

DROUGHT PLANNING & M

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Indiana State Climate Office

What is drought?

A lack of precipitation with resulting impacts

About *DROUGHT*

Drought –Challenges

- Challenging to define: measurements, impacts, etc.
- Difficult to monitor the onset, evolution, and demise
- Drought is “relative”, added complexity



Defining Drought

5 general drought categories:

1. Meteorological Drought: period with below-normal **precipitation** accumulation
2. Agricultural Drought: period with **soil moisture** deficiency
3. Hydrological Drought: period of **groundwater** and/or **streamflow** deficiency
4. Socioeconomic Drought: drought impacts result in effects on people through **availability of economic goods** (food, water, fuel, etc.)
5. Ecological Drought: prolonged and widespread deficit in **naturally available water supplies** that create multiple stresses across ecosystems

Drought Indicators in Indiana

- Precipitation
- Evapotranspiration & Evaporative Demand
- Soil moisture
- Streamflow/Ground Water
- Reservoir/Surface Water Level
- Snowpack
- Vegetation Health/Productivity
- Impact Reports

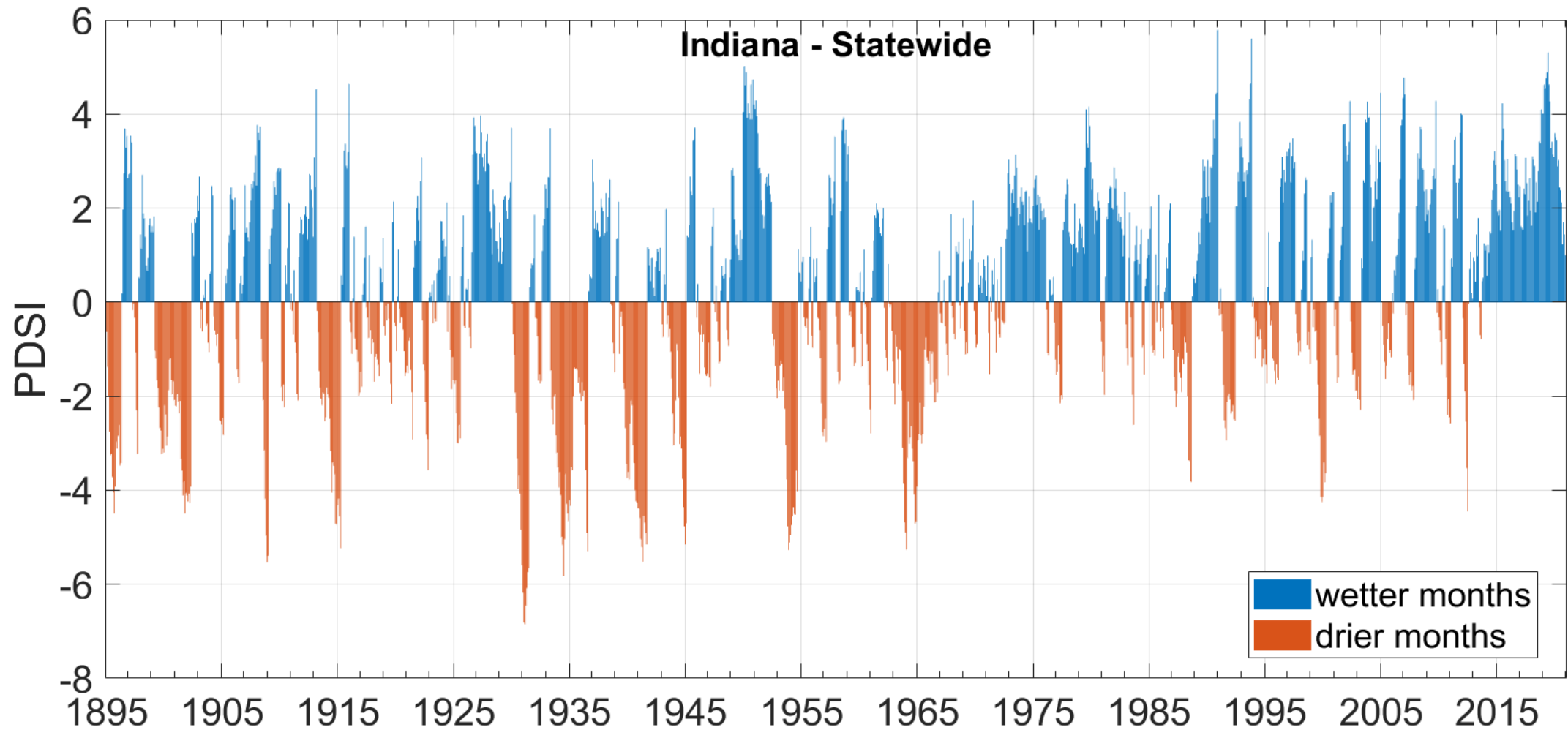
Drought Characteristics

- **Frequency:** how often drought occurs
- **Onset:** the point in time a location enters drought
- **Intensity:** magnitude of dryness and/or impacts; can be a snapshot or accumulated
- **Duration:** the time a location spends in drought
- **Extent:** the size of the geographic area(s) in drought
- **Demise:** the point in time a location is no longer in drought

There is no single indicator that can properly summarize any of these characteristics

About DROUGHT

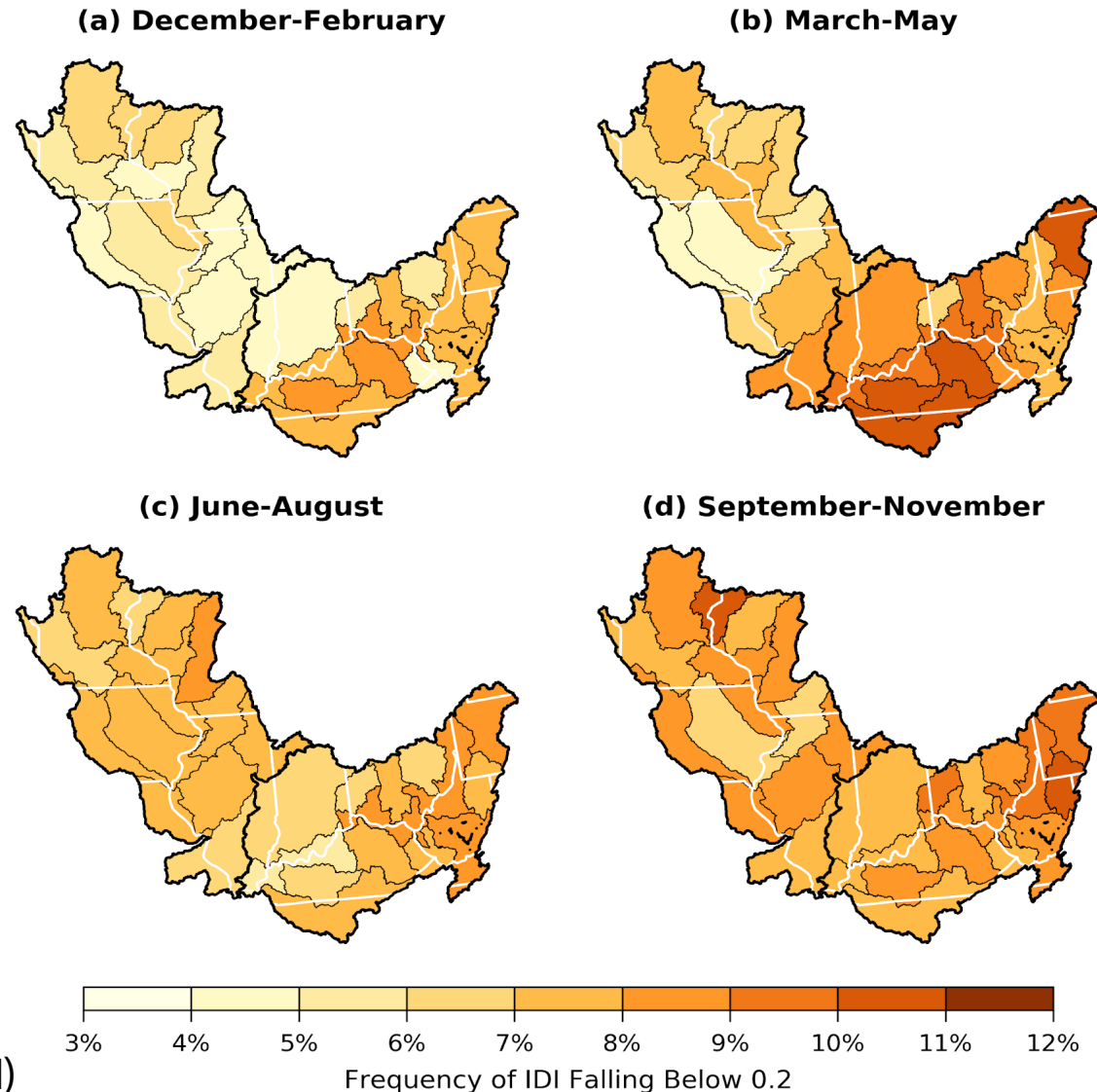
Drought Characterization



About DROUGHT

Drought Characteristics

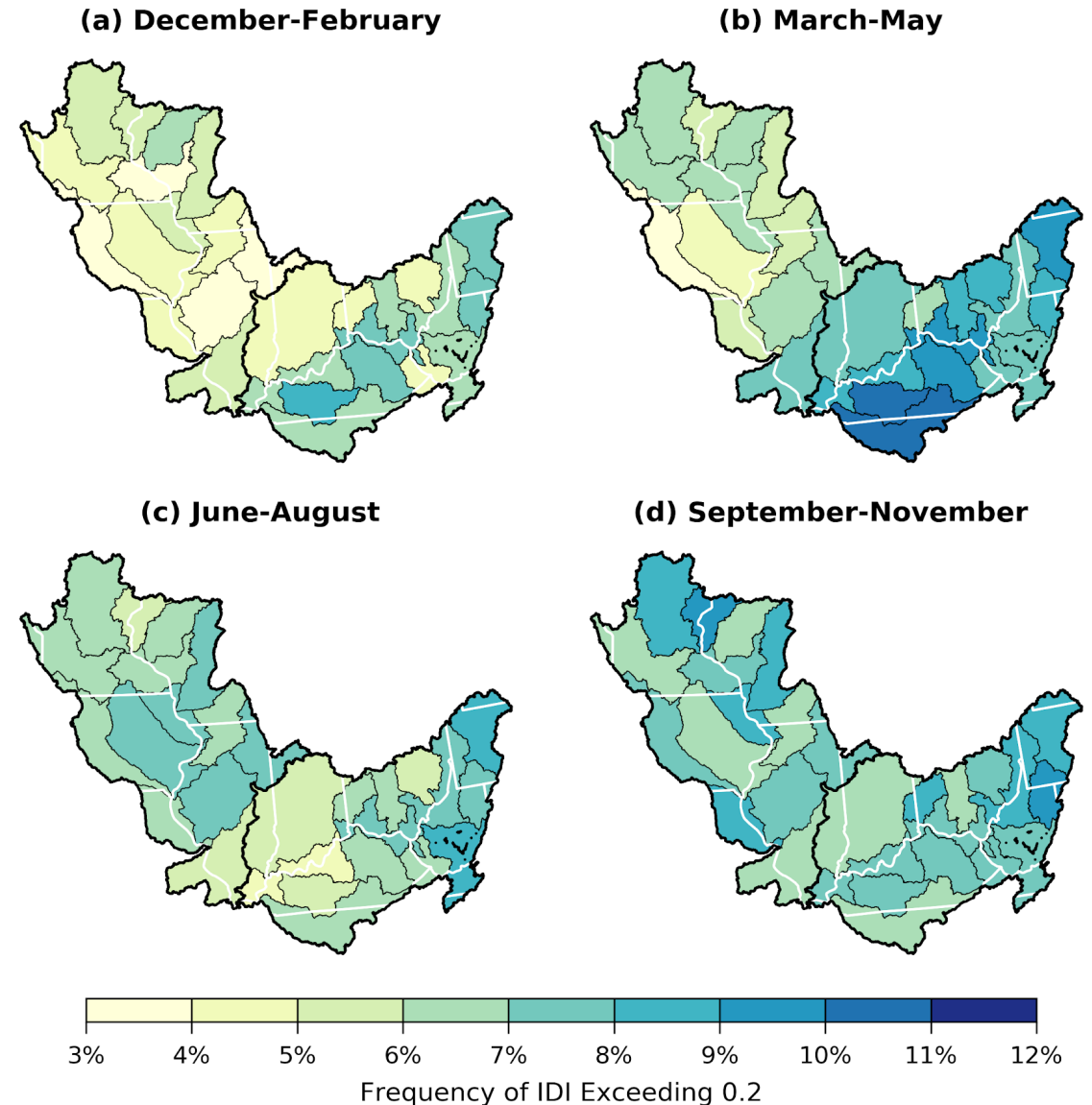
- Maps show frequency of drought onset by season across the OH and MS basins
- Drought onset is most likely in spring in all but northeast Indiana
- Winter onset is unlikely in all but far southern Indiana



About DROUGHT

Drought Characteristic

- Maps show frequency of drought demise by season across the OH and MS basins
- Drought demise is also most likely in spring; summer/fall in northern Indiana



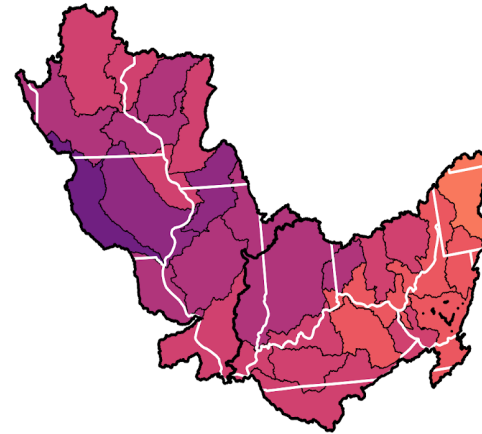
Hoell *et al.* (2021)

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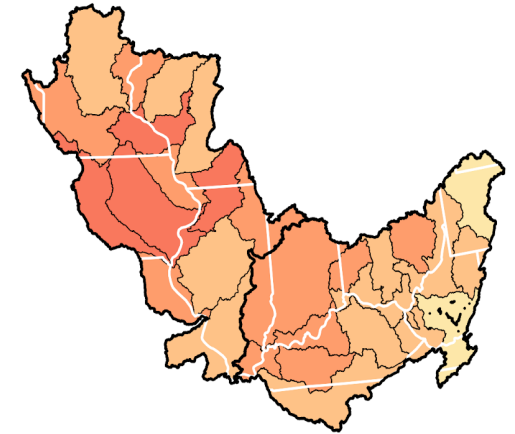
Drought Characterization

- Maps show frequency of drought by duration
- < 5% of droughts in Indiana persist for at least 6 months, < 1% at least 12 months

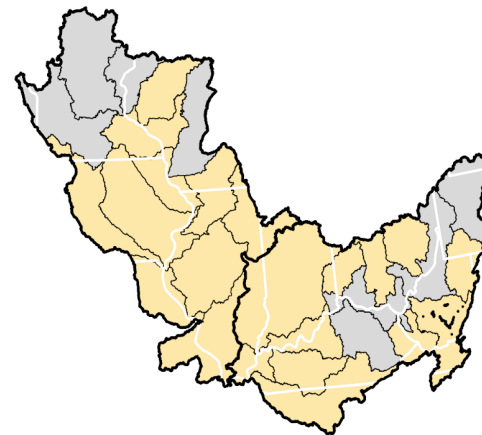
(a) At Least 2 Months



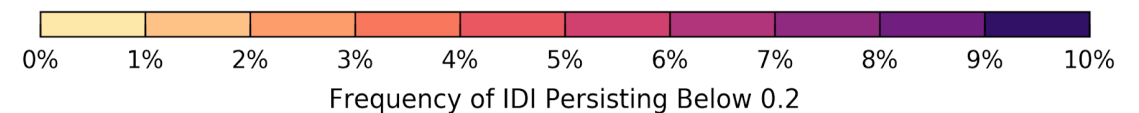
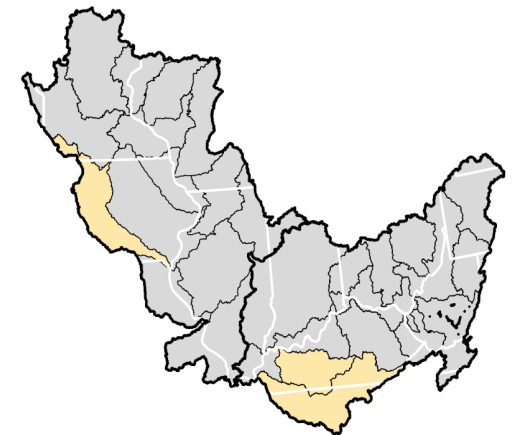
(b) At Least 6 Months



(c) At Least 12 Months



(d) At Least 18 Months

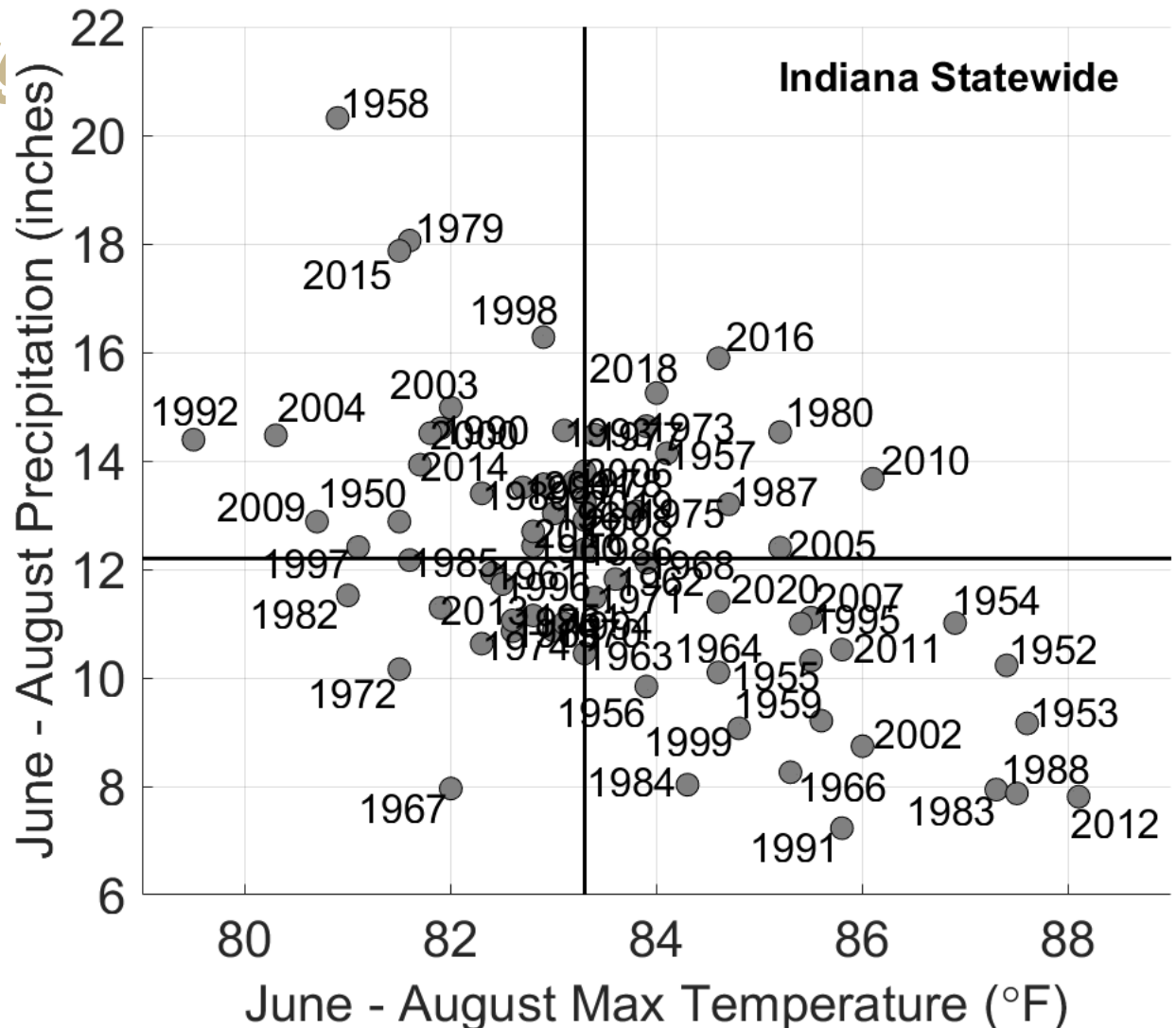


Hoell *et al.* (2021)

About DROUGHT

Dry Surface Feedback to Drought

- Subsidence, drier air reduce instability
- High evaporative demand, lack of cloud cover dries out the soil
- ET is decreased and the dry air becomes drier... higher temperatures
- 25–40% of drought persistence in the Midwest is attributed to soil moisture feedbacks



Drought Resources and Tools

NWS-Indy Drought Page

Drought Monitor Status | **Local Drought Statements** | **Recent Temp & Precip** | **Impacts** | **Water Resource** | **Forecasts & Outlooks** | **Acknowledgements**

Drought Status

US Drought Monitor Information for Indiana:

U.S. Drought Monitor
Indiana

June 15, 2021
(Released Thursday, Jun. 17, 2021)
Valid 8 a.m. EDT


Drought Conditions (Percent Area)

	None	D0-D1	D1-D2	D2-D3	D3-D4	D4
Current	79.21	23.79	0.00	0.00	0.00	0.00
Last Week (06-08-2021)	79.40	20.60	0.00	0.00	0.00	0.00
3 Months Ago (03-18-2021)	80.53	19.47	0.00	0.00	0.00	0.00
Start of Calendar Year (01-01-2021)	85.10	13.90	14.12	0.00	0.00	0.00
Start of Water Year (01-15-2021)	21.71	78.29	25.00	0.00	0.00	0.00
One Year Ago (06-18-2020)	32.45	70.54	0.00	0.00	0.00	0.00

Intensity:
None (White) | D0 Abnormally Dry (Yellow) | D1 Moderate Drought (Orange) | D2 Severe Drought (Red-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>

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National Drought Mitigation Center


droughtmonitor.unl.edu

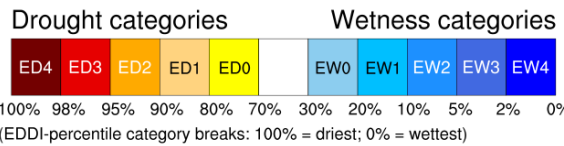
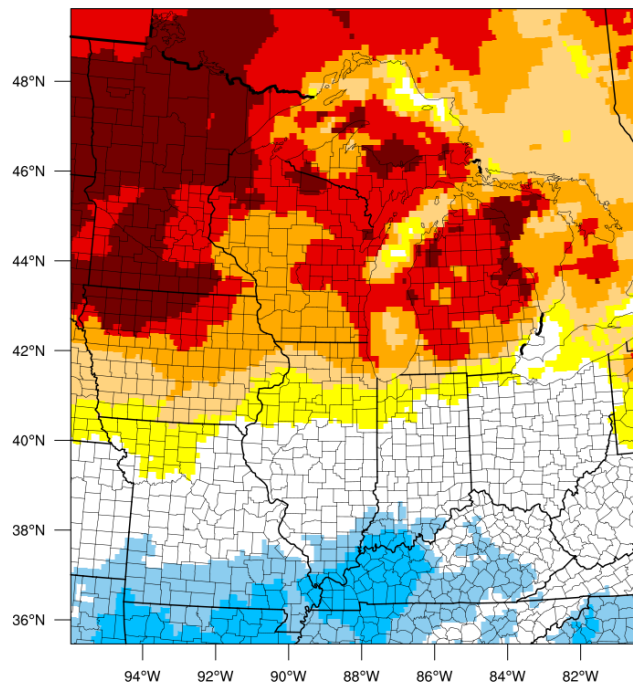
[Drought Monitor Change Maps](#) | [Time Series of Drought Monitor Status for a Location](#) (Down to County level)

<https://www.weather.gov/ind/drought>

Drought Resources and Tools

NWS-Indy Drought Page

2-week EDDI categories for June 14, 2021



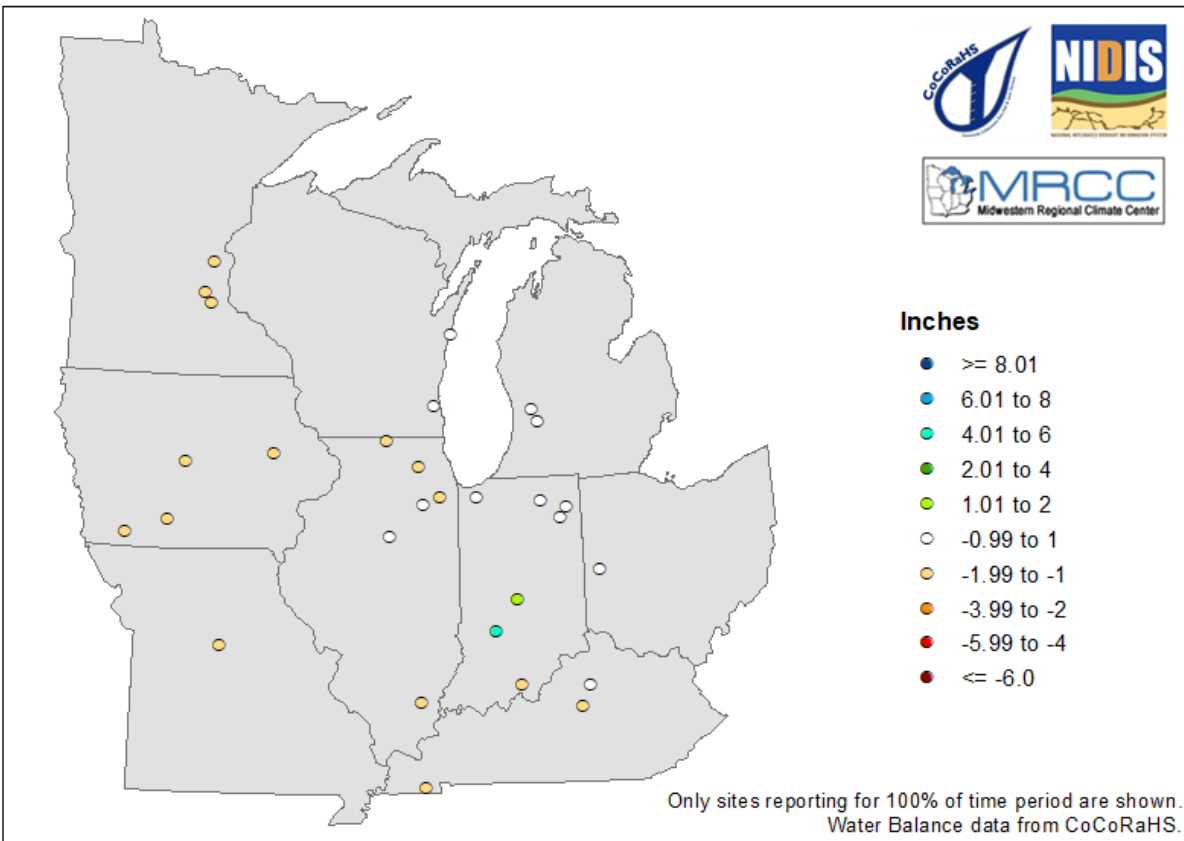
Generated by NOAA/ESRL/Physical Sciences Laboratory

<https://www.weather.gov/ind/drought>

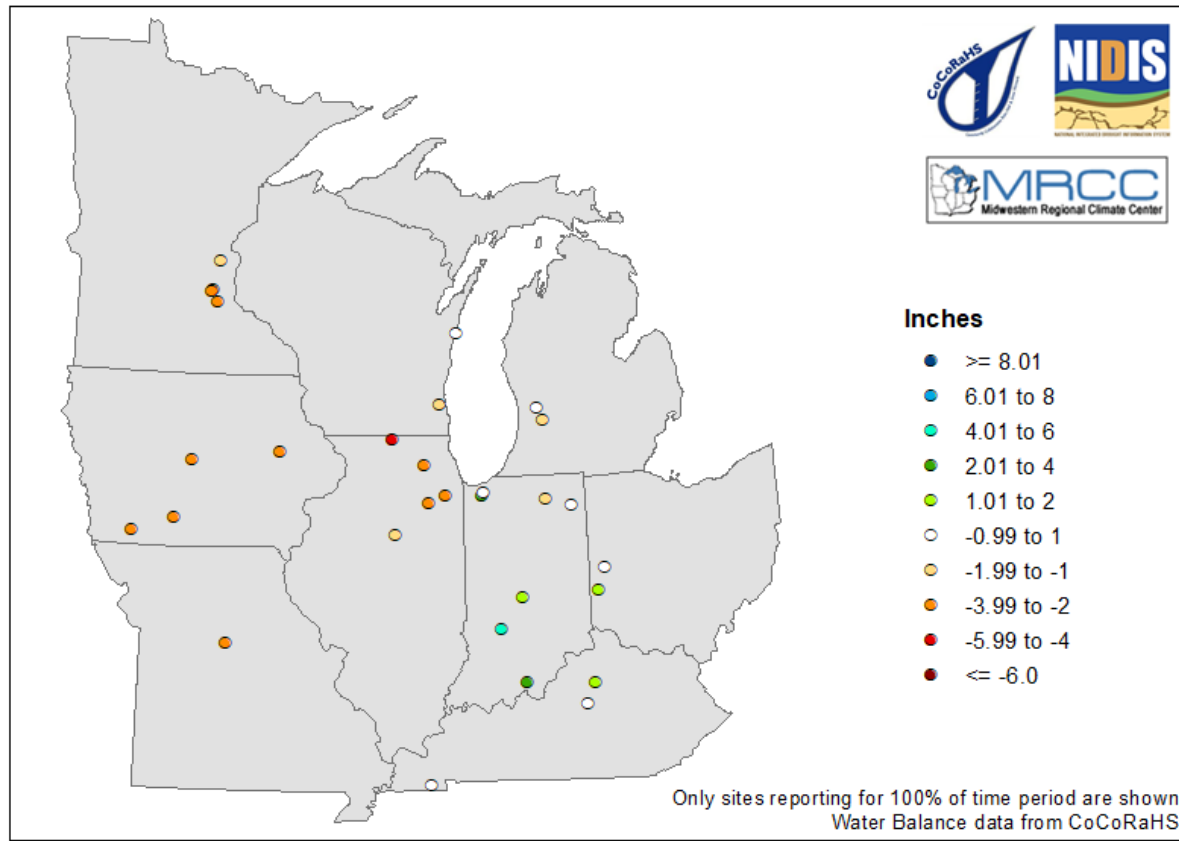
Drought Resources and Tools

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Water Balance for 7-day Period: 6/12/2021 - 6/19/2021



Water Balance for 30-day Period: 5/20/2021 - 6/19/2021

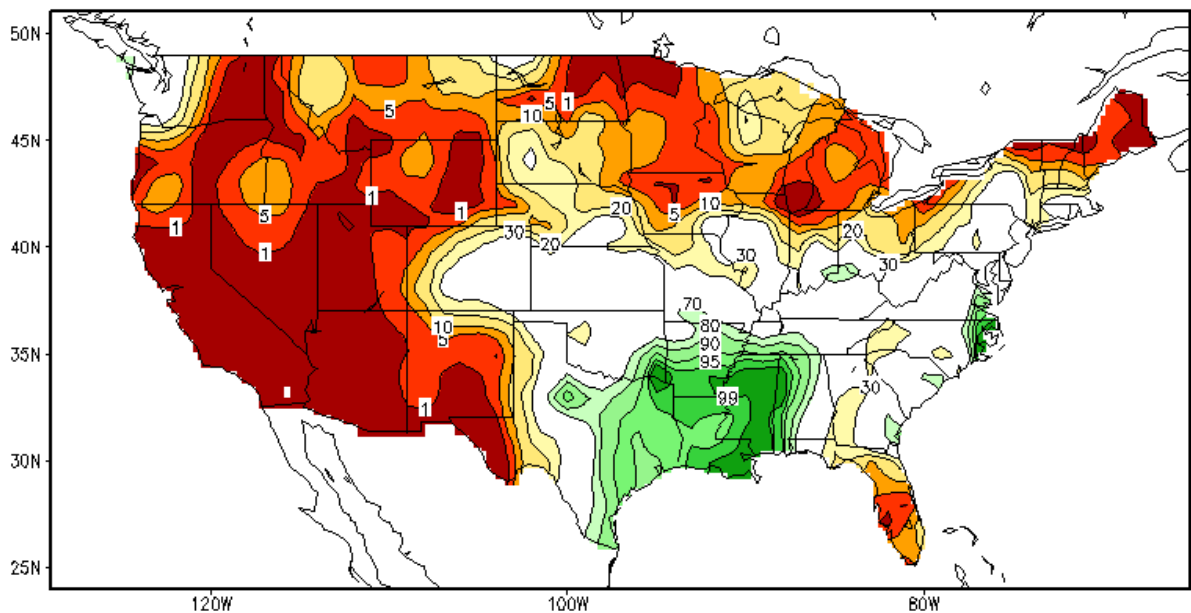


<https://www.weather.gov/ind/drought>

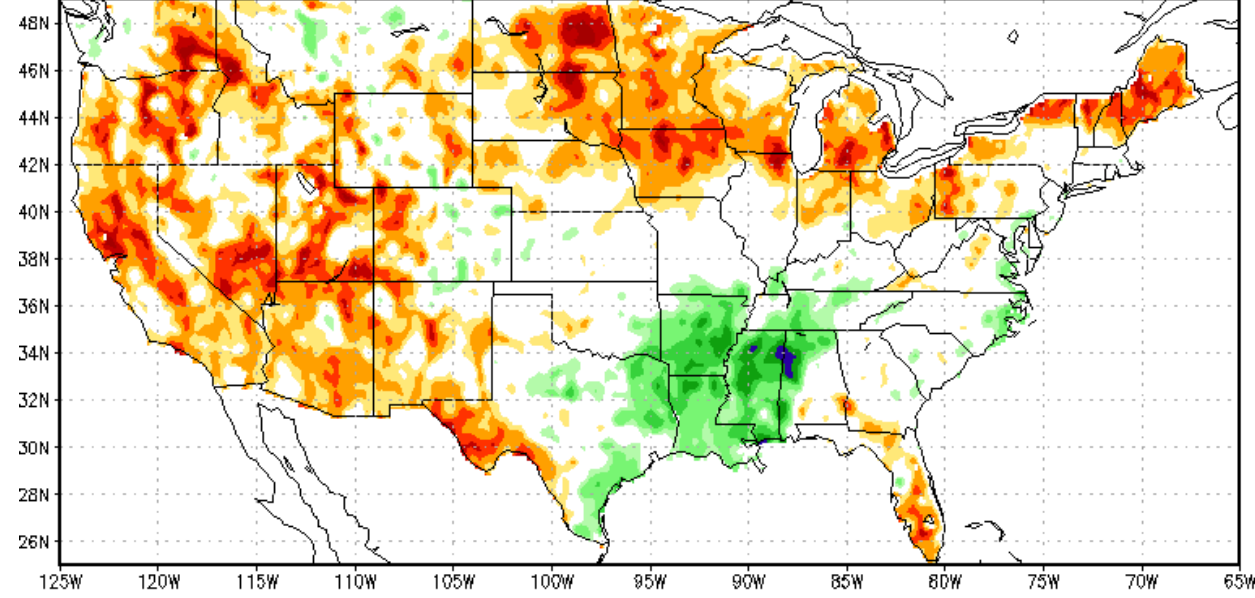
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Calculated Soil Moisture Ranking Percentile
JUN 19, 2021



Ensemble-Mean Current SMP 15Jun2021

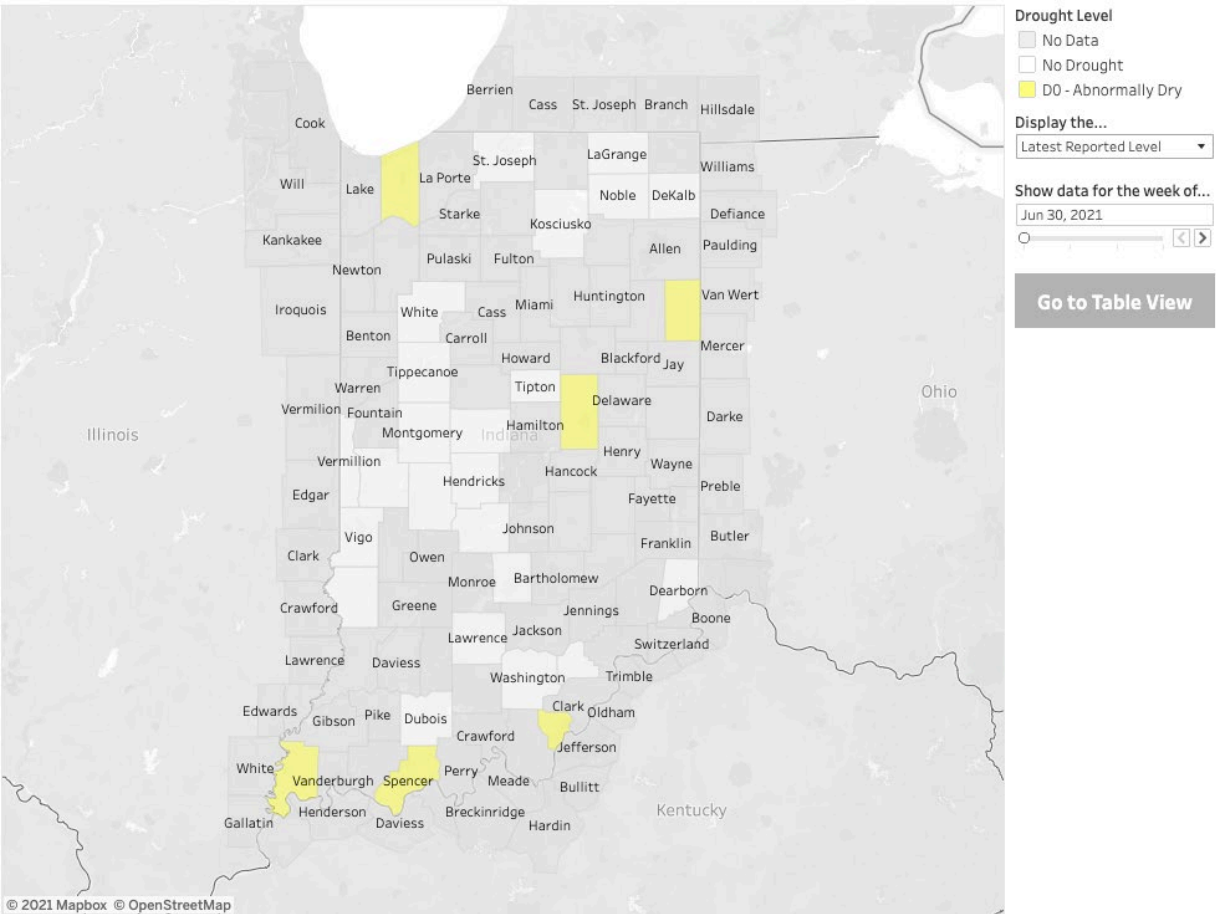


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How you can help!

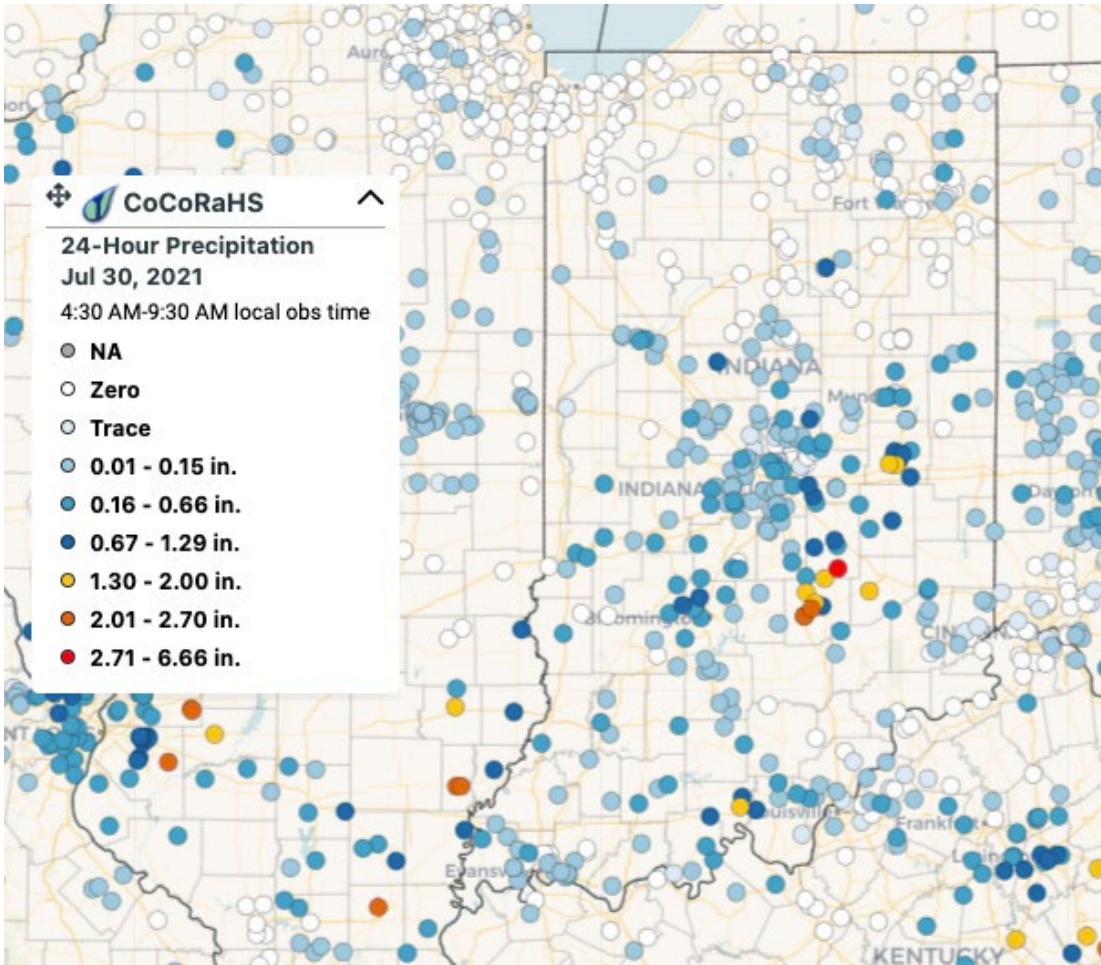
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County Extension Drought Input: June 30, 2021 - July 6, 2021



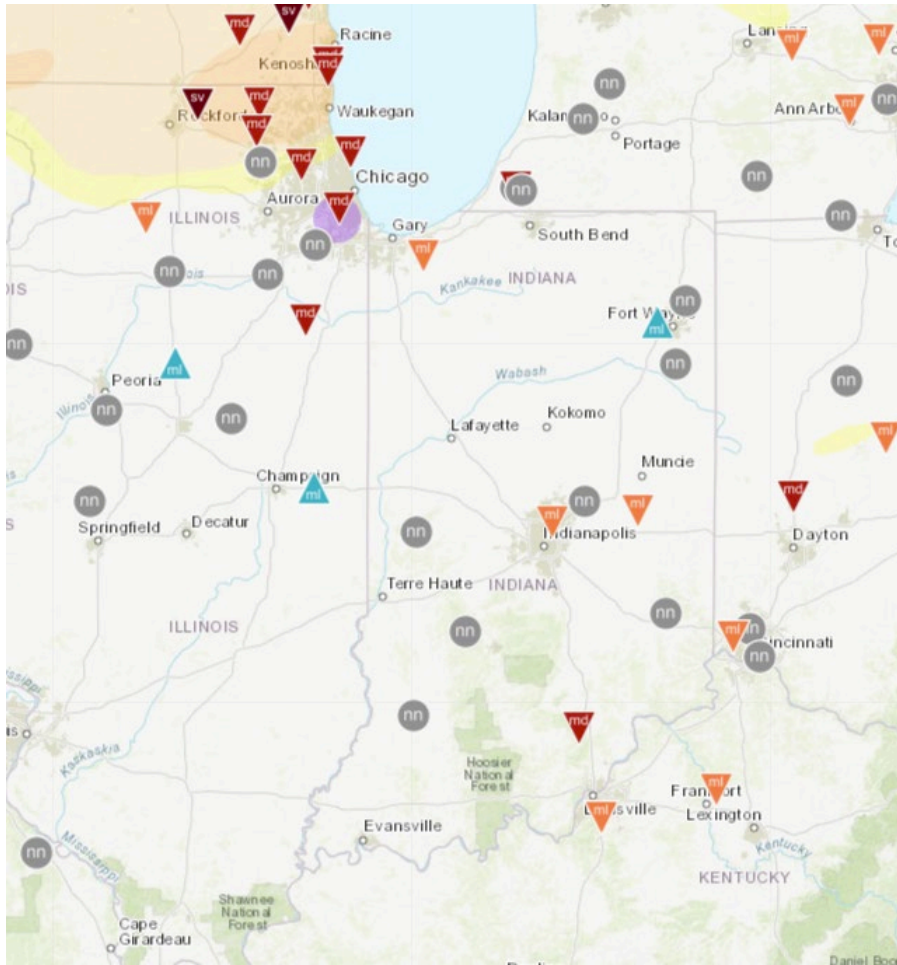
How you can help!

CoCoRaHS



How you can help!

CoCoRaHS



<https://www.cocorahs.org/>

Summary

- Drought is a **complex hazard** that requires a multi-faceted approach for prediction, early-warning, monitoring, and response
- Understanding drought impacts requires **engagement with multiple, diverse groups** across the state... precipitation alone will not cut it
- Indiana has experienced prolonged, severe droughts in the 20th Century, relatively **few since the 1960s**
- Long-term **increases in precipitation** have reduced drought duration and frequency
- Model projections show **increased variability** on top of the background of an overall wetter climate
- **Observations are critical** to understanding and planning for drought

THANK YOU

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