

Water Supply Outlook



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:

There is a below normal probability of releases from the Washington metropolitan area's back-up water supply reservoirs for the 2017 fall season. Generally, the use of Jennings Randolph and Little Seneca reservoirs is triggered by low flows brought about by a combination of low summer precipitation and low groundwater levels. Typically, the probability of releases decreases around this time of year, when evaporative loss and drinking water demands begin to decline due to lower temperatures. However, a mid-month heatwave brought unusually warm temperatures, which had previously been cool to normal. This along with a recent dry spell in precipitation for the month of September has caused Little Falls flow to fall below normal. As a result, daily monitoring of Point of Rocks and Little Falls flows began on September 19 and will continue to be watched as long as flow remains below the monitoring trigger level of 2,000 cubic feet per second (cfs) at Point of Rocks. While it seems as though a dry weather pattern has settled in, basin groundwater conditions are mostly near to above normal, and there remains sufficient flow in the Potomac River to meet the Washington metropolitan area's water demands without augmentation from upstream reservoirs. In the event that low-flow conditions do develop, the Washington metropolitan area is well-protected from a water supply shortage because of carefully designed drought-contingency plans.

ICPRB's Low Flow Outlook:

There is a 1 to 4 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. 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.

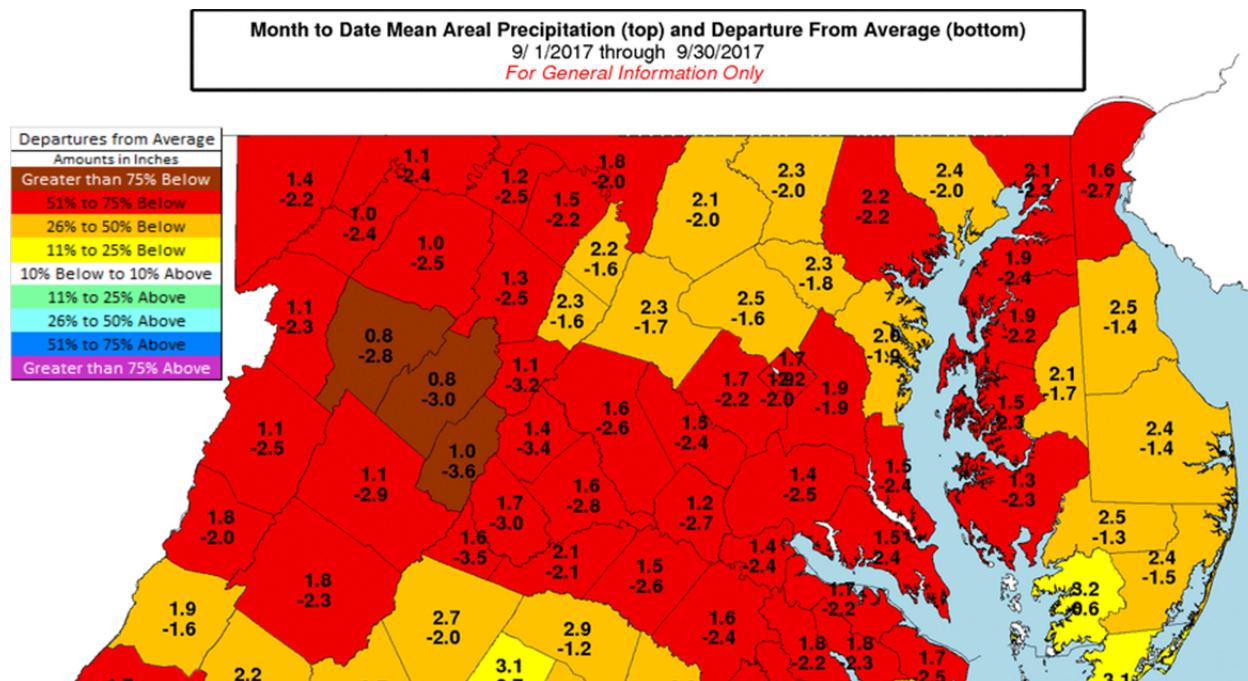
The conditional probability is estimated by analyzing the historical stream flow records and giving consideration to recent stream flow values, precipitation totals for the prior 12 months, current groundwater levels, and the current Palmer Drought Index. Past years in which watershed conditions most 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 1 to 4 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 1, 2017

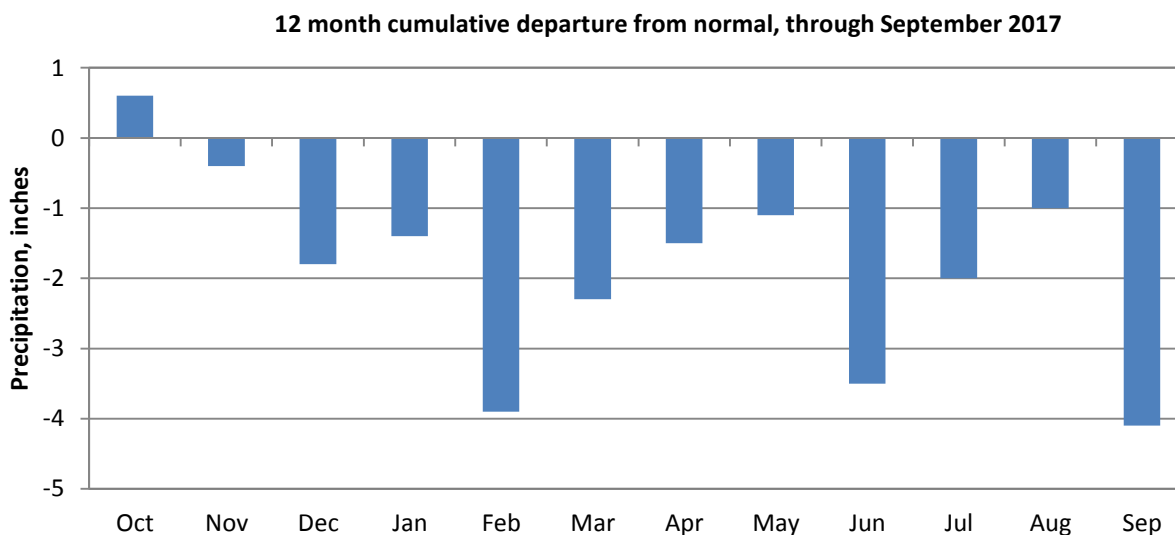
<i>Low flow threshold (MGD)</i>	<i>Low flow threshold (cfs)</i>	<i>Historical probability of lower flow October 1 through December 31</i>	<i>Conditional probability of lower flow October 1 through December 31</i>
1200	1858	49%	63%
1000	1548	28%	30%
800	1238	9%	7%
700	1084	5%	4%
600	929	3%	1%

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 a precipitation total of 1.4 inches for the month of September, which is 2.4 inches below normal. The map below shows that September precipitation has been an inch to 4 inches below normal in Maryland, Delaware, the eastern panhandle of West Virginia, and Virginia. The 12-month cumulative basin precipitation shows deterioration from 1.0 inch below normal in August to 4.1 inches below normal in September (see graph).

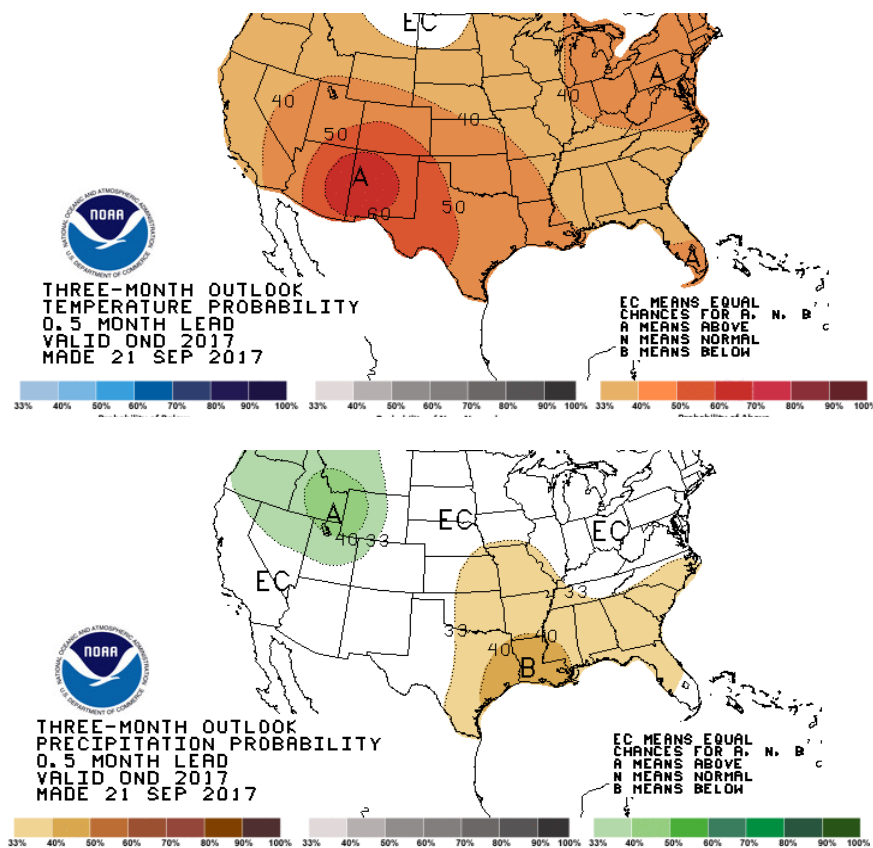


Source: Middle Atlantic River Forecast Center, National Weather Service



Information provided by the USGS, the Middle Atlantic River Forecast Center, and the National Weather Service.

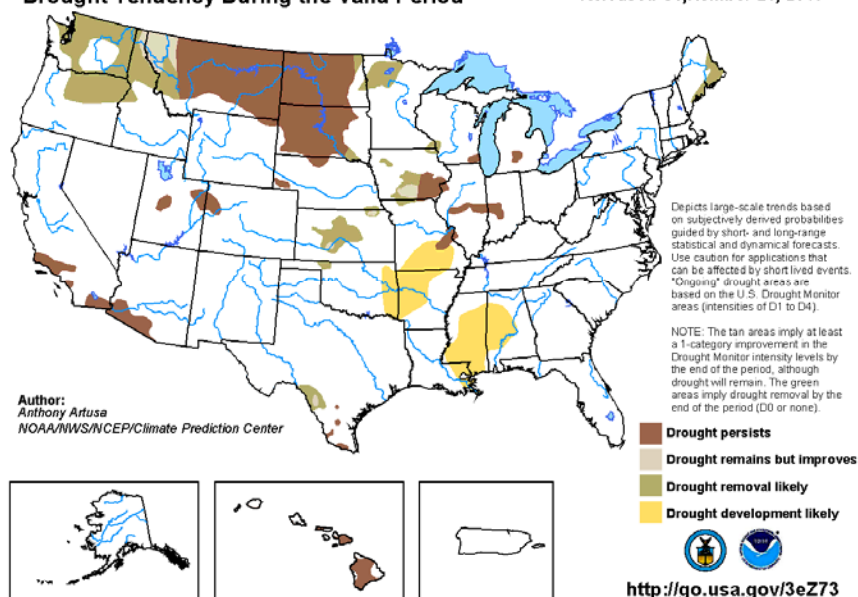
Precipitation and Drought Outlook for October, November, and December 2017:



MARFC's Water Resource Outlook for the southern portion of the Middle Atlantic calls for calls for near or below normal precipitation for the first week or so of October. Temperatures are expected to be near or above average during this time.

The National Weather Service Climate Prediction Center's 30-day outlook for October calls for near average precipitation and temperatures. The 90 day outlook for October through December calls for near average precipitation and above average temperatures.

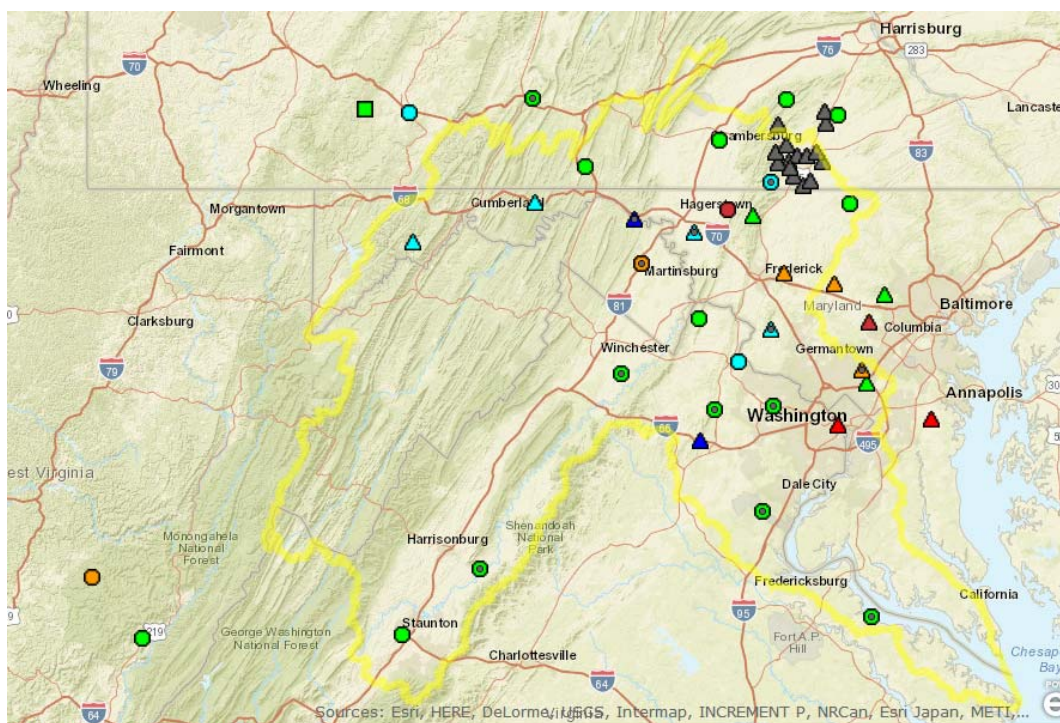
U.S. Seasonal Drought Outlook valid for September 21 - December 31, 2017 Drought Tendency During the Valid Period Released September 21, 2017



As of September 21, the Climate Prediction Center's U.S. Seasonal Drought Outlook reports no drought development in the Potomac basin.

Groundwater – Current Conditions:

MARFC's Water Resource Outlook for the Southern portion of the Middle Atlantic (September 25, 2017) reports that groundwater is mostly near or above normal. The groundwater map below, created by the U.S. Geological Survey (USGS), Pennsylvania Water Science Center, shows that current water levels in monitoring wells in the Potomac basin range from "Low" to "Much Above Normal." Wells with a gray dot inside the symbol identify Water Supply Outlook wells, the majority of which fall in the "Normal" and "Above Normal" categories. In this map, the USGS defines "Normal" as between the 25th and 75th percentiles, and "Below Normal" as between the 10th and 24th percentile.



Wells with a gray dot inside the symbol identify water supply outlook wells

Explanation - Percentile classes (symbol color based on most recent measurement)							
Low	<10	10-24	25-75	76-90	>90	High	Not Ranked
	Much Below Normal	Below Normal	Normal	Above Normal	Much Above Normal		

Wells		(on/off)
<input type="checkbox"/>	Real Time	<input checked="" type="checkbox"/>
<input type="checkbox"/>	Continuous	<input checked="" type="checkbox"/>
<input type="checkbox"/>	Periodic Measurement	<input checked="" type="checkbox"/>

Reservoir Storage – Current Conditions:

No water supply releases from the CO-OP shared system have been made this year. Triadelphia Reservoir is low and will remain so for the next two years because of rehabilitation work being done at the dam. Triadelphia Reservoir is one of the two Patuxent reservoirs.

The final whitewater release from Savage River Dam for 2017 was scheduled for Saturday, September 30. Approximately 1,000 cfs was released between 10am and 4pm. Releases from Jennings Randolph and Savage reservoirs are made for a variety of purposes. The flow values reported for whitewater and artificially varied flow (AVF) come entirely from water quality storage and may be increased or decreased without prior notice, depending on changing climatic and hydrologic conditions.

Information provided by the USGS, the Middle Atlantic River Forecast Center, and the National Weather Service.

Reservoir storage as of October 2, 2017

Facility	Percent Full	Current usable storage, BG	Total usable capacity, BG
WSSC's Patuxent reservoirs ⁴	39	4.6	11.9
Fairfax Water's Occoquan Reservoir	96	7.8	8.1
Little Seneca Reservoir ¹	99	3.8	3.9
Jennings Randolph water supply ²	100	13.1	13.1
Jennings Randolph water quality ²	70	11.4	16.3
Savage Reservoir ³	61	3.8	6.3

¹ Usable capacity consistent with Ortt, *et al.* (2011).

² 2013 revised stage-storage curve provided by Bill Haines, US Army Corps of Engineers, Baltimore District.

³ 1998 revised stage-storage curve provided by Bill Haines, US Army Corps of Engineers, Baltimore District.

⁴ Bathymetric study conducted December 2015 with revisions in December 2016, and unusable storage corrected June 2017.

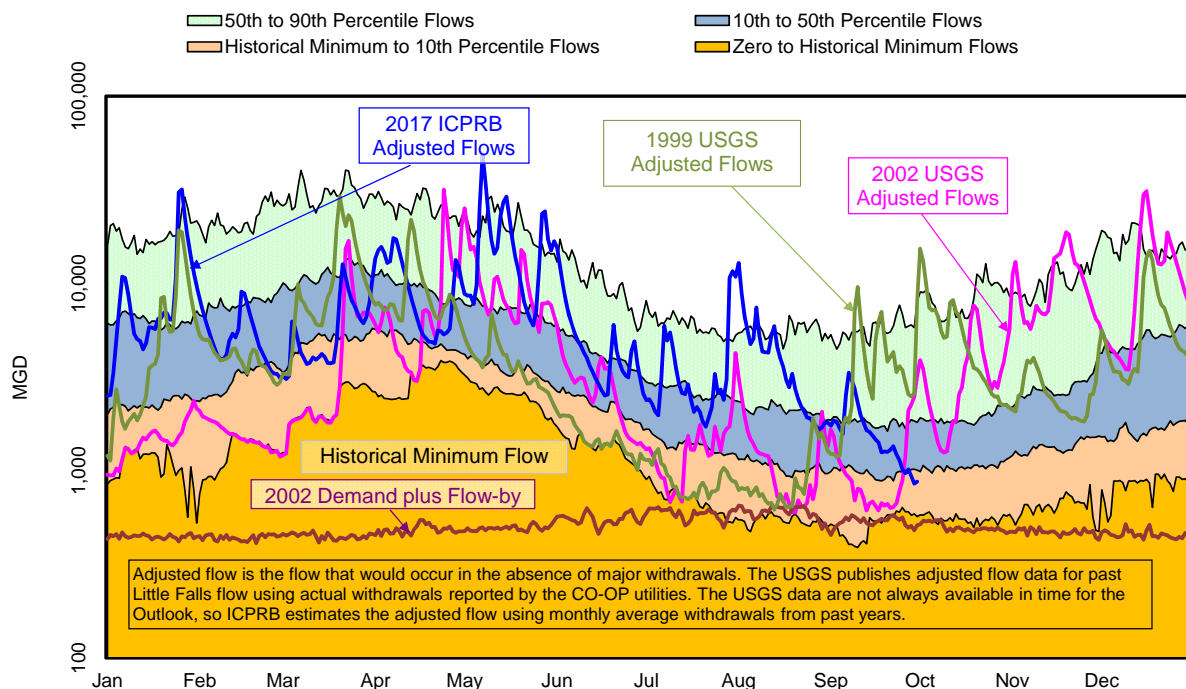
Potomac River Flow:

The estimated adjusted Potomac flow at Little Falls on September 30 was 0.9 billion gallons per day (BGD). For this day of the year, this value was above the historical minimum flow value of 0.6 BGD and below the 10th percentile flow value of 1.0 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 6.8 BGD for the first nine months of the year and 1.6 BGD in September.

Environmental Flow-by:

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

Adjusted Daily Flow at Little Falls for 2017, 1999 and 2002,
Daily Adjusted Flow Percentiles for 1930-2014 Data,
and Drought Year (2002) Demands plus Flow-by



Little Falls flow statistics are based on 1930 through 2014 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 FW, WSSC, the Aqueduct, and Rockville to the Little Falls gage flow record.

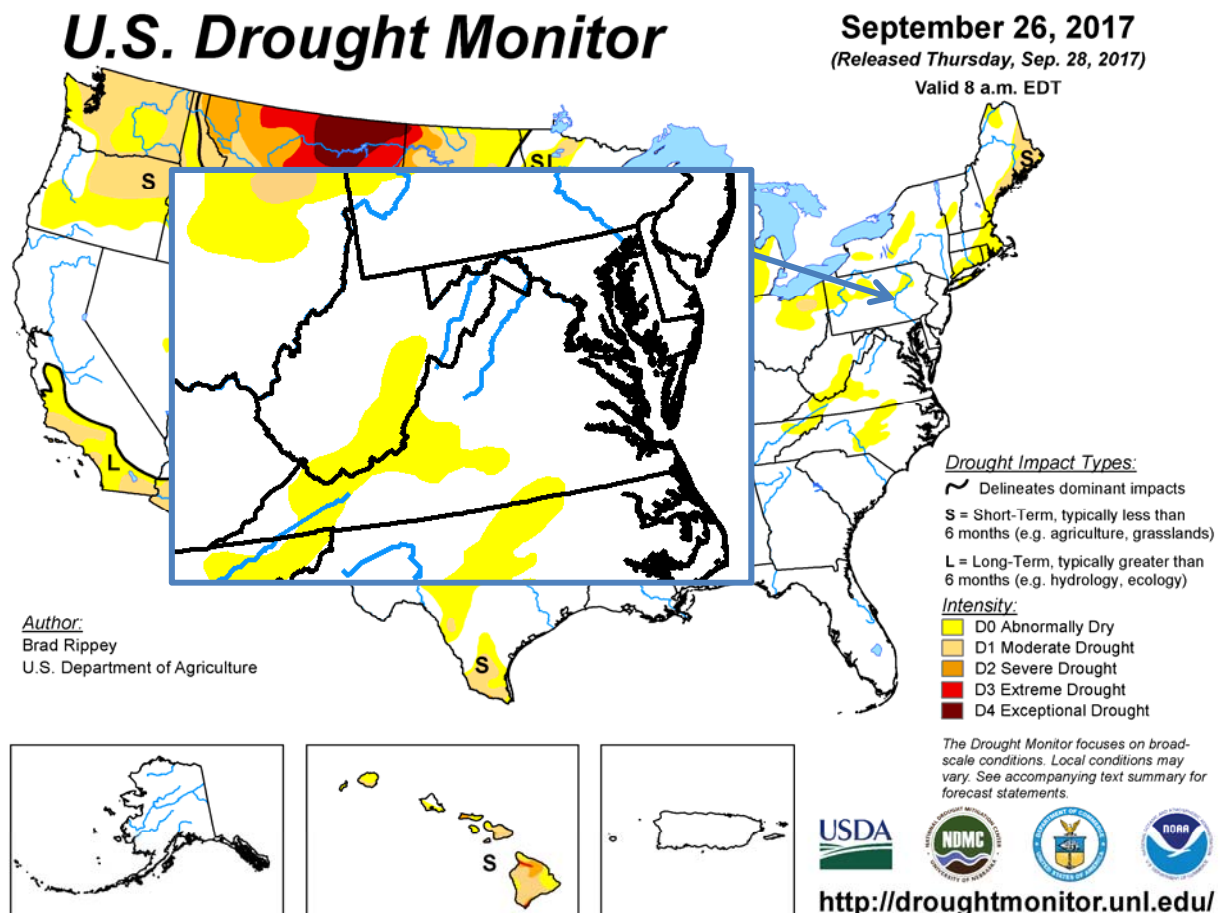
Information provided by the USGS, the Middle Atlantic River Forecast Center, and the National Weather Service.

Drought Status:

The Metropolitan Washington Council of Government's Drought Awareness Response Plan status is "Normal". The states of [Maryland](#) and [Pennsylvania](#) are "Normal." The state of [Virginia](#) has a "Drought Watch" in effect for north-central parts of the state.

Drought Monitor and Soil Moisture:

The NOAA Climate Prediction Center's U.S. Drought Monitor map (see first figure below) indicates no drought conditions for the majority of the Potomac basin. However, parts of West Virginia and Virginia, which include a portion of the Potomac basin, are abnormally dry (D0). The Palmer Drought Severity Index by Division map (see second figure on next page) indicates moderate to severe drought conditions occurring in West Virginia.



Drought Severity Index by Division
Weekly Value for Period Ending Sep 23, 2017
Long Term Palmer

