

Planning for a Healthy & Resilient Future: Incorporating Climate and Protection into County Land & Water Planning

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Land & Water Conservation Board Meeting

October 7, 2025



Why integrate climate and protection into LWRM

KEY CLIMATE TAKEAWAYS

Wisconsin is 3° Warmer

On average, Wisconsin has become approximately 3° Fahrenheit warmer since the 1950s.

SETTING RECORDS

The last two decades have been the warmest on record, and the past decade has been the wettest.

17% INCREASE IN PRECIPITATION

Wisconsin has become wetter – average precipitation has increased 17% (about 5 inches) since 1950.



Southern Wisconsin has experienced the highest increase in precipitation



Warming is happening fastest in the winter and at night.

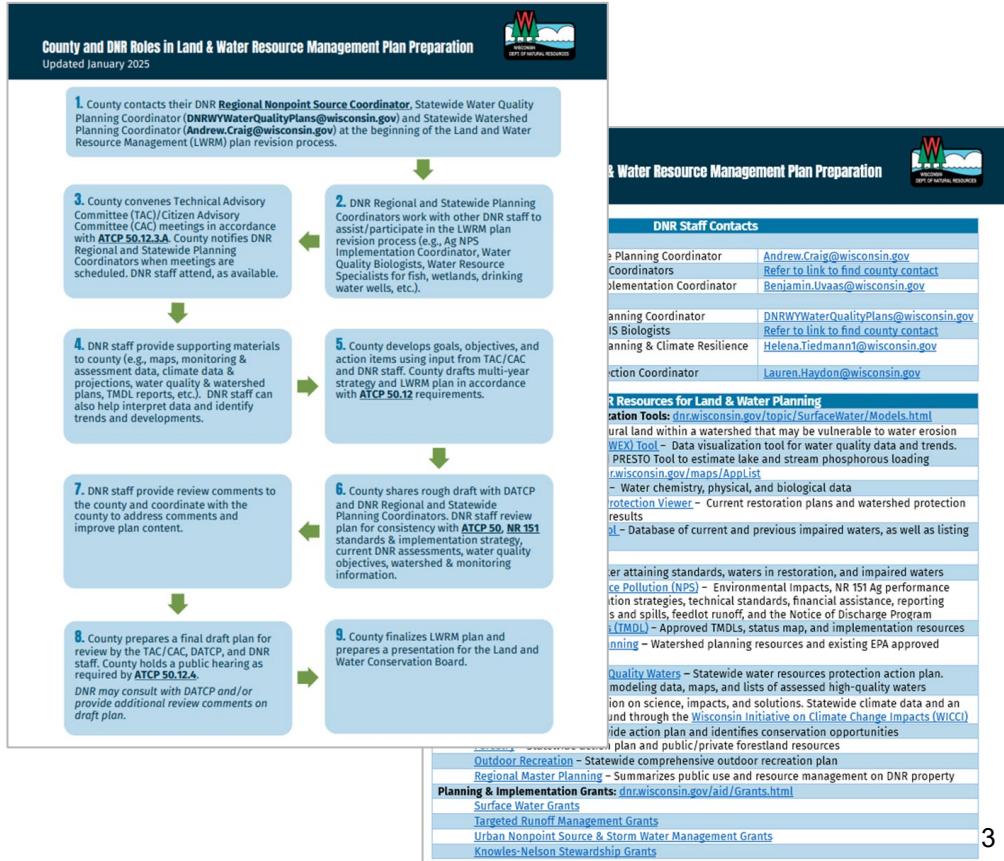
Extreme Events

are causing immense impacts across the state, and the frequency of those events will generally increase.

DNR Involvement in County LWRM F

- DNR staff involved in data sharing, review of plan updates
- Factsheet updated January 2026 in collaboration with DATCP
 - Process for DNR involvement in plan updates
 - Key contacts, data and information resources to consult in update process and other planning work

Factsheet on DATCP website



Engagement on Climate Resilience & Protection

- Beginning in 2023 -2024, new DNR staff brought on to provide technical assistance to counties, regional planning communities (RPCs), municipal utilities.
- Focus on incorporating climate resilience and watershed protection into water quality programmatic work done by DNR and our partners.

Helena Tiedmann : Water Quality Planning Coordinator

Lauren Haydon : Watershed Protection Coordinator

Ezra Meyer : Climate Resilience Outreach Specialist

Engagement on Climate Resilience & Protection

1. Kick-off meeting with counties
2. Coordinate with Watershed Planning Coordinator, Regional Nonpoint Coordinator, Regional WQ Biologists
3. Provide summary packet describing county climate (Helena) and watershed protection information (Lauren)
4. Help inform goals and objectives
5. Attend and present at TAC/CAC meetings as requested
6. Review plan draft and provide feedback on clarity, accuracy

Climate Summary Packet

January 24, 2025

Adams County Climate Information

Description of Included Figures

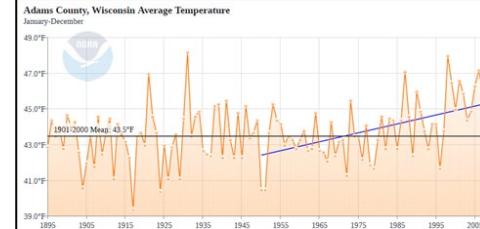
Climate Summary:

1. Climate normals for Friendship, Adams County, WI, 1991-2020. Climate normals are 30-year averages which provide a baseline for understanding a location's typical conditions. Climate normals for Adams County show that it experiences significant seasonal variability, with warm summers and very cold winters. Image source: Wisconsin State Climatology Office. <https://climatology.nelson.wisc.edu/wisconsin-climate-data/climate-normals-by-location/>



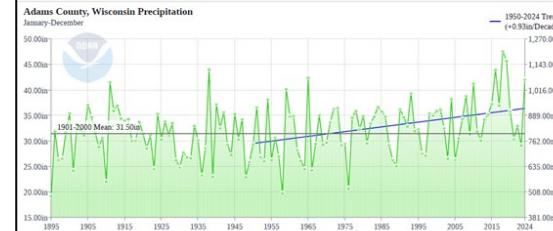
Historical Trends:

2. Annual average temperature for Adams County, WI, 1895-2024. Long-term temperature records show that Adams County is becoming warmer, with average annual temperatures increasing by approximately 3°F since 1900. Much of this warming has occurred in winter, with average winter temperatures increasing by 6°F, compared to 3°F in spring and fall and 2°F in summer. Image source: NOAA Climate at a Glance. https://www.ncdc.noaa.gov/access/monitoring/climate-at-a-glance/county/time-series/WI-001/tavg/12/12/1895-2024?base_prd=true&begbaseyear=1901&endbaseyear=2000&trend=true&trend_base=10&begtrendyear=1950&endtrendyear=2024 For seasonal breakdowns, see <https://wicci.wisc.edu/wisconsin-climate-trends-and-projections/>



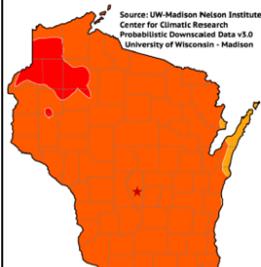
Future Projections:

4. Projected change in annual average temperature. Like most of Wisconsin, average annual temperatures in Adams County are expected to increase by approximately 5°F by the mid-21st century compared to recent historical averages (1981-2021). Image source: Wisconsin Initiative on Climate Change Impacts. <https://wicci.wisc.edu/wisconsin-climate-trends-and-projections/>
5. Projected change in the frequency of extreme precipitation events. Adams County is expected to see an increase in extreme precipitation events of all magnitudes. Top left shows the historical frequency of extreme events (top left), including the day of year when the event occurred. Top right shows projected frequency of extreme events (>5 inches per day) compared to future projections (bottom right). Bottom left shows the historical frequency of extreme events (>5 inches per day) compared to future projections (bottom right). Image source: Wisconsin Initiative on Climate Change Impacts. <https://wicci.wisc.edu/wisconsin-climate-trends-and-projections/>
6. Projected change in average temperature by season (clockwise from top left: winter, spring, fall, summer). Historic temperatures trends (Figure 2) are expected to continue, with temperatures in Adams County increasing in all seasons, but most of all in winter. Image source: Wisconsin Initiative on Climate Change Impacts. <https://wicci.wisc.edu/wisconsin-climate-trends-and-projections/>
7. Projected change in the number of below-freezing nights per year. Adams County is expected to see warmer winters, with very cold temperatures occurring less frequently. For example, Adams County is projected to see 20-40 fewer nights below freezing per year by the mid-21st century (right) compared to the recent historical average (left). Image source: Wisconsin Initiative on Climate Change Impacts. <https://wicci.wisc.edu/wisconsin-climate-trends-and-projections/>
8. Projected change in precipitation by season (clockwise from top left: winter, spring, fall, summer). In Adams County, precipitation in the winter and spring is expected to vary by season. Winters are projected to see the largest increase in precipitation, followed by spring and fall. Summer projections are more uncertain, and models diverge on whether increases or decreases are expected. Though average summer precipitation amounts may not change significantly, greater extremes (e.g., more severe droughts and floods) are expected. Image source: Wisconsin Initiative on Climate Change Impacts. <https://wicci.wisc.edu/wisconsin-climate-trends-and-projections/>

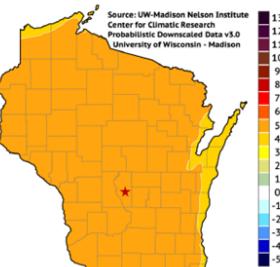


Projected Change in Mean Temperature by Season

Change in DJF TMEAN, SSP245: 2041-2060 minus 1981-2010



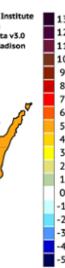
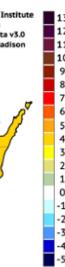
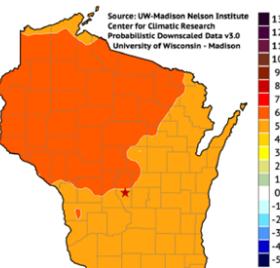
Change in MAM TMEAN, SSP245: 2041-2060 minus 1981-2010



Change in JJA TMEAN, SSP245: 2041-2060 minus 1981-2010



Change in SON TMEAN, SSP245: 2041-2060 minus 1981-2010



Adams county

Watershed Protection Summary Pack

HEALTHY WATERSHED

An area draining to a stream, lake or wetland where natural land cover supports the dynamic processes, habitat size and connectivity, and water quality conditions able to support healthy biological communities (adapted from EPA, epa.gov/hwp).

HIGH-QUALITY WATERS

Lakes, streams, and rivers with *at least two* of the following attributes:

- unique or rare resource,
- attaining state water quality standards,
- or good-to-excellent biotic integrity.

Also included are unique wetlands and those with least disturbed or reference conditions.

2021 High-Quality Waters: Lakes, Rivers, Streams										
Rusk County - 21 High-Quality Waters Identified in 2021										
Data sorted by alphabetical county and alphabetical waterbody name										
OFFICIAL NAME	LOCAL NAME	WBIC	PRIORITY WATERSHEDS HUC6+ State+ Both+ **	COUNTY NAME (STREAM MOUTH & LAKE LOCATION)	HUC6	HUC12 CODE (STREAM MOUTH & LAKE LOCATION)	UNIQUE & RARE RESOURCES (COUNT)	Attaining WQS (COUNT)	IBIs (COUNT)	HQW CRITERIA (COUNT)
Alder Creek		2366700 **	Rusk	Chippewa	070500010701		6		4	2
Bass Lake		2090900 **	Rusk	Chippewa	070500070402		1	1		2
Becky Creek		2369600 **	Rusk	Chippewa	070500010702		4	1	3	3
Big Weigor Creek	Weigor	2370400 ***	Rusk	Chippewa	070500010508		2	1	7	3
Clear Creek		2370100 ***	Rusk	Chippewa	070500010702		2		4	2
Dear Lake		2350600	Rusk	Chippewa	070500010502		1	1		2
Deer Creek		2374200 ***	Rusk	Chippewa	070500010508		4		3	2
Devils Creek		2366600 ***	Rusk	Chippewa	070500010701		5	2	9	3
Flambeau River		2225000 ***	Rusk	Chippewa	070500010904		7	4	10	3
Hackett Creek		2231400 ***	Rusk	Chippewa	070500030304		3		1	2
Island Lake		2350200	Rusk	Chippewa	070500010502		2	1		2
Little Soft Maple Creek		2357300 **	Rusk	Chippewa	070500010703		1	1	1	3
Little Weigor Creek	Weigor	2370500 ***	Rusk	Chippewa	070500010508		4		5	2
Louer Creek		2111000 **	Rusk	Chippewa	070500070104		2		1	2
Main Creek		2217100	Rusk	Chippewa	070500040305		1		5	2
Middle Fk Main Creek		2219700	Rusk	Chippewa	070500040302		2		1	2
Soft Maple Creek		2356600 **	Rusk	Chippewa	070500010703		6		4	2
South Fork Flambeau River		2231200 ***	Rusk	Chippewa	070500020607		5		8	2
South Fork Main Creek		2218000	Rusk	Chippewa	070500040304		4	4	11	3
Spring Creek		2374100 ***	Rusk	Chippewa	070500010508		2	1	2	3
Thornapple River		2360800 ***	Rusk	Chippewa	070500010607		1	2	6	3

2021 High-Quality Waters: Healthy Wetlands										
Rusk County - 2 Healthy Wetlands Identified in 2021										
Data sorted by alphabetical county and increasing Healthy Wetland ID										
WETLAND ID	SITE NAME	SITE ID	PRIORITY WATERSHEDS HUC6+ State+ Both+ **	COUNTY NAME	HUC6	HUC12 CODE	DISTURBANCE RANK	PLANT COMMUNITY CONDITION	LAT	LONG
Healthy_351	NLF-340	NL355		Rusk	Chippewa	070500040305	2	2	45.394192	-91.026016
Healthy_354	NLF-341	NL356	**	Rusk	Chippewa	070500010704	3	2	45.431812	-91.235283

Watershed Protection Summary Pack

C. Healthy Watersheds, High Quality Waters (DNR)

Background & General Overview

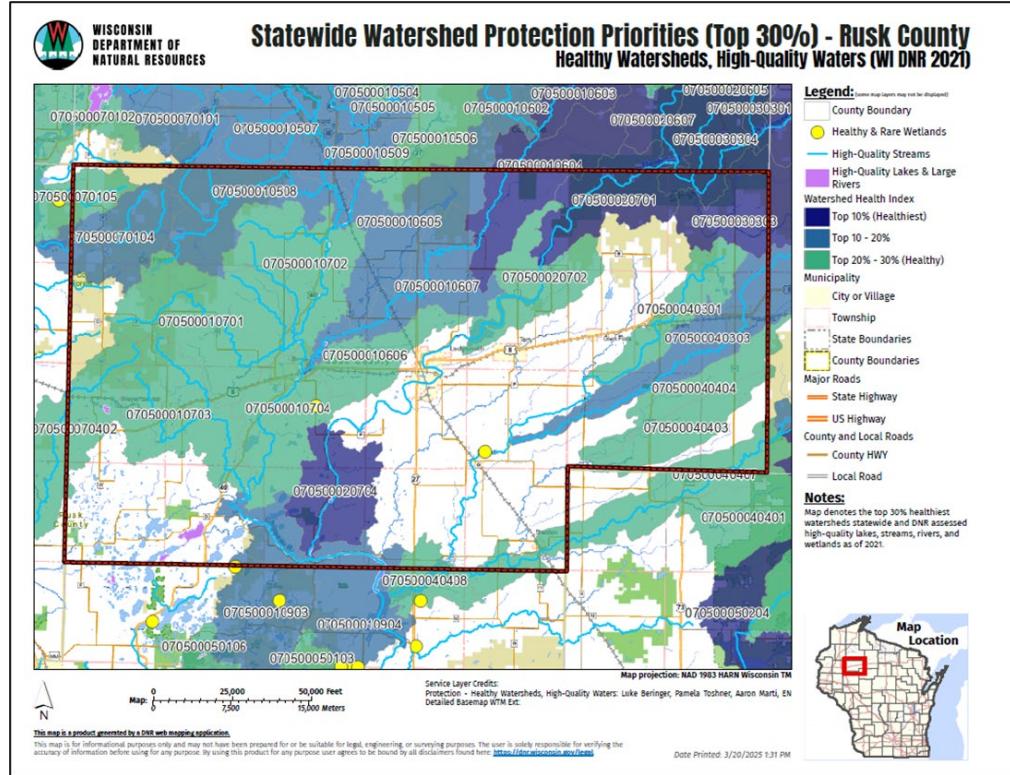
In 2022, the DNR's Water Quality Program launched the Healthy Watersheds, High-Quality Waters (HWHQW) initiative. This new focus on the "already healthy" waterbodies and watersheds – or land area draining to a lake, stream or wetland – is intended to celebrate these treasures and draw attention to the ecological, financial and societal benefits of protecting clean water.

This initiative utilized the US EPA Watershed Recovery Potential Screening Tool to model watershed health at the HUC12 scale throughout the state. The DNR also identified individual high-quality lakes, streams, rivers, and wetlands utilizing existing monitoring data and resource classifications. The modeled watersheds (HUC12 scale) can be sorted statewide and by major drainage basin (HUC6). The 30% healthiest watersheds in the state and within each major drainage basin are the geographic protection priorities for this statewide plan. As outlined in the Healthy Watersheds, High-Quality Waters Action Plan, the statewide goal is to keep 100% of the watershed protection priorities and high-quality waters within them healthy through 2030. The HWHQW website features an accompanying technical report, action plan for how to use this data, and ready-made maps and information dashboards.

Historically, much of the DNR's emphasis has been to restore polluted waters as required by the federal Clean Water Act. Evidence is mounting, however, that actively protecting healthy water resources is a wise public investment, and the shift towards protection efforts is growing nationally. Within Vilas County where there is vast forested watersheds and limited agricultural and urban development compared to other parts of the state, adopting a watershed scale approach to protection is essential for high-quality waters to thrive. Identifying watershed protection priorities also serves to expand funding opportunities as more agencies, such as the EPA, promote the use of watershed planning monies for protection efforts.

Modeling Watershed Vulnerability, Opportunities, & Protection Potential

In addition to modeling watershed health, the HWHQW modeling team worked in collaboration with US EPA to customize the Recovery Potential Screening (RPS) tool to create additional indices to model watershed stressors (hurdles to long-term protection) and opportunities for protection. These indices are referred to respectively as the Vulnerability Index and Opportunity Index. A list of the metrics used to inform these indices can be found below. Ultimately, the watershed health, vulnerability, and opportunity index scores for a given watershed can be used to calculate a Protection Potential Index (PPI). The PPI was developed based on feedback from partners to prioritize the healthiest watersheds first, and secondly consider the likely greatest potential for protection.

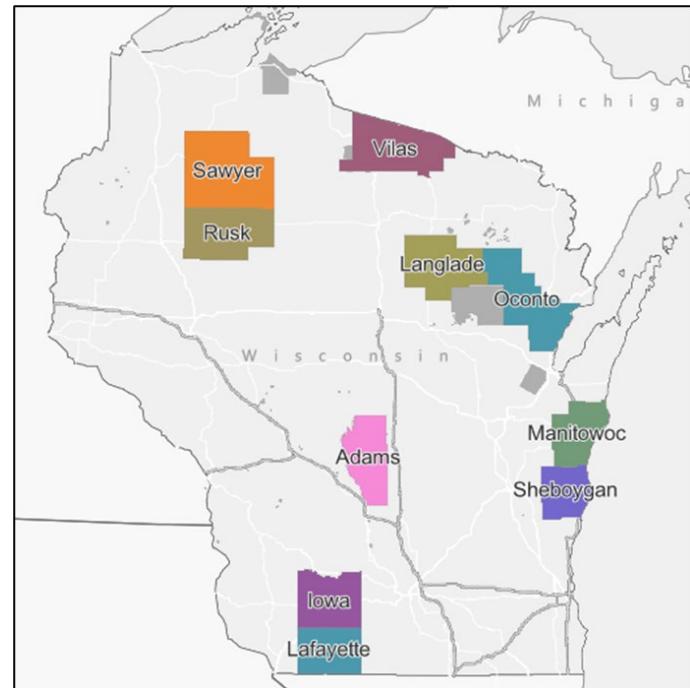


How's It Going So Far?

Counties Engaged to Date

- Positive reception from counties
- Spectrum of engagement and interest
- Specific interest in data, funding, implementation

→ How can we further help counties find this information and incorporate climate and protection in their planning work?



STEP 1 ASSESS CLIMATE AND VULNERABILITY

GOAL	WORKBOOK
Identify how climate change may negatively affect your county's natural resources and communities	1.569 1.569 1.569

Climate Impact

- Shorter, warmer winters
- Warmer temperatures and extreme heat
- Longer growing season
- Increased winter and spring precipitation
- More frequent heavy precipitation events
- Reduced soil moisture in drought
- Increased risk of wildfire
- Altered species flora
- Changes in species ranges or associations (plant or animal)
- Increase from insect pests or pathogens
- Increases in nonnative plant species
- Coastal hazards and shoreline erosion
- Other:

Resources: Refer to [Climate Change Toolkit](#)

STEP 3 IDENTIFY ADA ACTIONS

GOAL

Develop a list of prioritized actions to address vulnerabilities and enhance climate resilience

WORKBOOK 3

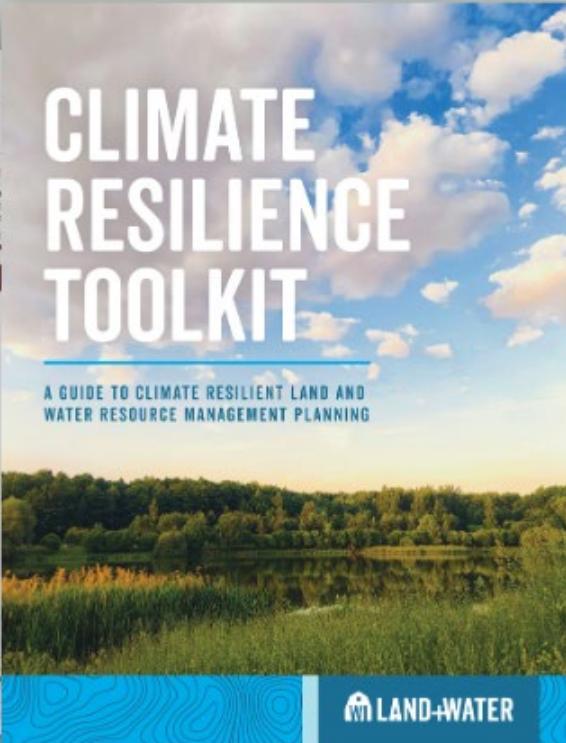
1. Identify climate resources that guide red slope
2. ADA actions Impact in you

Goal/Objective	Action/Strategy

Resources: Refer to [Adaptive Decision Making](#)

CLIMATE RESILIENCE TOOLKIT

A GUIDE TO CLIMATE RESILIENT LAND AND WATER RESOURCE MANAGEMENT PLANNING



WILDLAND + WATER



CONSERVATION AS A CLIMATE SOLUTION

Conservation is one of our best tools to adapt to and mitigate the effects of climate change. Not only do conservation practices draw carbon dioxide from the atmosphere, they also offer numerous co-benefits such as ecological restoration, water quality enhancement, and wildlife habitat protection.

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- County's are already doing this work
- Adaptation supports county land and water goals and objectives



BUILDING RESILIENCE

With extreme weather events on the rise, building resilience is an essential component of any climate action planning. Climate resilience is the ability to prepare for, recover from, and adapt to the impacts of these weather events ([c2es](#)). Local-level conservation planning is at the forefront of reducing a community's vulnerability while preventing impacts from growing worse.

NATURE-BASED SOLUTIONS

Conservation efforts serve as the foundation for nature-based solutions, which involve conserving, restoring, or better managing ecosystems to remove carbon dioxide from the atmosphere ([AU](#)). Examples include promoting the adoption of soil health-building agricultural practices, restoring wetlands, and preserving forests. Such practices serve to prevent greenhouse gas emissions and/or actively remove carbon dioxide from the atmosphere. Conservation practices offer a wide variety of opportunities to make a significant, measurable contribution to climate change mitigation, ultimately reducing the impacts on the environment and our local communities.

RESOURCE ASSESSMENT

Historic, Current, and Future Climate Trends
*WICCI, NOAA, State Climatology Office,
National Database Tools*

RESOURCE CONCERNs

Potential Impacts, Vulnerabilities, and
Adaptive Capacity of Systems
Prompting Question to Identify Opportunities

GOALS, OBJECTIVES & ACTIONS

Selecting Adaptations
Prompting Question to Identify Actions

DATA COLLECTION & INTERPRETATION



IDENTIFYING IMPACTS & OPPORTUNITIES



TAKING ACTION

Tips for Success



Apply to your existing planning work

- 10-year Land & Water Resource Management Plan updates
- 5-year plan reviews
- Annual work plans
- Conservation project planning



Work with a team

Complete the planning workbook with your:

- Project Team
- Technical/Local Advisory Committee
- Conservation Department Staff

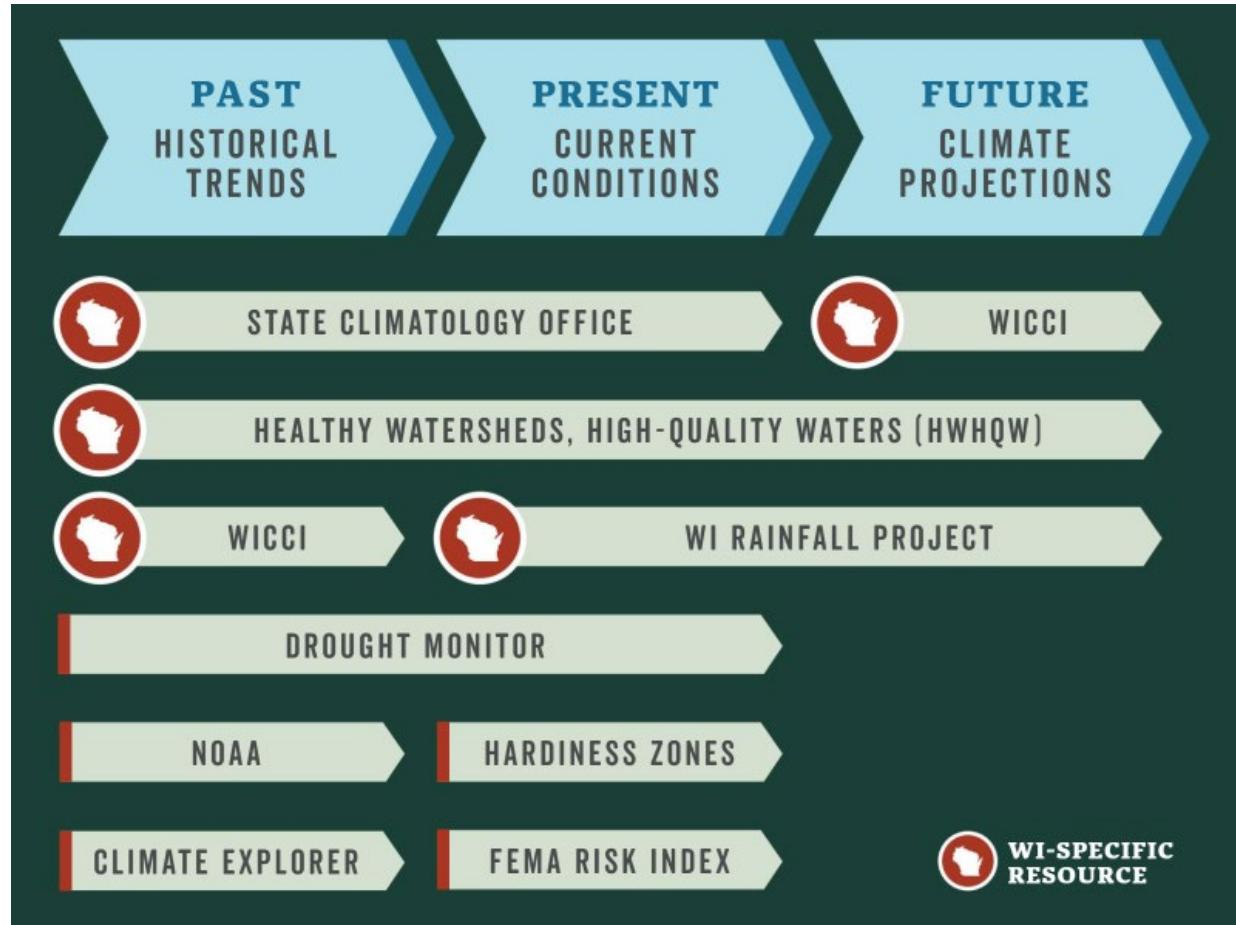


There's no “one size fits all” to climate resilience

- The climate resilience solutions and strategies will vary by location, project type, resource concerns, and stakeholder priorities
- Work with your team to identify the solution(s) that make the most sense for your planning context

Resource Assessment

- Characterize past, present, and future climate conditions
- Identify climate trends or concerns that might impact your resource management objectives



Where to access
Available scale(s)
Available format(s)

Brief description of
tool/resource

Instructions or
helpful tips for
using the
tool/generating
data outputs

NOAA CLIMATE AT A GLANCE

WEBSITE: <https://www.ncdc.noaa.gov/access/monitoring/climate-at-a-glance/>
SPATIAL SCALE: Nation, Region, State, Division, County, Major City
FORMATS: Time-Series (Charts, Datasets)

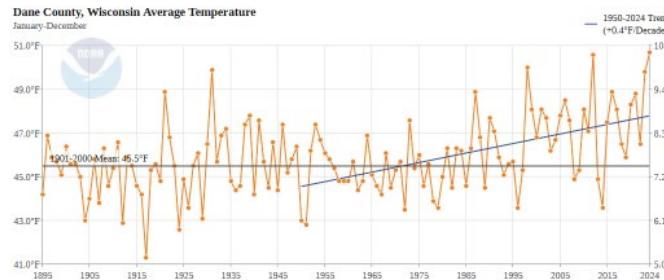
PAST

PRESENT

FUTURE

NOAA's Climate at a Glance tool provides historical climate data from 1895 to present-day at many different spatial scales, including at the county level. Most useful is the [county time series feature](#) which allows users to create exportable time series plots and datasets of different climate parameters for any county. The time scale, start and end years, and trendlines are all customizable.

PARAMETER: Average Temperature TIME SCALE: 12-Month START YEAR: 1895
MONTH: December END YEAR: 2024 STATE: Wisconsin
COUNTY: Dane County



TO USE

Select the Parameter of interest. The Time Scale determines the time period prior to the Month selected that will be averaged. For example, selecting Time Scale: 12-month and Month: December will give data points representing the annual average (January-December) for the years selected (see example above). Changing the Time Scale and Month allows you to see trends in different seasons. For example, selecting Time Scale: 3-month and Month: August will show trends for the summer months of June, July, and August. A trend line can be added for specified years. Note that WICCI uses 1950 as the start date when looking at long-term trends.

Time period(s)
data describes

Example of the
data/tool outputs

Example Resource

Wisconsin-specific resource

GIS data available in addition to online viewer

 **HEALTHY WATERSHEDS, HIGH-QUALITY WATERS (HWHQW)**

WEBSITE: dnr.wisconsin.gov/topic/SurfaceWater/HWHQW.html
SPATIAL SCALE: Watershed (HUC6 & HUC12), Waterbody Level Assessment
FORMATS: Map Viewer, Map/Tables (PDF), GIS Shapefiles

PAST > **PRESENT** > **FUTURE**

In 2022, the Wisconsin Department of Natural Resources (DNR) developed a new statewide water resources protection framework – Healthy Watersheds, High-Quality Waters (HWHQW). This initiative utilized the [US EPA Watershed Restoration & Protection Screening Tool](#) to model watershed health at the HUC12 scale throughout the state. The DNR also identified individual high-quality lakes, streams, rivers, and wetlands utilizing existing monitoring data and resource classifications. The [HWHQW website](#) features an accompanying technical report, action plan, and ready-made maps and information dashboards.

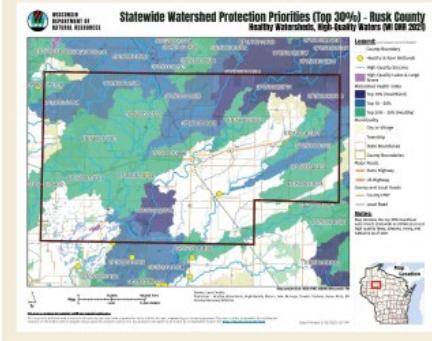
TO USE

The HWHQW modeling and assessment results can be found within the DNR [Watershed Restoration and Protection Viewer](#).

- The *High Quality Waters* dataset is made up of the Lakes & Large Rivers layer, Streams layer, and the Healthy & Rare wetlands.
- The *Watershed Protection Priorities* dataset allows users to explore the top 30% healthiest HUC12 watersheds within two scales: statewide or within each Large River & Great Lakes Basin (HUC6).
- In addition to the watershed health information, there are three indices to help prioritize protection activities: vulnerability, opportunity, and the protection potential index. The vulnerability index can be a useful tool for climate resiliency planning since it includes metrics such as projected spring runoff volume and change in summer air temperatures.

GIS DATA

The Healthy Watersheds, High-Quality Waters datasets are available to download from the DNR Open Data Portal website. A link to access these shapefiles can be found under the [Conservation Planning Tools](#) section on the DNR website or within the *Protection Tab* on the Watershed Restoration and Protection viewer.



Data describes past, present, and future conditions

Example Resource

Climate Planning Framework



ASSESS CLIMATE IMPACTS AND VULNERABILITIES

GOAL

Identify how climate change may uniquely affect your county's natural resources and communities.

WORKBOOK QUESTIONS

1. What climate impacts are you most concerned about in your county? *Identify priorities*
2. How specifically might these affect local resources?

Climate Impact	Local Impact
<ul style="list-style-type: none"><input type="radio"/> Shorter, warmer winters<input type="radio"/> Warmer temperatures and extreme heat<input type="radio"/> Longer growing season<input type="radio"/> Increased winter and spring precipitation<input type="radio"/> More frequent heavy precipitation events<input type="radio"/> Reduced soil moisture or drought<input type="radio"/> Increased risk of wildfire<input type="radio"/> Altered stream flows<input type="radio"/> Changes in species ranges or assemblages (plant or animal)<input type="radio"/> Damage from insect pests or pathogens<input type="radio"/> Increases in nonnative plant species<input type="radio"/> Coastal hazards and shoreline erosion<input type="radio"/> Other:	

Resources: Refer to Future Climate Projections section for a comprehensive list of tools

Impacts

What climate impacts are you most concerned about in your county?

How specifically might these affect local resources?

GOAL

Define clear management objectives that align with projected climate impacts and community needs.

WORKBOOK QUESTIONS

1. What are the focus areas and land and water management goals and objectives in your plan?
2. What opportunities exist for incorporating climate resilience into these elements?

LWRM Goals and Objectives	Climate Resilience Opportunities

Opportunities

What are the focus areas and land and water management goals/objectives in your plan?

How might climate change make it challenging to achieve these goals?

What opportunities exist for incorporating climate resilience?

GOAL

Develop a list of prioritized actions to address vulnerabilities and enhance climate resilience.

WORKBOOK QUESTIONS

1. Are your current management practices enough to overcome the challenges and meet your management goals and objectives?
2. What actions can you take to address these climate impacts in your county?

Goal/Objective	Action/Strategy	Considerations: Benefits, Drawbacks, Feasibility, Barriers, Resources, Timeline

Resources: Refer to *Adaptations* section for comprehensive lists of actions and strategies

Actions

What actions can you take to address these climate impacts in your county while meeting management goals?

Counties are taking action!

Example Goals from Recent LWRMPs:

- Monitor road/stream crossings to ensure hydrologic integrity
- Work with the County Highway Department to promote erosion control and culvert sizing
- Protect the top 30% healthiest watersheds in the County
- Evaluate implementation of a wetland preservation/restoration program
- Develop a lake classification system around vulnerability/resilience to shifts in climate
- Improve fisheries habitat to increase climate resiliency for gamefish
- Evaluate strategies for wildlife plantings to adapt to climate change
- Develop a County Conservation Natural Hazards Mitigation Plan
- Promote sustainable agriculture and plan for climate change
- Increase promotion of no-till, cover crops, and nutrient management programs
- Improve soil health, carbon storage & water infiltration
- Promote land practices to enhance resiliency to fluctuations in precipitation, temperature and seasonal variances

Concluding Thoughts

County's and others are already doing this work

Making adjustments based on a range of future projections to support broader conservation efforts.

Centered around counties' expertise

Many tools available to support informing decisions, but no tool replaces local knowledge.

We're here to help

We are available to support counties throughout their plan updates and other conservation planning efforts.

We'd love to hear your thoughts!



Questions?

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Climate Program Manager



Helena Tiedmann, WI DNR Helena.Tiedmann1@wisconsin.gov

Water Quality Planning Coordinator

