

The Intersection of Climate and Health: Connecting Historical Trends to Current Public Health Opportunities



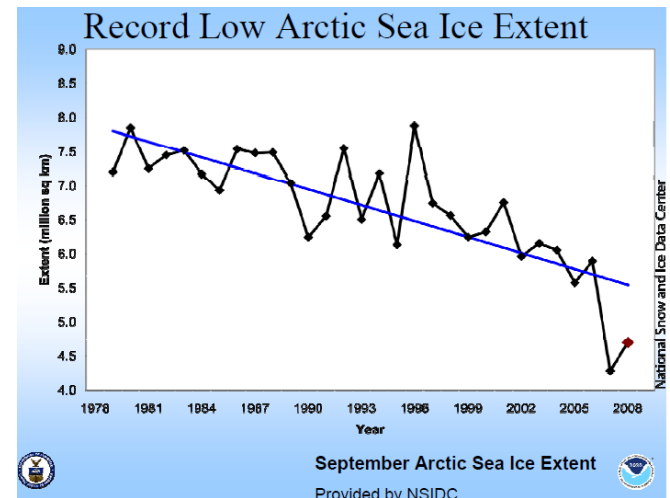
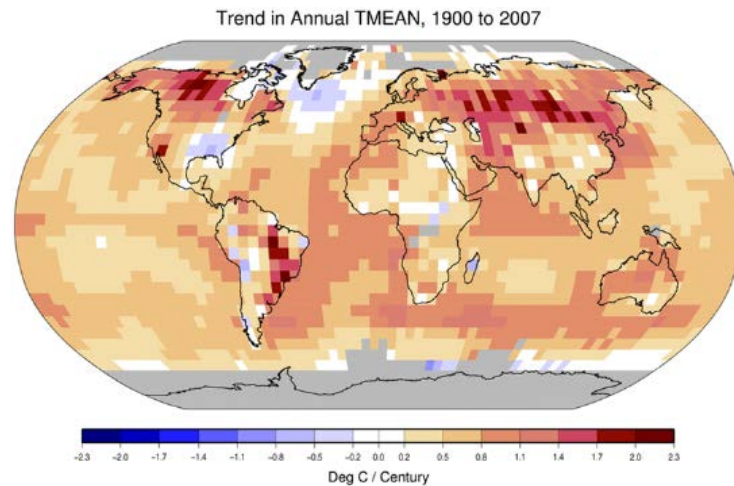
**Jeff Phillips, Climate and Health Program Manager
WI Department of Health Services**

University of Nebraska, June 18, 2014

Climate has been Changing; Data Suggests Increasing Extreme Weather

Based on scientific analysis of past climate data

Meteorological records from National Oceanic & Atmospheric Administration (NOAA), National Weather Service (NWS), and State Climatology Offices



Easterling. Observed and Projected Changes in Climate. NOAA Natl Climatic Data Center, Ashville, NC. 2009

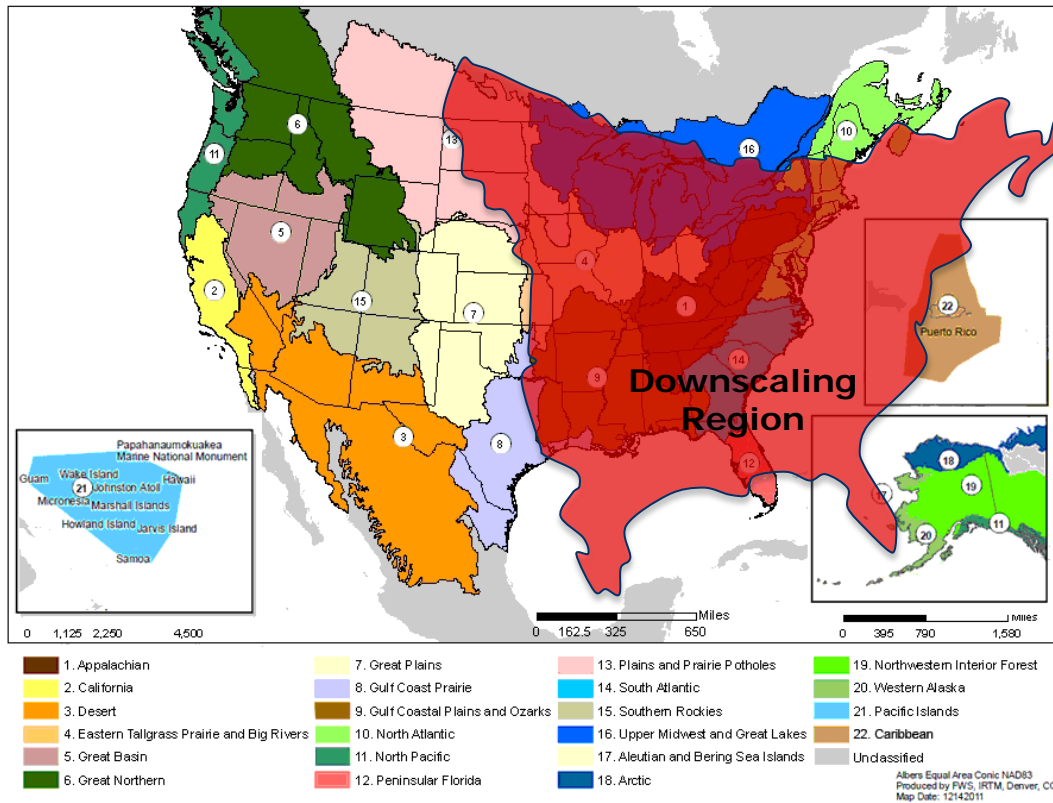


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Climate Assessments and Downscaling

UW-Center for Climatic Research

Statistical downscaling of climate projections - Objective to statistically downscale global climate model simulations to scales relevant for decision makers (around 10 km resolution)



Potential Regional Climate Impacts

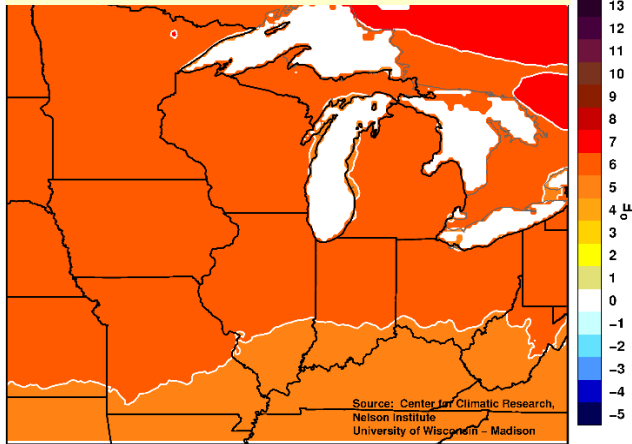
- ❑ Upcoming several slides show **possible** outcomes from downscaled modeling
- ❑ Suite of 14 models, averaged together
- ❑ Known as the Climate Model Intercomparison Project Phase 3 (CMIP3)
- ❑ The next 6 slides consider a time period of 1980 to 2055



How Far Do We Plan Ahead?

Mid 21st

Forecasted Annual Average Temperature



+6 °F

Planning Horizons

Local budgets: 1-2 years

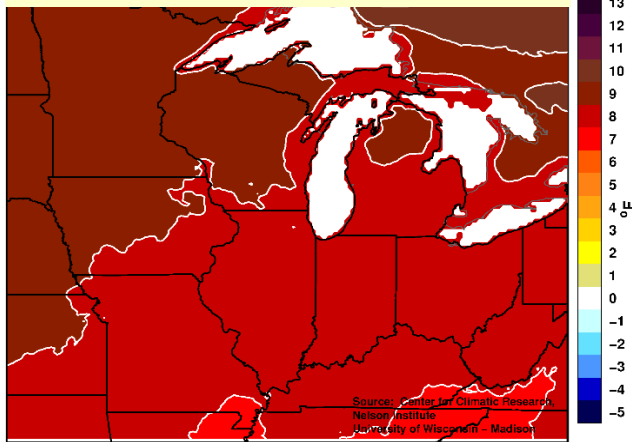
Staffing levels: 3-5 years

Buildings: 25-50 years

Roads, sewers, etc.: >50 years

Late 21st

Forecasted Annual Average Temperature

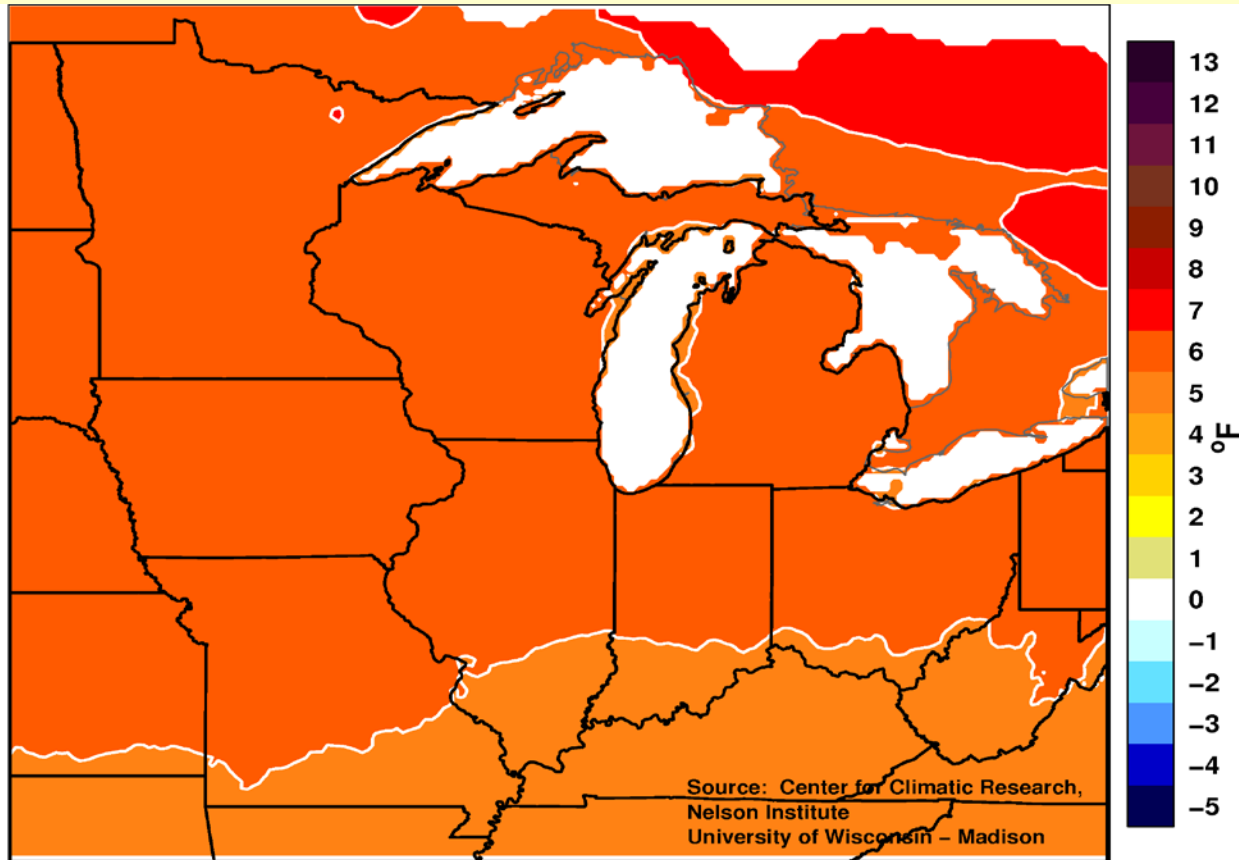


+9 °F



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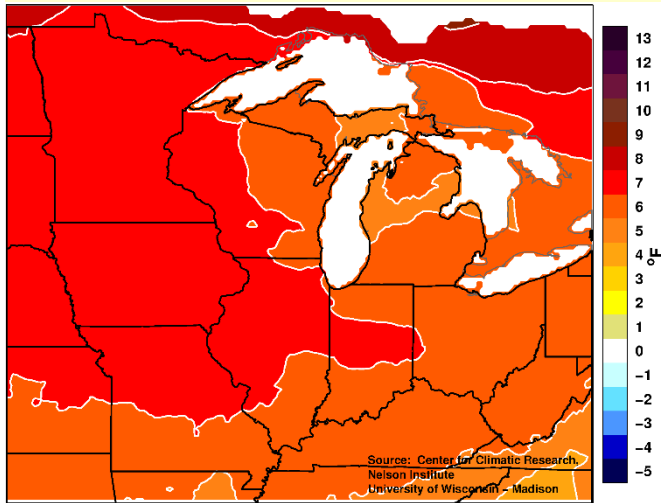
Potential North Central Regional Change in Mean Annual Temperature, 1980-2055 (+6°F)



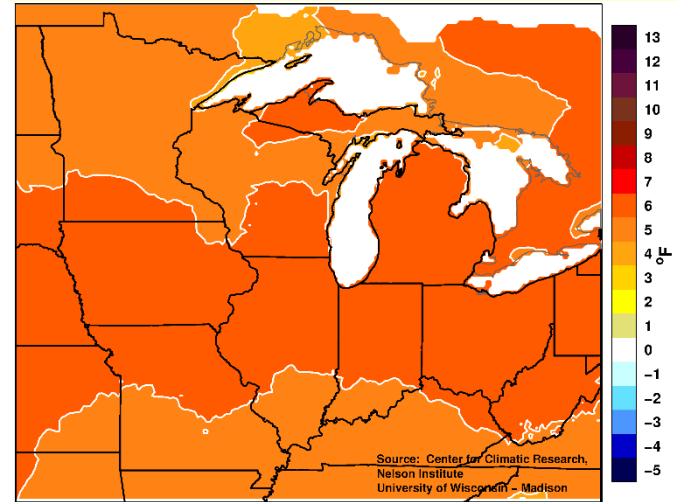
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Potential Seasonal Variations in Regional Maximum Temperature, 1980-2055

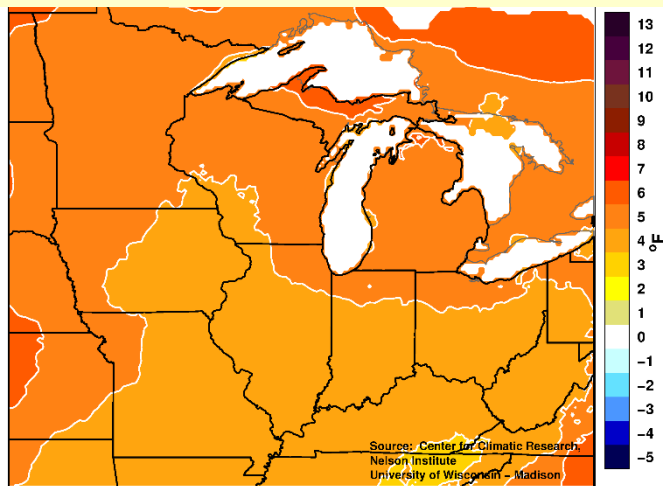
Winter +6-7°F



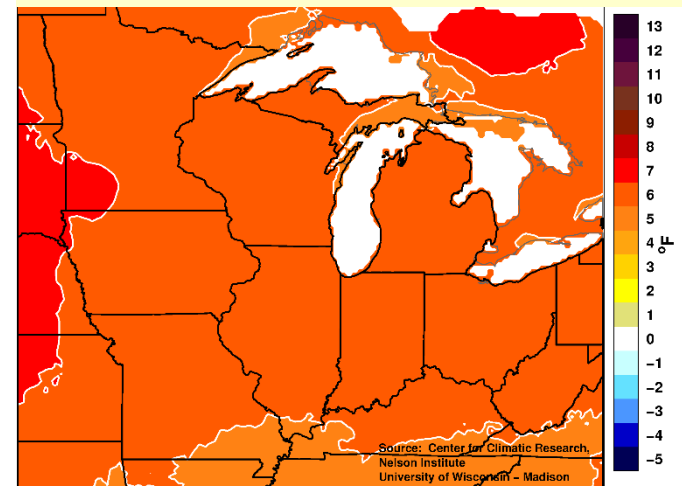
Spring +5-6°F



Summer +4-5°F



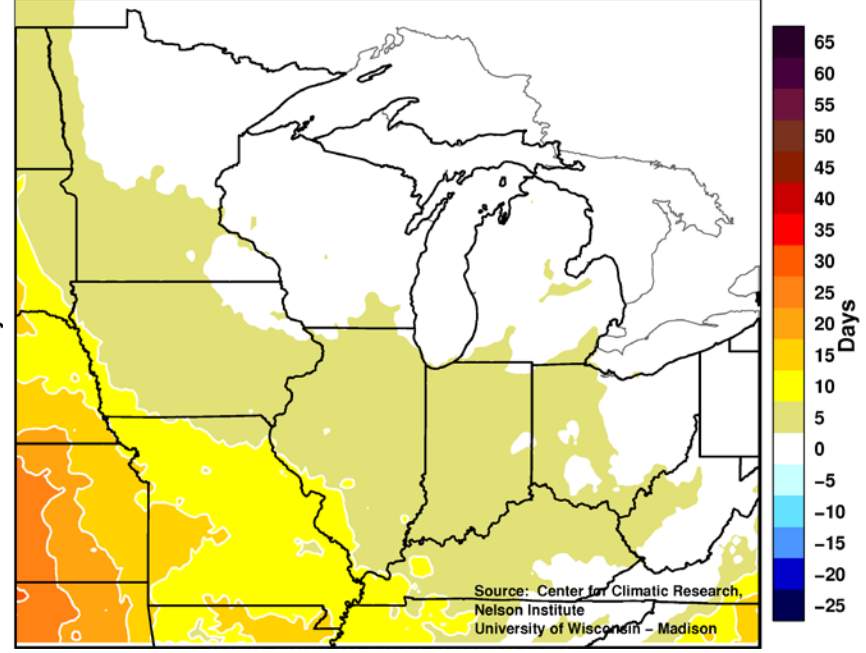
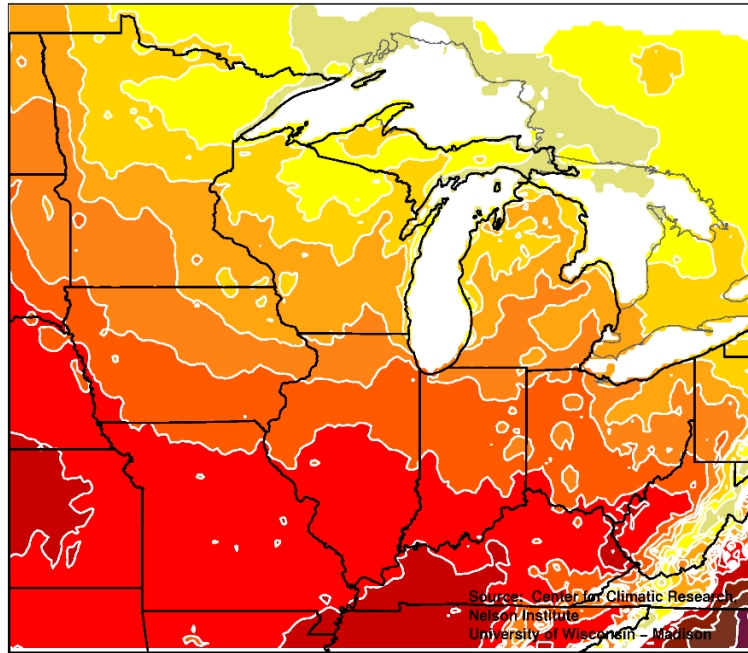
Fall +6°F



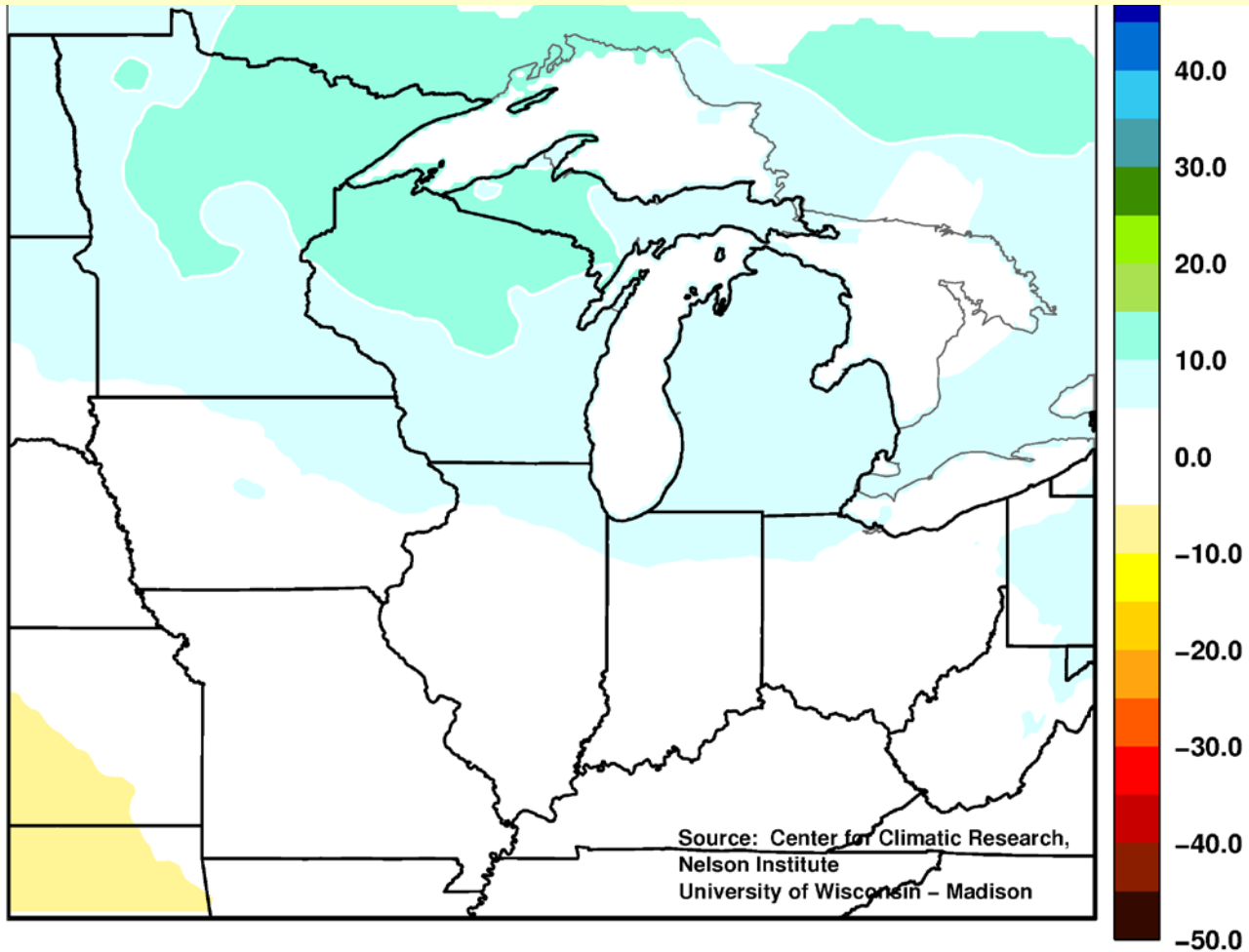
Possible Regional Peak Temperatures by 2055

Days > 90°F

Days > 100°F

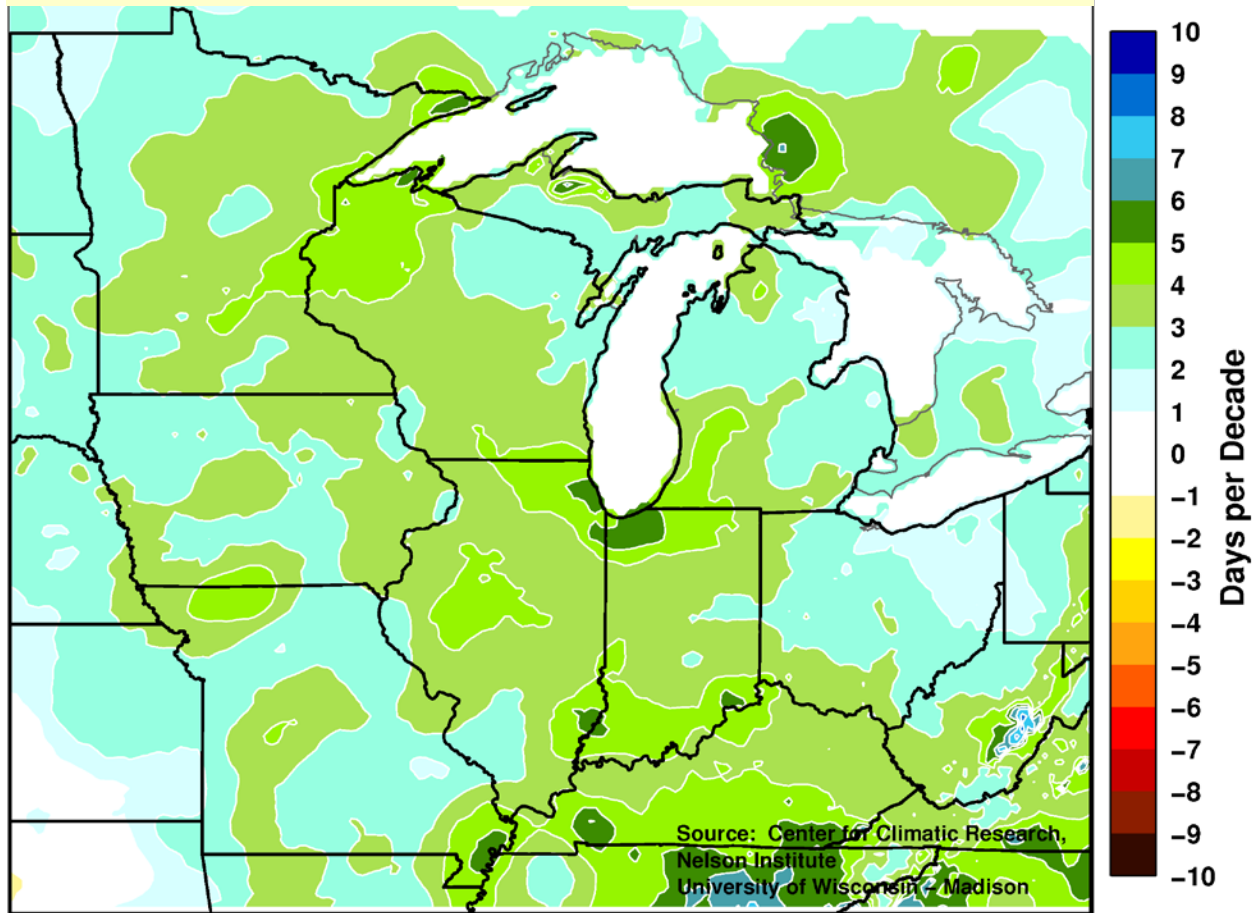


Possible Regional Change in Annual Precipitation (inches), 1980-2055



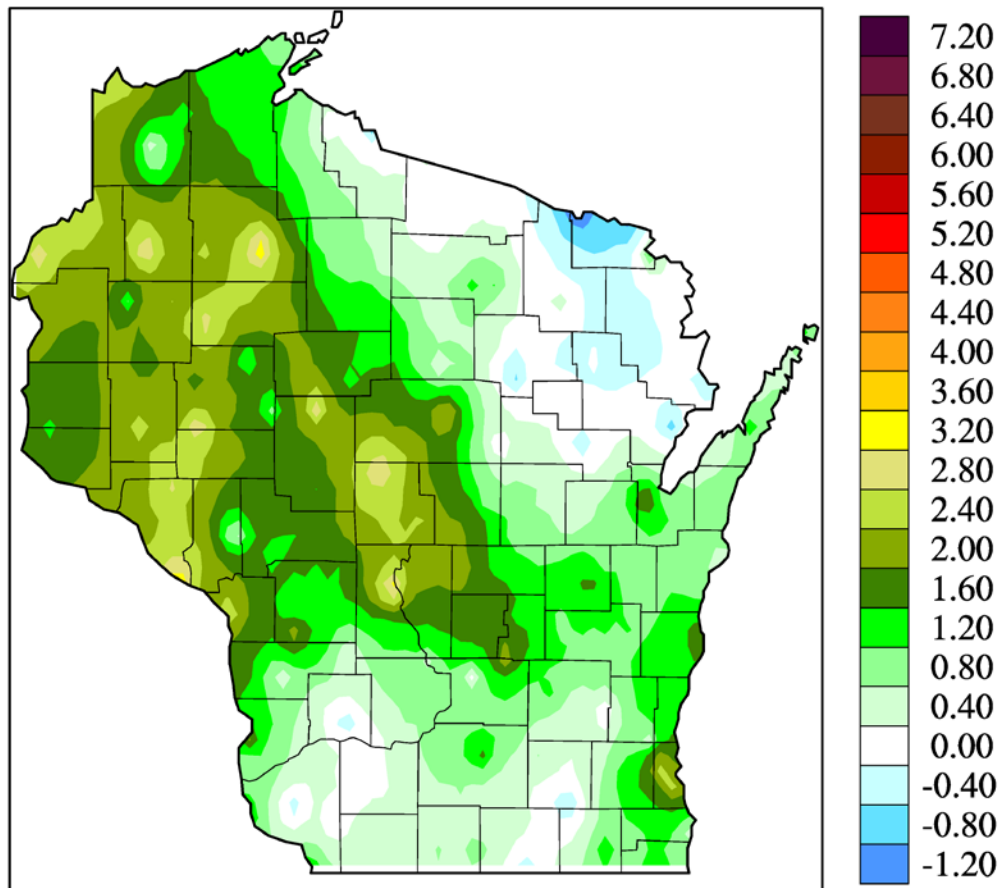
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Forecasted Heavy Precipitation Events, Days per Decade, 1980-2055



Historic Temperature Change

Change in Annual Average Temperature (°F) from 1950 to 2006

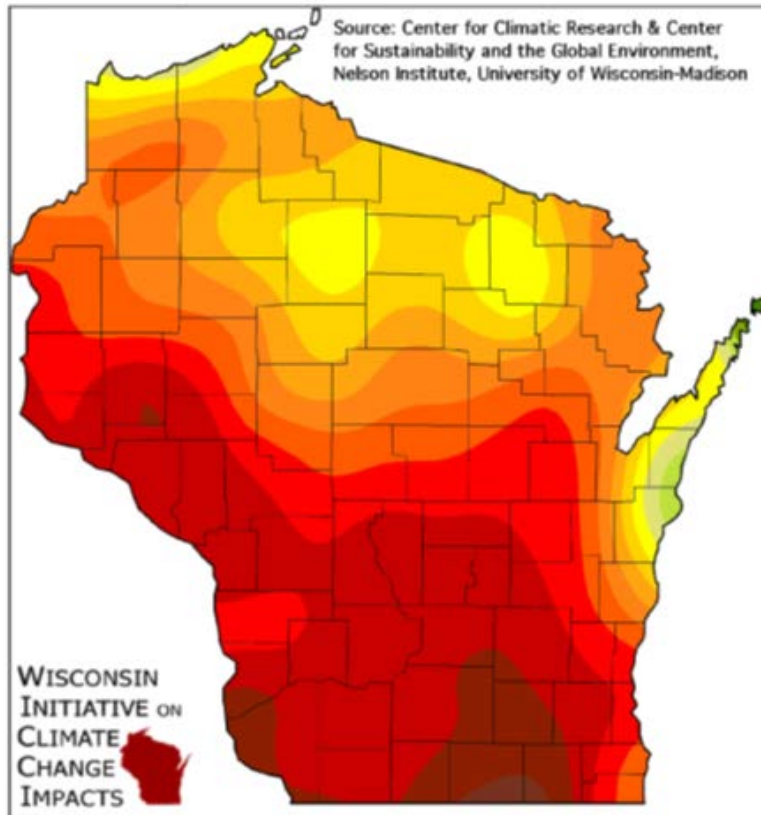


**Wisconsin has warmed
by 1°-1.5°F
since 1950**

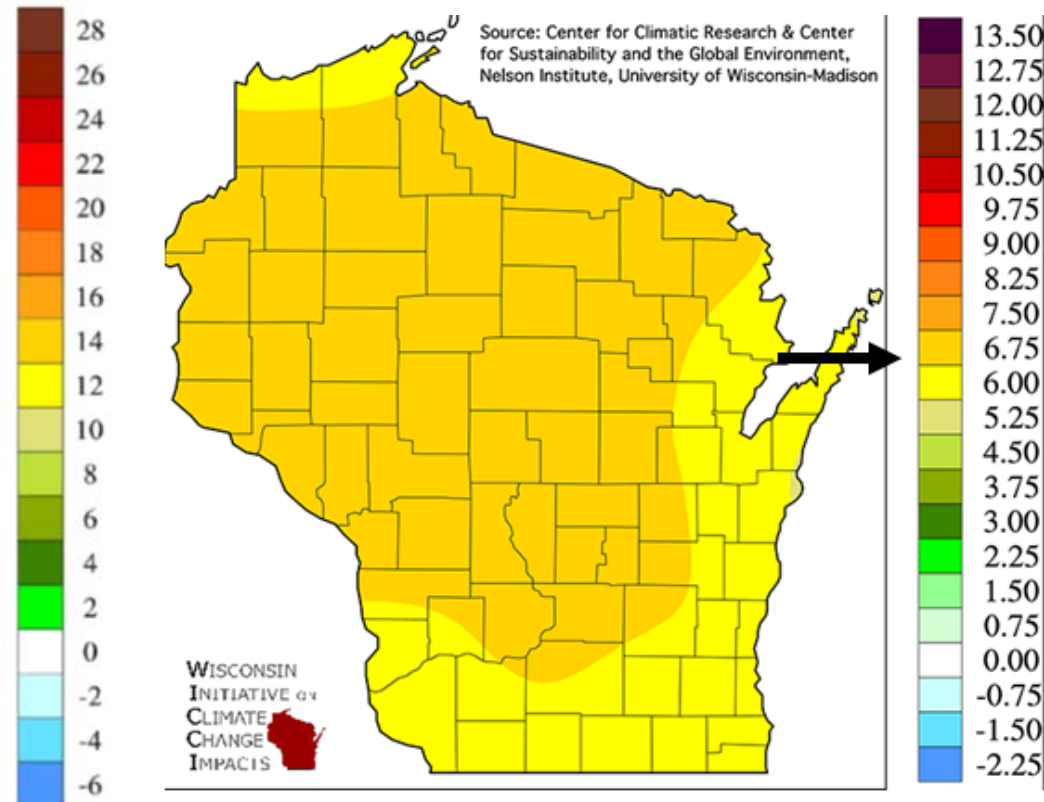


This Warming Trend May Continue

Frequency of 90°F Days

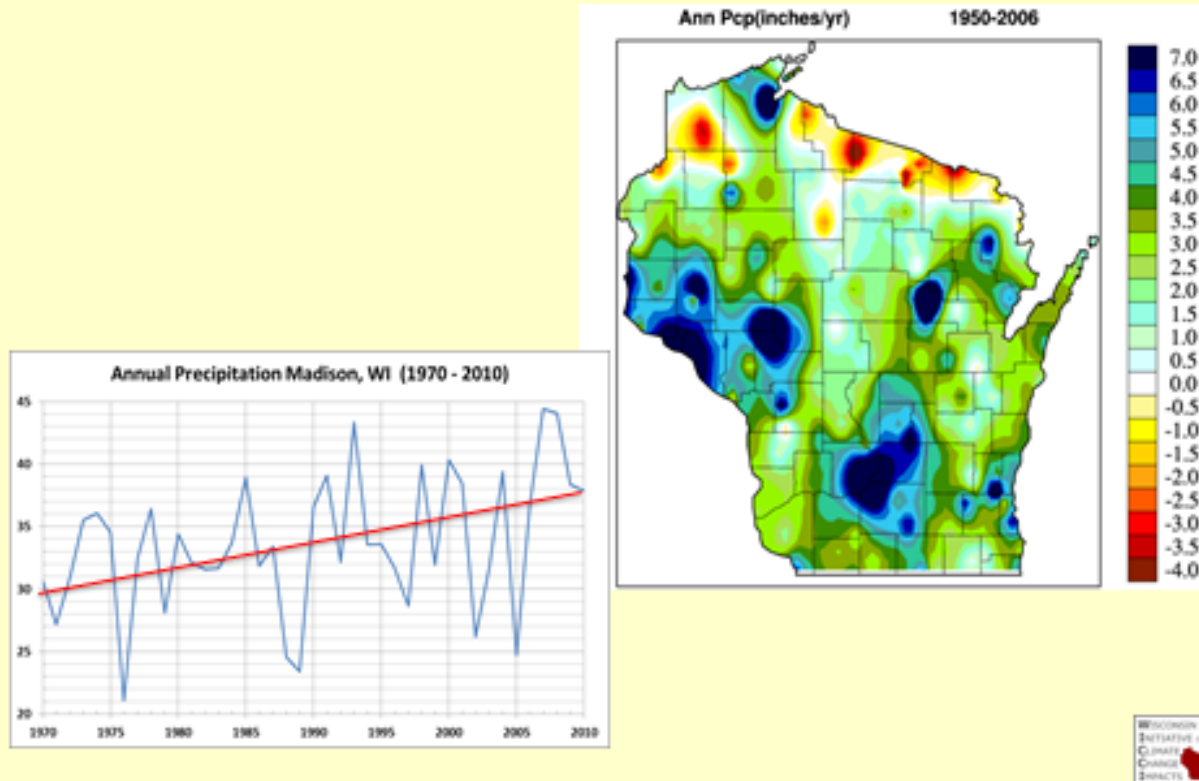


Average Annual Temperature



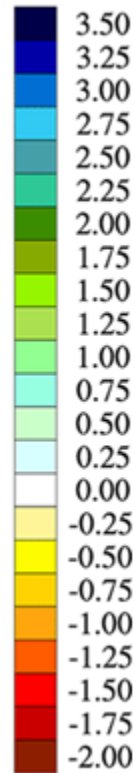
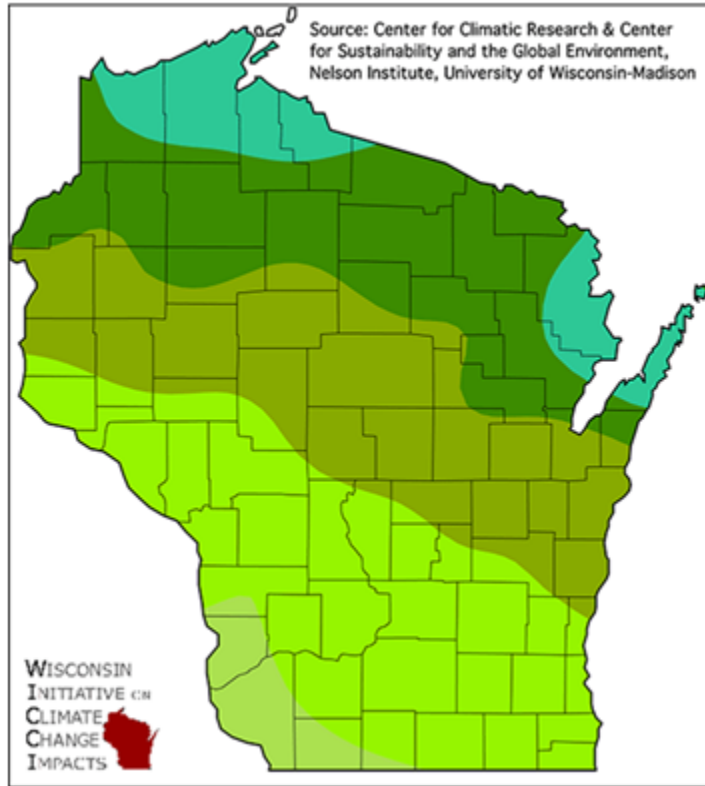
Historic Average Annual Precipitation, 1950-2006

Annual Average Precipitation Change

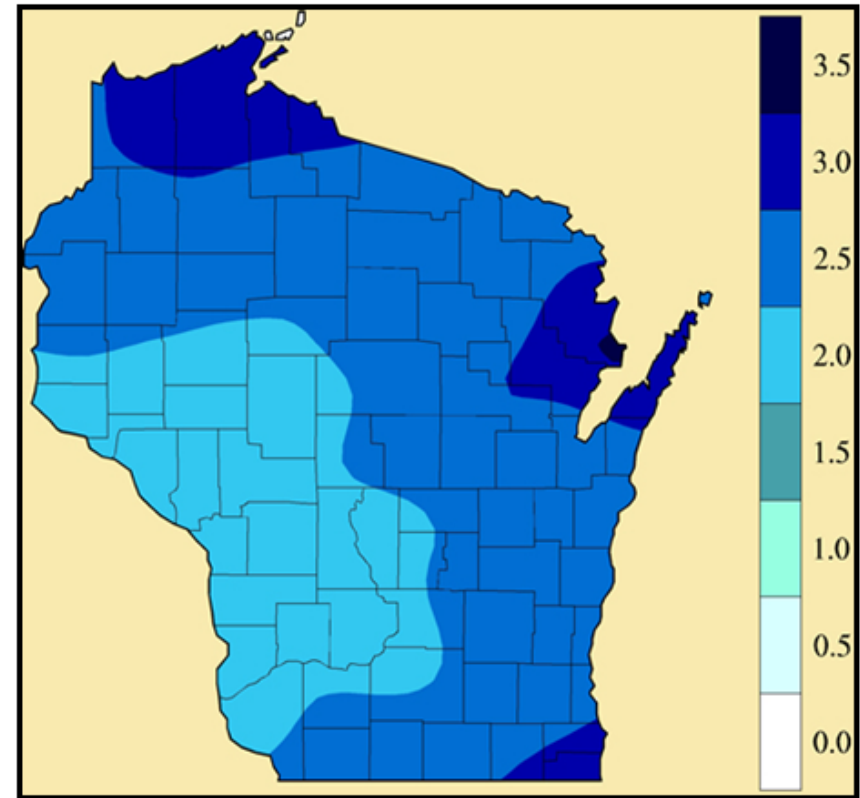


Wisconsin's Wetter Trend May Continue

Average Annual Precipitation (inches)



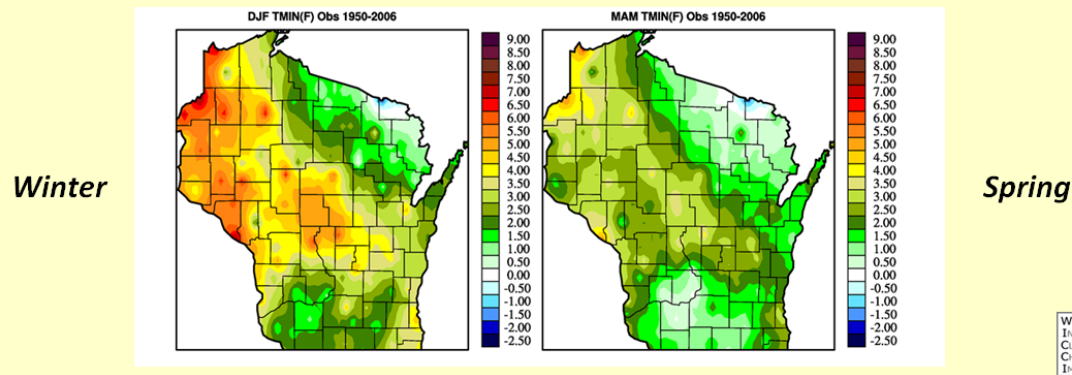
Anticipated Increase in Number of 2" Rain Events per Year.



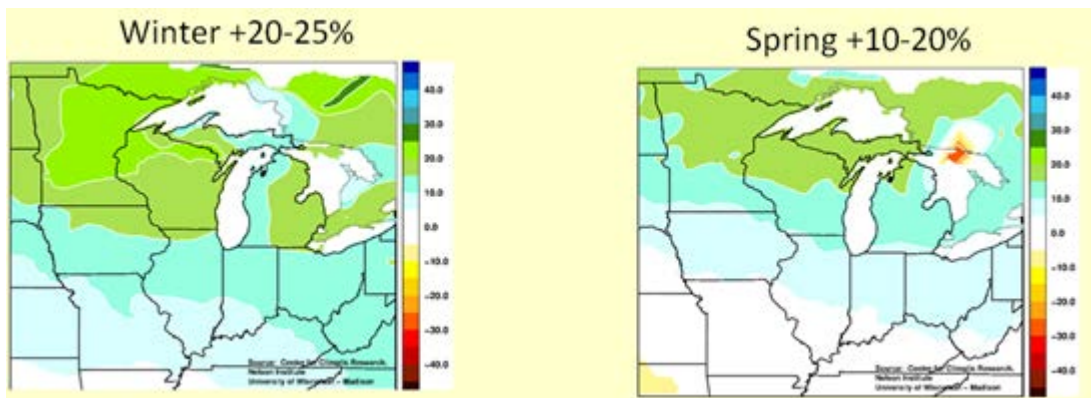
Seasonality and Timing

Warmer winters and increasing precipitation in late winter & early spring may lead to less snow cover, more freezing rain, and more ice storms

Nighttime Low Temperature Change



Precipitation Changes by Season



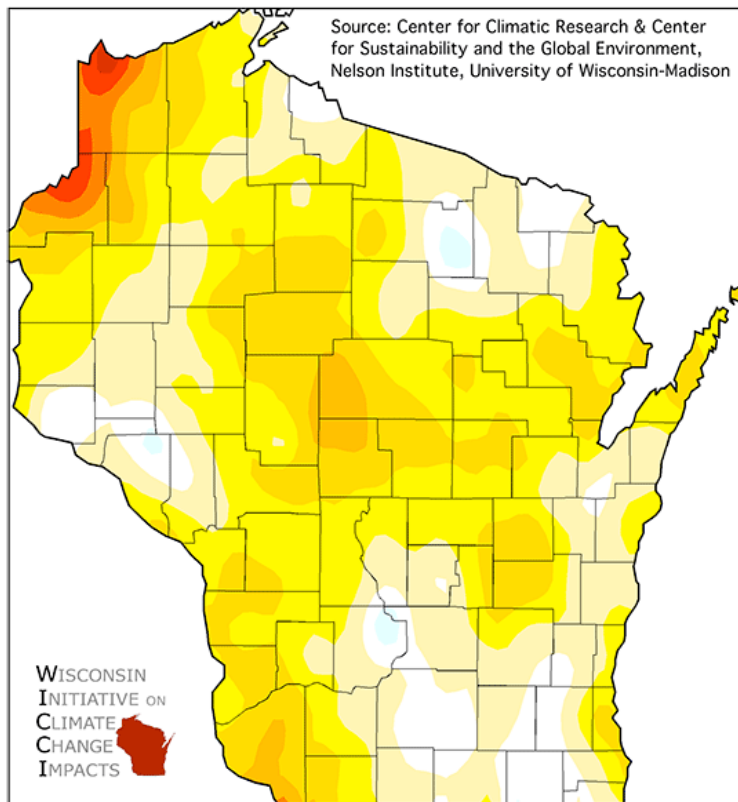
Annual snowfall reduction of 29%



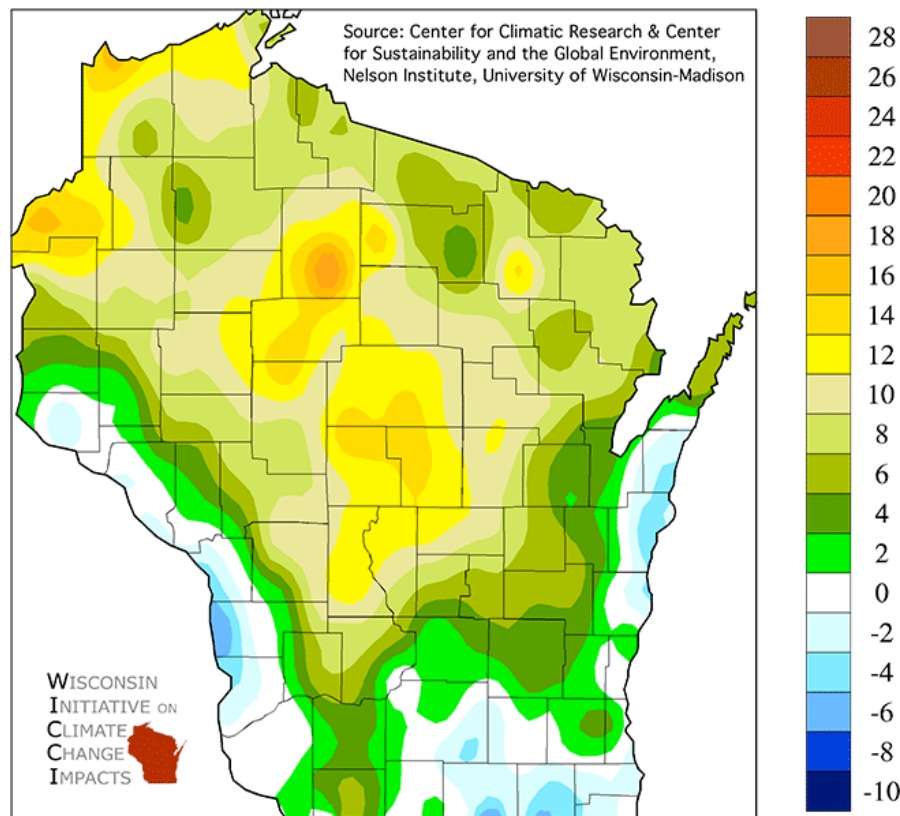
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Seasonal Changes and Freeze Dates

Change in Average Date of Last Spring Freeze from 1950 to 2006



Change in Average Date of First Autumn Freeze from 1950 to 2006



Wisconsin growing season lengthened by 1-4 weeks since 1950



Extreme Weather May Increase in the Future

Scientific modeling suggests:

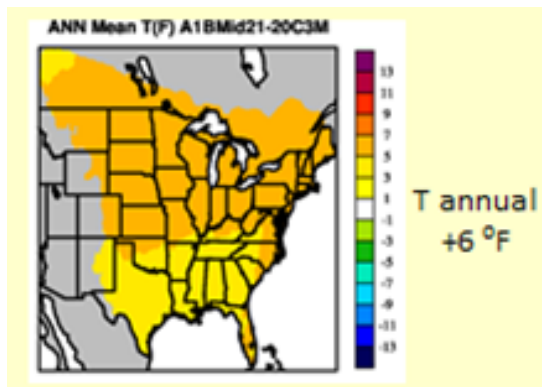


Temperature Increases

- Annual Mean and Max Temperature
- Extreme Heat Days ($\geq 90^{\circ}$ F)
- Cooling Degree Days (500+)

Precipitation Changes

- Annual Precipitation (Inches/Yr)
- Extreme Rainfall Events (2" in 24 Hrs.)
- Frequency
- Intensity
- Seasonal Differences



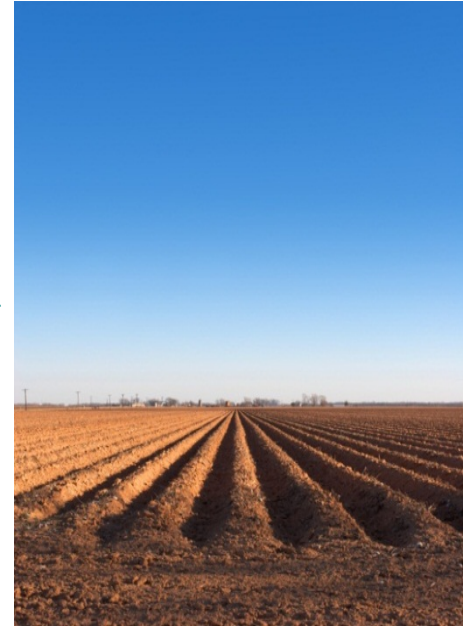
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Recent Climate/Weather Trends and Future Projections suggest...



We need to become better prepared for:

- *Extended drought*
- *Wildfires*
- *Heat waves*
- *Intense precipitation events*
- *Severe flooding*
- *Winter weather*
- *Water quality impacts*
- *Vectors and pests*



Wisconsin's Changing Climate: Impacts and Adaptation. 2011. WI Initiative on Climate Change Impacts. Nelson Institute for Environmental Studies. UW, Madison, WI



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Climate and Extreme Weather Events are Public Health Concerns



“Encouraging people to consider human health impacts... provides a useful and engaging frame of reference.”

“The Public Health Community has an important perspective to share about climate...a perspective that makes the problem more personally relevant, significant, and understandable to members of the public.”

Maibach et al. “Reframing Climate Change as a Public Health Issue: An Exploratory Study of Public Reactions.” BMC Public Health. 2010. 10:299.



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Climate and Extreme Weather Events are Public Health Concerns

- ❑ Most negatively impacted by weather and climate events are: Elderly, Very Young, Low Socio-Economic Status, Mental Health Issues, Chronic Diseases, and Socially Isolated.
- ❑ Building resilience is a collaborative effort.
- ❑ Emergency planning, preparedness, & response can help mitigate Public Health problems.



Potential Public Health Impacts

□ Heat

- Fatalities
- Heat tetany (stress) and syncope (fainting)
- Chronic diseases
- Environmental changes
- Mental health



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Potential Public Health Impacts

□ Precipitation

- Severe/Intense storms
- Injury
- Drowning
- Disease
- Environmental exposures
- Allergen exposures
- Mental health



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Potential Public Health Impacts

- Drought
 - Food insecurity
 - Economic losses
 - Allergen exposure
 - Mental health
 - Environmental impacts



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Potential Public Health Impacts

- Vectors and Pathogens
 - Lyme Disease
 - Erlichiosis
 - West Nile Virus
 - Histoplasmosis
 - Blastomycosis
 - Harmful Algal Blooms



http://en.wikipedia.org/wiki/Lyme_disease



http://en.wikipedia.org/wiki/West_Nile_virus

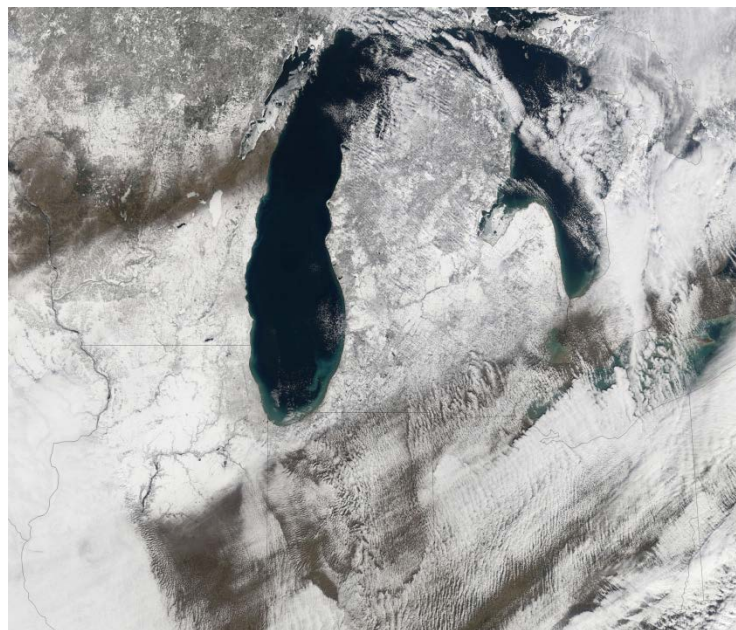


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Potential Public Health Impacts

□ Winter Weather

- Travel injuries
- Carbon Monoxide
- Hypothermia
- Mental Health/Isolation
- Economic losses



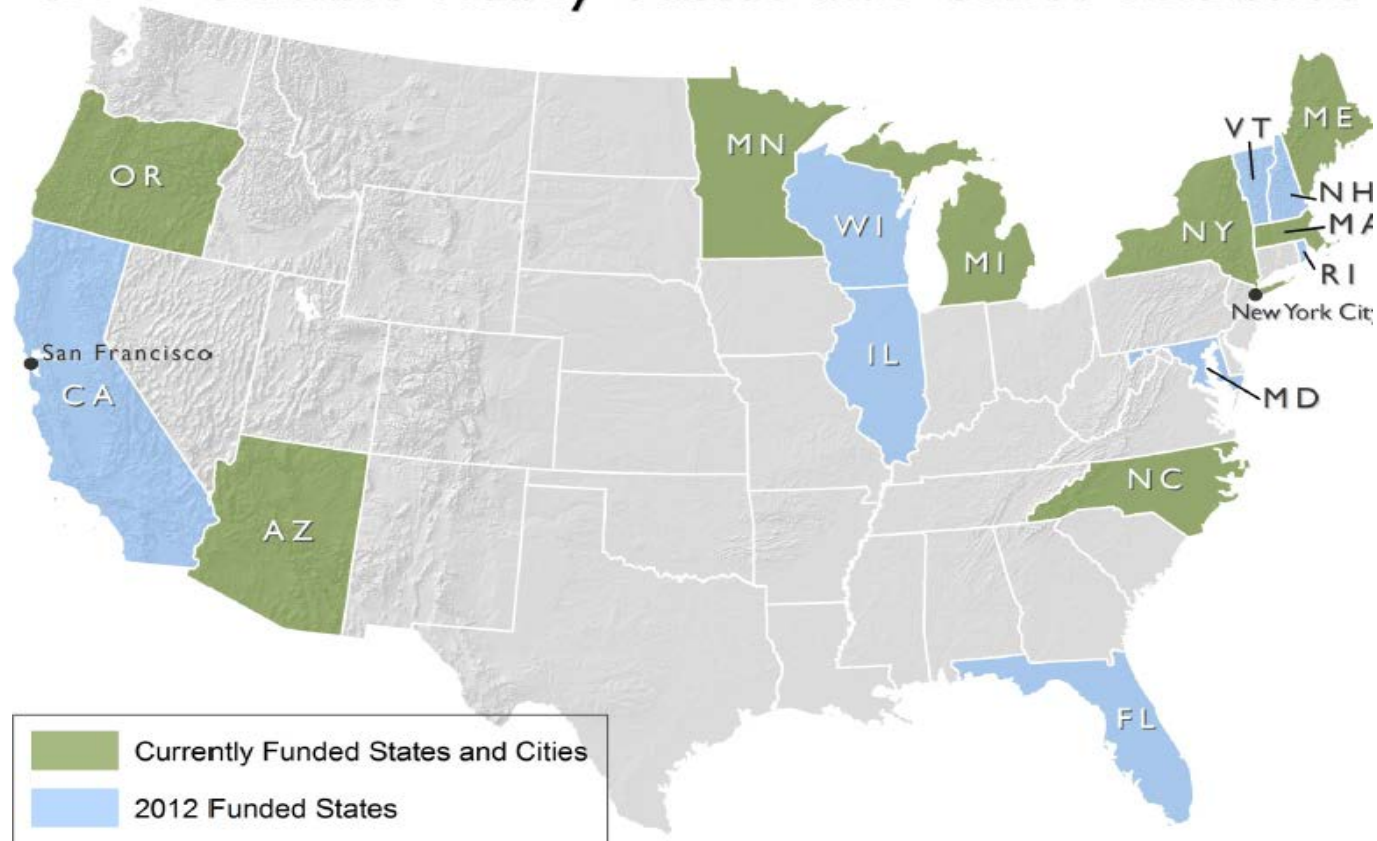
<http://www.photolib.noaa.gov/space/visible1.html>



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CDC Climate/Extreme Weather Programs

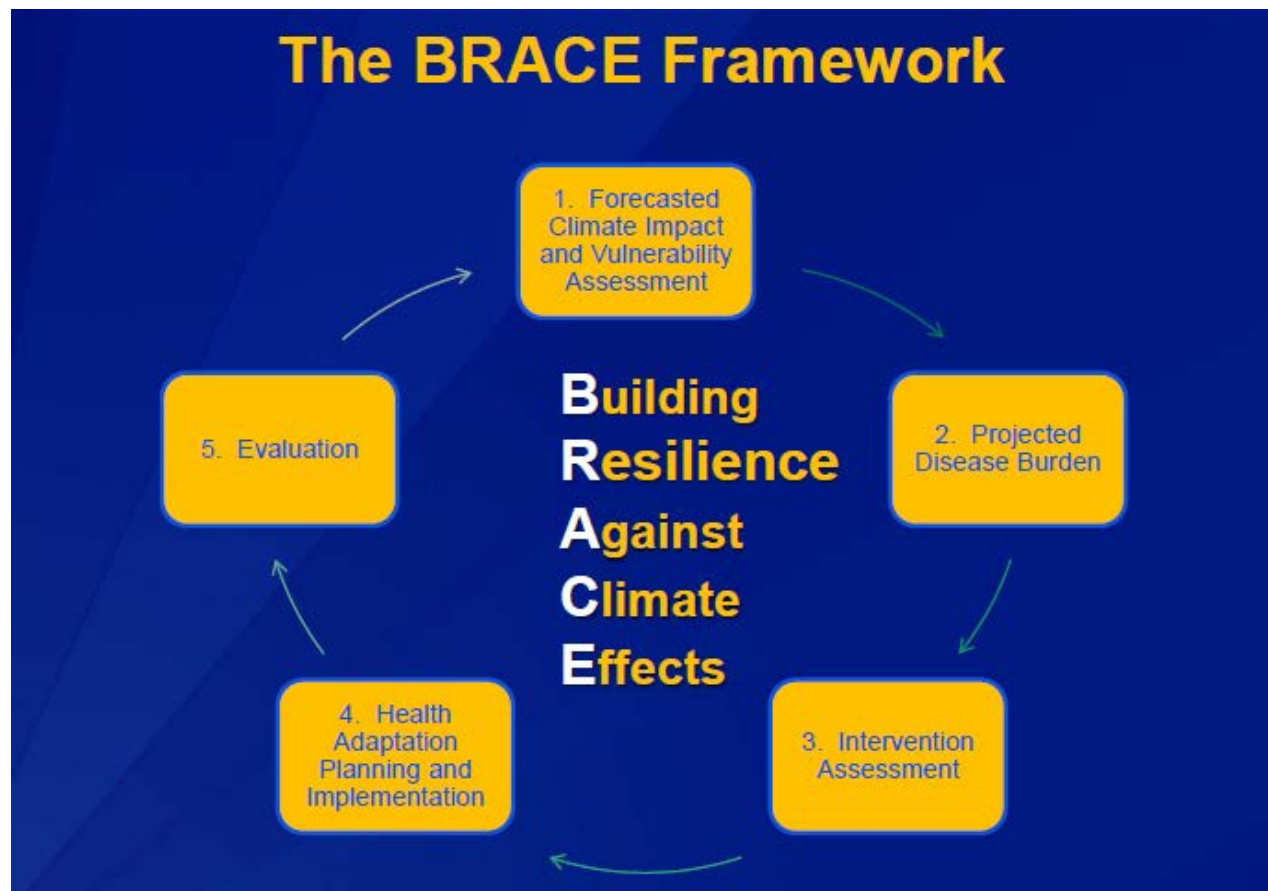
CDC Climate Ready States and Cities Initiative



http://www.cdc.gov/climateandhealth/climate_ready.htm



The BRACE Framework, as Developed by CDC



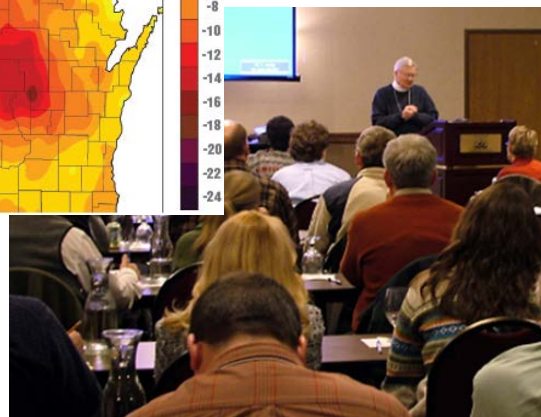
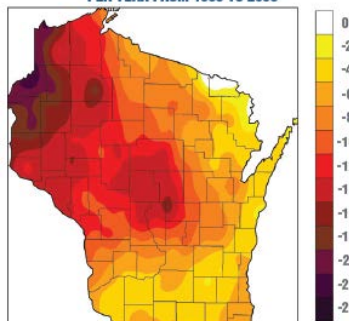
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Wisconsin BRACE Framework

Step 1: Forecast Climate Impacts and Assess Vulnerabilities

- Expert Advisory Panel
- WICCI climate projections
- Vulnerability Assessment
 - Extreme heat
 - Drought
 - Heavy rainfall/flooding
 - Warm winters/ice storms
 - Ground-/surface-water
 - Vectors, pests, diseases
- Identify health impacts
- EPHT tracking integration
- Developing & piloting tools

CHANGE IN THE FREQUENCY OF NIGHTS BELOW 0°F
PER YEAR FROM 1950 TO 2006

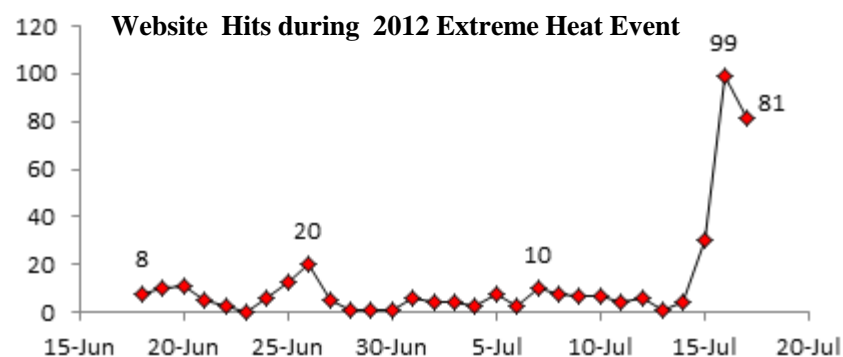


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Wisconsin BRACE Framework

Step 2: Project Disease Burdens

- Conduct epidemiological studies based on gaps
- Identify and monitor health indicators
- EPHT tracking of indicators
- Geo-spatial mapping and analysis
 - Heat Related Fatalities and morbidity, Heat Vulnerability Indices
 - Flood assessment and human health impacts
 - Vector baseline and projections



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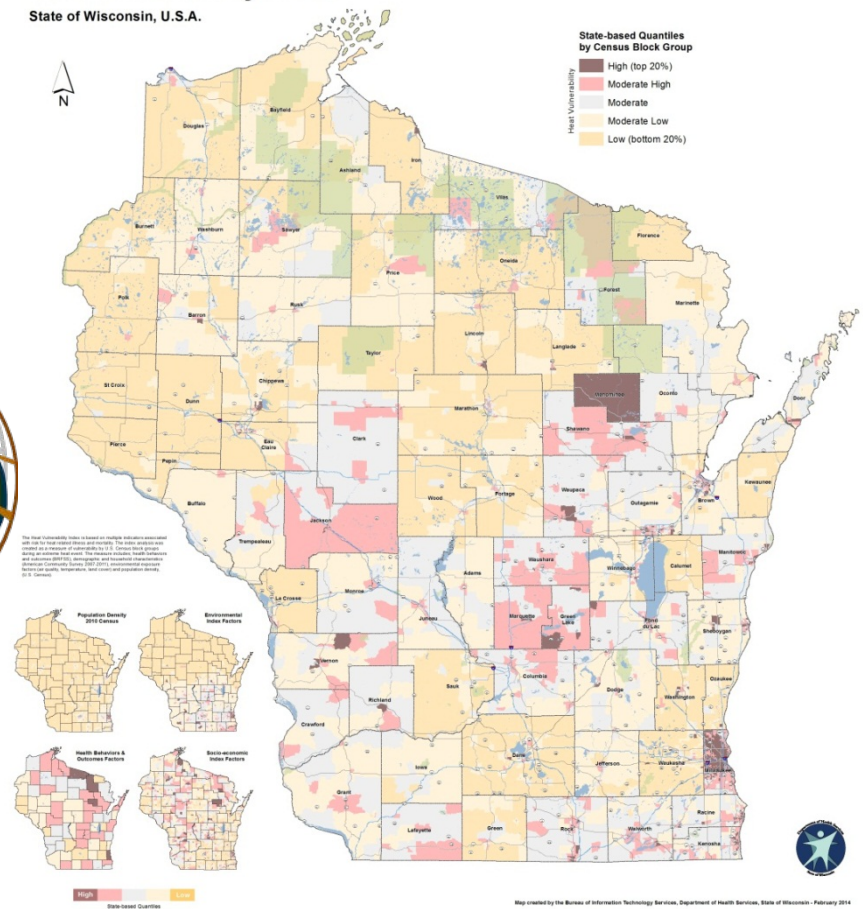
Tools for Extreme Heat

- Tracking of heat-related morbidity and mortality
- Heat Vulnerability Index
- Extreme Heat Toolkit



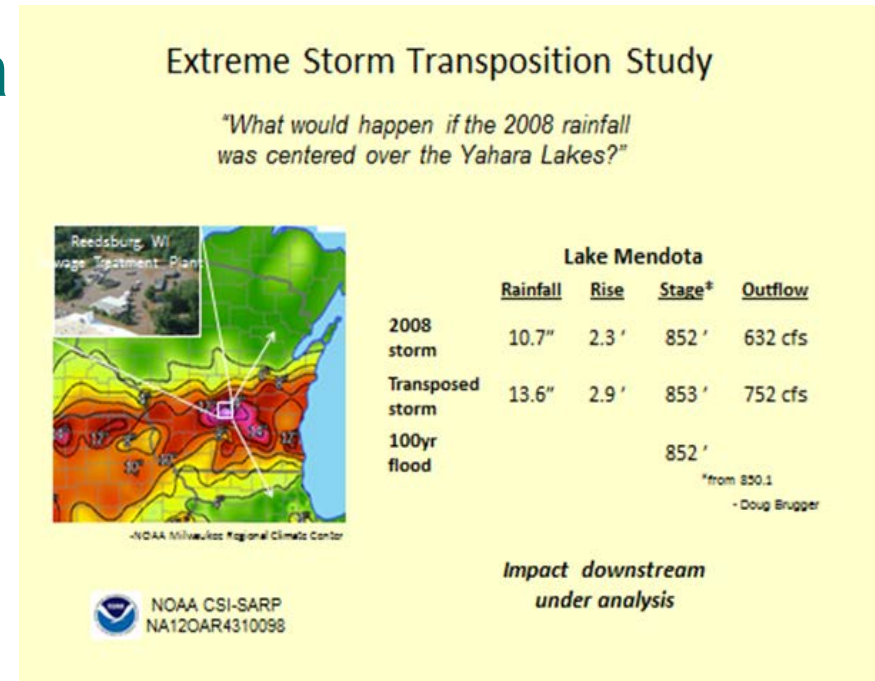
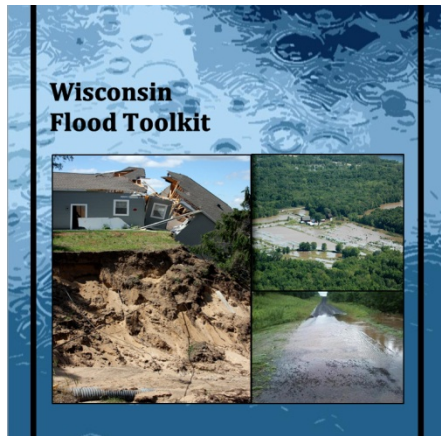
Heat Vulnerability Index

State of Wisconsin, U.S.A.



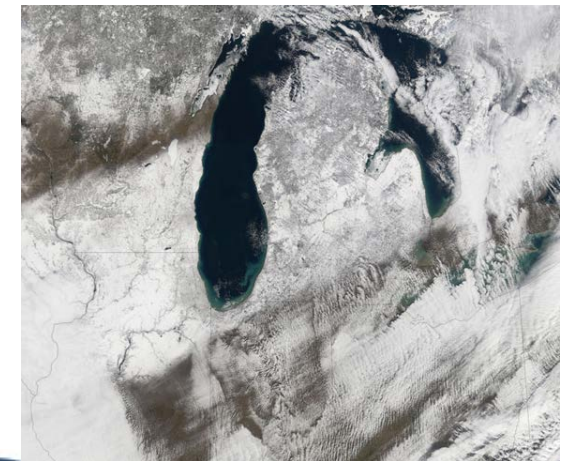
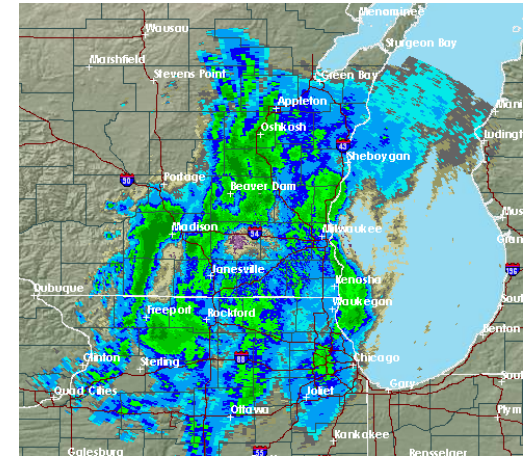
Tools for Increased Heavy Precipitation

- Tracking of flood data
- Downscaled models
- Flood Toolkit

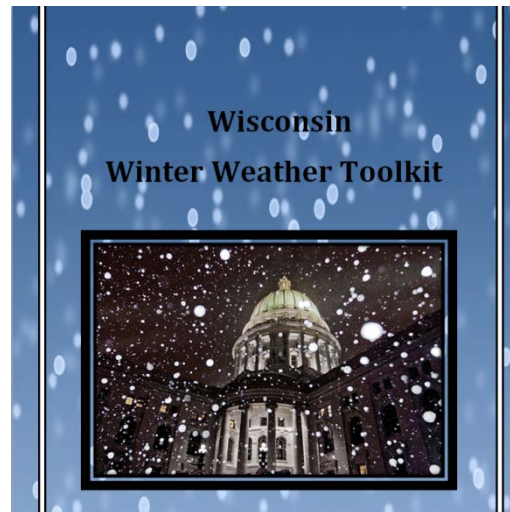


Tools for Winter Weather Changes

- ❑ Travel warnings
- ❑ Carbon monoxide warnings
- ❑ Tracking of cold mortality and morbidity
- ❑ Winter Weather Toolkit



<http://www.photolib.noaa.gov/space/visible1.html>



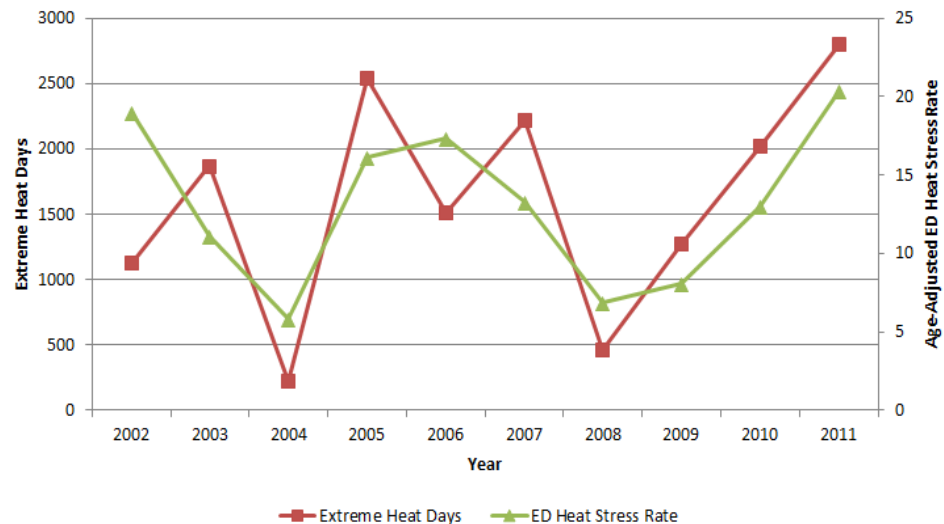
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Step 3: Public Health Interventions

- Best practices
- Indicators
- Tracking mechanism
- Integration with existing programs
- Leverage existing tools
- Local Public Health Agency (LPHA) pilot projects

Extreme Heat Days and ED Heat Stress Rate



Note: Rate is per 100,000 population.



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Step 4: Develop and Implement Strategic Health Adaptation Plans



- State Adaptation Plan
- Local adaptation plans by pilot LPHAs
- Capacity building
- Integration with Emergency Management and Public Health Preparedness Plans
- Integration with National Weather Service



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Step 5: Evaluation and Quality Improvement

- Ongoing evaluation
- Assure skills and capacities are available
- Continue to identify and leverage partnerships and collaborative efforts
- Investigate additional strategies to integrate climate and extreme weather events into other sustainable planning efforts
 - Mitigation plans
 - Development plans
 - Transportation plans
 - Infrastructure repairs/renovations
 - Green/Riparian spaces



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Role of Wisconsin DHS

- ❑ Assist local Public Health efforts
- ❑ Tools/best practices
- ❑ Build capacity
- ❑ Collaboration!



www.alleywatch.com



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Adaptation

- ❑ The process whereby a population becomes better suited to its habitat
- ❑ Starts with local resources
- ❑ Learned adaptive behaviors



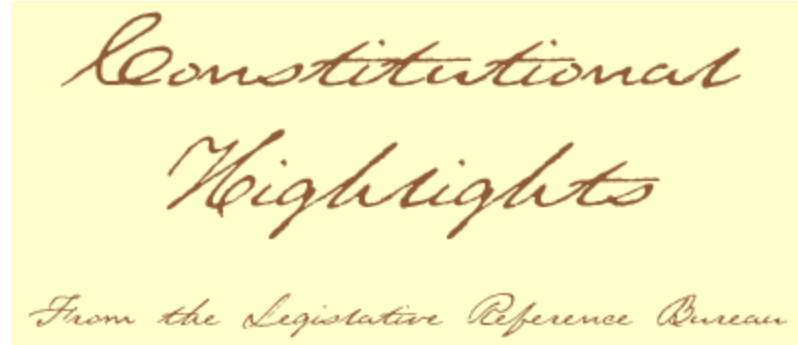
(<http://en.wikipedia.org/wiki/Adaptation>)



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Develop Adaptation Strategies

- Home Rule
- Local First!
- Pilot Projects



legis.wisconsin.gov



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Methodologies and Opportunities

Community Engagement Process

- Community Health Assessment
- Community Health Improvement Plans
- Accreditation
- Emergency Operations Planning
- Public Health Emergency Response



www.searchenginejournal.com



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Engage Stakeholders

- Community Leaders
- Champions
- Existing Partners
- Vulnerable Populations
- Community Capacity



www.ucdmc.ucdavis.edu



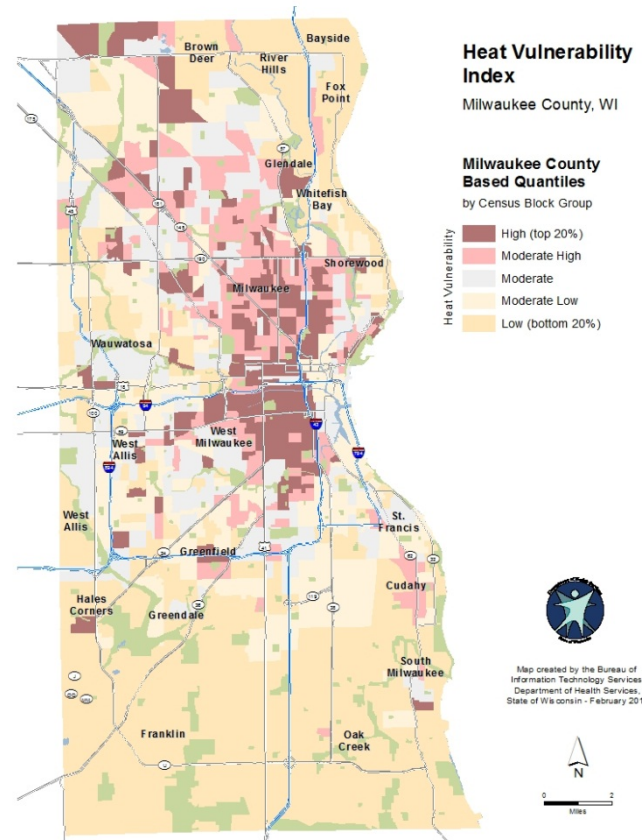
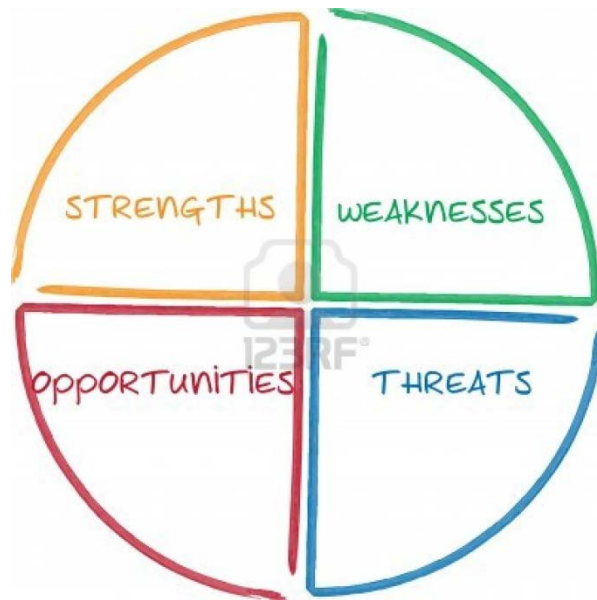
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Identify Local Needs

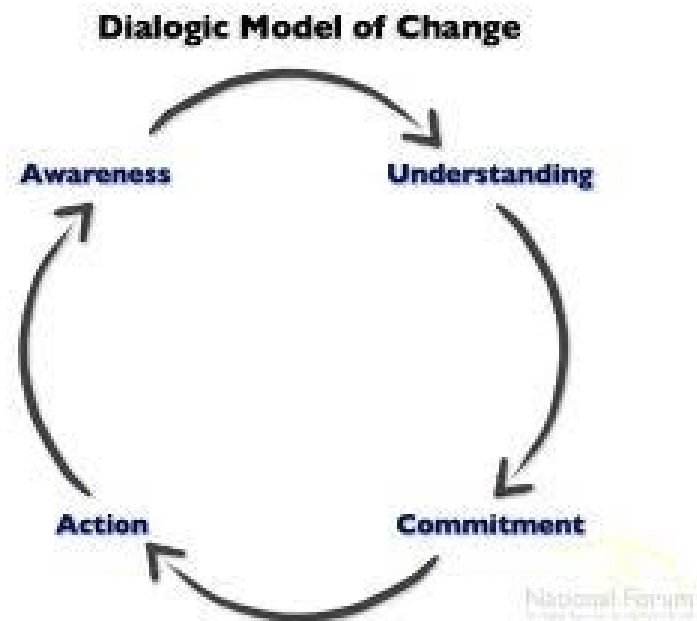
- SWOT
- Vulnerability Indices
- Gap Analysis
- Priorities



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Action Steps

- Goals/Objectives
- Infrastructure
- Actions
- Assignment



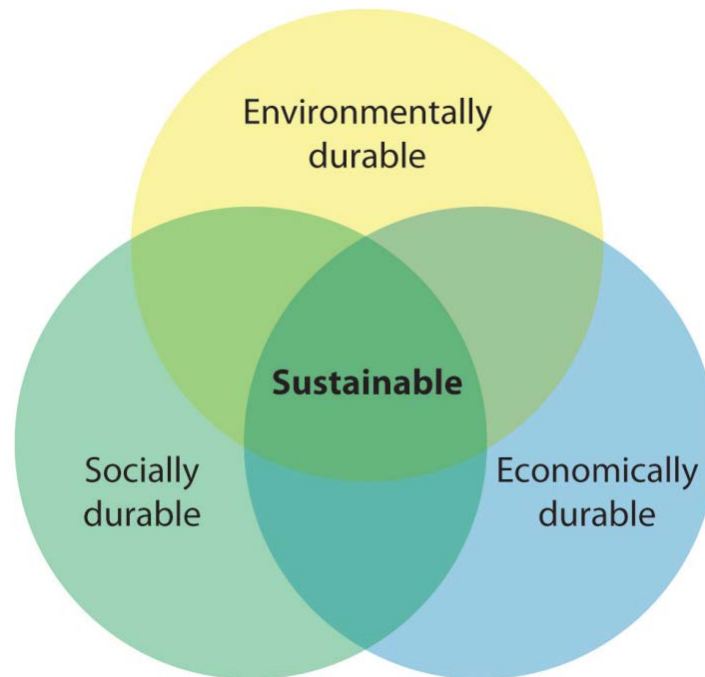
thenationalforum.org



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Integration into Existing Planning

- ❑ Coordination
- ❑ Exercises
- ❑ “Norms”
- ❑ Cost Effective
- ❑ Review/Revise



www.nps.gov



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Resilience...

re-sil-i-ence:

the ability to bounce back when faced
with stress or pressure.

www.resiliencybuilder.com

- Planning and preparation for climate and weather
- Building capacity within our community
- Protecting our most vulnerable citizens



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GOING FORWARD

**THANK YOU!
QUESTIONS?**