion gallons per day (BGD). For this day of the year, this value was above the 50th percentile flow value of 1.93 BGD and below the 90th percentile flow value of 9.24 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 6.61 BGD for the past nine months and 2.75 BGD in September.

Environmental Flow-by:

Average observed Potomac flow at Little Falls in September was well above the minimum recommendation of 100 MGD.



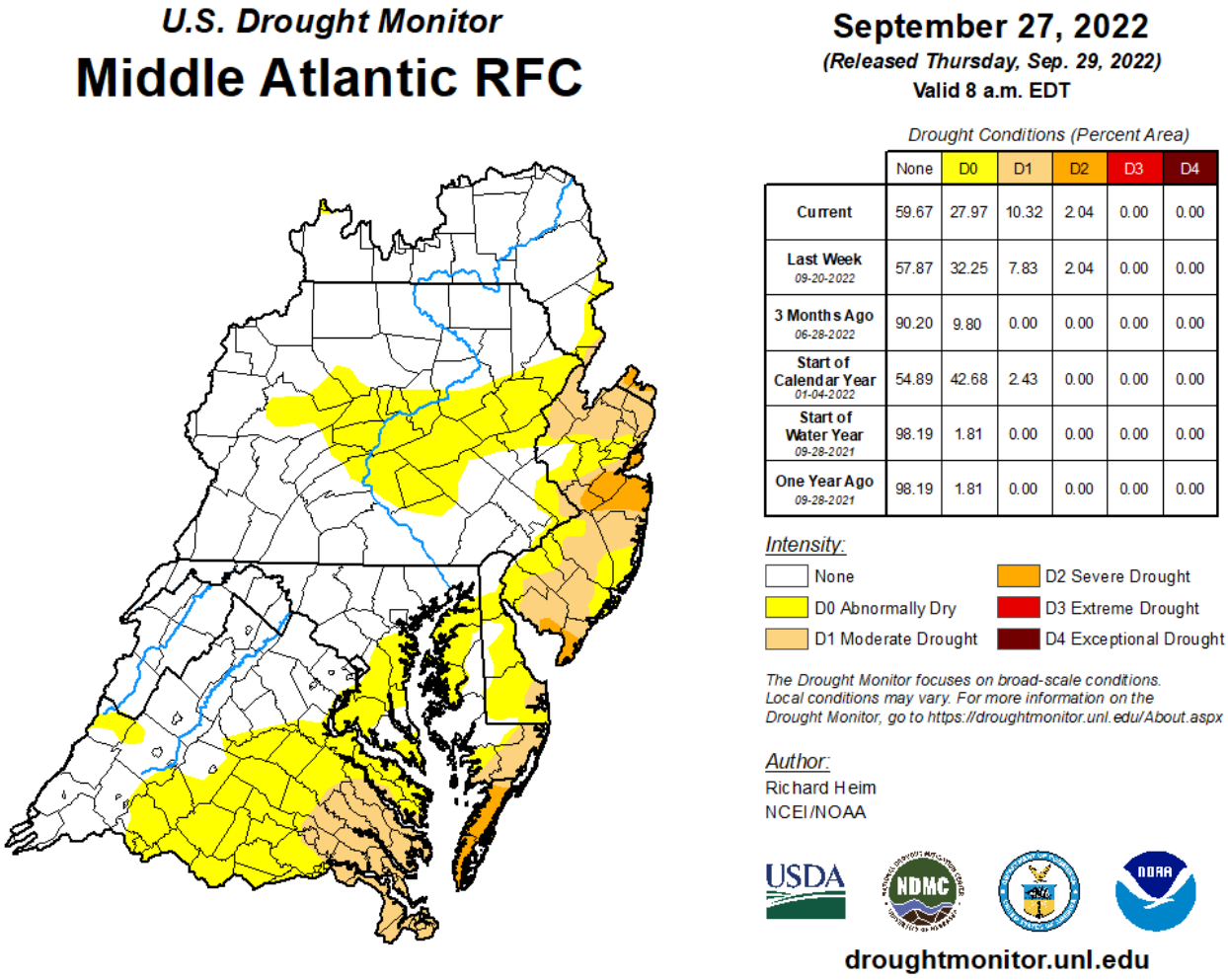
Little Falls flow statistics are based on 1930 through 2021 USGS published gage flow, "USGS 01646502 POTOMAC RIVER (ADJUSTED) NEAR WASH, DC". To create this flow record, the USGS has added historical water supply withdrawals from the Potomac as reported by U.S. Army Corps of Engineers, Washington Suburban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

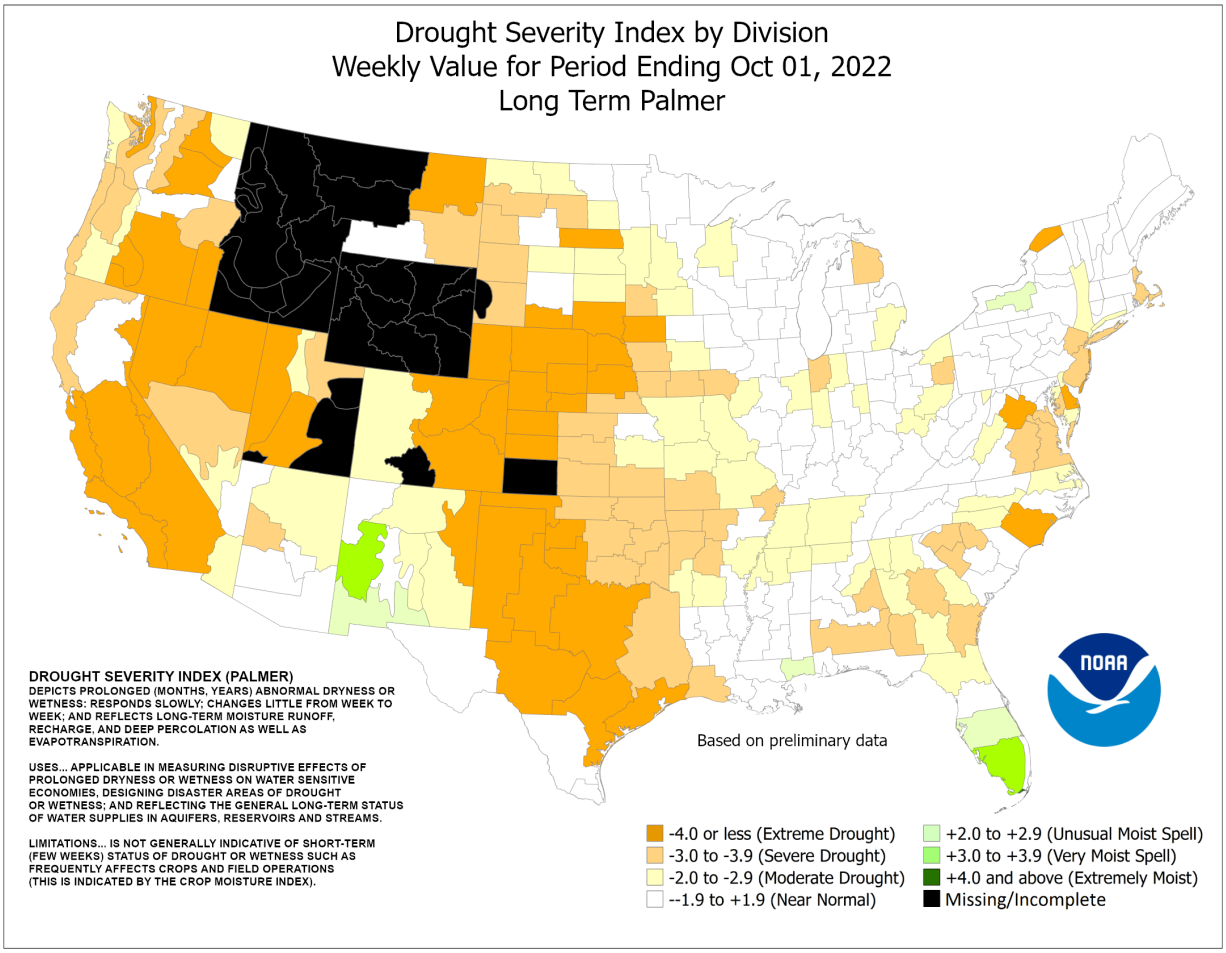
Drought Status:

Drought status in Maryland, Virginia and Pennsylvania is normal as of October 4. The current drought stage, as defined in the Metropolitan Washington Council of Governments (MWCOG)'s water supply and drought response awareness plan, is normal.

Drought Monitor and Soil Moisture:

The NOAA Climate Prediction Center's U.S. Drought Monitor map (see first figure below) indicates abnormally dry conditions in the lower portions of the Potomac Basin below the District of Columbia. Before Hurricane Ian, Moderate Drought conditions were increasing towards the south of the basin in Virginia. Improvements to the map are yet to be reported. The Palmer Drought Severity Index by Division map (see the second figure on the next page) indicates moderate to extreme drought conditions in portions of Virginia and moderate drought conditions up in the North Branch of the Potomac.




Drought Severity Index by Division
Weekly Value for Period Ending Oct 01, 2022
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