

# Weather Considerations for Effective Agricultural Management

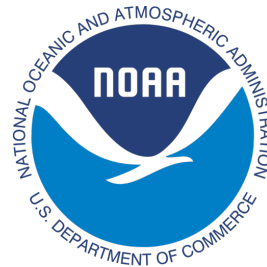
**Austin Pearson**

Climatologist  
Midwestern Regional Climate Center  
Indiana State Climate Office  
pearsona@purdue.edu

**December 17, 2024**



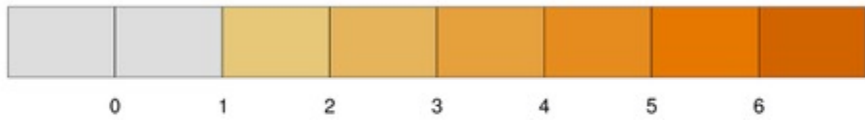
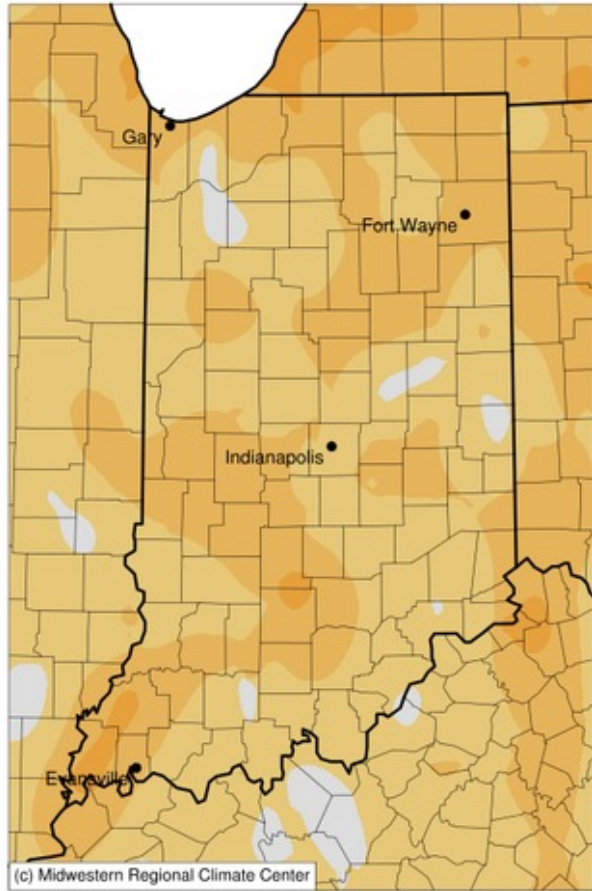
**MRCC**  
Midwestern Regional  
Climate Center



**P**  
**PURDUE**  
**UNIVERSITY**  
Indiana State Climate Office

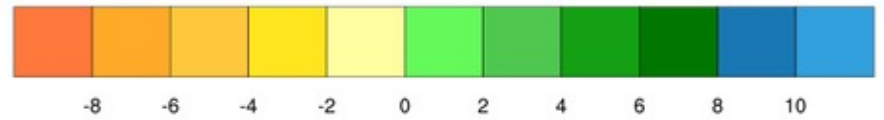
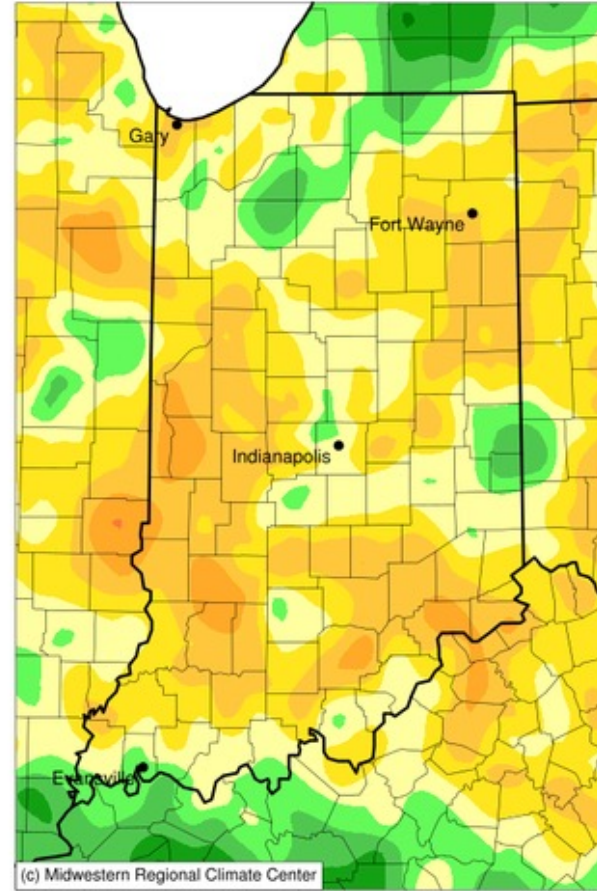
**Average Temperature (°F): Departure from 1991-2020 Normals**

April 01, 2024 to October 31, 2024



**Accumulated Precipitation (in): Departure from 1991-2020 Normals**

April 01, 2024 to October 31, 2024



- Warm winter, early perennial crop dormancy break.
- Digging ourselves out of dry winter conditions.
- Wet April, challenging to plant.
- Rain shut off in June.
- Beryl and stormy patterns saved crops in July.
- Drought began to expand in August and September.
- Helene brought measurable rain to southern IN in September.
- Second driest October on record since 1895.
- 18 of longest recording weather stations in IN had the driest October on record.
- Field and ditch fires throughout October, most of the harvest.

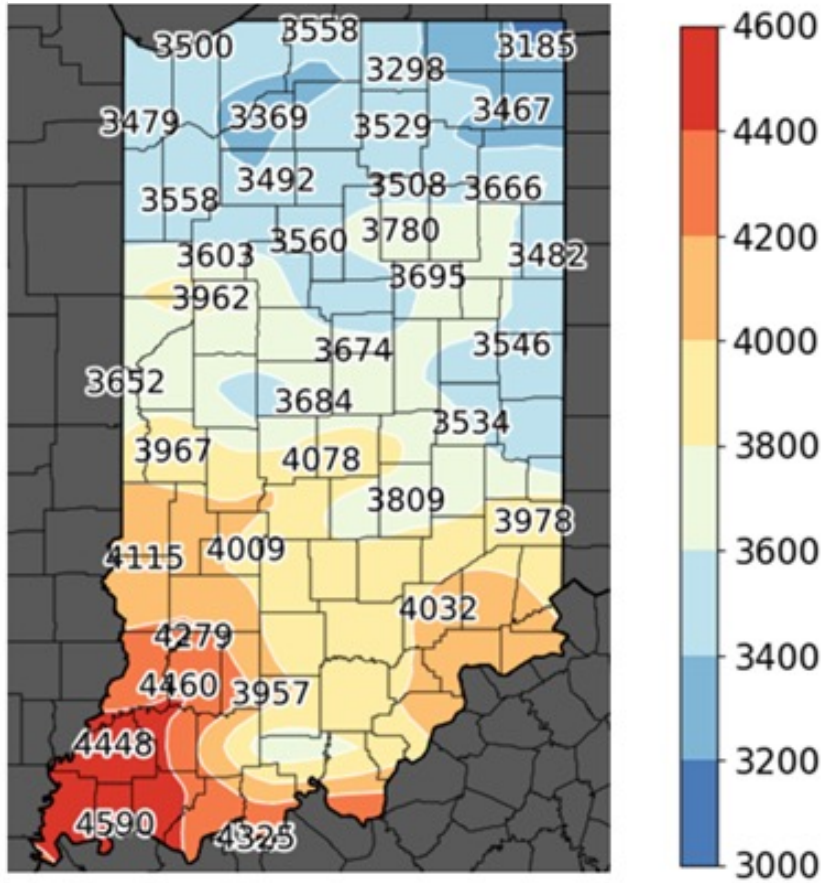
Division	Avg Temperature (Departure from 1991-2020)							
	Apr	May	Jun	Jul	Aug	Sep	Oct	Apr-Oct
1	51.8 (2.2)	64.6 (3.9)	72.1 (2.0)	71.4 (-1.8)	71.4 (0.1)	67.2 (2.4)	56.8 (3.7)	65.0 (1.8)
2	51.8 (2.3)	64.7 (4.2)	72.2 (2.3)	71.6 (-1.3)	71.6 (0.5)	67.1 (2.6)	56.1 (3.2)	65.0 (2.0)
3	52.2 (2.8)	64.6 (4.3)	71.9 (2.3)	71.6 (-1.2)	71.5 (0.6)	67.4 (3.1)	56.1 (3.4)	65.0 (2.2)
4	54.4 (2.2)	66.8 (4.0)	72.9 (1.4)	72.8 (-1.4)	73.1 (0.5)	68.2 (2.1)	57.8 (3.3)	66.6 (1.7)
5	54.9 (2.9)	67.0 (4.7)	72.6 (1.6)	72.9 (-1.0)	73.0 (0.7)	68.0 (2.2)	57.6 (3.3)	66.6 (2.1)
6	54.1 (2.8)	66.0 (4.4)	71.7 (1.3)	71.9 (-1.4)	72.1 (0.5)	67.2 (2.1)	56.5 (2.7)	65.6 (1.8)
7	58.4 (3.0)	69.0 (3.8)	74.8 (1.1)	76.0 (-0.7)	75.4 (0.2)	70.7 (2.2)	60.1 (3.1)	69.2 (1.8)
8	57.1 (2.6)	67.9 (3.8)	72.9 (0.6)	74.8 (-0.7)	74.3 (0.2)	69.5 (2.1)	58.7 (2.7)	67.9 (1.6)
9	57.5 (3.2)	67.9 (4.1)	73.3 (1.4)	75.1 (-0.7)	74.6 (0.6)	70.0 (2.7)	58.6 (2.8)	68.1 (2.1)
State	54.8 (2.7)	66.6 (4.1)	72.8 (1.6)	73.2 (-1.1)	73.1 (0.5)	68.4 (2.4)	57.7 (3.2)	66.7 (1.9)

Division	Total Precipitation (Departure from 1991-2020)							
	Apr	May	Jun	Jul	Aug	Sep	Oct	Apr-Oct
1	6.72 (2.98)	3.77 (-0.55)	3.71 (-1.04)	6.05 (1.70)	3.42 (-0.65)	1.81 (-1.45)	0.94 (-2.42)	26.42 (-1.43)
2	6.68 (2.92)	4.44 (0.13)	3.99 (-0.58)	5.54 (1.30)	2.39 (-1.61)	2.02 (-1.21)	0.45 (-2.78)	25.51 (-1.83)
3	6.44 (2.69)	4.19 (-0.22)	3.20 (-1.04)	3.92 (-0.09)	2.26 (-1.58)	1.88 (-1.21)	0.49 (-2.50)	22.38 (-3.95)
4	6.96 (2.49)	4.11 (-0.51)	2.50 (-2.56)	5.36 (0.94)	2.58 (-0.76)	2.20 (-0.97)	0.18 (-3.26)	23.89 (-4.63)
5	7.22 (2.84)	5.19 (0.43)	3.07 (-1.97)	4.95 (0.62)	2.97 (-0.54)	2.64 (-0.60)	0.22 (-3.06)	26.26 (-2.28)
6	7.58 (3.38)	3.33 (-1.27)	3.03 (-1.83)	4.36 (0.14)	2.69 (-0.85)	3.28 (0.16)	0.22 (-2.86)	24.49 (-3.13)
7	6.46 (1.38)	5.74 (0.42)	1.92 (-2.86)	5.24 (0.90)	1.78 (-1.41)	4.93 (1.37)	0.19 (-3.36)	26.26 (-3.56)
8	6.27 (1.13)	6.20 (0.85)	1.85 (-2.98)	5.55 (1.25)	2.72 (-0.72)	5.16 (1.61)	0.12 (-3.39)	27.87 (-2.25)
9	5.35 (0.47)	5.18 (-0.04)	1.90 (-3.01)	5.23 (0.86)	3.19 (-0.41)	5.34 (2.04)	0.24 (-3.17)	26.43 (-3.26)
State	6.67 (2.28)	4.77 (-0.01)	2.81 (-1.99)	5.17 (0.88)	2.65 (-0.95)	3.19 (-0.10)	0.34 (-2.99)	25.60 (-2.88)

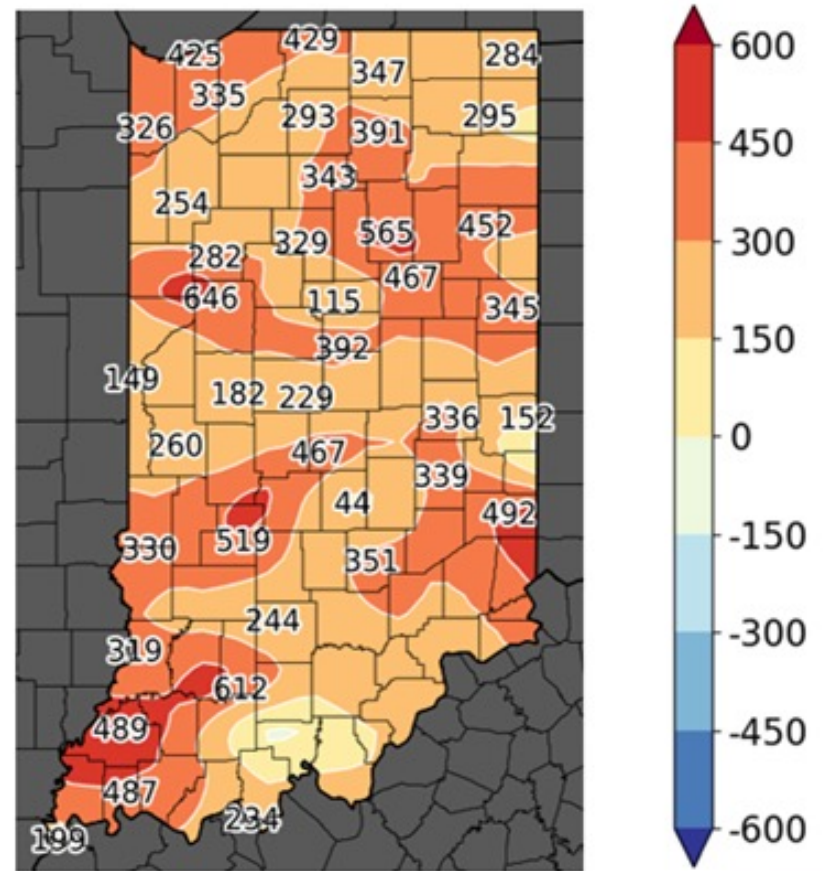
### IN Climate Divisions



Accumulated MGDDs Apr-Oct

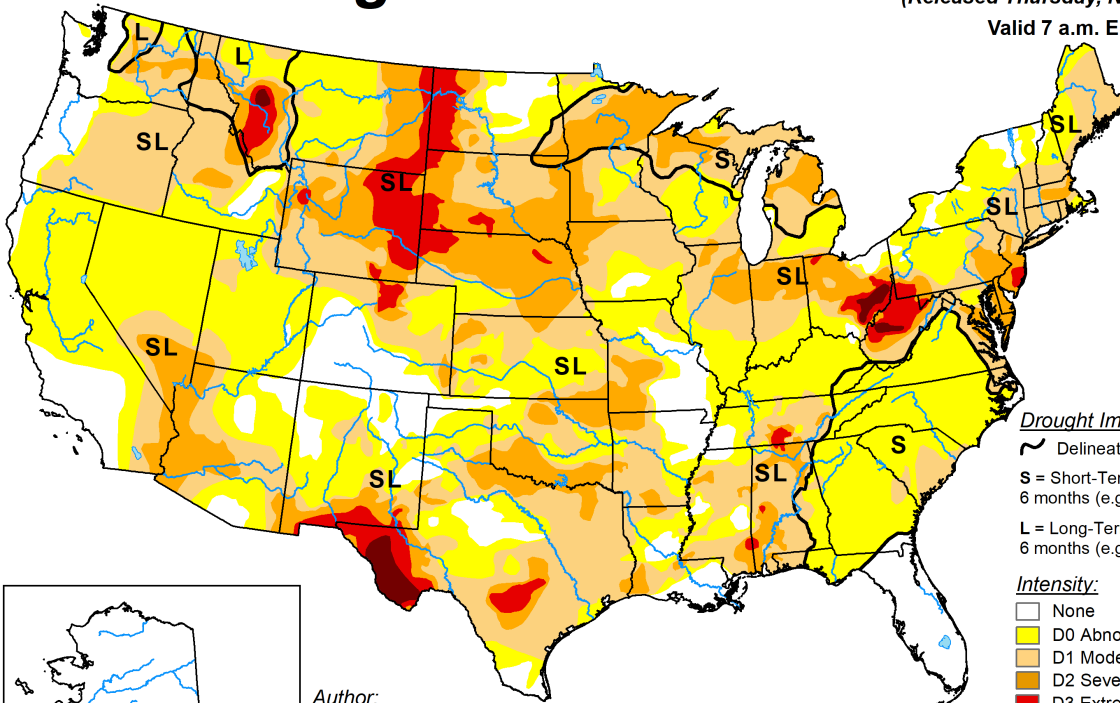


MGDDs Departure from Average Apr-Oct



# U.S. Drought Monitor

**November 5, 2024**  
 (Released Thursday, Nov. 7, 2024)  
 Valid 7 a.m. EST



Drought Impact Types:  
 ~ Delineates dominant impacts  
 S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)  
 L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

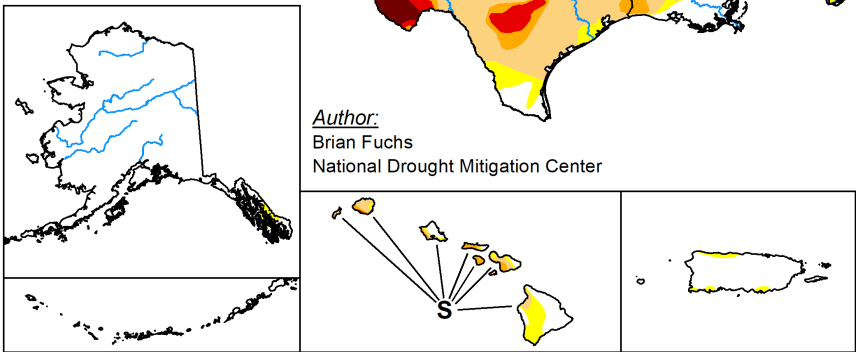
Intensity:  
 □ None  
 □ D0 Abnormally Dry  
 □ D1 Moderate Drought  
 □ D2 Severe Drought  
 □ D3 Extreme Drought  
 □ D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>



[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)

Author:  
 Brian Fuchs  
 National Drought Mitigation Center



- State input to national drought author each week by Tuesday morning.
- Data cutoff Tuesday morning.
- National author, for the most part, accepts local recommendations.
- Livestock Forage Disaster Program
  - Administered by FSA, offers financial support to livestock producers who experience grazing losses due to qualifying drought conditions or fire on federally managed rangelands.
- Eligible applicants include livestock producers who own or lease grazing land or pastureland in drought-affected areas.
- Must provide verifiable documentation of grazing losses and meet all program requirements.
- Submit application at local FSA office.

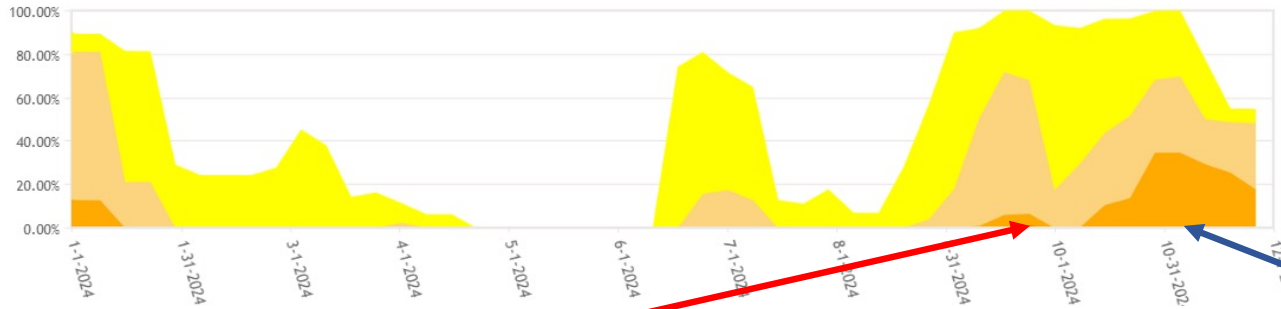
## Eligible Counties for Drought

An eligible livestock producer who, as a grazed forage crop producer, owns or leases grazing land or pastureland physically located in a county rated by the U.S. Drought Monitor as having a:

- D2 (severe drought) intensity in any area of the county for at least eight consecutive weeks during the normal grazing period is eligible to receive assistance in an amount equal to one monthly payment;
- D3 (extreme drought) intensity in any area of the county at any time during the normal grazing period is eligible to receive assistance in an amount equal to three monthly payments;
- D3 (extreme drought) intensity in any area of the county for at least four weeks during the normal grazing period or is rated a D4 (exceptional drought) intensity at any time during the normal grazing period is eligible to receive assistance in an amount equal to four monthly payments; or
- D4 (exceptional drought) in a county for four weeks (not necessarily four consecutive weeks) during the normal grazing period is eligible to receive assistance in an amount equal to five monthly payments.

<https://www.fsa.usda.gov/tools/informational/fact-sheets/livestock-forage-disaster-program-lfp>

Indiana Percent Area in U.S. Drought Monitor Categories

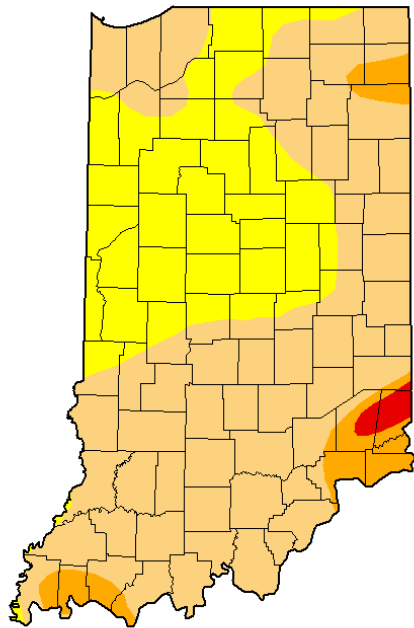


**U.S. Drought Monitor  
Indiana**

**September 24, 2024**  
(Released Thursday, Sep. 26, 2024)  
Valid 8 a.m. EDT

**U.S. Drought Monitor  
Indiana**

**November 5, 2024**  
(Released Thursday, Nov. 7, 2024)  
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	0.00	100.00	67.93	6.57	0.91	0.00
<b>Last Week</b> 09-17-2024	0.00	100.00	71.73	6.07	0.00	0.00
<b>3 Months Ago</b> 06-25-2024	19.07	80.93	15.70	0.00	0.00	0.00
<b>Start of Calendar Year</b> 01-02-2024	10.70	89.30	81.12	12.88	0.00	0.00
<b>Start of Water Year</b> 09-26-2023	1.38	98.62	85.30	0.00	0.00	0.00
<b>One Year Ago</b> 09-26-2023	1.38	98.62	85.30	0.00	0.00	0.00

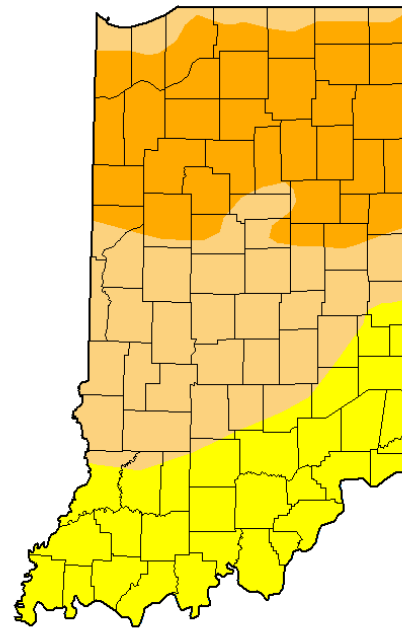
**Intensity:**  
 None (White)  
 D0 Abnormally Dry (Yellow)  
 D1 Moderate Drought (Light Orange)  
 D2 Severe Drought (Orange)  
 D3 Extreme Drought (Red)  
 D4 Exceptional Drought (Dark Red)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

**Author:**  
Brad Rippey  
U.S. Department of Agriculture



[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	0.00	100.00	69.72	34.65	0.00	0.00
<b>Last Week</b> 10-29-2024	0.13	99.87	68.14	34.65	0.00	0.00
<b>3 Months Ago</b> 08-06-2024	92.90	7.10	0.00	0.00	0.00	0.00
<b>Start of Calendar Year</b> 01-02-2024	10.70	89.30	81.12	12.88	0.00	0.00
<b>Start of Water Year</b> 10-01-2024	6.65	93.35	17.54	0.11	0.00	0.00
<b>One Year Ago</b> 11-07-2023	36.91	63.09	23.94	0.00	0.00	0.00

**Intensity:**  
 None (White)  
 D0 Abnormally Dry (Yellow)  
 D1 Moderate Drought (Light Orange)  
 D2 Severe Drought (Orange)  
 D3 Extreme Drought (Red)  
 D4 Exceptional Drought (Dark Red)

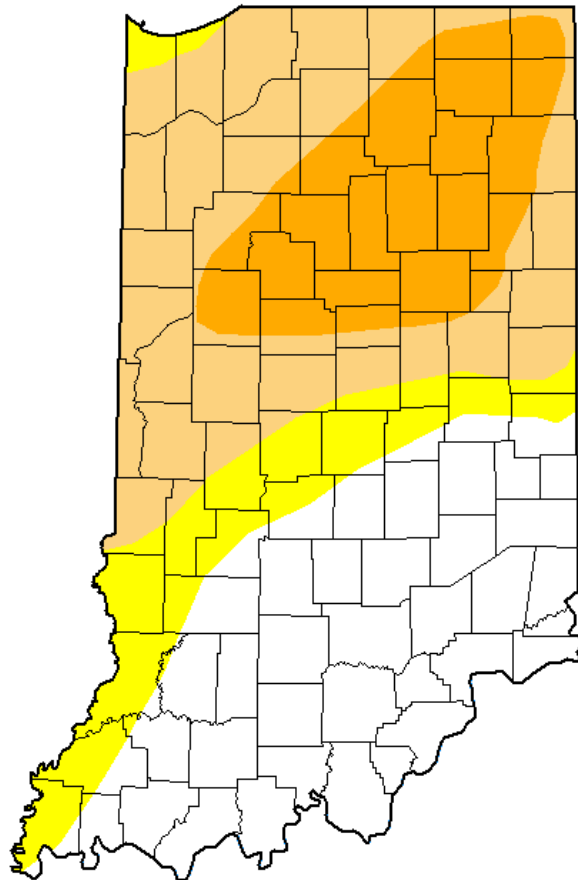
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**Author:**  
Brian Fuchs  
National Drought Mitigation Center



[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)

# U.S. Drought Monitor Indiana



**December 10, 2024**  
(Released Thursday, Dec. 12, 2024)  
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	36.37	63.63	50.15	19.71	0.00	0.00
<b>Last Week</b> <small>12-03-2024</small>	45.03	54.97	50.06	17.88	0.00	0.00
<b>3 Months Ago</b> <small>09-10-2024</small>	8.02	91.98	50.50	0.98	0.00	0.00
<b>Start of Calendar Year</b> <small>01-02-2024</small>	10.70	89.30	81.12	12.88	0.00	0.00
<b>Start of Water Year</b> <small>10-01-2024</small>	6.65	93.35	17.54	0.11	0.00	0.00
<b>One Year Ago</b> <small>12-12-2023</small>	1.92	98.08	54.15	7.61	0.00	0.00

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>*

Author:

Curtis Riganti  
National Drought Mitigation Center



[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)

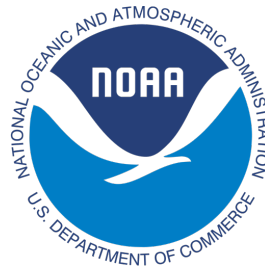


# Climate Services

## Obtaining Weather Data



**MRCC**  
Midwestern Regional  
Climate Center



**P**  
**PURDUE**  
**UNIVERSITY**  
Indiana State Climate Office

# Climate Services

“Services that equip decision makers in climate-sensitive sectors with better information to help society adapt to climate variability and change.” – *Global Framework for Climate Services*

“Scientifically-based information and products that enhance users’ knowledge and understanding about the impacts of climate on their decisions and actions.” – *American Meteorological Society*

DATA → INFORMATION → DECISIONS

## **Federal Level**

*National Centers for Environmental Information (NCEI)  
National Weather Service*

## **Regional Level**

*Regional Climate Centers*

## **State Level**

*State Climate Offices*

# Federal Data

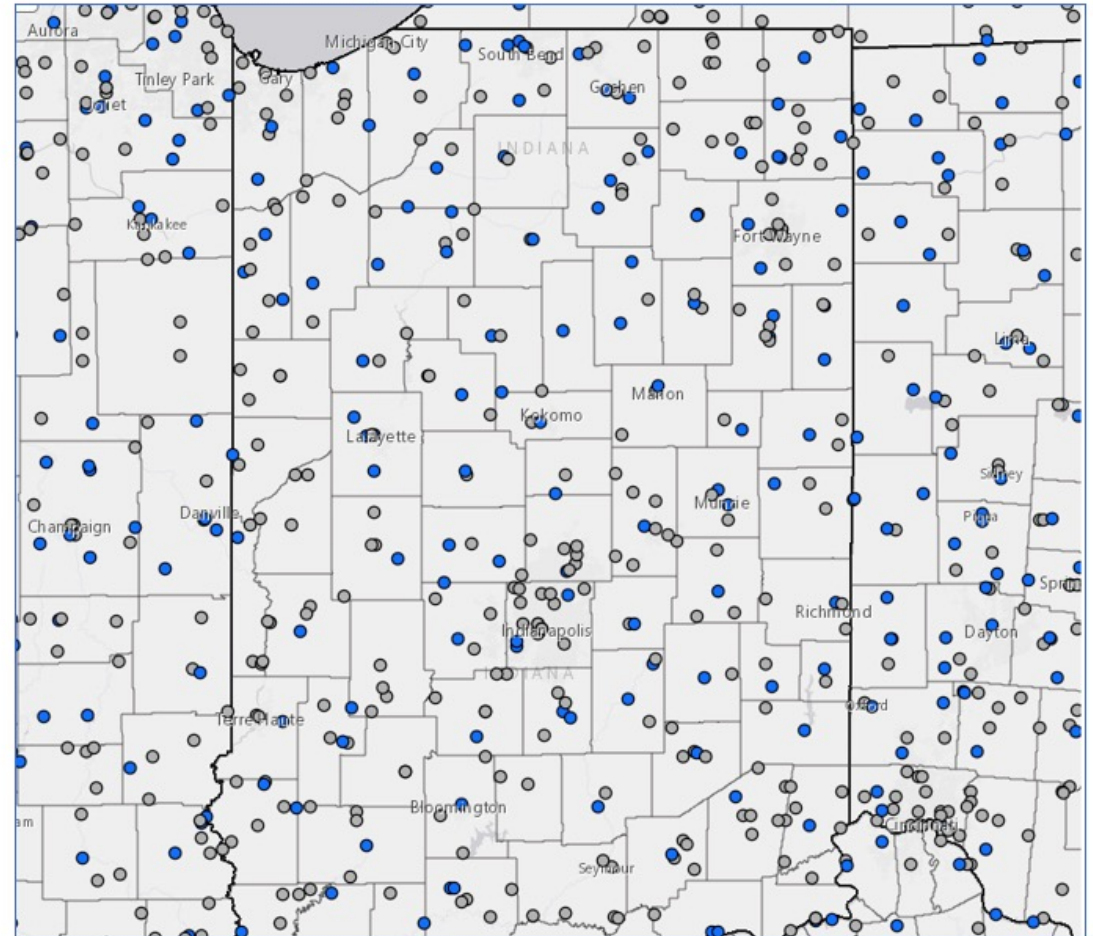
## NWS Cooperative Observer Program



- Daily
- Temperature  
(*max, min*)
- Precipitation  
(*rain, snow fall, snow depth*)



*Blue = still active*  
*Grey = inactive*



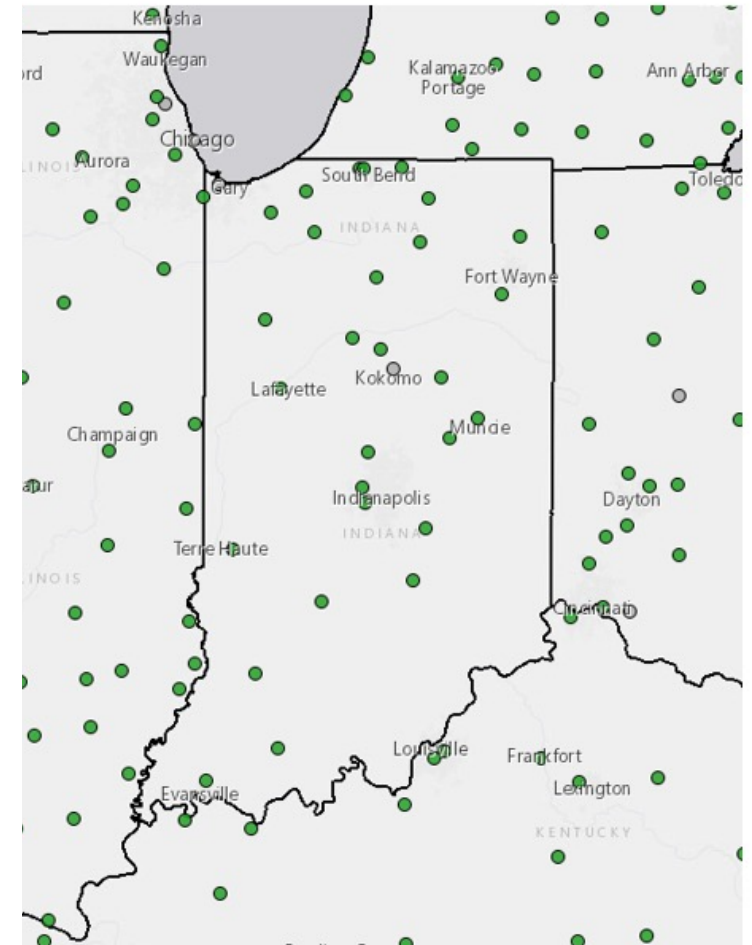
# Federal Data



- Automated
- Hourly
- 1948 - present
- Variables:
  - Temperature
  - Precipitation
  - Humidity
  - Winds
  - Pressure
  - Cloud height

*Green = still active*  
*Grey = inactive*

## FAA (airport) stations

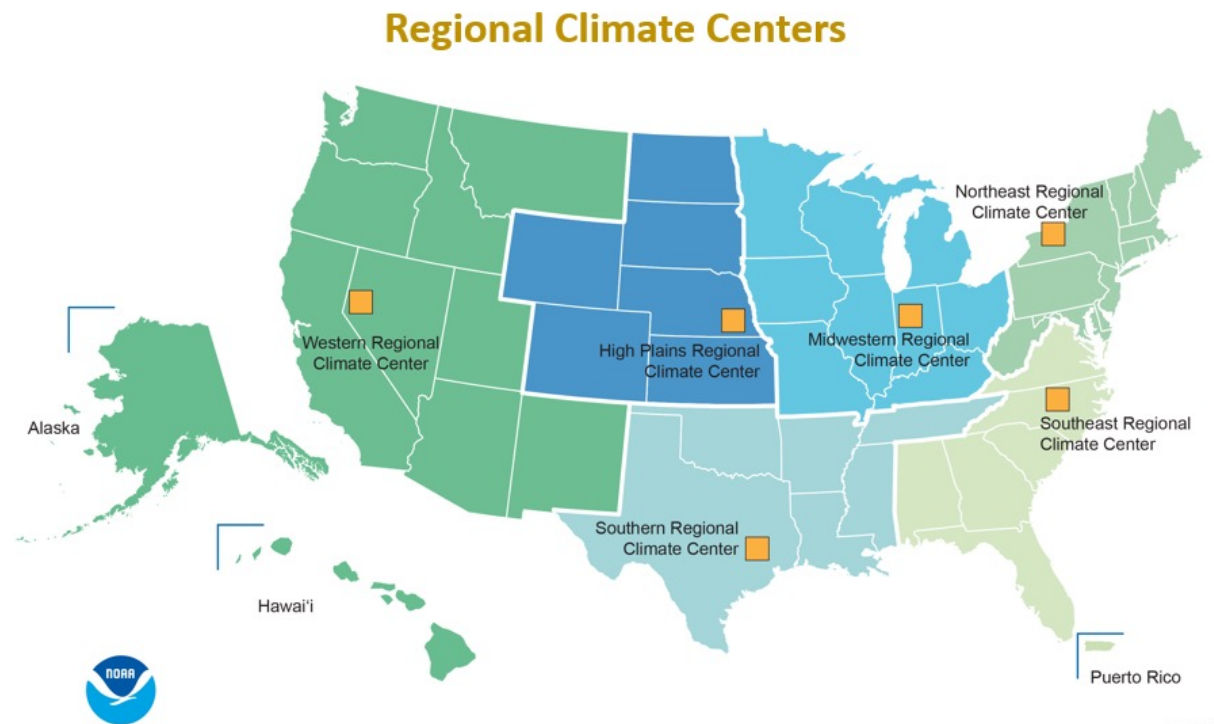


## Mission:

- Provide high-quality climate data, derived information, and data summaries *for the region*
- Monitor and assess *regional climate conditions* and their impacts
- Focus on region-specific needs
- Coordinate and conduct applied research on climate-related issues and problems
- Work with key stakeholders to identify climate services needs

## • **DECISION SUPPORT**

## Regional Services - RCCs



# Where to download Federal Data

<https://mrcc.purdue.edu>

The image shows the homepage of the MRCC (Midwestern Regional Climate Center) website. The header includes the MRCC logo and navigation links: About Us, Data, Monitoring, Tools, Resources, Login, and Register. The main heading is "Midwestern Regional Climate Center" with a subtext: "Providing high-quality climate data, tools, interactive maps, and customized services for the Midwest and the nation since 1982." Below this are three featured service tiles:

- cli-MATE Data Portal:** MRCC APPLICATION TOOLS ENVIRONMENT. Self-service access to climate data. This tile is highlighted with a red border.
- Midwest Climate Watch:** Monitor recent climate conditions. Includes a map of the Midwest region.
- National Climate Assessment 5:** Access newly released NCA5 resources. Includes an aerial photo of a farm with the text "CLIMATE CHANGE IS AFFECTING THE MIDWEST..."

**CURRENT DAILY STATION INFORMATION:**

Station Name: ANDERSON SEWAGE PLANT  
County: MADISON  
State: IN

Synchroniz  
Stations



**CURRENT HOURLY STATION INFORMATION:**

Station Name: CHICAGO MIDWAY AP  
County: COOK  
State: IL

Welcome to **cli-MATE**, the Midwestern Regional Climate Center's online data portal. If you are unsure of how to get started, we have resources for you in the "Help" section, located in the menu to the left. Should you have any issues while working in cli-MATE, please report them here.

- Daily-Observed Data >
- Hourly-Observed Data >
- Climate Division Data >
- State Data >
- Gridded Data >
- Maps of Data >
- Charts and Graphs >
- Help >

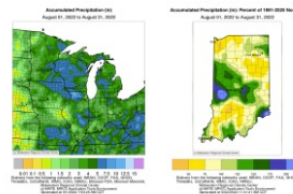
[Send Feedback](#)

**Featured Products**



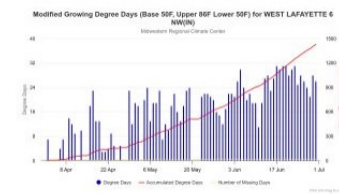
**Daily Station Selector Tool**

Choose the daily station of interest by using a map, where you can select from multiple climate data networks



**Interpolated Maps**

Create temperature and precipitation maps for customized time frames, data networks, and regions [Product Description]



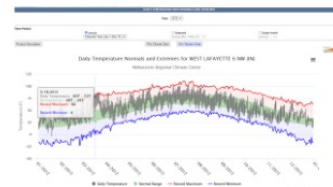
**Degree Days**

Create plots showing the accumulation of degree days for a chosen location and date range [Product Description]

Year	Start Date	End Date	Max	Min	Avg	Max	Min	Avg
2010	01-20	03-20	275	10.5	10.5	275	10.5	10.5
2010	01-20	03-20	275	10.5	10.5	275	10.5	10.5
2010	01-20	03-20	275	10.5	10.5	275	10.5	10.5
2010	01-20	03-20	275	10.5	10.5	275	10.5	10.5
2010	01-20	03-20	275	10.5	10.5	275	10.5	10.5
2010	01-20	03-20	275	10.5	10.5	275	10.5	10.5
2010	01-20	03-20	275	10.5	10.5	275	10.5	10.5
2010	01-20	03-20	275	10.5	10.5	275	10.5	10.5
2010	01-20	03-20	275	10.5	10.5	275	10.5	10.5
2010	01-20	03-20	275	10.5	10.5	275	10.5	10.5

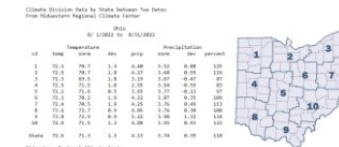
**Seasonal Statistics**

Compare customized seasonal statistics, including first/last snowfalls, degree days, and freeze events.



**Thermograph**

View charts or download tables containing temperature measurements, averages, and extremes for a specified time period [Product Description]



**Climate Division Estimated Between Two Dates**

Estimate state and climate division temperatures, precipitation, and degree days, for a user-selected time period



# cli-MATE

<https://mrcc.purdue.edu/CLIMATE/>

## Daily Threshold Search Tool

- Chronological List of Dates, Monthly Counts, Runs of Days Meeting a Threshold

### Threshold Search

LAFAYETTE PURDUE UNIVERSITY AP (IN)

14835

Lat/Lon/Elev: 40.4124/-86.9474/596

Years: 2015 to 2024

Limited to: 05/01 - 05/31 and 00:00 - 24:00

Criterion: Air Temperature (F) less than or equal to 32

Mode: Runs of hours meeting criteria

30 out of 7,440 hours missing (0.4%)

Time Period	Number of Consecutive Hours
2020-05-09 01:00 to 2020-05-09 05:00	5

### Threshold Search for Precipitation (in)

DUBOIS SRN IN FORAGE FARM (IN)

USC00122309

Lat/Lon/Elev: 38.4558/-86.6983/690.0

Years: 2019 to 2024

Dates: 01-01 to 12-31

Condition is: Precipitation (in) greater than 1.00

To sort multiple columns, hold SHIFT while clicking on the columns.

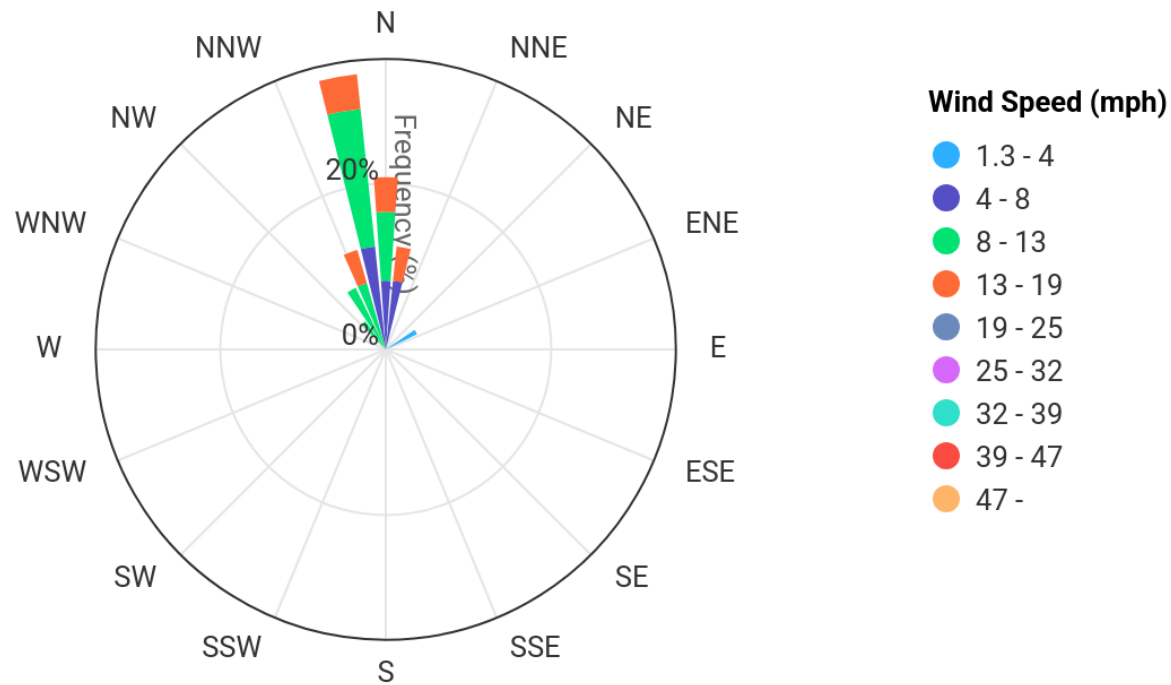
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov*	Dec	Annual
2019	1	4	4	4	4	3	2	1	0	3	2	1	29
2020	2	0	1	1	1	2	1	1	0	2	1	0	12
2021	1	1	1	2	0	2	2	1	2	1	0	1	14
2022	2	3	1	1	1	0	4	1	2	0	0	1	16
2023	2	1	4	1	1	0	3	1	0	1	0	0	14
2024	2	0	0	2	3	0	1	1	2	0	2	-	13
Average	1.7	1.5	1.8	1.8	1.7	1.2	2.2	1.0	1.0	1.2	0.8	0.5	16.3

## Hourly Wind Rose Tool

### LAFAYETTE PURDUE UNIVERSITY AP (IN) Wind Rose

June 10, 2024 - June 10, 2024

Sub-Interval: January 1 - December 31, 0 - 24

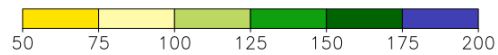
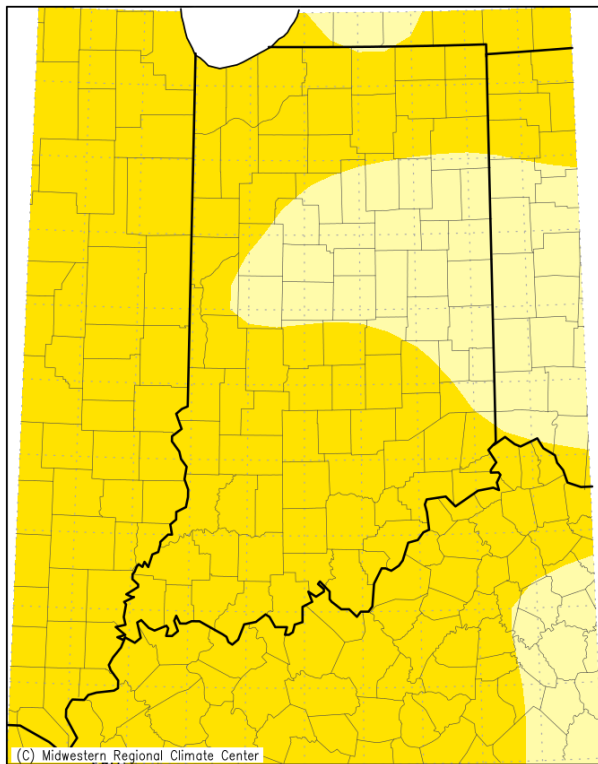


Click and drag to zoom

# cli-MATE

<https://mrcc.purdue.edu/CLIMATE/>

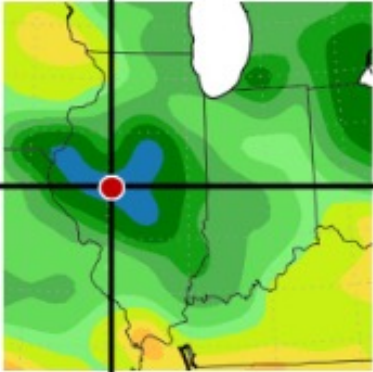
Accumulated Precipitation: Percent of Mean  
November 17, 2024 to December 16, 2024



Accumulated Precipitation (in): Percent of 1991-2020 Normals

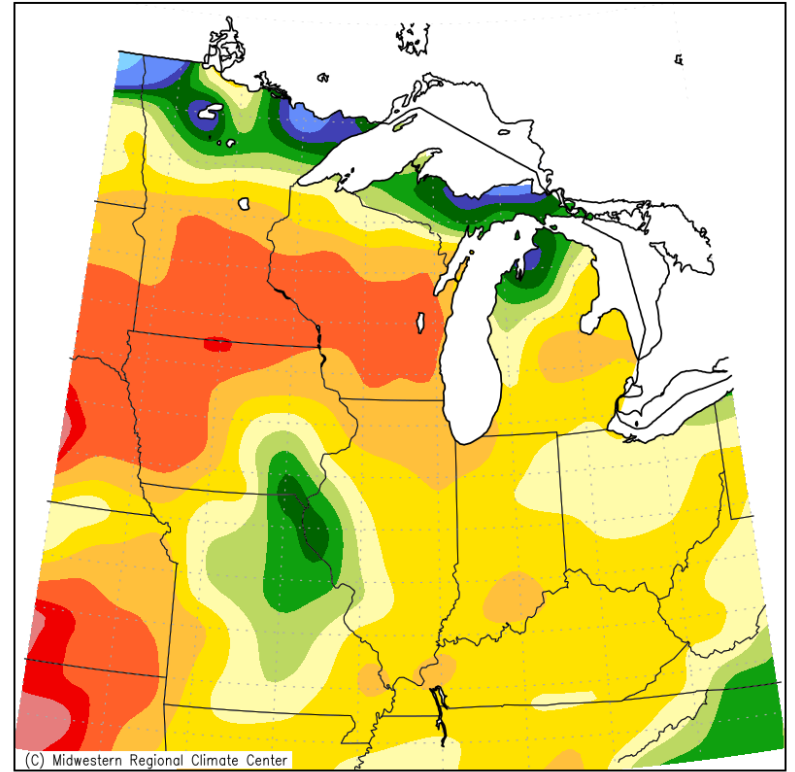
November 17, 2024 to December 16, 2024



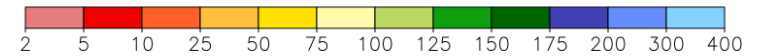


# Midwest CLIMATE WATCH

Accumulated Precipitation: Percent of Mean  
December 1, 2024 to December 15, 2024



Mean period is 1991–2020.

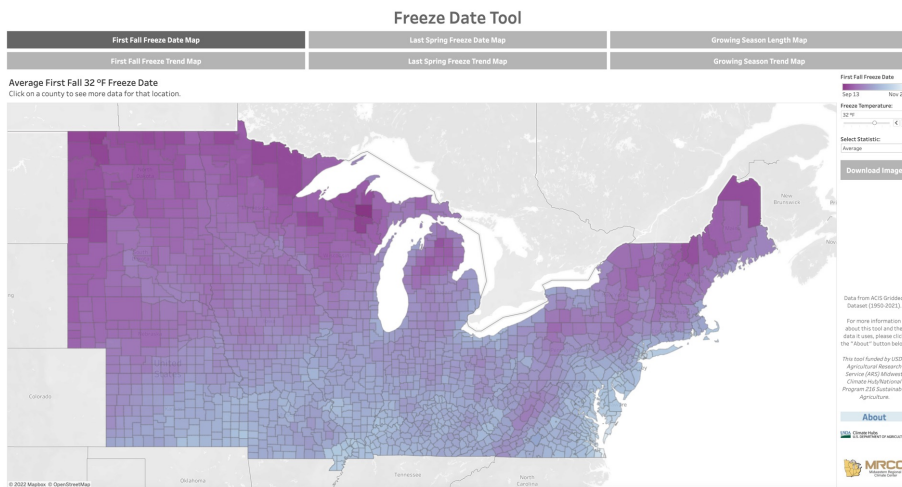


Midwestern Regional Climate Center  
Purdue University

	Temp	from Mean	Max Temp	from Mean	Min Temp	from Mean	Precip
LAST 7 DAYS							
LAST 30 DAYS							
MIDWEST MONTH-TO-DATE							

# Freeze Date Tool

*Interactive tool lets you explore local first/last freeze date and growing season climatologies, and trends*



- County-level **gridded** data, 1950-2023
- First fall freeze, last spring freeze, growing season length
  - Average, Early/late, Earliest/latest
  - Linear trend
- Customize freeze threshold ranging from 20°F to 40°F
- Seamlessly move between regional maps and local charts

# Freeze Date Tool

## Freeze Date Tool

First Fall Freeze Date Map

Last Spring Freeze Date Map

Growing Season Length Map

First Fall Freeze Trend Map

Last Spring Freeze Trend Map

Growing Season Trend Map

### Average First Fall 32°F Freeze Date

Click on a county to see more data for that location.

First Fall Freeze Date

Sep 14  Nov 22

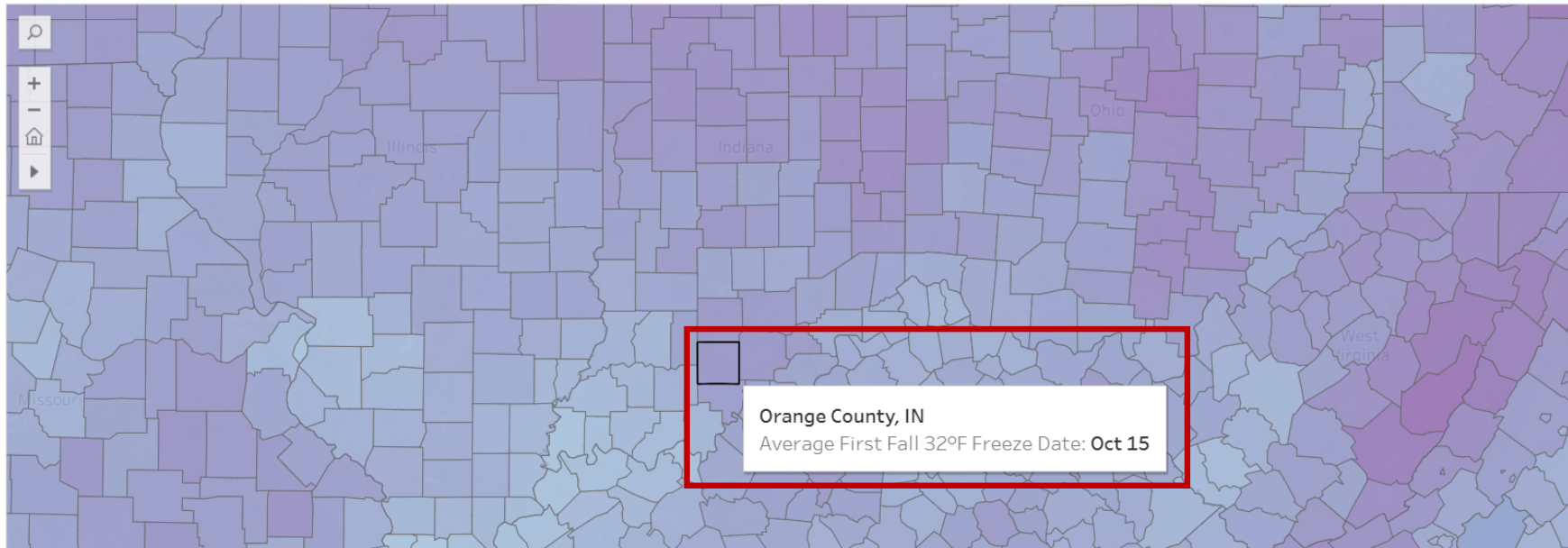
Freeze Temperature:

32°F 

Select Statistic:

Average 

Download Image



Data from ACIS Gridded Dataset.

For more information about this tool and the data it uses, please

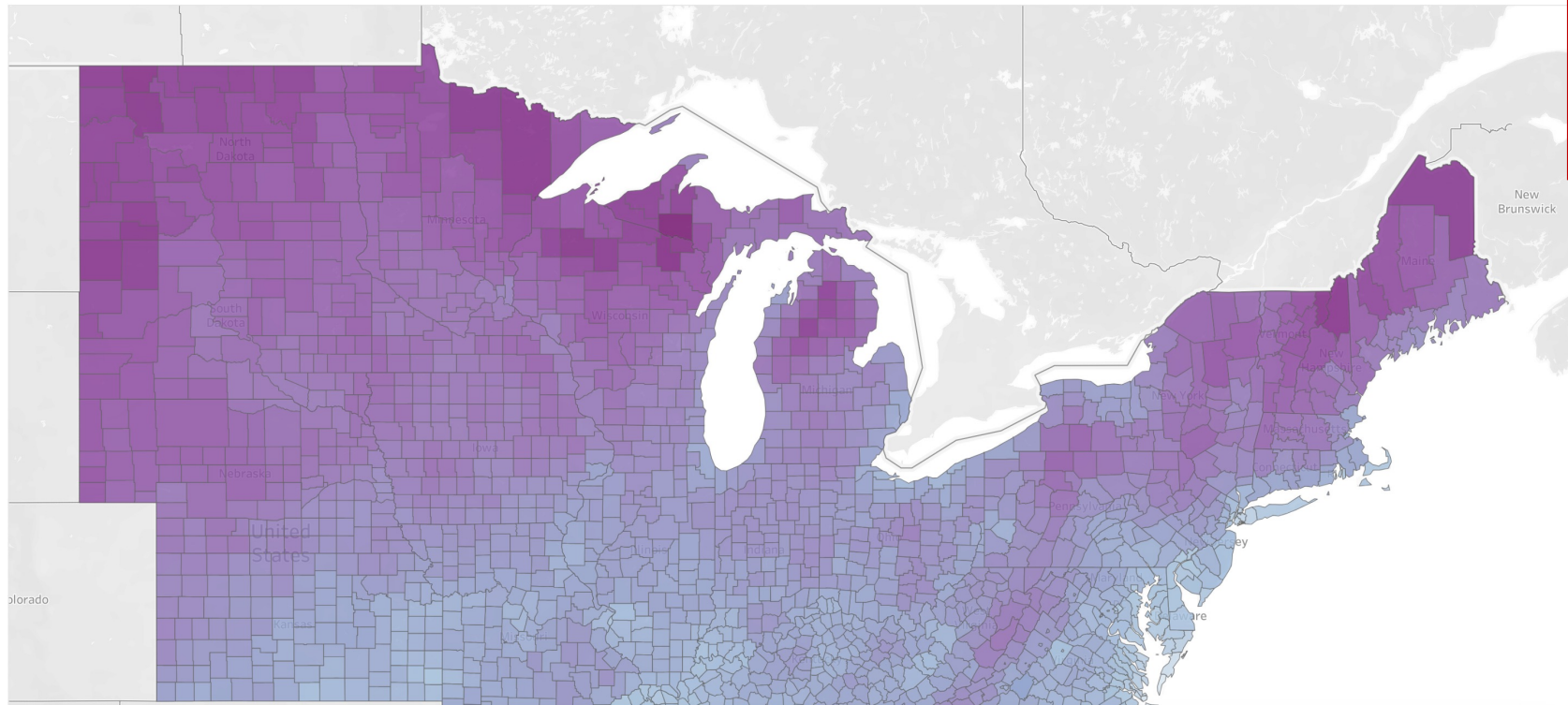
# Freeze Date Tool

## Freeze Date Tool

First Fall Freeze Date Map	Last Spring Freeze Date Map	Growing Season Length Map
First Fall Freeze Trend Map	Last Spring Freeze Trend Map	Growing Season Trend Map

### Average First Fall 32 °F Freeze Date

Click on a county to see more data for that location.



First Fall Freeze Date

Sep 14 Nov 21

Freeze Temperature:

32 °F

Select Statistic:

Average

Download Image

Data from ACIS Gridded Dataset (1950-2021).

For more information about this tool and the data it uses, please click the "About" button below

This tool funded by USDA- Agricultural Research Service (ARS) Midwest Climate Hub/National Program 216 Sustainable Agriculture.

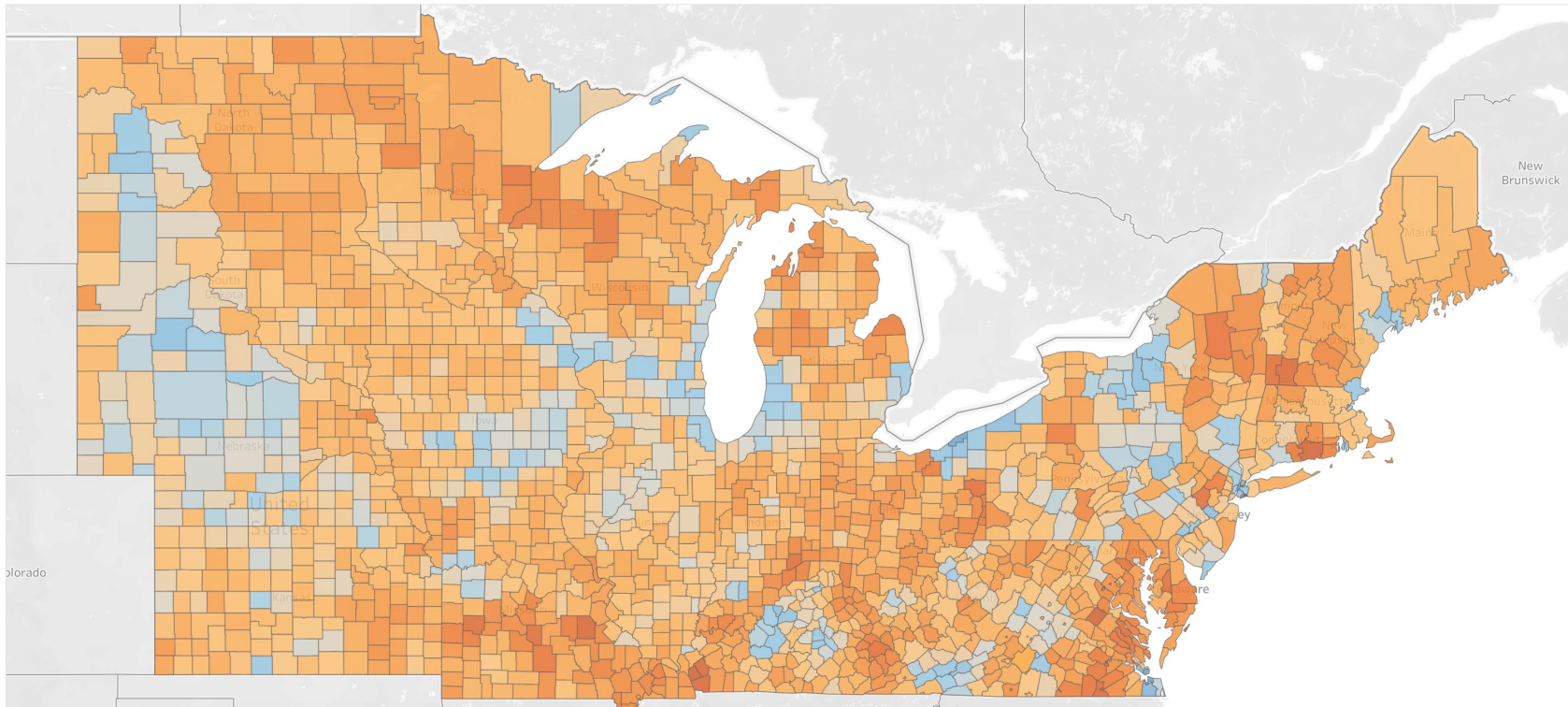
About

# Freeze Date Tool

## Freeze Date Tool

First Fall Freeze Date Map	Last Spring Freeze Date Map	Growing Season Length Map
First Fall Freeze Trend Map	Last Spring Freeze Trend Map	Growing Season Trend Map

Trend in Last Spring 32 °F Freeze Date  
Click on a county to see more data for that location.



Decadal Change (Days)  
-5.0 5.0

Freeze Temperature:  
32 °F

Hide Non-Significant Trends  
 Yes  
 No

Download Image

Data from ACIS Gridded Dataset (1950-2021).

For more information about this tool and the data it uses, please click the "About" button below

This tool funded by USDA-Agricultural Research Service (ARS) Midwest Climate Hub/National Program 216 Sustainable Agriculture.

About

USDA Climate Hubs  
U.S. DEPARTMENT OF AGRICULTURE

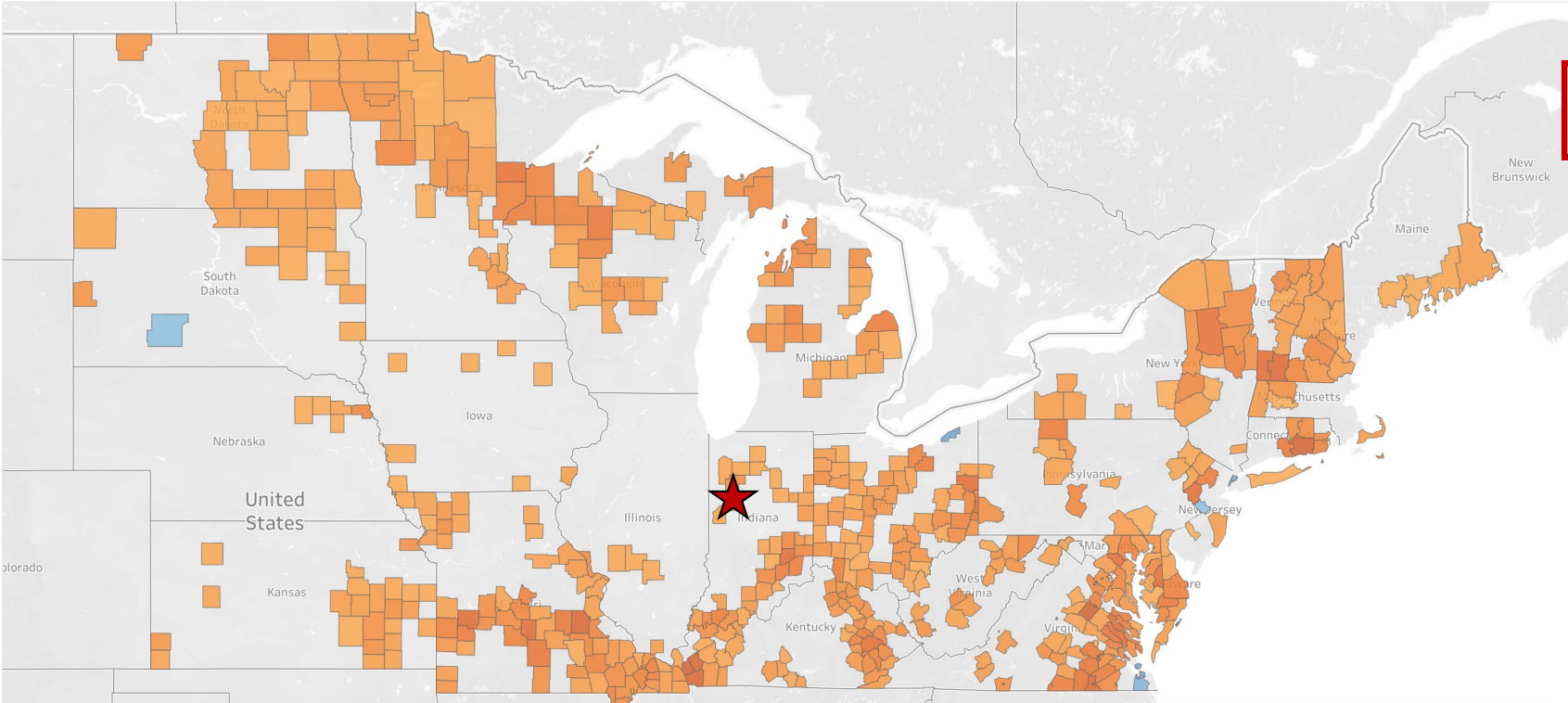


# Freeze Date Tool

## Freeze Date Tool

First Fall Freeze Date Map	Last Spring Freeze Date Map	Growing Season Length Map
First Fall Freeze Trend Map	Last Spring Freeze Trend Map	Growing Season Trend Map

Trend in Last Spring 32 °F Freeze Date  
Click on a county to see more data for that location.



Decadal Change (Days)  
-5.0 5.0

Freeze Temperature:  
32 °F

Hide Non-Significant Trends  
 Yes  
 No

Download Image

Data from ACIS Gridded Dataset (1950-2021).

For more information about this tool and the data it uses, please click the "About" button below

This tool funded by USDA-Agricultural Research Service (ARS) Midwest Climate Hub/National Program Z16 Sustainable Agriculture.

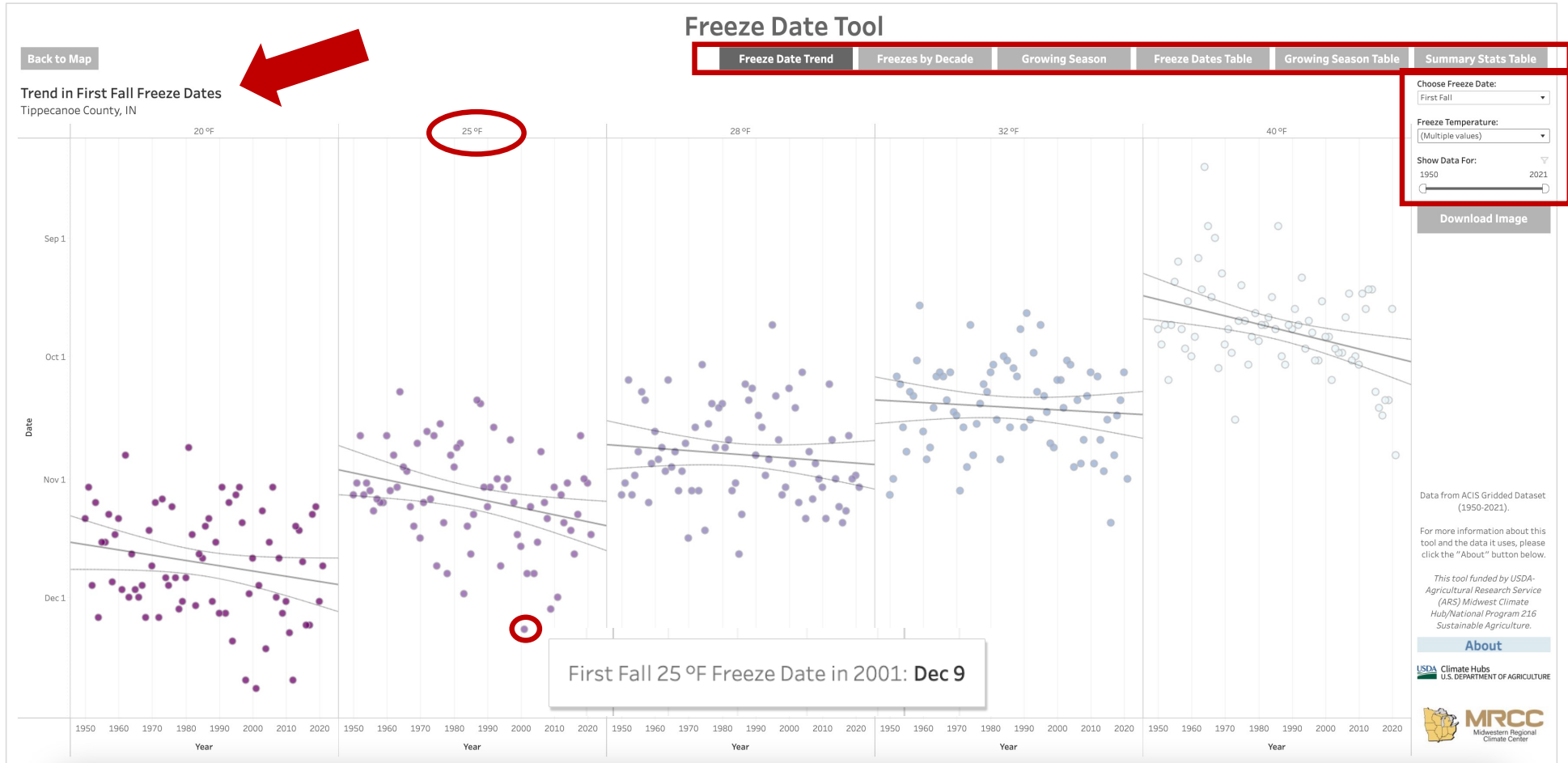
About



# Freeze Date Tool

<https://mrcc.purdue.edu/freeze/freezedatetool.html>

## Freeze Date Tool



# Freeze Date Tool

[Back to Map](#)

## Freeze Date Tool

[Freeze Date Trend](#)

[Freezes by Decade](#)

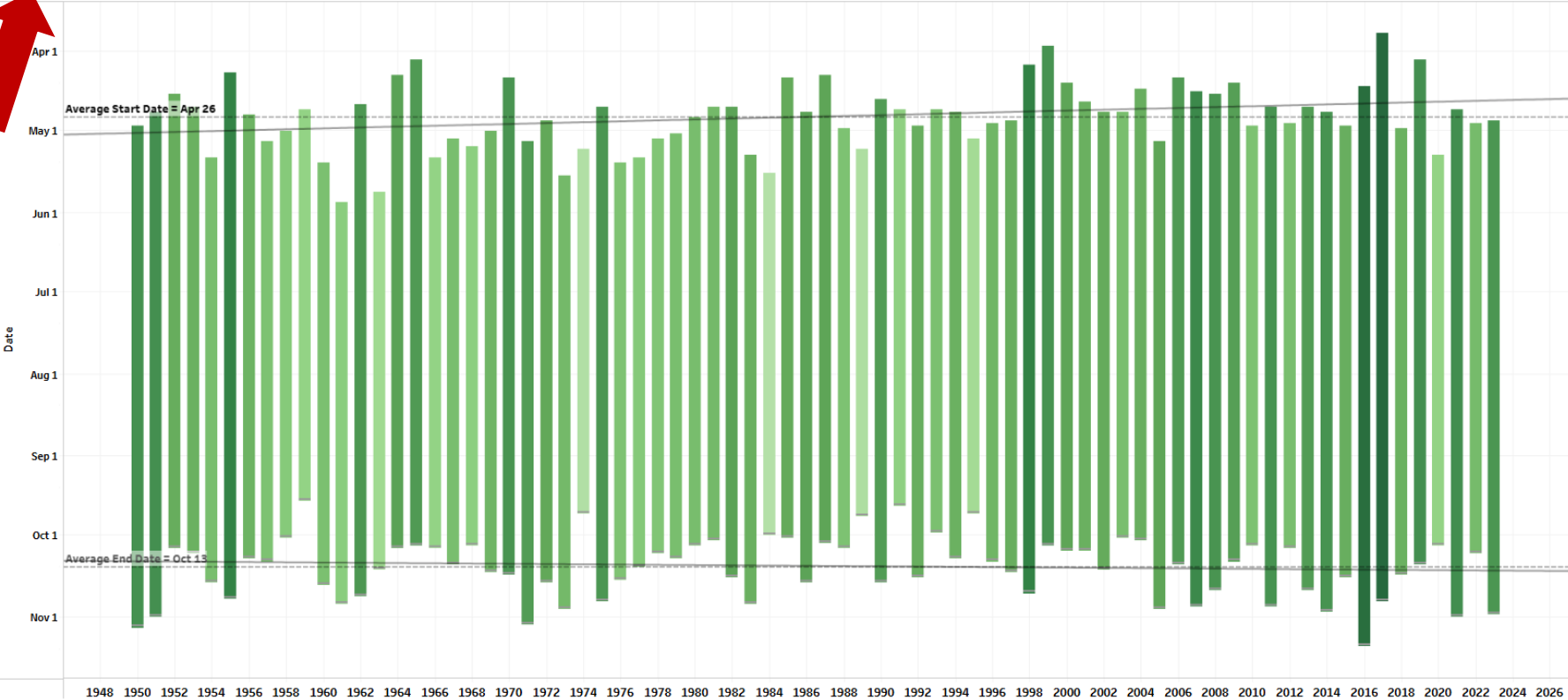
**[Growing Season](#)**

[Freeze Dates Table](#)

[Growing Season Table](#)

[Summary Stats Table](#)

Trend in 32°F Growing Season  
Tippecanoe County, IN



Freeze Temperature:  
32°F

Show Data For:  
1950 2024

Season Length (Days)  
137.00 215.00

[Download Image](#)

Data from ACIS Gridded Dataset.

For more information about this tool and the data it uses, please click the "About" button below.

*This tool funded by USDA-Agricultural Research Service (ARS) Midwest Climate Hub/National Program 216 Sustainable Agriculture.*

[About](#)

USDA Climate Hubs  
U.S. DEPARTMENT OF AGRICULTURE

## Spring and Fall Frost/Freeze Maps

### SHADED MAPS MENU

#### CURRENT SEASON FREEZES

- 28°F: Date of first Freeze
- 28°F: Date of most recent Freeze
- 28°F: Days since most recent Freeze
- 28°F: Over past 14 days, num. < 28°F
- 32°F: Date of first Freeze
- 32°F: Date of most recent Freeze
- 32°F: Days since most recent Freeze
- 32°F: Over past 14 days, num. < 32°F
- Lowest Min Temp: 10°F to 50°F
- Lowest Min Temp: -38°F to 10°F

#### GROWING DEGREE DAYS

#### VEGETATION STATUS

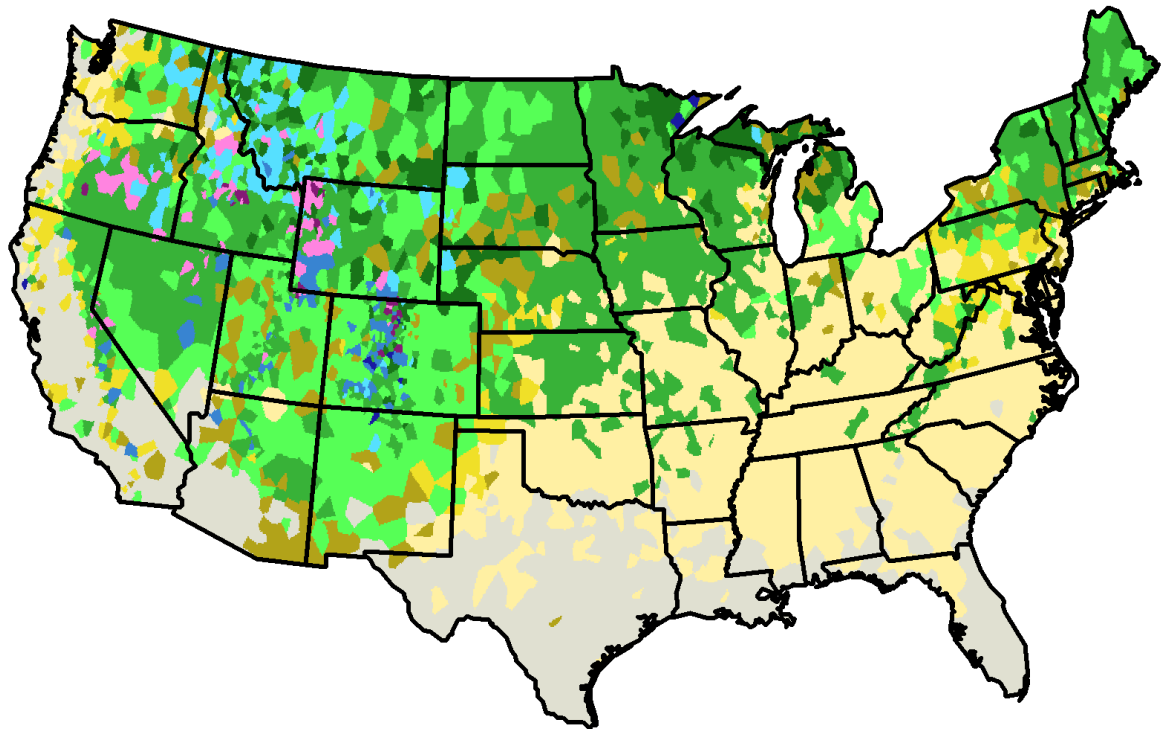
#### 28° FREEZE CLIMATOLOGIES

#### 32° FREEZE CLIMATOLOGIES

#### ABOUT STATION DATA

Date of First 28°F Freeze  
 for period 7/1/24 to 12/4/24

- |                   |             |             |                 |
|-------------------|-------------|-------------|-----------------|
| Aug 10 or Earlier | Sep 1 - 10  | Oct 1 - 10  | Nov 1 - 10      |
| Aug 11 - 20       | Sep 11 - 20 | Oct 11 - 20 | Nov 11 - 20     |
| Aug 21 - 31       | Sep 21 - 30 | Oct 21 - 31 | Nov 21 or Later |
|                   |             |             | No Freeze       |



MRCC Experimental Freeze Guidance:  
 These experimental maps may be utilized as a guide to local and regional freeze conditions but should NOT be used by themselves for decision processes.

## Spring and Fall Frost/Freeze Maps

### SHADED MAPS MENU

#### CURRENT SEASON FREEZES

- 28°F: Date of first Freeze
- 28°F: Date of most recent Freeze
- 28°F: Days since most recent Freeze
- 28°F: Over past 14 days, num. < 28°F
- 32°F: Date of first Freeze
- 32°F: Date of most recent Freeze
- 32°F: Days since most recent Freeze
- 32°F: Over past 14 days, num. < 32°F
- Lowest Min Temp: 10°F to 50°F
- Lowest Min Temp: -38°F to 10°F

#### GROWING DEGREE DAYS

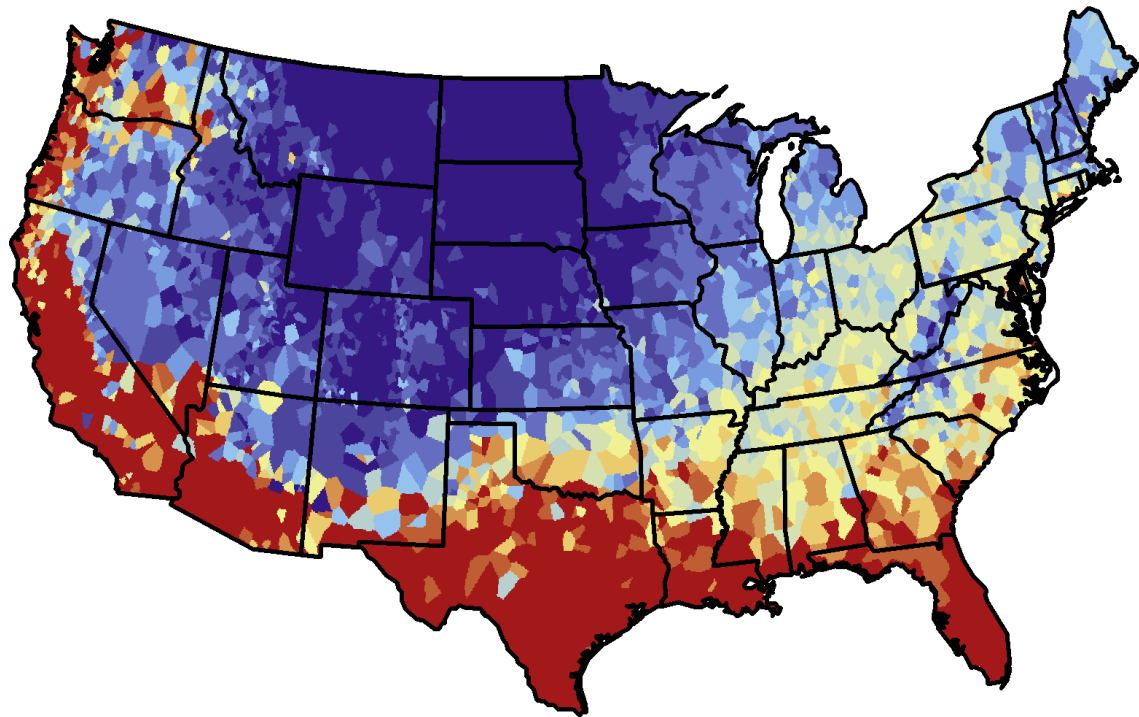
#### VEGETATION STATUS

#### 28° FREEZE CLIMATOLOGIES

#### 32° FREEZE CLIMATOLOGIES

#### ABOUT STATION DATA

Number of Days with Minimum Temperature  $\leq 28^{\circ}\text{F}$   
 between 11/21/24 and 12/4/24 (14-day period)



MRCC Experimental Freeze Guidance:  
 These experimental maps may be utilized as a guide to local and regional freeze conditions but should NOT be used by themselves for decision processes.

# Soil Temperature Climatology

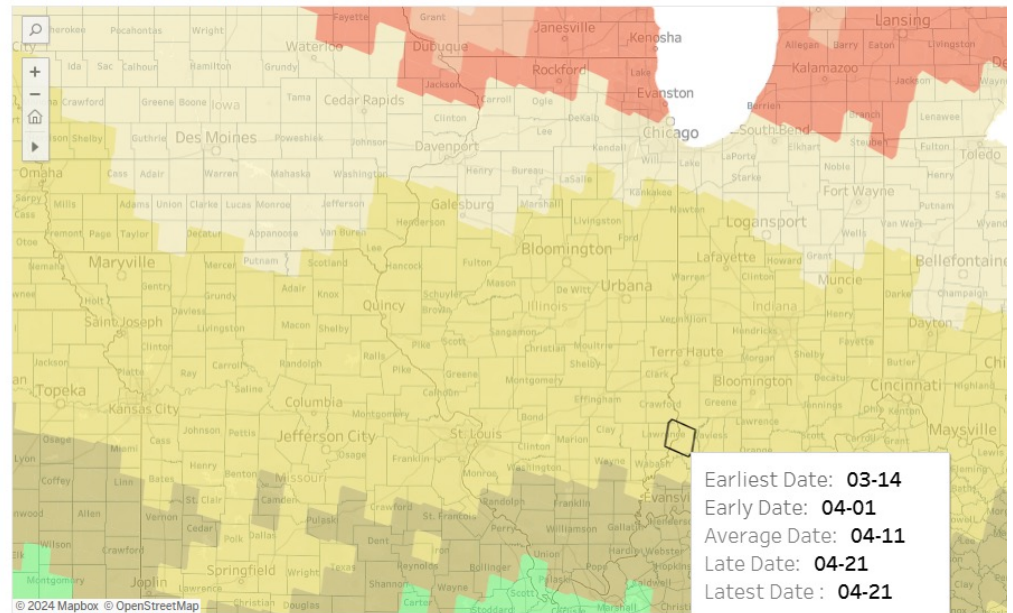
<https://mrcc.purdue.edu/clim/Soil-T>

*Provides historical soil temperature statistics for the north central US*

Date when soils **WARM ABOVE** temperature threshold

Date when soils **COOLS BELOW** temperature threshold

Date When 4" Soil Temperature Warms Above 50°F



30-yr averages using bias-corrected NARR reanalysis data

# Soil Temperature Climatology

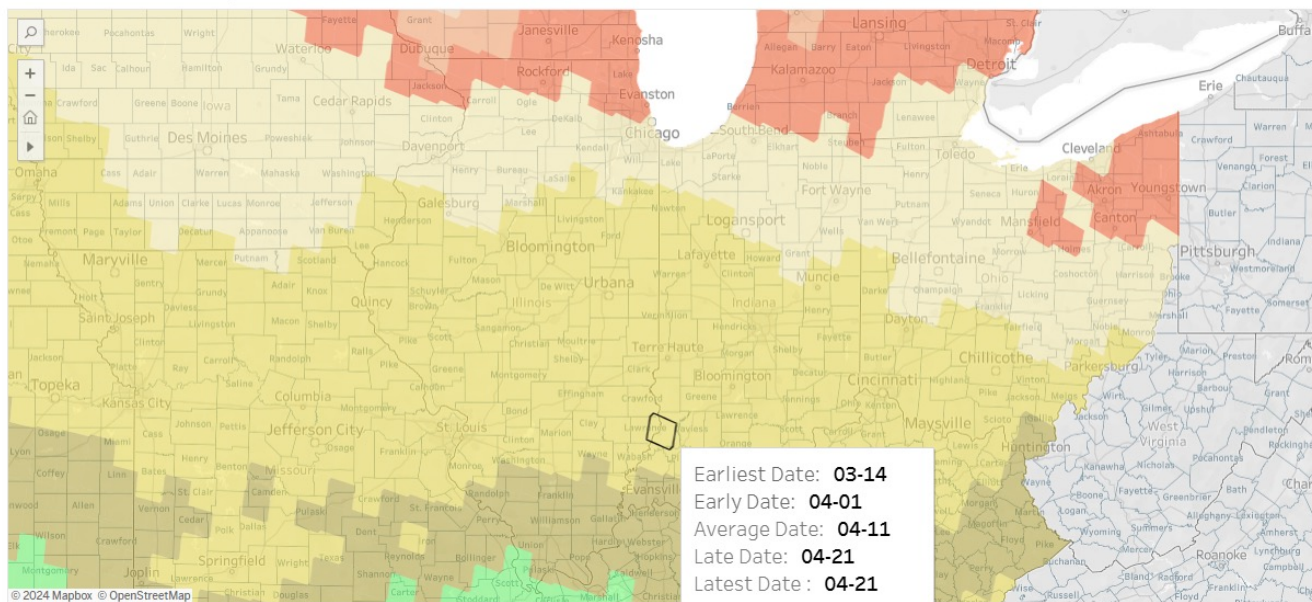
## 4" Soil Temperature Climatology

Go to "Warms Above" View    Go to "Cools Below" View    Go to "Temperatures Given Date" View

### Average Date

- Jan 9 or Before
- Jan 10-19
- Jan 20-31
- Feb 1-9
- Feb 10-19
- Feb 20-28
- Mar 1-9
- Mar 10-19
- Mar 20-31
- Apr 1-9
- Apr 10-19
- Apr 20-30
- May 1-9
- May 10-19
- May 20-31
- Jun 1-9
- Jun 10-19
- Jun 20 or Later

### Date When 4" Soil Temperature Warms Above 50°F



### Select Threshold (°F)

50

Climatology is based on 1991-2020 values at 4" depth. Map shows seven-day running average values. See About page for more information.

This tool funded by USDA Agricultural Research Service (ARS) Midwest Climate Hub/National Program 216 Sustainable Agriculture.

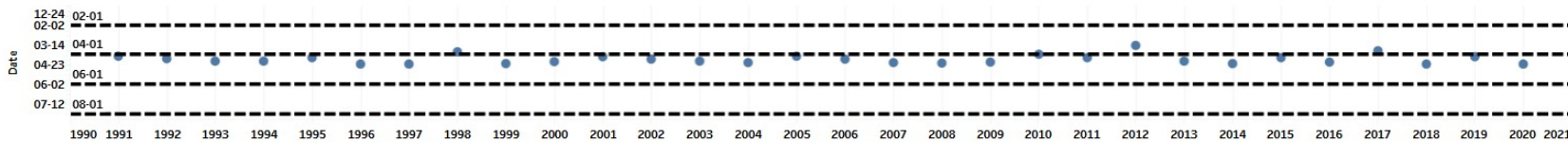


USDA Climate Hubs U.S. DEPARTMENT OF AGRICULTURE

About this Tool

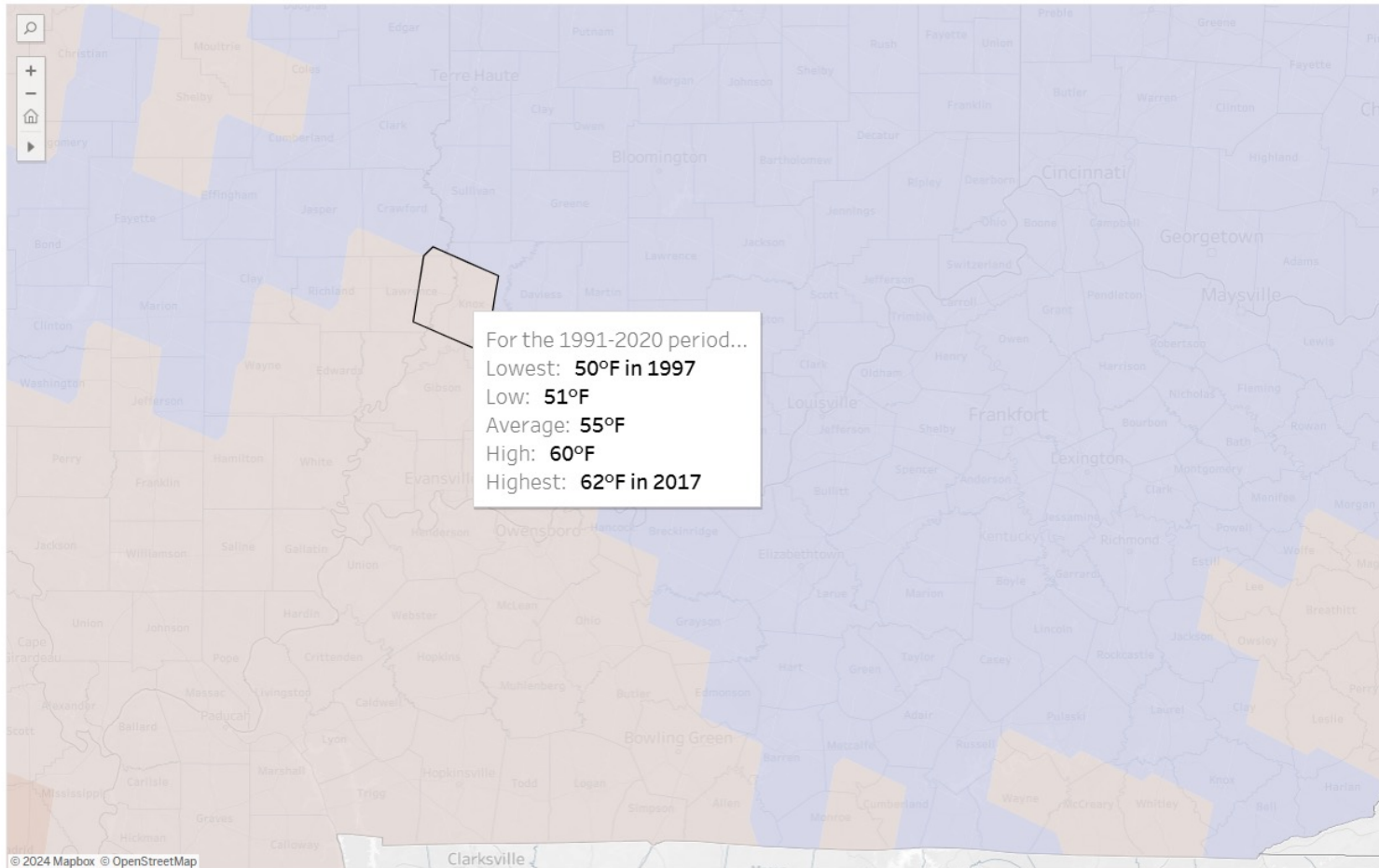
### Dates of Occurrence over 1991-2020 Period

Click on a gridbox to display dates.



# Soil Temperature Climatology

Average 4" Soil Temperature on Selected Calendar Date



Select a Month

April

Select a Day

20

Climatology is based on 1991-2020 values at 4" depth. Map shows seven-day running average values. See About page for more information.

This tool funded by USDA Agricultural Research Service (ARS) Midwest Climate Hub/National Program 216 Sustainable Agriculture.



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About this Tool

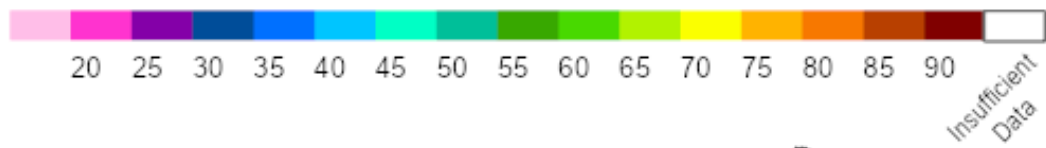
## Average 4" Soil Temperature

- 30°F to 34°F
- 35°F to 39°F
- 40°F to 44°F
- 45°F to 49°F
- 50°F to 54°F
- 55°F to 59°F
- 60°F to 64°F

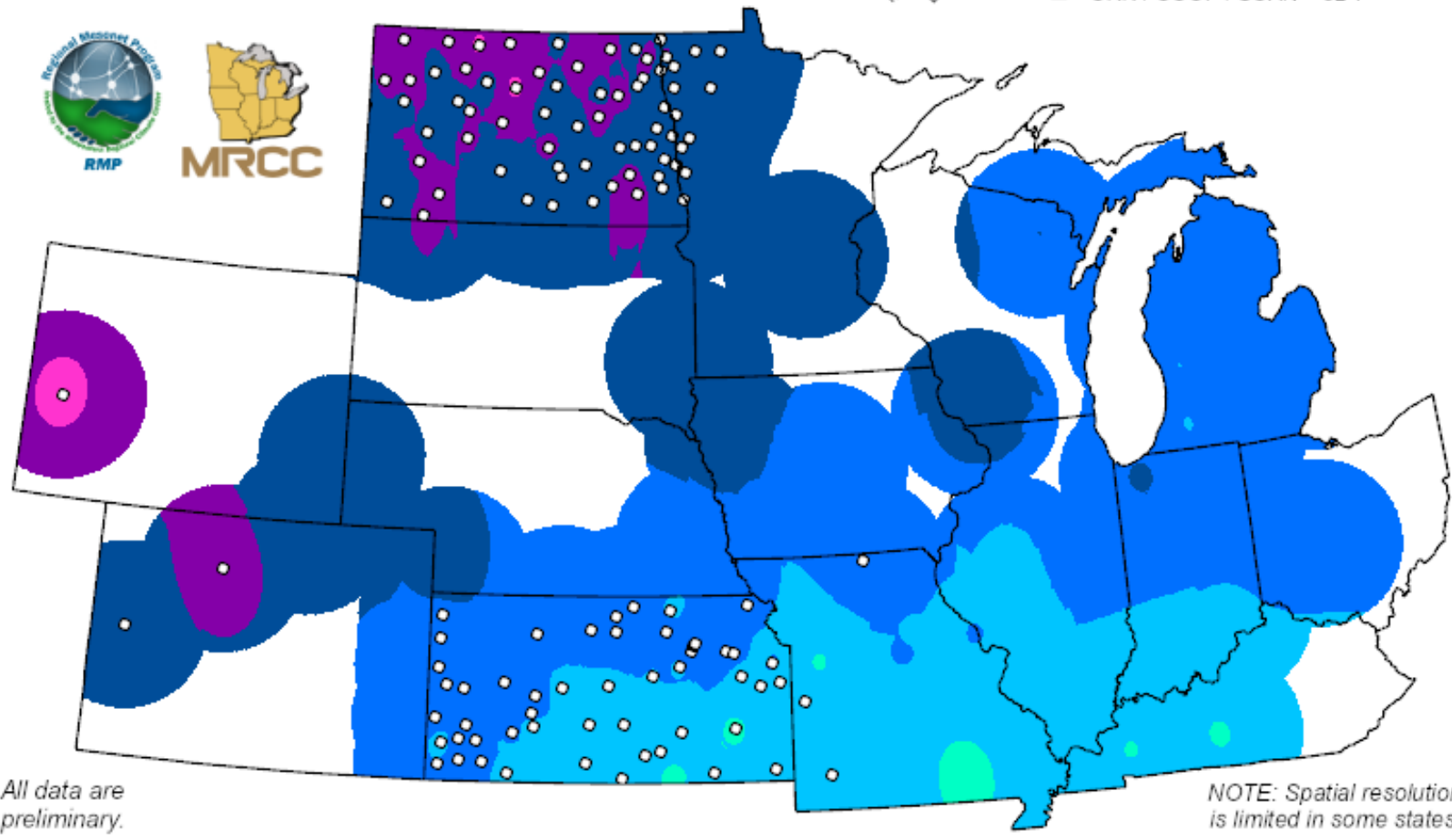


# 4" Soil Temperature (°F) (Sod)

Average, 7-Day Period Through 12/14/2024



- Mesonets <= 32°F
- Mesonets > 32°F
- △ CRN / COOP / SCAN <= 32°F
- ▲ CRN / COOP / SCAN > 32°F

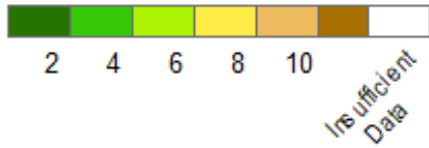


All data are preliminary.

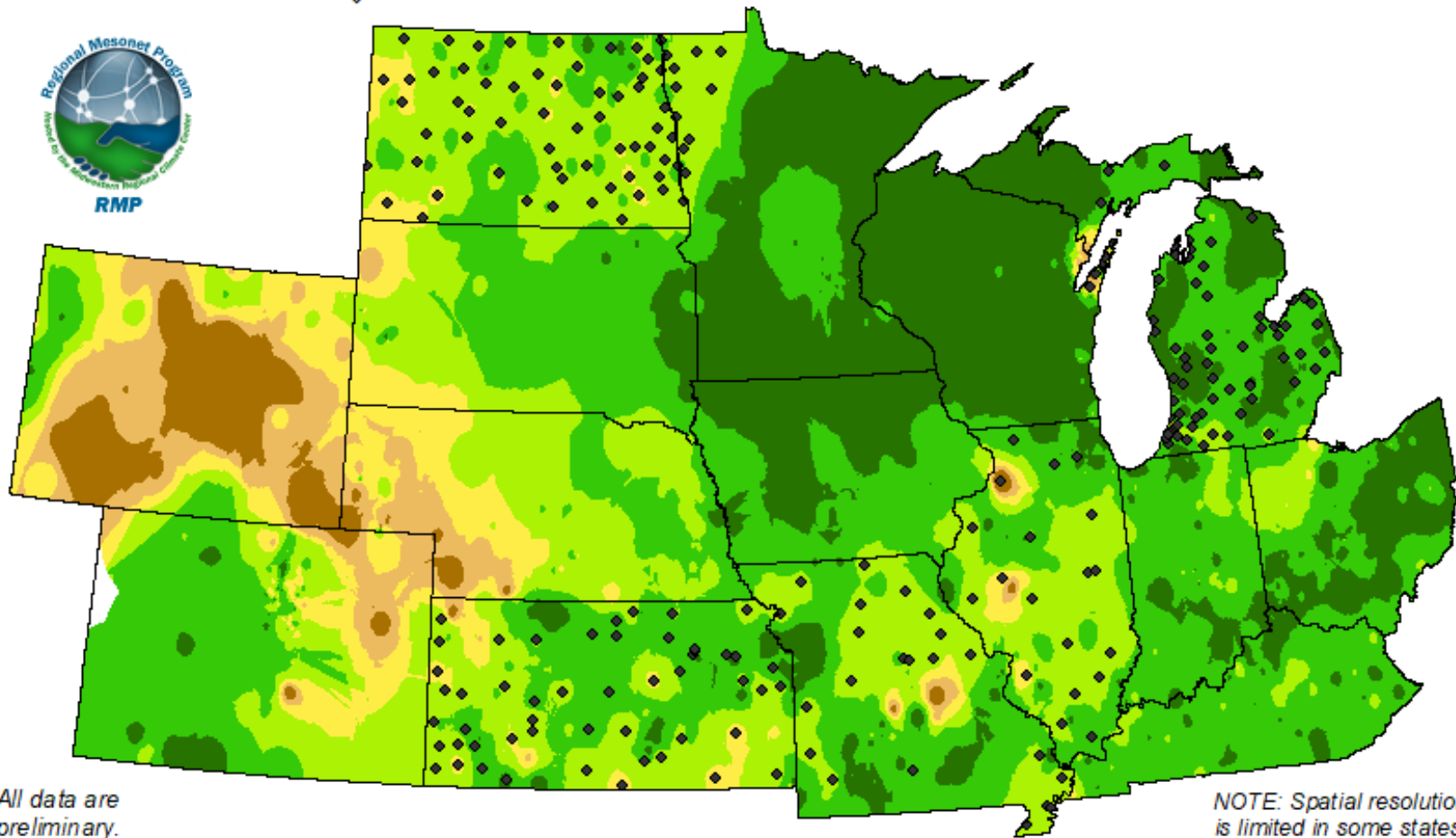
NOTE: Spatial resolution is limited in some states.

# Potential Evapotranspiration (mm)

24-Hour Period Through 6/23/2024



- ◆ Mesonets
- RAWS / SCAN



All data are preliminary.

NOTE: Spatial resolution is limited in some states.

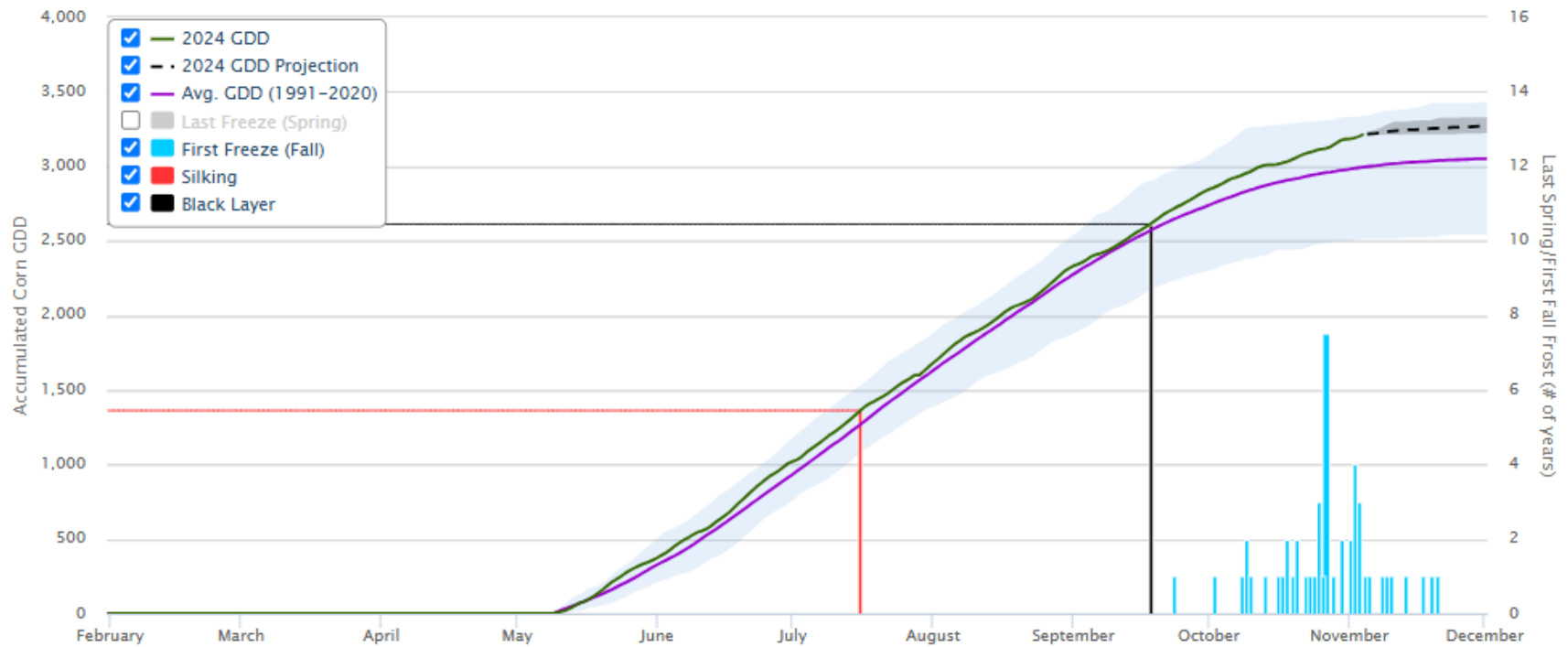
# Corn GDD Tool

<https://mrcc.purdue.edu/tools/corngdd>

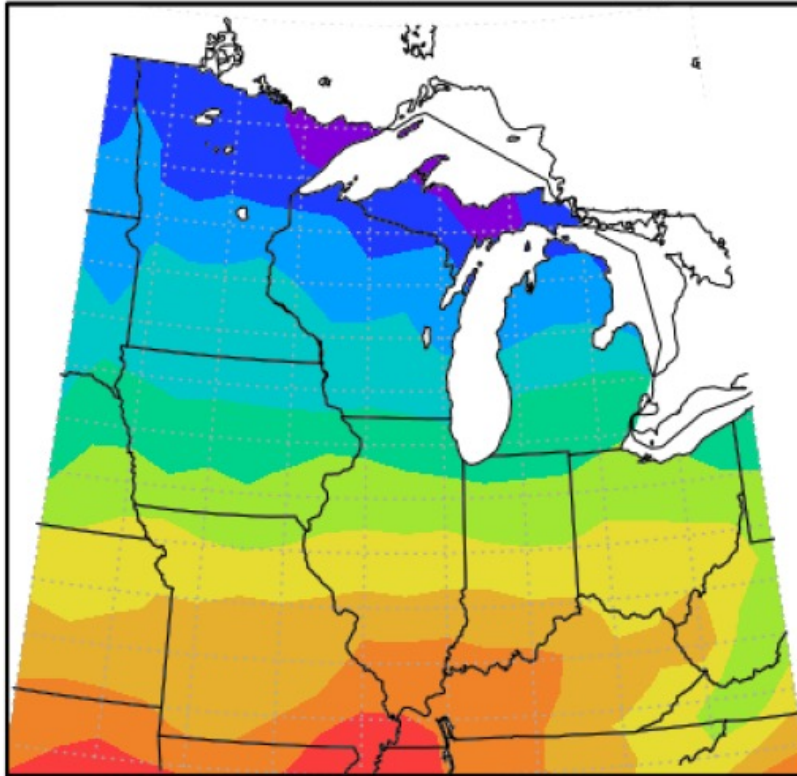
GDD Start:   Comparison Years:  Corn Maturity Days:  Silking GDDs:   
Freeze Temperature (°F):  Variation:  Current Day:  Black Layer GDDs:

## Corn Growing Degree Day Tool

Location: 40.28, -86.01 in Tipton Co., IN, Start Date: May 10, Maturity Days: 108, Freeze Temp: 28°F, Variation: All Years

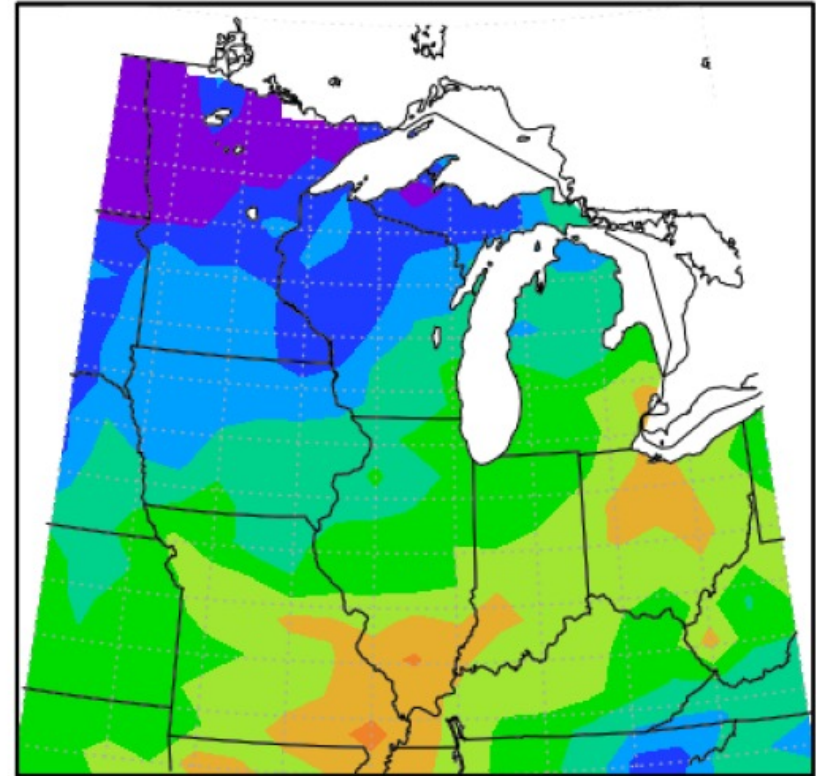


Total MGDD from 4/1/2024 to 6/2/2024



Midwestern Regional Climate Center  
Purdue University

MGDD Departure, 4/1/2024 to 6/2/2024



Midwestern Regional Climate Center  
Purdue University  
Normals Period, 1991-2020



## CLIMATE PERSPECTIVE

### An Exciting Summer for Weather Enthusiasts

By: Austin Pearson, Climatologist

The new summer blockbuster, *Twisters*, has certainly stirred up excitement among weather enthusiasts with its thrilling depiction of tornadoes. Although tornado activity this summer across the central Midwest has been notable, it's important to clarify that this is purely coincidental and not part of any marketing strategy. If the movie left you craving more, we have some great news for you.



While we can't match the same excitement as *Twisters*, we have recently updated our [Tornado Tracks Tool](#) with the latest [National Weather Service Storm Prediction Center \(SPC\)](#) data for 2023. This tool now provides detailed information on F/EF magnitudes, touchdown points, and tornado tracks for tornadoes that may have affected your area from 1950 to 2023. You might be wondering why data from 2024 are not available yet. This is because these data are still considered preliminary and undergo further quality control before their official release. To access this year's data in the Tornado Tracks Tool, you will need to wait until 2025. In the meantime, there is still plenty of exploration available in the updated tool.

If you are interested in preliminary storm data for this year, there are several excellent resources you can explore:

- [Southern Regional Climate Center's Storm Reports Viewer](#): Access tornado, wind, hail, and other special storm reports for your specified dates.
- [NOAA Storm Events Database](#): Obtain data for your state or county, including detailed information on injuries, fatalities, and estimates of property and crop damage.
- [SPC Preliminary Severe Weather Report Database](#): View a summary of total storm reports by state, including maps, tables, and charts.

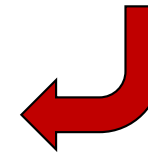
These options should help you find the information you need about historical storm activity. Happy exploring!

[Tornado Tracks Tool](#)

# STAY CONNECTED, STAY INFORMED



Sign up for the MRCC  
Quarterly Newsletter

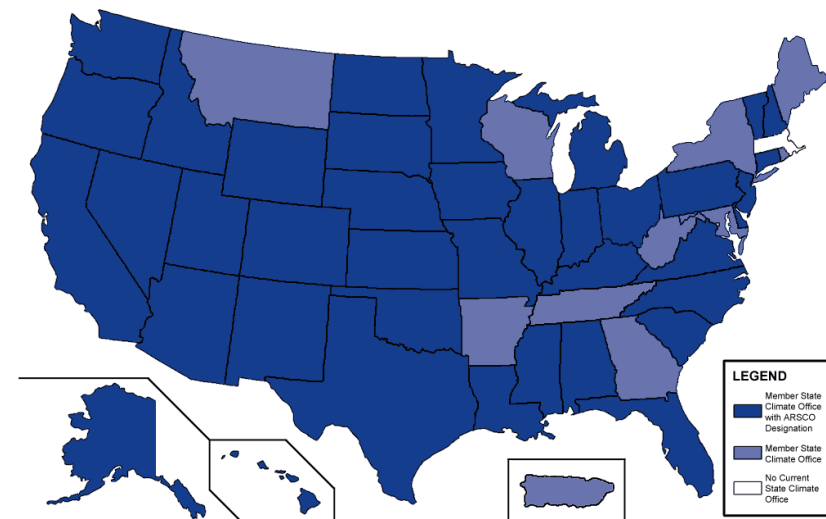


<https://tinyurl.com/mrcc-news>

# State Climate Offices

## About:

- Focus on state priorities
  - *Agriculture*
  - *Drought*
  - *Wildfires*
  - *Coastal issues*
  - *Urban issues*
- **More outreach than data tools**
  - *Articles*
  - *Presentations*
  - *Interviews*
- More climate change linkages
- Programs
  - *CoCoRaHS*
  - *Mesonets*



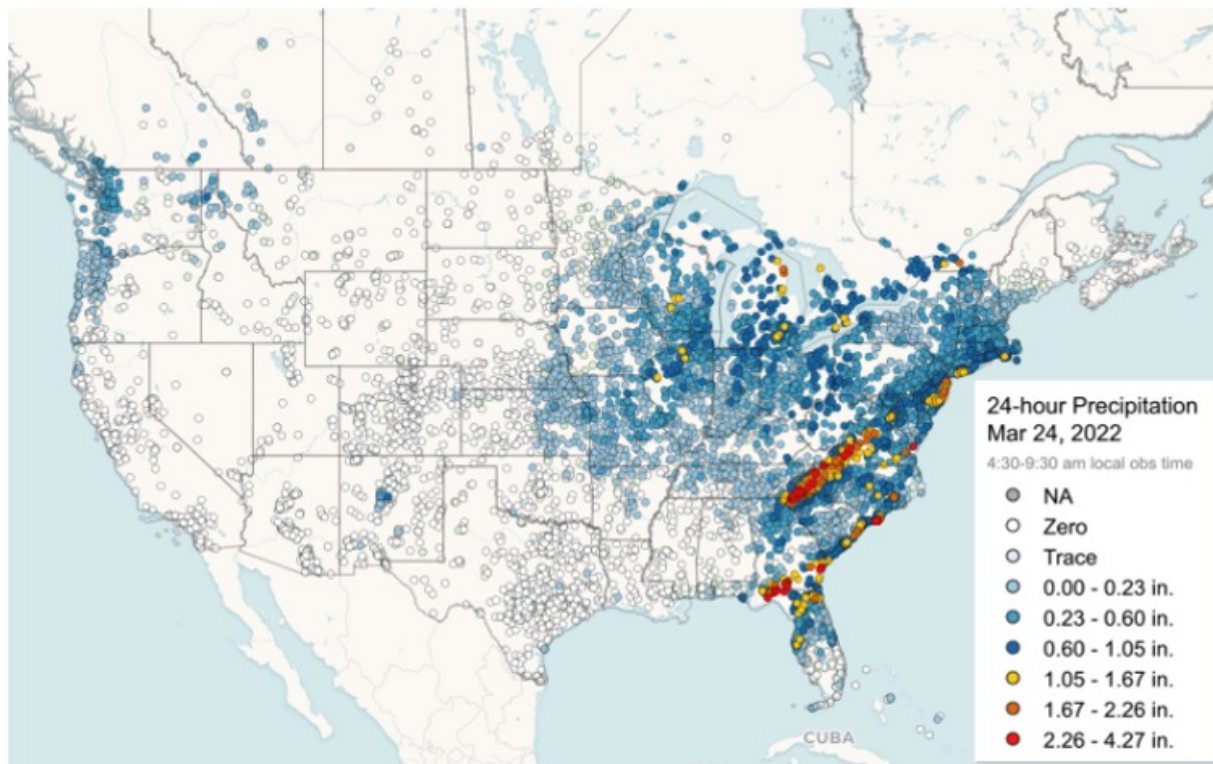
Indiana State Climate Office

# CoCoRaHS

## Community Collaborative Rain, Hail, and Snow network

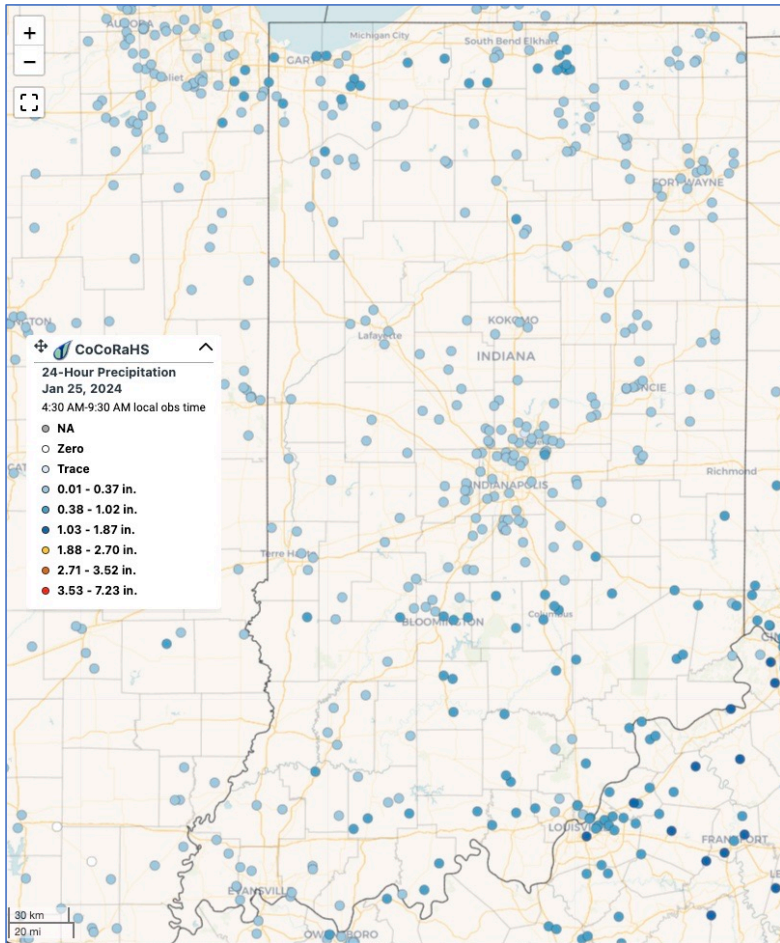
Reports received today 3/24/2022 as of 7:23 PM EDT

Daily	Multi-day	SigWx	Hail	Condition	ET
11,176	168	9	0	9	15



# CoCoRaHS

CoCoRaHS (Community Collaborative Rain, Hail, and Snow) Network  
[Cocorahs.org](http://Cocorahs.org)

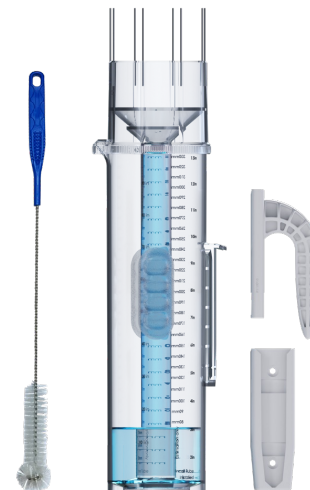
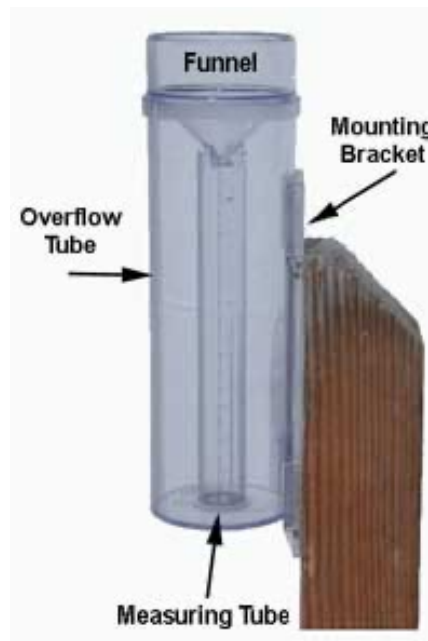
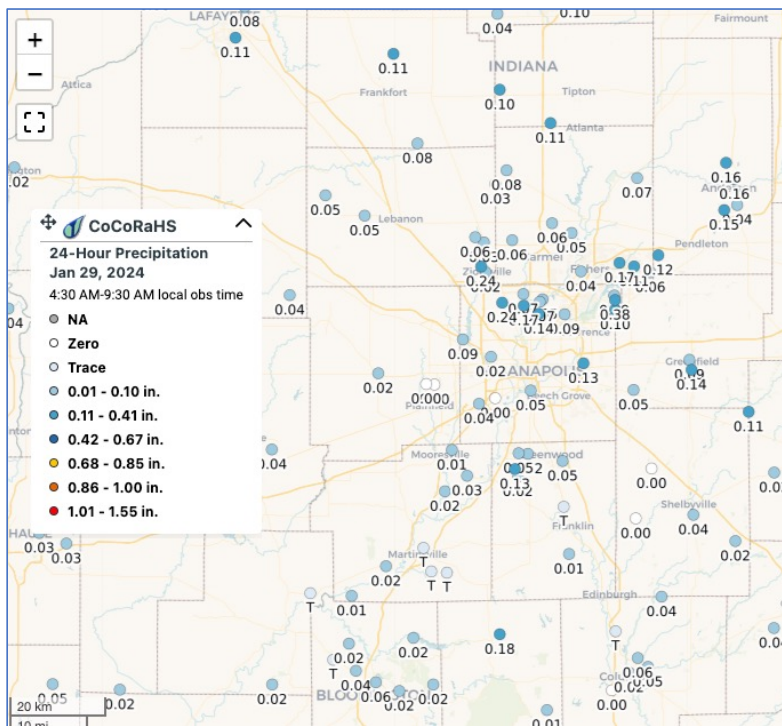


- Started over 25 years ago
- *Colorado* Collaborative Rain, Hail, and Snow network
- Manual observations
- Daily (morning)
- Multi-day
- Significant weather reports
- Condition monitoring reports
- ET monitoring



# CoCoRaHS

CoCoRaHS (Community Collaborative Rain, Hail, and Snow) Network  
[Cocorahs.org](http://Cocorahs.org)

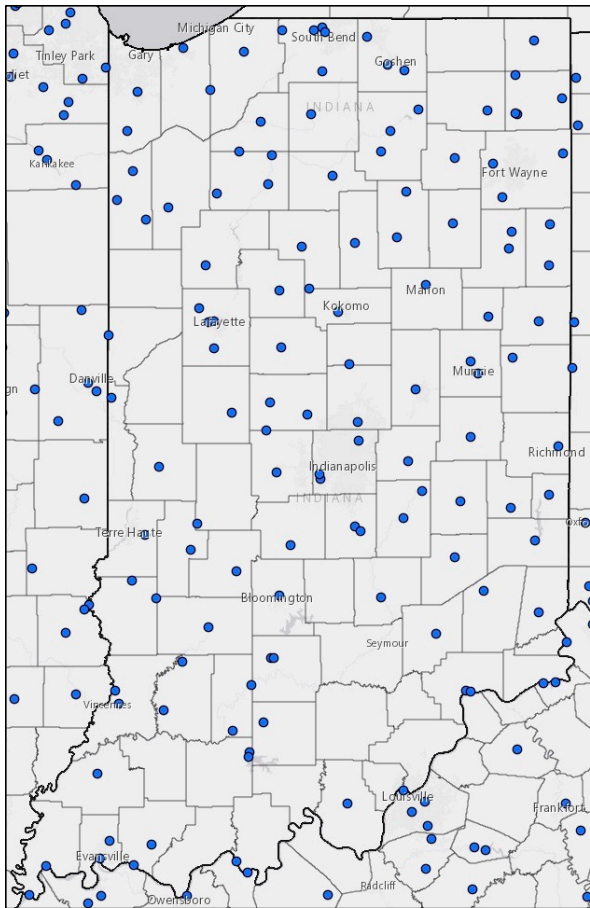


WEATHERYOURWAY  
.COM  
THE OFFICIAL DEALER for CoCoRaHS

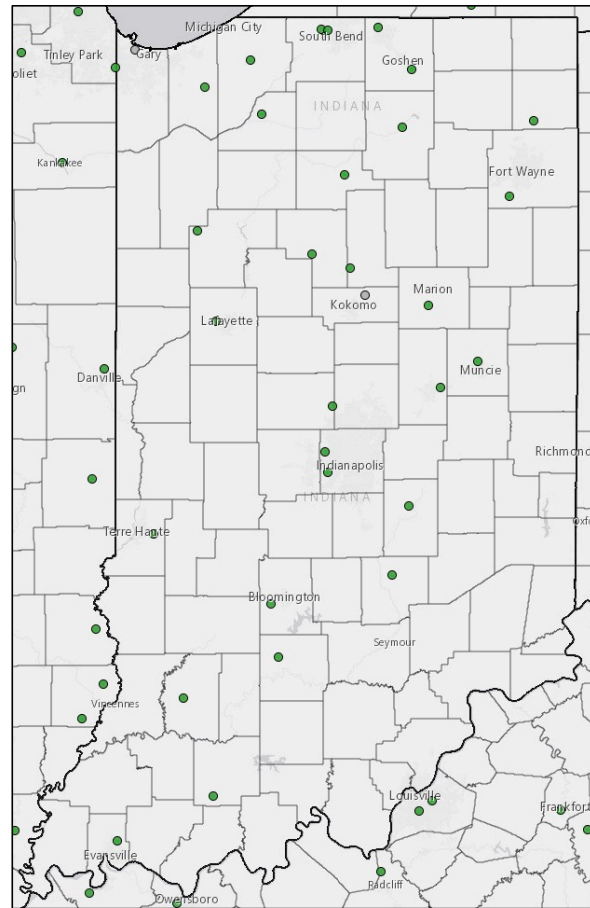


# Observation

NWS Cooperative Observer Network



ASOS / AWOS

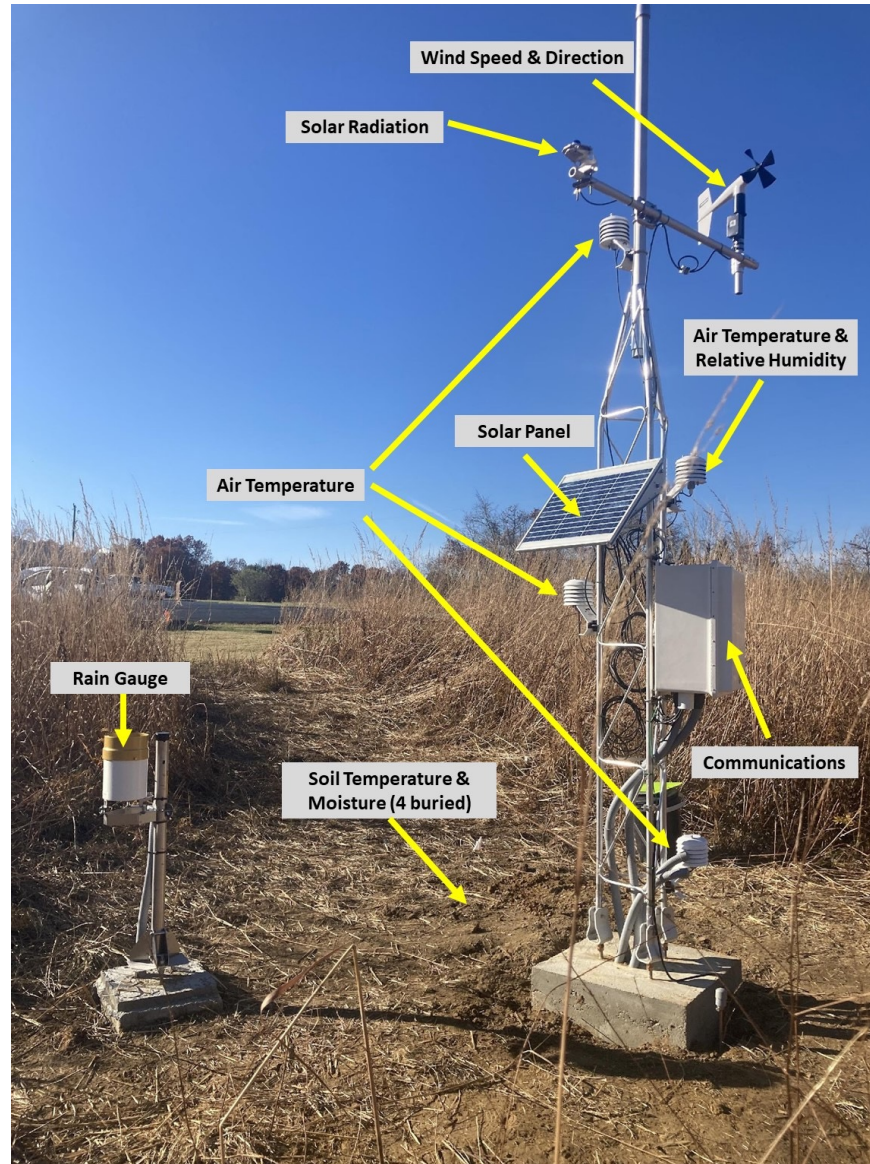


# PURDUE MESONET

A mesoscale network of high-quality, research-grade **weather stations**

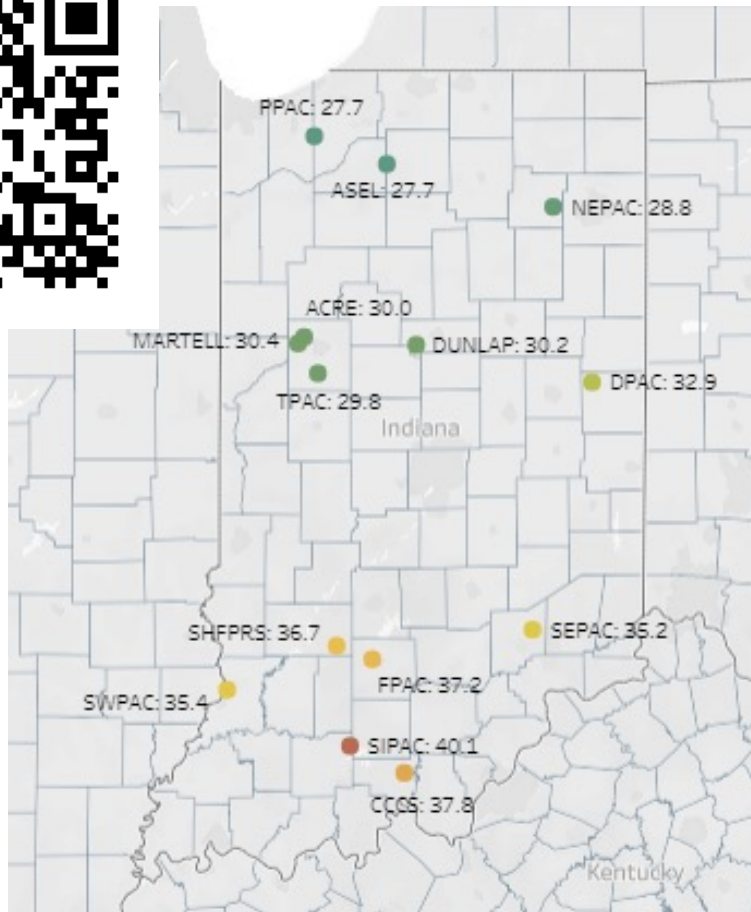
## About the Purdue Mesonet

- Maintain 15 Purdue Mesonet stations across Indiana, measuring real-time weather



Air Temp (°F)  
0.5 m Air Temp (°F)  
1.5 m Air Temp (°F)  
3 m Air Temp (°F)  
Inversion Strength (°F)  
Relative Humidity (%)  
24 hr Total Precipitation (in)  
Solar Radiation (kW/m<sup>2</sup>)  
Wind Speed (mph)  
Wind Direction (°)  
Wind Gust (mph)  
4" Bare Soil Temp (°F)  
4" Grass Soil Temp (°F)  
2" Soil Temp (°F)  
2" Soil Water Content (%)  
4" Soil Temp (°F)  
4" Soil Water Content (%)  
8" Soil Temp (°F)  
8" Soil Water Content (%)  
20" Soil Temp (°F)  
20" Soil Water Content (%)

# Useful Tools: IN-SCO – Purdue Mesonet



## Recent Conditions at SHFPRS (as of Jan 22 at 12:00 PM LST)

Air Temperature (°F)	36.7
Wind Speed (mph)	2.9
Wind Gust (MPH)	11.2
Wind Direction (°)	218
Dewpoint Temperature (°F)	17.2
4" Soil Temperature (°F)	33.6

## Past 24 Hours at SHFPRS

Avg. Air Temperature (°F)	23.9
Maximum Air Temperature (°F)	36.7
Minimum Air Temperature (°F)	18.3
Total Precipitation (in.)	0.02
Avg. 4" Soil Temp (°F)	33.6
Avg. Dewpoint Temperature (°F)	11.4

## Past 7 Days at SHFPRS

Avg. Air Temperature (°F)	13.9
Maximum Air Temperature (°F)	36.7
Minimum Air Temperature (°F)	-6.2
Total Precipitation (in.)	0.03

## Past 30 Days at SHFPRS

Avg. Air Temperature (°F)	29.4
Maximum Air Temperature (°F)	63.5
Minimum Air Temperature (°F)	-6.2
Total Precipitation (in.)	4.67

## Station ID

SHFPRS

[Go to Data Selector](#)

[Go to Map View](#)



PURDUE MESONET

## Start Time

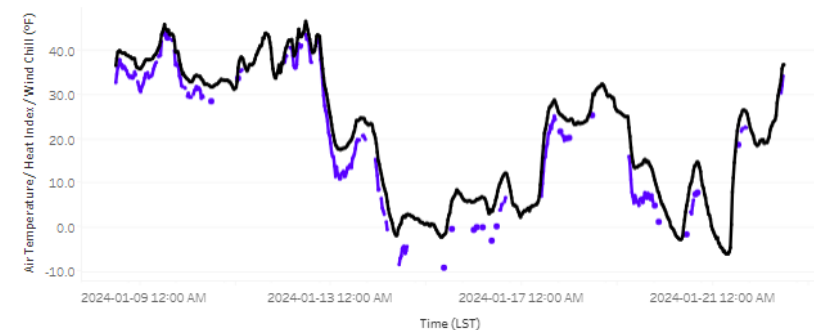
2024-01-08 12:00 PM

## End Time

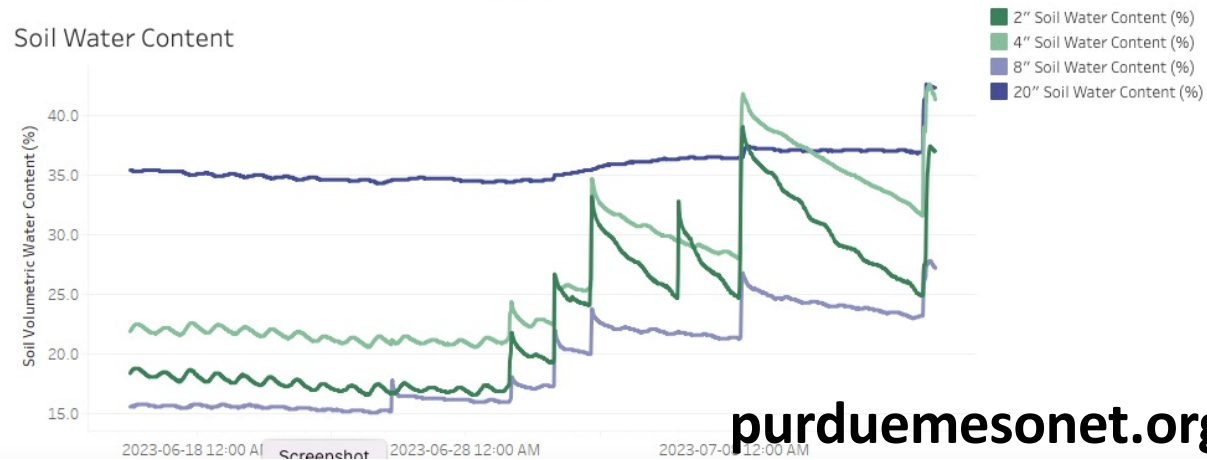
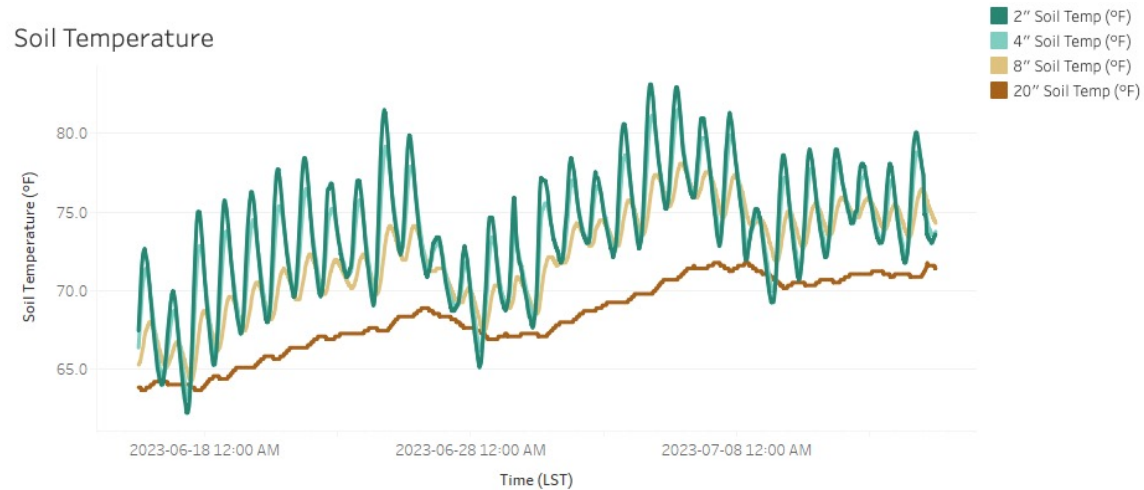
2024-01-22 12:00 PM

## Air Temperature / Heat Index / Wind Chill at SHFPRS

(Note: Wind chill is displayed only if air temperature is at or below 50°F and wind speed is greater than 3 miles per hour. Heat index is displayed only if air temperature is at or above 80°F.)



# Useful Tools: IN-SCO – Purdue Mesonet



[purduemesonet.org](http://purduemesonet.org)

# Useful Tools: IN-SCO – Purdue Mesonet

Lower-Level Inversion at ACRE



[purduemesonet.org](http://purduemesonet.org)

# Goals and Needs of the Mesonet

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- Expand network (under new umbrella)
  - *At least 1 station per county*
  - *Prioritize agricultural areas*
  - *Fill in spatial gaps*
- Identify communities in need
- Continue adding value
  - *Develop climatologies, perspectives*
  - *Integrate forecasts*
  - *Integrate alert system*
- *Integrate new tools and standards*
  - *Snow monitoring*
  - *Cameras*
  - *10-m towers*



**MESONET**

**Indiana State Climate Office  
Indiana Geological & Water Survey**

**[indianamesonet.org](http://indianamesonet.org)**

# Pesticide Application Considerations

## What are the factors that affect drift?

### Spray Characteristics

- Chemical properties
  - Volatility (How quickly changes to gas phase)
  - Water solubility
  - Persistence
- Drop size

### Equipment

- Nozzle size, type, pressure, height of release

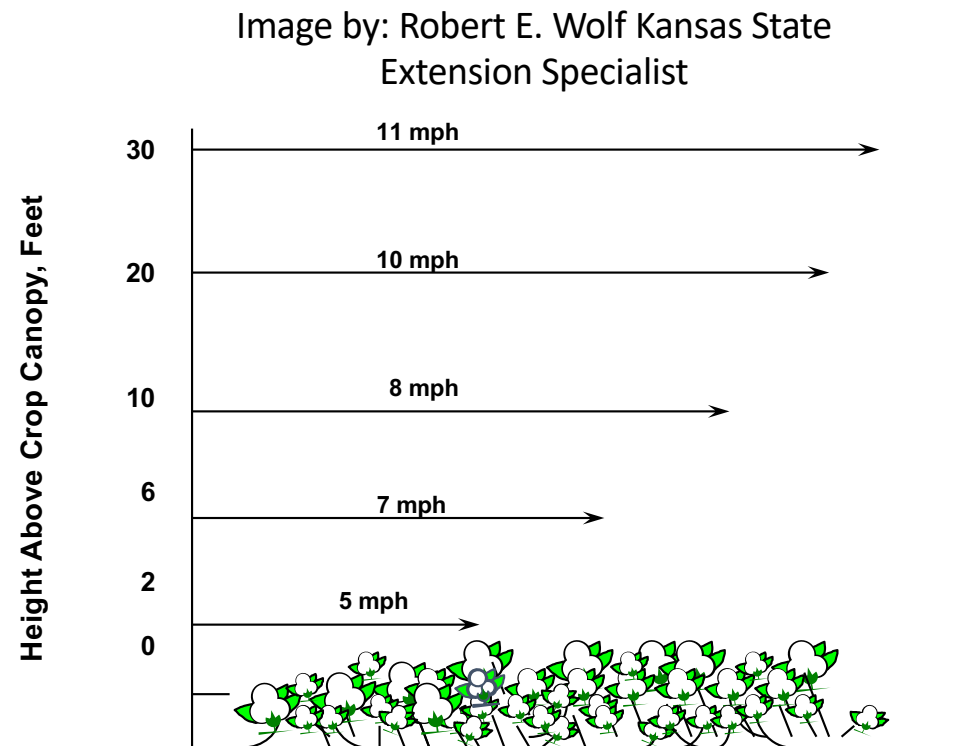
### Environmental Conditions

- Wind
- Temperature and humidity
- Temperatures increasing with height (Inversion)

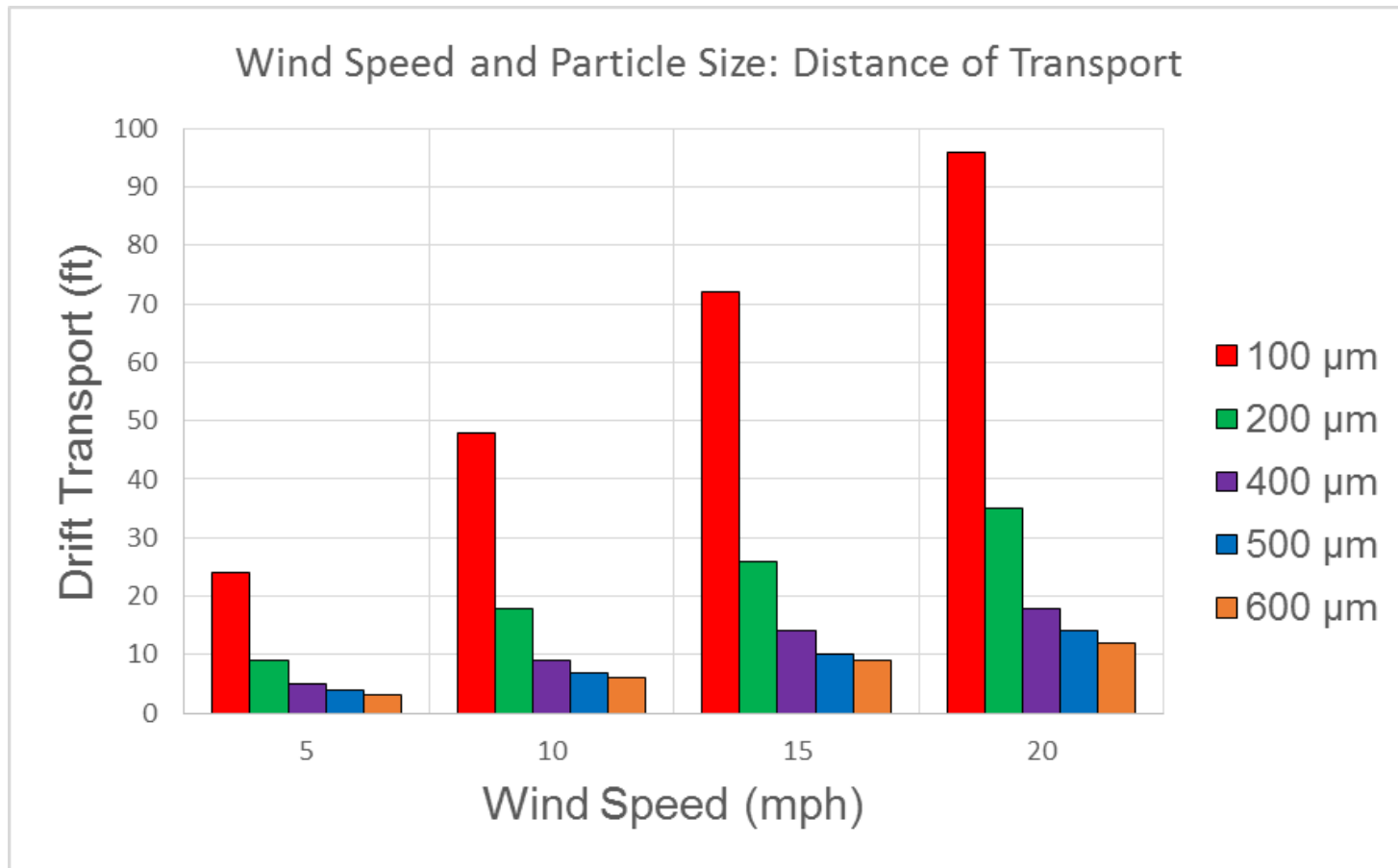


# Pesticide Application Considerations

- Current of air originating from a focused direction
- Not consistent with height
- Best application during 3 to 10 mph winds



# Pesticide Application Considerations



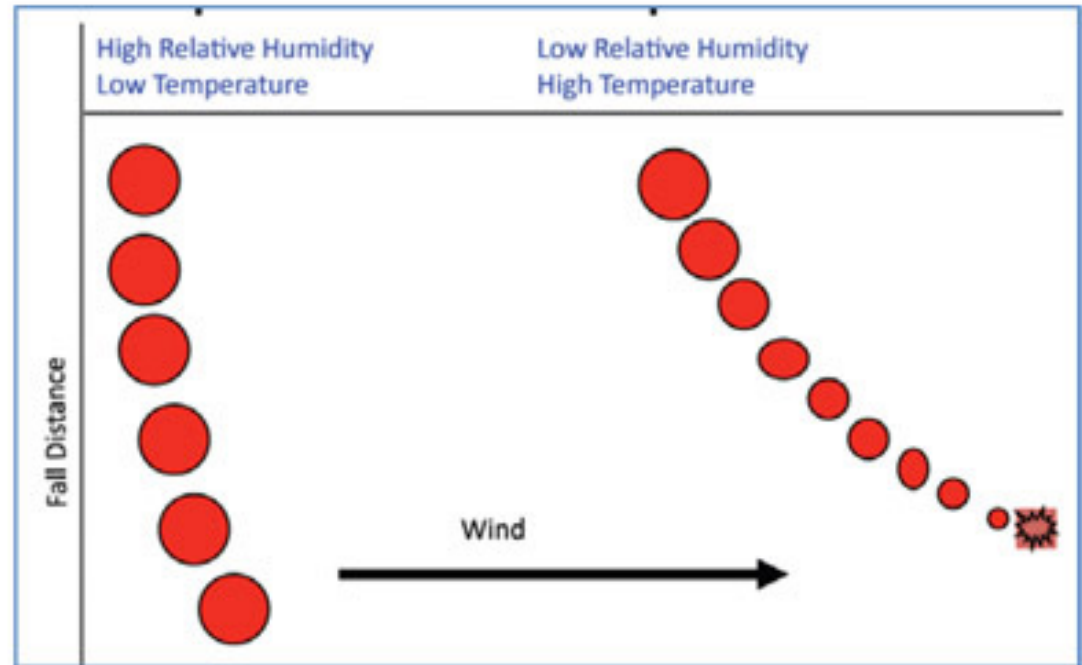
Boom Height: 3 feet

# Pesticide Application Considerations

## Evaporation of Droplets

### Temperature & Relative Humidity

- High temperature and low relative humidity
  - Much faster evaporation, smaller particles into the air
- **LIMITS**
  - Temperature: <77°F
  - Relative Humidity: >40%

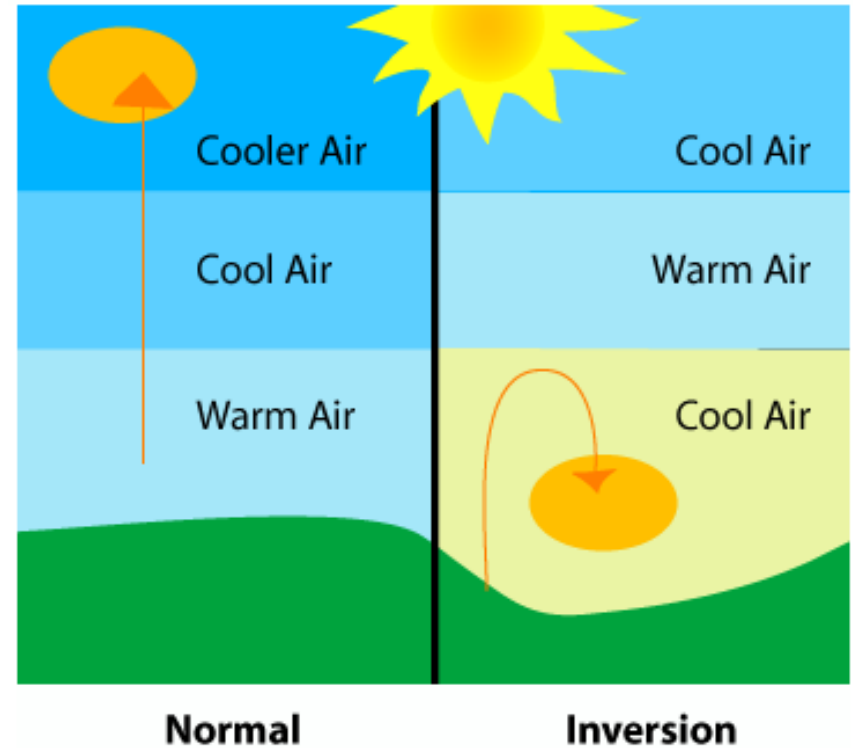


<http://crops.extension.iastate.edu/cropnews/2009/06/spray-drift-potential-increases-during-warm-weather-applications>

# Pesticide Application Considerations

## Temperature Inversions

- Temperature in the atmosphere increasing with height from the surface
- Very stable atmosphere
- Wind < 3 mph



<http://www.infinidim.org/temperature-inversions-and-takeoff-performance-calculation>

# Pesticide Application Considerations

## Temperature Inversions

- Likely present if:
  - Mist, fog, dew, or frost
  - Low hanging smoke that moves parallel to the ground
  - Large temperature swings from maximum and minimum temperatures
  - Clear skies after a day that was primarily sunny
  - Sounds travel through the air much further
  - Calm winds

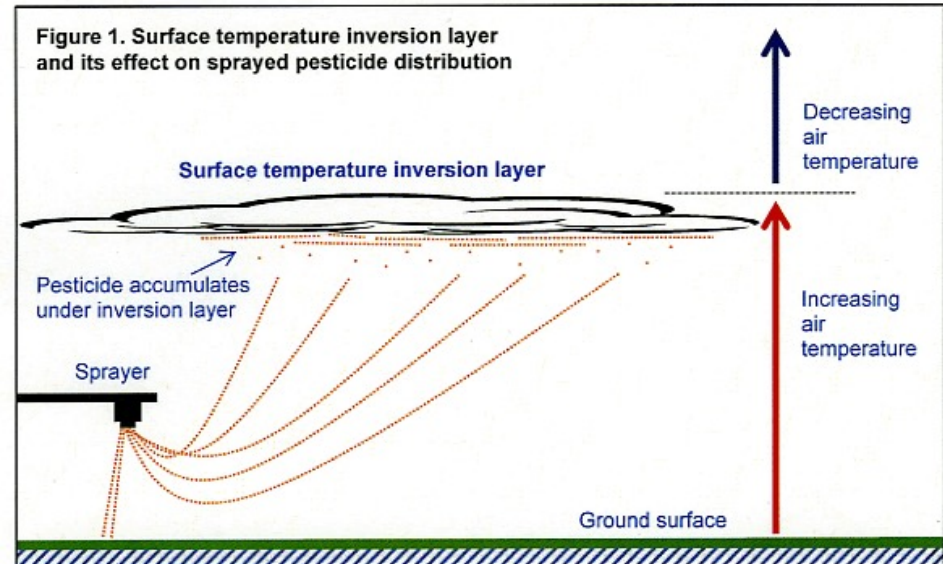
# Pesticide Application Considerations



[https://en.wikipedia.org/wiki/Inversion\\_\(meteorology\)#/media/File:SmokeCeilingInLochcarron.jpg](https://en.wikipedia.org/wiki/Inversion_(meteorology)#/media/File:SmokeCeilingInLochcarron.jpg)



## Inversion Drift

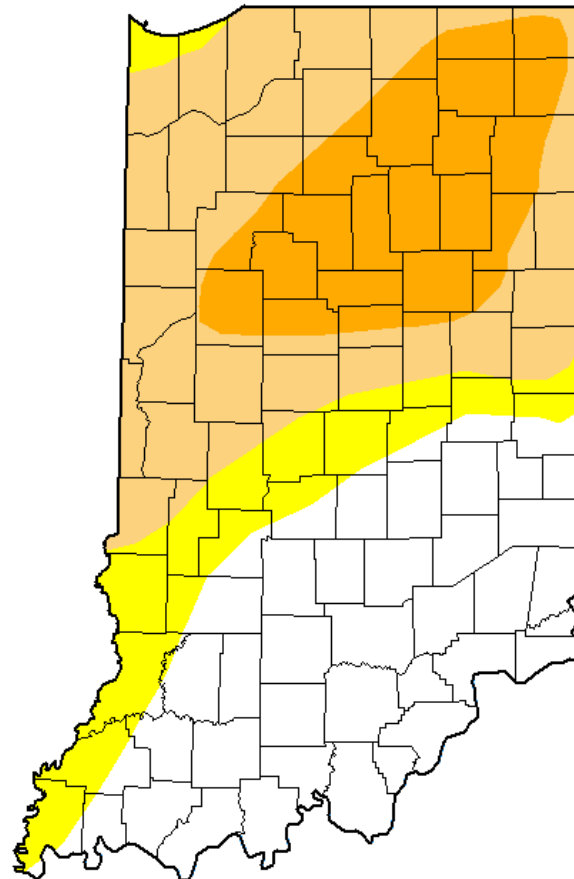


<http://agriculture.vic.gov.au/agriculture/farm-management/chemical-use/agricultural-chemical-use/spraying-spray-drift-and-off-target-damage/surface-temperature-inversions>

# Drought Input

## U.S. Drought Monitor Indiana

**December 10, 2024**  
(Released Thursday, Dec. 12, 2024)  
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	36.37	63.63	50.15	19.71	0.00	0.00
<b>Last Week</b> <small>12-03-2024</small>	45.03	54.97	50.06	17.88	0.00	0.00
<b>3 Months Ago</b> <small>09-10-2024</small>	8.02	91.98	50.50	0.98	0.00	0.00
<b>Start of Calendar Year</b> <small>01-02-2024</small>	10.70	89.30	81.12	12.88	0.00	0.00
<b>Start of Water Year</b> <small>10-01-2024</small>	6.65	93.35	17.54	0.11	0.00	0.00
<b>One Year Ago</b> <small>12-12-2023</small>	1.92	98.08	54.15	7.61	0.00	0.00

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>*

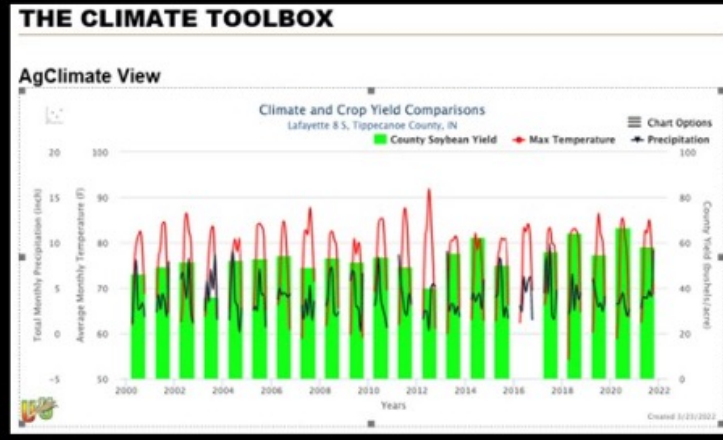
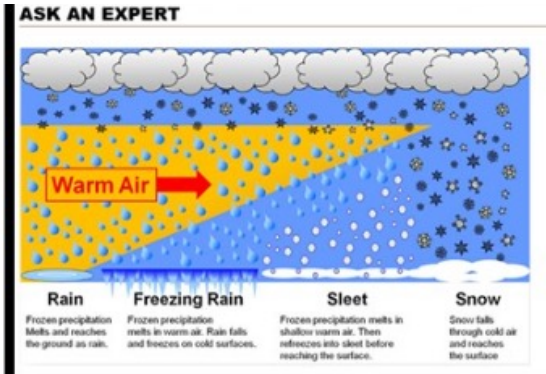
Author:

Curtis Riganti  
National Drought Mitigation Center



[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)

# Newsletter Signup

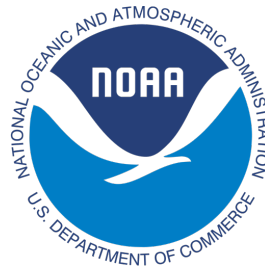




# Outlook



**MRCC**  
Midwestern Regional  
Climate Center

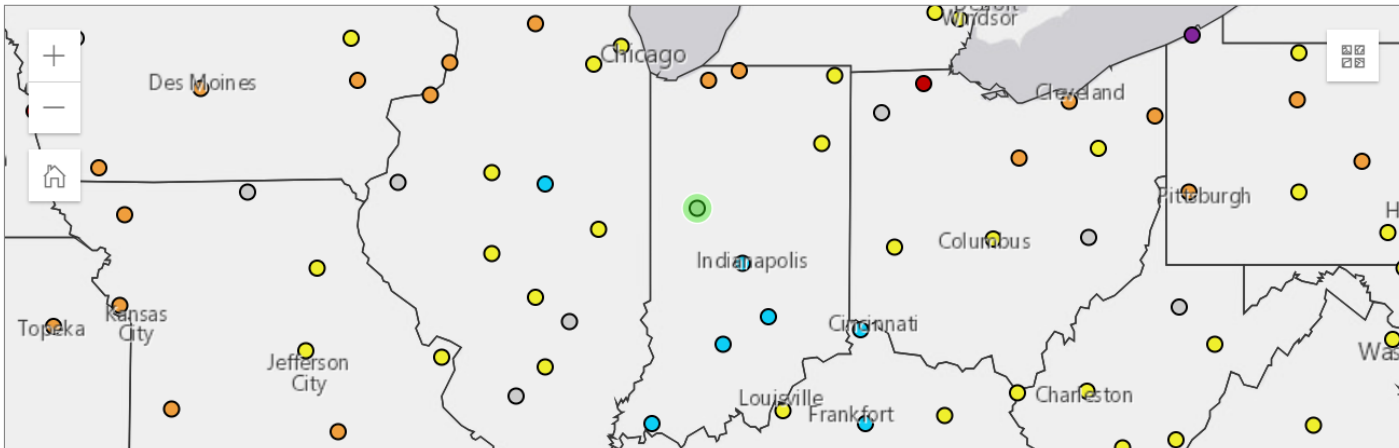


**P**  
**PURDUE**  
**UNIVERSITY**  
Indiana State Climate Office

**AWSSI Category**

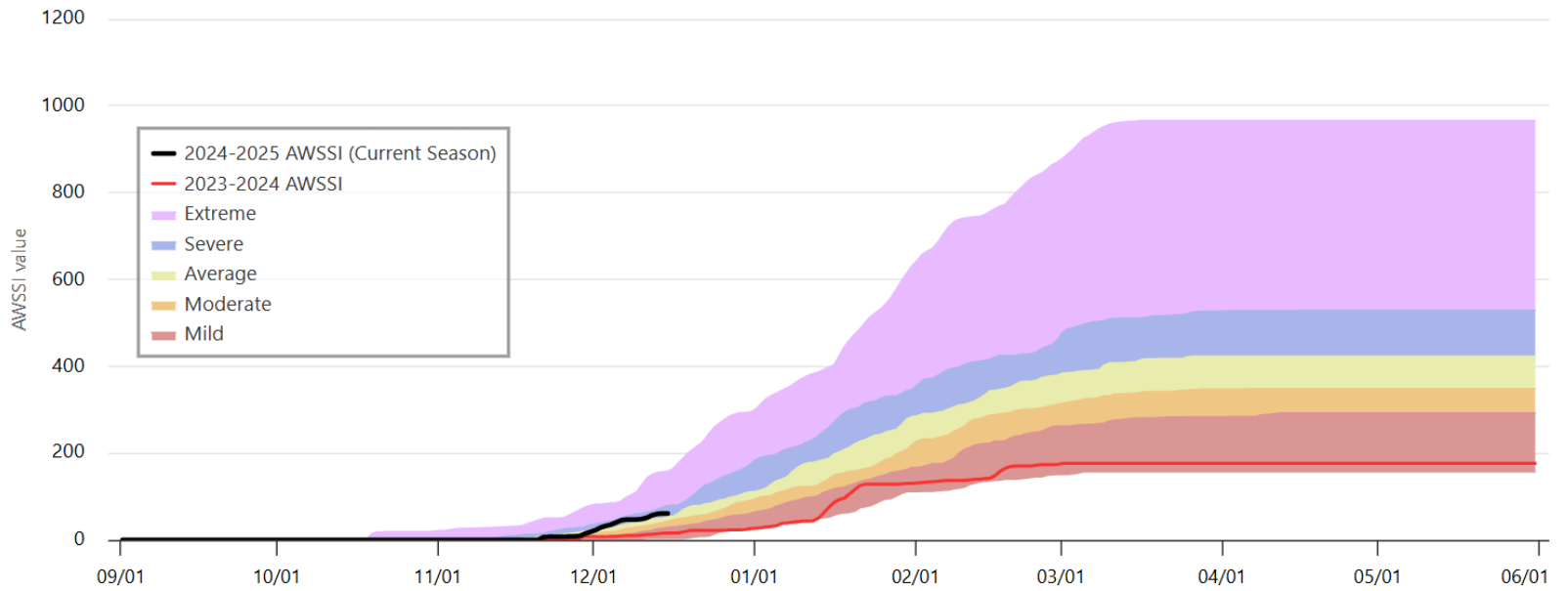
- Extreme
- Severe
- Average
- Moderate
- Mild
- Not current
- Record

**Data Last Updated:**  
12/17/2024 05:20 CST



### 2024-2025 AWSSI: "IN - Indianapolis"

Season: 2024-11-21 to 2024-12-15, 25 days

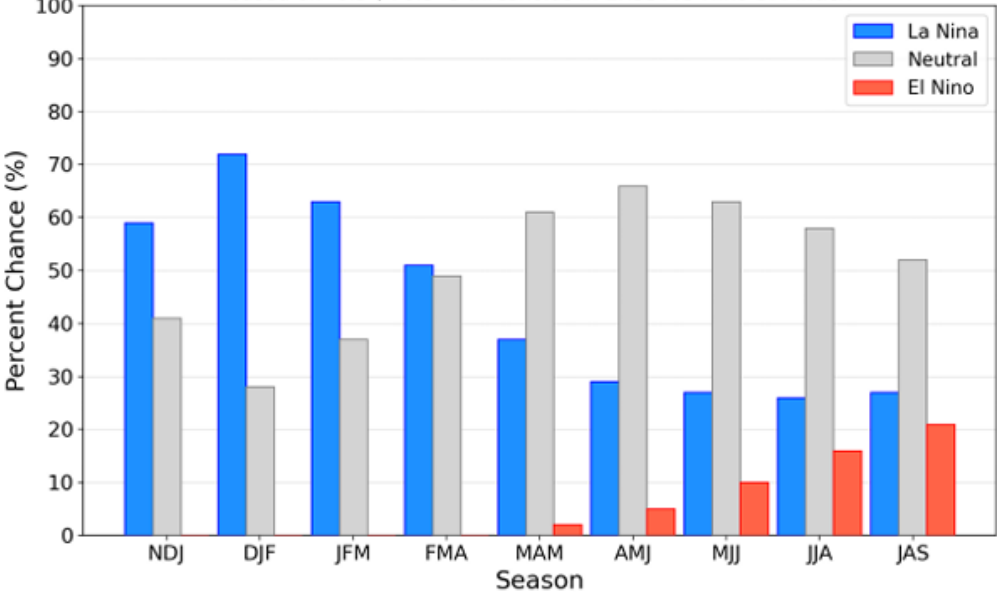


# ENSO Alert System Status: La Niña Watch

**Synopsis:** La Niña conditions are most likely to emerge in November 2024 - January 2025 (59% chance), with a transition to ENSO-neutral most likely by March-May 2025 (61% chance).

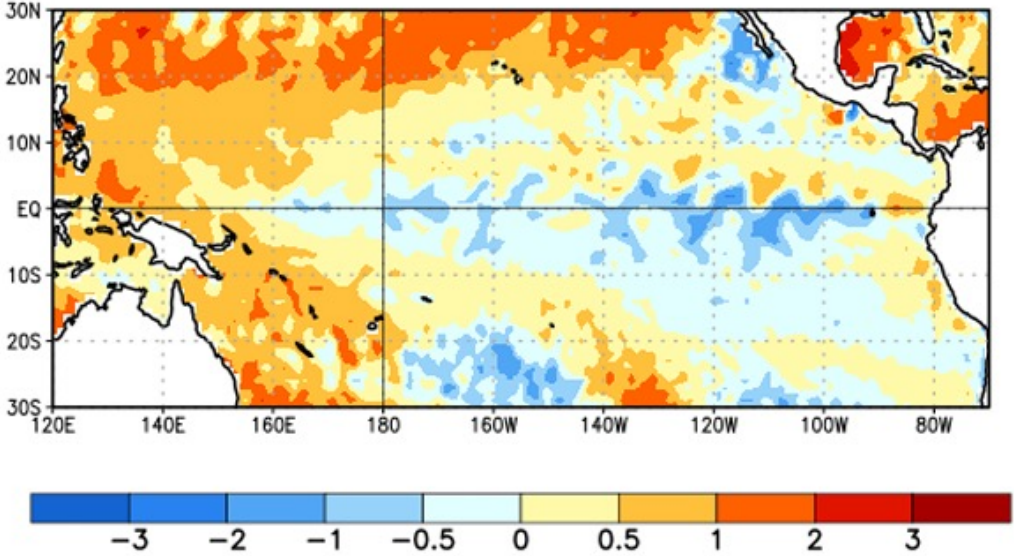
Official NOAA CPC ENSO Probabilities (issued December 2024)

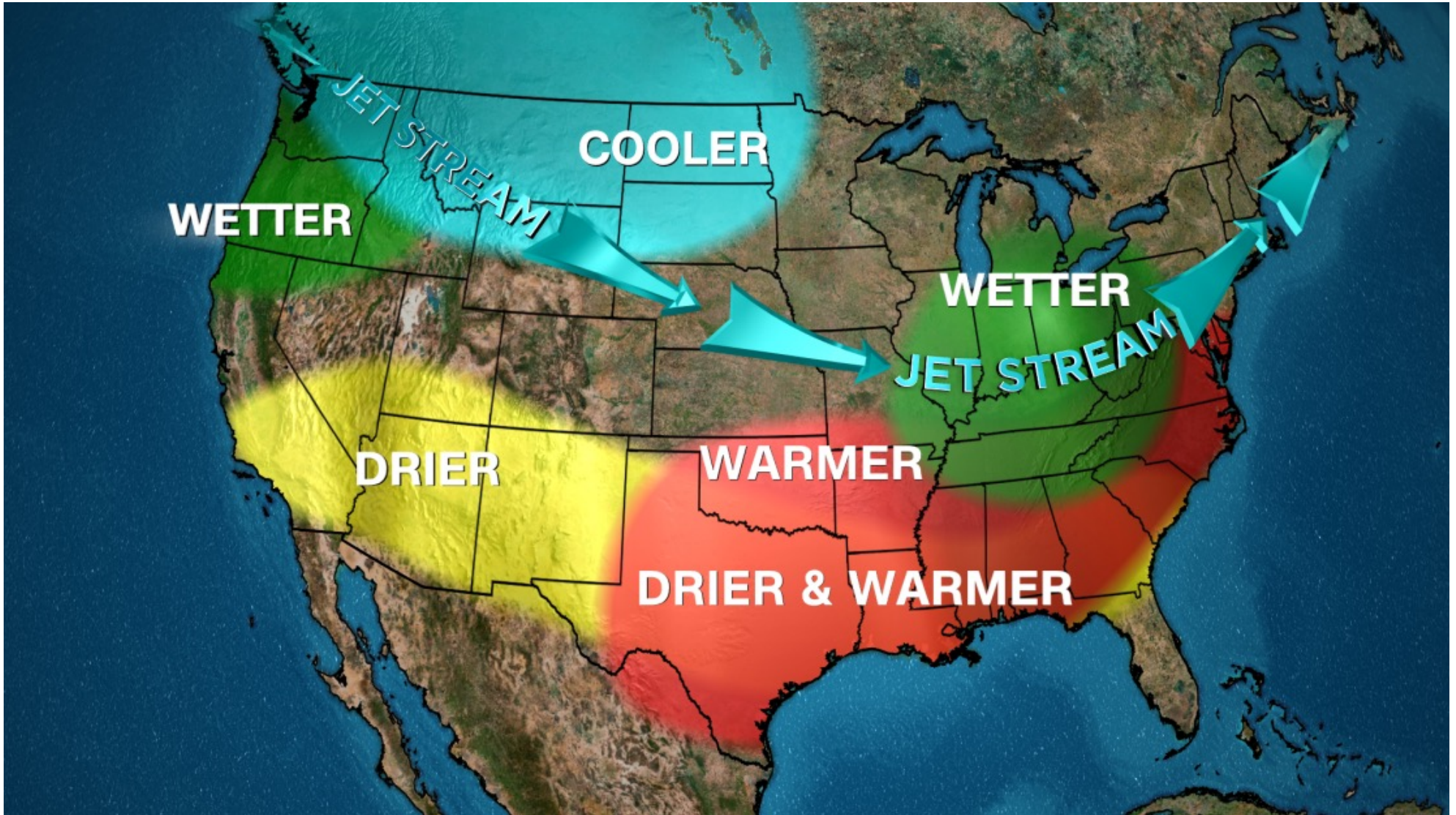
based on  $-0.5^{\circ}/+0.5^{\circ}\text{C}$  thresholds in ERSSTv5 Niño-3.4 index

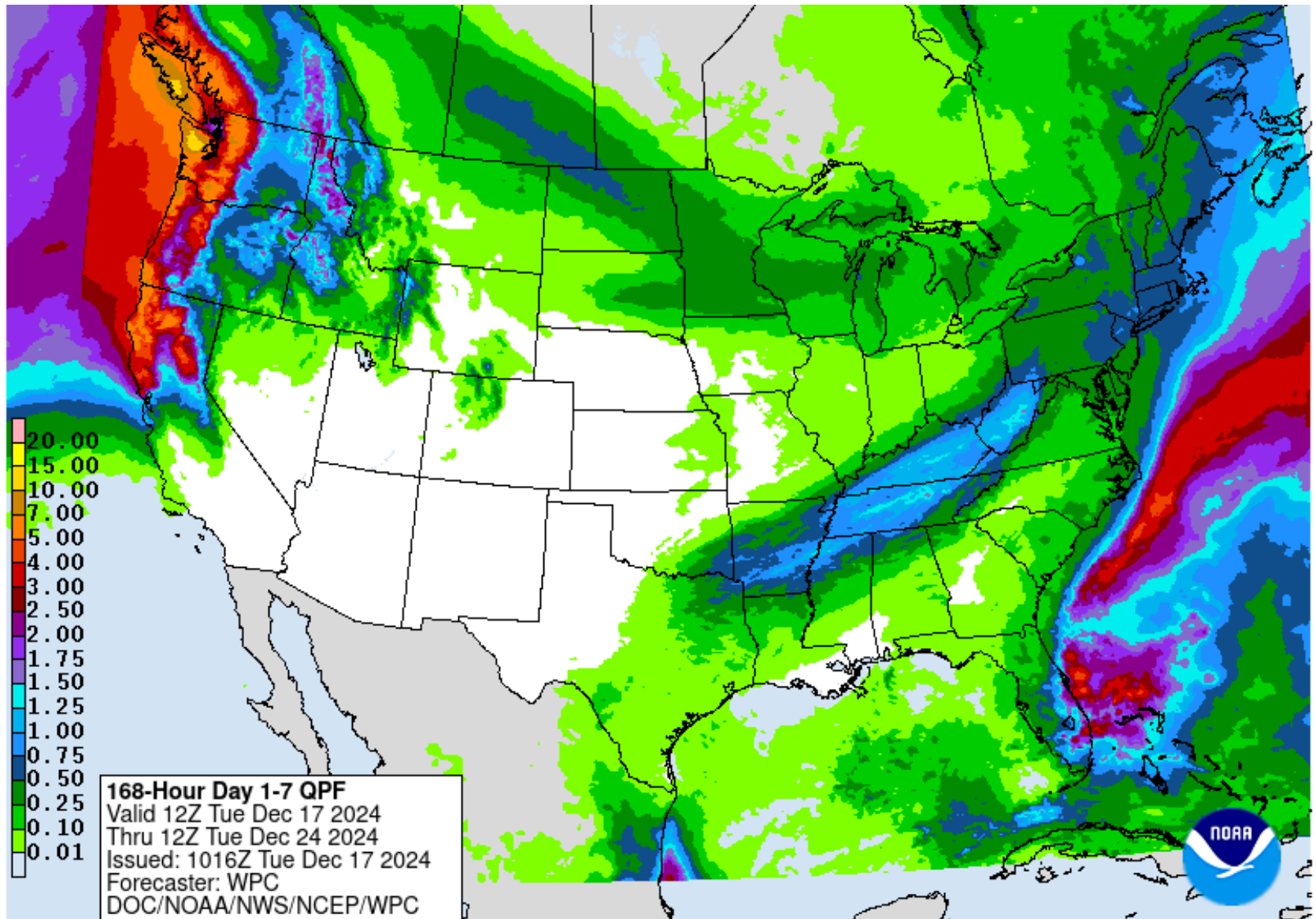


SST Anomalies ( $^{\circ}\text{C}$ )

04 DEC 2024





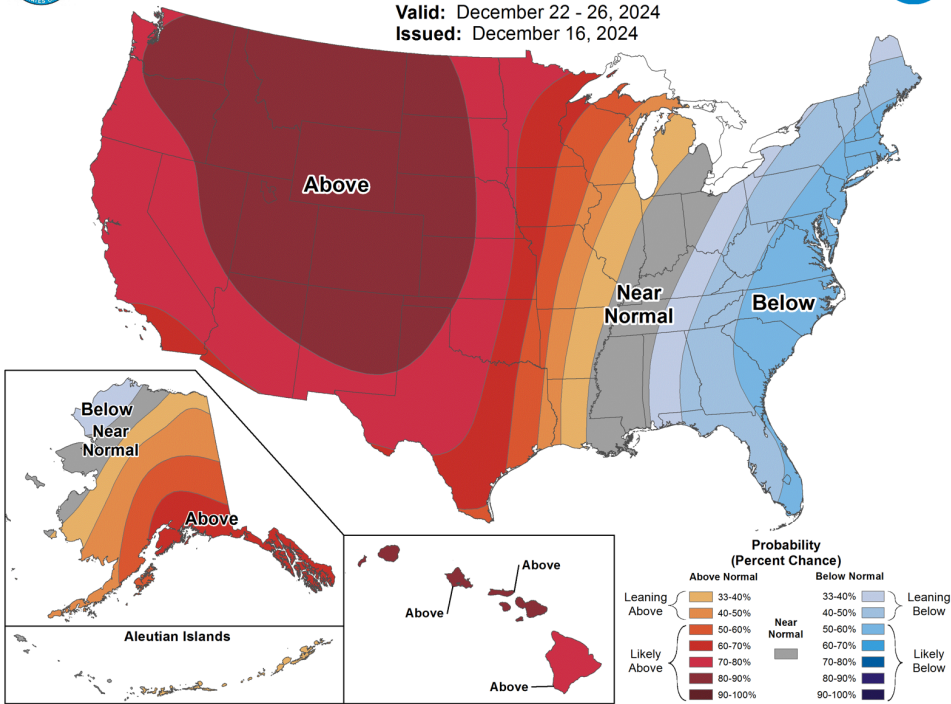




# 6-10 Day Temperature Outlook



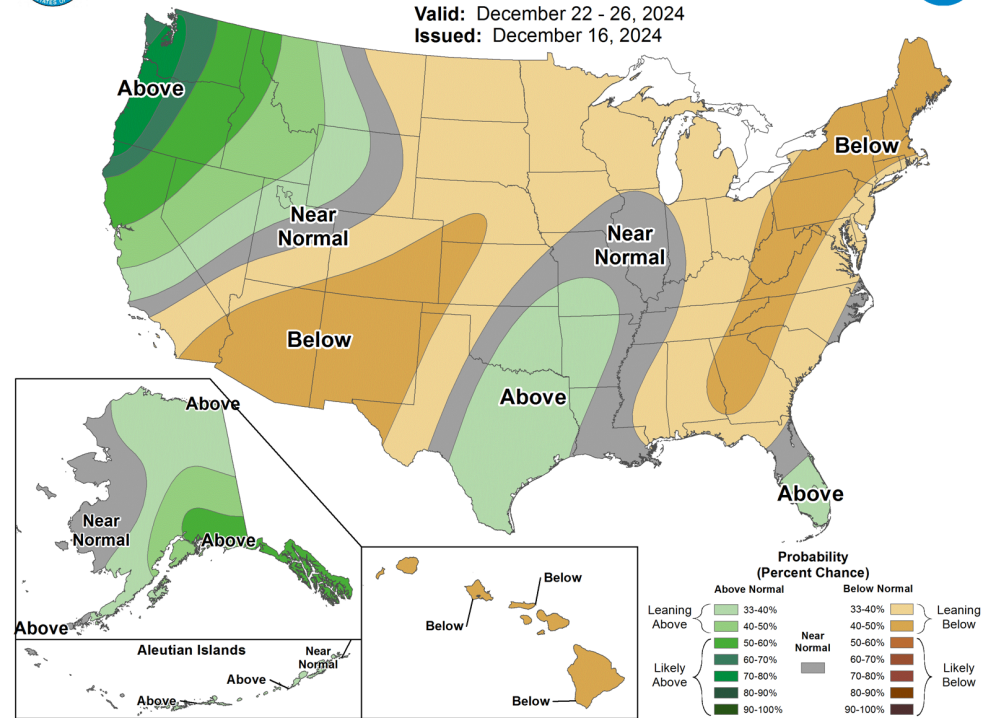
Valid: December 22 - 26, 2024  
Issued: December 16, 2024



# 6-10 Day Precipitation Outlook



Valid: December 22 - 26, 2024  
Issued: December 16, 2024





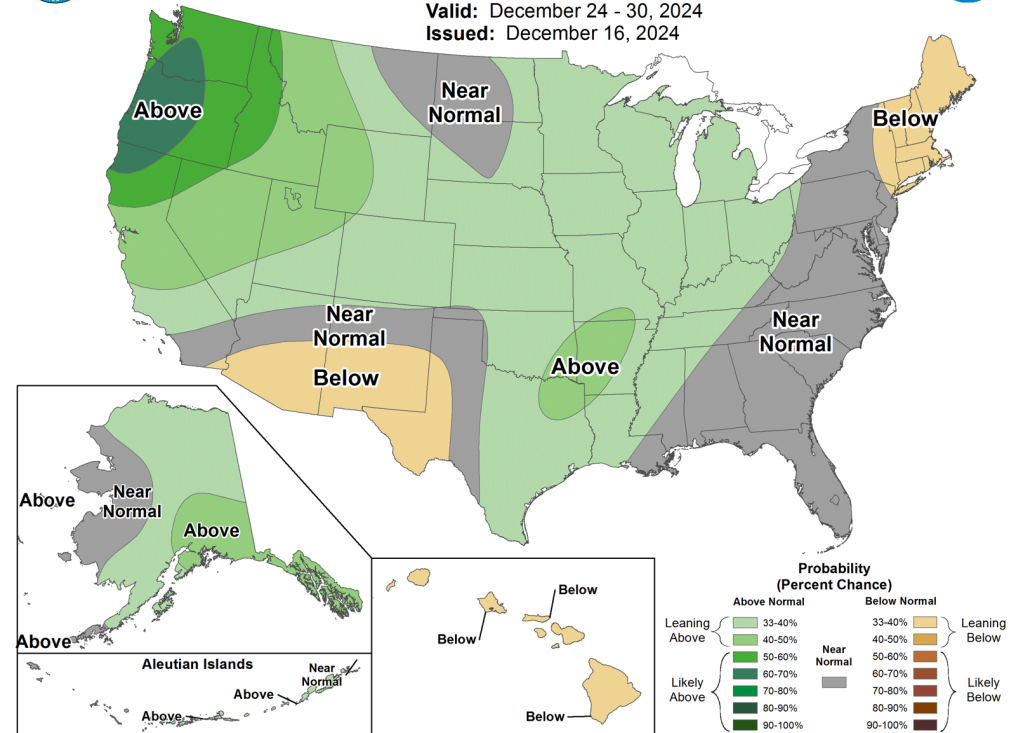
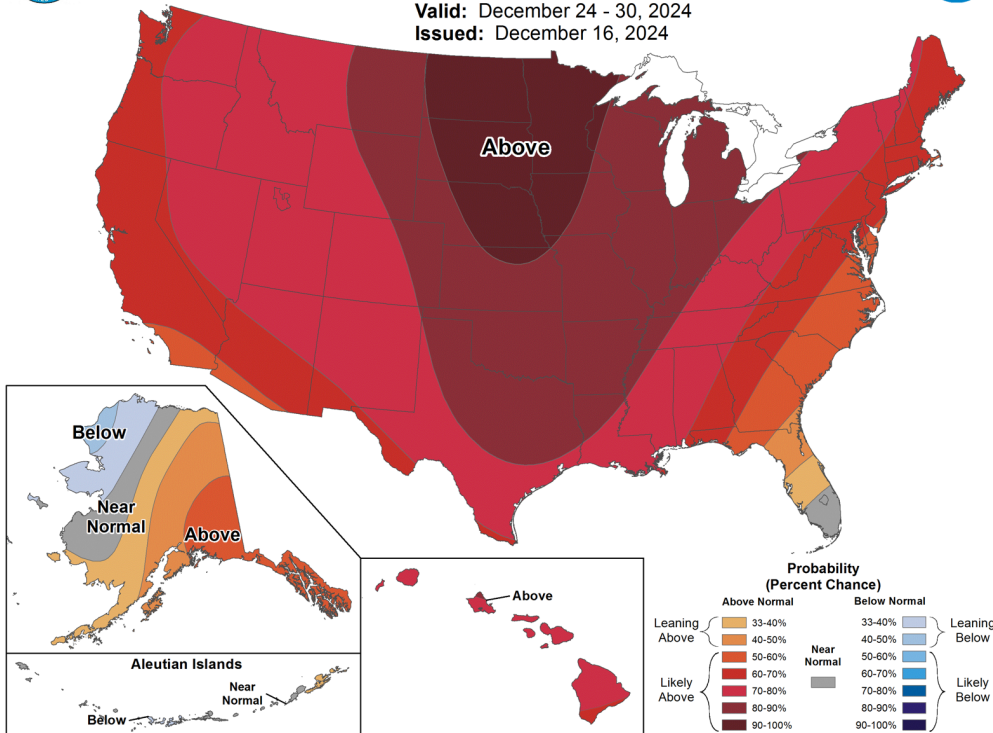
# 8-14 Day Temperature Outlook

Valid: December 24 - 30, 2024  
Issued: December 16, 2024



# 8-14 Day Precipitation Outlook

Valid: December 24 - 30, 2024  
Issued: December 16, 2024

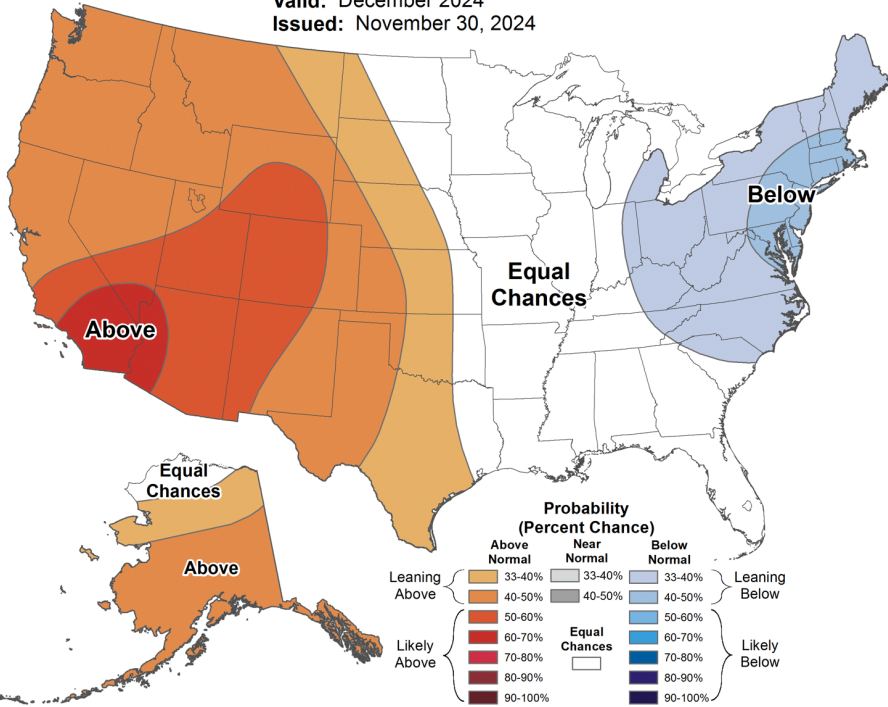




# Monthly Temperature Outlook



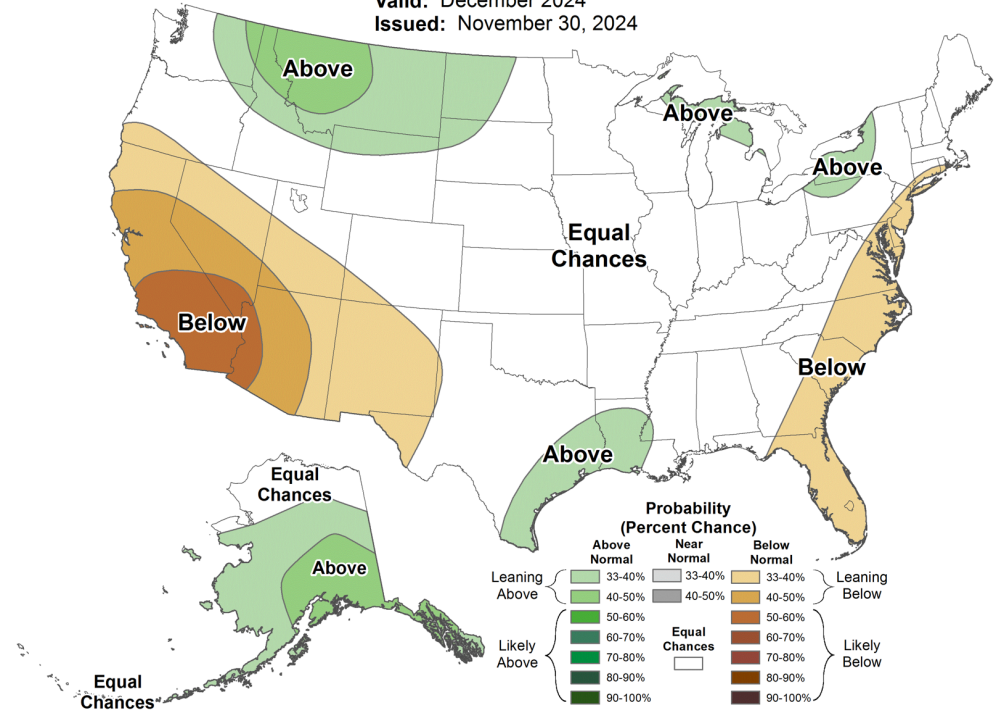
Valid: December 2024  
Issued: November 30, 2024



# Monthly Precipitation Outlook



Valid: December 2024  
Issued: November 30, 2024



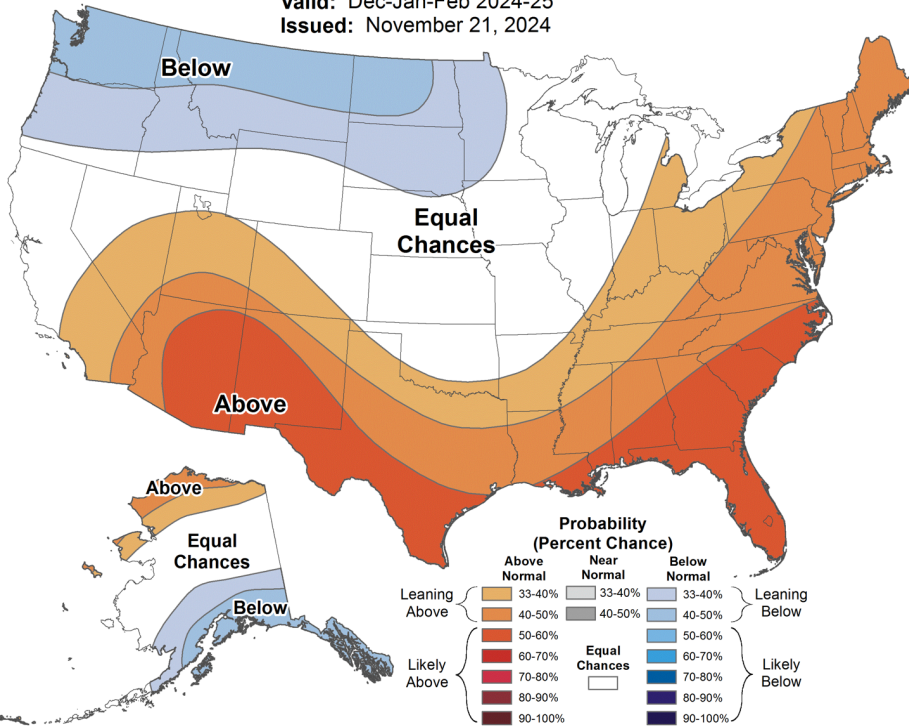




# Seasonal Temperature Outlook



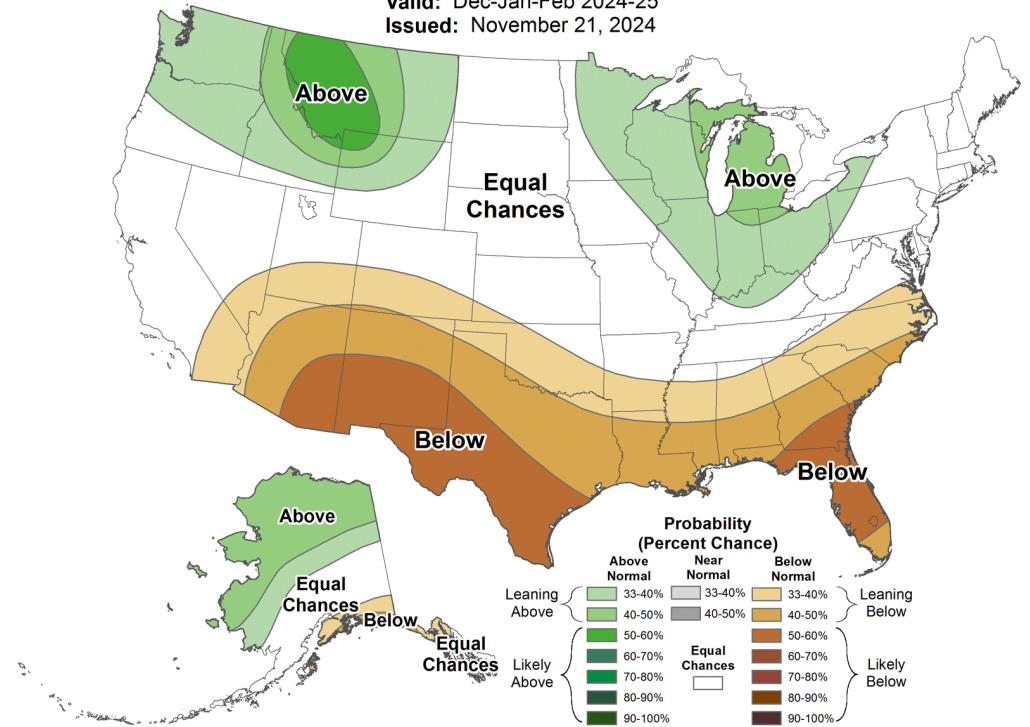
Valid: Dec-Jan-Feb 2024-25  
Issued: November 21, 2024



# Seasonal Precipitation Outlook



Valid: Dec-Jan-Feb 2024-25  
Issued: November 21, 2024



**Thank you!**

**Austin Pearson**

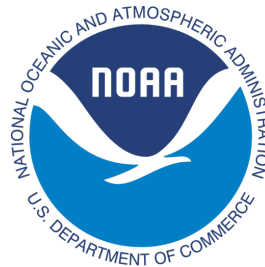
Climatologist

Midwestern Regional Climate Center/Indiana State Climate Office

pearsona@purdue.edu



**MRCC**  
Midwestern Regional  
Climate Center



**P**  
**PURDUE**  
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Indiana State Climate Office