



## Review – June 2024

### Temperature

Across Ohio, temperatures were consistent in June with most of the state recording above-average temperatures. Average temperatures of 70-75°F were noted for most of Ohio with a small portion of the northeast experiencing 65-70°F (Fig. 1a). The consistent warm average temperatures lead to temperatures being 1-3°F above normal across the state for June with the warmest of these departures in northern Ohio. These higher-than-average temperatures could also likely be a result of the stretches of warm temperatures that occurred near the middle of June (Fig. 1b). At the county level, nearly the entire state ranked in the warmest tenth of their records. 31 counties ranked in the warmest tenth of their record with most all of them located in the northern half of the state. Overall, this ranked as the 15<sup>th</sup> warmest June for Ohio.

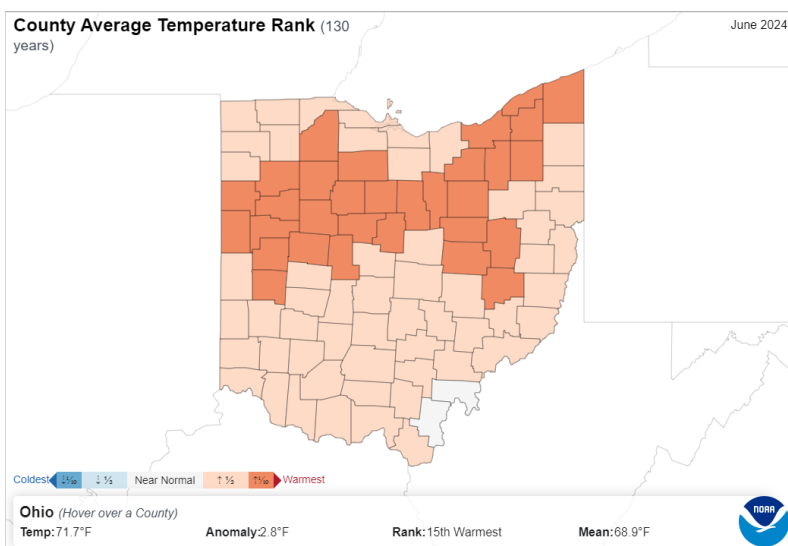
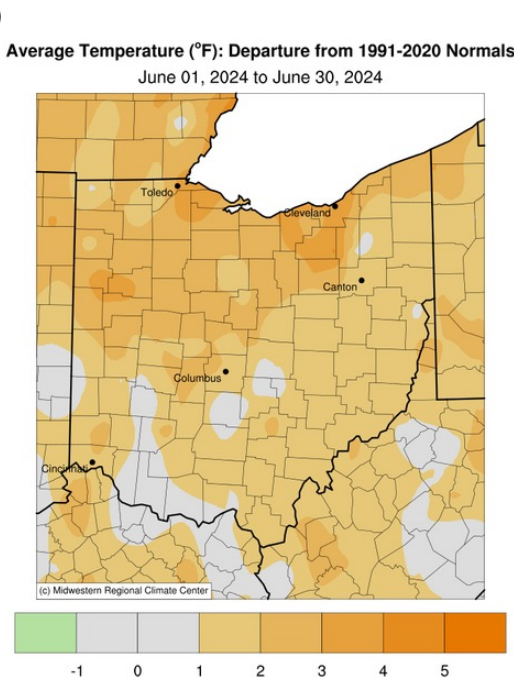
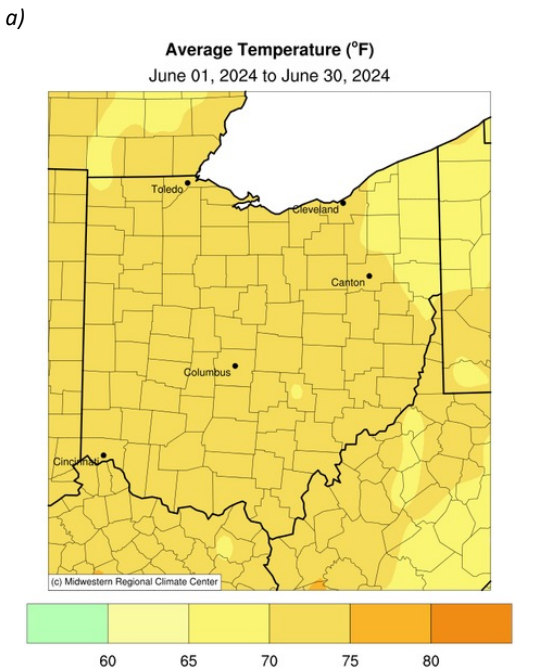


Figure 1a: Average temperature and 1b: Departure from Normal for the month of June 2024. Data courtesy of the Midwestern Regional Climate Center (<http://mrcc.purdue.edu>).

Figure 2: State of Ohio average temperature ranks by county for June 2024. Courtesy of the National Centers for Environmental Information (<https://www.ncdc.noaa.gov/sotc/>).

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### Precipitation

Accumulated precipitation in Ohio was chaotic in June with large ranges in recorded values. In the northwest around 3-6 inches of accumulated precipitation was reported while in the southern and western regions of the state, 1-3 inches were noted. Also, a small region of northeastern Ohio experienced 3-8 inches of accumulated precipitation with the heaviest of this amount along the lake shore (Fig. 3a). The variety in accumulated precipitation values led to a similar trend in departures from normal with the southern and western part of the state experiencing 0 to 4 inches below normal while the extreme north recorded 0 to 4 inches above normal (Fig. 3b). At the county level, similar trends are exhibited once again with a large majority of the counties ranking in at least the driest third of their record except for a few far northern counties which ranked near normal. Lucas County and Ashtabula County ranked in the wettest third of their record, driven by locally heavy thunderstorms.

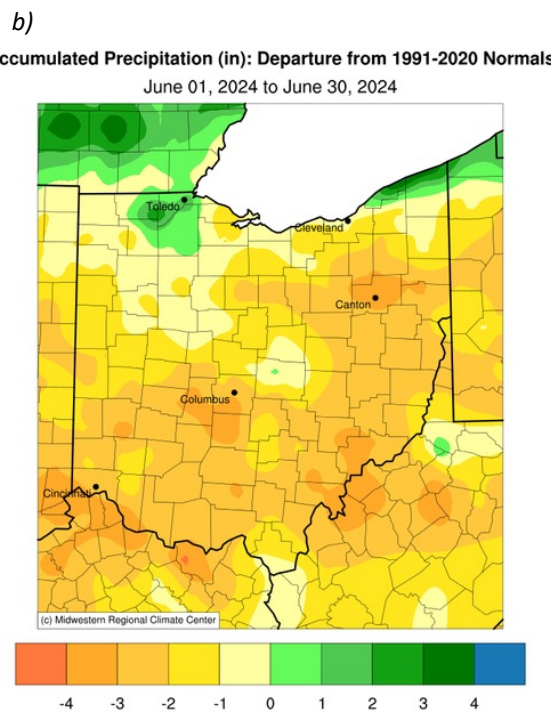
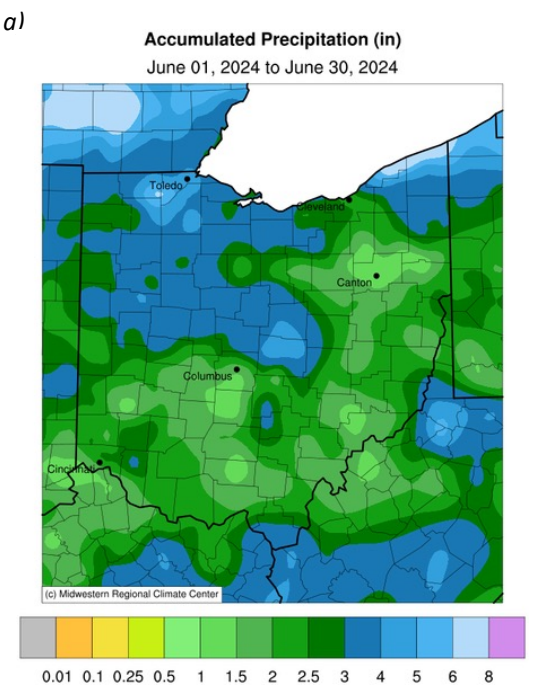


Figure 3a: Accumulated precipitation and 3b: Departures from Normal for the month of June 2024. Data courtesy of the Midwestern Regional Climate Center (<http://mrcc.purdue.edu>).

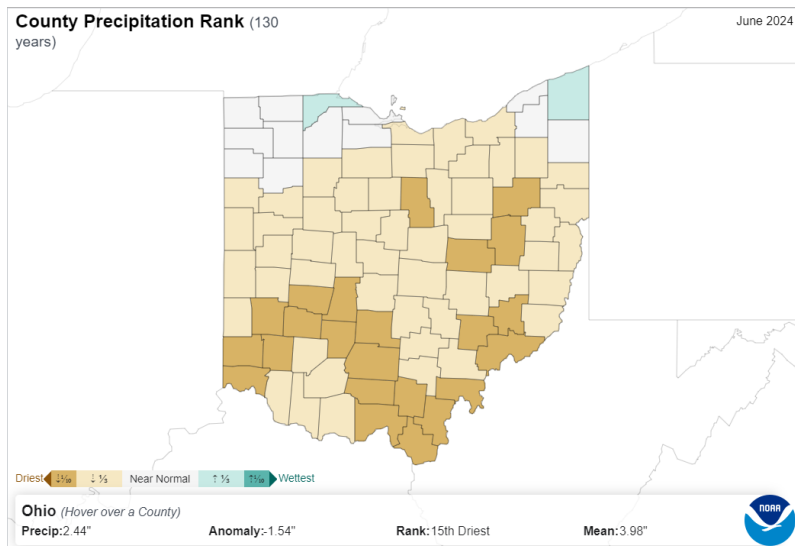
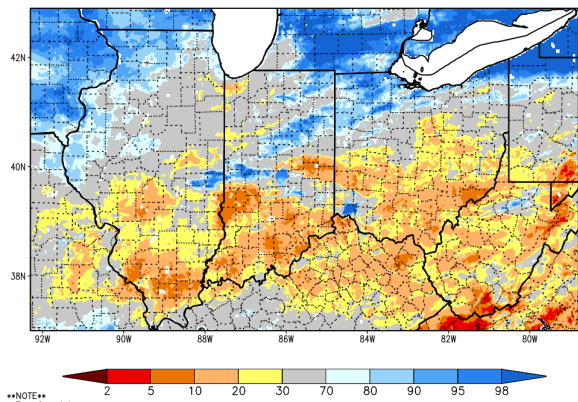


Figure 4: State of Ohio precipitation ranks by county for June 2024. Courtesy of the National Centers for Environmental Information (<https://www.ncdc.noaa.gov/sotc/>).

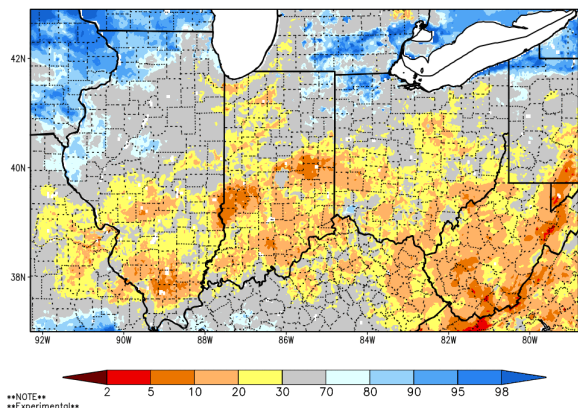


## Review – June 2024

a) SPoRT-LIS 0–40 cm Soil Moisture percentile valid 30 Jun 2024



b) SPoRT-LIS 0–200 cm Soil Moisture percentile valid 30 Jun 2024



## Soil and Energy

Soil conditions across Ohio were drying at the end of June which is a noticeable change compared to last month. The 0-40 cm map indicates drier soil moisture in the south while northern lakeshore regions remained quite moist (Fig. 5a). The 0-200 cm map expresses a similar trend with the moist conditions in the north being reduced compared to the 0-40 cm map. This difference is likely due to recent precipitation in the north as the 0-40 cm map responds more quickly to these changes (Fig. 5b).

Warm temperatures throughout June have led to a higher number of Cooling Degree Days (CDDs) than normal. Heating Degree Days (HDDs) also express these warm temperatures with lower-than-normal numbers. Warmer-than-average temperatures during summer months typically lead to increased stress on the energy sector due to the increased need for air conditioning.

**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](mailto:davis.5694@osu.edu)).

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

Climate Division	Heating Degree Days	Normal	Departure	Cooling Degree Days	Normal	Departure
1	6	25	-19	231	179	51
2	12	28	-16	236	174	61
3	38	45	-8	162	125	36
4	8	20	-11	241	194	47
5	11	18	-7	234	193	41
6	17	30	-13	212	155	57
7	21	28	-8	194	149	45
8	7	13	-6	245	211	34
9	11	13	-1	239	203	35
10	15	20	-5	220	172	48
State	15	24	-9	221	176	46



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



### Review – June 2024

#### Notable Events

With Ohio's tornado season finally past its peak, the state's most notable event in June was the period of unusually warm temperatures that occurred from June 16 to June 24. While no maximum daily temperature records were broken, many places experienced highs in the mid-90s for up to a week, with the highest maximum temperatures during the period reaching above 95°F. Combined with generally high relative humidity, heat indices stretched into the upper-90s and even above 100°F in some instances. Additionally, multiple dates broke their highest minimum daily temperature records across the state, with an extended stretch of days with lows in the low-to-mid 70s. During the period, average temperature departures were around 4-6°F above normal in the southern half of the state and 7-9°F above normal in the northern half (Fig. 7). As a type of severe weather, heat waves can have significant impacts on human health and infrastructure. Unusually high temperatures can increase a person's likelihood of experiencing heat stress while outside, especially in those with a low heat tolerance. During heat waves, even minimally arduous activities can become dangerous. Heat waves also put stress on energy grids as the use of air conditioning and other cooling methods drastically increases, as seen in this month's elevated cooling degree days. Additionally, stagnant winds caused by the heat wave's associated high-pressure system contributed to locally poor air quality, primarily impacting older or sensitive populations (Fig. 8).

Average Temperature (°F): Departure from 1991-2020 Normals

June 16, 2024 to June 24, 2024

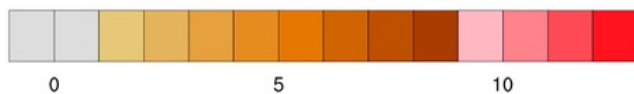
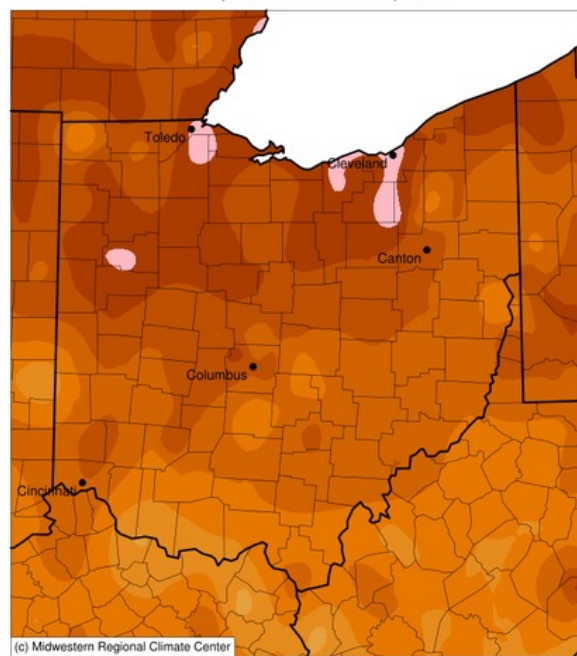


Figure 7: Average temperature departure from normal for the period of June 16-24, 2024. Data courtesy of the Midwestern Regional Climate Center (<http://mrcc.purdue.edu>).

#### US EPA PM2.5 AQI

One Hour Average

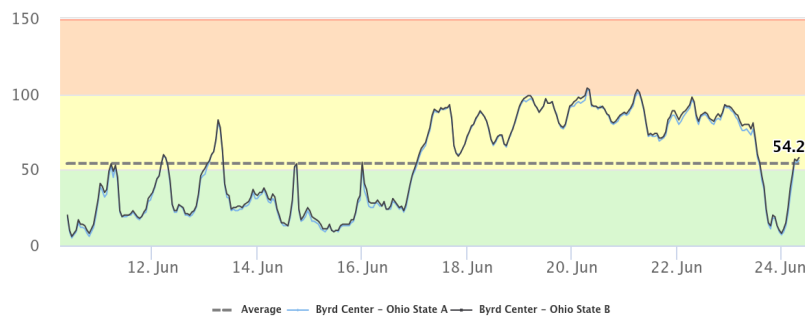


Figure 8: Plot of the Air Quality Index (AQI) at the Ohio State University Byrd Center from June 10-24, 2024. A higher AQI signifies worsened air quality. Data courtesy of PurpleAir (<https://map.purpleair.com>).

## Forecast: July - September

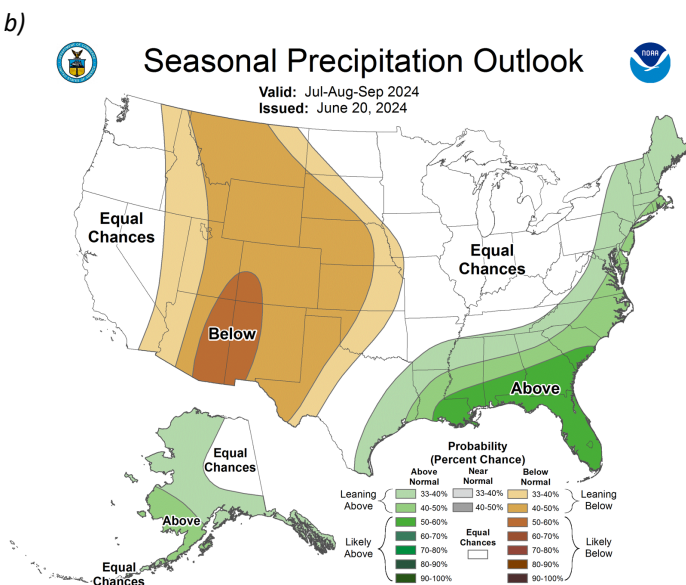
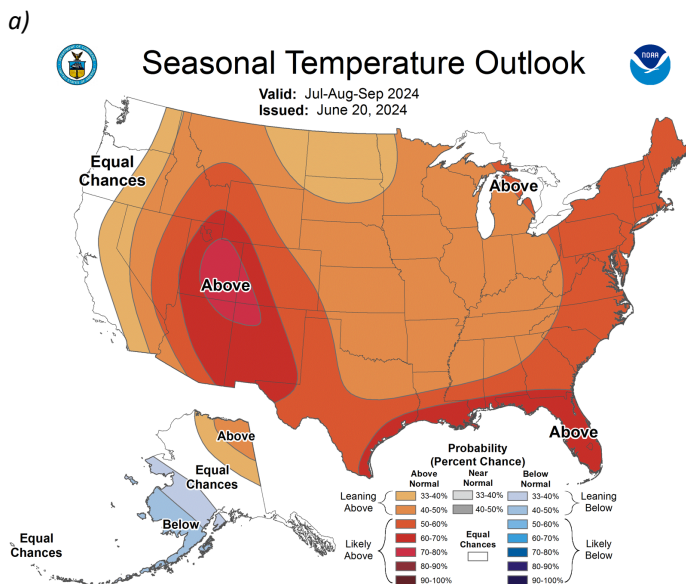


Figure 9a: Nationwide Seasonal Temperature and 9b: Precipitation Outlook for July-September. Courtesy of the Climate Prediction Center (<https://www.cpc.ncep.noaa.gov/>).

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### Looking Ahead

The CPC's 3-month outlooks suggest a warmer-than-average end of summer for Ohio, which is continuing the trend starting from the beginning of this year. Looking closer at the temperature outlook, nearly the entire state is predicted with moderate confidence to have higher-than-normal temperatures over the next three months (Fig. 9a). The precipitation outlook indicates equal chances of above-normal or below-normal levels of precipitation across Ohio (Fig. 9b). This pattern of warmer than average temperatures have persisted for many months and is predicted to continue. As a result, the impacts of this trend will likely also persist. One example of this is inconsistent precipitation and drought conditions. Farmers have trouble keeping fields irrigated in regions with warm temperatures and inadequate rainfall, which has played out over several parts of the state this June. Warmer-than-average temperatures can also cause issues for individuals with preexisting health conditions as they must take extra precautions to avoid contracting heat-related illnesses.

*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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