



Review – September 2024

Temperature

Average Temperatures were very consistent in September with the entire state experiencing above-average temperatures. Nearly the entire state recorded average temperatures of 65-70°F except for the Columbus metro and the region north of Cincinnati which logged 70-75°F (Fig. 1a). The urban heat island effect could explain the warmer temperatures in the Columbus region. This phenomenon occurs due to the increase in infrastructure which absorbs more heat. The departure from the normal temperatures map is more varied with most of the state experiencing 2-4°F above normal (Fig. 1b). Station-specific ranking showed that many stations ranked in the warmest fifth of their record all across Ohio for mean temperature in September. Stations in Dayton and Columbus ranked as the second warmest in their record. In total seven stations ranked in the warmest fifth of their record with most of them being located in the upper half of the state (Fig. 2).

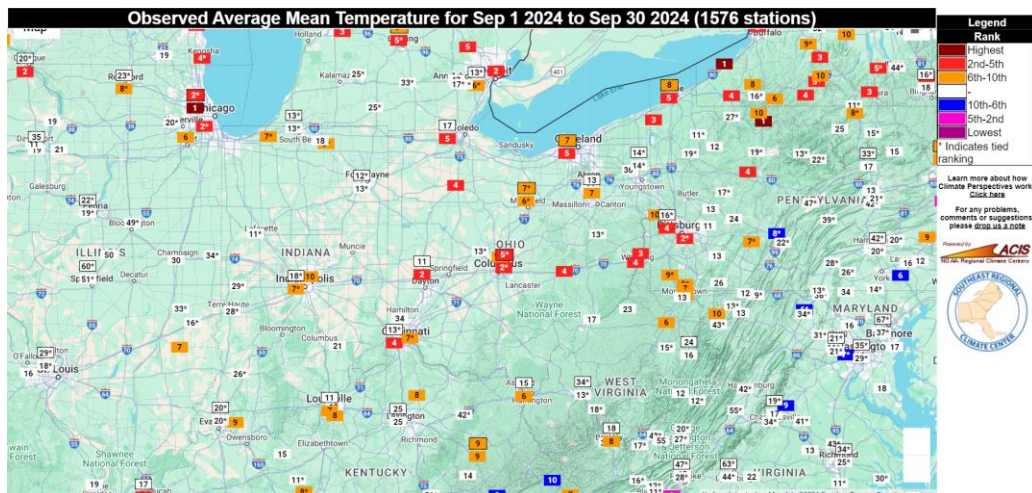
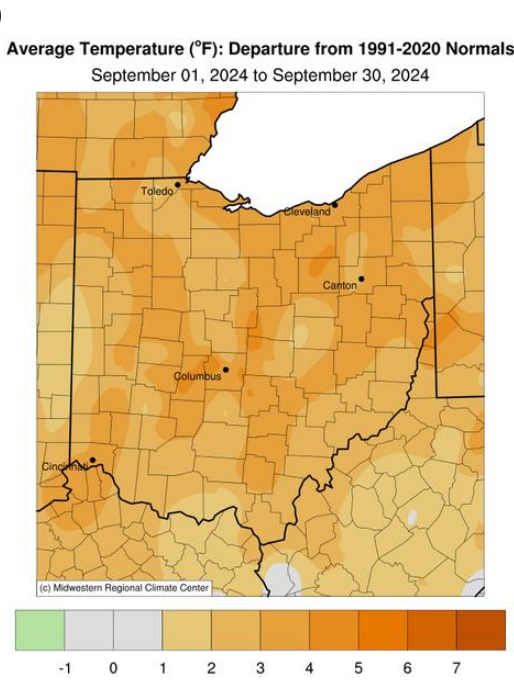
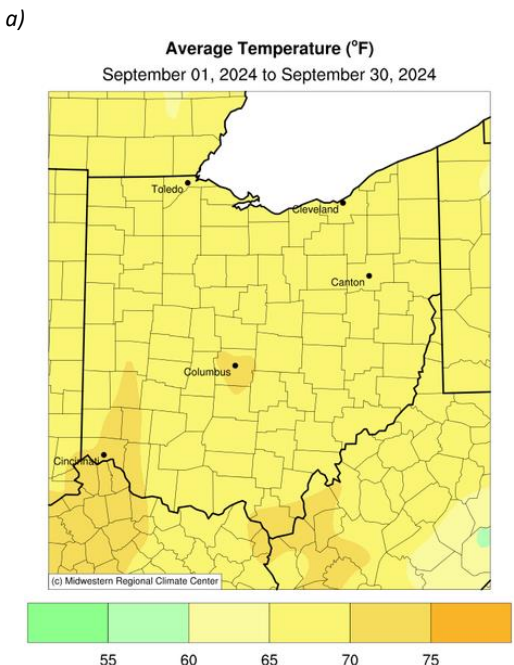


Figure 1a: Average temperature and 1b: Departure from Normal for the month of September 2024. Data courtesy of the Midwestern Regional Climate Center (<http://mrcc.purdue.edu>).

Figure 2: State of Ohio average temperature ranks by station for September 2024. Courtesy of the Southeast Regional Climate Center (<https://sercc.oasis.unc.edu/Map.php?region=us>)

This product is a substitute for NCEI's County Data rankings, which are unavailable due to the impacts of Hurricane Helene on NCEI's Asheville data center.

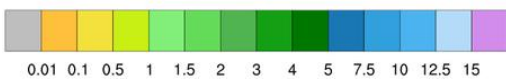
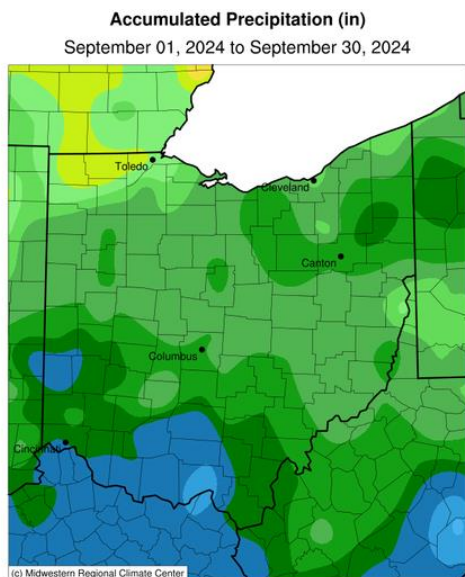


Review – September 2024

Precipitation

Accumulated precipitation was very localized and sporadic in September with multiple regions of above and below average levels. The Toledo area noted 0.5 to 1.5 inches of accumulated precipitation, most of the central Ohio region received 2 to 4 inches, and southeastern Ohio logged 4 to 10 inches (Fig. 3a). Departures from the normal precipitation show a similar trend with 1 to 2 inches below normal in the northwest and northeast, near normal for central region of the state, and southern Ohio logging 1 to 7 inches above normal (Fig. 3b). Most of the rain in southern Ohio is a result of the remnants of Hurricane Helene which is discussed further in the notable section. Station-specific rankings showed a few stations in the north and east in the top tenth driest September of their record while in the southwest in the top tenth for wettest in their record. The Akron Municipal Airport reported its driest September on its record. Many of the stations ranked near normal in their record (Fig. 4).

a)



b)

Accumulated Precipitation (in): Departure from 1991-2020 Normals
September 01, 2024 to September 30, 2024

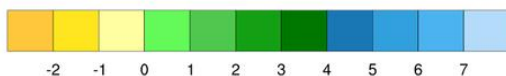
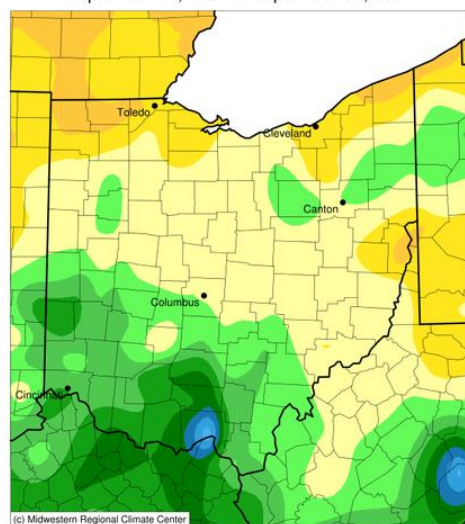


Figure 4: State of Ohio precipitation ranks by station for September 2024. Courtesy of the Southeast Regional Climate Center (<https://sercc.oasis.unc.edu/Map.php?region=us>)

This product is a substitute for NCEI's County Data rankings, which are unavailable due to the impacts of Hurricane Helene on NCEI's Asheville data center.

Figure 3a: Accumulated precipitation and 3b: Departures from Normal for the month of September 2024. Data courtesy of the Midwestern Regional Climate Center (<http://mrcc.purdue.edu>).

Review – September 2024

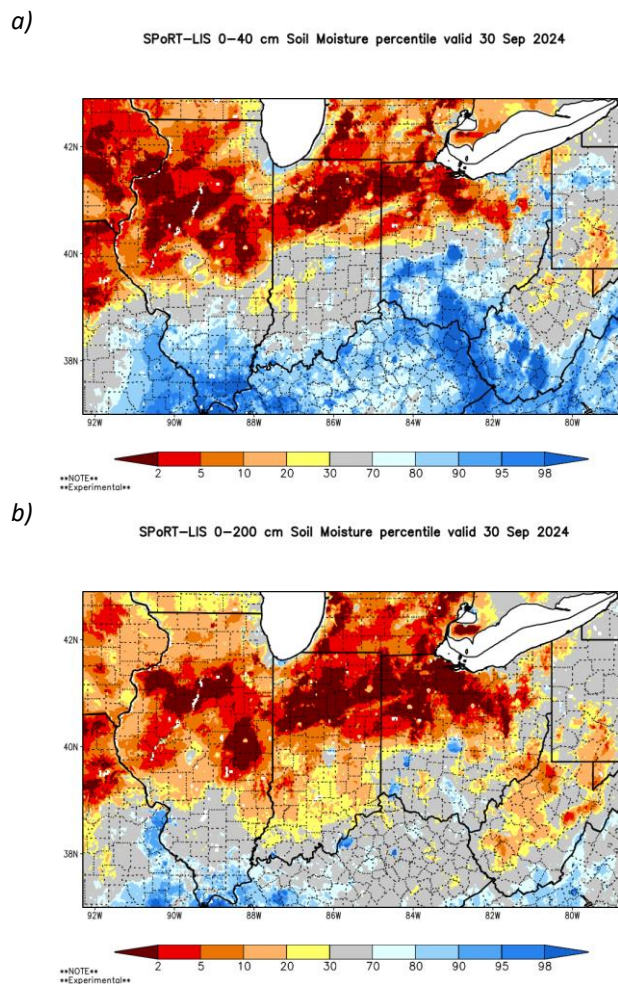


Figure 5a: 0-40 cm and 5b: 0-200 cm soil moisture percentile across the region at the end of September 2024. Courtesy of NASA SPoRTLIS (https://weather.msfc.nasa.gov/sport/case_studies/lis_IN.html).

Soil and Energy

Soil conditions at the end of September were mostly dry with recent rain bringing relief to southern Ohio. The 0-40 cm map shows extremely dry soil in the northwest, moderate soil conditions across the central belt, and moist soil conditions in the south (Fig. 5a). The 0-200 cm map is quite different showing moderate soil conditions in the southwest and extremely dry conditions across a large region in the northwest (Fig. 5b). The discrepancy between the maps is a result of how the upper levels of the soil respond much quicker to precipitation than the lower levels. Additionally, the remnants of Hurricane Helene caused a lot of precipitation in the south near the end of September when these recordings were taken, so moisture did not have time to infiltrate the soil.

Slightly above-average temperatures throughout September led to an increased number of Cooling Degree Days (CDDs) and a decreased number of Heating Degree Days (HDDs) across all climate divisions. As the transition into fall continues it is expected that the number of cooling degree days will decrease as temperatures continue to decrease (Fig. 6).

Product Note: Both NASA SPoRT LIS soil moisture products contain small pockets of inaccurate data indicating extremely wet or dry conditions. These small-scale errors can emerge in remote sensing products covering large areas or grid-spacings. For more information, please contact Geddy Davis (davis.5694@osu.edu)

Climate Division	Heating Degree Days	Normal	Departure	Cooling Degree Days	Normal	Departure
1	26	92	-66	110	82	28
2	24	87	-63	121	83	38
3	35	110	-75	80	59	21
4	23	78	-56	130	96	34
5	21	72	-51	136	96	40
6	24	96	-71	119	72	47
7	23	85	-62	110	76	34
8	20	63	-43	144	112	32
9	17	58	-40	144	113	31
10	20	73	-54	130	91	39
State	23	81	-58	122	88	34



Figure 6: (Left) September 2024 heating & cooling degree days. (Right) Corresponding Ohio Climate Divisions. Data courtesy of the Midwestern Regional Climate Center (<http://mrcc.purdue.edu>).

Current Event Update

Drought

Recent precipitation has brought relief to drought conditions in southeastern Ohio, but the rest of the state only had minor relief. In the east exceptional drought persists. As of October 8th, 17.63% of the state is in D0, 32.90% is in D1, 12.45% is in D2, 11.8% is in D3, and 7.99% is in D4. In total September recorded around a 12% reduction in total drought area but the area of D4 drought stayed relatively similar with less than half a percent drop (Fig. 7). Much of the reductions in drought conditions in the southwest resulted from the heavy precipitation that fell during the remnants of Hurricane Helene which is discussed further in the Notable Events section. The recent precipitation resulted in a slight improvement in pasture conditions with signs of greening. Early fall harvest has continued, though some improved corn and soybean conditions were also reported. The risk of harvest fires has decreased overall except in the areas that are still very dry. Open burn bans will persist for many counties until conditions improve further (Fig. 8). The worst conditions remain in the east where many of the improvements stated above were not experienced. Additionally, northwestern Ohio is now beginning to report extreme drought conditions as a result of the below-average precipitation levels near the Maumee River. It is important to note that even though drought conditions did improve, this does not necessarily mean they will continue to improve unless consistent precipitation continues.

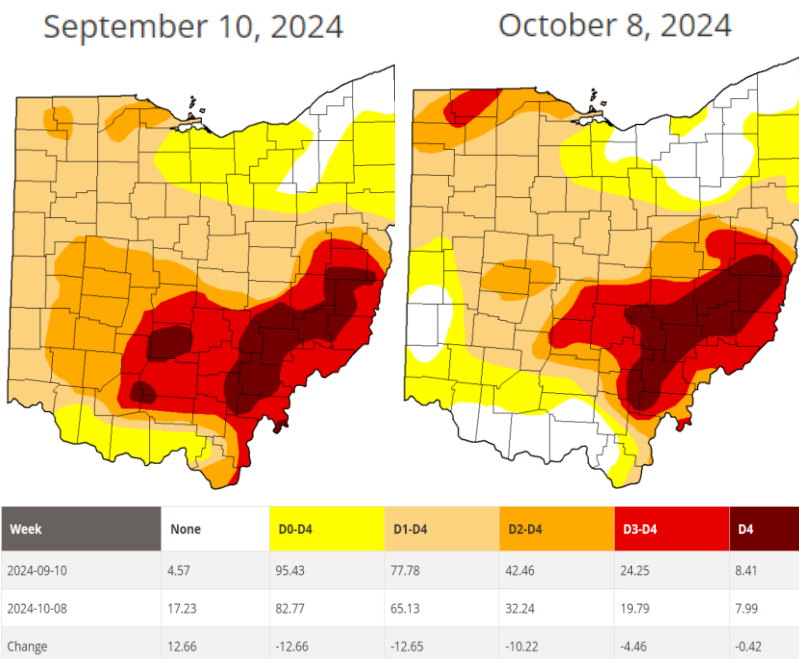


Figure 7: Maps comparing drought conditions in Ohio between September 10, and October 8, determined by the U.S. Drought Monitor. <https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?OH>



Figure 8: Two photos comparing grass conditions at Darby Creek Greenway from September 2nd (top) to September 30th (bottom). Photo credit to Connor Michael.



Review – September 2024

Notable Events

On September 26th, Hurricane Helene made landfall near Perry, Florida as a category 4 storm with winds of 140 mph. By September 27th, the remnants of this storm entered southern Ohio causing widespread wind damage and locally major flooding. A narrow band of persistent heavy rain occurred in south-central Ohio due to the storm interacting with a stationary front. This band of precipitation was responsible for upward of 6 inches of rain in certain areas along the US Route 23 corridor (Fig. 9).

Southern Ohio experienced widespread impacts from these remnants. At Wilmington Air Park a wind gust of 67 MPH was recorded, with several other 50-60 MPH gusts reported throughout the region. Over 120 thousand people were without power in the southwest (Fig. 10). Additionally, 6.57 inches of rain was recorded between Portsmouth and Sciotoville with other locations in the vicinity receiving 5-6 inches. In Pike and Ross Counties, 4 inches of rain or more was reported as well. The majority of the region noted somewhere between 1 to 3 inches of precipitation. This resulted in flooding and flash flooding occurring in a small corridor south of Route 35. As discussed in the drought section, this rain did help negate some of the effects of drought in this area, but dry ground allowed much of the rain to become runoff which is one reason for the flooding that occurred. Though the damage was impactful, the extent was nowhere close to what the Carolinas experienced.

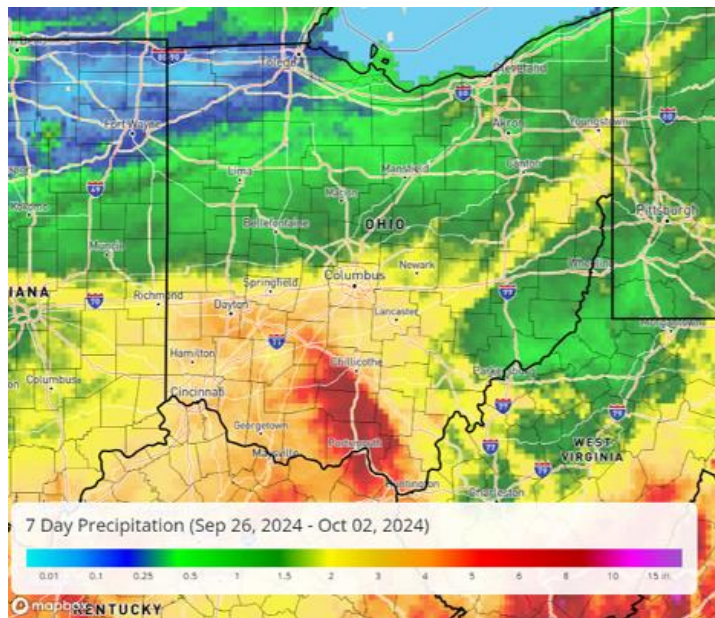


Figure 9: Graphic of 7 day precipitation totals from Southeastern Regional Climate Center (<https://sercc.com/>).

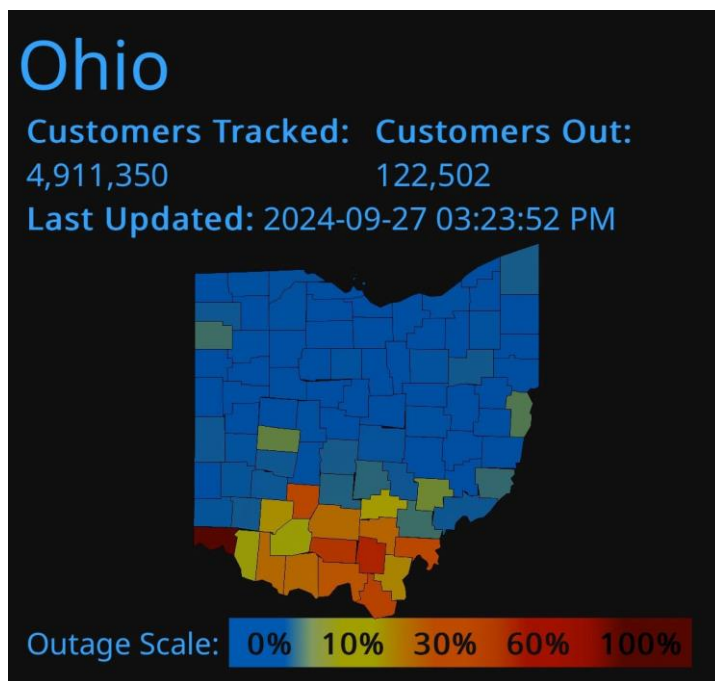


Figure 10: Graphic for power outages on September 27th resulting from Hurricane Helene remnants wind damage. Graphic pulled from <https://poweroutage.us/>.

Forecast: October - December

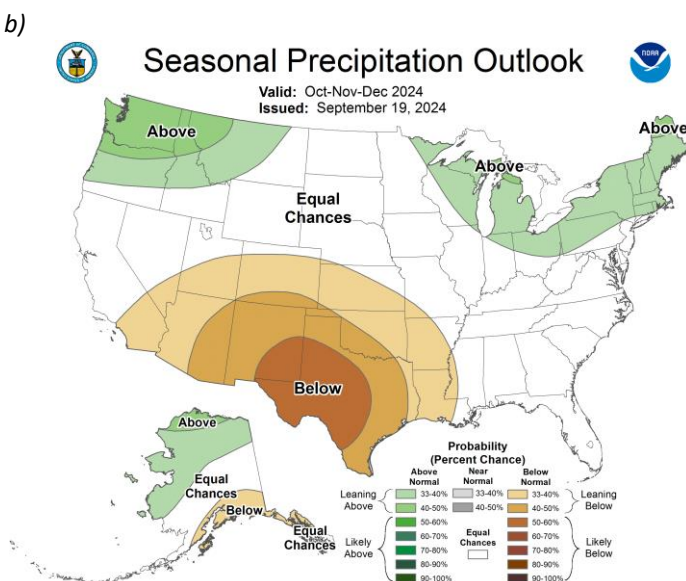
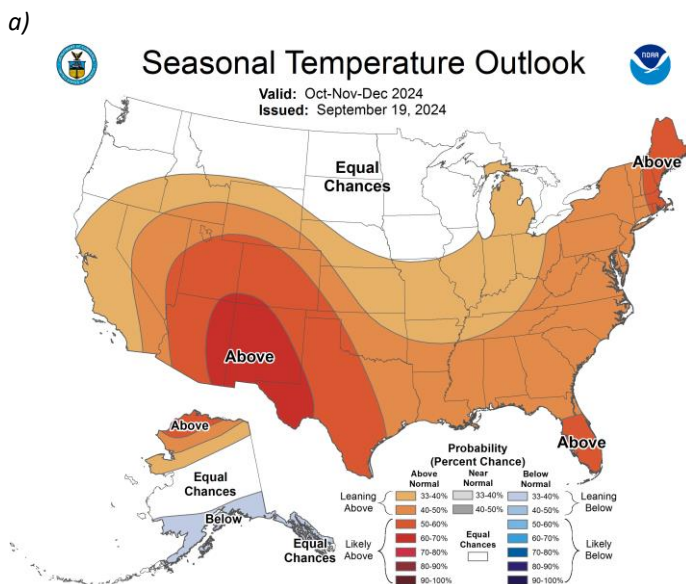


Figure 11a: Nationwide Seasonal Temperature and 9b: Precipitation Outlook for October-December. Courtesy of the Climate Prediction Center (<https://www.cpc.ncep.noaa.gov/>).

Authors:

Aiden Q. Ridgway
Atmospheric Sciences Undergraduate
Student Assistant: Climate Services
Byrd Polar and Climate Research Center
The Ohio State University
ridgway.72@osu.edu

Geddy R. Davis
Meteorologist/Atmospheric Scientist
Program Coordinator: Climate Services
Byrd Polar and Climate Research Center
The Ohio State University
davis.5694@osu.edu

Aaron B. Wilson
State Climate Office of Ohio
Byrd Polar and Climate Research Center
OSU Extension
The Ohio State University
wilson.1010@osu.edu

Looking Ahead

The CPC's 3-month outlooks depict seasonable conditions with slight confidence that temperatures and precipitation levels are going to be above normal levels. The temperature outlook indicates the entire state is predicted to be above average temperatures with the highest confidence in eastern Ohio (Fig. 11a). The precipitation outlook predicts the northern half of the state to have above normal levels of precipitation while the southern half suggests equal chances of above or below normal levels (Fig. 11b). Although the CPC outlooks only indicate confidence levels, above-average precipitation levels could provide relief to the drought-stressed regions of the state in particular eastern Ohio which is still in exceptional drought levels. As temperatures drop with the transition into the colder months, the expected warmer-than-average temperatures would keep temperatures comfortable as we transition into winter. Even though warmer-than-average temperatures are predicted short-term cold snaps are still possible and it is important to note that we are approaching the time of year when certain regions see their first frost.

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