

Review – July 2023

Temperature

With summer in full swing, temperatures were consistent in Ohio throughout July. Average temperatures ranged from 70-75°F for most of the state, with areas around Columbus and Toledo matching southern and western Ohio with slightly higher temps near 75-80°F (Fig. 1a). With few significant variations in the month, the bulk of Ohio saw temperature departures within a degree of normal (Fig. 1b). Small areas across the state reached slightly over 1°F above normal, with a portion of Crawford County seeing 1°F below normal. At the county level, most of the Ohio ranked near normal, though large swaths of the east, northwest, and south ranked just within the warmest third of the 129-year record (Fig. 2). Erie County was the only one to rank within the coldest third, seeing its 40th coldest July on record. Conversely, Guernsey County ranked furthest from normal, seeing its 29th warmest July.

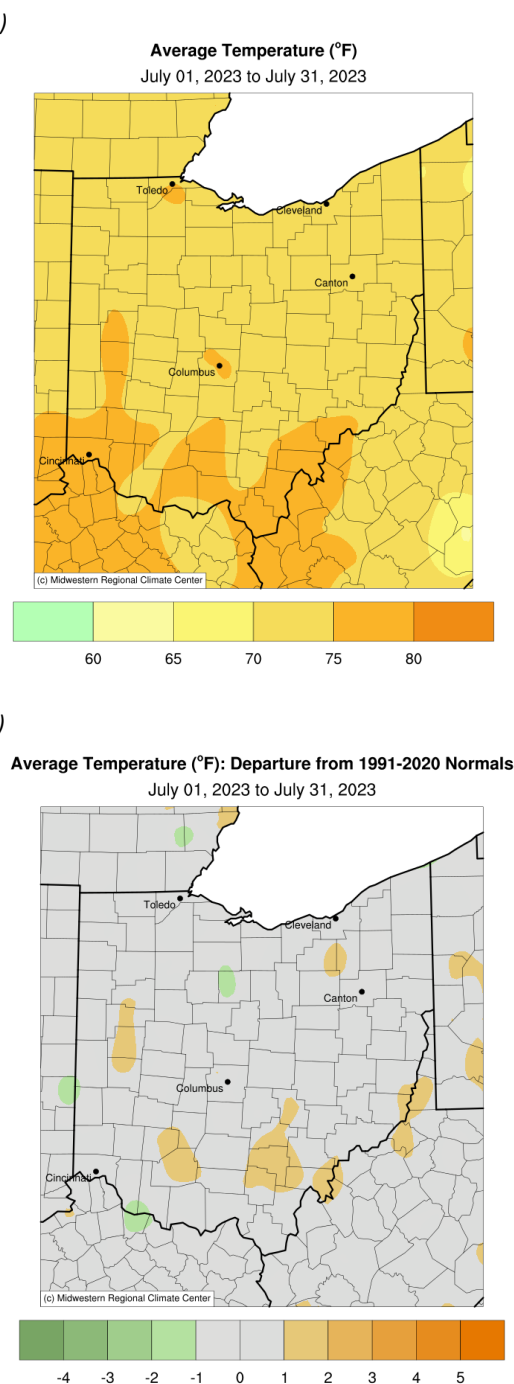


Figure 1a: Average temperature and 1b: Departure from Normal for the month of July 2023. Data courtesy of the Midwestern Regional Climate Center (<http://mrcc.purdue.edu>).

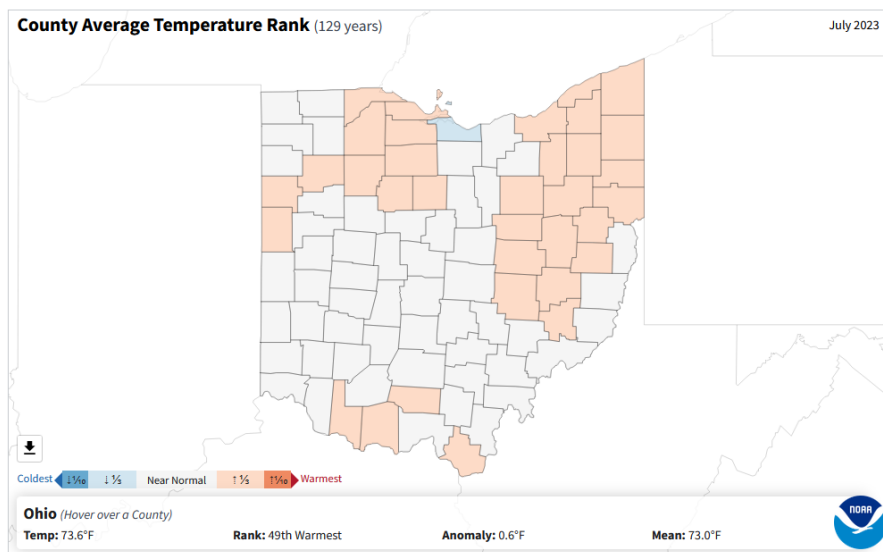


Figure 2: State of Ohio average temperature ranks by county for July 2023. Courtesy of the National Centers for Environmental Information (<https://www.ncdc.noaa.gov/sotc/>).

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Precipitation

With the frequent passage of storms throughout the state in July, Ohio saw a variety of precipitation totals. For the southwest, northeast, and far northwest portions of Ohio, precipitation accumulation of 5-10 inches was widely observed, while the rest of the state saw around 3-5 inches (Fig. 3a). Similarly, the wetter regions recorded accumulated precipitation departures of around 0-4 inches above normal, with localities near Cleveland, Toledo, and Clinton County recording departures of at least 4 inches above normal. Meanwhile the drier areas saw departures of 0-2 inches below normal (Fig. 3b). At the county level, areas around southwest, northeast, and northwest Ohio ranked at least in the wettest third of the historical record, with seven counties reaching the wettest tenth of the record (Fig. 4). Tuscarawas County saw the greatest departure from the record, seeing its 5th wettest July.

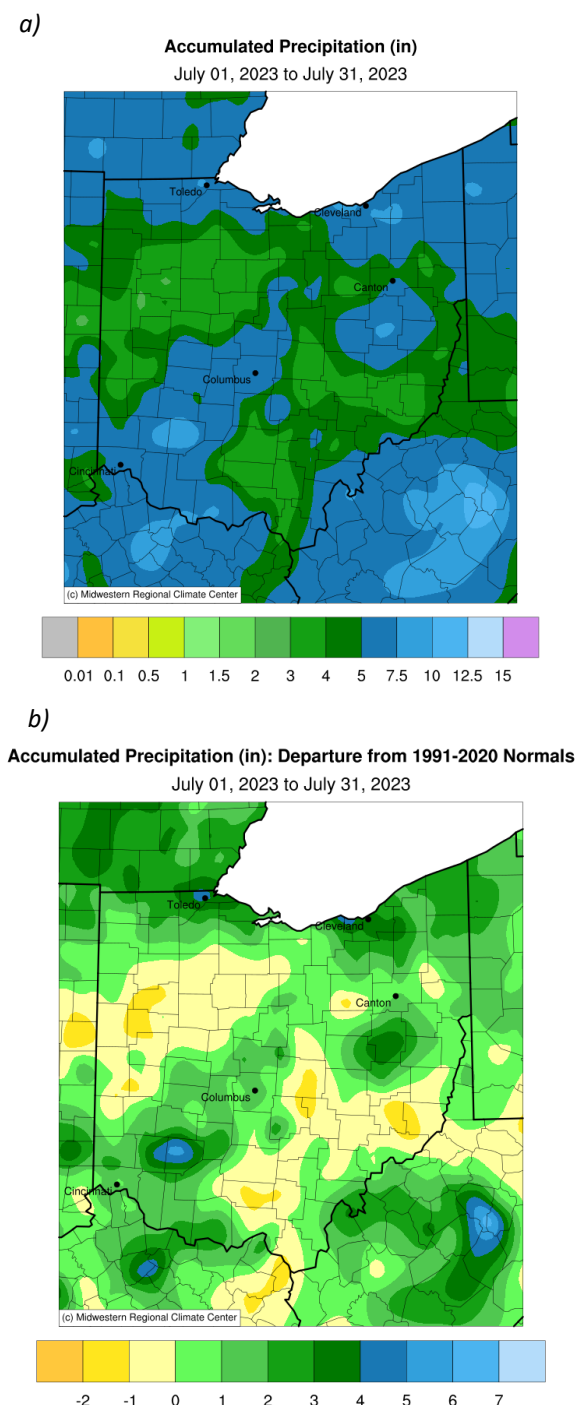


Figure 3a: Accumulated precipitation and 3b: Departures from Normal for the month of July 2023. Data courtesy of the Midwestern Regional Climate Center (<http://mrcc.purdue.edu>).

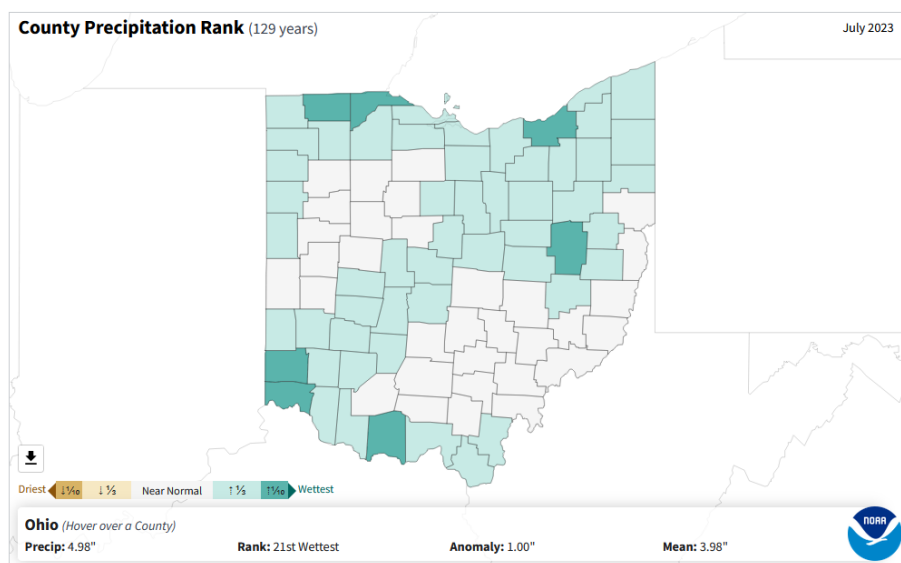
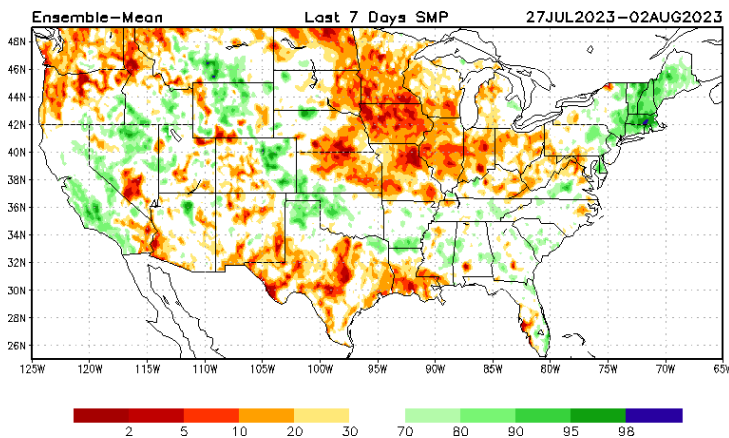


Figure 4: State of Ohio precipitation ranks by county for July 2023. Courtesy of the National Centers for Environmental Information (<https://www.ncdc.noaa.gov/sotc/>).

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a)



b)

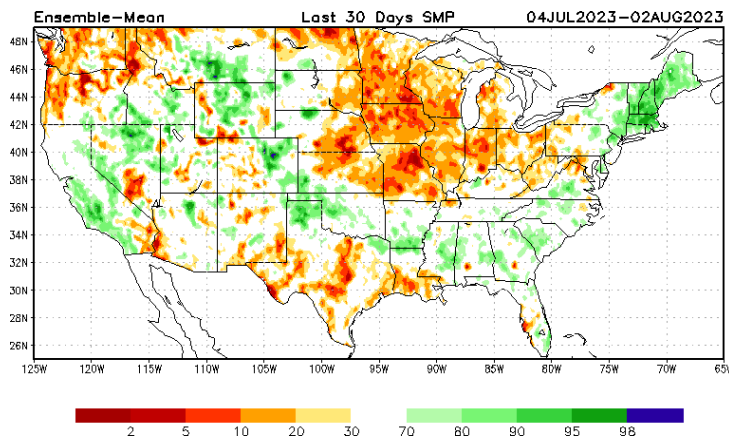


Figure 5a: Last 7 days and 5b: last 30 days mean soil moisture percentile across the United States. Courtesy of the Climate Prediction Center (https://www.cpc.ncep.noaa.gov/products/Drought/Monitoring/smp_new.shtml#).

Soil and Energy

While mostly average soil conditions were present in central Ohio, dryness still persists in some areas of the state. These conditions stayed mostly consistent throughout July, with the last 7 days of the month falling closely in line with the last 30 days (Fig. 5a and 5b). Although the state did not see significantly high soil moisture, Ohio stuck out as one of the least dry regions of the Midwest during July thanks to more frequent rain and storms.

As temperatures continued to rise throughout July, no Heating Degree Days (HDDs) were recorded anywhere in the state. Meanwhile, while the northern Ohio climate divisions saw negative departures of Cooling Degree Days (CDDs), the southern divisions recorded more than normal (Fig. 6). As a statewide average, both HDD and CDD observations were very close to normal.

Product Note: The NASA SPoRT LIS soil moisture product is currently unavailable due to a technical failure. While this is repaired, we will be using national soil moisture percentage products from the Climate Prediction Center. For more information, please contact Geddy Davis (davis.5694@osu.edu).

Climate Division	Heating Degree Days	Normal	Departure	Cooling Degree Days	Normal	Departure
1	0	2	-2	263	265	-1
2	0	2	-2	259	263	-4
3	0	6	-6	208	212	-4
4	0	1	-1	279	277	2
5	0	1	-1	281	280	0
6	0	3	-3	256	239	17
7	0	2	-2	265	247	18
8	0	0	0	306	304	1
9	0	0	0	316	304	12
10	0	1	1	296	269	27
Statewide	0	2	2	273	268	5



Figure 6: (Left) July 2023 heating & cooling degree days. (Right) Corresponding Ohio Climate Divisions. Data courtesy of the Midwestern Regional Climate Center (<http://mrcc.purdue.edu>).

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Notable Events

July was inundated with notable events, as the month hosted the frequent passage of impactful storms throughout Ohio. Starting early in the month with an EF-0 tornado in Defiance County on July 1st, nearly the entire state experienced severe thunderstorms at some point during the month, resulting in widespread reports of hail and damaging winds, and occasional tornadoes throughout July (Fig. 7). July 29th was one of the more active days, with damaging winds causing tree and powerline damage at multiple locations. Two EF-1 tornadoes also crossed through Defiance and Crawford Counties in the early morning hours. In terms of notable precipitation associated with these storms, areas in Clinton and Warren Counties received upwards of 9-11 inches of accumulated precipitation throughout July, which was more than triple the amount of precipitation expected for these areas in the month (Fig. 8). The frequency of damaging storms this July is just a part of the wider prevalence of severe weather across the United States, with an active pattern fueling storms in many areas of the country.

Ohio Severe Weather Reports: July, 2023

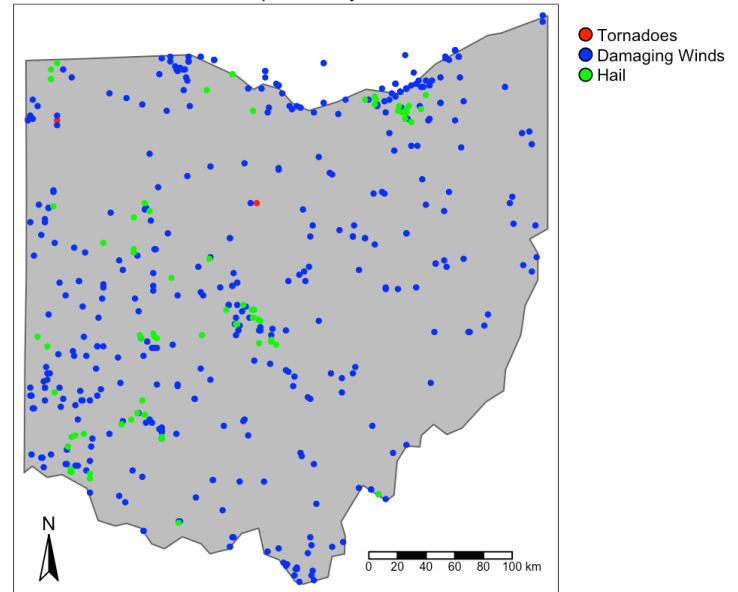
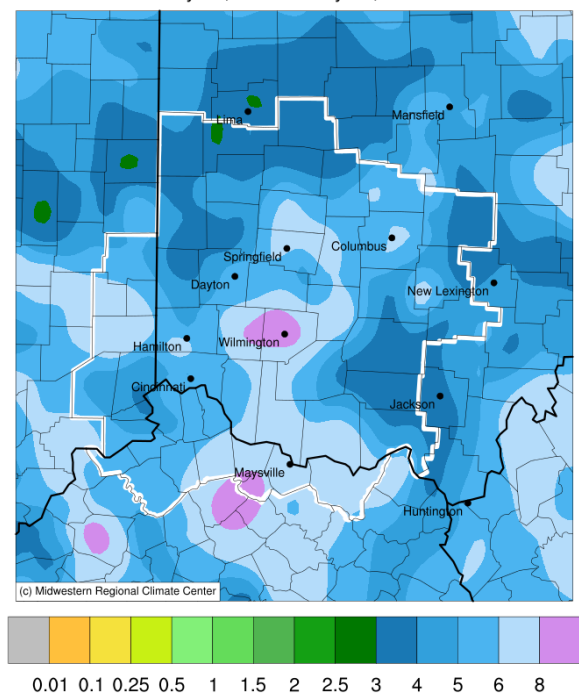


Figure 7: Statewide severe weather reports for July 2023, including damaging winds, hail, and tornadoes (above) and Figure 8: Accumulated precipitation for the NWS Wilmington forecast area for the month of July 2023 (below). Data courtesy of the National Weather Service Local Storm Report archive, accessed via Iowa Environmental Mesonet (<https://mesonet.agron.iastate.edu/>), and the Midwestern Regional Climate Center (<http://mrcc.purdue.edu>).

Accumulated Precipitation (in)
July 01, 2023 to July 31, 2023



Forecast: August - October 2023

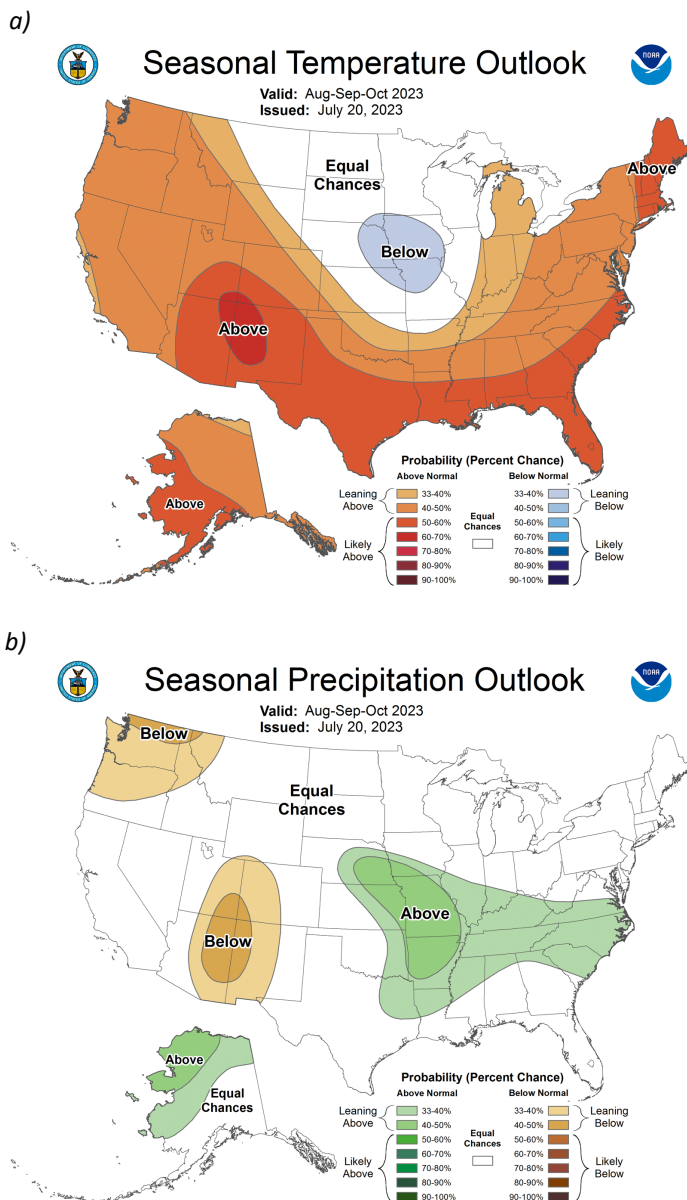


Figure 9a: Nationwide Seasonal Temperature and 9b: Precipitation Outlook for August-October. Courtesy of the Climate Prediction Center (<https://www.cpc.ncep.noaa.gov/>).

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Looking Ahead

While the CPC's 3-month outlooks show further shifts in nationwide temperature and precipitation trends, predictions for Ohio remain generally consistent to previous outlooks. The entire state is forecast to have higher temperatures than normal, with the western third having lower confidence than the rest of Ohio (Fig. 9a). Additionally, precipitation forecasts continue to lack confidence, as the entire state has equal chances of above- or below-normal precipitation in the coming months. With similar outlooks for Ohio as in past months, the trend seen in July consisting of drier weeks alternating with periods of storms may persist for the foreseeable future. While this would continue the possibility of frequent storms through the end of summer, it would also continue to curb the development of any widespread drought in the state.

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