

Fostering Watershed and Community-Based Climate Resiliency in Wisconsin

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Climate Intersections Conference
July 13, 2022

Outline

- 1. Climate is changing in Wisconsin (WICCI)*
- 2. Impacts and Adaptation*
- 3. Wisconsin DNR's Climate Action Blueprint*
- 4. Watershed and Climate Resiliency Team*
- 5. BIL opportunities and future plans*



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HOME / WATER RESOURCES WORKING GROUP

Scroll ↓

Water Resources Working Group

The WICCI Water Resources Working Group assesses and synthesizes climate change impacts to Wisconsin's water resources and assists in the development of adaptation strategies for dealing with those impacts. The group focuses on inland waters, including lakes, reservoirs, streams, rivers, wetlands, and groundwater.

Resources

The Water Resources Working Group white papers summarize the latest information regarding the impacts of warming and changing precipitation patterns on water resources and offer a wide variety of adaptation strategies.

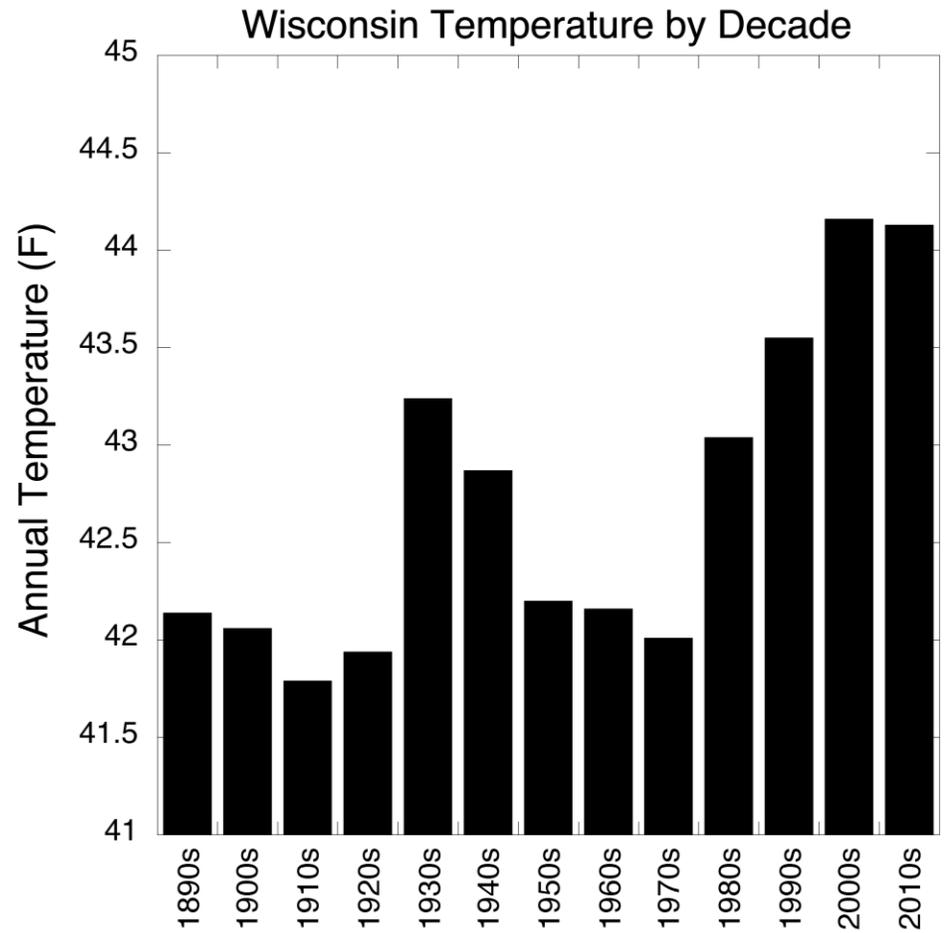
All links are pdfs.

- [Impacts of and Adaptation Strategies for Climate Change on Wisconsin's Water Resources](#) (Water Resources White Paper)
- [Climate Adaptation Strategies for Wisconsin's Water Resources](#) (developed for WICCI Report to the Governor's Task Force on Climate Change)
- [Long-term epilimnetic temperature trends in Lake Mendota and Trout Lake, Wisconsin](#)
- [Response in the water level of Anvil Lake, Wisconsin, to changes in meteorological and climatic conditions](#)
- [Flooding in two southern Wisconsin closed-basin lakes: adapting with a siphon pipe at Devil's Lake and living with the new normal at Fish Lake](#)
- [Mississippi River Climate Change: Status, Challenges and Adaptations](#)

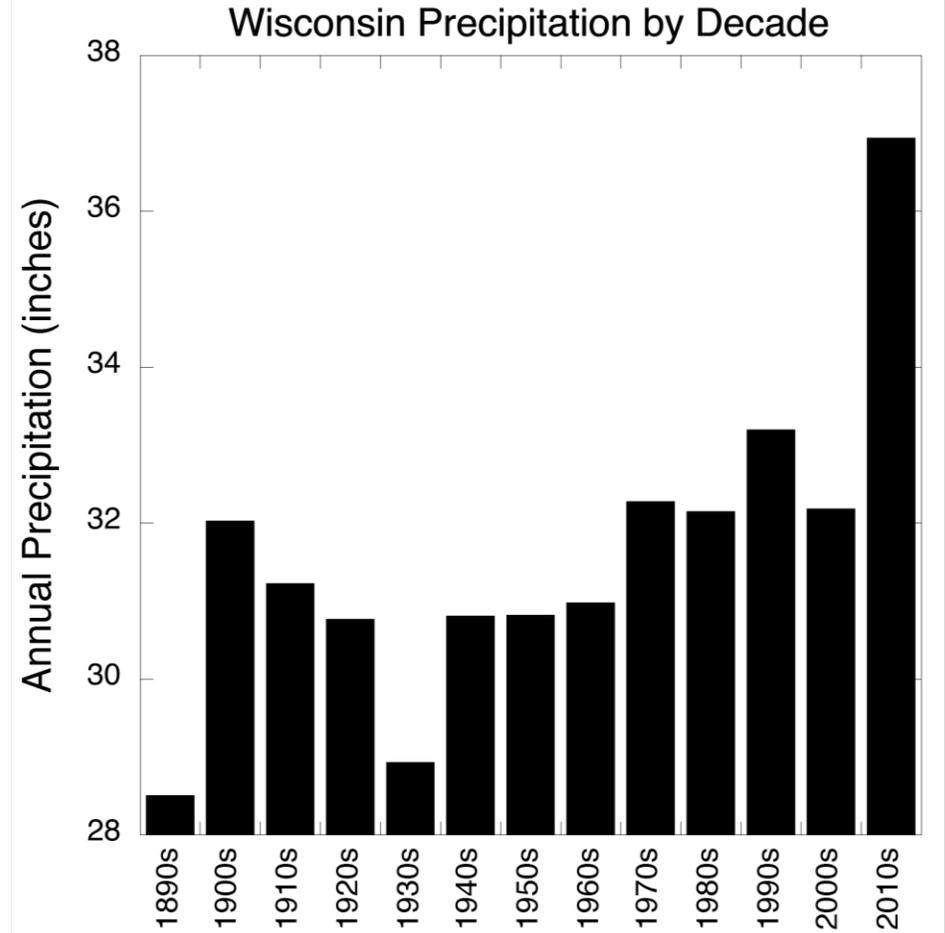
We also encourage readers to revisit the [2011 WICCI assessment report](#) for a comprehensive review of climate change impacts to water resources as the material in the 2011 report is still relevant.

<https://wicci.wisc.edu/water-resources-working-group/>

Wisconsin is Getting Warmer and Wetter



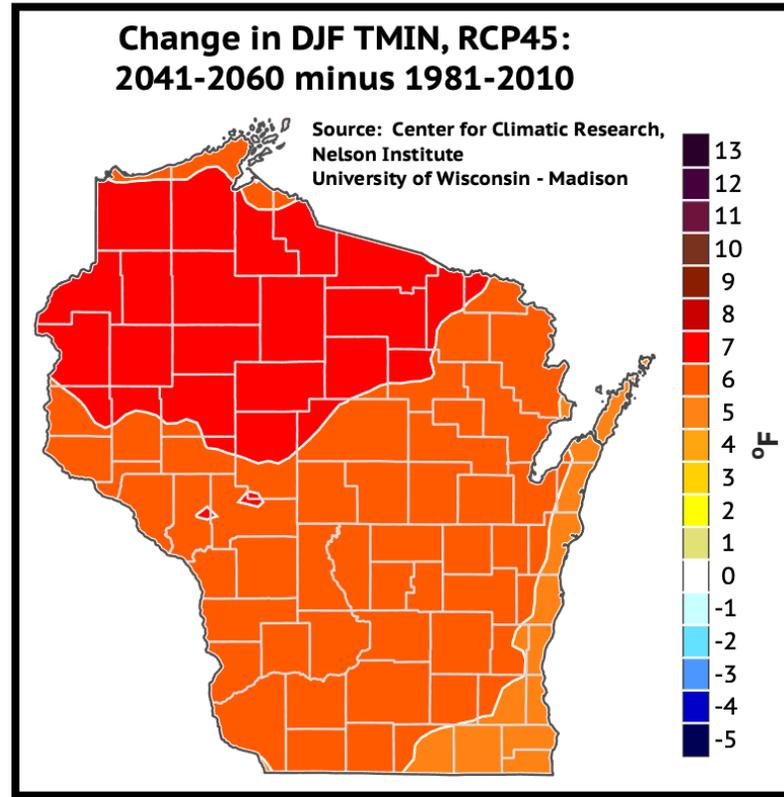
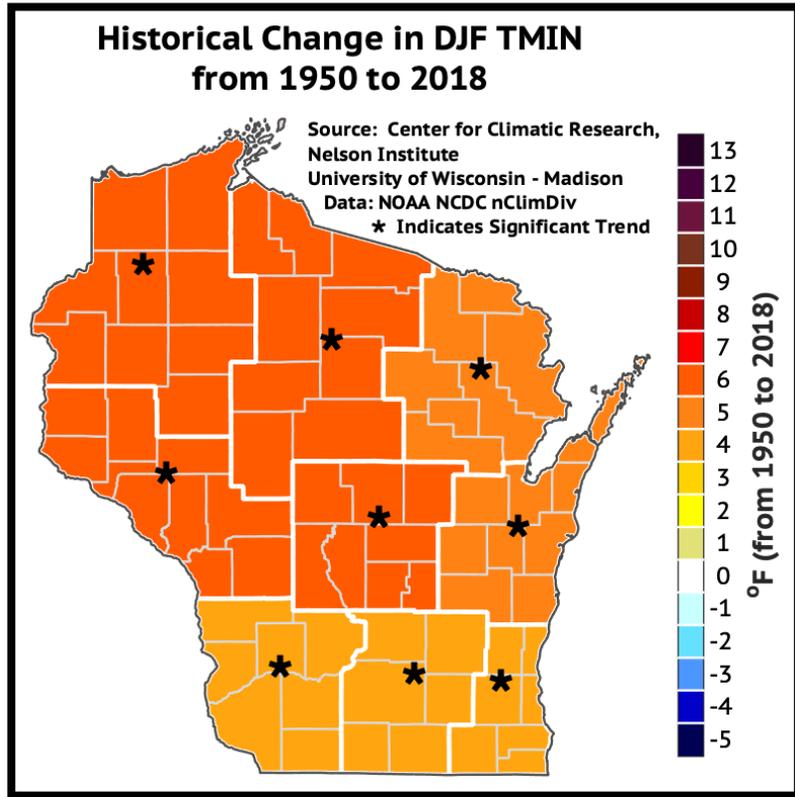
2000s and 2010s = warmest decades



2010s the wettest decade by far

Slide from Steve Vavrus

Winters vs Summers



Winter warms more
than summer

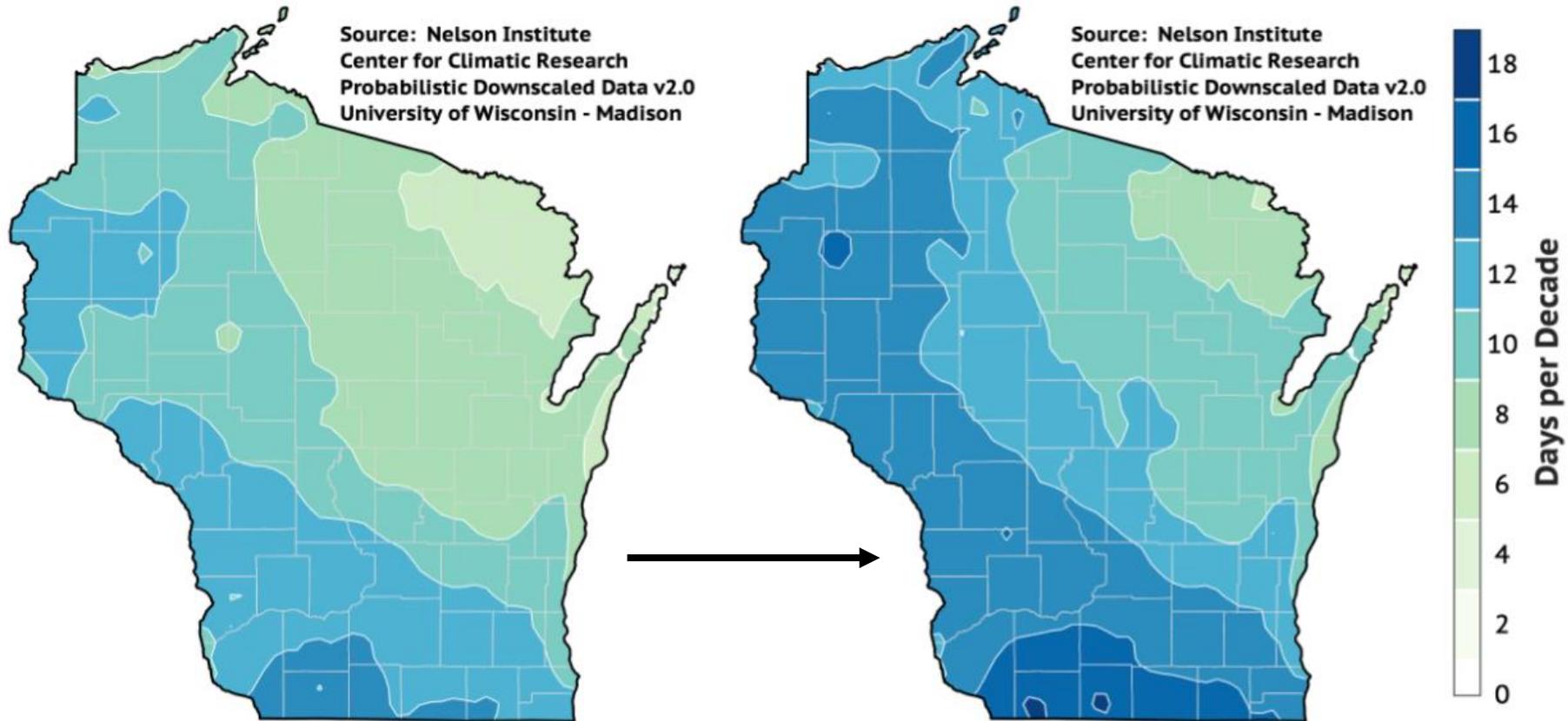
WI winters will warm
by 3-10°F by 2050

Wisconsin's Future Climate by Mid-Century?

Extreme Rain: 2-inch daily rainfalls

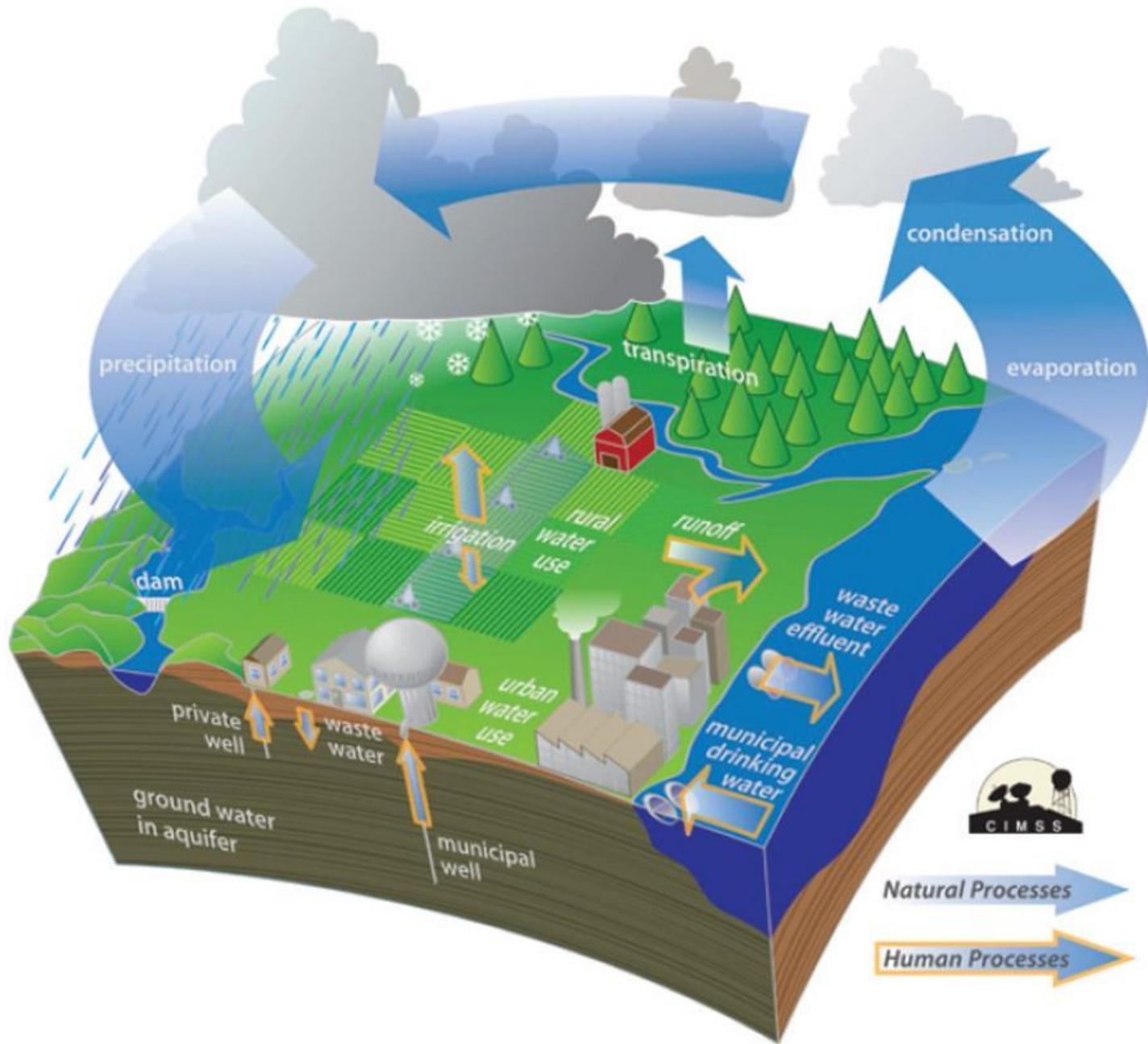
PAST: 1981-2010 average

FUTURE: 2040-2060 average



Extreme rainfall to increase in the future throughout Wisconsin

Slide from Steve Vavrus



“Climate change will affect how water moves through ecosystems in many ways, including more frequent heavy precipitation, a more variable snowpack, and changes in the timing of spring melt and runoff. These changes will have cascading effects on water quality and water availability.”

³Tribal Climate Adaptation Menu

Flooding Impacts

- Compromised septic and sewage systems
- Contaminated drinking wells
- Harmed infrastructure
- Increased contaminant transport
- Increase erosion and runoff
- Reduced water quality



C. Hein

Drought Impacts

- Reduced surface water volume
- Reduced groundwater discharge
- Dried drinking water wells
- Contaminated drinking water
- Dried streams & lakes
- Warmed surface waters
- Salinization
- More harmful algal blooms
- Stranded habitat



G. LaLiberte

Adaptation is the adjustment of systems in preparation for or in response to climate change.



Adaptation actions are designed to specifically address climate change impacts and vulnerabilities in order to meet goals and objectives

Variety of Adaptation Strategies

RESIST



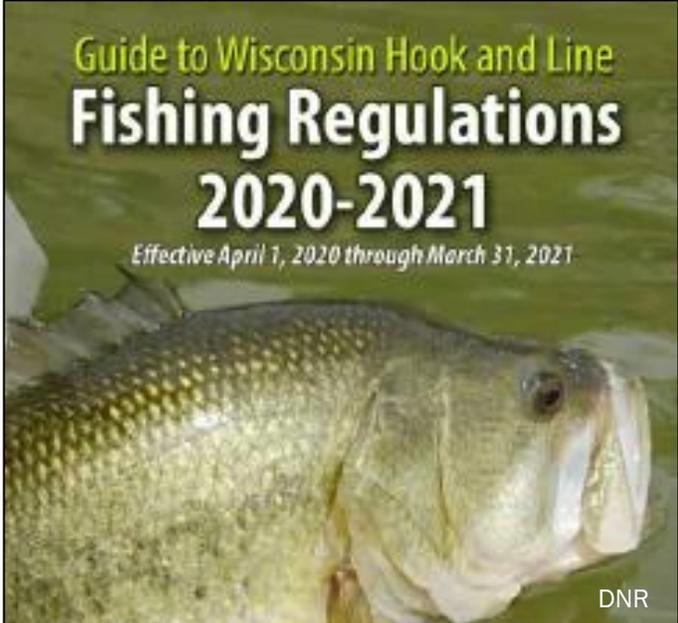
Defend against change

ACCEPT



Manage for new condition

DIRECT



Steer change



Maintain current conditions

Lynch et al. 2021

Promote change

Long List of Adaptation Actions

- Add woody and other habitat to deep water so it is available when lake levels are low
- Protect woody and other habitat stranded above water so it is available when lake levels rise
- **Protect and restore wetlands** and lake habitat in riparian and littoral zones
- Build adaptable/temporary structures, such as rolling or floating piers
- Set zoning regulations that **protect the riparian zone** from development
- Set insurance policies based on future climate projections to minimize building below the high- water mark
- Emphasize watershed based hydrologic assessment, planning, restoration, and monitoring.
- Use grade control and other low impact practices to reverse bed and bank erosion and **re-establish floodplain connection** and functions.
- Enhance the ability of ecosystems to retain water.
- Enhance infiltration by reducing impervious surfaces in urban/riparian areas and improving land management practices.
- **Protect recharge/infiltration areas and riparian buffers** from overland flow of polluted runoff.
- On lakes with water control structures, set lake level targets to anticipate future highs and lows
- Design infrastructure to accommodate extreme events and increased stormflow (e.g., manure storage facilities, wastewater facilities, stormwater drains, and culverts) and when possible select green infrastructure options.
- Incorporate working lands into flood management strategies.
- **Repair or restore headwater wetland** storage and infiltration to provide more stable summer discharge
- Incentivize and regulate agricultural and urban development practices that minimize water use and encourage water infiltration, including **restoring and repairing upper watershed wetlands**
- During the non-growing season, direct agricultural **drain water into wetlands** and other infiltration areas to facilitate groundwater recharge
- Incentivize companies and farmers to reduce nutrient runoff in the watershed using best management practices
- Remove combined storm overflows in urban areas

Hein et al. 2021 WICCI White Paper See: <https://uwmadison.box.com/s/eo1g89e6sh2j9xbfmu7e9uhbr5kl9jvk>

What can DNR do to help support efforts to make Wisconsin's water resources more resilient to climate change?

Blackdeer Channel Restoration
DNR, Fish & Wildlife, Army Corps



Green Infrastructure for Environmental Justice
Milwaukee Water Commons

<https://wicci.wisc.edu/water-resources-working-group/>

Resizing Stormwater Infrastructure
City of Brookfield



Climate Action “Blueprint”

- Reflects state climate goals
- DNR Goals aligned with core program areas
- DNR Actions
 - Climate and Environmental Justice
 - Climate Mitigation
 - Sequestering Carbon
 - Adapting Natural Resources Management
 - [Summary list of 44 climate actions](#)



Environmental (& Climate) Justice (ECJ)

- Analyzing and mapping impacts of pollution, climate, socio-economic/demographic, and other environmental/public health hazards to communities:
 - Developing [Wisconsin Environmental Equity Tool](#) (WEDC/DHS/DNR/DOA)
 - DNR disproportionality analyses: nitrates in groundwater and buildings in floodplain
 - DNR Open Data Portal: 25 EJ GIS data sets open to staff/public
- Plans for agencywide ECJ Action Team, external EJ Advisory Committee
- Staff training and resources: ECJ/EJ, DEI, public participation
- Recruiting for agency ECJ liaison with new Office of Environmental Justice



EXECUTIVE ORDER #161

Relating to the Creation of the Office of Environmental Justice

WHEREAS, environmental justice is the principle that all people and communities are entitled to equal protection and equal enforcement of environmental laws and regulations and have a right to equitable treatment and meaningful involvement concerning policy and regulatory development, implementation, and enforcement that has the potential to impact the environmental conditions of their community;

WHEREAS, Professor Robert Bullard, who is considered the father of environmental justice, once wrote, "whether by conscious design or institutional neglect, communities of color in urban ghettos, in rural 'poverty pockets,' or on economically impoverished Native American reservations face some of the worst environmental devastation in the nation";

WHEREAS, Civil Rights leaders in the 1960s brought attention to the public health risks associated with the unsafe environmental conditions especially affecting communities of color and low-income communities, laying the foundation for the environmental justice movement;

WHEREAS, environmental pollution is linked to certain chronic illnesses such as asthma and cancer, and in many cases, rates of these illnesses disproportionately affect people living in poverty and communities of color;

WHEREAS, a 2021 report by the United States Environmental Protection Agency found that the impacts of the climate change fall disproportionately on under-resourced communities, and many of these communities lack the resources to prepare for extreme weather conditions;

WHEREAS, in Wisconsin, scientists have concluded that the state's climate is warming, and precipitation and extreme weather events are increasing;

WHEREAS, the Governor's Task Force on Climate Change, which brought together a diverse coalition of representatives from agriculture, the business community, Native Nations, utility companies, labor groups, youth, and other industries and communities from across the state to develop recommendations to combat the climate crisis, recommended that the state of Wisconsin create an Office of Environmental Justice to help state government protect the health of its citizens and environment while promoting environmental equity;

WHEREAS, moreover, the state of Wisconsin Clean Energy plan calls for creating an Office of Environmental Justice to facilitate collaboration across state agencies and engage with environmental justice advocates, communities of color, Tribal Nations, and low-income populations;

DNR Blueprint Actions related to watershed resilience

Statewide Goal: Identify new, cost-effective conservation, sustainability and efficiency strategies for the state and prepare Wisconsin for climate change by incorporating climate adaptation strategies into existing planning.
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- **DNR Goal:** Support proactive consideration of climate change and variability in planning (hazard mitigation, sewer service area, comprehensive, etc.), regulation (floodplain, etc.) and storm, coastal erosion, and flood recovery efforts.
 - **DNR Action:** Improve hydrologic connection between wetlands and floodplains to provide flood storage.
 - **DNR Action:** Develop watershed strategies to promote water resource resilience and a train the trainer model to disseminate tools and information.

Watershed and Community-based Climate Resiliency Team

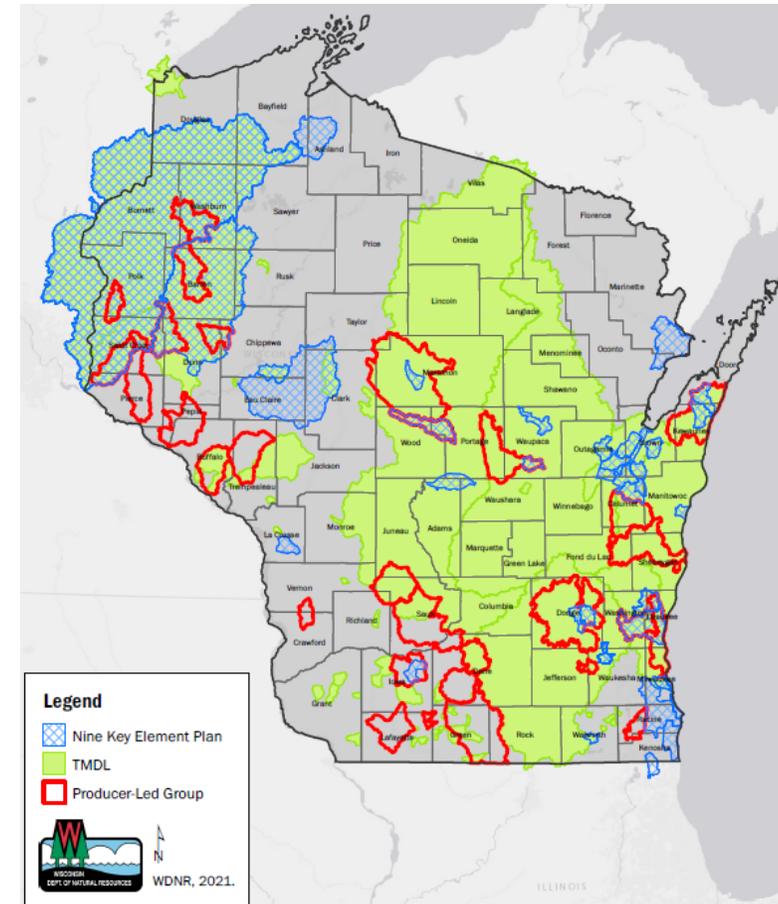
Charge: Form cross-agency Watershed and Community-Based Climate Resiliency team to identify strategies and outreach needed to drive the implementation of watershed-based projects that promote water resource climate resilience, including projects and policy innovations to improve hydrologic connection between wetlands and floodplains and projects that promote vegetation management to increase carbon sequestration.

Deliverables:

- Framework for incorporating climate resiliency planning into Dept led or supported watershed planning efforts
- Identification of 3-5 pilot projects/watersheds to highlight best practices and use as “demonstration” projects
- Training and communication plan/modules for staff and partners

Existing Watershed-Based Planning Efforts

- Nine-Key Element Watershed Plans (HUC-12)
- TMDL's (basin-scale, WI River, Fox/Wolf, Rock, Milwaukee, St. Croix)
- County Land and Water Conservation Plans
- Lake-focused watershed management plans (catchment scale)
- Producer-led watershed groups



1. Purpose and Scope
2. State and Federal Regulatory Overview
 - a. Wetland permitting
 - b. Wetland mitigation
 - c. Storm water permitting
 - d. Storm water crediting
 - e. Water quality trading
 - f. Floodplain permitting
3. Wetland Protection and Permitting
 - a. Developing project narratives
 - i. Watershed context
 - ii. Watershed position
 - iii. Watershed benefits to demonstrate net environmental gain
 - b. Wetland quality
 - i. Rare and high quality wetlands
 - ii. Functional value assessment
 - c. Wetland type
 - i. Conversion of wooded wetlands
 - ii. Hydrologic regime
 - iii. Relative abundance
 - d. Practicable alternatives analysis
4. Tools and Planning Resources
 - a. Watershed assessments and plans
 - i. [DNR Nine Key Element Plans](#)
 - ii. [DNR Targeted Watershed Assessments](#)
 - iii. [Areawide Water Quality Plans](#)
 - b. Conservation and restoration prioritization tools
 - i. [Wetlands by Design](#)
 - ii. [DNR Healthy Watersheds, High-Quality Waters](#)
 - iii. [EPA Enviroatlas](#)
 - c. [Assessing flood risk and building resiliency](#)
 - i. [Flood Inundation Mapping](#)
 - ii. [Natural Flood Management](#)
 - iii. [Wiscland 2.0 Land Cover Data](#)
5. Storm Water Design
 - a. Biofilter/infiltration basin limitations
 - b. Site topography and outlet design
 - c. [Municipal Separate Storm Sewer \(MS4\) Total Maximum Daily Load \(TMDL\) guidance](#)
6. Water Quality Trading and Watershed Non-Point Runoff
 - a. Achieving pollutant reduction
 - b. [TMDL overview and implementation](#)
 - c. Coupling wetland mitigation and water quality credits

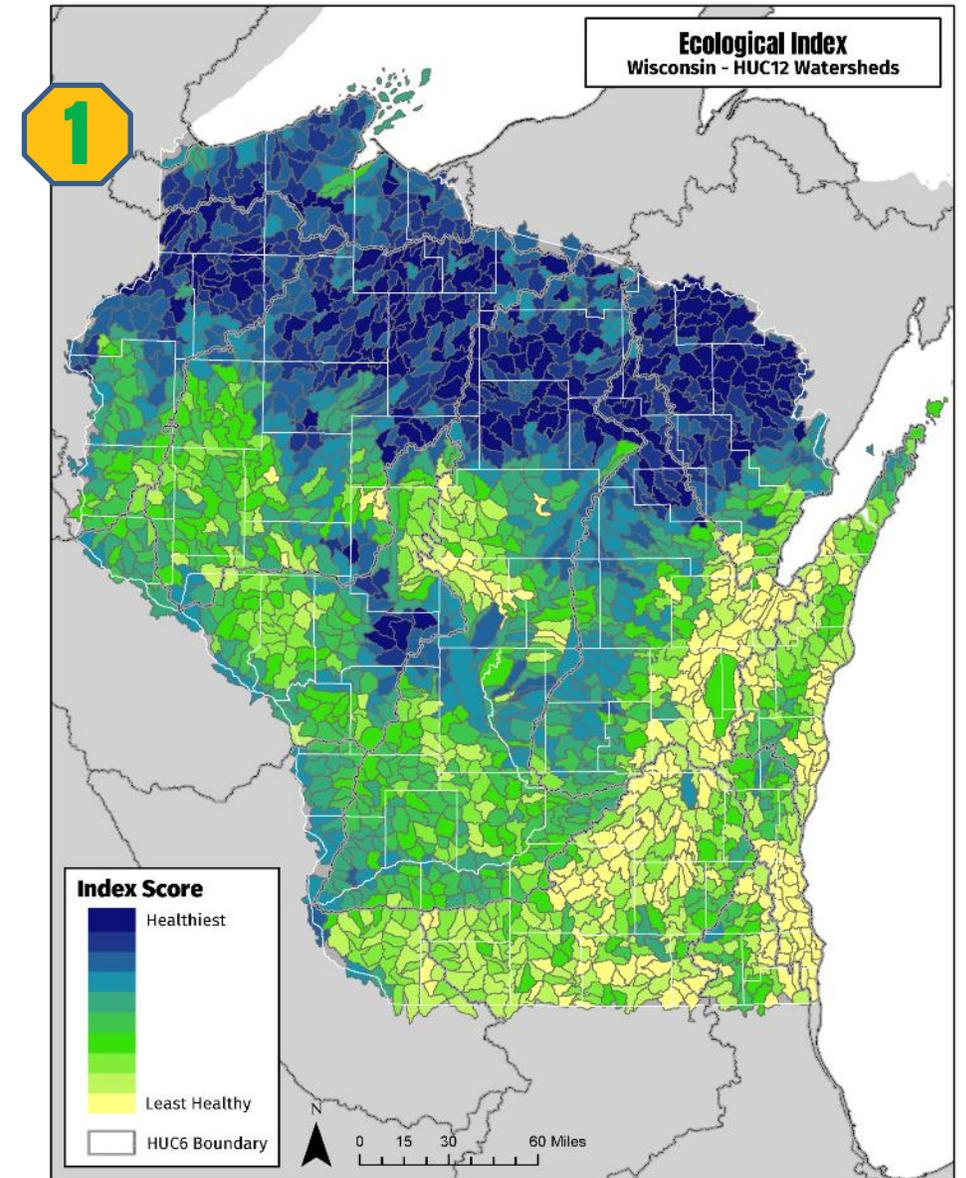
Healthy Waters Initiative

HWHQW Modelling and Assessment Effort determines statewide watershed health

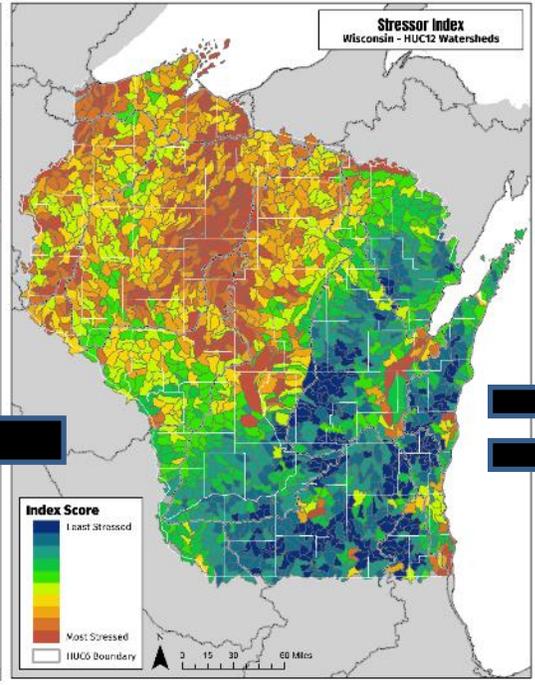
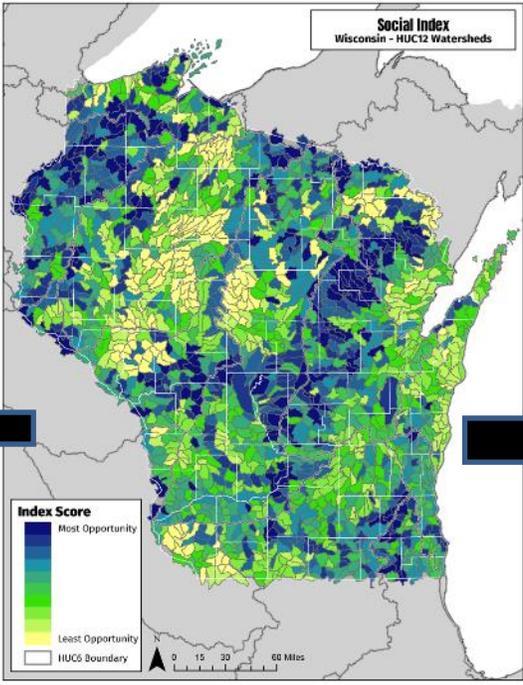
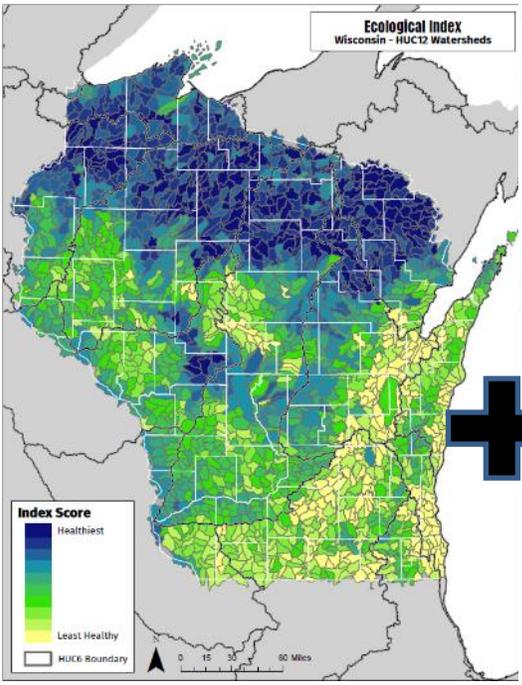
- Natural land cover and hydrological connectivity are the major drivers of watershed health
- Healthy Watersheds and High-Quality Waters are located throughout the state
- Modeling & assessment results can be applied at multiple scales – statewide and major drainage basin – to determine the healthiest watersheds within the given scale

Tech Report <https://dnr.wisconsin.gov/topic/SurfaceWater/HQW.html>

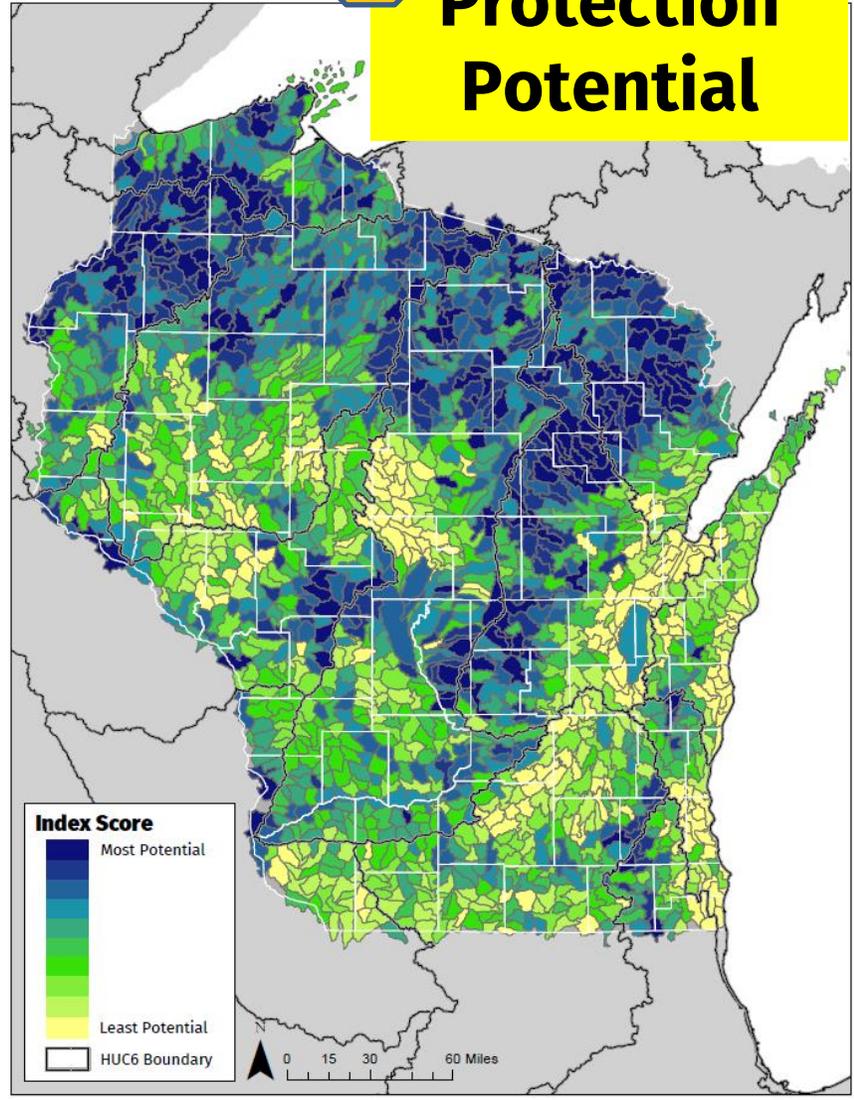
EPA's Recovery Potential Screening Tool <https://www.epa.gov/rps>



Statewide Watershed Health



3 Watershed Protection Potential



Ecological (WI PHWA-WHI +)

1

Opportunities (Social)

Vulnerability (Stressor)

Opportunity to re-imagine Basin Planning?



<https://dnr.wisconsin.gov/topic/Watersheds/basins>

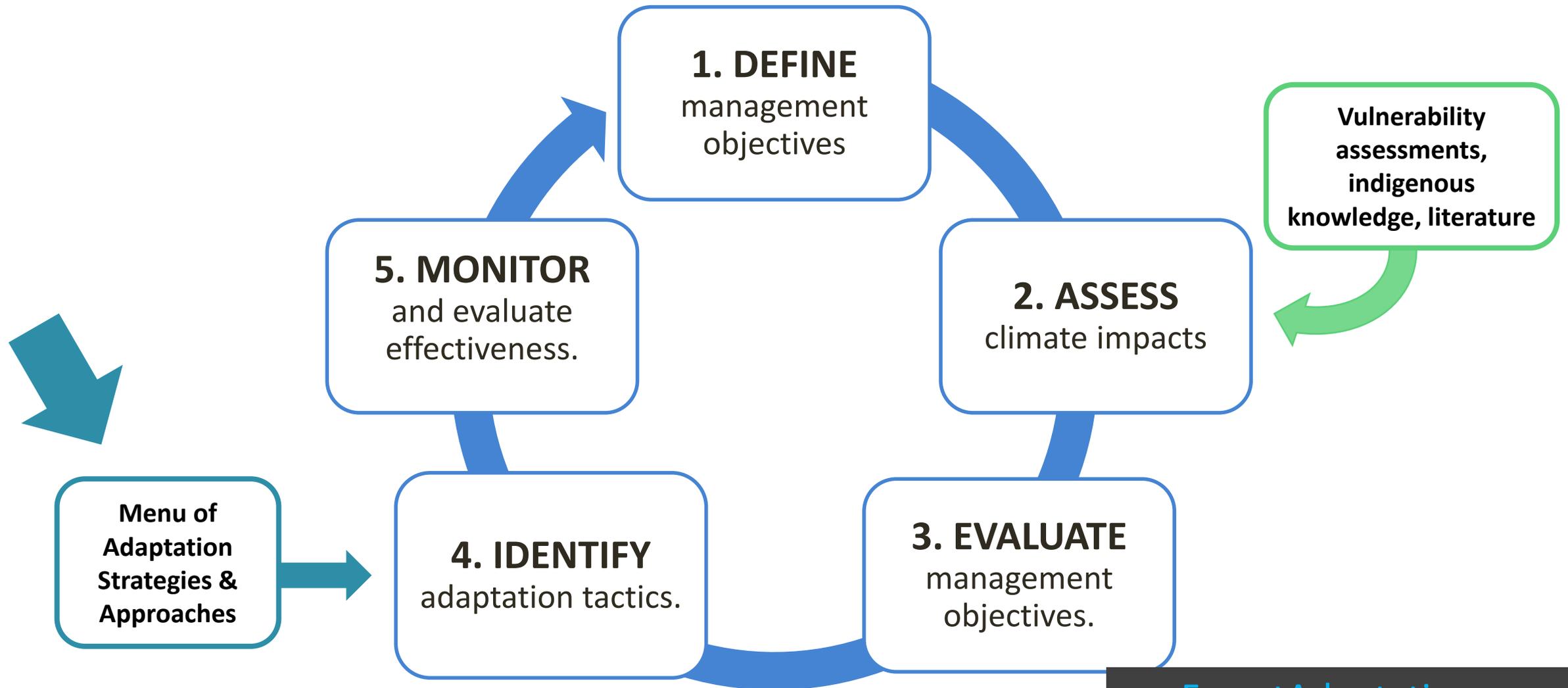
**LOWER FOX RIVER BASIN
INTEGRATED MANAGEMENT PLAN**
PUBL WT-666-2001



A Report by the Wisconsin
Department of Natural Resources in
cooperation with the Lower Fox River
Basin Partnership Team



Planning Framework



Climate Adaptation “Menus”

A menu IS ...

- A collection of possible adaptation actions that users can select from based on their situation.
- A way for managers to integrate climate change into management planning for natural resources.
- A way to connect broad adaptation ideas with specific actions.



Climate Adaptation Menus

Tribal Adaptation Menu

Forested Watersheds

Non-forested Wetlands

Inland Glacial Lake Fisheries

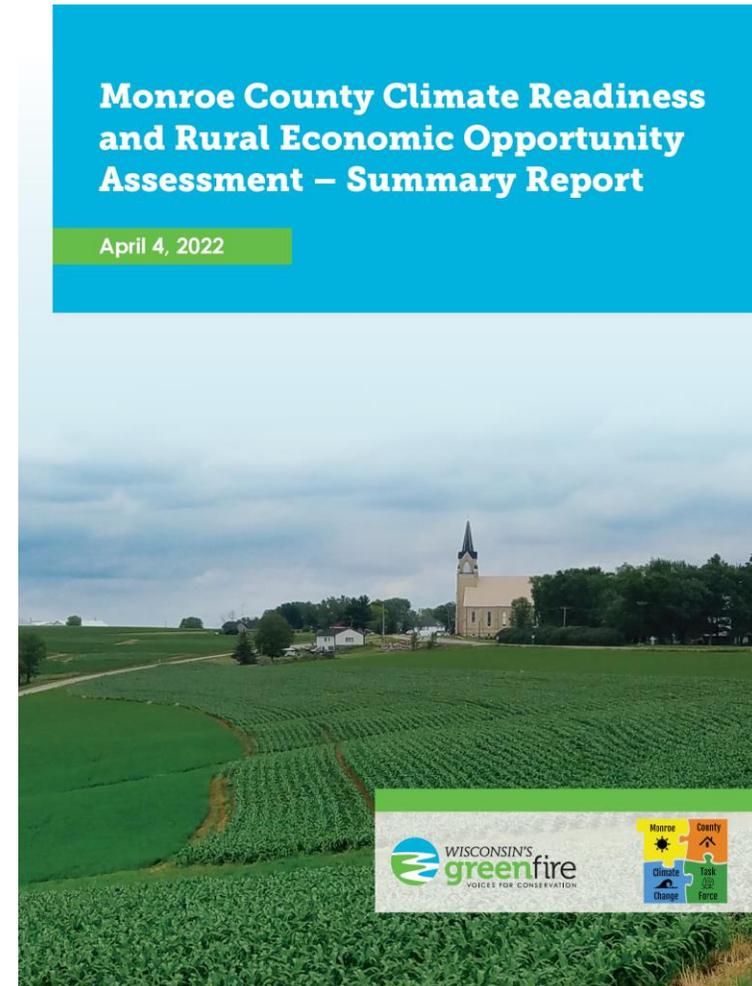
NIACS Eastern Forests

Considerations for Demonstration Projects

- Target activities from team charter
 - Support and implement climate resilience strategies
 - Train the trainer for water resource resilience
 - Participate in wetland/floodplain hydrology connection projects and studies
 - Expand opportunities for carbon sequestration
- Cover different landscapes and activities (e.g., urban, rural, forested)
- Seek new partners, esp underserved or vulnerable communities
- Projects that allow us to document process for outreach to other partners

Potential projects/partners

- Monroe County Climate Readiness Plan
- Ashland flood structures inventory
- Marengo River wetland efforts
- Milwaukee Metropolitan Sewerage District “Fresh Coast Initiative”
- Lower Fox River WQ Mgmt. Planning effort



Bipartisan Infrastructure Law (BIL)

Support Resilience and One Water Innovation

“States are strongly encouraged to fund projects that:

- **Foster resilience to all threats and hazards...** critical infrastructure must be secure and resilient to all threats and hazards, both natural and manmade...EPA urges states to use the historic increase in SRF funding to foster water, wastewater, and stormwater system resilience to all hazards....
- **Support climate adaptation...**EPA strongly encourages states to support water, wastewater, and stormwater infrastructure projects that apply the best available and most geographically relevant climate information, projections, and standards,
- **Drive toward energy efficient and climate smart water systems...** EPA strongly encourages states to utilize BIL funding to support local water and wastewater agencies’ efforts to reduce emissions, incorporate renewable energy generation, and... reduce the greenhouse gas footprint of the water industry.”

Comparison of Program Funding: Current vs. With Infrastructure		
Program	FY 22/26 (current/w infrastructure)	X increase
Clean Water SRF	\$215 mil/\$520 mil	2.4
Drinking Water SRF	\$93 mil/ \$292mil	3.1
Lead Service Lines	\$32 mil/\$282mil	8.8
PFAS*	\$0/ \$180 mil	
Sewer/Stormwater Overflows**	\$3.6 mil/ \$25 mil	6.9
Great Lakes (GLRI)*	\$120 mil/ \$200 mil	1.7
Gulf Hypoxia	\$1 mil/ \$5 mil	5

(EPA Memo to State SRF programs, March 2022)

Funding for Water Quality Planning!

- Clean Water Act Section 604(b) Water Quality Management Planning Grants
- 604(b) Supplemental BIL Funding – additional \$400K to WI in FY22, and up to \$2 million over next 4 years
- Focus on incorporating climate resiliency and environmental justice into water quality planning programs and activities
- 40% of funding to “pass through” to local partners
- Equity and Climate Assessments in first year

CLIMATE CHANGE

The Science, Impacts & Solutions

“CLIMATE CHANGE IS ONE OF THE DEFINING ISSUES OF OUR TIME. FROM SHIFTING WEATHER PATTERNS, INCREASES IN AVERAGE TEMPERATURE, HIGHER FREQUENCY AND INTENSITY OF RAINFALL TO HEAVIER SNOWFALLS, THE IMPACTS OF CLIMATE CHANGE DIRECTLY IMPACT WISCONSIN.”

- DNR SECRETARY PRESTON COLE



THE SCIENCE

Our climate is changing in many ways.

[READ MORE](#)



IMPACTS IN WISCONSIN

Consequences for the state's communities, natural resources and economy.

[READ MORE](#)



SOLUTIONS

Taking steps to address climate change.

[READ MORE](#)



dnr.wisconsin.gov/climatechange