State of Ohio Quarterly Climate Summary

THE OHIO STATE UNIVERSITY

Summer Review (Jun-Aug)

Released: 9/23/2024

Temperature and Precipitation

Nearly all of Ohio was seasonably warm and extremely dry this summer. The entire state was near normal for average temperature with western Ohio recording 1-2 °F above normal (Fig. 1a). Three-month accumulated precipitation values indicate southeastern regions of the state only experienced 5-7.5 inches of precipitation while the rest of Ohio logged between 7.5 – 12.5 inches (Fig. 1b). Most of the state noted precipitation was 2 to 6 inches below normal with southeastern Ohio being 8 inches below normal in some areas. Contrastingly, small sections near Lake County and Preble County logged 0-4 inches above normal (Fig. 1c). In terms of percentages, the southeast was at 25-75% of normal precipitation levels. The rest of the state was between 75-100% of normal levels (Fig. 1d). These warm and dry conditions led to the development of exceptional drought in the southeast, which will be discussed later in this summary.

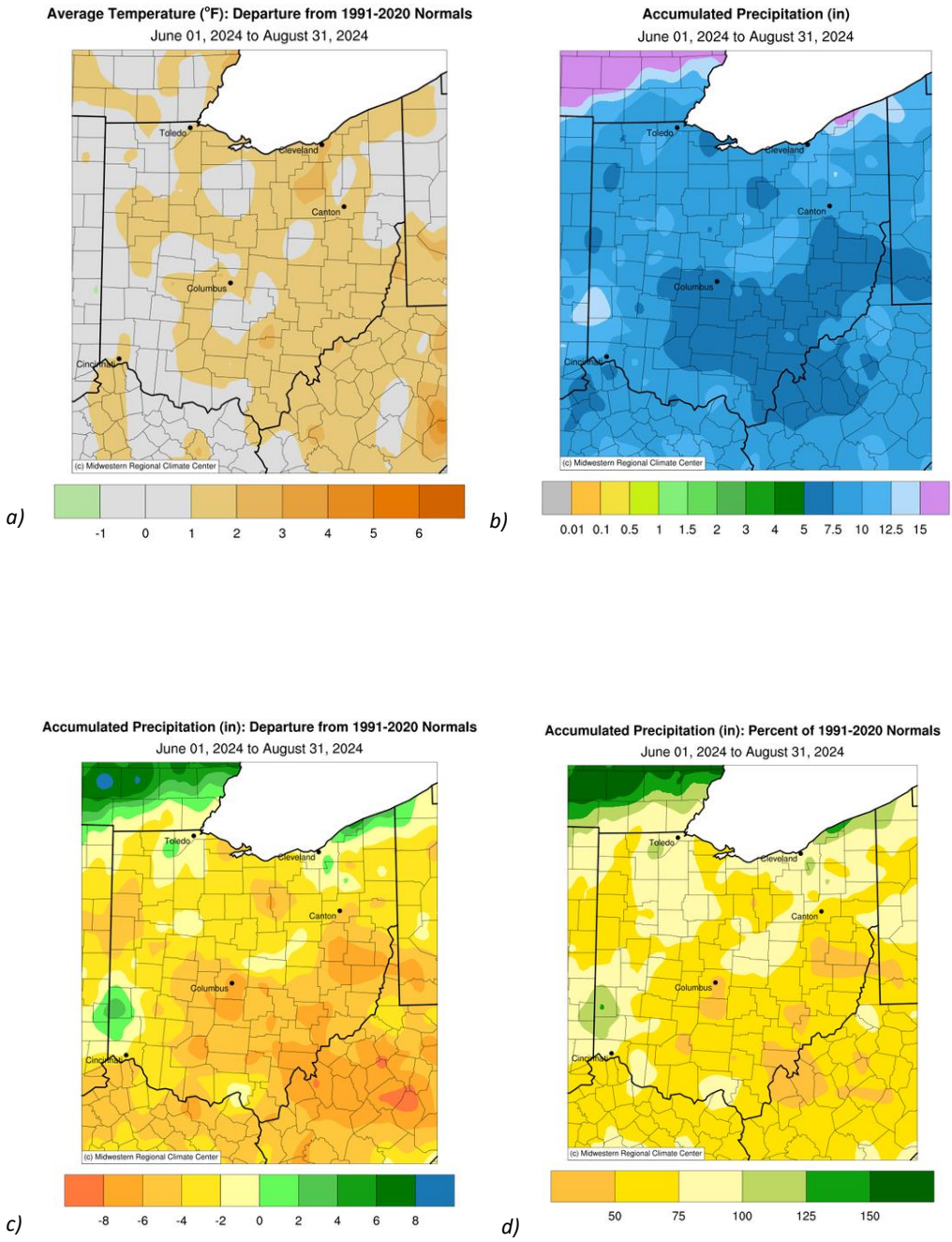


Figure 1: Statewide departures from normal temperature (a) and accumulated precipitation (b) over the summer months at top, followed by statewide accumulated precipitation departures (c) and percent of normals for precipitation (d) at bottom. All data courtesy of the Midwestern Regional Climate Center (http://mrcc.purdue.edu).

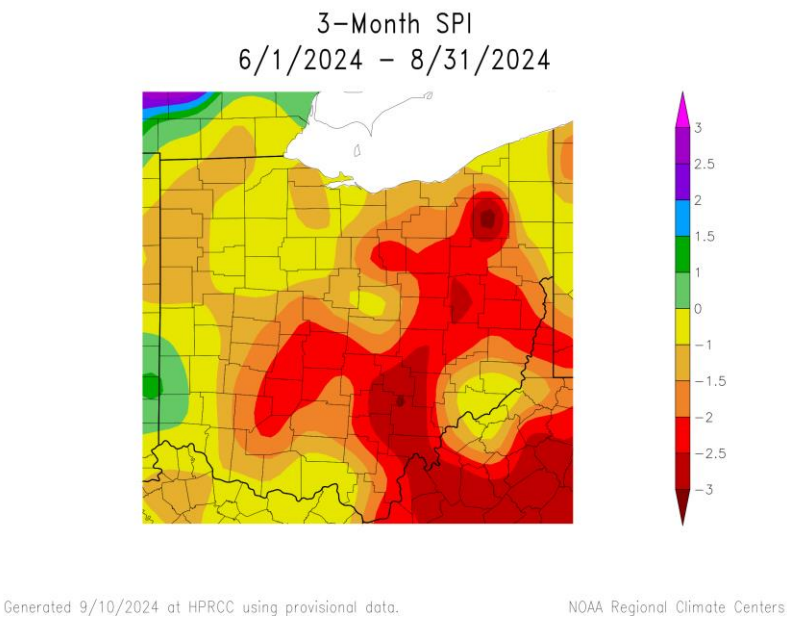


Figure 2: Three-month Standardized Precipitation Index (SPI) across the state of Ohio from August 2024 through Aug 2024, used as a proxy for soil moisture conditions. Data courtesy of the High Plains Regional Climate Center (https://hprcc.unl.edu/)

Soil and Energy

The largely below-normal precipitation values are reflected by the dramatically below-normal 3-month SPI. Most of Ohio had SPI values between 0 to -1.5 which indicates, indicating dry soil conditions across most of the state. In the southeast values of -2 to -3 were recorded which indicates incredibly dry soil conditions (Fig. 2). Low soil moisture over the period is a direct result of the below-normal levels of precipitation combined with slightly warmer than average temperatures. Low soil moisture has had many implications on the agriculture industry such as poor tree, crop, and pastureland health.

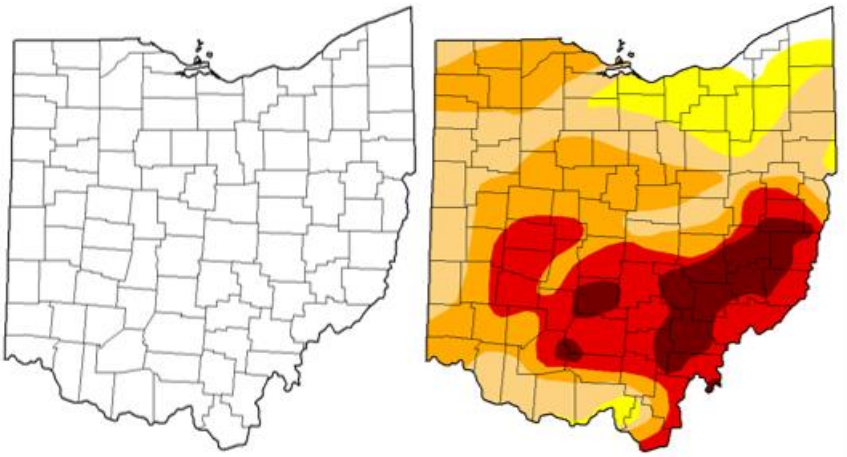
Slightly above-normal temperatures throughout the summer season resulted in more Cooling-Degree Days (CDDs) and fewer Heating-Degree Days (HDDs) than normal. Overall energy usage for heating and cooling was close to normal this summer as a result of the seasonable temperatures.

Climate Division	Heating Degree Days	Normal	Departure	Cooling Degree Days	Normal	Departure
1	16	35	-19	711	648	63
2	18	36	-18	754	647	107
3	58	63	-5	565	503	61
4	19	26	-7	764	679	67
5	24	23	1	796	707	89
6	33	41	-8	708	587	121
7	34	36	-2	710	602	109
8	14	16	-2	829	777	52
9	14	15	-1	889	771	118
10	23	25	-2	827	669	158
Statewide	24	30	-6	762	668	95

Figure 3: (Left) Total June-August heating & cooling degree days. (Right) Corresponding Ohio Climate Divisions. Data courtesy of the Midwestern Regional Climate Center (http://mrcc.purdue.edu).

Notable Events

This summer saw the first-ever onset of exceptional drought (D4) in Ohio, based on the U.S. Drought Monitor (2000-present). The beginning of June saw no drought conditions in Ohio but 3 months of below-average precipitation combined with above-average temperatures led to drought quickly developing. Currently, 87.45% of Ohio is in a drought categorization (D1-D4) with 9.52% in exceptional drought conditions (D4). The drought monitor update on August 27th had the first usage of D4 in Ohio since the drought monitor's inception in 2000 (Fig. 4). Since then, the area of D4 has expanded significantly. The impacts of this drought have been the most severe in southeastern Ohio within the agriculture industry. These impacts can be seen across crops, livestock, tree/plant health, and bodies of water. Impacts on crops include soybean pods not filling, stunted corn growth, and the beginning of early harvest as many fields have matured quicker than usual (Fig. 5) Along with this, pasturelands have been in very poor conditions causing many farmers to have to sell their livestock or switch to different food sources such as hay. The risk of wildfires is increasing as dry grasses combined with leaf litter from trees have provided fuel for small woodland ground fires. Many creeks, wells, and springs are drying or are already dry which has not been seen since 1988. Twenty-three Ohio counties have been declared primary disaster areas by the USDA as a result of the drought conditions.



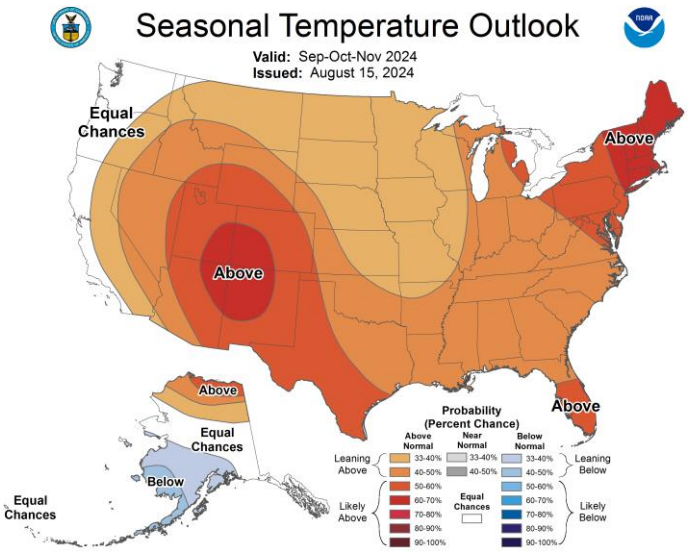
Statistics Comparison

Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
2024-06-04	100.00	0.00	0.00	0.00	0.00	0.00
2024-09-17	2.08	97.92	87.45	59.46	30.05	9.52
Change	-97.92	97.92	87.45	59.46	30.05	9.52

Figure 4: Image of the comparison between the Drought Monitor Map for June 4 vs September 17. The first map shows zero drought conditions, and the second shows exceptional drought conditions based on the U.S. Drought Monitor (2000-present). *(https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?OH)*

Figure 5: Drought conditions south of Mount Sterling, OH near Deer Creek State Park. Photo by Connor Michael.

a)



b)

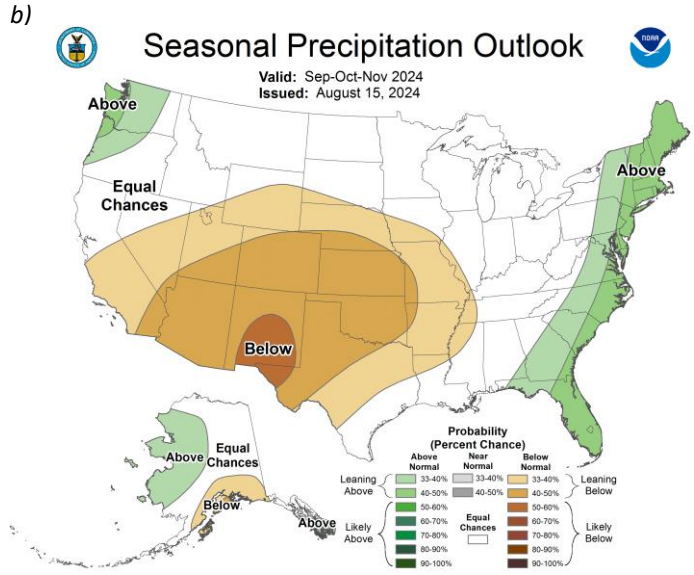


Figure 6: a) Nationwide Seasonal Temperature and b) Precipitation Outlook for September-November 2024. Courtesy of the Climate Prediction Center (https://www.cpc.ncep.noaa.gov/).

Looking Ahead

The CPC's three-month outlooks predict warmer than average temperatures for Ohio with uncertainty in the levels of precipitation. The seasonal temperature outlook shows moderate confidence in the entire state observing above-average temperatures through the fall season with the highest confidence in the northeast part of the state (Fig. 6a). The precipitation outlook shows no bias towards above or below-average precipitation over the next three months (Fig. 6b). The trend of CPC's seasonal outlooks predicting warmer than average temperatures in Ohio has continued since October of 2022. The last time a seasonal outlook predicted colder-than-average temperatures in Ohio was about 4 years and 9 months ago in December of 2019. The predicted warmer-than-average temperatures with uncertain precipitation continue the uncertain future of the current drought conditions in the state. Long-term or prolonged drought is typically categorized as a drought that lasts 6 months or more. The impacts of long-term drought range from increased risk of wildfire, widespread damage to different plants and ecosystems, and depletion of aquifers due to excessive need to pump ground water.

Note: these outlooks do not provide the quantity of above or below normal conditions, just the likelihood of occurrence (i.e., the probability).

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