Potential Effects of Climate Change on the City of Madison











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Sustainable Madison Committee
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WISCONSIN INITIATIVE ON CLIMATE CHANGE IMPACTS

Wisconsin Initiative on Climate Change Impacts (WICCI)

- A collaboration between the Nelson Institute for Environmental Studies, the Department of Natural Resources and other state, federal and tribal partners
- Includes >200 participants; 16 working groups; advisory council; science council; outreach group
- Website offers resources: www.wicci.wisc.edu

WISCONSIN DEPT. OF NATURAL RESOURCES

NELSON INSTITUTE FOR Environmental Studies UNIVERSITY OF WISCONSIN–MADISON

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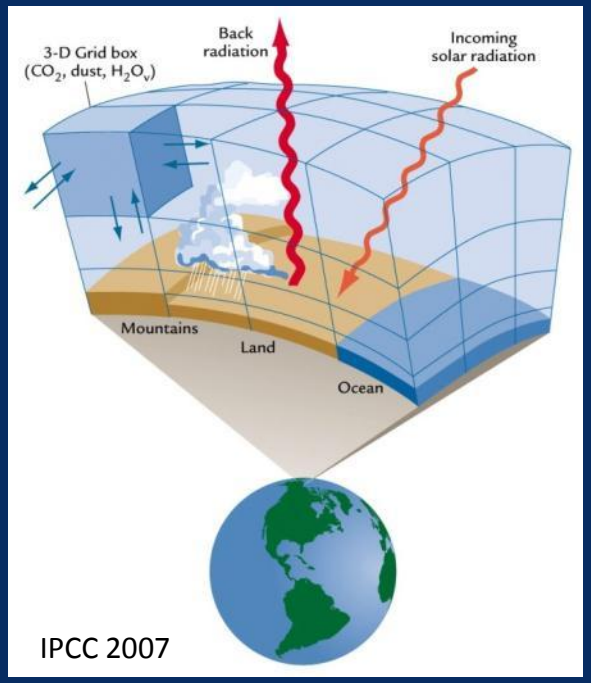


IPCC 2007

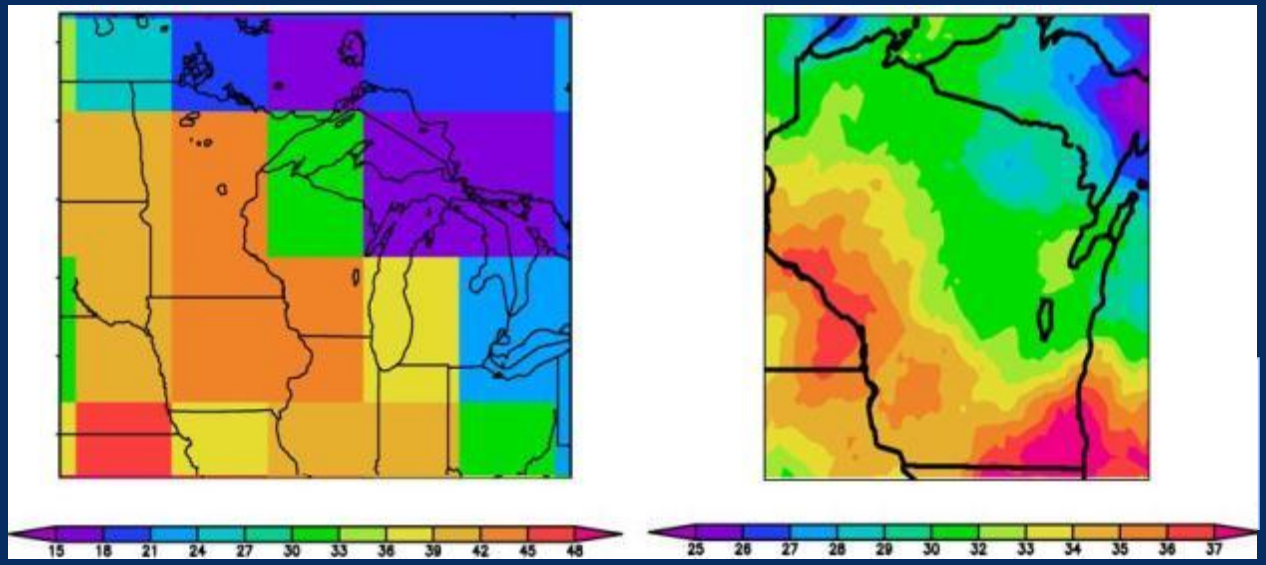
WICCI Climate Modeling:

- Used 14 Global Climate Models (GCM's) having daily data in IPCC 2007 assessment
- Downscaling verified using same Wisconsin weather station data analyzed for historical climate trends
- Provides a range of probable climate changes (probability distribution) essential for impact assessments

<u>Downscaling</u>: Focus global projections to a scale relevant to climate impacts in Wisconsin

Global Climate Model grid

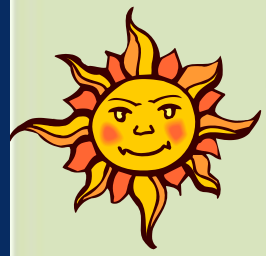
Downscaled (8x8 km grid)



Wisconsin's Past Climate
1950-2006

Winter **temperatures have increased an average of 2.5◦F across the state with the highest increase of 4.5◦F in the northwest. Our lakes are frozen for shorter time than in the past.**

Spring **temperatures have increased 1.7◦F across the state with the highest increase of 3.5◦F in the northwest. The last spring freeze arrives 2-10 days earlier than it used to.**



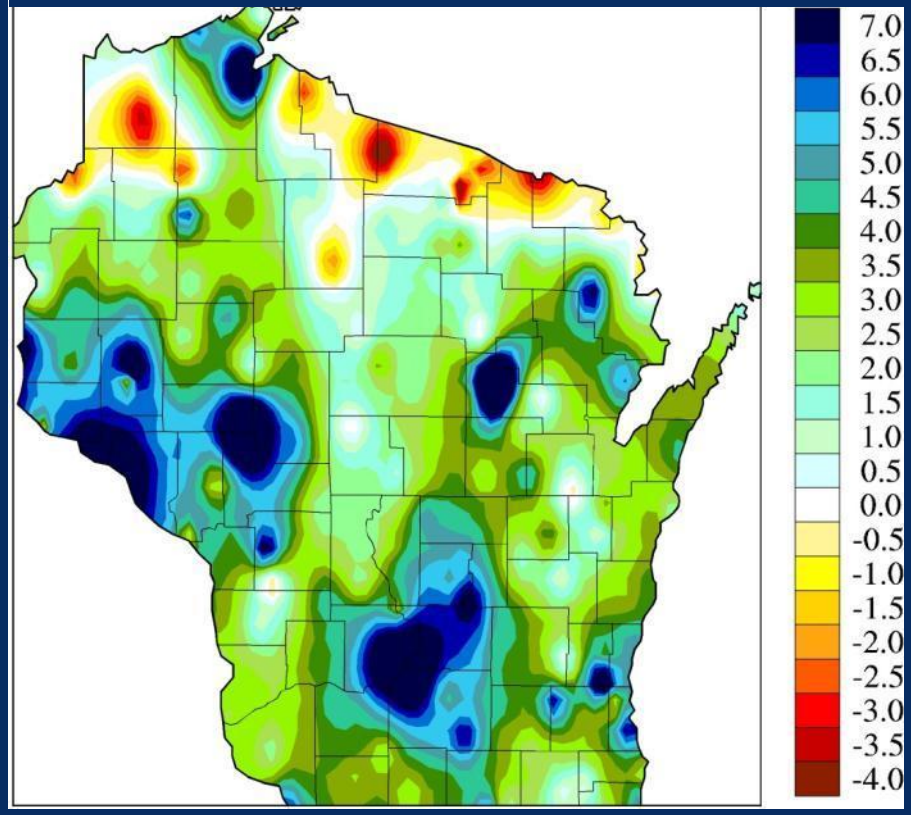
Summer temperatures have increased by only 0.5◦F averaged statewide. Northwestern and center Wisconsin have shown the greatest warming, but most of the state shows little change.

Autumn temperatures have changed little across the state. Northeastern and southern Wisconsin have cooled by about 1.5◦F. Statewide, the first fall freeze averages 6.5 days later than it did in 1950.

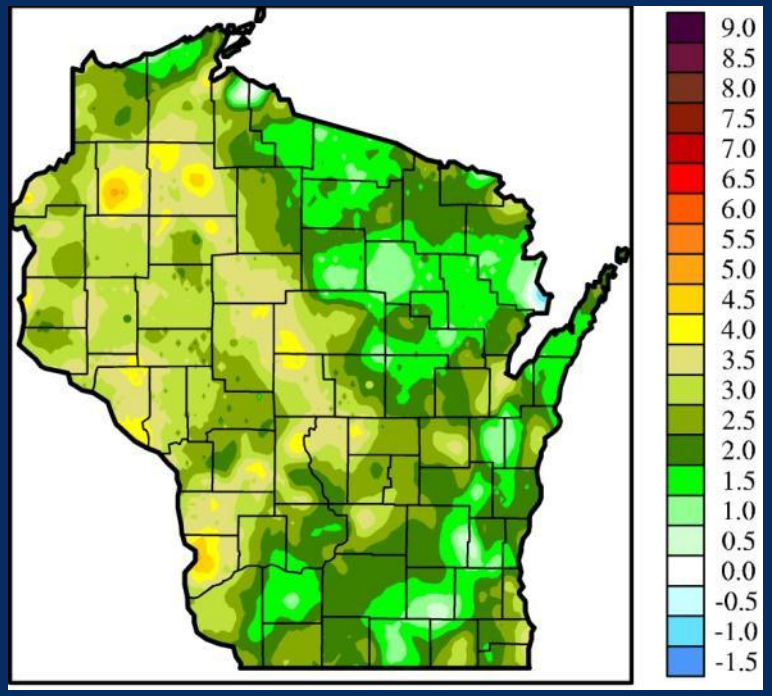
CLIMATE CHANGE IMPACTS

Wisconsin's Past Climate

Average Annual Precipitation - 1950 - 2006



Average Spring Temperature – 1950 -2010



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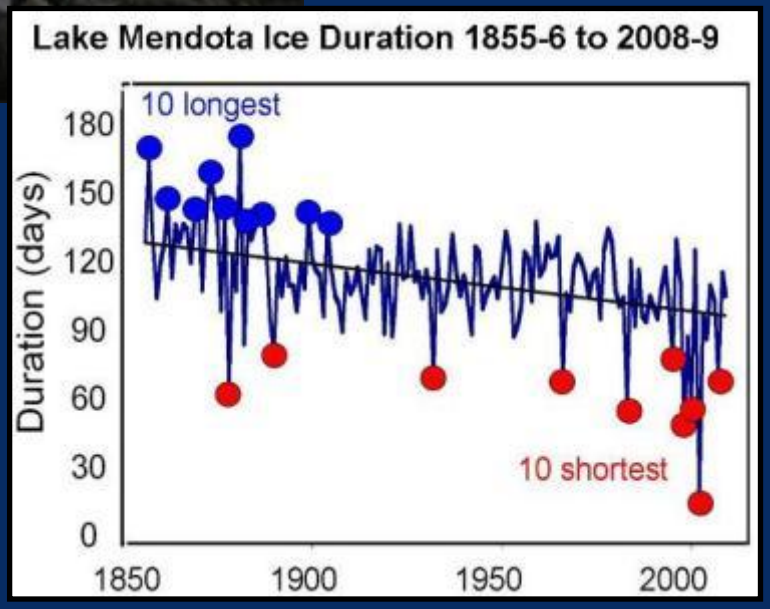
Signs of Climate Change in Madison

Duration of ice cover has decreased by about 19 days in 100 years:

- **Warmer fall temperatures**
- **Later freeze dates**
- **Earlier break-up dates**



Source: J. Magnuson, UW-Madison

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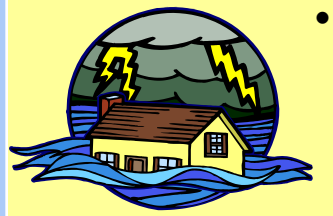
Wisconsin's Projected Climate 1980 - 2055

- Annual average temperature increase of 4-9◦ F
- More frequent hot days, fewer cold nights
- Rise in nighttime and winter temperatures



- Moderate increase in frequency and intensity of precipitation

- Significant increase in rain during winter

- Impact on short term variability (weather) not well understood

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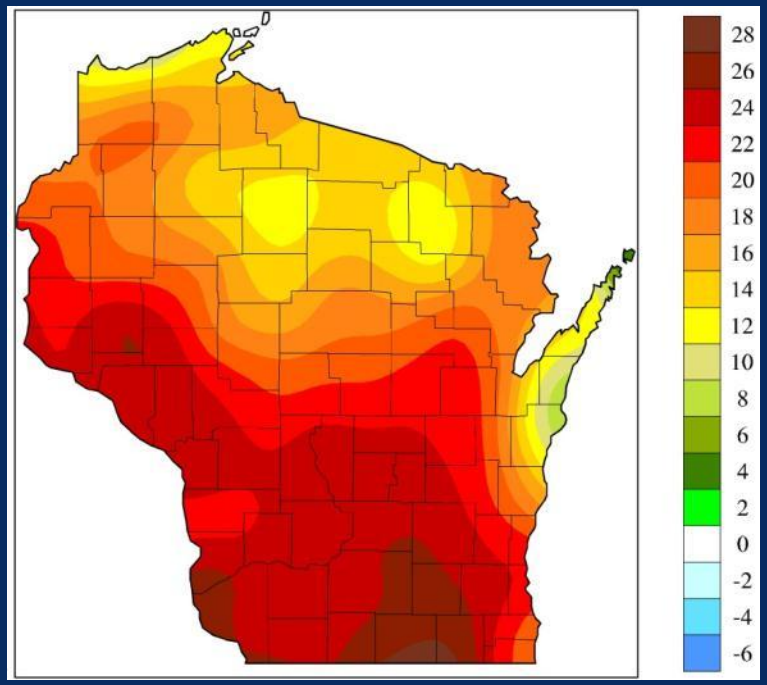
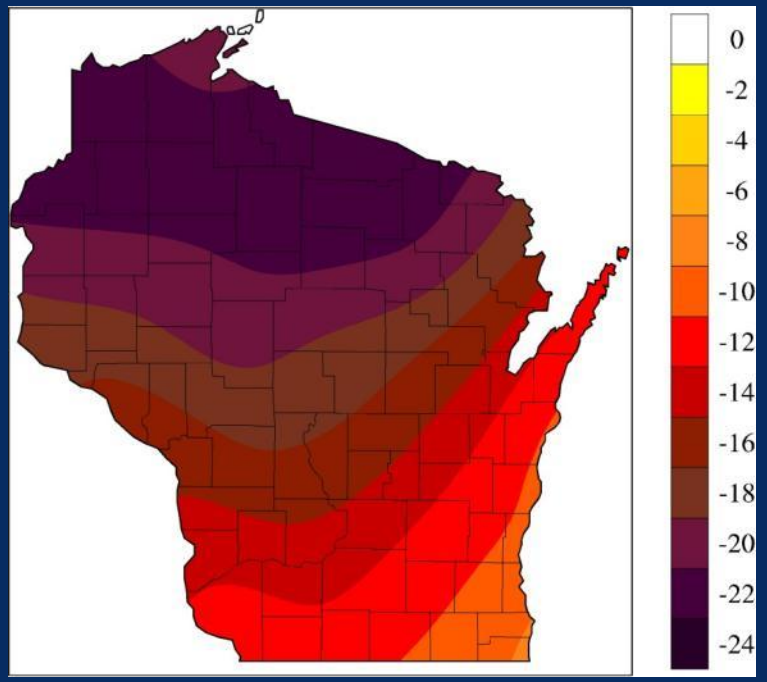
Projected Climate Change – 1980 - 2055

Frequency of Number of Days >90◦F



Frequency of Nights < 0◦F



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Projected increased flooding may overwhelm existing infrastructure

Manitou Way

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Earlier and more intense spring runoff events: Increased sediment and nutrient loading

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More sediment and phosphorus in our lakes

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More frequent harmful blue-green algal blooms with increased summer temperatures

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Variable lake levels with variable precipitation and evapotranspiration

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Increased winter rains

- Frozen ground with heavy rain – February 2013
- Water can't infiltrate, leading to flooding

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Recreational Impacts

Ironman Triathlon – need a clean lake

Kites on ice – a thing of the past due to ice safety fears

Statue of Liberty - 2010: Part of Madison's identity as a fun place to live

Madison Marathon – dates changed due to heat on Memorial Day

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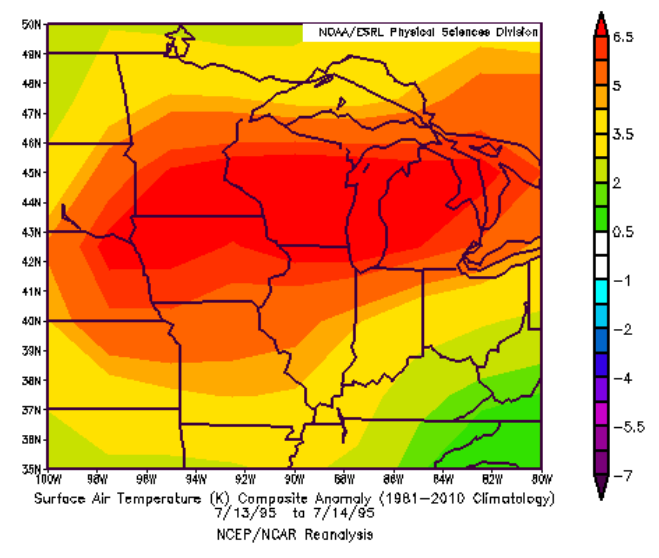
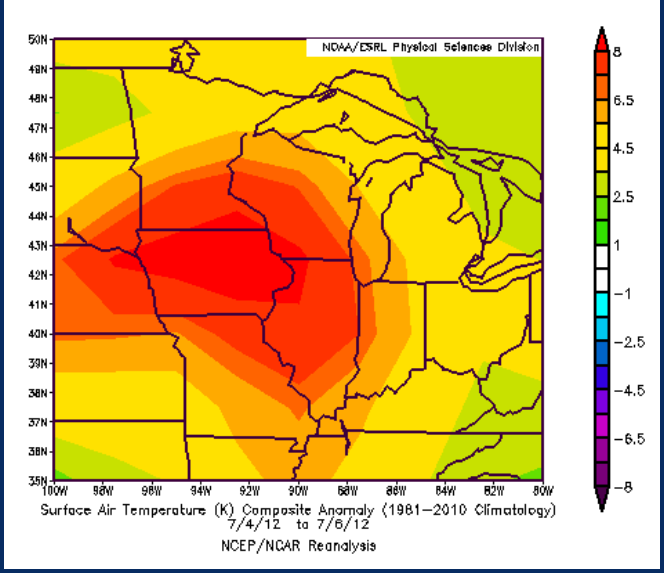
Recent Mid-West Heat Waves



1995 Heat Wave

- Madison hit 101º (hottest until 2012)
- Extremely high humidity
- 750 heat-related deaths in Chicago
- Elderly, poor, minorities especially hard hit



2012 Heat Wave

- Madison hit 104º
- 3 straight 100º days in Madison, Chicago
- Chicago heat deaths: ~ **18**

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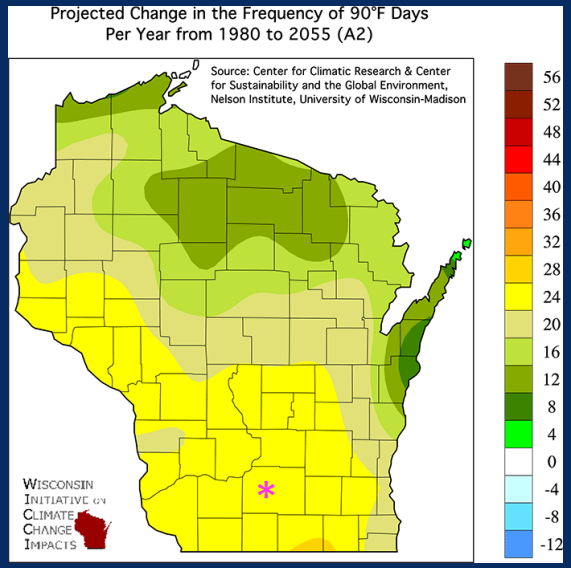
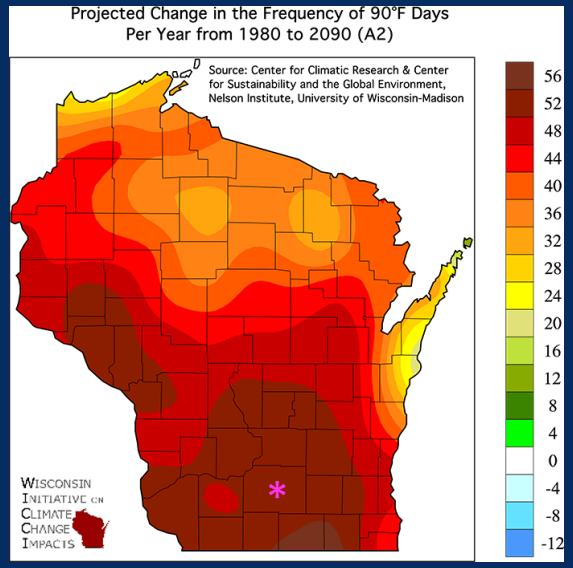
Heat Projections – Mid and late-century

90s



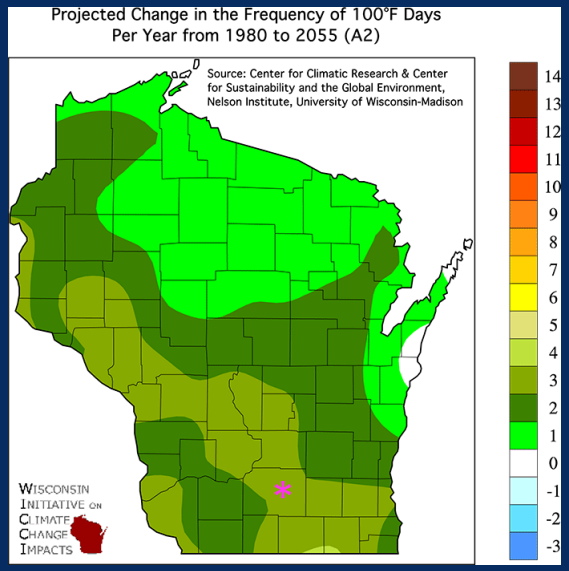
90s



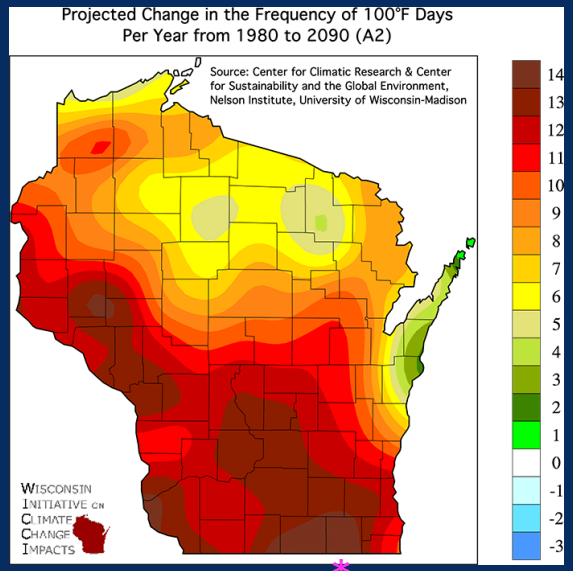
More than 2 months over 90°

Mid Century

100s



100s



Late Century

About 2 weeks over 100°

Heat Disaster Plans Save Lives

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