2024 Midwest State of the Climate Report

MRCC

Midwestern Regional Climate Center

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NOAA

U.S. DEPARTMENT OF COMMERCE

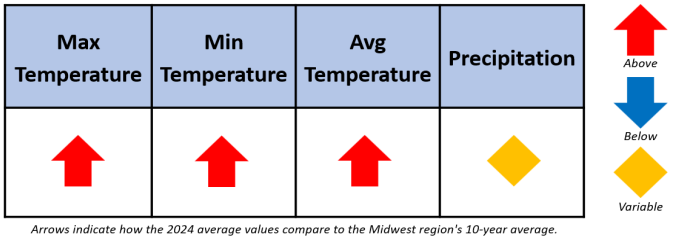
2024 Midwest State of the Climate Report

In 2024, the Midwest experienced significant climate anomalies, matching 2012 as the warmest year since 1895, with an average annual temperature of 52.2°F, 3.2°F above normal. Six states—Indiana, Kentucky, Michigan, Minnesota, Ohio, and Wisconsin—recorded their warmest years, Illinois and Missouri had their second warmest, and Iowa ranked third.

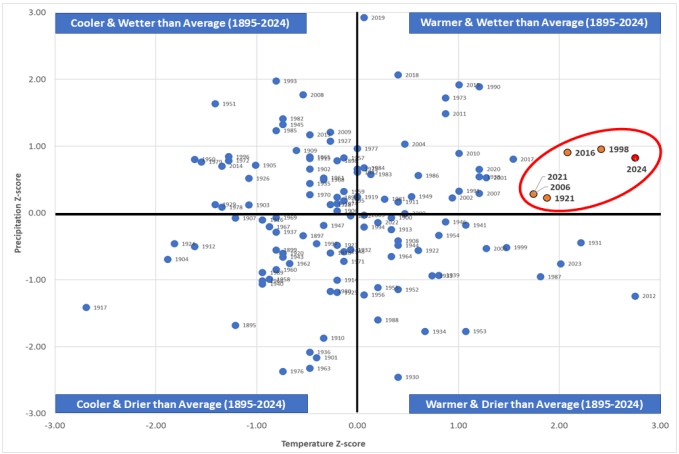
Annual precipitation was 38.52 inches, which was slightly above normal. Most areas experienced near-normal precipitation, but pockets of above-normal precipitation were observed in parts of Missouri, Wisconsin, and along the Minnesota-Iowa border. Snowfall was notably below normal, with some regions, especially along Lake Superior, experiencing deficits of up to 80 inches.

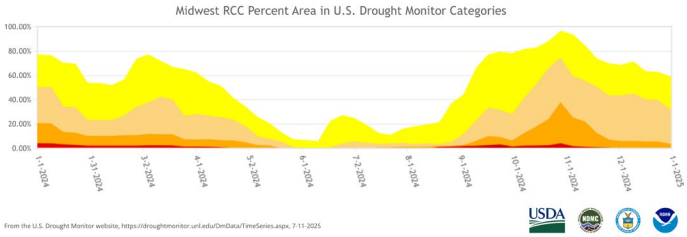
To determine which previous year had weather most similar to 2024 in the Midwest, average temperatures and precipitation were compared by calculating the Euclidean distance using Z-scores for both variables. The analysis showed that 1998 was the closest match to 2024, with an average temperature of 51.7°F and total precipitation of 38.99 inches. The next closest years were 2016 (51.2°F, 38.87”), 1891 (50.5°F, 36.2”), 2006 (50.7°F, 36.57”), and 2021 (50.7°F, 36.57”), circled in red.

Drought conditions varied throughout the year. Initially, over three-quarters of the region faced drought, particularly in Iowa. While spring rains alleviated some drought by June, dry summer weather led to an exceptional D4 drought in southeast Ohio by August. Hurricane Helene provided temporary relief in September, but drought conditions intensified again by October. By year-end, 59% of the region was still abnormally dry or in drought.



Arrows indicate how the 2024 average values compare to the Midwest region's 10-year average.





From the U.S. Drought Monitor website, https://droughtmonitor.unl.edu/DmData/TimeSeries.aspx, 7-11-2025

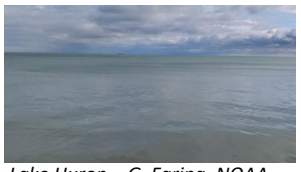
2024 Highlights

Warm temperatures dominated during the 2023-24 winter, making it the warmest on record. Rainfall replaced snowfall, leading to 40 to 80 inches less snow in lake-affected areas. The average Great Lakes ice cover dropped to 4.3%, the lowest ever recorded, severely impacting the tourism and recreation economy.

Multiple rounds of heavy rain fell across northern Iowa, southern Minnesota, and Wisconsin, dropping 2-3 months of rain in a single week. Between June 16 and 23, approximately 6-12 inches of rain fell, resulting in record and near-record river flows that caused railroad bridges and dams to collapse, inundated roadways, and flooded homes and businesses.

The Midwest had its 2nd-highest May tornado count since 2004. There were 237 preliminary tornado reports, nearly three times the monthly average. Tornadoes occurred on 19 days. Three significant outbreak days each had 20-50 confirmed touchdowns. On May 21, an EF-4 carved a 44-mile path through southeastern Iowa, causing extensive damage, injuring 35 people, and tragically claiming five lives.

By late summer, southeast Ohio faced its first exceptional drought (D4) since the U.S. Drought Monitor began in 2000. Dry conditions spread westward across the Midwest, with 75% of the region affected by late October. This resulted in depleted soil moisture, dormant vegetation, increased fire risk, early fall colors, low water levels, and reduced crop yields.



Lake Huron – G. Farina, NOAA

La Crosse, WI – J. Boyne, NWS

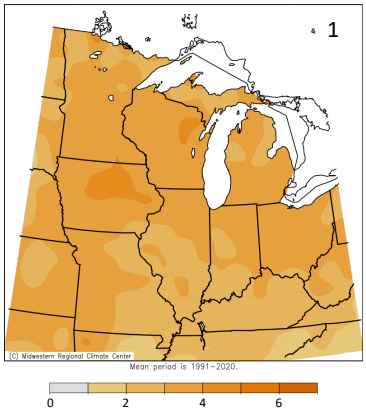
Greenfield, IA – I. Polanski

Coshocton Co., OH – S. Brinker

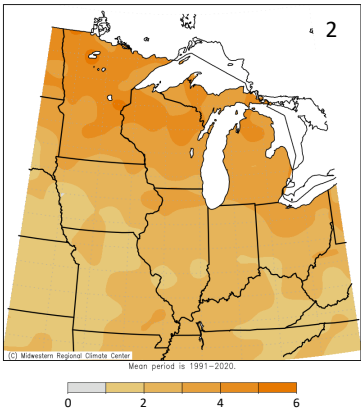
2024 Midwest State of the Climate Report: Annual Breakdown

Annual Maps

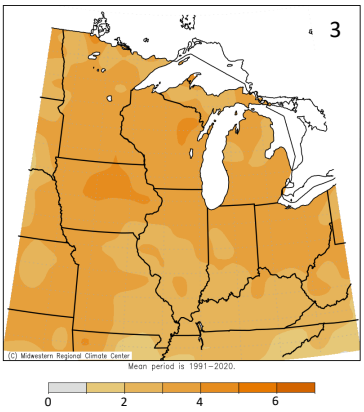
Max Temp (°F) Departure from Mean



Min Temp (°F) Departure from Mean

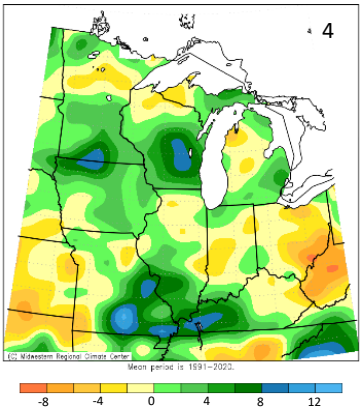


Avg Temp (°F) Departure from Mean

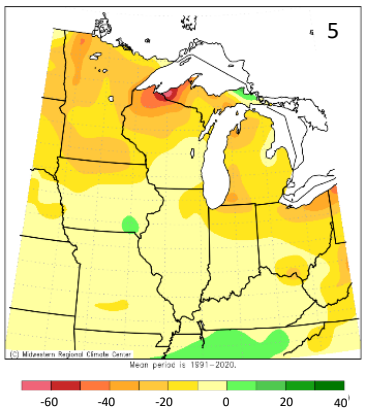


Max temperatures (1) were well above normal across the entire Midwest, a trend that also held true for min (2) and average temperatures (3). The entire region saw average temperatures that were 2-4°F above normal. Min temperature departures were more anomalous in the upper Midwest, with isolated locations reaching more than 4°F above normal.

Precipitation (in) Departure from Mean



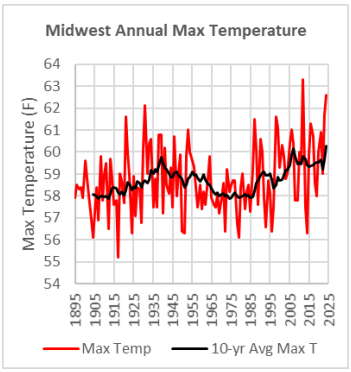
Snowfall (in) Departure from Mean

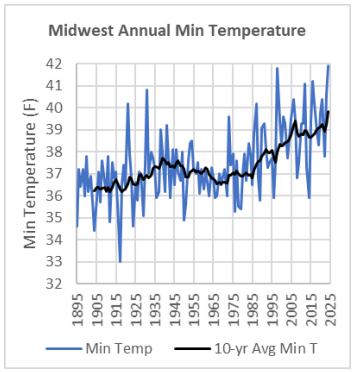


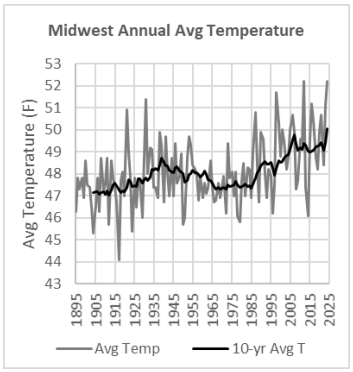
Precipitation totals across the region varied significantly. Some Ohio, Indiana, Michigan, and Missouri areas experienced precipitation levels between 6 and 12 inches below normal (4). In contrast, parts of Kentucky, Missouri, Minnesota, and Wisconsin had precipitation totals that exceeded normal by more than 6 inches, with some areas reporting departures as high as 12 inches above normal.

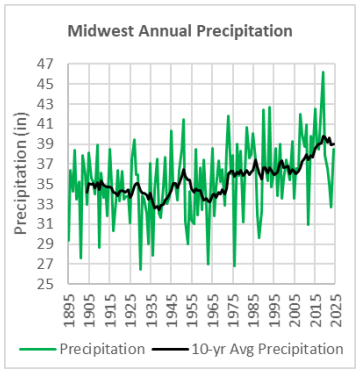
Snowfall totals were below normal for nearly the entire Midwest (5). Only a small portion of southeast Iowa and the extreme eastern edge of Michigan's Upper Peninsula had slightly above-normal snowfall. A vast stretch of Lake Superior's south shore totaled 40-70 inches below normal. Snowfall in Western Michigan and northern Ohio was 20-40 inches below normal.

Annual Timeseries









The maximum temperature (6) in 2024 was 2.3°F above the 10-year average and 3.4°F above the climatological average for 1991-2020. This was the second-highest temperature on record, following 2012. The minimum temperature (7) was also notable, being 2.1°F above the 10-year average and 3.2°F above the 1991-2020 average. It was the warmest minimum temperature recorded since 1895. The average temperature (8) for the year tied with 2012 for the warmest on record, measuring 2.2°F above the 10-year average and 3.2°F above the 1991-2020 climatological average. The total precipitation (9) for 2024 was 0.45 inches below the 10-year average, yet 0.56 inches above the 1991-2020 climatological average. These annual values are further broken down in the table to the right (10).

10 Variable	2024	Rank	Normal	Departure 30-YR Normal	10-YR Avg	Departure 10-YR Average
Max T (F)	62.6	2	59.2	3.4	60.3	2.3
Min T (F)	41.9	1	38.7	3.2	39.9	2
Avg T (F)	52.2	1*	49	3.2	50.0	2.2
Precipitation (in)	38.52	24**	37.96	0.56	39.00	-0.48

**Tied 2012 for warmest temperature on record.*

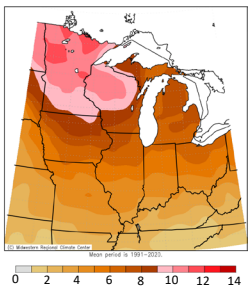
***Tied 1957 with 24th wettest on record.*

2024 Midwest State of the Climate Report: Seasonal Breakdown

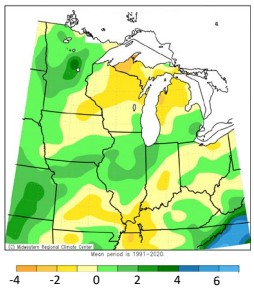
Winter 2023-2024 (Dec - Feb)

Winter temperatures in the lower Midwest were 4 to 8°F above normal; in the upper Midwest, they reached up to 12°F above normal. The Midwest recorded its warmest maximum and average temperatures since 1895, with the minimum temperature tying with that of 1997 for the warmest. Winter precipitation was normal across the Midwest, fluctuating between wet and dry conditions month to month. Minnesota experienced a record-wet December, while Illinois had its 2nd driest February. Excluding Iowa, the Midwest faced a lack of winter snowfall and snowpack due to the above-normal temperatures. The most significant snowfall deficits occurred in the upper Midwest, where snowfall was 40 to 80 inches below normal (10-50 percent of normal). Drought conditions improved slightly throughout the winter in the lower Midwest but remained consistent in the western and upper Midwest. By the end of the winter, 37 percent of the region was in drought status, down from 43 percent in early December.

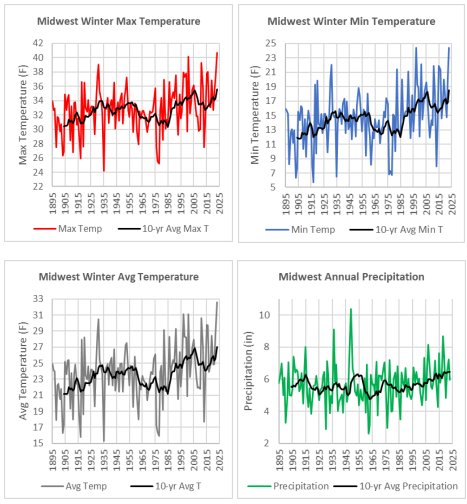
Avg Temp (°F) Departure from Mean



Precipitation (in) Departure from Mean

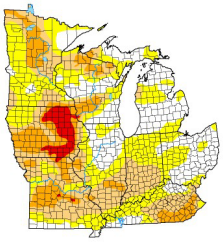


Period of Record Timeseries

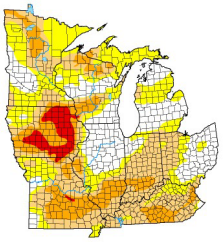


Variable	Winter 2023-2024	Rank	1991-2020 Normal	Departure 30-YR Normal	10-YR Average	Departure 10-YR Average
Max T (F)	40.7	1	34.1	6.6	35.5	5.2
Min T (F)	24.4	1*	16.8	7.6	18.5	5.9
Avg T (F)	32.6	1	25.5	7.1	27.0	5.6
Precipitation (in)	5.96	79	5.97	-0.01	6.50	-0.54

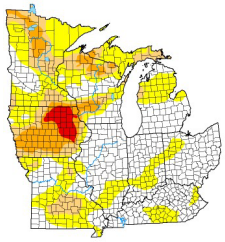
December 5, 2023

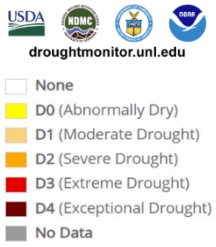


January 2, 2024



February 6, 2024

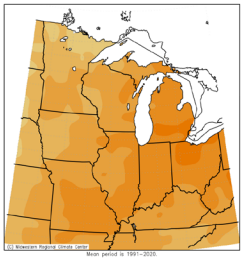




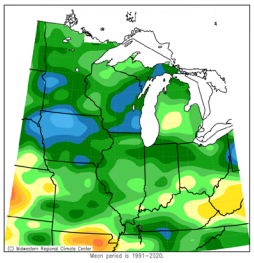
Spring 2024 (Mar – May)

Spring temperatures were 1 to 4°F above normal across the northwestern Midwest and up to 6°F above normal in the eastern half of the region. The Midwest recorded its 4th warmest spring, with temperatures 3.5°F above normal. Maximum temperatures tied with 1921 and 1910 for the 5th warmest on record, while minimum temperatures ranked the 4th warmest. Midwest spring precipitation was above normal, with Iowa, Minnesota, and Wisconsin experiencing their 4th wettest spring on record, while the Midwest as a whole recorded the 9th wettest. The season began with long-term drought conditions primarily affecting Iowa and persisting throughout the Upper Mississippi River Basin. An active weather pattern resulted in repeated and timely precipitation that alleviated the drought by late May. Several storms brought snow to the Upper Midwest in late March. Due to the above-normal temperatures, many perennial crops broke dormancy 1-3 weeks ahead of schedule.

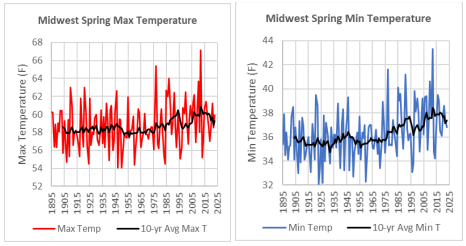
Avg Temp (°F) Departure from Mean



Precipitation (in) Departure from Mean



Period of Record Timeseries

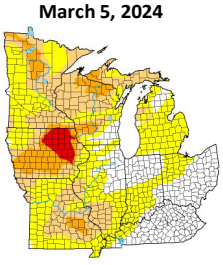


Variable	Spring 2024	Rank	1991-2020 Normal	Departure 30-YR Normal	10-YR Average	Departure 10-YR Average
Max T (F)	63	5*	59.4	3.6	59.9	3.1
Min T (F)	40.7	4	37.4	3.3	38	2.7
Avg T (F)	51.9	4	48.4	3.5	48.9	3
Precipitation (in)	12.59	9	10.62	1.97	10.90	1.69

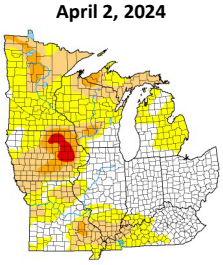
*Tied with 1921 and 1910.

Period of record 1895-2024.

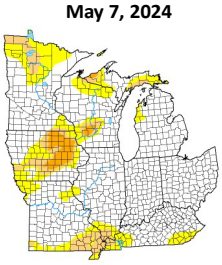
March 5, 2024

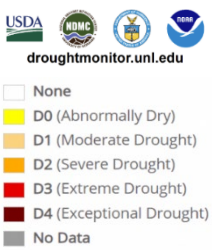


April 2, 2024



May 7, 2024



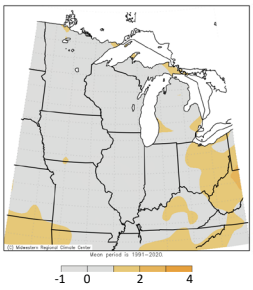


2024 Midwest State of the Climate Report: Seasonal Breakdown

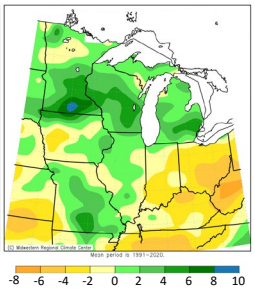
Summer 2024 (Jun – Aug)

Summer temperatures were near normal for most of the region, except in Ohio and central Kentucky, where temperatures were 1-2°F above normal. Regionally, summer temperatures were 0.4°F above normal. June ended above normal, and July was cooler than normal, breaking an 11-month streak of consecutive above-normal monthly temperatures for the Midwest. August remained close to normal for much of the region. Overall, summer precipitation was 0.40 inches above normal region-wide. However, there were sub-regional differences. The northwestern Midwest experienced above-normal precipitation, while the southeast experienced below-normal precipitation. Michigan and Wisconsin experienced their 5th and 6th wettest summers, respectively. Remarkably, Ohio, which had its seventh driest summer, began summer with no drought or abnormal dryness, but most of the state was in drought by summer's end.

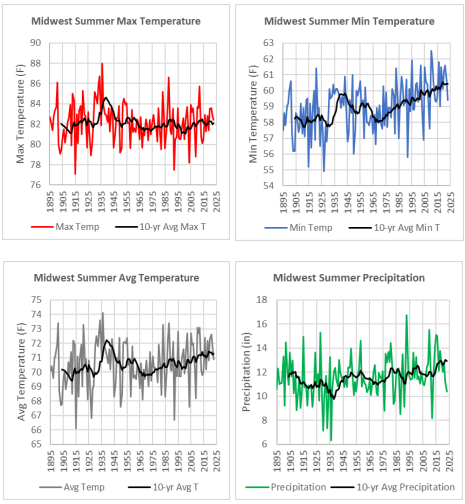
Avg Temp (°F) Departure from Mean



Precipitation (in) Departure from Mean



Period of Record Timeseries

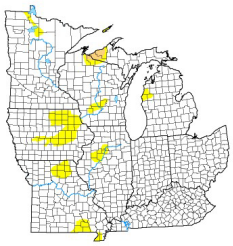


Variable	Summer 2024	Rank	1991-2020 Normal	Departure 30-YR Normal	10-YR Average	Departure 10-YR Average
Max T (F)	82.1	70*	81.8	0.3	82.3	-0.2
Min T (F)	60.6	16**	60	0.6	60.5	0.1
Avg T (F)	71.3	45	70.9	0.4	71.4	-0.1
Precipitation (in)	12.70	28	12.30	0.40	12.80	-0.10

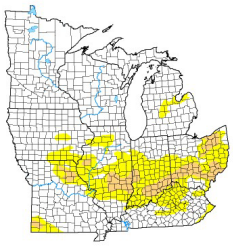
*Tied with 1956. Period of record 1895-2024.

**Tied with 1901, 1955, 2006, and 2022.

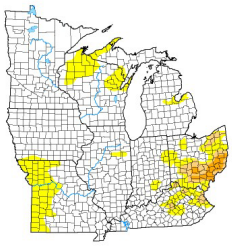
June 4, 2024

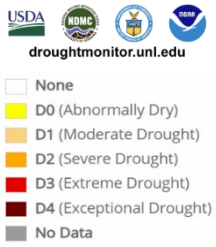


July 2, 2024



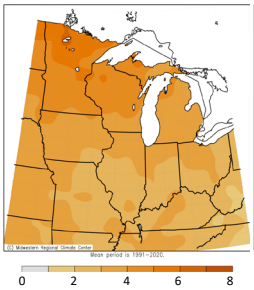
August 6, 2024



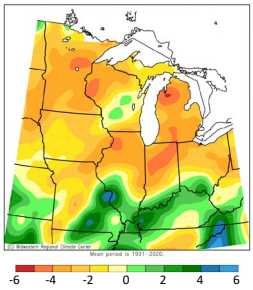


Fall 2024 (Sep – Nov)

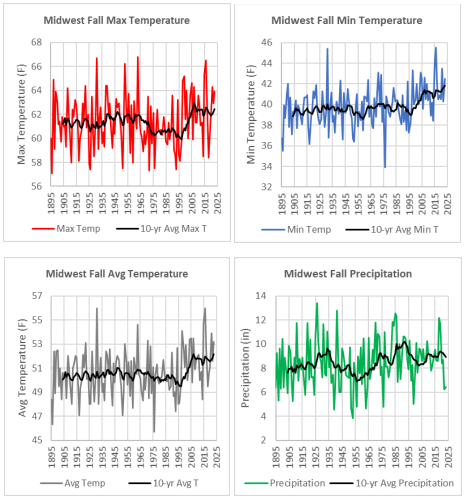
Avg Temp (°F) Departure from Mean



Precipitation (in) Departure from Mean



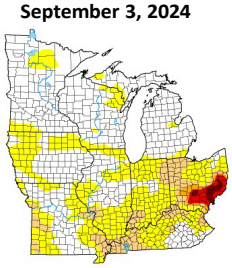
Period of Record Timeseries



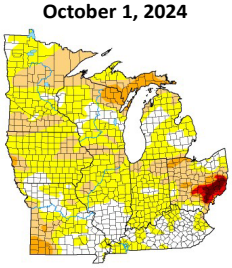
Variable	Fall 2024	Rank	1991-2020 Normal	Departure 30-YR Normal	10-YR Average	Departure 10-YR Average
Max T (F)	66.8	1*	61.6	5.2	63.3	3.5
Min T (F)	43.9	4	40.7	3.2	42.4	1.5
Avg T (F)	55.4	3	51.2	4.2	52.9	2.5
Precipitation (in)	7.10	100	9.06	-1.96	8.70	-1.60

*Tied with 1963. Period of record 1895-2024.

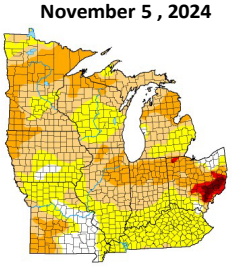
September 3, 2024

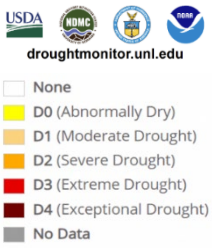


October 1, 2024



November 5 , 2024





Fall 2024 (Sep – Nov)

The Midwest experienced its third warmest fall on record, with average temperature deviations ranging from 2 to 6°F above normal throughout the region. Minnesota and Wisconsin recorded their warmest falls. Monthly temperatures in the region ranked among the top 10 warmest for September (8th), October (9th), and November (7th). Maximum temperatures were significantly elevated, averaging 5.2°F above normal, tying with 1963 for the warmest on record. Minimum temperatures ranked as the 4th warmest on record. Fall precipitation was above normal in the south, primarily due to Hurricane Helene, while the north was drier than usual. Iowa and Minnesota experienced their driest September on record. October was dry everywhere, making it the 9th driest October for the Midwest. Indiana and Kentucky recorded their 2nd driest October on record. November was wet throughout the region, resulting in the 9th wettest November for the Midwest.

US Department of Agriculture

Contact Us

MRCC
Midwestern Regional Climate Center

mrcc.purdue.edu

mrcc@purdue.edu

765-494-6574

915 Mitch Daniels Blvd.
West Lafayette, IN 47907

Partnering with the National Centers for Environmental Information and Purdue University.