Ohio's Changing Climate: Current and Future Perspectives

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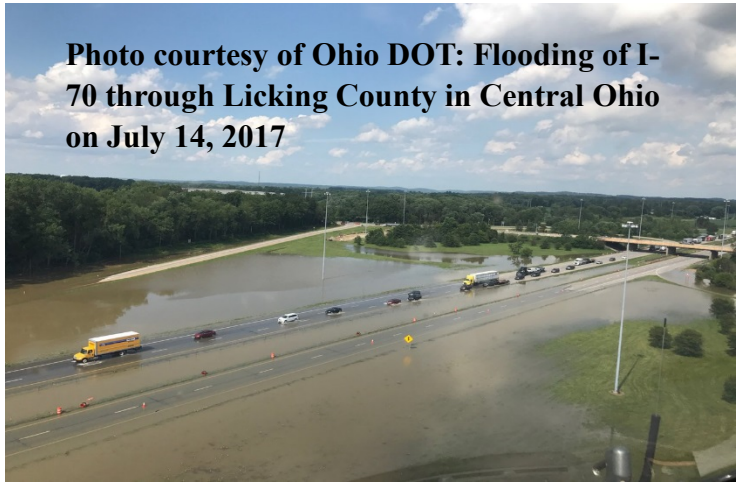
Byrd Center | OSU Extension | State Climate Office of Ohio

Understanding Algal Blooms: State of the Science Conference

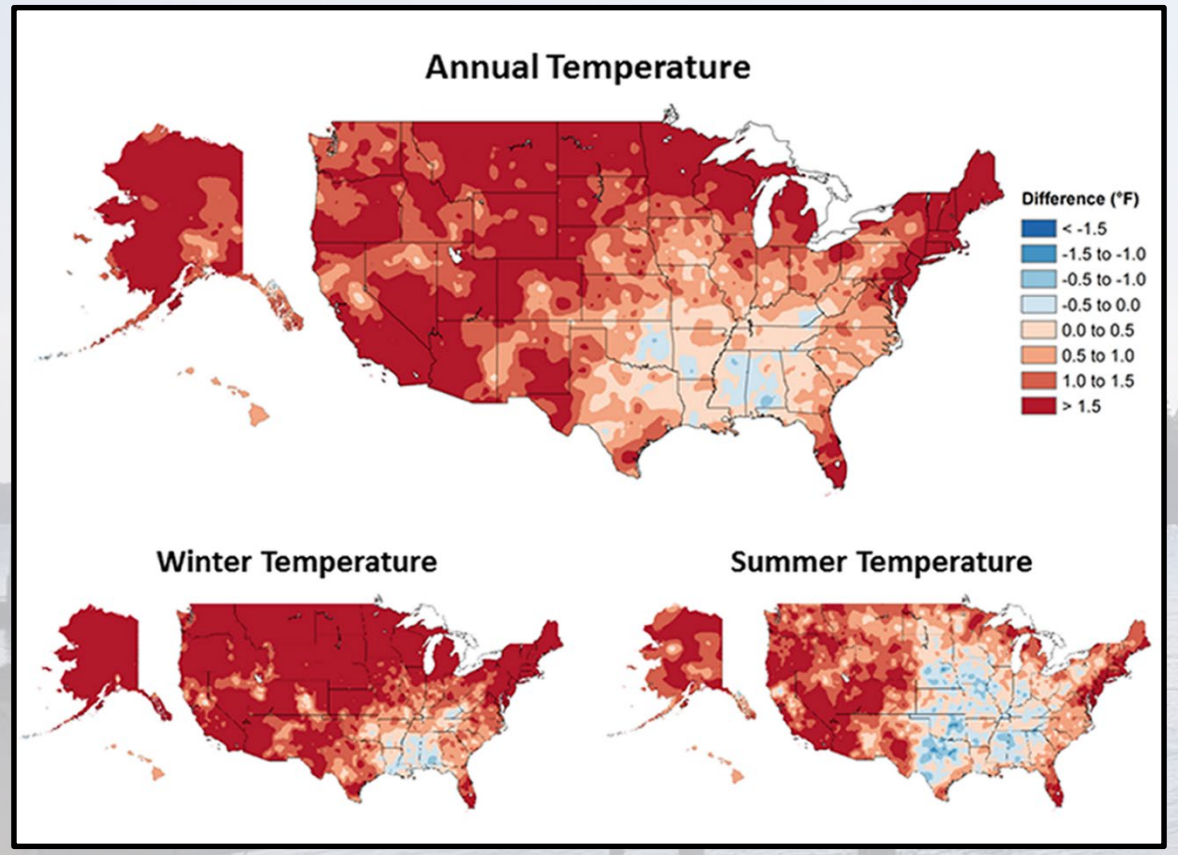
September 11, 2019

THE OHIO STATE UNIVERSITY



"Climate Change directly impacts our *economic and environmental* sustainability."

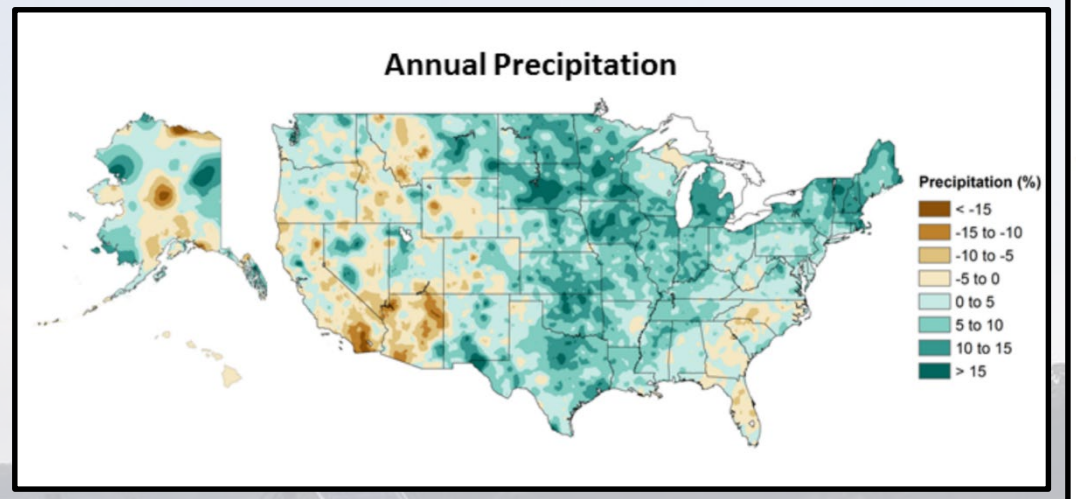
Seasonal Differences in Warming

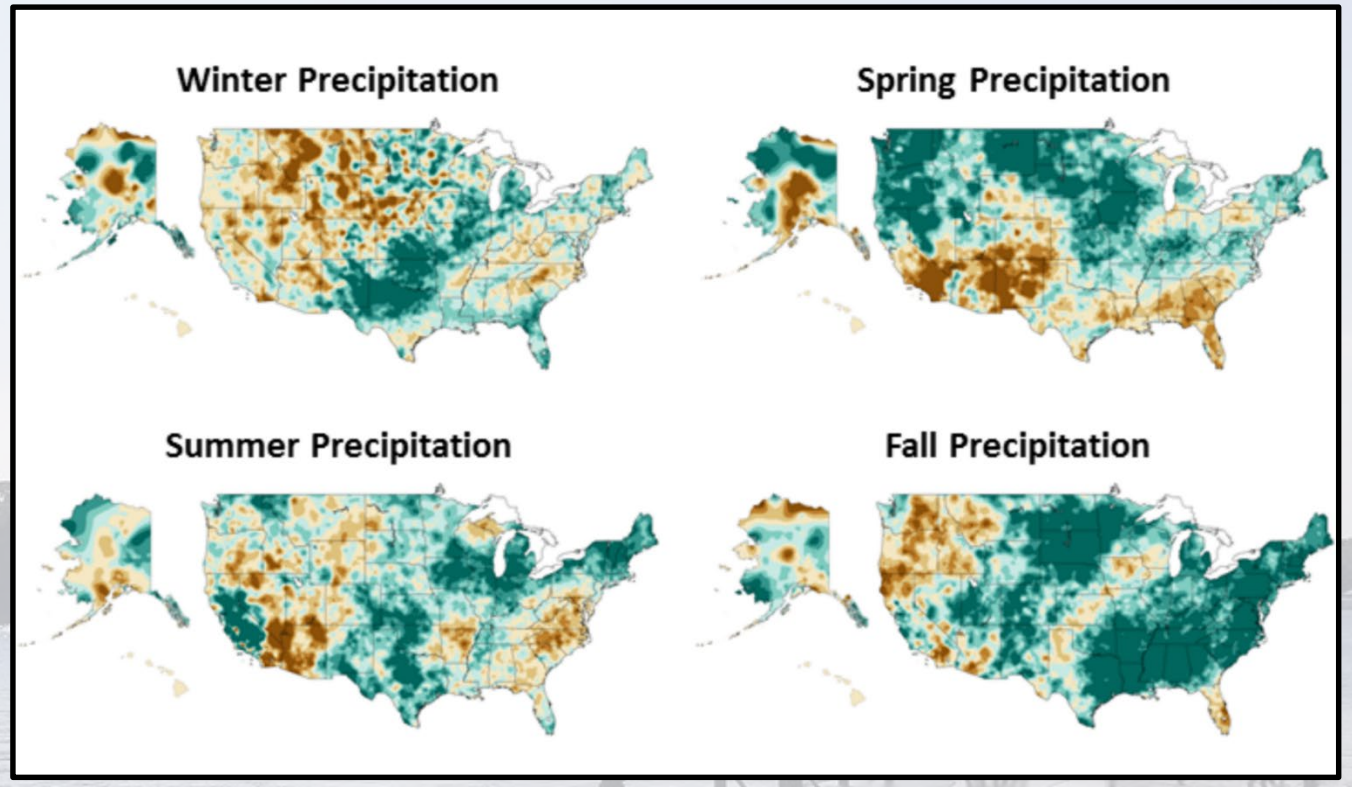


- More than 95% of the land surface demonstrated an increase in annual average temperature
- Paleoclimate records suggest recent period the warmest in at least the past 1,500 years
- Greatest and most widespread in winter

Annual average temperature over the contiguous United States has increased by 1.2°F (0.7°C) for the period 1986–2016 relative to 1901–1960 and by 1.8°F (1.0°C) based on a linear regression for the period 1895–2016: National Climate Assessment CCSR: https://science2017.globalchange.gov/

Annual and Seasonal Changes in Precipitation

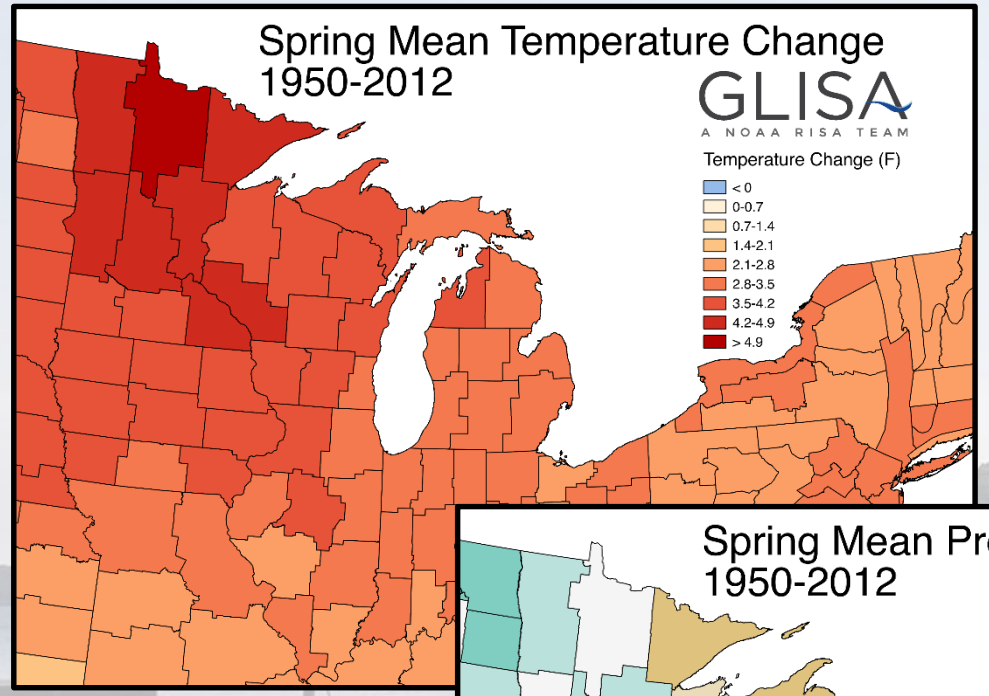


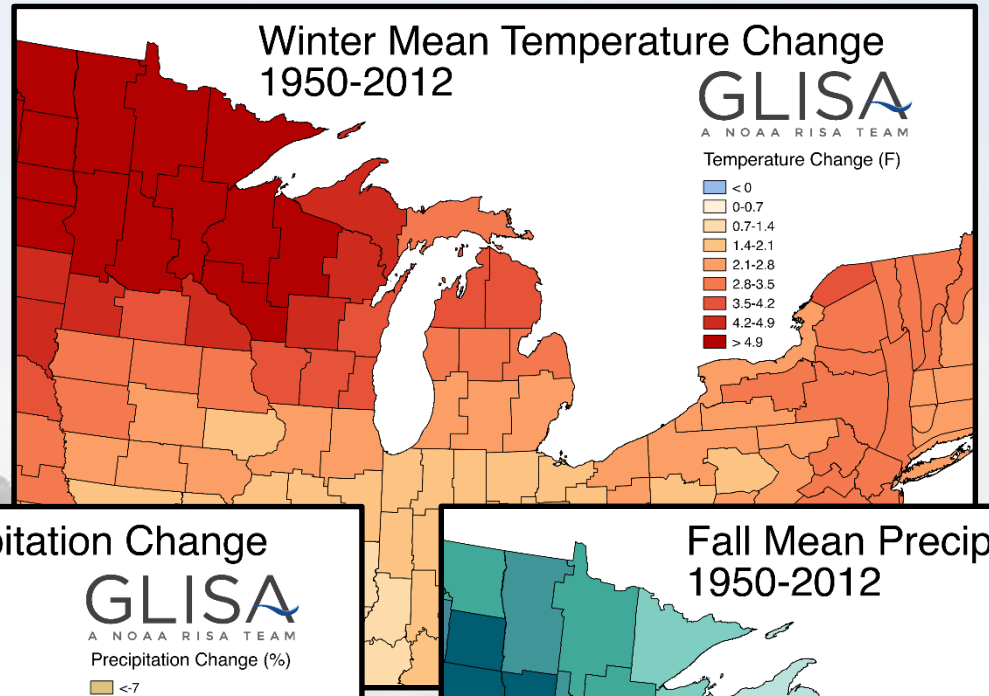


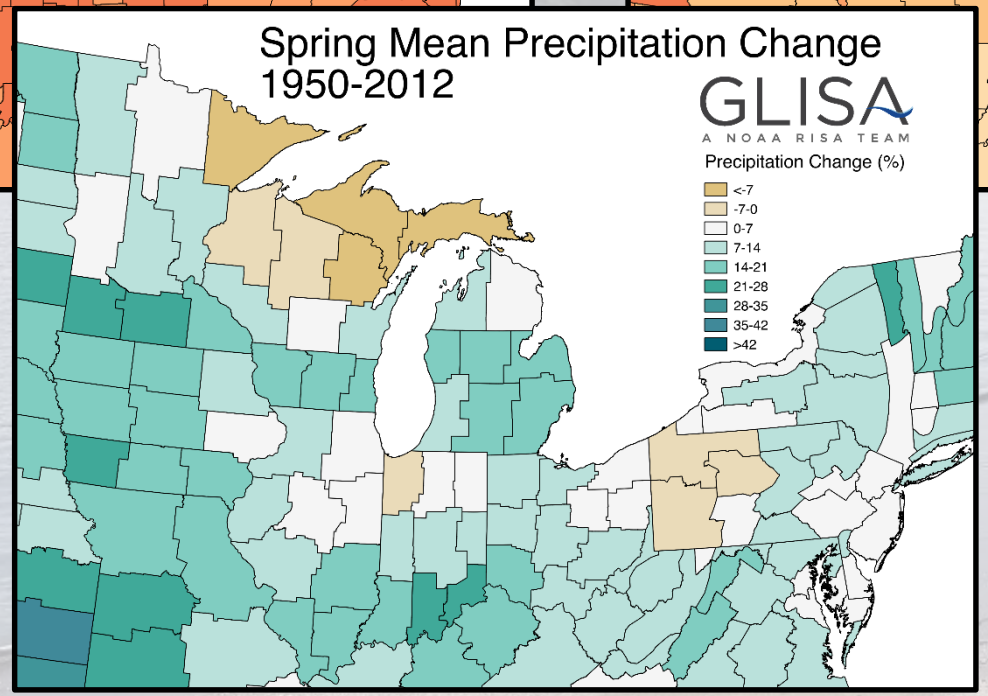
National Climate Assessment CCSR:
https://science2017.globalchange.gov/

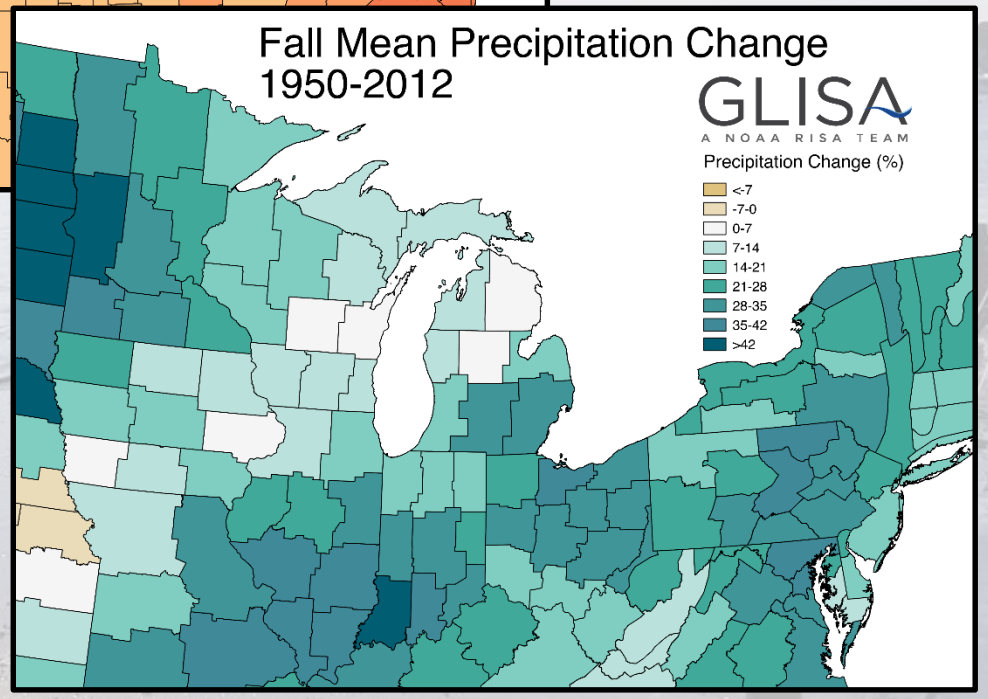
- National average increase of 4% in annual precipitation since 1901: Ohio: 5-15%
- Driven strongly by fall trends (10-15% in some locations)
- Regional Spring, Summer, and Fall Trends across Ohio
- Increased Intensity of rainfall events

Great Lakes Seasonal Changes

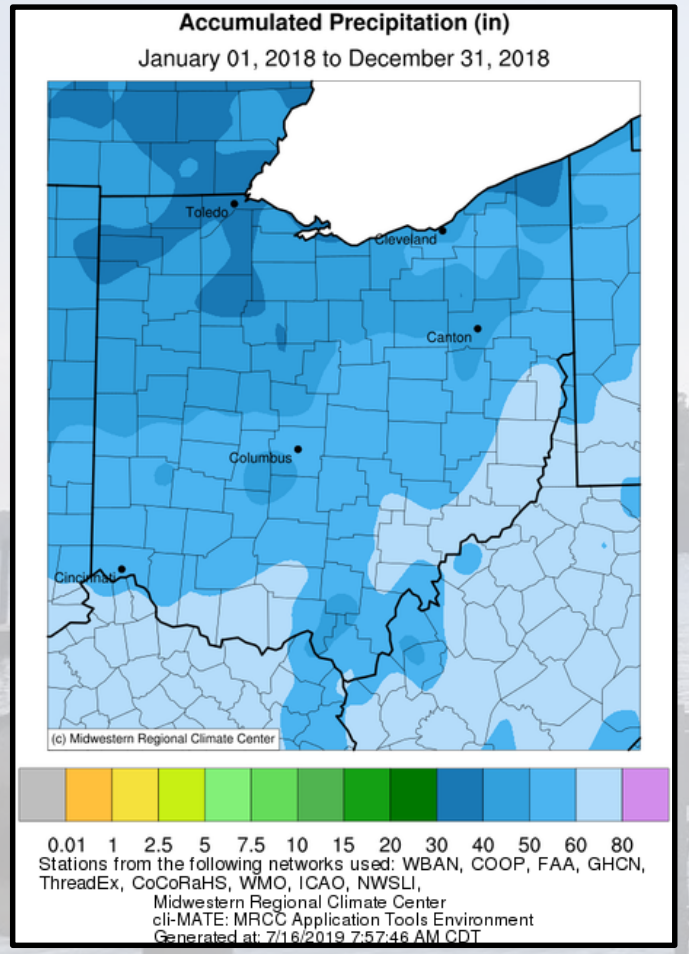


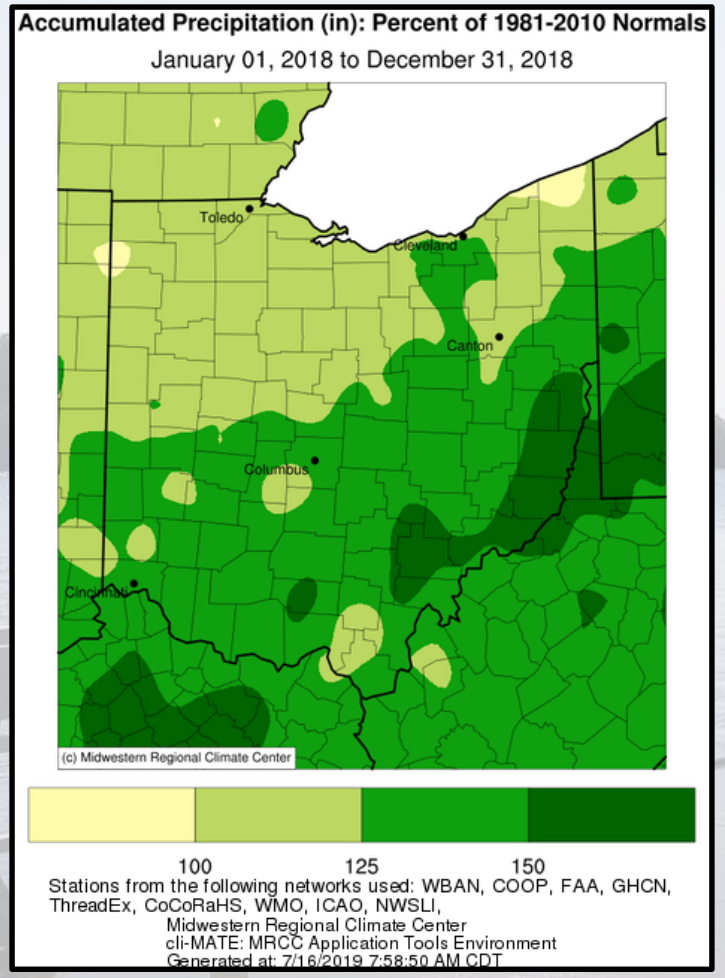






2018 for the State of Ohio

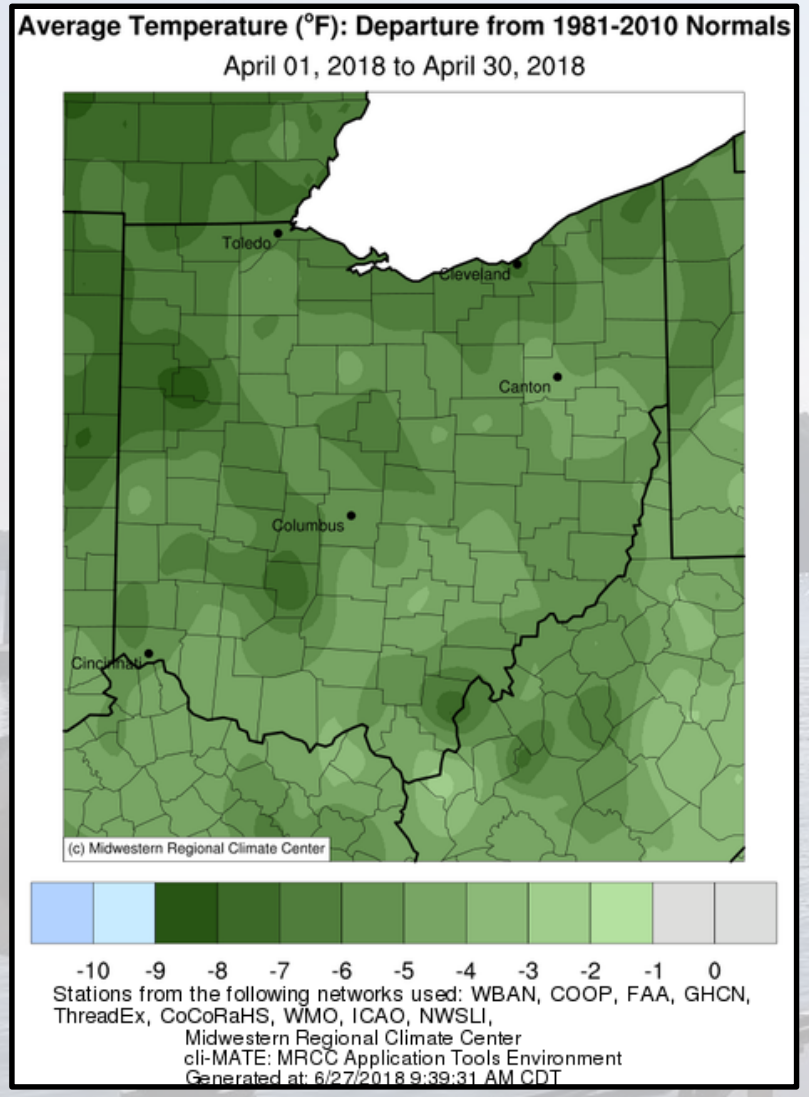


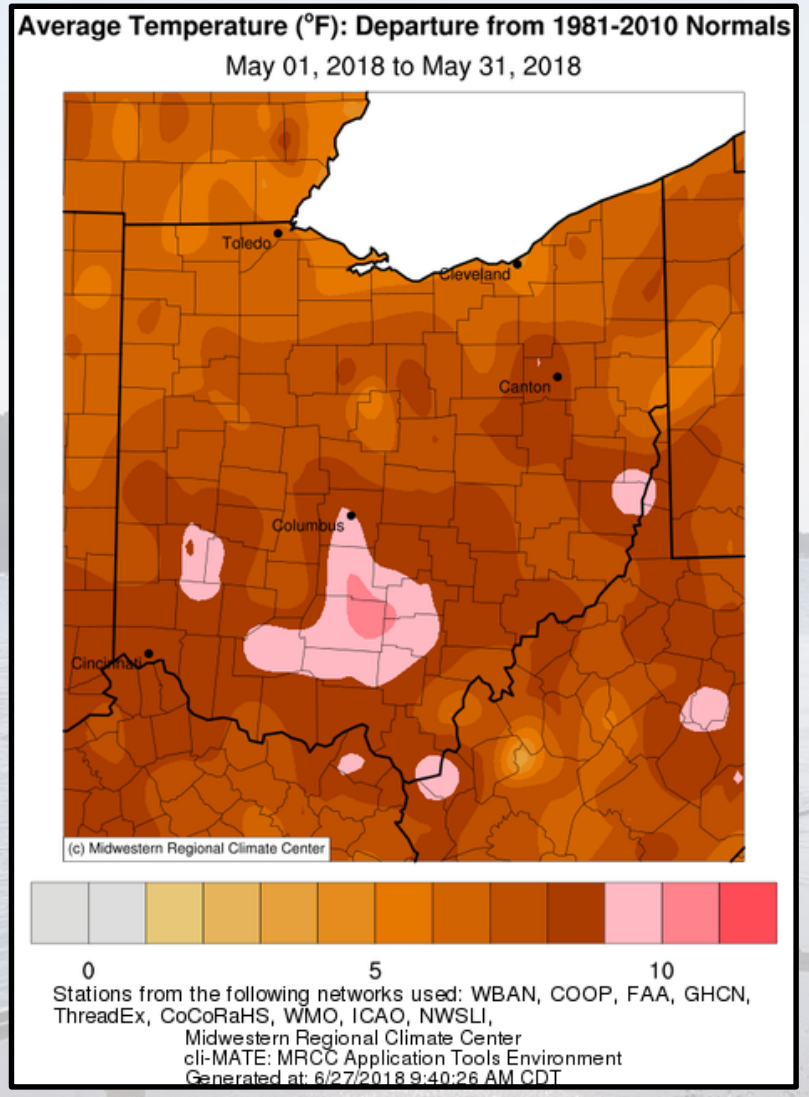


RANK	YEAR	AVERAGE	DIFFERENCE
1	2011	55.95	16.50
2	1990	51.07	11.62
3	2018	50.83	11.38
4	1950	48.34	8.89
5	1996	46.85	7.40
6	2003	46.42	6.97
7	1929	46.42	6.62
8	2017	45.51	6.06
9	2004	45.45	6.00
10	1937	45.18	5.73

- 19th Warmest
- 3rd Wettest
- Modern Period (1895 – 2018)

Recall the Variability of Spring 2018

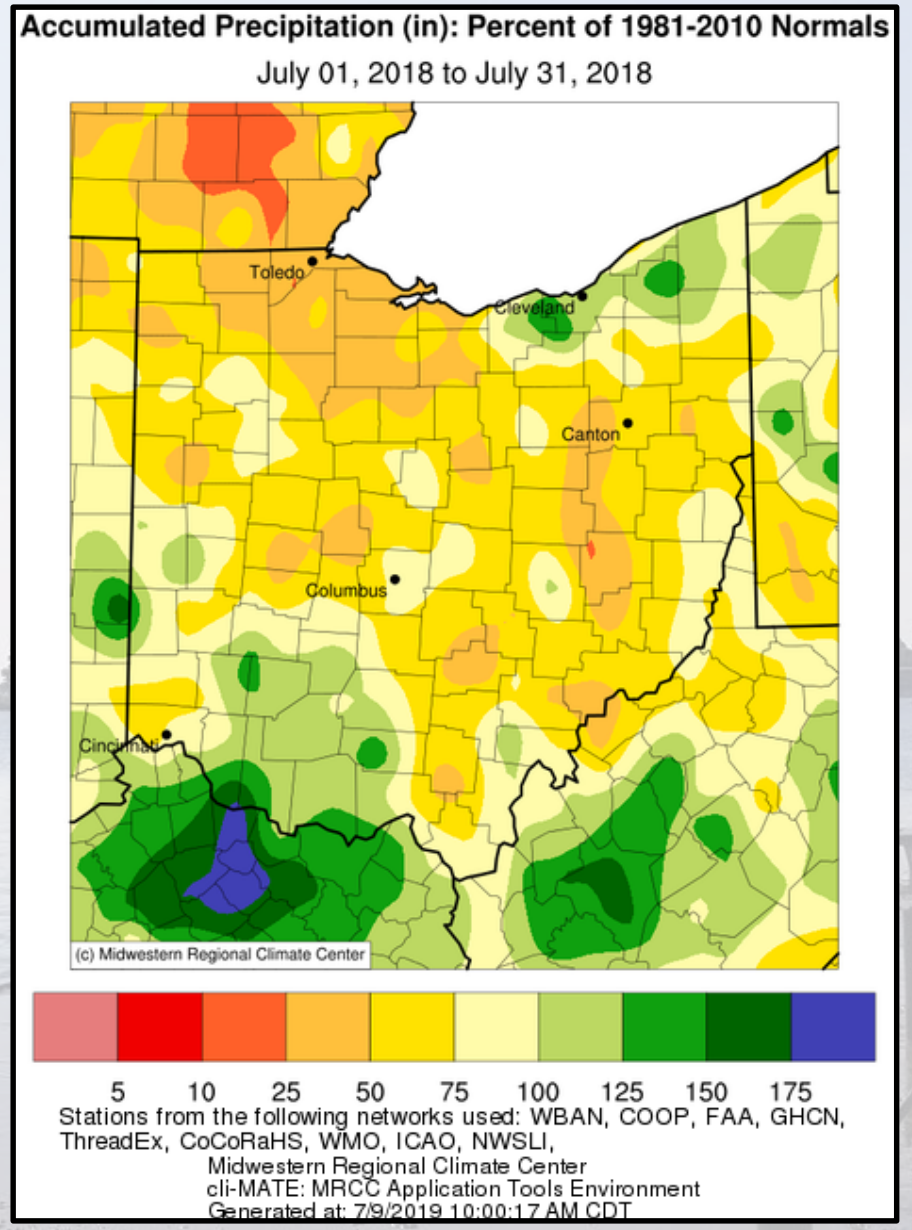




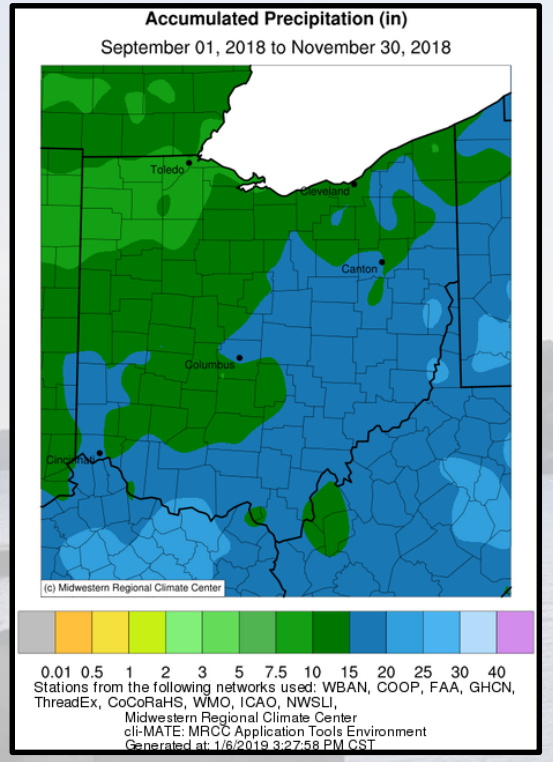
- MAM 2018 ranks as the 49th warmest – close to average
- **Extreme monthly variability**
- 9th coldest April on record (1895-present)
- Warmest May (1895-present)
- Stayed wet and cool across northern Ohio through about mid-May

How can it be so dry, when it's been so wet?

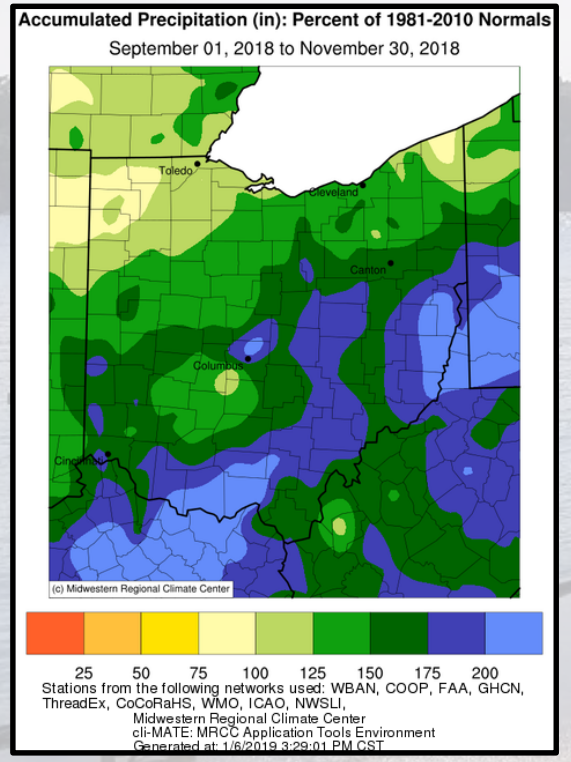
- June 2018 ranks as the 4th warmest with the summer of 2018 ranked as the 17th warmest (1895-2018)
- Warmth driven strongly by warm overnight lows
- Moderate drought conditions were experienced across parts of NW Ohio (Ottawa, Lucas, Wood, Sandusky, Huron Counties)

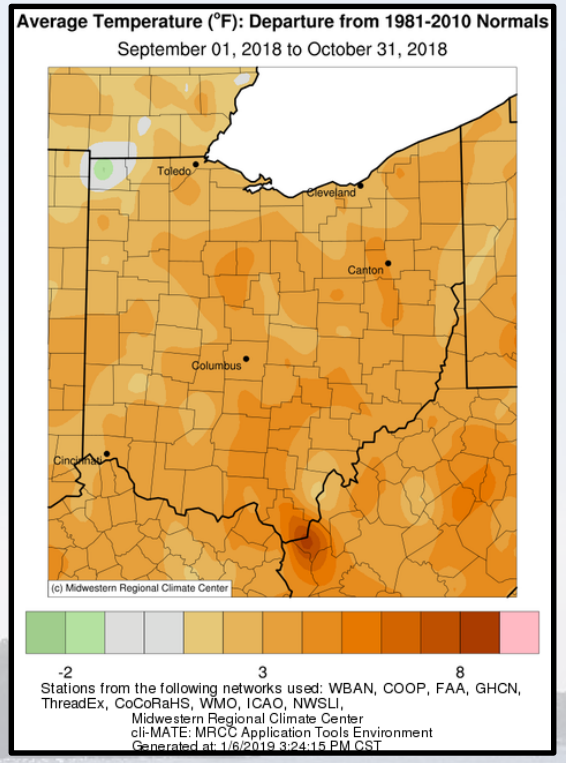


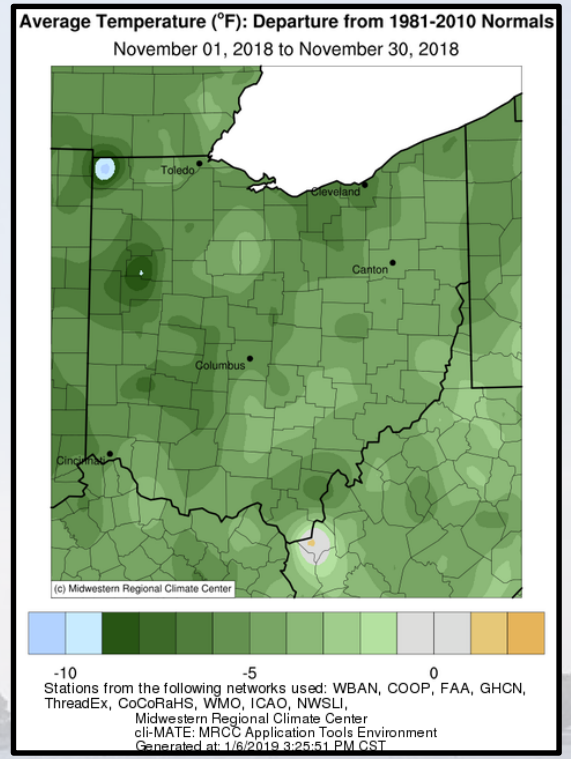
A Crazy Fall in Ohio



Fall 2018: Extreme Variability







- 3rd wettest on record since 1895.
- Sep. 2018 ranks as 2nd wettest.
- Driven largely by tropical activity

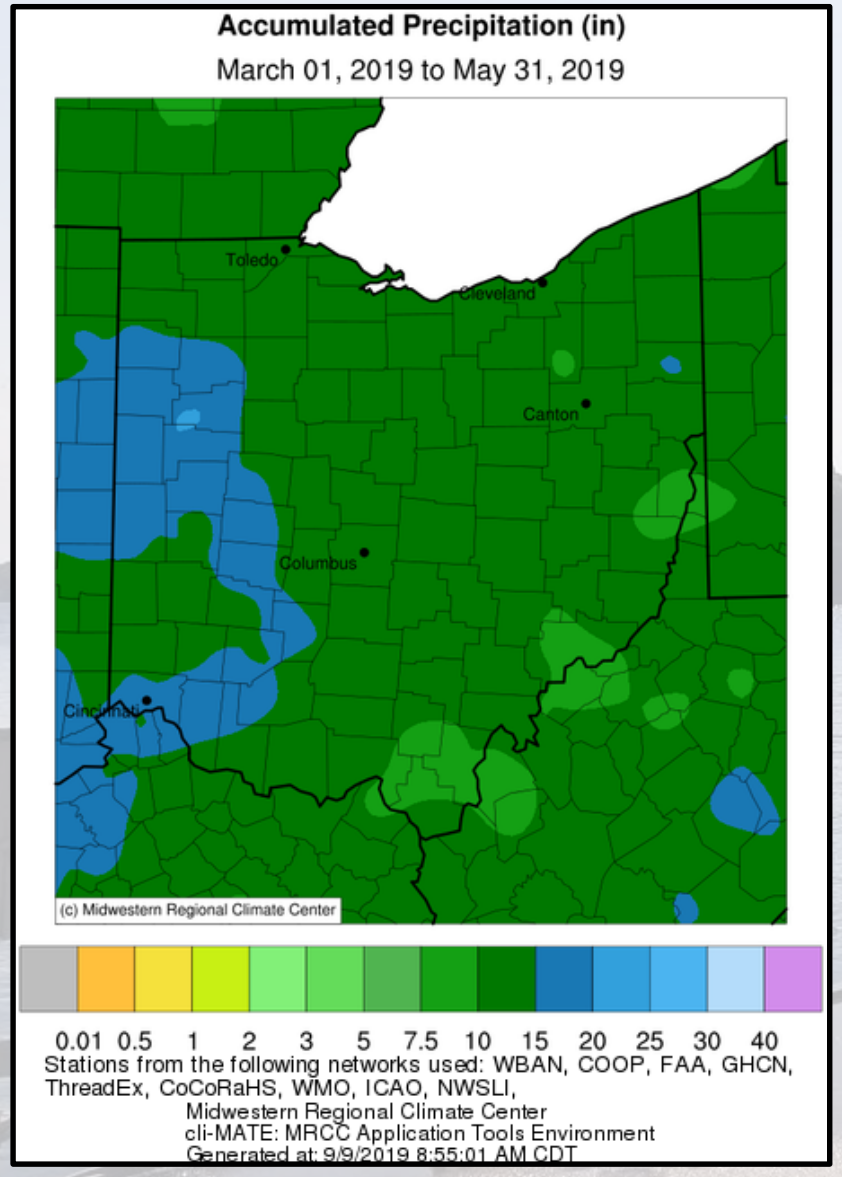
2019 – Wet Again!

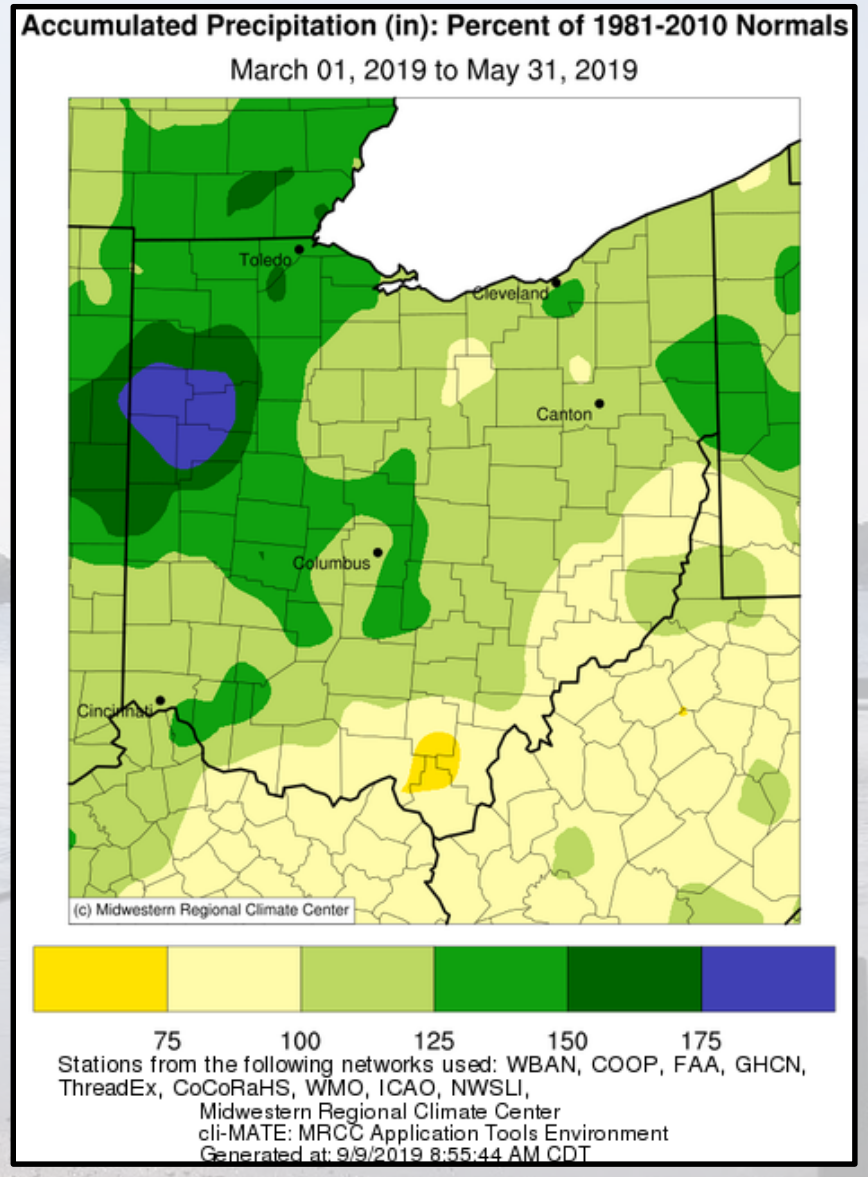
- Winter was the 11th wettest for Ohio – focused mostly along and south of I-70
- March-May 2019 rank as the 36th warmest and 32nd wettest for the state
- West-central and northwest Ohio ranked 7th and 3rd wettest on record, respectively.
- St. Marys, Ohio (Auglaize County), CoCoRaHS observer reported over 20 inches of precipitation between March 1 and May 31 - ***that's over half of their normal yearly rainfall in just three months.***
- Multiple observers in excess of 15 inches
- Reports of 20-26 days of at least a trace of precipitation during the month of May
- Only 7 days suitable for fieldwork during May


Photo Credit: Greg McGlinch

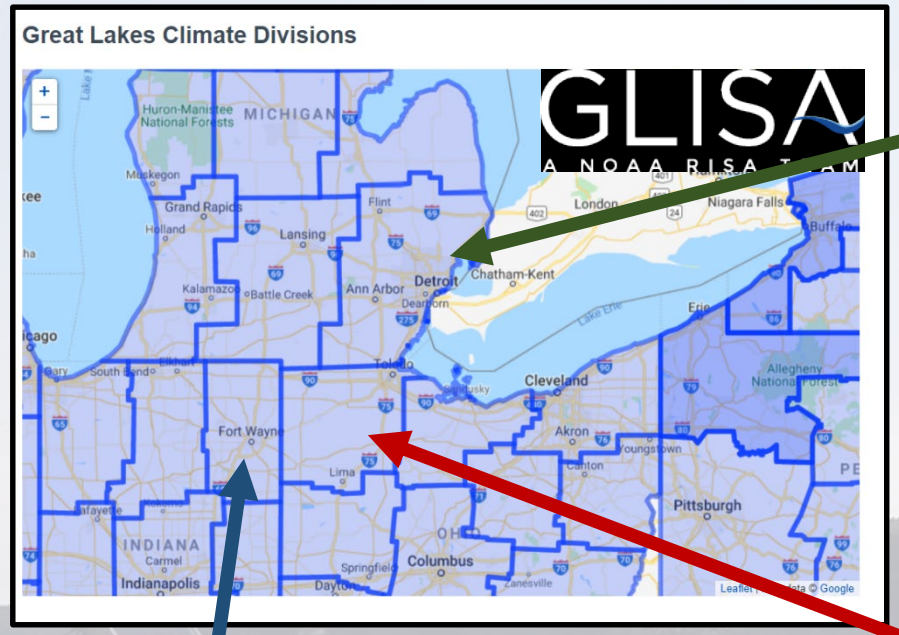

Photo Credit: Amanda Douridas

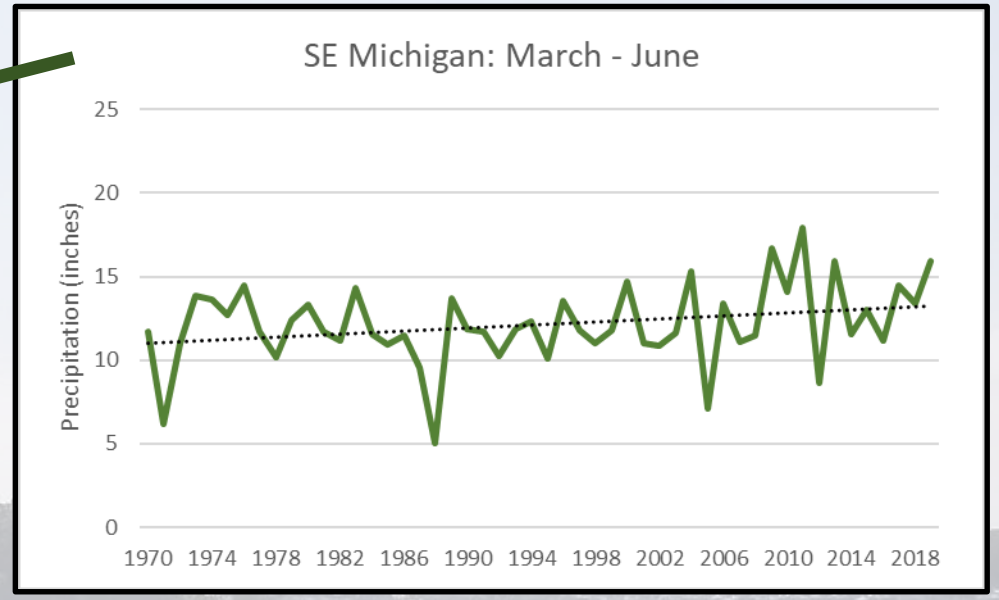
Spring 2019 In the Western Basin

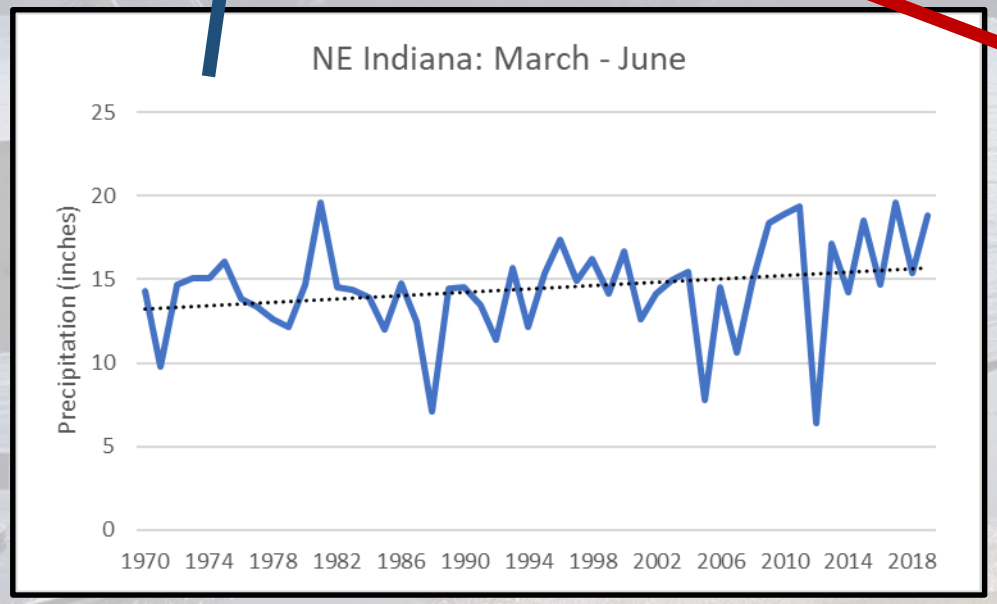


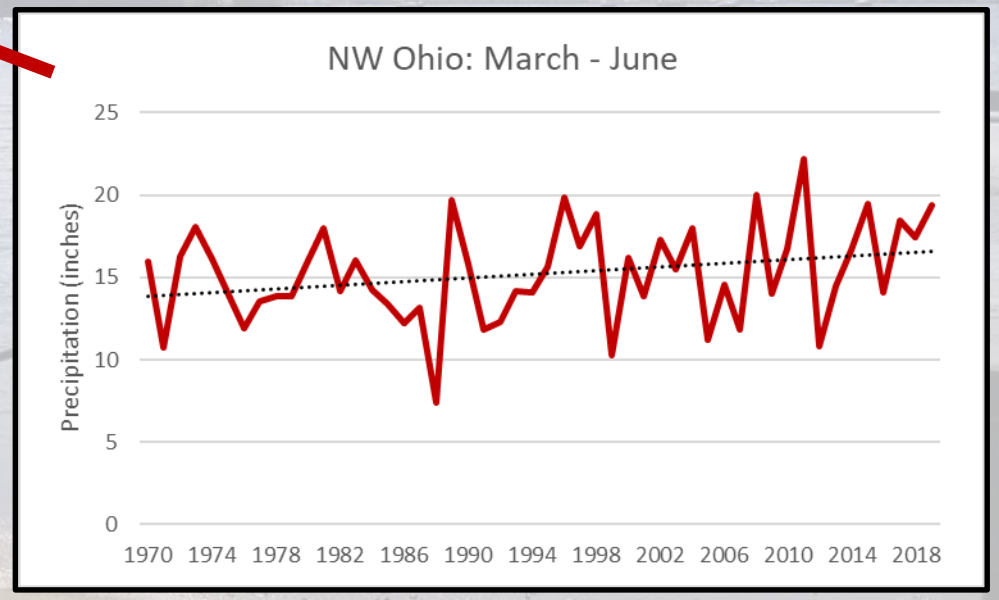


Western Basin Precipitation Trends

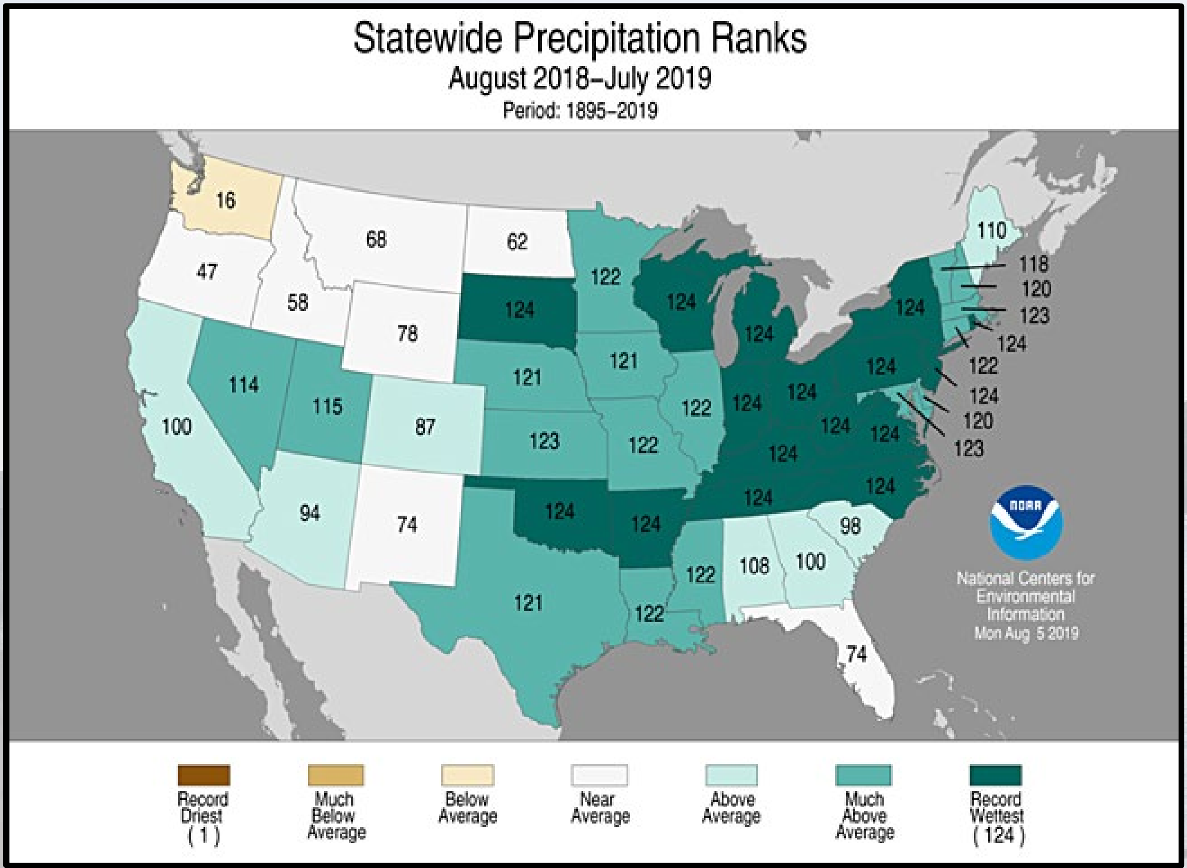


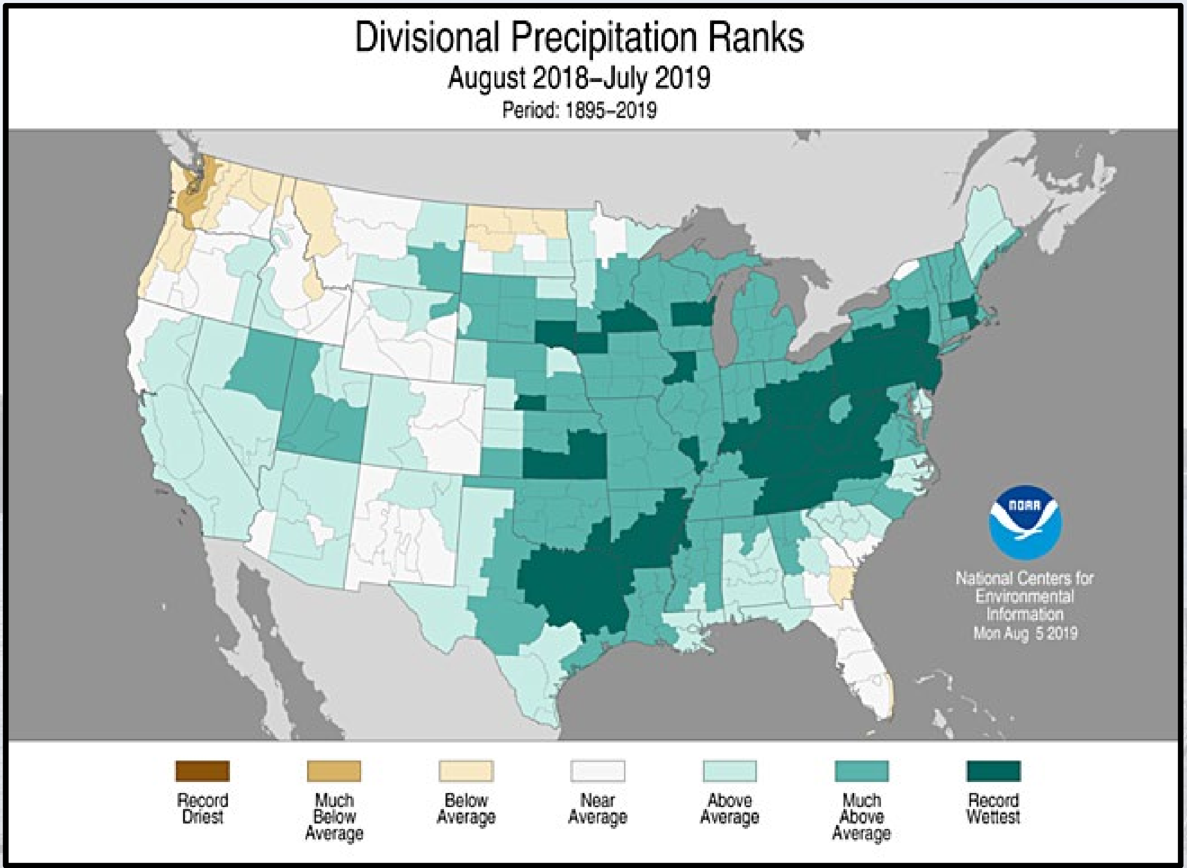




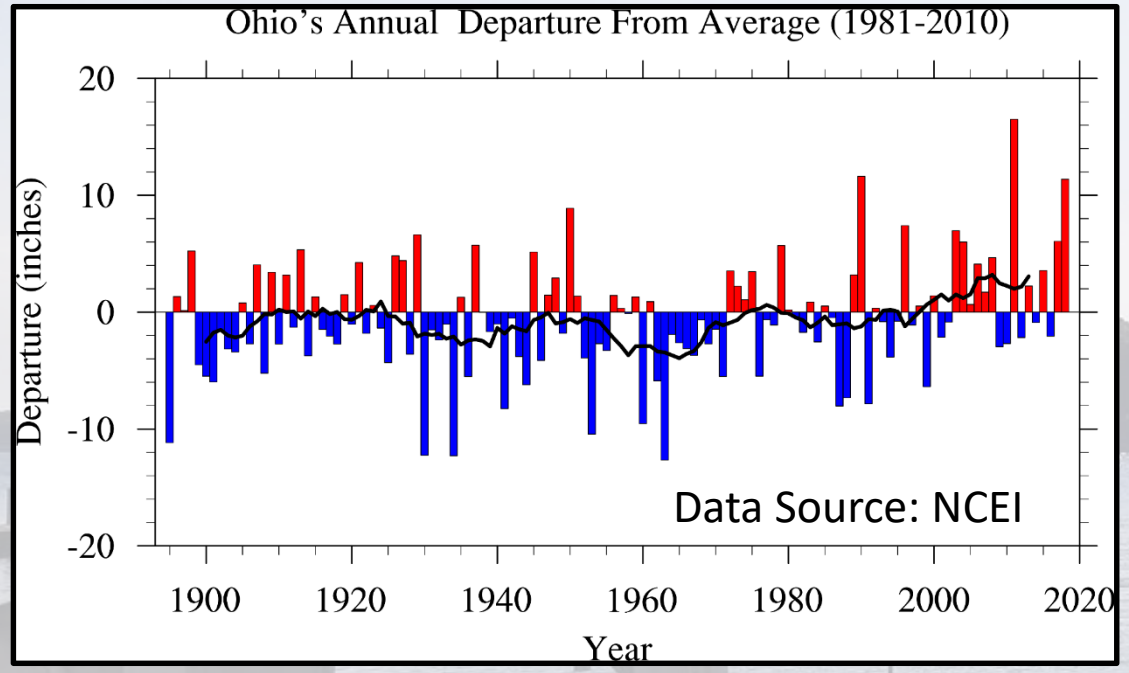


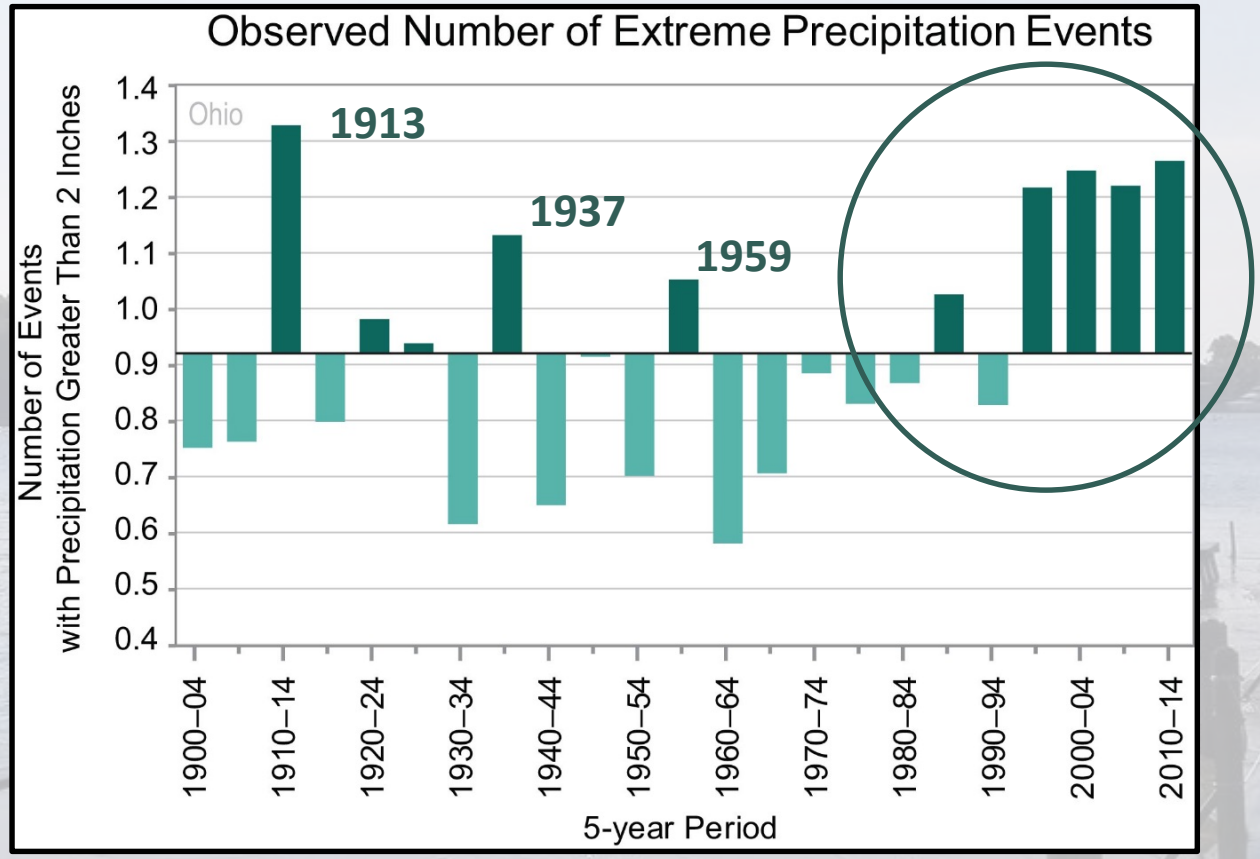
It's Been a VERY Wet Year!





Long-term Precipitation Trends in Ohio

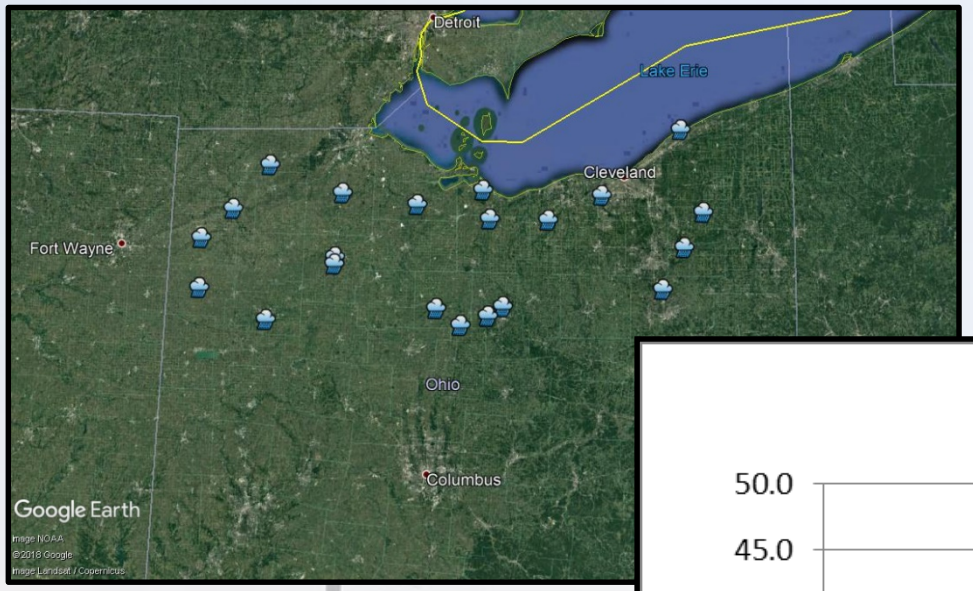


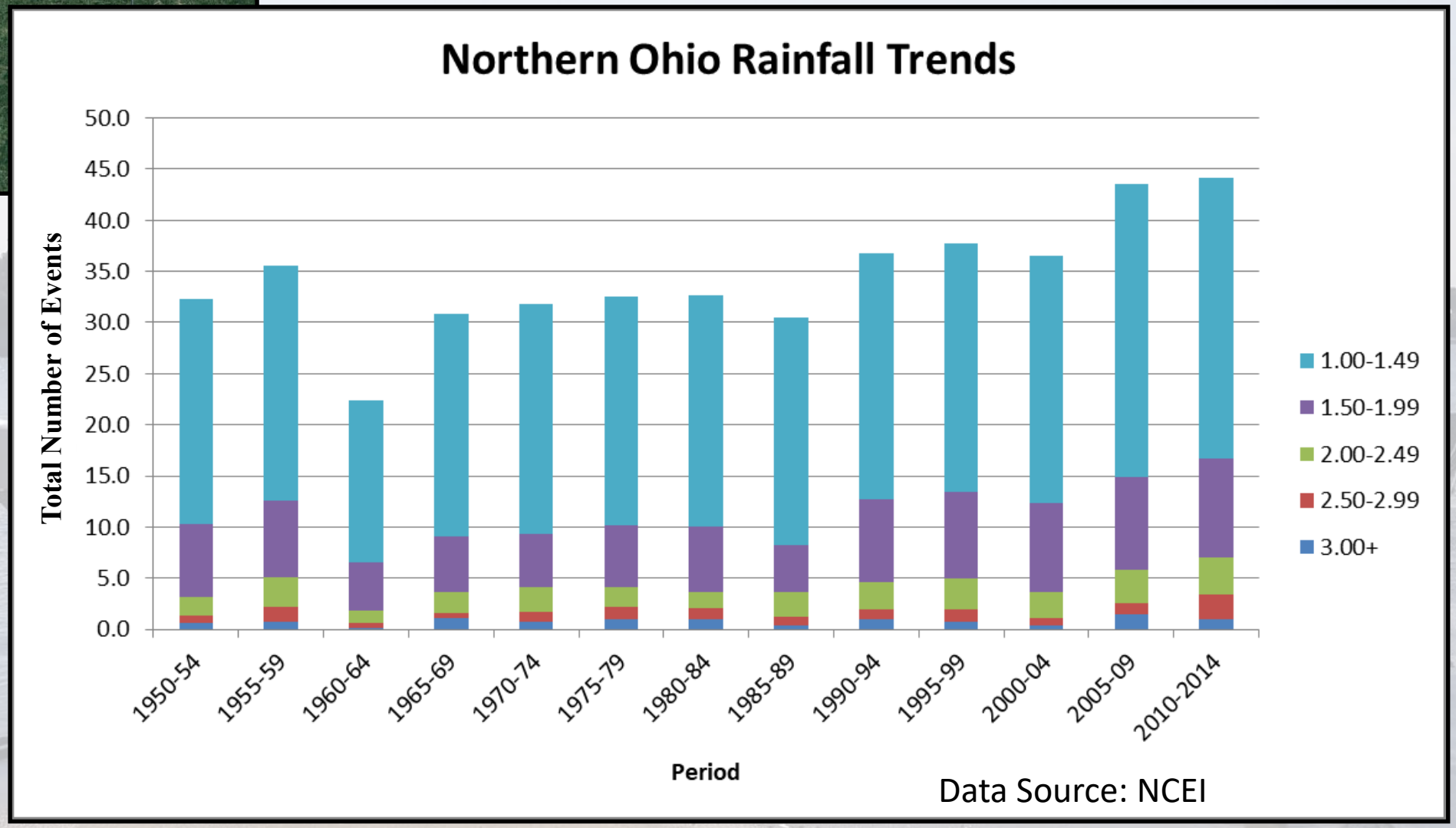


NOAA

https://statesummaries.ncics.org/oh

Intensity of Rainfall

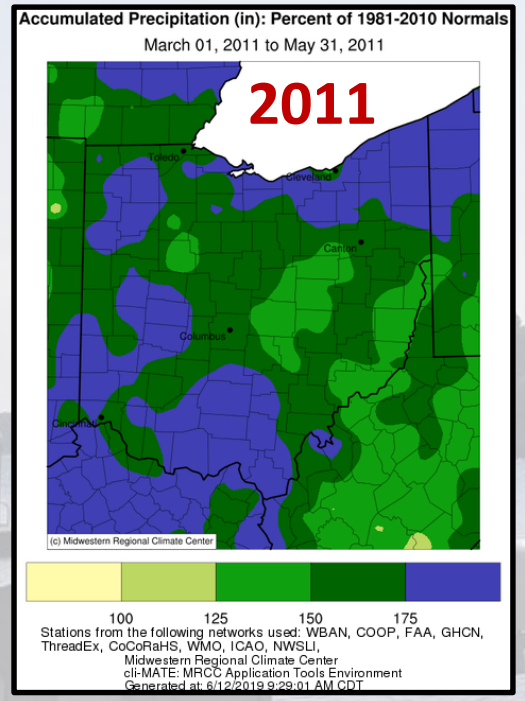


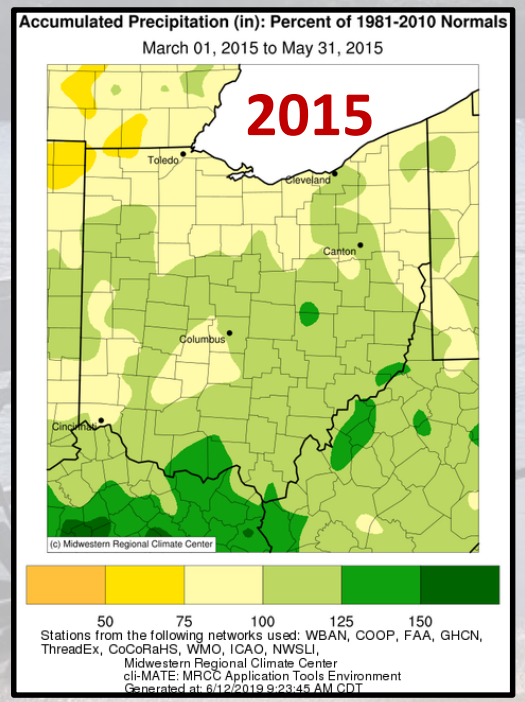


Data Source: NCEI

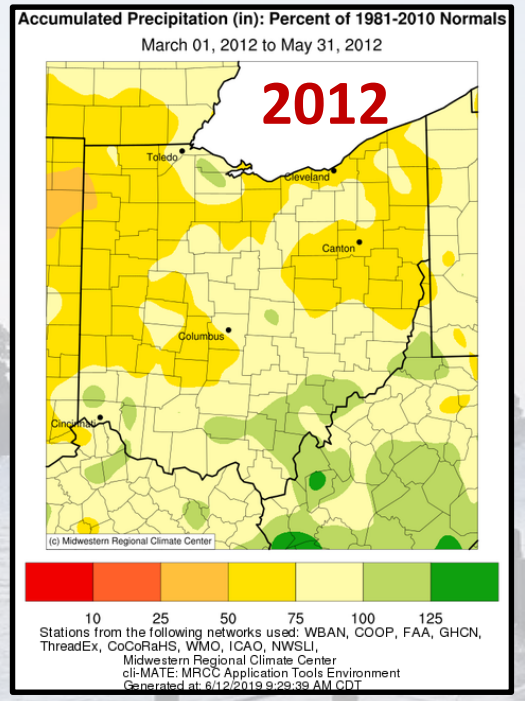
Spring Precipitation and HABs

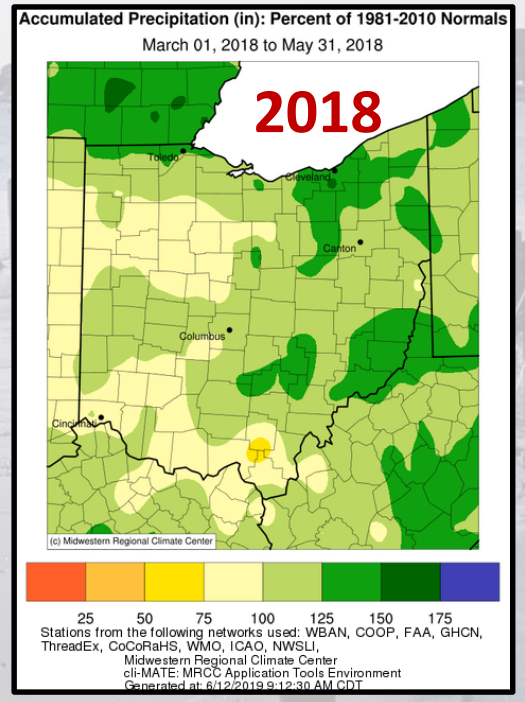
Significant HAB



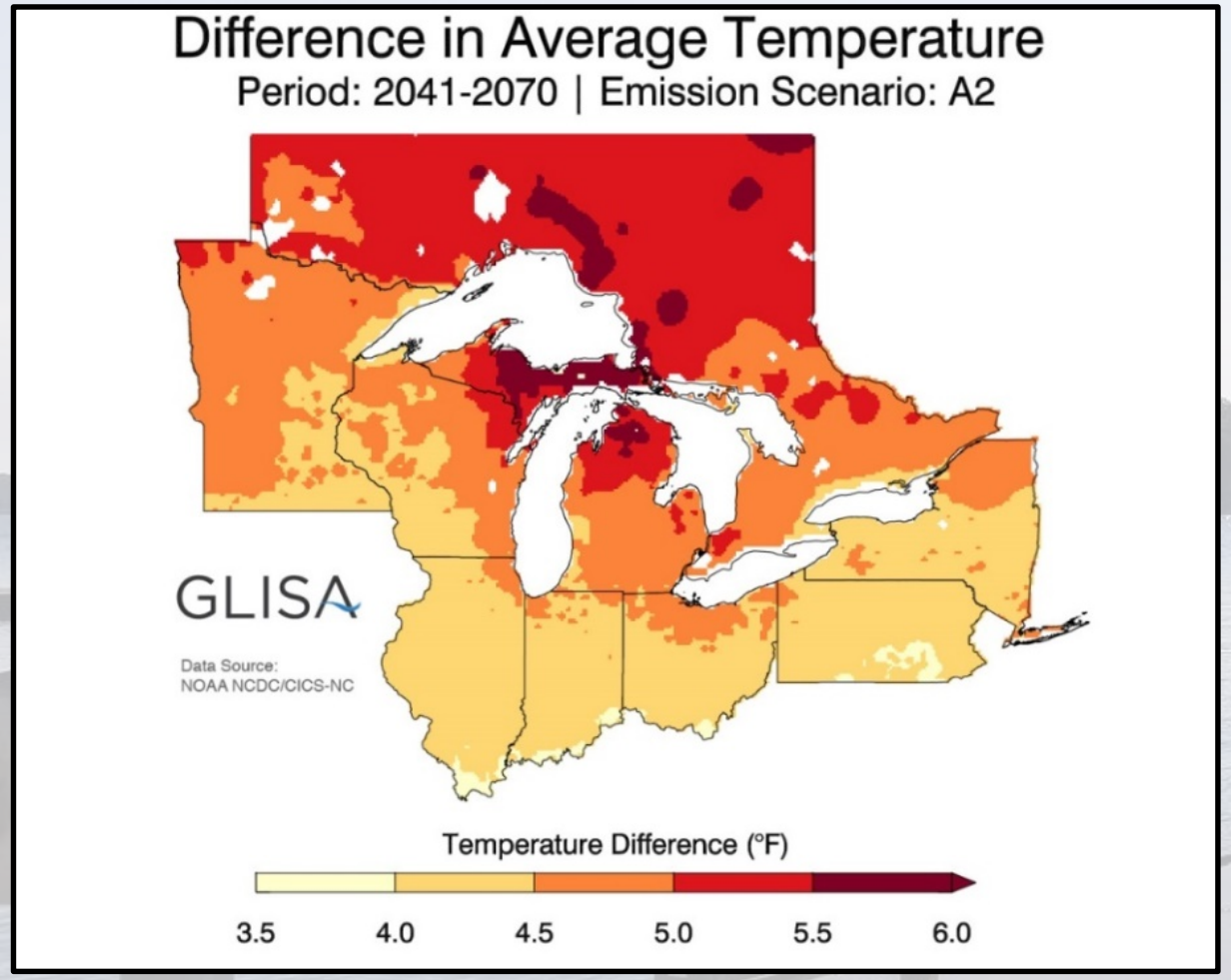


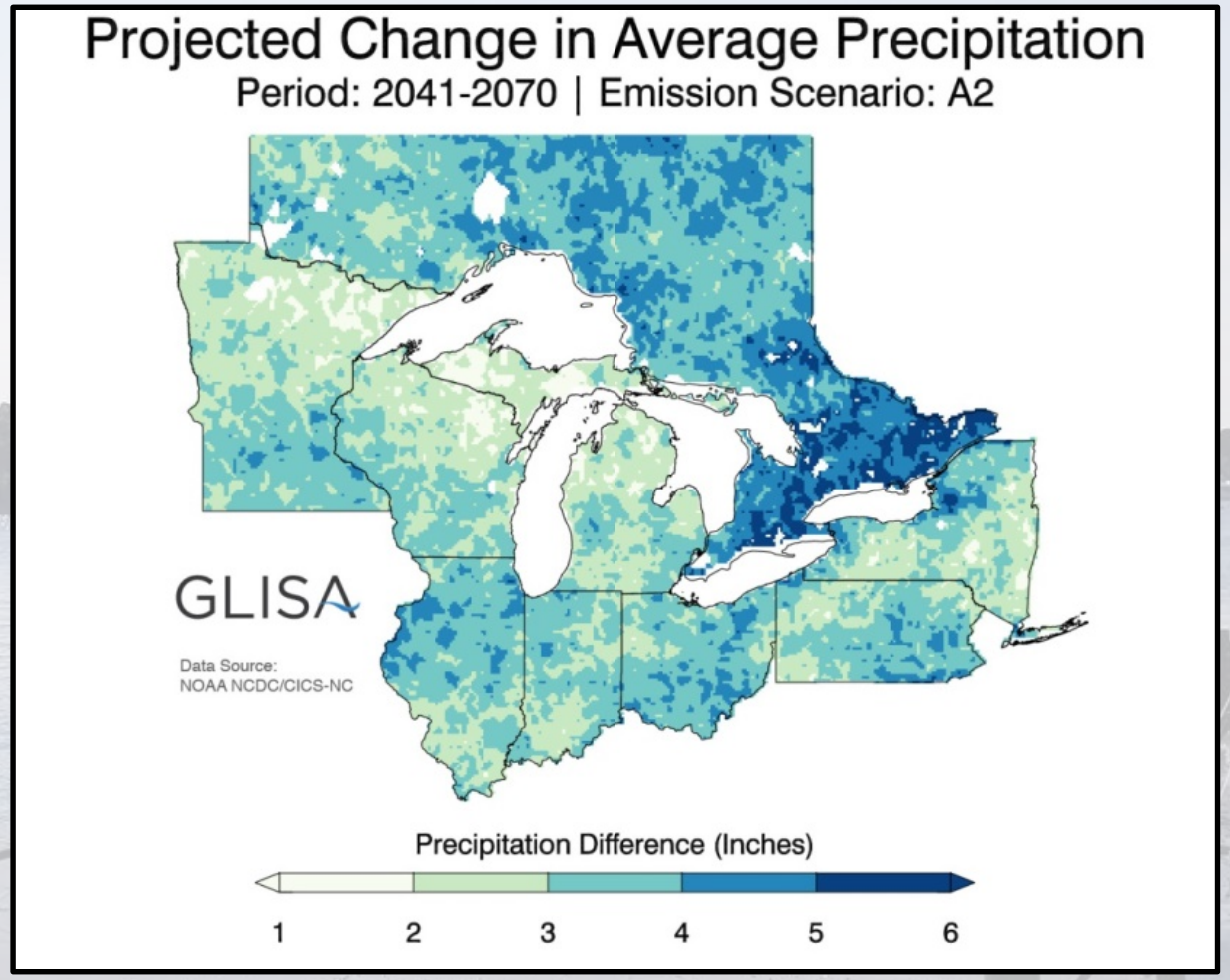
Mild HAB



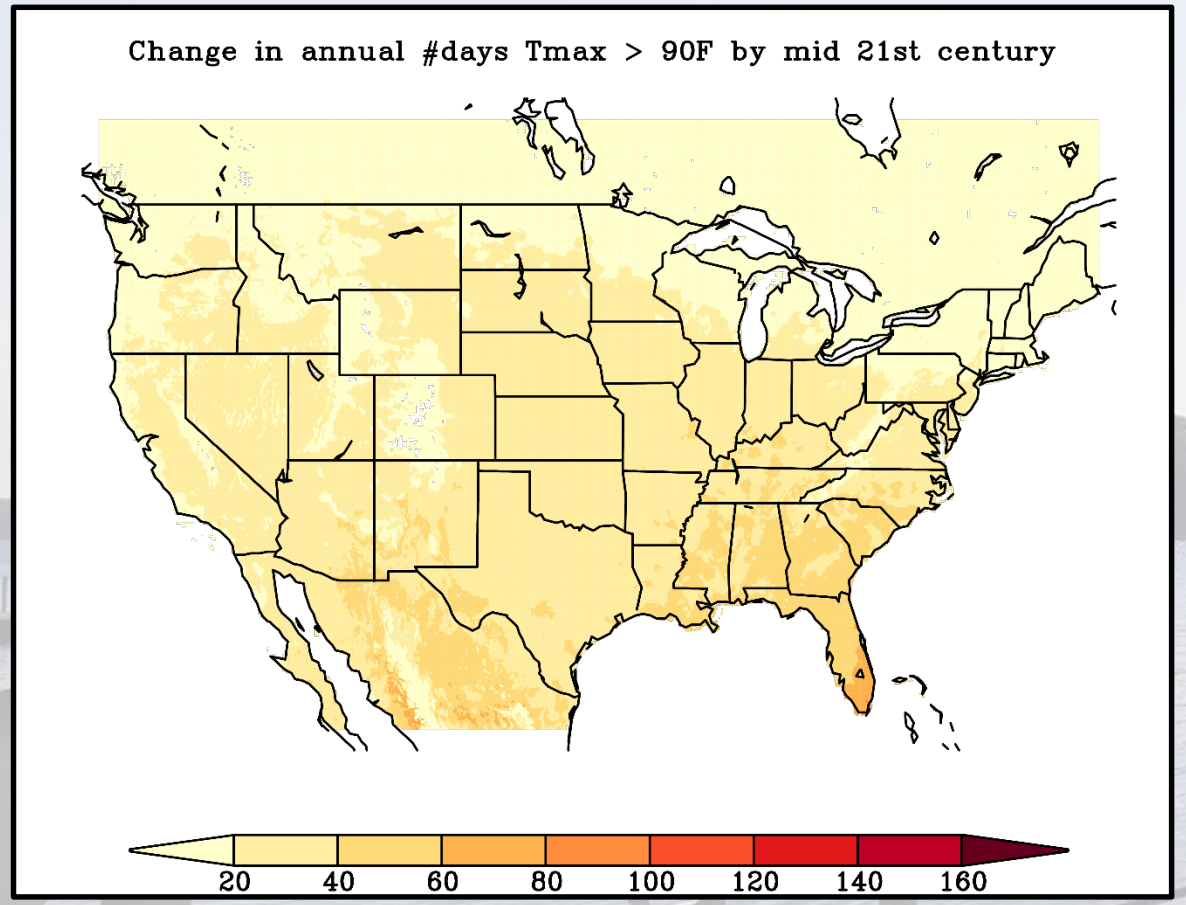


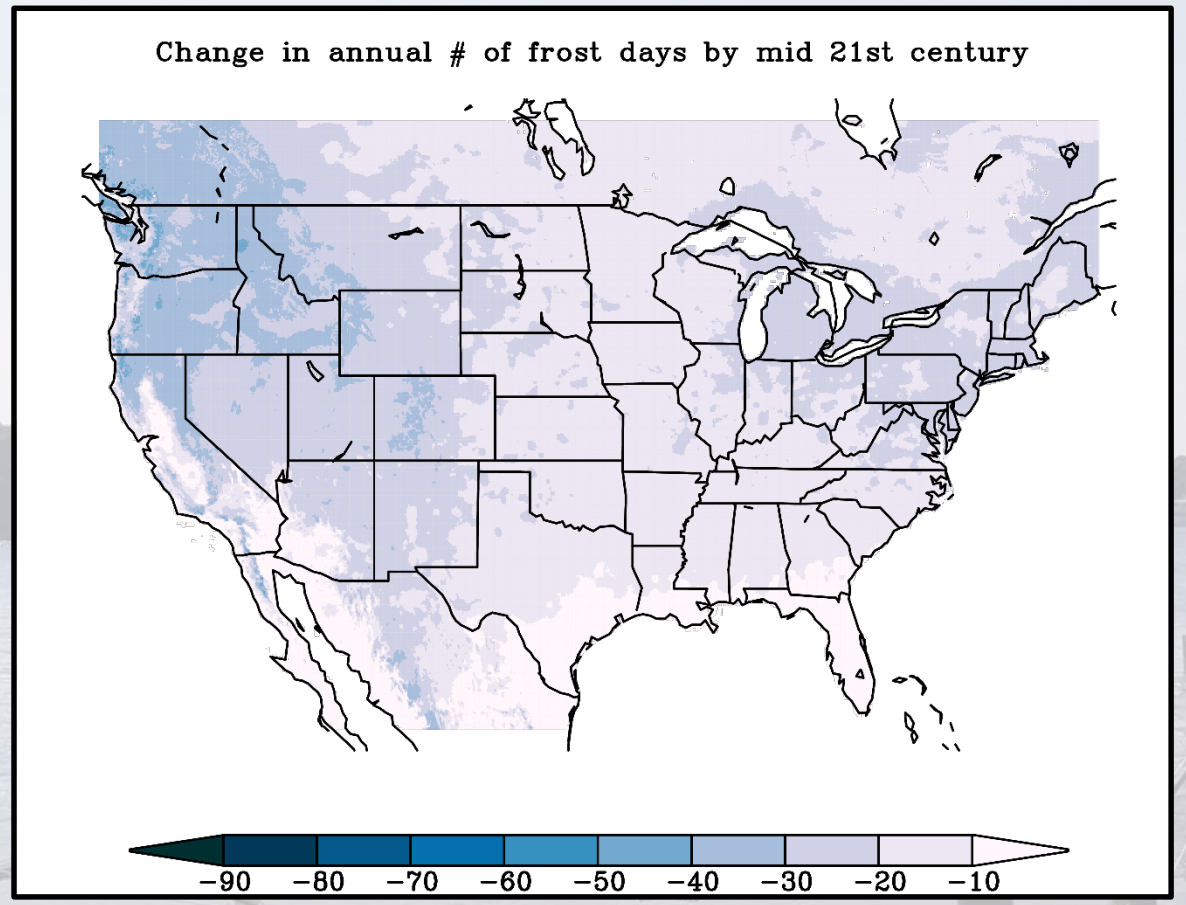
Future Climate





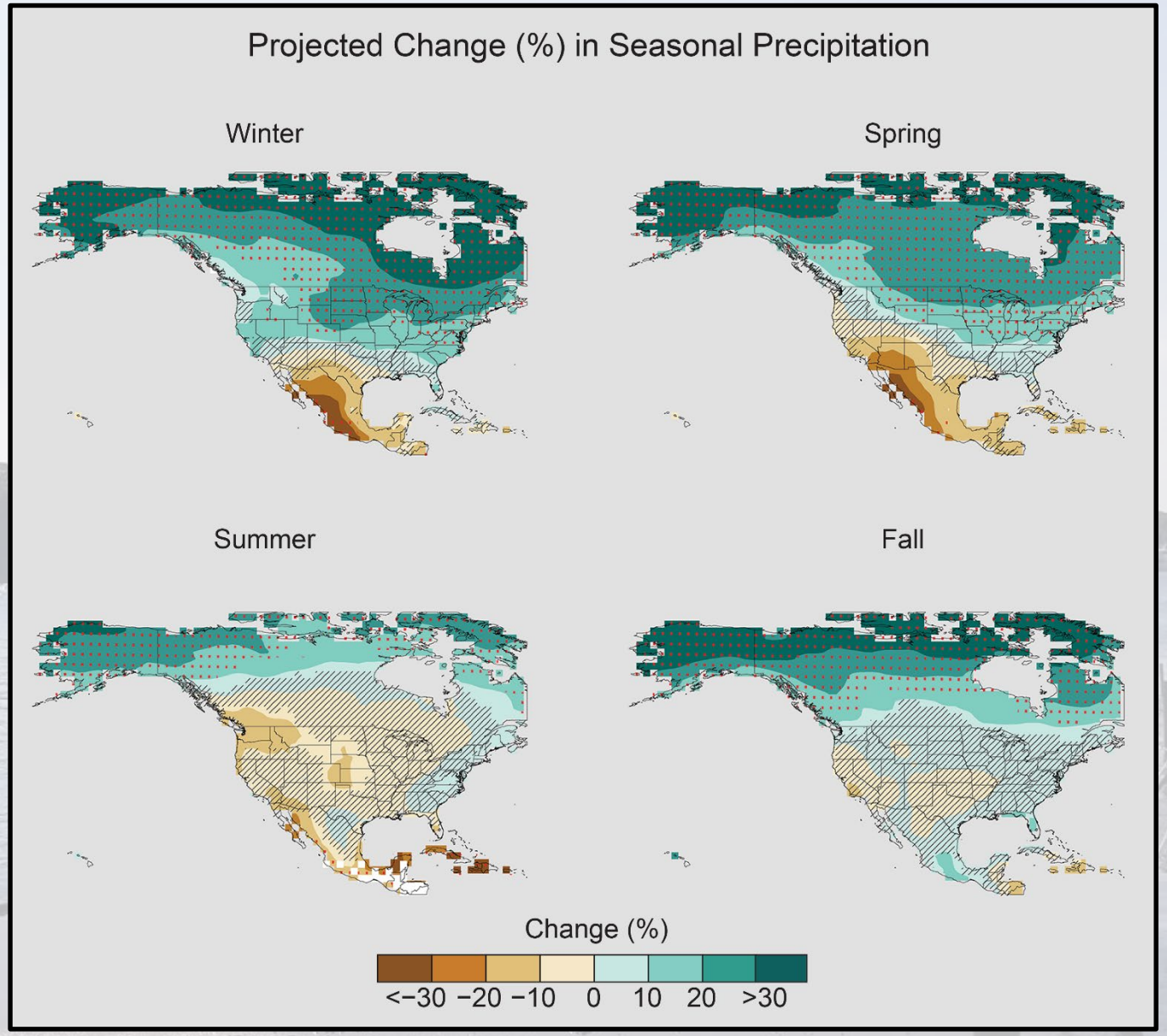
Temperature Changes





https://scenarios.globalchange.gov/loca-viewer/

Seasonal Redistribution of Precipitation



-Fourth National Climate Assessment

https://nca2018.globalchange.gov/

Summary

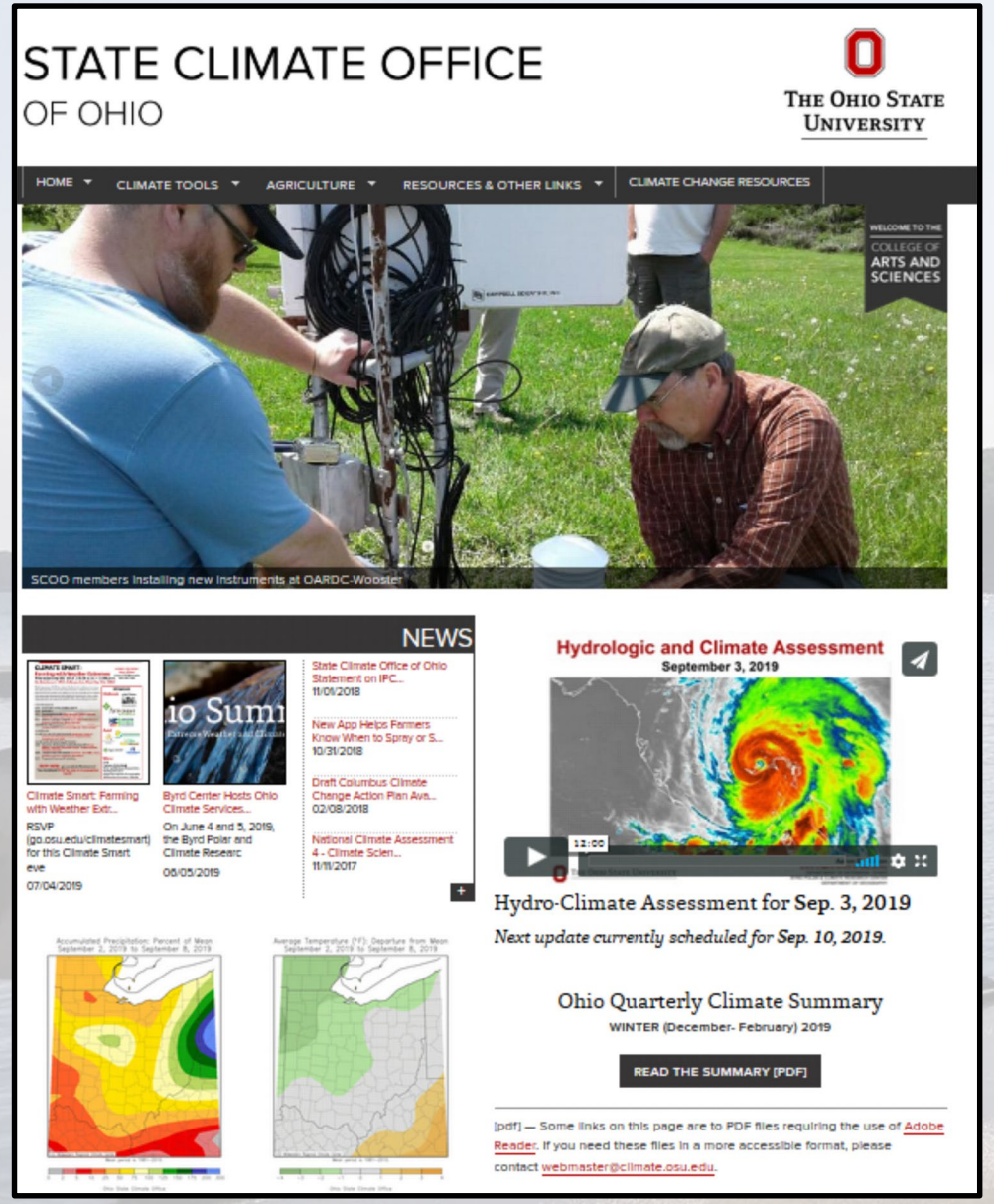
- Trends are clear:
  - Warmer (winter-spring, overnight)
  - Wetter (especially during “Ag off-season”)

- Recent period (turn of the century) very challenging weather-wise from a water quantity/quality standpoint

- Future trends are more of the same: 2019 more of a new normal?

SCOO

climate.osu.edu



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NOAA National Oceanic and Atmospheric Administration U.S. Department of Commerce

National Drought Mitigation Center NDMC University of Nebraska

Regional Climate Centers

NIDIS National Integrated Drought Information System

USDA United States Department of Agriculture Midwest Climate Hub

AASC American Association of State Climatologists