Hazard Mitigation Plan

Marquette County, Wisconsin

Updated – September 29, 2025

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Acronyms

ACE	Army Corps of Engineers
ARC	American Red Cross
ASL	Above Sea Level
ASPR	Assistant Secretary for Preparedness and Response
CAR	Communities At Risk
CDBG	Community Development Block Grant
CI	City
CO	County
CO HWY	County Highway Department
COOP/COG	Continuity of Operations & Continuation of Government
CTH	County Highway
DFIRM	Digital Flood Insurance Rate Map
DHS	US Department of Homeland Security
DNR	Wisconsin Department of Natural Resources
DOT	Department of Transportation
DPW	Department of Public Works
EAP	Emergency Assistance Program or Emergency Action Plan
EF	Enhanced Fujita Scale
EM	Emergency Management
EMS	Emergency Medical Services
EMT	Emergency Medical Technician
EOC	Emergency Operations Center
EOP	Emergency Operating Procedure
EPA	US Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
F	Fahrenheit or Fujita Scale
FCIC	Federal Crop Insurance Corporation
FD	Fire Department
FEMA	Federal Emergency Management Agency
FIRMS	Flood Rate Insurance Maps
FMA	Flood Mitigation Assistance
FSA	Farm Service Agency
GIS	Geographic Information System
HazMat	Hazardous Materials
HazMit	Hazard Mitigation

HAZUS	Hazards United States
HAZUS-MH	Hazards United States Multi-hazard
HMGP	Hazard Mitigation Grant Program
HUD	US Department of Housing and Urban Development
HVA	Hazard Vulnerability Analysis
HWY	Highway
ICS	Incident Command System
LE	Law Enforcement
LEPC	Local Emergency Planning Committee
LIO	Land Information Office
LIDAR	Laser Imaging Detection and Ranging
LPDM	Lagrangian particle dispersion
LWC	Land and Water Conservation Department
MAP	FEMA's Risk Mapping, Assessment and Planning
MHz	Megahertz
MMI	Modified Mercalli Intensity Scale
MOU	Memorandum of Understanding
MPH	Miles Per Hour
NFIA	National Flood Insurance Act
NFIF	National Flood Insurance Fund
NFIP	National Flood Insurance Program
NIDIS	National Integrated Drought Information System
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NRP	National Response Plan
NWS	National Weather Service
PDM	Pre-Disaster Mitigation
PGA	Peak Ground Acceleration
PH	Public Health
RACES	Radio Amateur Civil Emergency Service
RFC	Repetitive Flood Claims
SBA	Small Business Administration
SMART	Spatial Management, Analysis and Resource Tracking
SPI	Standardized Precipitation Index
SRL	Severe Repetitive Loss
STH	State Highway
SWAT	Special Weapons and Tactics

TN	Township
UC	Unified Command
USDA	US Department of Agriculture
USFS	US Forestry Service
USGS	US Geological Survey
USH	US Highway
UW	University of Wisconsin
UW Ext	University of Wisconsin – Extension Office
VHF	Very High Frequency
VI	Village
VOAD	Voluntary Organizations Active in Disaster
WEM	Wisconsin Emergency Management
WISP	Wisconsin Irrigation Scheduling Program
ZA	Zoning Administration

Introduction and Background

The Marquette County Hazard Mitigation Plan is intended to provide strategies for reducing susceptibility to future damage to public and private infrastructure in the county. The Marquette County Emergency Management Office applied for and was awarded a grant to update the hazard mitigation plan in 2021. This grant program is sponsored by the U.S. Department of Homeland Security - Federal Emergency Management Agency (FEMA) and is administered by the Wisconsin Department of Military Affairs - Wisconsin Emergency Management (WEM). The procedures used in preparing this plan are based on guidance provided by FEMA and WEM and should therefore be considered consistent with the requirements and procedures in the Disaster Mitigation Act of 2000.

Section 409 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 93-228, as amended) is the impetus for involvement of state and local governments in evaluating and mitigating natural hazards as a condition of receiving federal disaster assistance. Federal Emergency Management Agency (FEMA) rules for implementing Section 409 are in 44 CFR Part 206 Subpart M.

Section 409 states that the county is obligated to try to reduce damage susceptibility to any hazard that has received relief funding in the past. Developing a hazard mitigation plan provides an opportunity for communities to meet this requirement by developing strategies for the reduction of potential losses from future natural disasters. Hazard mitigation planning is the process of developing a set of actions designed to reduce or eliminate long-term risk to people and property from hazards and their effects. Completion of this plan should put Marquette County in an advantageous position when competing for pre- and post-disaster mitigation project dollars because projects have been pre-identified. The cooperation of government, private, and volunteer agencies is essential in mitigation efforts, and over the long term, it is hoped that implementation of this plan will save taxpayer dollars because less money is needed for post-disaster recovery activities. Furthermore, mitigation planning measures incorporated in economic or community development goals support a more comprehensive and effective government. This plan evaluates the risks that all natural hazards pose to the citizens and property of Marquette County by presenting:

- A profile and analysis of past hazardous events
- An assessment of the vulnerability of community assets
- Potential hazard mitigation strategies
- Methods for building community support and ensuring plan adoption

Plan Overview

The Marquette County Hazard Mitigation Plan provides background information on Marquette County and identifies those hazards that have occurred or could occur in the county. It includes a description of each hazard, its frequency of occurrence, appropriate actions in case of emergency, and possible steps to mitigate the hazard. These hazards are the basis for the development of all county emergency plans.

A well-prepared plan allows emergency management to act swiftly and efficiently in the event of a hazard, reducing the damage and the cost incurred from displacing residents and businesses. Hazard mitigation activities will be emphasized in the plan as a major component of overall emergency management. The plan is intended to provide strategies for reducing future damage to public and private infrastructure in the county, including flood damage.

Previous Planning Efforts and Legal Basis

The Marquette County Office of Emergency Management has incorporated a hazard vulnerability analysis (HVA) that identifies all likely natural hazards that might or have occurred within the county into this plan; it is based on the State of Wisconsin's HVA. Hazards were reviewed and discussed, and led to no removals or additions since the previous plan.

There have also been plans, codes, and ordinances completed by individual Marquette County departments or municipalities, which were used as reference materials for this plan, including:

Marquette County [1]

Chapter 68	Comprehensive Plan
Chapter 69	Subdivision
Chapter 70	General Zoning, Floodplain
Chapter 71	Building and Mechanical Code
Chapter 73	Nonmetallic Mining

City of Montello [2]

Chapter 136	Building Construction
Chapter 178	Fire Protection
Chapter 194	Housing Standards
Chapter 350	Floodplain Zoning
Chapter 364	Shoreland-Wetland Zoning
Chapter 370	Subdivision of Land
Chapter 385	Zoning

Village of Endeavor [3]

Chapter 198	Building Construction
Chapter 261	Housing Standards
Chapter 300	Mobile Homes
Chapter 450	Comprehensive Plan
Chapter 480	Zoning

Village of Oxford [4]

Chapter 6	Building and Building Regulations
Chapter 10	Floodplains
Chapter 50	Zoning, Erosion Control, Mobile Homes, Shoreland-Wetland, Stormwater Management and Subdivisions

Village of Westfield [5]

Chapter 219	Building Construction and Fire Prevention
Chapter 298	Housing Standards
Chapter 345	Mobile Homes
Chapter 500	Floodplain Zoning
Chapter 510	Shoreland-Wetland Zoning
Chapter 515	Subdivision of Land
Chapter 525	Zoning

[1] https://www.co.marquette.wi.us/government/county-code-of-ordinances
[2] http://www.cityofmontello.com/city-ordinances/ and https://ecode360.com/MO2080
[3] https://villageofendeavor.org/index.asp?SEC=A03970DC-9011-4B57-A179-0B45A69F1411
[4] https://villageofoxfordwi.com/ordinances/ and https://library.municode.com/WI/Oxford
[5] http://www.villageofwestfieldwi.com/ and https://ecode360.com/WE2245

The Village of Neshkoro[6] has no online ordinances.

Town of Buffalo [7]

Chapter 2	Comprehensive Plan
Chapter 4	Mobile Homes and Manufactured Homes Ordinance
Chapter 10	Subdivision/Land Division Ordinance
Chapter 12	Building Permit Ordinance
Chapter 16	Zoning
Chapter 19	Town Roads

Town of Mecan [8]

Ordinance 01-01	Comprehensive Planning
Ordinance 02-01	Building Code
Resolution 52-2009	Approve County Zoning
Ordinance 2-10	Regulation of Groundwater
Ordinance 02-2012	Nonmetallic Mining Reclamation
Resolution 2015-03	Comprehensive Plan and Farmland Preservation
Ordinance 88-3	Mobile Home Parks

Town of Oxford [9]

Ordinance 15	Building Code

Town of Packwaukee [10]

Title 10, Ch.1	Subdivisions and Platting
Title 10, Ch. 2	Building Code
Title 10, Ch. 3	Mobile Homes

Town of Shields [11]

Manufactured Home Ordinance

The Towns of Crystal Lake, Douglas, Harris, Montello, Moundville, Newton, Springfield, and Westfield have no online ordinances.

The Town of Neshkoro[12] has no relevant ordinances online.

[6] https://neshkorowi.gov/
[7] http://tn.buffalo.wi.gov/?page_id=13
[8] http://www.townofmecan.org/ordinance-resolution
[9] https://townofoxfordwi.com/ordinances-resolutions/
[10] https://www.townofpackwaukee.org/ordinances.html
[11] https://townofshields-wi.gov/ordinances-resolutions/
[12] https://townofneshkoro.org/ordinances-resolutions/

According to the 2023 Wisconsin Comprehensive Plan and Local Land Regulations Inventory Report, 39 percent of local governments do not have an official website, do not post ordinances on their website, or have an incomplete listing of ordinances. [13]

As part of its Building Science program, FEMA studies how natural hazards affect structures. As part of this focus, it tracks building code adoption status for jurisdictions across the country through a searchable portal organized by hazard. [14]

The local HVA serves as the starting point for the hazard mitigation plan. Other data on historical events is gathered from the National Weather Service's storm report database[15], recent news reports, local resources (e.g., website; local community ordinances; local plans such as the comprehensive plan, stormwater management plans), the FEMA Region V mitigation survey, and from the memories of the local planning team members. Team members are presented with this educational background data and asked to rate their concern (likelihood of future occurrences and amount of disruption/damage should it occur) on a five-point scale (very high, high, medium, low, very low). From that, team members, members of the community, survey respondents, and other planning participants are asked to determine hazard mitigation strategies that might benefit their communities. Local existing plans are referenced again currently, with the members and authors of these plans (e.g., comprehensive, stormwater management) serving as core members of the workgroup committee. The selected mitigation strategies are recorded and detailed in each chapter as well as in the table in Appendix E.

Mitigation strategies are reviewed over the five years of the plan's life by the leadership staff from the applicable departments (e.g., Emergency Management, Sheriff's Office/Communications, Highway, Land and Water Management, Planning and Parks) with the elected leaders from the jurisdictions to triage projects and determine what can and should be done within the planning period. Agencies within the county that have the authority to regulate development include Zoning administration for Marquette County, the City of Montello and the Villages of Endeavor, Neshkoro, Oxford, and Westfield. These options are usually discussed in open meetings prior to implementation, as required by Wisconsin state law. The determining factor for most projects is obviously budget

[13] https://doa.wi.gov/DIR/2023-Comp-Plan-and-Land-Regs-Inventory-Report.pdf
[14] https://stantec.maps.arcgis.com/apps/MapSeries/index.html?appid=a053ac48343c4217ab4184bc8759c350
[15] https://www.ncdc.noaa.gov/stormevents/

availability. The units of government have several options for funding implementation including grants, special taxing authority (for the project and/or any matching funds), general purpose revenue from existing budgets, and regulatory authority, which can be used to require that an individual or business complete the project using their funds. The units of government use or improve, if necessary, the mechanisms described above to ensure the implementation of hazard mitigation ideas.

Plan Preparation, Adoption, and Maintenance

The Marquette County Emergency Management Director contracted with Emergency Planning, Training, and Exercise Consulting (EPTEC, Inc.) to draft this plan. A committee was organized to work with the county and the planning consultant to perform activities required to update this plan. Attendance and participation were strongly encouraged to progress through the planning process. The committee understood that they would need to convey information to their jurisdictions, engage local leadership and staff to encourage a collective community voice, solicit input from their jurisdiction, and arrange for review and official adoption of the plan. The committee members include:

- Aaron Williams, Marquette County Emergency Management
- Ron Barger, County Administrator
- Megan Stalker, Marquette County Land Information
- Brian Trebiatowski, Marquette County Highway Dept
- Sarah Jensen, Marquette County Health Department
- Keri Solis, Marquette County Economic Development
- Mandy Stanley, Marquette County Human Services Director
- Paul Van Treeck, Marquette County
- Dawn Calnin, CI of Montello
- Michael Kohnke, CI of Montello DPW
- Gary Sorensen, VI of Oxford
- Scott Kempley, TN of Buffalo
- Karen Wampler, TN Douglas
- Mike Raddatz, TN of Mecan
- Gary Schoppenhorst, TN of Moundville
- Glen Bubolz, TN of Montello
- Mark Milbrandt, TN of Neshkoro
- Chris Peschel, TN of Newton Fire Dept
- Steve Klump, TN of Oxford Fire Dept and Hazmat Team
- Mary Walters, TN of Oxford and Marquette County Board
- Ken Borzick, TN of Shields

- John Bennett, TN of Westfield
- Jeff Buchholz, TN of Westfield
- Sharon Galonski, TN of Westfield
- Pat Hamilton, TN of Westfield and LEPC
- Michelle Johnson, School District of Westfield
- Damaris Thome, Department of Public Instruction
- Pat Hamilton, Brakebush Brothers, Inc.
- Dennis Dahlke, Pioneer Power and Light
- Jane Lentz-Gervais, Adams County Emergency Management
- Lenora Borchardt, EPTEC, Inc. (Contractor)

An informational brochure was created, and copies were distributed throughout the community at local community gathering points such as municipal halls, libraries, etc. Meetings were held with chief elected officials from the municipalities to explain and gather input regarding the program (e.g., previous occurrences, mitigation strategies). The FEMA Region V survey was sent to every Marquette County city, village, and town clerk for distribution to the elected officials for discussion, review, and completion. Key county departments (e.g., Planning/Zoning, Highway, Sheriff's) also received the survey with a request for completion; the completed county and municipal surveys were compiled, and the results, along with the cover letter, are in Appendix G. Additionally, each community was provided a survey to complete that requested information on their hazards, their future development, and a request for ideas for mitigation and road projects. The results of this survey can be found in Appendix G. Additional communications with each of the communities to elicit plan information were also conducted.

This project was begun in 2021. The workgroup met twice via Zoom in 2022. There are some places where minor information was not available (e.g., dates of past projects, total dollar amounts spent), but it does not detract from the plan's readability or take away from highlighting the efforts that the county and its municipal partners have made in mitigating hazards. Marquette County and its municipalities are proud to say that they came together to finish this plan to highlight strategies to make their communities more resilient over the next five years.

The committee met to evaluate and incorporate input from local officials and then to review and provide input on the progress of the plan. Invitations were extended via notices in newspapers and direct correspondence to members of the public, local officials, academia,

business, non-profit, and industry leaders to participate in the process. A working draft of the plan was distributed to the County Emergency Management Directors from the contiguous counties (i.e., Waushara, Green Lake, Columbia, and Adams). No comments or edits were received. Unfortunately, despite multiple attempts and invitations being made to the public, no public comments were received. An additional effort was made to reach those whose primary language is not English, as well as underserved populations and those who may not have traditional access to the information being provided. A copy of the supporting materials, including community fliers, the mitigation brochure, a list of meeting dates and informational sessions to gather public and official input, etc., can be viewed in Appendix G.

The Marquette County Hazard Mitigation Plan Workgroup reviewed the past events records (generally gathered from the National Weather Service), and a consensus was reached on the anticipated probability of future events. This probability was designated as “very high,” “high,” “medium,” “low,” or “very low” by the workgroup based on their evaluation and experience with the data.

The hazard mitigation strategies from the previous version of this plan were reviewed, and progress is reported in Appendix D. The workgroup also, after reviewing the updated draft plan, selected the potential new mitigation projects, which are listed in Appendix E (Summary of Mitigation Strategies) and discussed in more detail in each chapter’s Hazard Mitigation Strategies section. The workgroup participants were given the *Mitigation Ideas: Possible Mitigation Measures by Hazard Type* (Mitigation Ideas, FEMA-R5, 9/02) booklet as an aid to generating ideas. All of the ideas generated during the workgroup meetings were incorporated into the plan and can be found in the Hazard Mitigation Strategies section of each chapter and are summarized in Appendix E. Based on the information collected, each of these projects was assigned a “very high,” “high,” “medium,” “low” or “very low” priority based on the workgroup’s internal consensus assessment during a discussion of the balances of risk, reward, cost effectiveness (cost benefit) and likelihood of local will and funding (local or grant) to complete the strategy.

The municipal leaders were briefed regarding the need to formally adopt this plan as a prerequisite for future mitigation funding eligibility. A draft was sent to Wisconsin Emergency Management (WEM) for review and tentative approval. Based on WEM’s comments, a final draft plan was completed, and the plan was deemed “approvable.” It was sent to the communities to conduct

general adoption meetings to review and discuss the plan with members of the public, local officials, academia, and business and industry leaders. Adoption paperwork was provided to the municipal leaders advising them of the need to formally adopt this plan as a prerequisite for future mitigation funding eligibility.

The resolution was passed by the Marquette County Board; the City of Montello; the Villages of Endeavor, Neshkoro, Oxford, and Westfield, and the Towns of Buffalo, Crystal Lake, Douglas, Harris, Mecan, Montello, Moundville, Neshkoro, Newton, Oxford, Packwaukee, Shields, Springfield, and Westfield. Scanned copies of the adoption resolutions are available in Appendix C. The final plan has been submitted to WEM for review and certification and notice of acceptance has been received of FEMA plan approval as of 16 September 2025.

The Disaster Mitigation Act of 2000 requires the monitoring, evaluation, and updating of the hazard mitigation plan every five years. This hazard mitigation plan is designed to be a “living” document and, therefore, will be reviewed and updated within five years from its approval date. The Marquette County Hazard Mitigation Plan Workgroup will provide leadership and guidance throughout the plan’s life cycle (i.e., monitoring, evaluating, and updating). Updates will allow municipal leaders and the public to provide input into the process. The public will be notified of this opportunity via legal public notices.

The process for integrating hazard mitigation actions into other planning mechanisms will be led by the county Emergency Management Director. As he receives information between the five-year update periods (e.g., comprehensive or capital improvement plans) that might be included, it will be added to Appendix H: Inter-Revision Updates. Marquette County Emergency Management Department maintains responsibility and is the point of contact for all issues (e.g., monitoring, updating, and evaluating the effectiveness) regarding this plan. Municipalities can contact the county Emergency Management Director to add updated local information to Appendix H at any time. Furthermore, the county Emergency Management Director may solicit updates from the plan’s stakeholders (county offices, municipalities, the public, etc.). The solicitation would seek to determine if there are new elements for the mitigation plan, as well as any plans (new or updates) in which the mitigation plan can and/or will be used as a source plan. Comments will be received and discussed at an annual publicly noticed open meeting of the county’s Emergency Management committee. Note that after a disaster, the Emergency Management committee may also meet to discuss

mitigation strategies that might be applicable. These same stakeholders will be invited to fully participate in the five-year plan update, which will be detailed in the updated plan documents and will fully conform to FEMA's requirements.

Marquette County and the municipalities at all levels within the State of Wisconsin (i.e., city, village, town) are individually empowered to enact all the hazard mitigation strategies in this plan. Realistic constraints to enacting include adequate budgeting, and, as unincorporated municipalities, towns are unable to independently receive federal grants. The county has a history of working collaboratively to support town initiatives. During the plan's lifecycle, the county and incorporated municipalities will consider the strategies listed in Appendix E as they annually prioritize "regular" maintenance projects, as they set their annual budgets, after a disaster period, and as grants become available that might help off set the costs of some of the strategies listed within the plan. The latter will be instigated by notice of these opportunities by the County Emergency Management Director. These projects will be reported in the annual letter to the County Emergency Management Director. The Director will keep and compile the inter-revision data for inclusion in the five-year update, which will be coordinated through County Emergency Management beginning at least 18 months prior to expiration, and at which time they will report on their progress towards meeting the hazard mitigation goals. The update will bring together many of the same workgroup members as well as any new stakeholders (e.g., elected officials, businesses, academia, members of the public) who respond to the invitation to participate and have an interest in mitigation planning.

The plan participants also recognize this document as an important planning tool within the community and will use this plan as a reference as they complete and update community ordinances and other planning, such as zoning, shoreland, floodplain, wetland, park and recreation, sustainability, and farmland preservation. They will also refer to it as they are involved in the planning and other preparedness activities of the municipalities. The plan was adopted, but after discussions with the communities, it was unclear if it was incorporated into their plans. There is also no evidence that this plan was integrated with other planning efforts.

Many of these plans are on a regular updating cycle, and as emergency management is notified that they are up for renewal, they will provide any relevant planning materials (from the hazard mitigation plan and any additional information received since the

plan's approval). Municipalities with planning departments are also encouraged to refer to the mitigation plan in their zoning updates, flood and shoreland planning, and in their comprehensive plans.

After this plan has passed its reviews from Wisconsin Emergency Management (WEM) and the Federal Emergency Management Agency (FEMA) and is approved, the County Planning and Zoning Department and the municipalities will receive a copy. They have committed to using and referring to the mitigation plan as they complete their regularly scheduled reviews and updates of the aforementioned plans. Marquette County Emergency Management will also refer to this plan in their emergency preparedness activities.

Physical Characteristics of Marquette County

General Community Introduction

Marquette County was named in honor of Father Jacques Marquette, a French Jesuit missionary who passed through the region in 1673. Father Marquette was a companion to the French-Canadian explorer Louis Joliet.[16] However, these were not the first outsiders to travel this wilderness. Among the early explorers were Jean Nicolet in 1634, followed about twenty-five years later by Sieur Radisson and Sieur des Groseilliers. When the French first arrived, the American Indian tribes in the vicinity were the Winnebago and Menominee. People began to settle in the region, and the government made treaties with the natives, who became very friendly and carried on trade with settlers. Most of Waushara County, much of Marquette County, and some of Green Lake County have long been known as "Indian Lands" because they were the last places in Wisconsin where native peoples inhabited. Here also are found mounds in the shape of birds, lizards, turtles, and other animals, as well as some being simply long lines of embankments which seem to have been erected for defense. The largest and richest group of these mounds is found on the J. Kratz farm about three miles from Montello.[17]

Marquette County was formed in 1836 from the Marquette District and Brown County. Located in central Wisconsin, it embraced twenty-one townships. The county seat was originally the Village of Marquette[18]. The county was originally bounded on the north by Waushara, east by Winnebago and Fond du Lac, on the south by Dodge and Columbia, and on the west by Adams. It was 24 by 30 miles square. It was set off from Brown County, December 7, 1836. The county was celebrated for its good lands, deep lakes, fine water powers, and its industrious and thrifty inhabitants. It was watered by Fox River (Neenah) and its branches. The population in 1840 was 18. However, by 1850, the population had blossomed to 8,642, including 237 farms, 9 manufacturing firms, and 1,747 dwellings.[19] The first settlement within the limits of the present county was in the town of Buffalo, established by H. F. Owen and J. I.

[16] http://en.wikipedia.org/wiki/Jacques_Marquette
[17] http://www.formycousins.com/gallery/Album-History1.html "Early History of Marquette County" by Laura Bertha Tagatz
[18] http://www.formycousins.com/1878atlas-Marquette.html

O'Blanis in the spring of 1848. The first schoolhouse in the county was built soon afterward.

The boundaries of the county were enlarged in 1849 by the addition of thirty-five townships. It is currently surrounded on the north by Waushara, on the east by Green Lake, on the south by Columbia, and on the west by Adams Counties. The last division of this county was in 1858, when Green Lake County was detached. The county seat now rests at Montello. Once called Hill River, the city was well located on the shore of Buffalo Lake, with towering bluffs and encircling rivers. This city was the only one in the county having both river and railroad communications. Its position on the navigable Fox River and on the Wisconsin Central railway gave it rare advantages as a center for shipping and exchange.[20]

Plan Area

Marquette County covers 464 square miles. This is a rural county, with farmland covering about 43% and woodlands encompassing another 30%. Marquette County is home to 15,838 people, according to 2023 U.S. Census Bureau estimates. [21]

Marquette County lies in an ecological region known as the “Central Sand Hills.” This region is located at the eastern edge of the old Glacial Lake Wisconsin and contains a series of glacial moraines and partially covered glacial outwash. Pre-settlement vegetation consisted of oak forests, oak savannah, and a variety of prairie types. The most prominent natural feature in Marquette County is the Fox River. The Fox River enters the county from Columbia County and flows into Buffalo Lake, where it continues, eventually entering Lake Puckaway. The county has over 90 lakes and several streams and rivers. Covering 2,210 acres, Buffalo Lake is the largest lake in the county. Other prominent lakes in the county include Montello, Lawrence, Tuttle, Crystal, White, and Mason Lakes. Nearly 25% of Marquette County is covered by wetlands, which play an important role in regulating flooding impacts throughout the County.

Marquette County’s landforms and topography are characterized by several glacial advances and retreats that took place over northeastern and central Wisconsin some 15,000 to 25,000 years ago. As a result of this activity, numerous unique geologic and

[20] http://www.formycousins.com/1878atlas-Marquette.html
[21] https://www.census.gov/quickfacts/fact/dashboard/marquettecountywisconsin,US/PST045221

topographic features emerged, such as escarpments, outwash plains, lake plains, terminal moraines, ground moraines, and drumlins.[22]

Marquette County lies within the Central Plain geographic province. The Central Plain of Wisconsin is a crescent-shaped belt covering about 13,000 square miles. All of it is floored by the weak Cambrian sandstone, except in the northwest, where the removal of the sandstone has exposed the underlying Keweenawan lavas for a small area.[23] The county's western portion is covered by a thick mantle of glacial till referred to as the terminal moraine. Within the moraine, old glacial lake beds exist, now reflected in marshland and scattered areas of red clay. The remainder of the county has a shallower mantle of drift, referred to as ground moraine, associated with large tracts of marsh deposits.[24] The average slope in Marquette County is 2.9% with a total relief range of about 560 feet.[25] Within the county, about 8% of soils are highly erodible and are largely located in the western third of the county.[26]

Marquette County is located in east central Wisconsin and is bordered by Waushara County to the north, Columbia County to the south, Adams County to the west, and Green Lake County to the east.

In Wisconsin, there are three types of sub-county, full-service local government units: towns, which are unincorporated, and villages and cities, which are incorporated. Marquette County contains the City of Montello; the Villages of Endeavor, Neshkoro, Oxford, and Westfield; and the Towns of Buffalo, Crystal Lake, Douglas, Harris, Mecan, Montello, Moundville, Neshkoro, Newton, Oxford, Packwaukee, Shields, Springfield, and Westfield. See Appendix A for a map of Marquette County. The county and all municipalities have adopted the plan. Copies of the adoptions can be found in Appendix C.

Geology

When the territory first emerged from the ocean, it is reported that this region was a vast plain having a slight inclination to the east and

[22] Marquette County Comprehensive Plan
[23] http://web.archive.org/web/20201129132728/https://www.wisconline.com/counties/marquette/index.html
[24] Marquette County Comprehensive Plan
[25] USGS, National Elevation Dataset, 2001
[26] USDA-NRCS Digital Soil Survey

southeast. The present condition is due to three classes of agents acting under different conditions at different times.

First, during the pre-glacial period, the streams cut their beds deep into the rocks, especially the softer ones, making the surface very irregular and uneven. It was the tendency of the streams to follow the slopes and especially the softer rocks as far as possible. Thus, the main streams flowed in a northerly and southerly direction.

During the glacial period, the agency was twofold: first in leveling the surface by planning down the hills and filling up the valleys; second in creating a new uneven surface by heaping up the clay, sand, gravel, and boulders. In many places, parallel ridges were formed, sometimes miles in length, as were rounded hills, mounds of drift, oval domes of rock, sharp gravel ridges of odd shapes, peculiar depressions known as "kettles", half-submerged rock gorges known as "fiords", and other features. The meeting of the ice gave rise to many lakes and rivers, which modified the surface even more.

After the glacial period, the wearing action of the streams was resumed. In addition, a depression of the land toward the north formed, and the volume of water so greatly increased in the lakes that nearly one half of the district was submerged. This leveled down many of the irregularities and deposited red clay on the surface. After the land rose again from the water, the streams resumed their cutting in the soft clay, which rapidly eroded deep, wide gorges, leaving abrupt terraces on either side.[27]

The southeastern part of the county is typified by long drumlin-like ridges that have an east-west orientation. Lapeer and Pardeeville soils are dominant on those ridges. The southwestern and west-central parts of the county consist of steep, hilly moraines adjacent to undulating lacustrine basins. This part of the county has a complex soil pattern. The northwestern part of the county is characterized by well-drained upland soils on irregular-shaped hills and ridges and deeply pitted outwash terraces. The north-central and northeastern parts of the county are predominantly a complex pattern of wet and well-drained soils in level lacustrine basins and on gently undulating outwash terraces. Few isolated hills and ridges occur throughout the region. The central and east-central part of the county is characterized by gently sloping to sloping soils on outwash

[27] http://www.formycousins.com/gallery/Album-History1.html

benches. Some isolated lacustrine basins and steep-sided pits are found.[28]

Topography

Wisconsin lies in the upper Midwest between Lake Superior, the upper peninsula of Michigan, Lake Michigan, and the Mississippi and Saint Croix Rivers. Its greatest length is 320 miles and greatest width 295 miles for a total area of 56,066 square miles. Glaciation has largely determined the topography and soils of the state, except for the 13,360 square miles of driftless area in southwestern Wisconsin. The various glaciations created rolling terrain with nearly 9,000 lakes and several areas of marshes and swamps. Elevations range from about 600 feet above sea level along the Lake Superior and Lake Michigan shores and in the Mississippi floodplain in southwestern Wisconsin to nearly 1,950 feet at Rib and Strawberry Hills.

The Northern Highlands, a plateau extending across northern Wisconsin, is an area of about 15,000 square miles with elevations from 1,000 to 1,800 feet. This area has many lakes and is the origin of most of the major streams in the state. The slope down to the narrow Lake Superior plain is quite steep. A comparatively flat, crescent-shaped lowland lies immediately south of the Northern Highlands and embodies nearly one-fourth of Wisconsin. The eastern ridges and lowlands to the southeast of the Central Plains are the most densely populated and have the highest concentration of industry and farms. The uplands of southwestern Wisconsin, west of the ridges and lowlands and south of the Central Plains, make up about one-fourth of the state. This is the roughest section of the state, rising 200 to 350 feet above the Central Plains and 100 to 200 feet above the Eastern Ridges and Lowlands. The Mississippi River bluffs rise 230 to 650 feet.[29]

Marquette County is in the south-central part of Wisconsin. It covers approximately 291,200 acres (455 square miles) of land. Nearly 6,000 acres of the county is water. Marquette County is almost 20 miles long and 22 miles wide.[30]

Several acres in the northwest corner of the county are elevated, in some places as high as eighty feet. The highest elevation is called Liberty Bluff; the sides are rugged walls of sandstone, and Norway

[28] Soil Survey of Marquette County, 1975
[29] https://extension.wisc.edu/
[30] Soil Survey of Marquette County, 1975

Pines, which are not found elsewhere in the county, grow on the summit.

Another bluff, located in the town of Buffalo, rises two hundred fifty feet above the general level. The rocks are very dark in appearance, having a grayish to black compact matrix thickly dotted with large brownish to pink facets of feldspar. This is known as Observatory Hill. A bluff of Pottsdam sandstone is found on the southwest quarter of the same section but is approximately one hundred feet lower than Observatory Hill.

On the edge of the Fox River Marsh at the head of Buffalo Lake in Moundville are three low, rounded outcrops of quartz porphyry. These are five miles in length and are slightly northwest of Observatory Hill. The rock has a dark brown matrix thickly scattered with large brownish feldspar surfaces.

Montello has an elliptical-shaped, rounded mound of pink granite about forty feet high and a third of a mile in length. This granite is of exceptional durability and strength. A large quarry operated here from 1880 until the 1960s. The granite quarried was used as monuments, paving blocks, gravel of different grades, building stones, and in various other forms.[31]

Climate

The Wisconsin climate is typically continental with some modification by Lakes Michigan and Superior. Winters are generally cold and snowy, and summers are warm. About two-thirds of the annual precipitation falls during the growing season; this is normally adequate for vegetation, although there are occasional droughts. The climate favors dairy farming, and the primary crops are corn, small grains, hay, and vegetables. Storm tracks generally move from west to east and southwest to northeast.

The average annual temperature varies from 39°F in the north to about 50°F in the south, with statewide extreme records of 114°F (Wisconsin Dells, 7/13/1936) and minus 55°F (Couderay, 2/2/1996 & 2/4/1996).[32] During more than half of the winters, temperatures fall to minus 40°F or lower, and almost every winter temperatures of minus 30°F or colder are reported from northern stations. Summer

[31] http://www.formycousins.com/gallery/Album-History1.html
[32] https://www.ncei.noaa.gov/access/monitoring/scec/records

temperatures above 90°F average two to four days in northern counties and about 14 days in southern districts, including Marquette County. During marked cool outbreaks in summer months, the central lowlands occasionally report freezing temperatures.

The freeze-free season ranges from around 80 days per year in the upper northeast and north-central lowlands to about 180 days in the Milwaukee area. The pronounced moderating effect of Lake Michigan is well-illustrated by the fact that the growing season of 140 to 150 days along the east-central coastal area is of the same duration as in the southwestern Wisconsin valleys. The short growing season in the central portion of the state is attributed to a number of factors, among them an inward cold air drainage and the low heat capacities of the peat and sandy soils. The average date of the last spring freeze ranges from early May along the Lake Michigan coastal area and southern counties to early June in the northernmost counties. The first autumn freezes occur in late August and early September in the northern and central lowlands and in mid-October along the Lake Michigan coastline. However, a July freeze is not entirely unusual in the north and central Wisconsin lowlands.

The long-term mean annual precipitation ranges from 30 to 34 inches over most of the Western Uplands and Northern Highlands, then diminishes to about 28 inches along most of the Wisconsin Central Plain and Lake Superior Coastal area. The higher average annual precipitation generally coincides with the highest elevations, particularly the windward slopes of the Western Uplands and Northern Highlands. Thunderstorms average about 30 per year in northern Wisconsin to about 40 per year in southern counties and occur mostly in the summer. Occasional hail, wind, and lightning damage are also reported.

The average seasonal snowfall varies from about 30 inches at Beloit to well over 100 inches in northern Iron County along the steep western slope of the Gogebic Range. Greater average snowfall is recorded over the Western Uplands and Eastern Ridges than in the adjacent lowlands. The mean dates of first snowfall of consequence (an inch or more) vary from early November in northern localities to early December in southern Wisconsin counties. The average annual duration of snow cover ranges from 85 days in southernmost Wisconsin to more than 140 days along Lake Superior. The snow

cover acts as protective insulation for grasses, autumn-seeded grains, alfalfa, and other vegetation.[33]

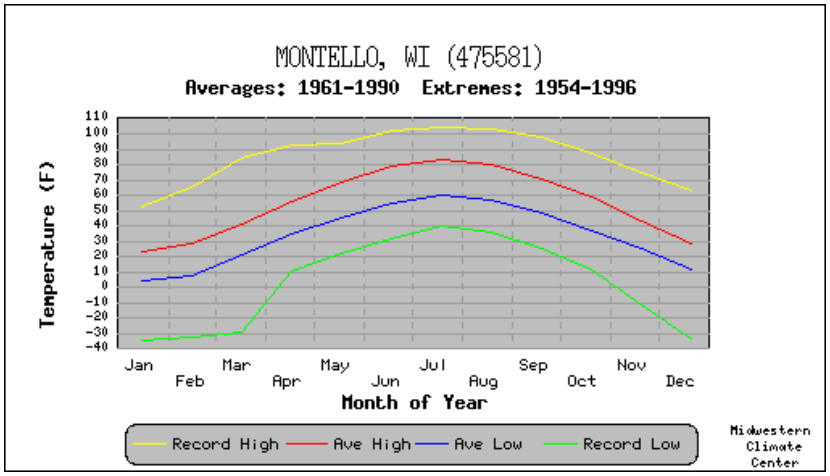
The average growing season is defined as the number of days following the last 32°F freeze in the spring through the beginning of fall. The mean growing season duration in Marquette County is 144 days.[34] Shallow lakes normally freeze in late November and remain frozen until late March or early April.[35]

Climate Normals	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Ave Daily High (F°)	23.4	28.2	40.3	55.7	68.0	78.2	82.7	79.3	70.2	59.1	42.9	28.6
Ave Daily Low (F°)	3.8	7.7	21.2	34.2	45.4	54.5	59.6	56.5	47.9	37.0	24.7	10.9
Growing Degree Days	0	1	26	137	336	513	640	550	357	173	31	2
Heating Degree Days	1593	1316	1063	600	291	68	13	42	190	524	936	1404
Cooling Degree Days	0	0	0	0	33	110	202	132	13	0	0	0
Ave Precipitation (")	1.12	1.11	2.32	3.08	3.27	3.68	3.36	3.77	4.18	2.37	2.22	1.62
Ave Snowfall (")	9.0	7.5	7.2	1.8	0.1	0.0	0.0	0.0	0.0	0.1	3.9	10.8

Data from the Montello weather station, latitude 43°48' N, longitude 89°19' W, elevation 790 ft.[36]

[33] https://www.aos.wisc.edu/~sco/
[34] http://web.archive.org/web/20201129132728/https://www.wisconline.com/counties/marquette/climate.html
[35] https://www.wisconsin.edu/
[36] http://web.archive.org/web/20201129132728/https://www.wisconline.com/counties/marquette/climate.html

Climate Normals and Growing Season Summary[37]



In 2012, the Wisconsin Department of Health Services (DHS), Bureau of Environmental and Occupational Health (BEOH) was awarded a grant to study and prepare for the anticipated climatic effects on the public's health. The Wisconsin Climate and Health Profile Report highlights evidence-based data related to extreme weather events, corresponding health outcomes, and the development of projects and best practices to adapt to and prepare for future extreme weather events.

Over the past 60 years, Wisconsin has become warmer and wetter, especially during the winter months. Evidence and research drawn from the Wisconsin Initiative on Climate Change Impacts (WICCI) suggest that climate-sensitive human health impacts will likely be affected by precipitation changes, heat extremes, drought, winter weather changes, disease vectors, surface water, and groundwater. Those most vulnerable to these changes include the very young, elderly, persons with chronic disease (e.g., asthma), persons of low socio-economic status, persons with mental health issues, and those who are socially isolated.

Possible impacts during the four seasons include:

- Spring - More frequent and intense rain events may lead to more flooding with health impacts such as stress and mental health disorders, foodborne and waterborne illnesses, injuries, drowning, and death.

[37] Data Provided by the Midwestern Regional Climate Center https://mrcc.illinois.edu

- Summer - Southern Wisconsin may experience approximately 28 more days exceeding 90 degrees Fahrenheit. Health impacts can include heat stress, respiratory disease, allergic reactions, and death.
- Fall - Extended periods of warming could cause more drought with health impacts including water and food insecurity; respiratory distress; allergic reactions; and death.
- Winter - Warmer winters might cause more ice, sleet, and rain. Health impacts may include traffic accidents, power outages, injuries, and death.[38]

Climate change is defined as *"Changes in average weather conditions that persist over multiple decades or longer. Climate change encompasses both increases and decreases in temperature, as well as shifts in precipitation, changes in the risk of certain types of severe weather events, and changes to other features of the climate system."* [39]

The Climate Change Explorer[40] looks at the top climate concerns for the county using the 2018 National Climate Assessment. It compares projections for the middle third of this century (2035 to 2064) with average conditions observed from 1961 to 1990. Some concerns for the county, which are more thoroughly addressed in relevant chapters of this plan, include:

- Extreme temperatures in Marquette County have historically averaged 91°F. Extreme temperatures on the hottest days of the year are projected to increase by 8°F.
- Historically, the county has averaged 12 dry spells per year, which are defined as periods of consecutive days without precipitation. Projections show that the number is not likely to increase.
- Intense rainstorms, those that drop two or more inches in one day, have averaged zero in the past, and that count is not projected to increase.
- Changing seasonal patterns may affect agricultural productivity.

The county can use the tool to explore further and to monitor changing conditions over the life of this plan. Future updates will include current data and address any significant changes to climate-

[38] *Wisconsin Climate and Health Profile Report*, 2014, WI Department of Health Services, Bureau of Environmental and Occupational Health http://www.dhs.wisconsin.gov/publications/P0/P00709.pdf
[39] U.S. Global Change Research Program, 4th National Climate Assessment
[40] https://crt-climate-explorer.nemac.org/

related concerns. Population data showing potential Social Vulnerabilities is provided in the Demographics chapter of this plan.

Hydrology

The land in Wisconsin drains into Lake Superior, Lake Michigan, and the Mississippi River. The Mississippi and St. Croix Rivers form most of the western boundary. About one-half of the northwestern portion of the state is drained through the Chippewa River, while the remainder of this region drains directly into the Mississippi or St. Croix Rivers and into Lake Superior. The Wisconsin River has its source at a small lake nearly 1,600 feet above mean sea level on the Upper Michigan boundary and drains most of central Wisconsin. Most of its tributaries also spring from the many lakes in the north. Except for the Rock River, a Mississippi River tributary which flows through northern Illinois, eastern Wisconsin, drains into Lake Michigan. The subcontinental divide traverses the county in a north-south direction in the eastern tier of communities, separating the county between the Mississippi River and the Great Lakes-St. Lawrence River drainage systems.

Most of the streams and lakes in the state are ice-covered from late November to late March. Snow covers the ground in practically all the winter months except in extreme southern areas. Flooding is most frequent and most serious in April due to the melting of snow and spring rains. During this period, flood conditions are often aggravated by ice jams, which back up the flood waters. Excessive rains of the thunderstorm type sometimes produce tributary flooding or flash flooding along the smaller streams and creeks.[41]

Groundwater reservoirs are recharged by direct precipitation. Spring is a prime time for recharge because evapotranspiration is low, and melting snow and rainfall infiltrate and percolate the water table on unfrozen ground. Fall is another prime time for high recharge. During the summer, groundwater levels drop because precipitation is lower, causing losses to evaporation and transpiration to exceed precipitation. In addition, groundwater is lost to surface waters by discharge in the form of springs.[42] The winter period normally lacks infiltration because of frozen ground.

Groundwater resources constitute an extremely valuable element of the natural resource base of Marquette County. The groundwater

[41] https://www.aos.wisc.edu/~sco/
[42] DeVaul, 1967

reservoir not only sustains lake levels and provides the base flow of streams in the county but also comprises a major source of water for domestic, municipal, and industrial water users. Like surface water, groundwater is susceptible to depletion in quantity and to deterioration in quality.

Marquette County has over 90 lakes and several streams and rivers. Covering 2,210 acres, Buffalo Lake is the largest lake in the county. Other prominent lakes in the county include Montello, Lawrence, Tuttle, Crystal, White, and Mason Lakes. Nearly 25% of Marquette County is covered by wetlands, which play an important role in regulating flooding impacts throughout the county.[43]

A watershed is an area that drains to a common waterway, such as a river, wetland, lake, or ocean. Marquette County is divided into seven major watersheds, all of which lie within the Upper Fox River Basin and drain into Lake Michigan. The Montello River Watershed drains the northwest part of the county, and is the largest in the county, covering 126 square miles of agriculture, forestland, and the developed areas of Westfield, Harrisville, and parts of the City of Montello. The Little Roche-A-Cri Creek drains a small part of the northwestern part of the county and drains to the Wisconsin River. The northeastern part of the county is drained by the Mecan River, White River, and Fox River Watersheds. Several groundwater-fed "glacial pothole" lakes are in this watershed. The county's southern portion is drained by the Neenah Creek, Buffalo-Puckaway, and Lower Grand River Watersheds.[44]

The state has nearly 11,500 public water systems, which meet the daily water needs of about 4 million people. Public water systems that are owned by a community are called municipal water systems. In addition to the public water systems, about 850,000 private wells provide drinking water to Wisconsin's population. Unlike public water systems, the protection and maintenance of a private well is largely the responsibility of homeowners.

Land use decisions can have impacts on groundwater, as anything that is spilled or spread on the ground can impact the quality. As a result, pollution is a very real threat to the county's water supplies. Ways to protect groundwater include:

- Wellhead Protection Plans and Ordinances: Wellhead protection plans are developed to achieve groundwater

[43] Marquette County Comprehensive Plan
[44] Marquette County Comprehensive Plan

pollution prevention measures within public water supply wellhead areas. A wellhead protection plan uses public involvement to delineate the wellhead protection area, inventory potential groundwater contamination sources, and manage the wellhead protection area. All new municipal wells are required to have a wellhead protection plan. A wellhead protection ordinance is a zoning ordinance that implements the wellhead protection plan by controlling land uses in the wellhead protection area.

- Animal Waste Management Ordinances: Most Wisconsin counties have adopted an animal waste management ordinance that applies to all unincorporated areas of the county (areas outside of city and village boundaries). While the purposes of such ordinances vary among counties, a key purpose is often to protect the groundwater and surface water resources. This is accomplished by regulations such as:

  - Permitting of animal waste storage facilities;
  - Permitting of new and expanding feedlots;
  - Nutrient management;
  - Prohibiting:
    - Overflow of manure storage structures;
    - Unconfined manure stacking or piling within areas adjacent to stream banks, lakeshores, and in drainage channels;
    - Direct runoff from feedlots or stored manure to waters of the state;
    - Unlimited livestock access to waters of the state where high concentrations of animals prevent adequate sod cover maintenance.

- Nitrate - Aquifers that are close to the land surface have limited natural protection, which makes them vulnerable to pollution.

  In 2006, the Wisconsin DNR and DATCP reported that NO_3-N is the most widespread groundwater contaminant in Wisconsin and that the nitrate problem is increasing both in extent and severity, with 80% of nitrate inputs originating from manure spreading, agricultural fertilizers, and legume

cropping systems. Septic systems can also be a significant nitrate source in densely populated areas, areas where fractured bedrock is near the surface, or areas with coarse-textured soils. Additionally, concentrations of NO_3-N in private wells frequently exceed the drinking water limit. For example, in 2005, 11.6% of 48,818 private wells exceeded the nitrate limit.

Land use affects nitrate concentrations in groundwater, with a study of over 35,000 private well samples being three times more likely to be unsafe to drink due to high nitrate in agricultural areas, especially those with sandy areas/highly permeable soils, than in forested areas. Groundwater with high nitrate levels from agricultural lands is also more likely to contain pesticides than groundwater with low nitrate levels.

- Pesticides - A pesticide is any substance used to kill, control, or repel pests or to prevent the damage that pests may cause. Included in the broad term “pesticide” are herbicides to control weeds, insecticides to control insects, and fungicides to control fungi and molds. Pesticides are used by businesses and homeowners as well as by farmers, but figures for the amounts and specific types of pesticides used are not generally available on a county-by-county basis. A 2005 report indicates that approximately 13 million pounds of pesticides are applied to major agricultural crops in Wisconsin each year, including over 8.5 million pounds of herbicides, 315,000 pounds of insecticides, one million pounds of fungicides, and 3 million pounds of other chemicals (this last category applied mainly to potatoes). The report also shows that herbicides are used on 100% of carrots for processing, 99% of potatoes, 98% of cucumbers for processing, 98% of soybeans, 97% of field corn, 89% of snap beans for processing, 87% of sweet corn, and 84% of green peas for processing. Insecticides are used on 97% of potatoes, 96% of carrots, and 88% of apples. Fungicides are used on 99% of potatoes, 88% of carrots, and 89% of apples.

- Arsenic - Arsenic is an element that occurs naturally in some of Wisconsin’s aquifers and may contaminate well water drawn from those aquifers. It is a particular problem in parts of the Fox River valley of northeastern Wisconsin.

However, arsenic has been detected in wells in every county in Wisconsin, and arsenic concentrations greater than the drinking water limit of 10 µg/L (micrograms per liter, or parts per billion) have been documented in 51 of Wisconsin's 72 counties.

- Contaminated Groundwater and/or Soil - Properties that were or are contaminated with hazardous substances can be found using the WDNR's Bureau for Remediation and Redevelopment Tracking System (BRRTS).[45] Marquette County has no open leaking underground storage tank (LUST) sites that have contaminated soil and/or groundwater with petroleum, which includes toxic and cancer-causing substances. Given time, petroleum contamination naturally breaks down in the environment. There are two open environmental repair (ERP) sites, which are sites other than LUSTs that have contaminated soil and/or groundwater. Examples include industrial spills or dumping, buried containers of hazardous substances, and closed landfills that have caused contamination. There are no open spill sites.

- Concentrated Animal Feeding Operations (CAFO) - There is one concentrated animal feeding operation (i.e., greater than 1,000 animal units) in Marquette County.[46] CAFOs are required under their Wisconsin Pollutant Discharge Elimination System (WPDES) permits to practice proper manure management and ensure that adverse impacts to water quality do not occur. Permit applicants must submit detailed information about the operation, a manure management plan, plans and specifications for all manure storage facilities, and a completed environmental analysis questionnaire. Once a WPDES CAFO permit is issued, operators must comply with the terms of the permit by following approved construction specifications and manure spreading plans, conducting a monitoring and inspection program, and providing annual reports. Other potential groundwater contaminants from agriculture

[45] https://dnr.wi.gov/topic/Brownfields/botw.html
[46] https://dnr.wi.gov/topic/AgBusiness/data/CAFO/cafo_cty.asp?CountyChoice=Marquette&Submit=Submit

include fertilizers and pesticides. Large amounts of nitrogen fertilizers are used when fields are planted continuously with corn, and they can leach into groundwater as nitrate.[47]

- Licensed Landfills and Superfund Sites – There are no licensed landfills and no Superfund sites in Marquette County. [48] [49] In 1980, Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as the Superfund law. The Superfund law created a tax on the chemical and petroleum industries, which went into a trust fund to help pay for cleaning up abandoned or uncontrolled waste sites. The U.S. Environmental Protection Agency (EPA) administers the Superfund trust fund and works closely with state and local governments and tribal groups to remediate sites that may endanger public health or the environment. The contamination at many of these sites was created years ago when environmental regulations were virtually nonexistent and companies dumped or emitted hazardous materials freely into the environment. Years later, the threat to humans and the ecosystems remains so great that the sites need to be cleaned up.

  Since much of this contamination was caused many years ago, it can be hard to find the parties responsible, or the parties responsible may be unwilling or unable to pay for the cleanup. In these cases, the Superfund trust fund can be used to pay for most of the cleanup process. States must pay for a portion of such cleanups. CERCLA also provides the EPA with enforcement tools to compel those responsible for causing the contamination to pay for the cleanup, including the issuance of administrative orders. If the trust fund is used, then EPA and the state may go to court to recover their expenditures from those who are responsible.

[47] https://dnr.wi.gov/topic/AgBusiness/CAFO/
[48] https://dnr.wi.gov/wastemgmt/wm/wmexternal/ShellReportViewer.aspx?RID=106
[49] https://dnr.wi.gov/files/PDF/pubs/rr/RR005.pdf

- Cleanup -
  - Petroleum Environmental Cleanup Fund Award - The Petroleum Environmental Cleanup Fund Award (PECFA) program was created in response to the enactment of federal regulations requiring release prevention from underground storage tanks and cleanup of existing contamination from those tanks. PECFA is a reimbursement program returning a portion of incurred remedial cleanup costs to owners of eligible petroleum product systems, including home heating oil systems. This program ended by Wisconsin State statute on June 30, 2020; however, liability for clean-up did not end when the program expired. As of June 30, 2004, $8,520,368 has been reimbursed by the PECFA fund to clean up 50 petroleum-contaminated sites in Marquette County. [50]
  - Nitrate Removal Systems – No municipal water systems in Marquette County have spent money to reduce nitrate levels. As of 2005, over 20 municipal water systems in Wisconsin had spent over $24 million reducing nitrate concentrations in municipal water systems. [51]

WDNR's Outstanding and Exceptional Resource Waters Program provides a designation for Wisconsin's cleanest waters. An outstanding resource water is defined as a lake or stream that has excellent water quality, high recreational and aesthetic value, high-quality fishing, and is free from point source or non-point source pollution. An exceptional resource water is defined as a stream that exhibits the same high-quality resource values as an outstanding resource water but that may be impacted by point source pollution or that may have the potential for future discharge from a small sewer community. There are four outstanding and four exceptional resource waters in Marquette County. [52]

[50] https://docs.legis.wisconsin.gov/misc/lfb/informational_papers/january_2005/0059_petroleum_environmental_cleanup_fund_award_pecfa_program_informational_paper_59.pdf
[51] https://wi.water.usgs.gov/gwcomp/find/marquette/index.html
[52] https://dnr.wisconsin.gov/topic/SurfaceWater/orwerw.html

Eight watersheds [53] are contained completely or partially within Marquette County and are explained in greater detail in the Flooding and Dam Failure chapter of this plan.

Soil Types

Soils provide the physical base for development and agriculture within a community. Knowledge of their limitations and potential difficulties is important in evaluating crop production capabilities and other land use alternatives such as residential development and utility installation. The criteria considered by the Natural Resource Conservation Service (NRCS) in establishing the severe rating of soils include wetness, shrink–swell potential, bearing strength, susceptibility to flooding, land spreading, slope steepness, and frost action. Severe soil limitations do not necessarily exclude areas from being developed but instead indicate that more extensive construction measures must be taken to prevent environmental and property damage.

Marquette County lies within the glaciated part of Wisconsin on the southeastern fringe of the Central Sandy Plains. As discussed earlier, the topography of the county varies greatly because there are numerous recessional moraines, pitted plains, outwash terraces, kames, eskers, and lacustrine basins. Most of the soils are underlain by many feet of glacial drift.[54]

The County is composed largely of sand. Dolomite makes up from 65 to 85 percent of the gravel. Chert, sandstone, and crystalline pebbles are much less common. This type of parent material is characterized by (a) its light brown color, (b) coarse texture, (c) high content of dolomitic gravel, (d) stratification, and (e) its occurrence on level terraces or on complex hilly landforms. Acid sands are found throughout the county. However, the largest areas are in the north-central and northeastern parts. Deposits vary slightly in texture and lithology. In some places, sandy loam layers occur, or gravelly strata are found. In other areas, the sands may be neutral or calcareous in reaction. Most deposits, however, consist of light brown fine to medium sands that are acid (about pH 5.8) to depths of five feet or more. These sands are very low in calcium and magnesium and show no consistent ratio of these basic cations. Phosphorus determined by acid extraction is low and variable. This type of parent material may be recognized by (a) its light brown color, (b) sandy

[53] https://apps.dnr.wi.gov/water/watershedSearch.aspx
[54] Soil Survey of Marquette County, 1975

texture, (c) generally acidic reaction, and (d) occurrence on broad flats, as valley fill, or hilly and complex morainic topography.

Glacio-lacustrine sediments are found mainly on flats and in basin areas. However, they also occur on terrace remnants found on moraines in the western part of the county. They have been divided into two main groups: (1) the calcareous reddish-brown silts and clays, and (2) the calcareous silts and fine sands. The first of these is found as a surface deposit mainly in the western one-third of the county, particularly just east of the recessional moraines. The second kind is apt to be found locally along former drainage ways. Fairly large deposits occur in the northeastern part of the county.

The largest areas of calcareous reddish-brown silts and clays are found in the townships of Douglas, Harris, Oxford, Springfield, and Newton. Sediments range in texture from silt to clay. However, surface layers of loam or fine sands are commonly present. These may range in depth up to five feet or more. The calcium carbonate equivalent averages about 25-30 percent. The available phosphorus content is low as determined by the Bray No. 1 Test. The acid-soluble calcium-magnesium ratio is approximately 1.80. Deposits often show distinct laminations. They are gravel-free except for local pebbles and stones, probably deposited from ice rafts. Some deposits are very deep. Landowners report the thickness of “clay” in well borings to be 80 feet. “Lignite” (probably a buried peat layer) has been reported at the bottom of the “clay.” The best agricultural soils in Marquette County are formed from these lacustrine parent materials. Recognition is based on (a) its light brown color, (b) silt loam to clay texture, (c) effervescence with dilute acid, (d) lack of gravel, (e) laminations, and (f) occurrence in basin-like areas, although these sediments are also found on upland slopes.[55]

Soil types help determine the best and most cost-effective locations for new development; about 28% of the County may be unsuitable for development based on soil type. As defined by the United States Department of Agriculture (USDA), the soils in Marquette County are of the following major types: [56]

The Plainfield-Gotham Association is the most extensive soil association in the county, covering about 30% of its land area. It is distributed mainly in the north and central parts of the County. The

[55] http://digicoll.library.wisc.edu/cgi-bin/EcoNatRes/EcoNatRes-idx?type=turn&entity=EcoNatRes.WGB83Soil58.p0019&id=EcoNatRes.WGB83Soil58&isize=text

[56] Marquette County Comprehensive Plan 2015 https://www.co.marquette.wi.us/home/showpublisheddocument/2966/635893297648530000

soils in this association are the sandy Plainfield soils, which are excessively drained. Most of the areas in this association remain in woodland, but some areas have been cleared and are used for agriculture. The steeper soils are used mainly for pasture and maintained as woodland. This soil association poses few limitations for development and on-site sewage disposal.

The Houghton-Adrian Association covers about 18% of the County's land area, and includes organic soils underlain by stratified loamy and sandy soils at about three feet. These soils are very poorly drained. This association is distributed mostly in the southern and eastern parts of the county and occupies broad, low-lying areas. Most of the areas in this association remain in native vegetation of sedges, grasses, and reeds. In some areas, the soils have been drained and cultivated. These soils are generally unsuitable for development or on-site sewage disposal.

About 16% of the County is covered by the **Oshtemo-Gotham Association,** which includes loamy soils underlain by sandy material at about three feet. These soils are well drained. This association is distributed mainly in the east-central and southeastern parts of the county, and occupies hills, ridges, outwash terraces, and sloping areas. Much of the area in this association is cultivated and suited for farming, with the steeper soils used mainly for pasture or woodlands. This soil association poses few limitations for development and on-site sewage disposal.

The soils in the **Delton-Briggsville-Mundelein Association** cover about 15% of the County's land area and are generally sandy underlain by silty clay at about three feet. Most of the areas in this association are well-drained and suited for farming. This association is distributed mostly in the western part of the county and occupies hills, foot slopes, terraces, and lower lying areas. This soil association poses slight to moderate limitations for development and on-site sewage disposal.

The soils found in the **Granby-Tedrow-Moundville Association** are poorly drained and include the Yahara and Keowns soils. This association is distributed mostly in the northeastern, central, and eastern parts of the county, where it occupies low-lying areas, terraces, and outwash plains. Much of this association is in woodland and/or permanent pasture, with some areas having been cleared for cultivation. About 10% of the County is in this association. This soil association poses moderate to severe limitations for development and on-site sewage disposal.

The NRCS soil survey can provide very specific details on the county's soil types. [57]

Wetlands

Wetlands perform many indispensable roles in the proper function of the hydrologic cycle and local ecological systems. In terms of hazard mitigation, they act as water storage devices in times of high water. Wetlands can absorb excess water and release it back into the watershed slowly, preventing flooding and minimizing flood damage. Wetland's capacity for stormwater storage becomes increasingly important as more impermeable surfaces are developed.

From the sedge meadows of southern Wisconsin to the spruce bogs in the north, wetlands cover a wide array of landscapes. They share the ability to support aquatic or "water-loving" plants and provide habitat for more species of plants and animals than any other type of landscape in Wisconsin. Habitat is not their only functional value. Wetlands can also store water to prevent flooding, purify water, protect lake and stream shores from eroding, and provide recreational opportunities for wildlife watchers, anglers, hunters, and boaters.[58]

According to the Wisconsin Department of Natural Resources, Marquette County has approximately 68,881 acres of wetlands (approximately 23.6% of the total area of the county). This comprises 1.3% of the total statewide acreage of wetlands.[59]

In Marquette County, wetlands are regulated by the Wisconsin Department of Natural Resources, the Land and Water Conservation Department, the Land Information Office, and the Zoning Administration.

Because wetlands provide many benefits to the environment, several municipal, state, and federal ordinances/regulations protect wetland areas. The basic concept associated with these laws is that wetland areas on any property cannot be disturbed without a permit. Wetlands store flood waters and filter water from precipitation before it enters lakes and streams. Some wetlands also recharge local groundwater aquifers. By slowing water movement, wetlands reduce the likelihood that heavy rainfall or spring snowmelt will cause

[57] http://websoilsurvey.nrcs.usda.gov/app/
[58] https://dnr.wisconsin.gov/topic/Wetlands
[59] https://dnr.wisconsin.gov/topic/Wetlands

erosion and flooding. Wetlands retain eroded soil and hold nutrients that would otherwise promote excessive weed growth and algae blooms in lakes and streams. These nutrients, when held in the wetlands, produce a heavy growth of vegetation that provides nesting sites, food, and cover for waterfowl, small mammals, and many other types of wildlife. Wetlands also provide recreational opportunities for humans (wildlife observation, hiking, hunting, etc.).

There are three basic factors in determining whether a property is a wetland:

- The presence of water at, near, or above the surface (hydrology).
- Water present long enough to sustain aquatic plant life (hydrophytic vegetation).
- Soils indicative of wet conditions (hydric soils).

Approximately one-third of the land area of Marquette County consists of wetlands. They are somewhat poorly drained, poorly drained, and very poorly drained areas of both mineral and organic soils. The county is drained by somewhat irregular channeled streams that flow into and out of lakes and have a limited number of relatively short tributaries. Many of the lakes are shallow and are formed by dams along rivers and streams. Other smaller lakes occur at random throughout the county. They are in natural depressions that are remnants of glaciation. The Fox River is the major river in the county. It serves as an outlet for all other streams draining Marquette County, including such major streams as the Montello, Mecan, Grand, and White Rivers. Many smaller creeks and streams also flow into these rivers and their tributaries.[60]

Figuring out what is or is not a wetland can be extremely confusing if you only associate “wetlands” with the presence of water. It is possible that a property could have standing water for a portion of the year and still not be a wetland, and it is also possible that a true wetland with all three of the above characteristics may never have water present above the land surface.

Wetlands perform an important set of natural functions, which make them particularly valuable resources, lending to overall environmental health and diversity. Some wetlands provide seasonal groundwater recharge or discharge. Those wetlands that provide

[60] Soil Survey of Marquette County, 1975

groundwater discharge often provide base flow to surface waters. Wetlands contribute to the maintenance of good water quality, except during unusual periods of high runoff following prolonged drought, by serving as traps, which retain nutrients and sediments, thereby preventing them from reaching streams and lakes. They act to retain water during dry periods and hold it during flooding events, thus keeping the water table high and relatively stable. They provide essential breeding, nesting, resting, and feeding grounds and predator escape cover for many forms of fish and wildlife. These attributes have the net effect of improving general environmental health; providing recreational, research, and educational opportunities; maintaining opportunities for hunting and fishing; and adding to the aesthetics of an area.

Wetlands pose severe limitations for urban development. In general, these limitations are related to the high-water table and the high compressibility and instability, low bearing capacity, and high shrink-swell potential of wetland soils. These limitations may result in flooding, wet basements, unstable foundations, failing pavements, and failing sewer and water lines. Moreover, there are significant and costly onsite preparation and maintenance costs associated with the development of wetland soils, particularly in connection with roads, foundations, and public utilities.

Land Use

The land in Marquette County consists of farmland, shoreland, and forests as well as commercial, residential, and industrial land. Its land area is about 291,200 acres, or 455 square miles. The total water surface area is about 6,000 acres, or 9.4 square miles. While land use is primarily (by area) rural (farmland, woodlots, and wetlands), human population is concentrated in the villages, city, and waterfront areas. Approximately 43 percent of Marquette County is cropland. Local farmers produce a variety of agricultural commodities, including dairy products, alfalfa, corn, and soybeans.

The Wisconsin Department of Natural Resources has identified 11 natural resources areas in the county. [61]

[61] http://dnr.wi.gov/topic/Lands/NaturalAreas/county.html

Summerton Bog[62] is situated in a glacial lakebed with muck and peat soils. It is a highly diverse complex of low meadow, bog, fen, tamarack, and shrub communities. Water is at or near the surface year-round in the lowland areas, supplied by precipitation and five large artesian springs. The earliest maps of the area, dating back to the 1830s, show sedge meadow as the predominant vegetation. Located in the southeastern corner is a five-acre glacial till island wooded with red and white oaks. On the western flank of the island is a calcareous fen. Its calcium-rich waters have allowed an unusual assemblage of plants to thrive, including typical fen species bluejoint grass, sweet grass, tussock sedge, spring cress, valerian, fringed gentian, and lousewort. Forested communities are mostly dominated by tamarack, with a few black spruce. Ground layer species include sundew, pitcher plant, and cranberries. At the southwestern corner is an area of black ash, basswood, and shagbark hickory. Remaining communities are shrub carr and sedge meadow. Poison sumac is abundant throughout the sedge meadow and tamarack bog. Nesting birds include sandhill crane, bobolink, sedge wren, Nashville warbler, and veery. Of note is the presence of the rare pickerel frog (*Rana palustris*), a species of special concern in Wisconsin. Prescribed burns and brushing are conducted to maintain sedge meadow and fen community vigor. Summerton Bog is owned by the Wisconsin Chapter of the Nature Conservancy and was designated a State Natural Area in 1966.

[62] https://dnr.wisconsin.gov/topic/statenaturalareas/SummertonBog

Lawrence Creek[63] is a cold, hard water trout stream with an excellent stream flora and fauna. Originating in ground moraine about one and a half miles upstream, the creek is internationally famous for research on brook trout ecology, life history, and management. The designated portion constitutes the main spawning area for a large reproducing population of brook trout, and has not been subjected to in-stream or bank manipulation, making it a valuable reference area for manipulated stream stretches. In-stream seepage springs and short spring runs contribute much to the water flow and composition. Stream vegetation is dominated by comb pondweed and waterweed with water parsnip, marsh marigold, common duckweed, water speedwell, and white water crowfoot. Rare plant species include brook grass (*Catabrosa aquatica*), low nut-rush (*Scleria verticillata*), lesser fringed gentian (*Gentianopsis procera*), and tufted hair grass (*Deschampsia cespitosa*). Oaks, basswood, alder, willows, and reed canary grass cover the banks. Lawrence Creek is owned by the DNR and was designated a State Natural Area in 1968.

Muir Park[64] contains a variety of upland and wetland communities surrounding 30-acre Ennis Lake, a spring-fed kettle lake occupying a marshy pocket in ground moraine. The seepage lake has a marl bottom and a maximum depth of 30 feet. The surrounding vegetation is diverse and includes a rich fen that lies along an outlet stream, sedge meadow, and open bog, northern wet forest dominated by tamarack, southern dry forest, oak opening, and wet-mesic prairie. The calcareous fen and prairie contain a diversity of unusual and rare species, including grass-of-Parnassus, Kalm's lobelia, bottle gentian, and nodding lady 's-tresses orchid. Rare plants include small fringed gentian (*Gentianopsis procera*), low nut-sedge (*Scleria verticillata*), prairie fameflower (*Talinum rugosperum*), and false asphodel (*Tofieldia glutinosa*). Big blue-stem, Indian grass, blazing-star, and prairie

[63] https://dnr.wisconsin.gov/topic/statenaturalareas/LawrenceCreek
[64] https://dnr.wisconsin.gov/topic/statenaturalareas/MuirPark

phlox are present in the low prairie, which grades into a spongy sedge meadow and tall shrub community. Tamarack, poison sumac, and bog birch, with numerous pitcher plants beneath, can be found in the bog near the lake's southeast corner. The area was settled in 1849 by the Ennis and Muir families and was the boyhood home of John Muir, founder of the Sierra Club, who admired the natural beauty of the area. Muir Park is owned by Marquette County and was designated a State Natural Area in 1972.

Comstock Bog-Meadow[65] lies within a 1000-acre natural basin in the glaciated Central Plain, and features a large, quaking sedge meadow marsh with a high diversity of unusual plants. The undisturbed marsh is permanently wet and relatively free of water fluctuations. The south end lies on a drainage divide and is dominated by narrow-leaved sedges with many acid bog plants occurring on the quaking, rhizomatous mat. Of particular interest is the unique assemblage of plants with many characteristic calcareous wetland species growing in association with bog species, including twig rush, grass-of-Parnassus, marsh fern, pitcher plant, bladderworts, and sundews. Northward and westward, the species composition changes to more closely resemble a sedge meadow. Except for a small area of tamarack, poison sumac, and bog birch, the entire tract is treeless. The marsh is used by a variety of small mammals, muskrat, mink, reptiles, and amphibians. Sandhill cranes nest in the marsh and use the area as a fall staging site. Rare breeding bird species include Le Conte's sparrow (*Ammodramus leconteii*), Henslow's sparrow (*Ammodramus henslowii*), and state-endangered yellow rail (*Coturnicops noveboracensis*). In 1851, the original land surveyors described the area as a wet, quaking marsh, "over which we crossed with not a little danger to our lives." Comstock Bog-Meadow is owned by the DNR and was designated a State Natural Area in 1975.

[65] https://dnr.wisconsin.gov/topic/statenaturalareas/ComstockBogMeadow

Observatory Hill[66] is the highest point in Marquette County. It is an isolated outcropping of porphyritic rhyolite rising 300 feet above the surrounding landscape. The fine-grained rhyolite, an igneous rock embedded with feldspar crystals, is highly resistant to erosion and has been dated to 1.76 billion years ago. On the exposed rocks at the summit are polished rock surfaces with grooves, striations, and chatter marks created by the passage of the glacial Cary ice sheet 12,000 years ago. Recently, scientists have discovered the existence of petroglyphs on the hill's rock outcroppings, which may be part of a larger prehistoric petroform found in Marquette County. The slopes are covered with a southern dry forest community dominated by red and white oak, basswood, and shagbark hickory, and much of the area is now being restored to oak savanna – an imperiled vegetation community in Wisconsin. Near the top of the hill, bedrock is exposed or close to the surface, creating acidic conditions where a specialized glade community has developed. Red cedar dominates the glade, and the thin soils support a sparse ground cover of mosses, ferns, and lichens. The state-threatened slender bush clover (*Lespedeza virginica*) is also found on the site. The hill has long been known by naturalists and was a favorite childhood haunt of John Muir, who lived nearby. Observatory Hill is owned by the DNR and was designated a State Natural Area in 1989.

Upper Fox Headwaters[67] contains three distinct units: Zinke Lake, Upper Chaffee Creek Meadow, and Caves Creek. Zinke Lake is a small hard water spring lake with a tamarack-dominated shore. The water is deep, clear, and cold, with limited aquatic vegetation that includes common horsetail, common pondweed, chara, and water milfoil. The spring outlet has a soft sandy bottom and contains white water crowfoot. Other plants include marsh-marigold, lousewort, cow parsnip, ironweed, bulbet water-hemlock, showy goldenrod, and Missouri goldenrod. The lake's outlet stream is also used by brook

[66] https://dnr.wisconsin.gov/topic/statenaturalareas/ObservatoryHill
[67] https://dnr.wisconsin.gov/topic/statenaturalareas/UpperFoxHeadwaters

trout for spawning. Upper Chaffee Creek Meadow contains a wetland complex of fen, wet-mesic, and wet prairie with over 100 native plant species present. Running through the site is Chaffee Creek. The creek valley varies between very wet sedge meadow through fen-like areas along the gentle slope north of the creek and grading to wet-mesic prairie. Grasses include big and little blue-stem, blue-joint grass, and slender wheat grass. Featured forbs are marsh pea, Michigan lily, western sunflower, pale-spike lobelia, Kalm's lobelia, grass-of-Parnassus, marsh fern, and swamp lousewort. Caves Creek contains spring seeps and runs, a 2-acre spring pond, sedge meadow and tamarack swamp, and oak barrens. The spring seeps are floristically rich and are surrounded by a diversity of wetlands. The barrens lie on a south-facing slope and contain a good diversity of prairie species, including little blue-stem, June grass, flowering spurge, and bird's-foot violet. A state-endangered species, the western slender glass lizard (*Ophisaurus attenuatus*), has been found at the site. Upper Fox Headwaters is owned by the DNR and was designated a State Natural Area in 1998.

Page Creek Marsh[68] is located in the central sands of Wisconsin. It is a large wetland preserve that supports a rich diversity of plants, rare meadow birds, and waterfowl. Dominant plant communities are northern and southern sedge meadow and sandy oak savanna. Also present are fens, wet-mesic prairie, bog, and seepage lakes. Page Creek winds northwest near the west edge of the marsh through gently rolling farmland enhanced by remnants of native prairie and savanna. Broad sedge meadows, cat-tails, and areas of open water afford habitat to a variety of rare species, including downy willow-herb (*Epilobium strictum*) and bog reed grass (*Calamagrostis stricta spp*). A portion of the sedge meadow is of boggy northern type with plant species including wiregrass, cotton grass, bog bean, and northern bog aster. The area is host to numerous other plant species, including marsh marigold, lake sedge, turtlehead, water dock, sensitive fern, and wild rice. Page Creek Marsh is of particular value as a staging area for sandhill cranes during their fall migration. Luxuriant with emergent aquatic plants, the secure, deep-water habitat of the marsh provides cover for large numbers of birds every

[68] https://dnr.wisconsin.gov/topic/statenaturalareas/PageCreekMarsh

season. Page Creek Marsh is also important habitat for two rare animals the slender glass lizard (*Ophisaurus attenuatus*) and Blanding's turtle (*Emydoidea blandingii*). Page Creek Marsh is owned by The Nature Conservatory and was designated a State Natural Area in 1996.

Germania Wet Prairie[69] is situated on the terraces above the Mecan River. It is a diverse wet-to-wet mesic prairie with a showy flora and some sedge meadow and fen affinities. The natural area has had little to no previous disturbance, such as grazing, which is a common occurrence in the surrounding area. Grasses include prairie cord grass, blue-joint grass, and slender wheat grass. Herbaceous plants include wild bergamot, prairie blazing-star, mountain mint, swamp thistle, Michigan lily, marsh bellflower, downy phlox, boneset, tall meadow rue, pale-spike lobelia, and royal fern. Germania Wet Prairie is owned by the DNR and was designated a State Natural Area in 2002.

Wedde Creek Savanna[70] features a premier example of a black oak savanna, a community type that was historically prevalent across this Ecological Landscape. The dry and level sandy soils support scattered, large, open-grown oaks with some jack pine. Numerous oak seedlings are present. The ground layer is comprised of characteristic vegetation such as Pennsylvania sedge, flowering spurge, goat's-rue, June grass, bird's-foot violet, hairy hawkweed, and dotted horsemint. Of note is the presence of woolly milkweed (*Asclepias lanuginosa*), a state-threatened plant. Originally maintained by naturally occurring fires, management now focuses on tree thinning, understory manipulation, and prescribed fire that attempts to mimic natural disturbance patterns. Wedde Creek

[69] https://dnr.wisconsin.gov/topic/statenaturalareas/GermaniaWetPrairie
[70] https://dnr.wisconsin.gov/topic/statenaturalareas/WeddeCreekSavanna

Savanna is owned by the DNR and was designated a State Natural Area in 2008.

Mecan River Pine-Oak Forest[71] represents the only known old-growth white pine/black oak forest in the Central Sand Hills Ecological Landscape. This community type is relatively uncommon. Canopy trees are large white pine, white oak, and red oak, up to 36, 30, and 32 inches in diameter, respectively. The ground layer varies in diversity with scattered patches of dense herbs. Characteristic species include wild sarsaparilla, pipsissewa, bracken fern, round-lobed hepatica, partridgeberry, downy rattlesnake plantain, wild geranium, long-leaved bluets, royal fern, and ostrich fern. Breeding birds are the pileated woodpecker, eastern wood-pewee, red-breasted nuthatch, brown creeper, wood thrush, yellow-throated vireo, pine warbler, ovenbird, and scarlet tanager. In addition, two state-threatened birds have been recorded here, the cerulean warbler and the red-shouldered hawk. Old stream channels add to the microtopography and diversity within the site. Mecan River Pine-Oak Forest is owned by the DNR and was designated a State Natural Area in 2008.

French Creek North[72] French Creek North features a large wetland complex comprised of southern sedge meadow, calcareous fen, rich tamarack swamp, shrub-carr, emergent marsh, and springs. The area is notably free of invasives, although reed canary grass is present in small amounts along ditches and impoundments. The high-quality sedge meadow is dominated by tussock sedge, with fringed brome, cotton-grass, sensitive fern, and white meadowsweet. Forbs are less represented but include marsh blue violet, marsh marigold, marsh valerian, spring cress, yellow star grass, blue-flag iris, tufted

[71] https://dnr.wisconsin.gov/topic/statenaturalareas/MecanRiverPineOakForest
[72] https://dnr.wisconsin.gov/topic/statenaturalareas/FrenchCreekNorth

loosestrife, and goldenrods. Shrubs include red-osier dogwood, prairie ninebark, common elderberry, bog birch, and sage-leaved willow. Many areas contain shallow standing water, and evidence suggests that spring seepages are present. In the northeast corner of the site is a rich tamarack swamp with a broken to closed canopy over a tall shrub layer of poison sumac, speckled alder, or bog birch with an herbaceous layer of sedge meadow species. Several rare animals are present here. French Creek North is owned by the DNR and was designated a State Natural Area in 2012.

Vegetation

The non-agricultural vegetation in Marquette County consists primarily of oak savanna. In the west, northwest, and north-central portions of the county, soft maple dominates.[73]

[73] https://web.archive.org/web/20170613132813/http://www.wisconline.com/counties/marquette/index.html

Demographics

Human Settlement Patterns

The first evidence of human settlement in the Mississippi River Region was approximately 11,000 years ago, following closely the withdrawal of the Wisconsin glacier. These earliest known "Paleo-Indians" were hunter-gatherers who traveled in small nomadic family groups. This Ice Age era was known geologically as the Pleistocene period.

The Menominee, Chippewa, and Ho-Chunk (or Winnebago) were the most prominent Native American tribes in this area at the time European exploration began.[74]

Between 1670 and 1680, the first Europeans visited this area. They consisted primarily of French traders aiming to establish trading and military posts in the name of France and Jesuits intending to bring Christianity to the native inhabitants. Because the French made no definite settlement of the territory, they yielded their rights in 1761 to the English, who claimed possession until after the Revolutionary War.

Father Pere Jacques Marquette was a French missionary and explorer who, together with Sieur Joliet, explored the region around present-day Marquette County in 1673. Marquette and Joliet stopped for several days in the village of the Mascouten Indians, on the site of the present village of Marquette, at the southeast end of Lake Puckaway. Luther Gleason of Vermont established an Indian trading post on this village site in 1829.[75] Marquette County was created in 1836 from the Marquette District. The county boundaries continued to evolve as the area's population grew, with the final boundary being set in 1858.[76]

[74] Marquette County Comprehensive Plan
[74] http://www.mapofus.org/wisconsin/

With a navigable waterway in the Fox River (the first steamboat traversed it in 1851) and early railroad access (the southern division of the Wisconsin Central Railroad was completed in 1870)[77], settlement of Marquette County progressed steadily. British, Irish, and German immigrants favored the Marquette County area. This can still be seen in the ancestry reported by county residents (in the 2000 census, 45% reported German ancestry and 12% reported Irish ancestry).[78]

Marquette County has experienced moderate population growth over the past 50 years. Most of the newest people moving into the county are seeking recreational or retirement homes along lakeshores or woodlots. Marquette County, with its abundant natural resources and proximity to Chicago, Milwaukee, Madison, the Fox Valley, and other nearby urban areas, attracts individuals looking for a more rural landscape. During this same period, the unincorporated areas of the county grew faster than the cities and villages.[79]

Population

In the 2020 U.S. Census, the county was home to 15,591 people, and according to the 1 July 2023 U.S. Census Bureau estimate[80], there were 15,838 people residing in Marquette County for an increase of approximately 1.6%.

According to the 2018-2022 U.S. census estimate, there were 6,830 households in Marquette County with an average of 2.26 people per household. The 2018-2022 U.S. census numbers indicate that the median household income was $59,748 and that the per capita income is $33,291. Approximately 11.8% of the people live below the poverty line. The 2023 census estimate also indicated that there were approximately 9,902 housing units within the county as of 1 July.

According to the U.S. Census report, the majority of people in Marquette County reported that they were white (96.0%), with 92.7% stating they were white alone. People of Hispanic or Latino origin were counted as a subcategory of those reporting that they were white. Those reporting as two or more races were 1.2%. American

[77] http://genealogytrails.com/wis/marquette/history.htm
[78] Marquette County Comprehensive Plan
[79] Marquette County Comprehensive Plan
[80] https://www.census.gov/quickfacts/fact/dashboard/marquettecountywisconsin,US/PST045221

Indians account for 1.0% of the population of Marquette County. Black or African American alone was 0.9%, and Asian alone was 0.9%.

Other miscellaneous demographic information reported by the Census Bureau is detailed below. These figures identify potential needs for special consideration in a disaster response or in recovery operation planning and implementation.

- People under 5 years old: 4.4%
- People under 18 years old: 18.8%
- People over 65 years old: 27.2%
- Females: 48.2%
- Foreign born: 1.8%
- People with a disability, under 65 years old: 12.8%

The Climate Change Explorer[81] uses U.S. Census data to find disadvantaged communities that may suffer extreme adverse impacts due to climate change and/or natural hazards. Additional data can be found by clicking on the link to Explore Neighborhoods at Risk.

Marquette County contains the City of Montello; the Villages of Endeavor, Neshkoro, Oxford, and Westfield; and the Towns of Buffalo, Crystal Lake, Douglas, Harris, Mecan, Montello, Moundville, Neshkoro, Newton, Oxford, Packwaukee, Shields, Springfield, and Westfield.

Transportation Network

Marquette County has a good transportation network that connects the county's inhabitants and visitors to commercial, recreational, and educational sites. These roadways support most of the traffic movement within the county.

Although private vehicles are the primary mode of transportation in Marquette County, there are several biking and pedestrian opportunities available to the residents and visitors. The primary transportation system consists of a hierarchical network of state and county highways, as well as other local roads and streets that pass through or near the county.

[81] https://crt-climate-explorer.nemac.org/

To help plan for current and future traffic conditions, it is useful to categorize roads based on their primary function. Functional classification is the process by which highways are grouped into classes according to the character of services they are intended to provide, ranging from a high degree of travel mobility to land access functions.[82] Marquette County roads and their classifications include: [83]

Rural Principal arterials serve corridor movements having trip length and travel density characteristics of an interstate or interregional nature.

- Interstate 39
- State Highway 21
- State Highway 23
- State Highway 82

Rural Minor arterials, in conjunction with principal arterials, serve moderate to large-sized places (cities, villages, towns, and clusters of communities) and other traffic generators providing intra-regional and inter-area traffic movements.

- State Highway 16
- State Highway 22
- State Highway 33
- State Highway 73

Rural Major Collectors provide service to smaller-to-moderate places and other intra-area traffic generators and link those generators to nearby larger population centers (cities, villages, and towns) or higher-function routes.

- State Highway 23
- County Road A
- County Road B
- County Road C
- County Road CH
- County Road CX
- County Road D
- County Road E

[82] https://wisconsindot.gov/Pages/projects/data-plan/plan-res/function.aspx
[83] https://wisconsindot.gov/Documents/projects/data-plan/plan-res/functional/rural/marquette.pdf

- County Road F
- County Road G
- County Road J
- County Road K
- County Road M
- County Road O

Rural Minor Collectors provide service to all remaining smaller places, link the locally important traffic generators with their rural hinterland, and are spaced consistently with population density to collect traffic from local roads and bring all developed areas within a reasonable distance of a collector road.

- 4th Avenue
- 4th Road
- 5th Avenue
- 5th Road
- County Road A
- County Road B
- County Road CC
- County Road D
- County Road EE
- County Road N
- County Road X
- County Road Y
- Dakota Road

All other rural roads not classified as arterials or collectors are referred to as local function roads. A map in Appendix A shows the various roads in the county and their classifications.

The county has maintained these roads along with others to provide a safe and efficient transportation system. With continued maintenance, these roads will continue to serve the population effectively.

The four airports most convenient to Marquette County residents that provide scheduled commercial air service are Central Wisconsin Regional Airport in Mosinee, Outagamie County Regional Airport in Appleton, Dane County Regional Airport in Madison, and Austin Straubel Airport in Green Bay.

There are several small private airstrips in Marquette County, but no public airports. The Union Pacific Railroad runs through the southern part of Marquette County, beginning in the Town of Buffalo and running through the Towns of Packwaukee, Montello, and Oxford. This rail line connects Chicago, Milwaukee, and Minneapolis and traverses Wisconsin in a roughly diagonal route. This is a freight rail route; there is no passenger rail service serving the county. There is no scheduled bus service within the county.

There are no commercial ports in Marquette County. The nearest commercial port is in Green Bay. Passenger ferries are in Manitowoc and Milwaukee. Both ports offer passage across Lake Michigan to Lower Michigan.

Land Use and Development Trends

Land use is an important determinant in the potential impact a particular hazard may have, and an action that may be taken to mitigate the hazard's impact. An understanding of the amount, type, and spatial distribution of urban and rural land uses within the county is an important consideration in the development of a sound hazard mitigation plan.

Marquette County is primarily a rural community in the east-central portion of the state. The county has some natural areas that will not be developed and some rural farming areas, as well as light manufacturing and other primarily service businesses that have chosen to locate in the area.

The county was experiencing slow growth on par with other demographically similar Wisconsin counties until the economic “Great Recession” that began in 2008, which has halted growth and constricted community activity in some areas. As of the time of this plan, it is expected that growth trends will mirror the recovery of the general national, state, and regional economy, which is difficult to predict at this time.

Current land use is variable and includes residential, commercial, industrial, agricultural, wetlands, woodlands, and unused rural/open lands. The Wisconsin Department of Revenue (WDOR) tax assessment data classifies the land use in Marquette County as follows:

- *Agricultural (Includes WDOR categories of Forest, Agricultural Forest, and Other) - Lands devoted primarily to agriculture, small-scale agricultural forestation,* and lands that are producing, or can produce, commercial forest products (as defined by State of Wisconsin Statute 70.05) and other supporting activities. Also includes lands containing dwelling units and related improvements associated with agricultural use. This category does not include forests or woods that are in parks or that are not being forested under WDOR definitions.
- *Residential* - Lands containing dwelling units and related improvements not associated with agricultural use.
- *Commercial* - Lands, including improvements, devoted primarily to commercial operations, including, but not limited to, dining, lodging, and retail sales establishments.
- *Manufacturing* - Lands, including improvements, devoted primarily to manufacturing and industrial operations, including, but not limited to, assembling, processing, and fabricating.
- *Undeveloped* - Lands generally unfit for any of the uses, including, but not limited to, parks, hunting grounds, wetlands, ponds, gravel pits, and road rights of way.

Land Use Changes Based on 2024 WDOR Marquette County Tax Assessment Data [84]

Land Use Category	2023 Equalized Value	2024 Equalized Value	Percent Change
Agricultural	$16,218,700	$17,813,400	10%
Agricultural Forest	$53,602,600	$59,948,300	12%
Forest	$149,000,500	$170,533,500	14%
Residential	$1,943,240,100	$2,139,944,300	10%
Commercial	$110,688,000	$119,042,100	8%
Manufacturing	$21,060,300	$20,444,900	-3%
Undeveloped	$86,327,100	$89,391,800	4%
Other	$133,671,900	$156,591,300	17%
Total	**$2,513,809,200**	**$2,773,709,600**	**10%**

[84] https://www.revenue.wi.gov/SLFReportsassessor/2024socMarquette.PDF

Public Safety Support

The type and location of public emergency services are important considerations in hazard mitigation planning because of the potential direct involvement of such facilities in certain hazard situations. The location of these services is shown on maps in Appendix A.

To coordinate these services, Marquette County has created an emergency operations plan (EOP). The plan provides a general overview for county and municipal emergency response personnel during response to disasters. This document serves to coordinate the county and local units of government during times of response and recovery. It also provides a link between the county and municipal plans.

The departments listed below provide ongoing training to their staff and participate in periodically scheduled disaster exercises with area hospitals, other emergency medical services, law enforcement, fire services, and emergency management.

Medical

Marquette County communities are served by a range of health facilities and health professionals within the county and in neighboring communities. In terms of availability of health care services, there are no major hospitals located in the county, with the nearest hospital located in Portage.

There are other hospitals in surrounding counties and areas. These health care facilities will coordinate with responding agencies to ensure the best utilization of services and the least injury or loss of life from a disaster situation. It should also be noted that area hospitals have reciprocal verbal agreements for transferring critical patients during a disaster.

Fire Service

There are 11 fire departments that serve areas of Marquette County.[85] A map showing the location of each of the fire service areas can be found in Appendix A.

[85] https://www.co.marquette.wi.us/home/showpublisheddocument/15668/637902817421430000

- Briggsville/Douglas
- Endeavor/Moundville
- Harris
- Mecan/Princeton
- Montello
- Neshkoro
- Newton
- Oxford (Town and Village)
- Springfield
- Westfield (Town)
- Westfield Village

Ambulance Service

Marquette County relies on a mix of volunteer, paid-on-call, and paid staff to provide pre-hospital emergency medical services. The following departments in Marquette County provide ambulance service:[86]

- Marquette County EMS
- Neshkoro Fire District First Responders

Each of these departments provides monthly training to their staff, and they participate in periodically scheduled disaster exercises with area hospitals, other emergency medical services, law enforcement, fire services, and emergency management.

Marquette County's Emergency Medical Service is staffed with five full-time employees. The director of EMS and his assistant work at the Services Center building in Montello. Full-time Crew Chiefs are assigned to each ambulance area of Oxford, Montello, and Westfield. A core of 70 paid-on-call volunteer Emergency Medical Technicians (EMTs) staff the four ambulances at the EMT Intermediate level. The EMS service provides a vital service to the County's rural population, providing emergency care from the rural areas to regional hospitals.

[86] https://www.wi-emss.org/lms/public/portal#/lookup/service

Law Enforcement

Law enforcement agencies are responsible for responding to criminal incidents, traffic incidents, and other requests for law enforcement services; investigating criminal offenses and apprehending the perpetrators; investigating law violations; maintaining a smooth, orderly, and safe flow of traffic; and public information activities.

The Marquette County Sheriff's Department provides service to all the towns and villages for law enforcement and provides dispatch services to the entire county. The following departments supplement the Sheriff's Department:

- Endeavor Police Department
- Montello Police Department
- Neshkoro Police Department
- Oxford Police Department
- Westfield Police Department

The sheriff is the chief law enforcement officer in the county and is responsible for the protection of life and property within the boundaries of Marquette County. The Sheriff's Office provides law enforcement service on a 24-hour basis to unincorporated areas of the county or to those jurisdictions that do not maintain full-time police service.

The Wisconsin State Patrol and Wisconsin Department of Natural Resources also provide law enforcement services within the county. The Wisconsin State Patrol provides limited coverage from its north-central region office in Wausau.[87] See the Marquette County Law Enforcement District Map in Appendix A for district boundary details.

Special Teams

Wisconsin Emergency Management (WEM) contracts and manages twenty-two Regional Hazardous Materials Response Teams. The teams are divided into Task Forces (i.e., Northeast Task Force, Northwest Task Force, Southeast Task Force, Southwest Task Force). These Task Forces are then divided into Type I, Type II, and

[87] http://wisconsindot.gov/Documents/about-wisdot/who-we-are/dsp/dsp-regions-map.pdf

Type III teams, all with complementary capabilities and training requirements.[80] Hazardous materials response in Marquette County is performed by Type II and Type III Teams.

The Wisconsin Hazardous Materials Response System may be activated for an incident involving a hazardous materials spill, leak, explosion, injury, or the potential of an immediate threat to life, the environment, or property. The Wisconsin Hazardous Materials Response system responds to the most serious spills and releases requiring the highest level of skin and respiratory protective gear. This includes all chemical, biological, or radiological emergencies.

In addition, there are regional bomb squad teams, dive teams, and special weapons and tactics (SWAT) teams available throughout the state.

Archaeological and Historical Resources

The National Register of Historic Places includes a listing of locations in Marquette County.[88] As mitigation projects are considered, the county is committed to ensuring that archaeological and historical sites are preserved.

Historic Sites		
Historic Site Name	Address	Municipality or Township
Bonnie Oaks Historic District	Grouse Dr	Briggsville
Fountain Lake Farm, also known as Wisconsin Farm Home of John Muir	Co. Hwy. F and Gillette Rd	Montello
Marquette County Courthouse and Marquette County Sheriff's Office and Jail	77 W. Park St	Montello
Montello Commercial Historic District	W. Montello and Main Sts. at the Montello R. and the quarry on E. Montello St.	Montello
Richter, Charles Samuel House, also known as Le Maison Granit	55, 103, and 105 Underwood Ave	Montello
Vaughn's Hall and Blacksmith Shop	55 W. Montello St	Montello

[88] http://www.nationalregisterofhistoricplaces.com/wi/Marquette/state.html

The Wisconsin Historical Society maintains a list of archaeological sites and cemeteries known as the Archaeological Site Inventory Database (ASI); this list is available to governmental agencies upon request. These sites cover an extended period and include campsites/villages/communities, cabins/homesteads, sugar mapling sites, cemeteries/burial mounds, trading/fur posts, mills/sawmills, and kilns.

These sites have been reported to the State Historical Society of Wisconsin and are protected sites. If there is concern that a mitigation project will impact one of these or any other identified or suspected archeological site, the county will work with the proper authorities to ensure that all applicable laws and regulations are followed.

The National Park Service [89] offers technical assistance to disaster-impacted communities. Their Guidance for State and Tribal Historic Preservation Leaders [90] provides information on grants, agencies, and other resources that may be available to aid following a disaster to help ensure proper stewardship of historic properties and the environment. Steps taken to strengthen or rebuild communities can have long-term environmental and cultural impacts.

The county and its municipalities could also contact the National Trust for Historic Preservation [91], which is a privately funded non-profit organization that has led the movement to save America's historic places for more than 70 years. One program they lead is Main Street America[92], which is committed to strengthening communities through preservation-based economic development in older and historic downtowns and neighborhood commercial districts.

[89] https://www.nps.gov/
[90] https://www.nps.gov/subjects/historicpreservationfund/upload/Before_and_After_Disasters_Guide-online-form.pdf
[91] https://savingplaces.org/
[92] https://mainstreet.org/

Hazard Analysis and Previous Mitigation Projects

The following sections identify those hazards that have occurred or could occur in Marquette County. Each includes a description of a hazard and its frequency of occurrence. Also included is a section that describes the general vulnerabilities of the community and its infrastructure to each hazard. More detailed and specific analyses will be conducted as projects are identified for inclusion in grant applications. As part of the application process, the methodology of data collection and future development patterns will be addressed. Estimates of potential dollar losses and the methodology used to arrive at those estimates will also be described during this application process. It should be noted that there have been no changes in the county or participating jurisdictions since the last plan update.

Wisconsin Emergency Management (WEM) completed and regularly updates the State Hazard Mitigation Plan, which was last revised in November 2021.[93] This plan describes the hazards that have occurred or are most likely to occur within the state and includes the frequency of occurrence, potential impacts, and suggested actions to mitigate the hazard. This plan is the basis for the development of all emergency management plans and is distributed upon revision to county emergency government directors and other stakeholder agencies.

For this plan, the Marquette County Hazard Mitigation Plan Workgroup reviewed past event records, and an internal workgroup consensus was reached on the anticipated probability of future events. This probability was designated as “very high,” “high,” “medium,” “low,” or “very low” by the workgroup based on their evaluation and experience with the data.

The workgroup understands that historical weather data provided by the National Weather Service does not include events that may adversely affect their communities but fall below the reporting thresholds. However, each weather event was analyzed for historic frequency and averages over the last 25 years and is noted within each section. Additionally, a table with this information is included in Appendix B, Frequency of Occurrence.

[93] https://wem.wi.gov/state-planning/

Hazard	Likelihood of Occurrence*	Severity of Effects if It Does Happen*	Misc. Notes
Drought/Dust Storm	2	3 – Agriculture and fire 2 – Everything else	
Earthquake	2	1	
Flood – Flash Flood and River Flood	4	5	
Flood – Dam Break	1	2	2/3 – Montello Lake spillway (see Appendix E)
Forest Fire	Most of the county – 2	2	
	"The Bluffs" in TN Oxford and Westfield - 3	3	
	Firewise communities – 3	3	
	TN Newton/Crystal Lake - 3	3	
Wildfire	2	1	Mostly in Spring
Severe Temperature - Hot	3	1 – General population 2 – Seniors and economically disadvantaged	
Severe Temperature - Cold	3	1 – General population 2 – Seniors and economically disadvantaged	
Hail	3	3 – Roof, cars, crops 2 – Everything else	
Lightning	5	2	Fires
Thunderstorm	5	2	
Tornado	2	5	
Derecho (High Wind)	3	5	Northwest corner of the county has forested land with a mix of trees that are being killed due to disease (oak wilt); or are being trunk-harvested for wood and limbs are left behind.
Winter Storm (Snow and Ice)	5	3	
Utility Failure	2	4	

*5 point scale = Very Low (1), Low (2), Medium (3), High (4), Very High (5)

For the purposes of this document, the "Frequency of Occurrence" section will use the following descriptors, as selected by the hazard mitigation planning workgroup when they evaluated the history and their experiences and expectations for the probability of future events. These descriptors are generally assigned the probabilities below, unless otherwise defined within the chapter's text.

Descriptor	Number	Definition
Very Low	1	0% - 20% chance of a damaging incident occurring annually
Low	2	20% - 40% chance of a damaging incident occurring annually
Medium	3	40% - 60% chance of a damaging incident occurring annually
High	4	60% - 80% chance of a damaging incident occurring annually
Very High	5	80% - 100% chance of a damaging incident occurring annually

The National Risk Index (NRI) [94] is an online tool provided by the Federal Emergency Management Agency (FEMA) that uses the best available source data to help illustrate communities most at risk of natural hazards. It calculates a baseline relative risk measurement for 18 natural hazards based on expected annual loss, social vulnerability, and community resilience.

Although 18 natural hazards are part of this data, some have no value as they do not pose a risk to Marquette County or are otherwise not specifically addressed in this plan.[95] Information for the remaining NRI hazards is included in the relevant chapters.

It should be noted that the NRI information may not necessarily match the hazard ratings above and is only being included for

[94] https://hazards.fema.gov/nri/map

[95] Hazards from the NRI data that are not included in this plan: Avalanche, Coastal Flooding, Hurricane, Landslide, Tsunami and Volcanic Activity.

reference. General county statistics are below. The data is current as of November 2021.

Ratings Summary

Risk Index	Very Low
Expected Annual Loss	Very Low
Social Vulnerability	Relatively Moderate
Community Resilience	Relatively Moderate

Risk Index Overview

Rating	Very Low
Score	6.75
National Percentile	10.60
State Percentile	7.34

Social Vulnerability

Rating	Relatively Moderate
Score	38.31
National Percentile	38.35
State Percentile	35.53

Community Resilience

Rating	Relatively Moderate
Score	54.56
National Percentile	54.59
State Percentile	56.91

Expected Annual Loss

Rating	Very Low
Score	8.33
National Average	13.33
State Average	10.85

Total ($)	1,418,119.25
Building Value ($)	625,368.55
Population Fatalities	0.08
Population Equivalence ($)	613,079.43
Agricultural Value ($)	179,671.27

The emphasis in the following sections is on mitigation activities for each hazard as a major component of overall emergency management. Mitigation or prevention activities reduce the degree of long-term risk to human life and property from natural and man-made hazards. The cooperation of government, academia, the private sector and volunteer agencies is essential in mitigation efforts. The Marquette County Emergency Management Department is committed to working with municipalities and the private sector to ensure that county mitigation information is shared and it is incorporated into their planning as appropriate.

Each community will be given a copy of the plan to use as a reference during their own preparedness activities (i.e., planning, training, permitting, zoning). Communities that have comprehensive plans will reference this mitigation plan and its contents in the next scheduled plan update. Municipalities that do not have comprehensive plans either are under the purview of and request assistance from the Marquette County Planning and Zoning Department or have their own planning departments. Members of the county Planning and Zoning Department and municipal planning departments were included on the Hazard Mitigation Workgroup and are aware of the benefits and requirements of utilizing this plan as they go about their preparedness activities.

Marquette County and its municipalities have a considerable history of identifying, planning, and completing hazard mitigation projects, including these (listed below), which received supplemental funding. It was also noted by the workgroup that there are several opportunities for grant funding from various federal and state resources, including:

Community Development Block Grant (CDBG) - The U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant-Disaster Recovery Assistance provides flexible grants to help cities, counties, and states recover from Presidentially declared disasters, especially in low-income areas, subject to availability of supplemental appropriations. In response to disasters, Congress may appropriate additional funding for the CDBG program as disaster recovery grants to rebuild the affected

areas and provide crucial seed money to start the recovery process. Since CDBG Disaster Recovery assistance may fund a broad range of recovery activities, HUD can help communities and neighborhoods that otherwise might not recover due to limited resources. Disaster Recovery grants often supplement the disaster programs of FEMA, the SBA, and the U.S. Army Corps of Engineers (i.e., these funds can be used for the local matching requirement of other federal grants).[96]

CDBG Emergency Assistance Program (EAP) Projects:

- EAP #08-02 Marquette County $275,000 Rehabilitation of damaged housing units
- EAP #08-58 Westfield, Village Marquette $500,000 Sewer and lift station upgrades

It was noted by the workgroup that there are several opportunities for grant funding from various federal and state resources, including:

HMGP - The Hazard Mitigation Grant Program (HMGP) is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended. The key purpose of HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster. HMGP is available, when authorized under the Presidential major disaster declaration, is available in all areas of the state following a Presidential disaster declaration.[97] Hazard Mitigation Grant Program (HMGP) Projects Funded in Marquette County:

- 2010 Marquette County $4,552.00 – Purchase/ distribution of weather radios and outreach to home-bound seniors.
- 2010 Marquette County $16,945.57 – Plan update.
- 2018 Marquette County $24,952.81 – Plan update.

PDM - The Pre-Disaster Mitigation (PDM) program is authorized by Section 203 of the Stafford Act, 42 USC. 5133. The PDM program is designed to assist States, Territories, tribal governments, and local communities in implementing a sustained pre-disaster natural hazard mitigation program to reduce overall risk to the population

[96] https://www.hud.gov/program_offices/comm_planning/communitydevelopment
[97] http://www.fema.gov/hazard-mitigation-grant-program

and structures from future hazard events, while also reducing reliance on Federal funding from future major disaster declarations.[98]

Pre-Disaster Mitigation (PDM) Projects and/or Plans Funded in Marquette County[99]

- 2002 WEM All $15,520 Technical assistance Personnel, travel, and supplies
- 2003 WEM All $32,834 Technical assistance Personnel, travel, and supplies
- 2003C WEM All $176,812 Technical assistance Personnel, travel, and supplies
- 2005C State of Wisconsin All $182,010 Development of structure inventory database
- 2005C WEM All $88,480 Technical assistance Personnel, travel, and supplies
- 2006C WEM All $22,141 Technical assistance Personnel, travel, and supplies
- 2007C Marquette County $34,028 New plan
- 2007C WEM All $70,092 Technical assistance Personnel, travel, and supplies
- 2007C WEM All $402,574 Update Agreement with UW for HAZUS flood risk assessment
- 2008C WEM All $23,897 Technical assistance Personnel, travel, and supplies
- 2008C WEM $18,906 Technical assistance LPDM; personnel, travel, and supplies
- 2009C WEM All $25,579 Technical assistance Personnel, travel, and supplies
- 2010C WEM All $47,859 Technical assistance Personnel, travel, and supplies

BRIC – The Building Resilient Infrastructure and Communities (BRIC) was created as Section 1234 of the Disaster Recovery Reform Act of 2018, which will replace the PDM Grant Program. BRIC is built upon lessons learned from that program and is funded based on a formula of obligations from the previous year for all active disasters, not just one disaster.[100] As of early 2025, the BRIC program has been disbanded. It is unclear at the time of this writing if another program will replace it.

[98] http://www.fema.gov/pre-disaster-mitigation-grant-program

[99] Note that several grants to the State of Wisconsin/WEM are listed when searching for Marquette County projects. These state projects are deemed as benefiting the state's counties but are not listed in this plan because they were not directly received by the county.

[100] Building Resilient Infrastructure and Communities | FEMA.gov

FMA - The Flood Mitigation Assistance (FMA) program is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended, with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). The Repetitive Flood Claims (RFC) program has the goal of reducing flood damages to individual properties for which one or more claim payments for losses have been made under flood insurance coverage, and that will result in the greatest savings to the National Flood Insurance Fund (NFIF) in the shortest period.[101]

SRL - The Severe Repetitive Loss (SRL) program is authorized by Section 1361A of the NFIA and has the goal of reducing flood damages to residential properties that have experienced severe repetitive losses under flood insurance coverage and that will result in the greatest amount of savings to the NFIF in the shortest period.[102]

RFC - The Repetitive Flood Claims (RFC) grant program was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (P.L. 108–264), which amended the National Flood Insurance Act (NFIA) of 1968 (42 U.S.C. 4001, et al). Up to $10 million is available annually for the Federal Emergency Management Agency (FEMA) to provide RFC funds to assist states and communities in reducing flood damages to insured properties that have had one or more claims to the National Flood Insurance Program (NFIP). FEMA may contribute up to 100 percent of the total amount approved under the RFC grant award to implement approved activities if the applicant has demonstrated that the proposed activities cannot be funded under the FFMA program. [103]

406 Mitigation – The Public Assistance- Section 406 Mitigation Funding may be considered by FEMA in a federal disaster declaration to fund mitigation measures to a public facility damaged by the event that enhance the facility's ability to resist similar damage in future events. This funding is authorized under Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act and provides discretionary authority to fund mitigation measures in conjunction with the repair of the disaster-damaged facilities, which usually present themselves during the repair efforts.

[101] http://www.fema.gov/flood-mitigation-assistance-program
[102] http://www.fema.gov/severe-repetitive-loss-program
[103] http://www.fema.gov/repetitive-flood-claims-program

The mitigation measures must be related to eligible disaster-related damages and must directly reduce the potential for future, similar disaster damages to the eligible facility. This work is performed on the parts of the facility that were damaged by the disaster, and the mitigation provides protection from subsequent events. Mitigation measures must be determined to be cost-effective, technically feasible, and in compliance with statutory, regulatory, and executive order requirements. In addition, the measure cannot cause a negative impact on the facility's operation, surrounding areas, or susceptibility to damage from another hazard.[104]

Municipal Flood Control Grant Program - This Wisconsin Department of Natural Resources (DNR) grant is available to all cities, villages, towns, tribes, and metropolitan sewerage districts. Assistance is provided with items such as the acquisition of property, vacant land, structure removal, flood proofing, administrative support, and others.[105] Marquette County has not received any grants under this program.

Dam Removal Grant Program - This Wisconsin DNR grant is available to all cities, villages, towns, tribes, and metropolitan sewerage districts and provides 100% of eligible project costs up to a maximum of $50,000 to remove a dam. Assistance is provided with items such as the acquisition of property, vacant land, structure removal, flood-proofing, administrative support, and others.[106] Marquette County has not received any dam removal grants.

[104] http://www.fema.gov/public-assistance-local-state-tribal-and-non-profit/hazard-mitigation-funding-under-section-406-0
[105] http://dnr.wi.gov/Aid/MunFloodControl.html
[106] http://dnr.wi.gov/aid/damremoval.html

All Hazards

One of the bedrock principles of emergency management is to approach issues from an all-hazards perspective. This is generally very cost-effective because it accomplishes preparedness and/or mitigation goals for many types of disasters with one resource. Some of the all-hazards mitigation projects that Marquette County would like to accomplish are detailed in the following sections.

The planning committee also used the all-hazards approach to identify mitigation goals for the county and all its municipalities. The purpose of the hazard mitigation plan is to identify hazard areas, to assess the risks, to analyze the potential for mitigation, and to recommend mitigation strategies where appropriate. Potential mitigation projects will be reviewed using criteria that stress the intrinsic value of the increased safety for people and property in relation to the monetary costs to achieve this (i.e., a cost-benefit analysis). With that in mind, the planning goals for this entire plan, as determined by the mitigation planning committee, were:

- **Objective 1:** To preserve life and minimize the potential for injuries or death.
- **Objective 2: To** preserve and enhance the quality of life throughout Marquette County by identifying potential property damage risks and recommending appropriate mitigation strategies to minimize potential property damage.
- **Objective 3: To** promote countywide planning that avoids transferring the risk from one community to an adjacent community, where appropriate.
- **Objective 4: To** identify potential funding sources for mitigation projects and form the basis for FEMA project grant applications.

Vulnerability

Perhaps one of the largest risks that falls under the all-hazards banner is the continuing challenge of securing funding to keep up with the rapid technological changes and advances in the public safety communications infrastructure. When departments cannot communicate with each other, they cannot be effectively coordinated in a disaster, which could cause potential delays in providing critical services to citizens in need.

Another vulnerability is the fact that not all agencies that work together in disaster response and recovery can communicate with one another (i.e., are interoperable). Local first response agencies are generally able to communicate with one another, but communications-related issues will remain ongoing challenges as technologies evolve and departments acquire equipment suitable for their response.

Also, it is a continuing challenge to ensure that emergency services can notify the public in a timely manner. Because of the nature of modern society, adequate notification requires multiple outlets, but managing the usage, cost, and updates of these systems is an ongoing project for all communities.

Hazard Mitigation Strategies

Marquette County and its municipalities have sought grants and partnerships to reduce the significant costs of improving their core communication networks, but much of the technology upgrade has been funded by county and municipal budgetary expenditures.

In this plan, many of the non-core communications projects that are listed are either not capital improvement projects and therefore are not very expensive (e.g., upgrading Memoranda of Understanding (MOU), updating the website) or they are projects that require significant capital outlays and are, for the most part, grant dependent. Since the profile (e.g., economic, geographic) of an area may change between the identification of a project in this plan and the availability of grant funds, projects will be identified within the plan and be slated for detailed study and analysis at such time as grants become available. The detailed study will identify the types and numbers of existing and future structures, the potential dollar losses to vulnerable structures, and the lead agency or department that will

manage the project. At that point, grant-eligible projects will be evaluated using the appropriate grant criteria for factors such as:

- Overall benefit to the community
- Economic feasibility (i.e., a cost-benefit analysis)
- Compliance with environmental, social justice, and other laws

Public Alert and Notification

Public alert and notification plans are vital in a time of crisis to reduce property damage and human casualties. An advance plan allows the appropriate authorities to perform their emergency duties in an efficient manner. Marquette County should be capable of the following:

- Disseminate emergency warning and notification to the public through its county-wide warning systems,
- Support emergency management operations.
- Provide adequate warning and communication systems, and
- Plan for alternative means and resources in the event of a warning or communication system breakdown.

Marquette County Sheriff's Office receives and distributes warning information to the public and emergency management agencies.

During an emergency, the general public receives information by sirens, mass notification systems, National Oceanic and Atmospheric Administration (NOAA) weather radio, local broadcast, printed media, door-to-door notification by emergency services personnel, and/or a mobile public address system. It should be noted that the ability to use the NOAA weather radio system for an expanded list of emergency messages is a positive move that makes this alert and warning tool even more valuable. As a result, Marquette County will continue to promote increased use of these radios among the public, as it does annually at the county fair. Many municipalities promote the mass notification system by including letters with tax and utility bills, and on their websites and social media.

Methods for notification of people with functional and access needs include door-to-door warnings, foreign language media messages, and closed-caption television messages. Other notices and procedures can be found in Marquette County's Emergency Operations Plan, which is reviewed and updated on a regular schedule.

Marquette County will prepare facilities, systems, and procedures to activate warning and communication. During an emergency, Marquette County will deliver prompt and accurate warnings to businesses and residents. Strategies to help ensure that this goal is achieved include:

To help promote and implement modern hazard warning systems, the Marquette County Emergency Management Department has incorporated the RAVE notification system. The City of Montello and Town of Oxford will provide this on their website and social media platforms, with a link to the county Emergency Management site. The system will continue to be promoted. Emergency Management will also continually monitor and update communication systems for technological maintenance and upgrades as required. They will also explore alternatives to increase severe weather warnings, such as sirens and call-out phone banks.

Most municipalities are removing sirens, and residents are moving to phone applications. The county does not own any sirens but does activate them.

Websites and Social Media

The County Emergency Management Department should have a general webpage to post links to disaster-specific information from FEMA, to volunteer, department contact information, etc. In recognition of the importance of this communication tool, especially in pre-planning activities, county offices will review their web pages to ensure that important information and links for general preparedness topics are available from agencies such as the Department of Homeland Security/FEMA, the American Red Cross, and Wisconsin Emergency Management. The county will also look for ways to publicize the website so that community members will know what valuable information is available there. The county will continue to expand its community outreach and communication by displaying the Incident Command Center at the county fair and distributing informational materials, and sharing information with local newspapers, at the senior center, and by using social media.

The county, the Town of Oxford, and the Villages of Endeavor and Oxford will also work to expand their community outreach and communication using websites, traditional media outlets, and social media by providing information and links to the main county website and social media platforms. The Village of Oxford's website is also used to remind residents about siren tests.

Community Preparedness

Marquette County has a comprehensive preparedness program and will work with its municipalities to complete the following preparedness programs that will also support mitigation goals:

The County Emergency Management Department will continue to update the countywide Emergency Access Plan and continually improve planning and regulatory practices.

Critical facilities and infrastructure will be protected. Emergency Management will also ensure the county has adequate power resources in times of emergency. Emergency Management will explore hookup options and implement emergency power generators as a power supply for county schools to be used as shelter. Two schools in the Village of Westfield have generators and are exploring hook-up options.

Drought and Dust Storms

Two types of droughts occur in Wisconsin: agricultural and hydrologic. Agricultural drought is a dry period that reduces crop yields. Hydrologic drought is a dry period of sufficient length and intensity to affect lake and stream levels and the height of the groundwater table. These two types of droughts may, but do not necessarily, occur together.

Dust storms result from a combination of high winds and dry, loose soil conditions. While high winds and periods of drought have each occurred in Marquette County, there has never been a recorded dust storm event. Since natural hazards that have occurred in the past are more likely to occur in the future, there is a low likelihood that a dust storm event will occur in Marquette County; and an overall low impact if a dust storm did happen; and a medium impact to agriculture and fire. While there are concerns about topsoil erosion, and some mitigation activities may be planned that would reduce the effects of these types of events, they will not be a major focus of this plan.

Physical Characteristics

The understanding that a deficit of precipitation has different impacts on groundwater, reservoir storage, soil moisture, snowpack, and streamflow led to the development of the Standardized Precipitation Index (SPI) in 1993. The SPI quantifies the precipitation deficit for multiple time scales. These time scales reflect the impact of drought on the availability of the different water resources. Soil moisture conditions respond to precipitation anomalies on a relatively short scale. Groundwater, streamflow, and reservoir storage reflect longer-term precipitation anomalies. For these reasons, the SPI is calculated for 3-, 6-, 12-, 24-, and 48-month time scales.

The SPI calculation for any location is based on the long-term precipitation record for a desired period. This long-term record is fitted to a probability distribution, which is then transformed into a normal distribution so that the mean SPI for the location and desired period is zero. Positive SPI values indicate greater than median

precipitation, and negative values indicate less than median precipitation. Because the SPI is normalized, wetter and drier climates can be represented in the same way, and wet periods can also be monitored using the SPI.

The classification system shown in the SPI values table (below) defines drought intensities resulting from the SPI. The criteria for a drought event are also defined for any of the time scales. A drought event occurs any time the SPI is continuously negative and reaches an intensity of -1.0 or less. The event ends when the SPI becomes positive. Each drought event, therefore, has a duration defined by its beginning and end and an intensity for each month that the event continues. The positive sum of the SPI for all the months within a drought event can be termed the drought's "magnitude." Current SPI maps for the United States can be found online.[107]

SPI Values [108]	
2.0+	Extremely wet
1.5 to 1.99	Very wet
1.0 to 1.49	Moderately wet
-0.99 to 0.99	Near normal
-1.0 to 1.49	Moderately dry
-1.5 to -1.99	Severely dry
-2.0 and less	Extremely dry

The Palmer Index is an older scale and is used more often by governmental organizations. It is effective in determining long-term drought (i.e., over several months) but is not as good with short-term forecasts (i.e., weeks). It uses a zero as normal; drought is shown in terms of negative numbers, and excess moisture is reflected by positive figures. The future incidence of drought is highly unpredictable and may also be localized, making it difficult to determine probability with any accuracy.

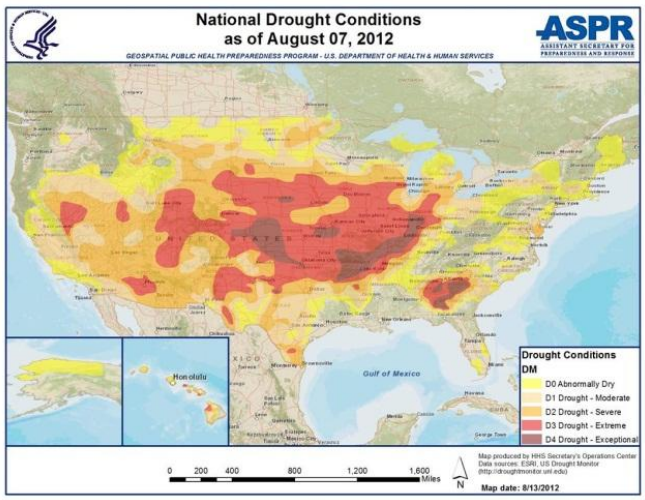
Drought conditions may vary from below-normal precipitation for a few weeks to a severe lack of normal precipitation for several months. Drought primarily affects agricultural areas because the amount and timing of rainfall have a significant impact on crop production. The severity of a drought cannot, therefore, be completely measured in terms of precipitation alone but must include crop yields.

[107] https://www.drought.gov/data-maps-tools/us-gridded-standardized-precipitation-index-spi-nclimgrid-daily
[108] https://drought.unl.edu/ranchplan/DroughtBasics/WeatherandDrought/MeasuringDrought.aspx

Frequency of Occurrence

Drought is a relatively common phenomenon in Wisconsin and has occurred statewide in 1895, 1910, 1939, 1948, 1958, 1976, 1988, 1992, 2003, 2005, and 2012. The 1976 drought received a Presidential Emergency Declaration with damage to 64 Wisconsin counties, including Marquette.[109] Estimated losses of $624 million primarily affected the agricultural sector. Reports show that Marquette County was as affected as the rest of the state in this drought, receiving money for emergency feed programs for livestock and for increased fire protection of its wilderness areas. It should be noted that only 19% ($119,434,924) of this loss was compensated by any federal program.

The 2012 heat wave resulted in significant droughts across more the half the country as well as increases in heat-related illnesses and deaths. July 2012 was the hottest month in US history, eclipsing the previous record set during the heart of the Dust Bowl in 1936. The worst of the heat was in the Midwest, the Plains, and along the Eastern Seaboard. Most of the contiguous US had record and near-record warmth for the seven-month period, except the Pacific Northwest, which was near average. The August 7, 2012, Drought Monitor map shows 52.27% of the United States and Puerto Rico in moderate drought or worse, with Marquette County in the D2 – Severe Drought category.[110] As of November 14, 2024, Marquette County is in the D0- Abnormally Dry category.[111]

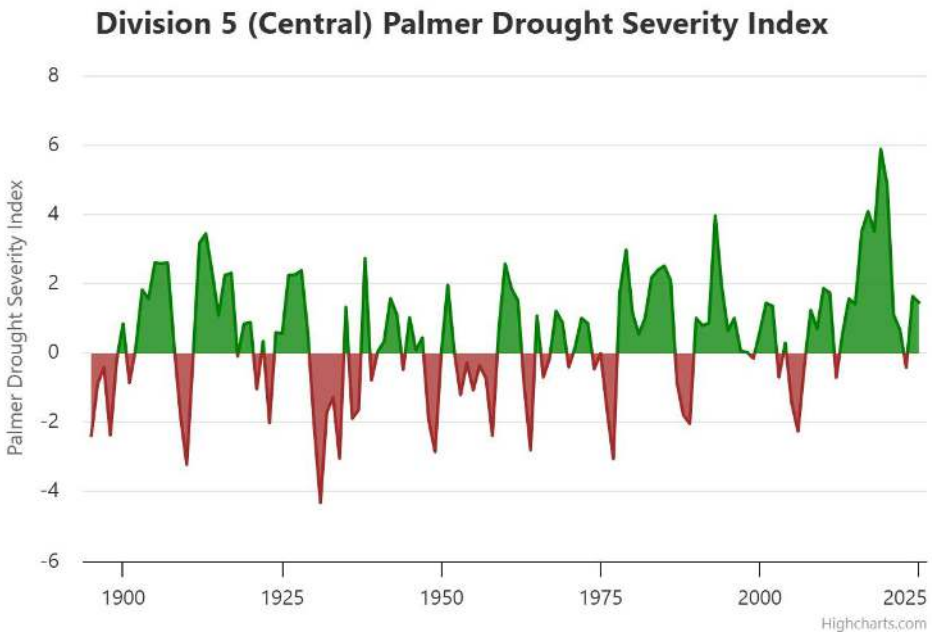


[109] http://www.fema.gov/disaster/3014/designated-areas

[110] 2012 Heat & Drought Federal Report, HHS ESF 8, UPDATE #2, US Department of Health and Human Services, Assistant Secretary for Preparedness and Response

[111] https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?WI

The Palmer Index chart for the years between January 1895 and August 2025 in Central Wisconsin, which includes Marquette County, follows:[112]



The U.S. Drought Monitor (USDM) provides information that is updated weekly about drought conditions and other information for the county. Current conditions, recent precipitation and temperature conditions, agriculture information, streamflow information, public health information, future conditions, and historical conditions are also available. [113] The same information is also available for the entire state of Wisconsin. [114]

As can be seen from the frequency table above, Marquette County regularly experiences drought, at least to a moderate level, two to three times every ten years. While drought is a regular occurrence, it is generally very difficult to predict with any accuracy, but according to the Wisconsin Hazard Mitigation Plan, "the NWS and National Integrated Drought Information System (NIDIS) are improving methodology to accurately forecast drought conditions. Both organizations use a combination of current and historical

[112] https://climatology.nelson.wisc.edu/wisconsin-climate-divisions/divisional-palmer-drought-severity-index/
[113] https://www.drought.gov/states/wisconsin/county/marquette
[114] https://www.drought.gov/states/wisconsin

precipitation, streamflow, groundwater, and crop data to perform short-term and long-term forecasts."[115]

On July 15, 2005, the Governor declared a drought emergency for the entire state of Wisconsin. This declaration, the first since August 2003, allowed farmers access to additional water for crop irrigation. The summer of 2012 was also extremely hot and dry across much of the United States, including Wisconsin. A table showing the drought events recorded by the National Weather Service for Marquette County can be found in Appendix B.

Considering past occurrences, it can be surmised that Marquette County has a low probability of drought occurrence in the near future, and the likelihood of damage due to drought is considered medium for agricultural losses and low for other types of losses. Over the past 25 years, there have been 17 occurrences of drought, for an average of less than one time per year.

It should also be noted that Marquette County, like the rest of the world, is experiencing a changing climate. The University of Wisconsin-Madison, Nelson Institute for Environmental Studies, has partnered with the Wisconsin Department of Natural Resources to publish information in the Wisconsin Initiative on Climate Change Impacts.[116] This study shows a scientific consensus that, "Wisconsin is likely to become a much warmer state over the next few decades, with average temperatures more like those currently experienced in states hundreds of miles to our south." Additionally, "our state is also likely to become somewhat wetter, with a modest increase in total precipitation and in the number of intense rainfall events. The amount of climate change varies by season, with winter experiencing the greatest warming and most likely increase in precipitation." The site's information shows that Marquette County is likely to experience warmer weather and an increase in precipitation for all four seasons of the year, with the greatest increases in winter and summer. This will likely reduce the impact of drought in the future.

[115] State of Wisconsin Hazard Mitigation Plan
[116] Trends and Projections | Wisconsin Initiative on Climate Change Impacts (WICCI)

As noted earlier in this plan, the National Risk Index (NRI) tool [117] has been made available by the Federal Emergency Management Agency (FEMA). It calculates a baseline relative risk measurement for 18 natural hazards based on expected annual loss, social vulnerability, and community resilience. Below is data relevant to the hazard discussed in this chapter. It should be noted that the NRI information may not necessarily match the hazard ratings reached by the county and is only being included for reference.

Number of Events	14
Annualized Frequency	0.30
Expo. - Agricultural Value ($)	11,837,383
Expo. - Total ($)	11,837,383
HLR – Agriculture ($)	3.68 per 100K
HLR - Overall Rating	Very Low
EAL - Agricultural Value ($)	339
EAL - Total ($)	339
EAL Score	1.12
EAL Rating	Very Low
Risk Score	1.10
Risk Rating	Very Low

"Expo." = Exposure / "HLR" = Historic Loss Ratio / "EAL" = Expected Annual Loss

Vulnerability

Drought generally impacts farm output by reducing crop yields and the health and productivity (e.g., milk) of livestock. As a result, a drought will seriously impact the economy of the entire county. Dust storms impact farms in the long term by blowing away the top levels of soil, which are the richest. This could economically impact the county by reducing its long-term viability for farming.

The concern for agricultural losses due to drought is difficult to estimate because each incident will impact the county differently based on the length of the drought, when it occurs in the planting season and which crops were planted in various locations in that particular season but one can see by looking at the agricultural

[117] https://hazards.fema.gov/nri/map

statistics listed below[118] that this sector is an important part of the Marquette County economy and that the losses could be considerable:

- Average size of farms: 233 acres
- Average value of agricultural products sold per farm: $60,188.
- Average value of crops sold per acre for harvested cropland: $242.47.
- The value of livestock, poultry, and their products as a percentage of the total market value of agricultural products sold: 52.83%
- Harvested cropland as a percentage of land in farms: 50.20%
- Average number of cattle and calves per 100 acres of all land in farms: 11.64
- Corn for grain: 26,387 harvested acres
- All wheat for grain: 721 harvested acres
- Soybeans for beans: 11,966 harvested acres
- Vegetables: 1,879 harvested acres
- Land in orchards: 5 acres

Drought is also a major risk factor for wildfire and can reduce the amount of surface water available for recreational activities (e.g., boating, fishing, water skiing) and for wildlife. This is important because, for example, low water levels can lead to an outbreak of disease (e.g., botulism) in migratory bird pools.

Prolonged drought can also impact the groundwater reserves. This can reduce the ability of the municipal water services and rural individuals with wells to draw adequate fresh water. This may especially impact rural homeowners who tend to have wells that are not drilled as deeply as municipal wells. In Marquette County, the population that lives outside of the cities and villages is generally on well water. There could also be a safety risk during dust storms if

[118] http://www.city-data.com/county/Marquette_County-WI.html

they are severe enough to reduce the visibility of the roadways for drivers.

Hazard Mitigation Strategies

The goal of drought and dust storm mitigation activities is to reduce, in a cost-effective manner, the loss of lives and property due to these events.

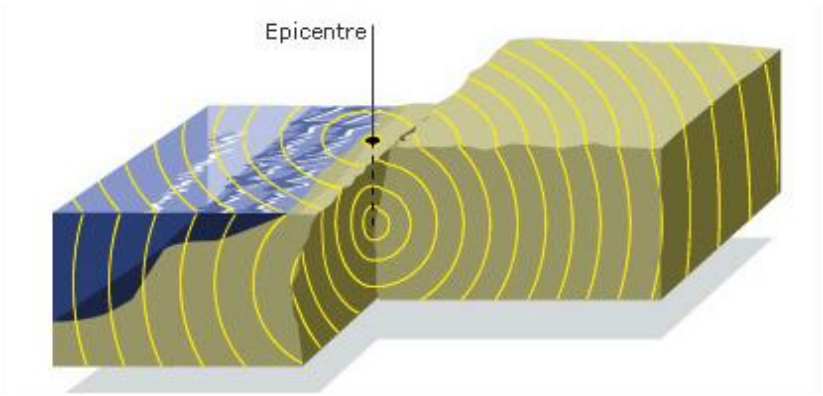
Marquette County farmers can contact the University of Wisconsin – Marquette County Extension Office and its federal partners from the US Department of Agriculture for information and guidance related to drought. Various federal and state publications are available regarding groundwater movement, the hydrologic cycle, and irrigation methods. These agencies are also the lead agencies for obtaining emergency food and water supplies for agricultural use and for providing information regarding crop insurance.

Municipalities and the county will work together to ensure that drought considerations are included in emergency plans and will provide emergency information to non-farm concerns as needed. Additionally, they will promote the use of Best Management Practices for agriculture and yards, continue to provide community outreach and education to farmers during times of drought, and prepare/publicize water usage regulations for non-farm areas during drought.

The hazard mitigation strategies listed above primarily involve providing information on water conservation measures to farmers and the public. Water conservation will ensure that the resource is available for critical residential, business, and agricultural uses (e.g., drinking, food irrigation, manufacturing, firefighting), and good farming practices may help prevent erosion of the rich topsoil found in Marquette County. Since drought and dust storms are not hazards that affect buildings or traditional infrastructure (e.g., bridges, culverts), these strategies did not need to be designed to reduce damage to existing or future buildings and infrastructure.

Earthquakes

An earthquake is a shaking or sometimes violent trembling of the earth that results from the sudden shifting of rock beneath the earth's crust. These sudden shifting releases energy in the form of seismic waves (wave-like movement of the earth's surface).[119]



Physical Characteristics

Earthquakes can strike without warning and may range in intensity from slight tremors to great shocks. They can last from a few seconds to over five minutes, and they may also occur as a series of tremors over a period of several days. The actual movement of the ground during an earthquake is seldom the direct cause of injury or death. Casualties usually result from falling objects and debris because the shocks have shaken, damaged, or demolished buildings and other structures. Movement may trigger fires, dam failures, landslides, or releases of hazardous materials that compound an earthquake's disastrous effect.

Earthquakes are measured by two principal methods: seismographs and human judgment. The seismograph measures the magnitude of an earthquake and interprets the amount of energy released on the Richter Scale, a logarithmic scale with no upper limit. For example, an earthquake measuring 6.0 on the Richter Scale is ten times more powerful than a 5.0; and 100 times more powerful than a 4.0. This is a measure of the absolute size or strength of an earthquake and does not consider the effect at any specific location. The Modified

[119] http://news.bbc.co.uk/2/shared/bsp/hi/pdfs/earthquake_guide.pdf

Mercalli Intensity (MMI) Scale measures the strength of a shock at a particular location (i.e., intensity).

A third, less-often-used, way of measuring an earthquake's severity involves comparing its acceleration to the normal acceleration caused by the force of gravity. The acceleration due to gravity, often noted "g," is equal to 9.8 meters per second. Peak Ground Acceleration (PGA) measures the rate of change of motion relative to the rate of acceleration due to gravity and is expressed as a percentage. These three scales can be roughly correlated, as expressed in the table that follows: [120]

Earthquake PGA, Magnitude and Intensity Comparison Table

PGA [%g]	Magnitude [Richter]	Intensity [MMI]	Description [MMI]
<0.17	1.0 - 3.0	I	I. Not felt except by a very few under especially favorable conditions.
0.17 - 1.4	3.0 - 3.9	II - III	II. Felt only by a few persons at rest, especially on the upper floors of buildings. III. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
1.4 - 9.2	4.0 - 4.9	IV - V	IV. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing cars rock noticeably. V. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
9.2 - 34	5.0 - 5.9	VI - VII	VI. Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight. VII. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
34 - 124	6.0 - 6.9	VII - IX	VIII. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
>124	7.0 and higher	VIII or higher	X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent. XI. Few, if any [masonry] structures remain standing. Bridges destroyed. Rails bent greatly. XII. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

[120] Wald, Quitoriano, Heaton and Kanamori, 1999

Most of Wisconsin's occurrences have not been severe, with only one since 1899 registering above 5.0 on the Richter Scale.

Frequency of Occurrence

Earthquakes that have affected Wisconsin from 1899 through 2004 are listed in the table that follows. The most severe earthquake in Wisconsin was the record earthquake of 1811, centered along the New Madrid Fault; this occurred prior to reliable intensity/magnitude measurements. Most earthquakes that do occur in Wisconsin are very low in intensity and can hardly be felt. These very minor earthquakes are common, occurring every few years. Events of moderate magnitude have occurred in locations in Illinois and Michigan. Those and other stronger earthquakes centered in other parts of the country have been felt primarily in Southern Wisconsin.

Date	Location	Latitude North	Longitude West	Maximum Intensity	Magnitude
10/12/1899	Kenosha	42° 34'	87° 50'	II	3.0
3/13/1905	Marinette	45° 08'	87° 40'	V	3.8
4/22/1906	Shorewood	43° 03'	87° 55'	II	3.0
4/24/1906	Milwaukee	43° 03'	87° 55'	III	--
1/10/1907	Marinette	45° 08'	87° 40'	III	--
5/26/1909	Beloit	42° 30'	89° 00'	VII	5.1 (max)
10/7/1914	Madison	43° 05'	89° 23'	IV	3.8
5/31/1916	Madison	43° 05'	89° 21'	II	3.0
7/7/1922	Fond du Lac	43° 47'	88° 29'	V	3.6
10/18/1931	Madison	43° 05'	89° 23'	III	3.4
12/6/1933	Stoughton	42° 54'	89° 15'	IV	3.5
11/7/1938	Dubuque	42° 30'	90° 43'	II	3.0
11/7/1938	Dubuque	42° 30'	90° 43'	II	3.0
11/7/1938	Dubuque	42° 30'	90° 43'	II	3.0
2/9/1943	Thunder Mountain	45° 11'	88° 10'	III	3.2
5/6/1947	Milwaukee	43° 00'	87° 55'	V	4.0
1/15/1948	Lake Mendota	43° 09'	89° 41'	IV	3.8
7/18/1956	Oostburg	43° 37'	87°45'	IV	3.8
7/18/1956	Oostburg	43° 37'	87°45'	IV	3.8
10/13/1956	South Milwaukee	42° 55'	87°52'	IV	3.8
1/8/1957	Beaver Dam	42° 32'	98°48'	IV	3.6
2/28/1979	Bill Cross Rapids	45° 13'	89°46'	--	<1.0 MoLg
1/9/1981	Madison	43° 05'	87°55'	II	--
3/13/1981	Madison	43° 37'	87°45'	II	--
6/12/1981	Oxford	43° 52'	89°39'	IV-V	--
2/12/1987	Milwaukee	42° 95'	87°84'	IV-V	--
2/12/1987	Milwaukee	43° 19'	87°28'	IV-V	--
6/28/2004	Troy Grove, IL	41° 46'	88°91'	IV	4.2

Also in Wisconsin, a 2012 article published in the Milwaukee Journal-Sentinel discussed an incident in Waupaca County that was not an earthquake as traditionally discussed and understood. This episode is highlighted in this plan because it was widely reported in the state and could be a concern for Marquette County citizens:[121]

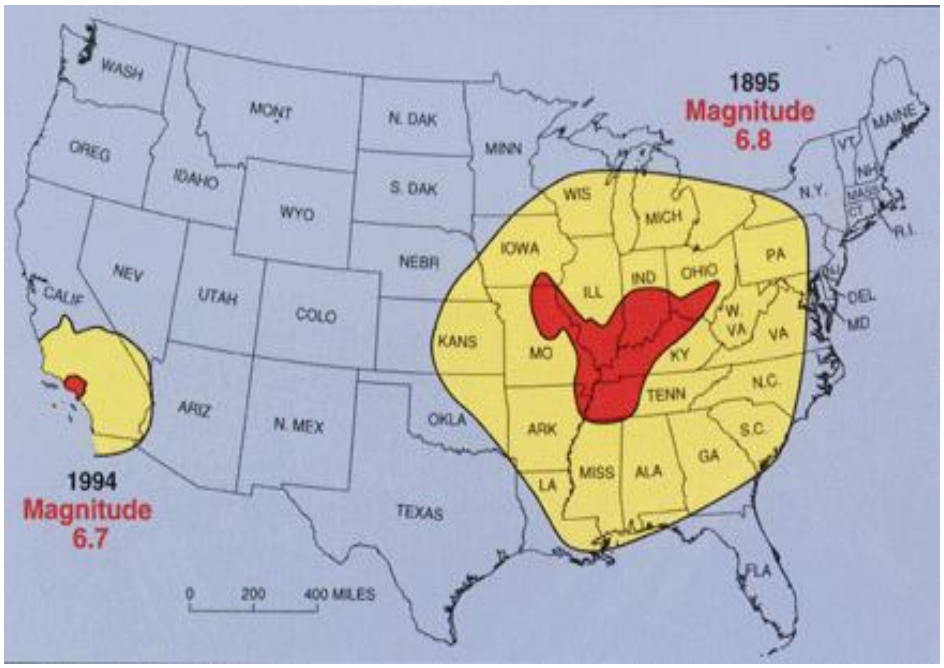
> *A 1.5-magnitude earthquake was recorded at 12:15 a.m. March 20 beneath Clintonville, according to the National Earthquake Information Center. The center is operated by the US Geological Survey.*
>
> *The US Geological Survey said several days of booms and vibrations that rattled windows and nerves last week likely were caused by a swarm of small earthquakes.*
>
> *Scientists at the Wisconsin Geological and Natural History Survey in Madison said the low-intensity seismic activity could have been produced by a phenomenon known as postglacial rebound.*
>
> *Granite bedrock beneath eastern Waupaca County is slowly adjusting to a great weight being lifted off it when the last glacier melted more than 10,000 years ago. As the granite stretches, rising only a few millimeters a year, it can crack to relieve pressure, according to David Hart, a geophysicist at the Wisconsin Geological and Natural History Survey.*
>
> *As it cracks, one piece slides or shifts places, releasing enough energy to create a seismic wave that rises to the surface.*
>
> *There is no known geologic fault beneath central Wisconsin, so the postglacial rebounding is the only thing stretching the bedrock crust in the state, Hart said.*

This phenomenon was widely reported in local, state, and national news and drew interest from the public.

The nearest major active fault is the New Madrid Fault, stretching along the central Mississippi River Valley in Missouri. In recent years, considerable attention has focused on seismic activity in the New Madrid seismic zone that lies within the central Mississippi Valley, extending from northeast Arkansas through southeast Missouri, western Tennessee, and western Kentucky to southern Illinois. Scientists at the Center for Earthquake Information have computed

[121] http://www.jsonline.com/news/wisconsin/rumbling-booming-resumes-in-clintonville-6e4p9o8-144653925.html

a set of probabilities that estimate the potential for different magnitude earthquakes to occur at the New Madrid Fault. Even an 8.3 magnitude earthquake at the New Madrid Fault, however, would cause only minor damage in the southeastern corner of Wisconsin. Currently, it is not possible to predict the exact date, duration, or magnitude of an earthquake.



The earthquake threat to Marquette County is considered low (the 50-year acceleration probability is 2%). Minor damage (e.g., cracked plaster, broken windows) from earthquakes has occurred in Wisconsin, but most often the results have been only rattling windows and shaking ground. There is little risk except to structures that are badly constructed. Most of the felt earthquakes reported have been centered in other nearby states. The causes of these local quakes are poorly understood and are thought to have resulted from the still-occurring rebound of the Earth's crust after the retreat of the last glacial ice. The likelihood of damage from an earthquake is very low.

As noted earlier in this plan, the National Risk Index (NRI) tool [122] has been made available by the Federal Emergency Management Agency (FEMA). It calculates a baseline relative risk measurement for 18 natural hazards based on expected annual loss, social vulnerability, and community resilience. Below is data relevant to the hazard discussed in this chapter. It should be noted that the NRI information may not necessarily match the hazard ratings reached by the county and is only being included for reference.

Number of Events	N/A
Annualized Frequency	0.013% chance
Expo. - Building Value ($)	2,156,433,000
Expo. - Population	15,404
Expo. - Population Equiv. ($)	117,070,400,000
Expo. - Total ($)	119,226,833,000
HLR – Buildings ($)	1.68 per 100
HLR - Population ($)	1.40 per 10K
HLR – Agriculture ($)	N/A
HLR - Overall Rating	Very Low
EAL - Building Value ($)	2,827
EAL - Population	0
EAL - Population Equiv. ($)	118
EAL - Total ($)	2,944
EAL Score	1.02
EAL Rating	Very Low
Risk Score	0.83
Risk Rating	Very Low

"Expo." = Exposure / "HLR" = Historic Loss Ratio / "EAL" = Expected Annual Loss

Vulnerability

Any impact on the community from the earthquake would likely be due to a few broken windows and personal effects that fell in the earthquake. The damage to critical infrastructure and buildings would be negligible, although there could be indirect effects from any

[122] https://hazards.fema.gov/nri/map

unlikely losses to the electrical grid, transportation routes/goods shipments, and pipelines.

Hazard Mitigation Strategies

Since Marquette County is not likely to suffer directly from a severe earthquake, the community impacts are not considered significant, and mitigation planning for this hazard is not necessary. If there is ever a need, obviously emergency resources will be mobilized, but the goal for this section of the plan is therefore to educate on the low risks of earthquake damage in Marquette County.

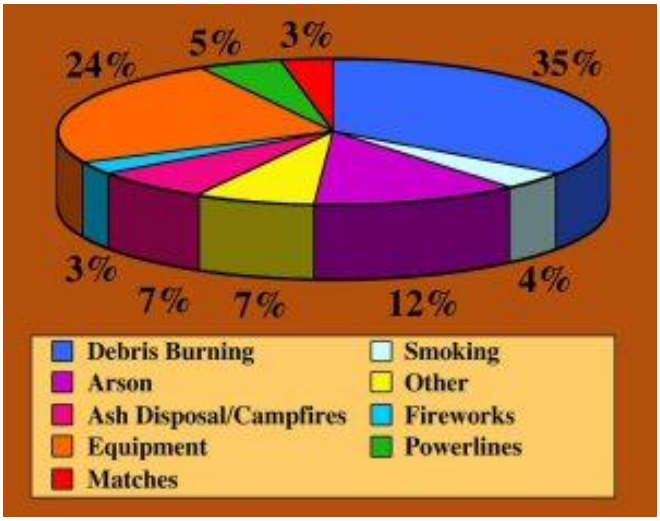
Fires: Forest, Grass, and Wildfires

The grassfire and wildfire (fires on open or agricultural land) season in Marquette County begins in March and continues through November, although fires can occur at any time during any month of the year. However, fires are more likely to occur whenever vegetation is dry because of a winter with little snow or a summer with sparse rainfall.

The Wisconsin Department of Natural Resources (DNR) is responsible for forest fire protection on approximately 18 million acres of forest and wildland in Wisconsin. The US Forest Service maintains forest fire protection on two million acres of this land while local fire departments retain responsibility for the remaining wooded acreage.

Physical Characteristics

The Wisconsin DNR has previously reported that approximately 1,500 fires annually burn over 5,000 acres of the land that they protect; over 90% of these fires are human caused. It should be noted that these figures do not include areas of the state where a local fire department has primary responsibility for service.



Frequency of Occurrence

While the total number of open fires in Wisconsin has decreased over the years, the potential danger to lives and property remains due to the increased encroachment of development into previously open lands.

According to the Wisconsin DNR Fire Management Dashboard,[123] since 2012, Marquette County has experienced 398 separate instances of wildfires burning a total of 379.65 acres. As such, the overall probability for a wildfire in Marquette County is low and is more likely to occur in the Spring. The probability of damage from wildfire is considered very low.

The probability for a forest fire is considered low for most of the county, except for a medium rating for The Bluffs in the Towns of Oxford and Westfield, Firewise communities, and the Town of Newton/Crystal Lake.

There has been one statewide wildfire event recorded since 1950 by the National Weather Service. This event occurred on 23 April 1994 and caused no injuries or deaths but did cause $500,000 in crop and property damage (each).

Since the fire in 1994, there have been two wildfires in Marquette County in 2003 and 2004. No injuries or deaths were recorded, with significant crop/property damage.[124]

2004 - Kendall Marsh Fire
The Kendall Marsh Fire occurred in Marquette County on April 4 and burned 45 acres. The fire was started by a local citizen burning debris in a barrel. Complete suppression was done by DNR, Menominee Tribal Enterprises, Montello, and Princeton fire departments. It took one and a half hours to contain this fire. The responsible party was billed $1,865 in suppression costs and issued a $156.20 citation for burning without a permit.

2003 - Crystal Lake Fire
On April 14, a wildfire began in northern Marquette County near the Lake of the Woods campground. Between 50 and 100 camper trailers in the campground and 24 homes and outbuildings in the area were directly threatened by the fire

[123] https://dnrmaps.wi.gov/wildfiredashboard/
[124] http://dnr.wi.gov/topic/ForestFire/WisconsinFires.html

but ultimately saved with the help of 17 local fire department engines and tankers, DNR engines, bulldozers, aircraft and air tankers, and private bulldozers. The fire eventually burned 572 acres and was determined to have been caused by debris burning.

The University of Wisconsin-Madison, Nelson Institute for Environmental Studies/ Wisconsin DNR's Wisconsin Initiative on Climate Change Impacts[125] shows a scientific consensus that, "Wisconsin is likely to become a much warmer state over the next few decades…and…our state is also likely to become somewhat wetter, with a modest increase in total precipitation and in the number of intense rainfall events. The amount of climate change varies by season, with winter experiencing the greatest warming and most likely increase in precipitation." The site's information shows that Marquette County is likely to experience warmer weather and an increase in precipitation for all four seasons of the year. This is likely to increase the growth rate of vegetation, but the additional rainfall is likely to reduce the number of fires.

As noted earlier in this plan, the National Risk Index (NRI) tool [126] has been made available by the Federal Emergency Management Agency (FEMA). It calculates a baseline relative risk measurement for 18 natural hazards based on expected annual loss, social vulnerability, and community resilience. Below is data relevant to the hazard discussed in this chapter. It should be noted that the NRI information may not necessarily match the hazard ratings reached by the county and is only being included for reference.

Number of Events	N/A
Annualized Frequency	0.018% chance per year
Expo. - Building Value ($)	304,631,131
Expo. - Population	2,110.09
Expo. - Agricultural Value ($)	9,901,031
Expo. - Population Equiv. ($)	16,036,646,400
Expo. - Total ($)	16,351,178,562
HLR – Buildings ($)	4.00 per 10
HLR - Population ($)	6.89 per 10K
HLR - Agriculture ($)	3.56 per 100K

[125] Trends and Projections | Wisconsin Initiative on Climate Change Impacts (WICCI)
[126] https://hazards.fema.gov/nri/map

HLR - Overall Rating	Very Low
EAL - Building Value ($)	26,104
EAL - Population	0
EAL - Population Equiv. ($)	2,381
EAL - Total ($)	28,485
EAL Score	5.64
EAL Rating	Very Low
Risk Score	5.32
Risk Rating	Very Low

"Expo." = Exposure / "HLR" = Historic Loss Ratio / "EAL" = Expected Annual Loss

Vulnerability

Grassfires and wildfires can impact the ecology of the open lands. Marquette County has 11 state natural areas: Comstock Bog-Meadow, French Creek North, Germania Wet Prairie, Lawrence Creek, Mecan River Pine-Oak Forest, Muir Park, Observatory Hill, Page Creek Marsh, Summerton Bog, Upper Fox Headwaters, and Wedde Creek Savanna.[127]. The county has three state wildlife areas: Germania Marsh, Lawrence Creek Fish and Wildlife Area, and White River Marsh.[128] Within the county, there are also other local and county parks. All would be impacted by a wildfire since a disruption from fire could erase the usability of this habitat for wildlife and/or recreational purposes for many years.

In 2003, the National Association of State Foresters produced a Field Guidance for Identifying and Prioritizing Communities-at-Risk (CAR). The purpose of the guide was to provide states with a nationally consistent approach for assessing and displaying the risks to communities from wildfire. The DNR, in cooperation with its federal and tribal partners, began working on the statewide assessment of Communities-at-Risk in 2004.

Communities-at-Risk is a model to identify broad areas of the state that are at relatively high exposure to resource damage due to wildfire. Results of the model can then be used by local governments developing Community Wildfire Protection Plans (CWPP) and by the

[127] https://dnr.wisconsin.gov/topic/Lands/NaturalAreas/county.html#Marquette
[128] https://dnr.wisconsin.gov/topic/Lands/WildlifeAreas/alpha.html

DNR to reduce local risks of wildland fire by prioritizing hazard mitigation and fire protection efforts.

The approach used in this risk assessment model is based on the "Methodology" section of the NASF Field Guidance document, which recommends assessing and mapping four factors:

- Historic Fire Occurrence
- Hazard
- Values Protected
- Capabilities

Modifications to this methodology were made to fit the GIS mapping data layers available for Wisconsin. The Wisconsin DNR uses three factors to assess Communities-at-Risk of wildfire damage:

- Hazard – the relative likelihood that an ignited wildfire will achieve sufficient intensity to threaten life or property based on land cover type and historic fire regime.
- WUI (Values at Risk) – the relative vulnerability of each 2000 census block to wildfire damage based on housing density and spatial relationship with undeveloped vegetation based on housing density and proximity to vegetation (Wisconsin's Wildland-Urban Interface). Wisconsin's WUI was layered with a weighted vegetation layer to accentuate proximity to flammable vegetation.
- Ignition Risk – the relative likelihood of a wildfire ignition within a given 30-m pixel based on historic fire occurrence, population density, and proximity to a potential ignition source.

Models were developed in GIS to create statewide grids representing each of the three weighted {Hazard (40%), WUI (30%), and Risk (30%)} inputs. This composite grid represents communities-at-risk (CAR) on a 0-9 scale of threat, with zero representing no threat and nine a very high threat. The data was then represented by municipal civil divisions (MCDs), which are city and village boundaries. Quantitative markers were assigned for five threat levels: very low, low, moderate, high, and very high, and those MCDs determined to have a high or very high threat of wildfire were considered CARs. 337 communities met the requirements for being "at risk."

Communities in Wisconsin vary considerably in size. This is particularly evident in a north-south pattern, with smaller, more rural towns in northern Wisconsin and larger, more urban towns in southern Wisconsin. Because of this variation in size, the potential

for missing areas of high risk due to smoothing out by other parts of the town was greater for larger towns. For this reason, WI DNR incorporated a "Community of Concern" category to identify those towns that have portions of their town in high risk of wildfire but were not otherwise included as a Community-at-Risk. A Community of Concern was determined to be an area of at least two contiguous square miles at high or very high risk; 237 communities were named as Communities of Concern.[129]

The following were identified as Communities at Risk or Communities of Concern: [130]

Community at Risk – Very High:

- Town of Packwaukee
- Town of Springfield

Communities at Risk – High:

- City of Montello
- Village of Neshkoro
- Town of Buffalo
- Town of Crystal Lake
- Town of Harris
- Town of Mecan
- Town of Montello
- Town of Moundville
- Town of Neshkoro
- Town of Newton
- Town of Oxford
- Town of Shields
- Town of Westfield

Communities of Concern:

- Town of Douglas

Hazard Mitigation Strategies

Government at all levels is developing mitigation programs in fire control and firefighting tactics with the goal of protecting lives and property from loss due to grassfire and wildfire. Local fire departments attend regular trainings on open land firefighting tactics, NIMS/ICS management systems, and other coordination initiatives

[129] Wisconsin State Hazard Mitigation Plan
[130] https://dnr.wisconsin.gov/sites/default/files/topic/ForestFire/communitiesAtRiskWildfire.pdf

to keep their skills honed. The County Emergency Management Office assists local departments and their staff with available grant applications for training, exercising, equipment, and planning as able and requested.

Local fire departments will continue to provide outreach efforts and education to homeowners on protecting homes and structures from fires. Updated information is shared on the county and municipal websites, in local newspapers, and at Senior Centers and other businesses. Facebook and Twitter are also being used as communication tools for community outreach.

The emergency management office also partners with the local fire departments to provide information on the County Emergency Management website about fire safety and other mitigation strategies to the public (e.g., protecting structures from wildfires, asking people not to burn combustibles), especially during Fire Safety Week in October of each year.

The hazard mitigation strategies listed above primarily involve providing information on general fire safety measures to the public for residential and commercial structures and providing ongoing training to the firefighters who fight these types of fires. These measures provide basic fire safety information. Other strategies include:

- Support active forest management to minimize the potential for catastrophic fires by engaging in good land use planning, proper home siting, and providing adequate access to homes in fire-prone areas. Local fire departments currently survey the region to ensure driveways are wide enough and clear for emergency access. They also ensure fire numbers are properly placed and easily visible.

- Maintain the dry hydrant system. There are a number of dry hydrant systems throughout the county. This system is managed cooperatively by the county's Fire Chiefs Association.

- The Town of Oxford will continue evaluating the need for a dry hydrant system at CX.

- Conduct DNR wildfire training each spring.

Flooding and Dam Failure

Flooding is defined as a general condition of partial or complete inundation of normally dry land (i.e., the floodplains) caused by the overflow of inland waters or the unusual and rapid accumulation or runoff of surface waters from any source. Floodplains are the lowlands next to a body of water that are susceptible to recurring floods.[131]

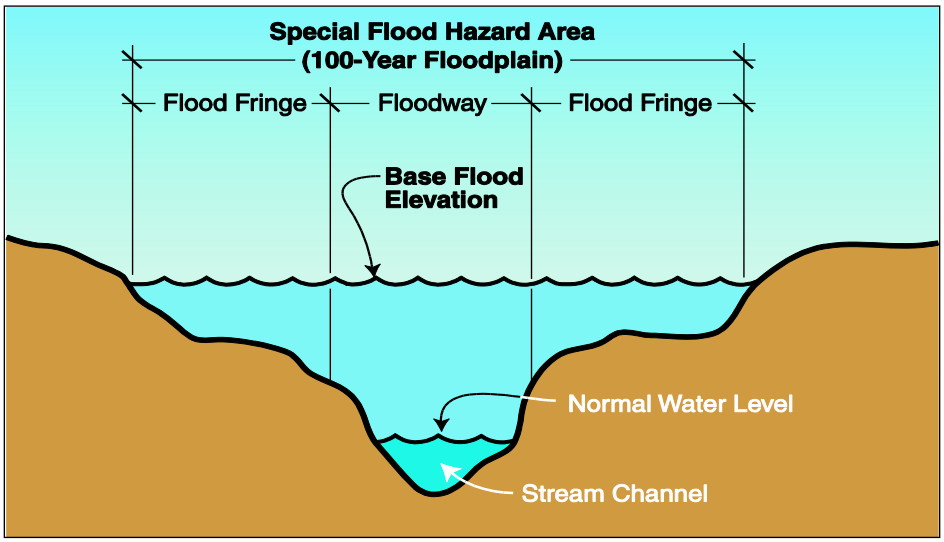


Figure 1: Floodplain Diagram

Floods are common in the United States, including in Wisconsin, and are considered natural events that are hazardous only when adversely affecting people and property.

Physical Characteristics

Major floods in Wisconsin have usually been confined either to specific streams or to locations that receive intense rainfall in a short period of time.

[131] FEMA, August 2001

Flooding that occurs in the spring due to snow melt or during a period of heavy rain is characterized by a slow buildup of flow and velocity in rivers and streams over a period of days. This buildup continues until the river or stream overflows its banks, for as long as a week or two, then slowly recedes. Generally, the timing and location of this type of flooding are fairly predictable and allow ample time for the evacuation of people and property.

For prediction and warning purposes, floods are classified by the National Weather Service into two types: those that develop and crest over a period of approximately six hours or more and those that crest more quickly. The former are referred to as "floods" and the latter as "flash floods". Flash flooding occurs solely from surface run-off that results from intense rainfall. Flash flooding occurs less frequently in Wisconsin than flooding associated with spring snow melt, but it is unpredictable.

Generally, the amount of damage from flooding is a direct consequence of land use. If the ground is already saturated, stripped of vegetation, or paved, the amount of run-off increases, adding to the flooding. There is also a concern regarding the loss of topsoil and erosion due to flooding.

Terms commonly used when referring to flooding are "100-year flood" and "floodplain." A "100-year flood" is defined as a flood having a one percent chance of being equaled or exceeded in magnitude in any given year.

Flood Probability Terms Table[132]

Flood Recurrence Intervals	Percent Chance of Occurrence Annually
10 year	10.0%
50 year	2.0%
100 year	1.0%
500 year	0.2%

[132] State of Wisconsin Hazard Mitigation Plan

The Wisconsin Department of Natural Resources (DNR), working with local zoning offices, has designated floodplain areas as those places where there is the greatest potential for flooding. Flooding may also occur due to a dam breach or overflow. Dams are barriers built across a waterway to store, control, or divert water; a dam failure is a failure of a dam that causes downstream flooding. Failures may be caused by technological events (e.g., materials failure) or by natural events (e.g., landslide, earthquake), with flooding being the most common result.

According to the Wisconsin Department of Natural Resources (WDNR) Dam Safety Program, there are approximately 3,800 dams in existence in the State of Wisconsin. Since the late 19th century, more than 700 dams have been built, then washed out or removed. Since 1967, approximately 100 dams have been removed. Almost 60% of the dams in Wisconsin are owned by a former company or private individual, 9% by the State of Wisconsin, 17% by a municipality such as a township or county government, and 14% by other ownership types.

The federal government has jurisdiction over most large dams in Wisconsin that produce hydroelectricity, approximately 5% or nearly 200 dams. The Wisconsin Department of Natural Resources regulates the rest of the dams. A dam with a structural height of over 6 feet and impounding 50 acre-feet or more or having a structural height of 25 feet or more and impounding more than 15 acre-feet, is classified as a large dam. There are approximately 1,160 large dams in the State of Wisconsin.

The Wisconsin DNR database lists the following dams in Marquette County:[133]

Dam Official Name	Size	Latitude	Longitude	Owner	Waterway Name
LAWRENCE LAKE	LARGE	43.88265	-89.546304	LAKE LAWRENCE REHAB DIST	LAWRENCE CREEK
HARRISVILLE	LARGE	43.87598	-89.40241	TOWN OF HARRIS	MONTELLO CREEK
MONTELLO GRANITE	LARGE	43.793379	-89.328876	CITY OF MONTELLO	MONTELLO RIVER
OXFORD	LARGE	43.78165	-89.57632	VILLAGE OF OXFORD	NEENAH CREEK
WESTFIELD	LARGE	43.88635	-89.49365	VILLAGE OF WESTFIELD	WESTFIELD CREEK

[133] http://dnr.wi.gov/topic/dams/damsearch.html

Dam Official Name	Size	Latitude	Longitude	Owner	Waterway Name
NESHKORO	LARGE	43.96352	-89.21702	VILLAGE OF NESHKORO	WHITE RIVER
BRIGGSVILLE	LARGE	43.653592	-89.587280	TOWN OF DOUGLAS	SOUTH BRANCH NEENAH CREEK
RICHARDS MILL	LARGE	43.78770	-89.44578	LAKE EMERY REHABILITATION DISTRICT	OX CREEK
OETLINGER DAM	SMALL	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN
LANG	LARGE	43.97180	-89.34647	LAKE OF THE WOODS RV, LLC	LITTLE PINE CREEK
GERMANIA (LOWER)	LARGE	43.89388	-89.25972	WI DNR	MECAN
GRAND RIVER MARSH	LARGE	43.72841	-89.26098	WI DNR	GRAND RIVER
MONTELLO (BUFFALO LAKE DAM)	LARGE	43.78571	-89.32871	WI DNR	FOX
IRV DAGGETT	SMALL	43.825435	-89.358202	IRV DAGGETT	TR MONTELLO RIVER
GRAND RIVER	SMALL	43.758960	-89.283670	WI DNR	FOX
GERMANIA MARSH UPPER	SMALL	43.89605	-89.27249	WI DNR	TR-MECAN RIVER
FELDMAN, JOSEPH	SMALL	43.82361	-89.38244	FELDMAN, JOSEPH	TR-MONTELLO RIVER
THAL ACRES GOLF COURSE	UNK	43.86300	-89.49982	THAL ACRES GOLF COURSE	KLAWITTER CREEK
KLATT, RUSSEL V NO 2	SMALL	43.72243	-89.26823	UNKNOWN	UNNAMED
KLATT, RUSSELL V.NO 1	SMALL	43.72014	-89.26827	UNKNOWN	TR-GRAND RIVER
BAUMAN, REINHOLD	SMALL	43.833141	-89.515782	BAUMAN, REINHOLD	NO WATERWAY
PACKERS BAY	SMALL	43.76610	-89.37098	WILLIAMS LAKE REHAB. DIS	WILLIAMS LAKE OUTLET
O'CONNELL, PAT	SMALL	43.74227	-89.37683	O'CONNELL, PAT	TRIB. GRAND RIVER
WEBER, CLAYTON	UNK	43.771193	-89.455424	UNKNOWN	TR FOX RIVER
JAMES THAYS	SMALL	43.86664	-89.40999	JAMES THAYS	TR-MONTELLO R
HANSEN'S DAM	UNK	43.85496	-89.45888	CHRIS HANSEN	KLAWITTER CREEK
GRAHAM	SMALL	43.780421	-89.39775	DANIEL BRAAKSMA	UNKNOWN
DUFFY'S MARSH	LARGE	43.73782	-89.30688	DUFFY MARSH PROPERTY OWNERS	UNNAMED TRIB TO GRAND RIVER

Dam Official Name	Size	Latitude	Longitude	Owner	Waterway Name
HENDRICKSON, WILLARD	SMALL	43.75388	-89.50696	WILLARD HENDRICKSON	A SPRING DISCHARGING TO DITCH
BAKER, BOB	SMALL	43.77267	-89.56267	BOB AND GEORGIA BAKER	TRIB TO NEENAH CREEK
GUMZ DAM	SMALL	43.836249	-89.328592	RICHARD GUMS	TRIBUTARY TO MONTELLO RIVER
FRENCH CREEK WLA #8M-4563	SMALL	43.658985	-89.361957	WI DNR	UNKNOWN
BENTLEY	SMALL	43.83410	-89.22647	KEN BENTLEY	UNNAMED TRIB TO MECAN RIVER
LEVERICH #1	SMALL	43.84688	-89.38049	PAUL LEVERICH	NON-NAV TRIB TO MONTELLO R
RIXEL	SMALL	43.68256	-89.57482	GREG VAN RIXEL	NON-NAV TRIB GOOD EARTH CR
LEVERICH #2	SMALL	43.84691	-89.38197	PAUL LEVERICH	UNNAMED TRIBUTARY TO MONTELLO
LEVERICH #3	SMALL	43.84911	-89.38198	PAUL LEVERICH	UNNAMED TRIBUTARY TO MONTELLO
FOX RIVER NWR #14	UNK	43.689906	-89.398151	US DEPT OF THE INTERIOR	UNKNOWN
FOX RIVER NWR #13	UNK	43.690145	-89.398817	US DEPT OF THE INTERIOR	UNKNOWN
FOX RIVER NWR #1	UNK	43.69191	-89.418171	US DEPT OF THE INTERIOR	UNKNOWN
FOX RIVER NWR #2	UNK	43.691708	-89.417679	US DEPT OF THE INTERIOR	UNKNOWN
FOX RIVER NWR #3	UNK	43.696558	-89.419306	US DEPT OF THE INTERIOR	UNKNOWN
FOX RIVER NWR #4	UNK	43.691067	-89.410664	US DEPT OF THE INTERIOR	UNKNOWN
FOX RIVER NWR #5	UNK	43.693325	-89.419546	US DEPT OF THE INTERIOR	UNKNOWN
FOX RIVER NWR #7	UNK	43.695245	-89.419669	US DEPT OF THE INTERIOR	UNKNOWN
FOX RIVER NWR #8	UNK	43.691462	-89.408992	US DEPT OF THE INTERIOR	UNKNOWN
FOX RIVER NWR #10	UNK	43.691742	-89.405586	US DEPT OF THE INTERIOR	UNKNOWN
FOX RIVER NWR #11	UNK	43.69669	-89.405679	US DEPT OF THE INTERIOR	UNKNOWN

Dam Official Name	Size	Latitude	Longitude	Owner	Waterway Name
COMSTOCK LAKE	SMALL	43.886479	-89.276088	JAMES MCGRATH	TRIB TO MCAN RIVER
DAVE SCHMIDT/ DUFFY'S MARSH	SMALL	43.73898	-89.336938	DAVID SCHMIDT	UNKNOWN
RHODE DAM	SMALL	UNK	UNK	UNK	UNKNOWN
ROBERT TIMM (6028)	SMALL	43.6606479	-89.523426	ROBERT TIMM	UNKNOWN
RON LEDVINA #1	UNK	43.849129	-89.255894	RON LEDVINA	UNKNOWN
RON LEDVINA #2	SMALL	UNKOWN	UNKNOWN	RON LEDVINA	UNKNOWN
SHELDON MARCH WETLAND	SMALL	43.95778	-89.170284	UNKOWN	UNKNOWN
GRAND RIVER LOCK STRUCTURE	UNK	UNKNOWN	UNKNOWN	UNKNOWN	FOX RIVER LOCK CHANNEL
STELTER (6118)	UNK	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN
STELTER (6120)	UNK	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN
STELTER (6119)	UNK	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN
STELTER (6121)	SMALL	43.833203	-89.245728	UNKNOWN	UNKNOWN
HALE WALTERS	SMALL	43.722328	-89.423366	GINGER HALE-WALTERS	UNNAMED TRIB TO FOX RIVER
MARION KIHN	SMALL	43.920700	-89.304508	UNKNOWN	UNNAMED TRIB TO MECAN RIVER
ROBERT TIMM (6027)	UNK	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN

Most of these dams are small, mill-type dams under the jurisdiction of the DNR and are also privately owned. None of these dams could handle the volume of water generated by a 100- or 500-year flood without overtopping. These dams are inspected by the Wisconsin Department of Natural Resources (DNR), and the largest are required to have an Emergency Action Plan (EAP) and failure analysis on them.

The Wisconsin Department of Natural Resources assigns hazard ratings to large dams within the state. When assigning hazard ratings, two factors are considered: existing land use and land use controls (zoning) downstream of the dam. Dams are classified into three categories that identify potential hazards to life and property downstream should the dam fail. A high hazard indicates that a failure would most probably result in the loss of life. A significant hazard indicates a failure could result in appreciable property

damage. A low hazard exists where failure would result in only minimal property damage, and loss of life is unlikely.

For Marquette County, the Briggsville, Montello Granite, and Harrisville dams have a high hazard rating. The Richards Mill dam has a significant hazard rating. The other dams in Marquette County are considered low hazard.

There are no dams in other counties that pose a significant flooding risk to the citizens of Marquette County.

One potential effect of flooding is erosion. Erosion is defined as the removal of soil by the force of waves, currents, and/or ice at a lakeshore or streambank or by the power of wind or water on open land. Erosion is a natural process that can be accelerated by natural disasters (e.g., flooding, heavy rains, strong winds, drought) or by human activity (e.g., removal of plants/trees, tilling.) Because of the many waterways in Marquette County, there is concern about ensuring the stabilization of the shorelines.

Watersheds

Marquette County has eight watersheds.[134] The maps in Appendix A show the watershed boundaries and 100-year floodplains for the entire county. Marquette County river systems drain to two major basins – Lake Michigan and the Mississippi River. Everything north of the sub-continental divide is part of the Lake Michigan drainage system. Everything south of the sub-continental divide drains to the Mississippi River. All the streams are important in the hydrological and ecological regime and should be protected by shoreland zoning and physical protective measures. Following is a brief description of each watershed:

Lake Michigan Basin

Buffalo and Puckaway Lakes (UF10)[135]
The Buffalo and Puckaway Lakes Watershed is in Marquette, Green Lake, and Columbia Counties. The watershed is 144,072 acres in size and contains 305 miles of streams and rivers, 5,877 acres of lakes, and 35,513 acres of wetlands. The watershed is dominated by agriculture (27%), wetlands (24%), forest (23%), and grasslands (16%) and is ranked high for nonpoint source issues affecting groundwater.

[134] https://apps.dnr.wi.gov/water/watershedSearch.aspx
[135] https://apps.dnr.wi.gov/water/watershedDetail.aspx?code=UF10

Fox River – Berlin (UF06)[136]
The Fox River-Berlin Watershed is located primarily in Green Lake County but extends into parts of Waushara, Winnebago, and Marquette Counties. The watershed is 133,595 acres in size and contains 328 miles of streams and rivers, 453 acres of lakes, and 41,067 acres of wetlands. The watershed is dominated by agriculture (41%), wetlands (30%), forest (12%), and grassland (11%), and is ranked high for nonpoint source issues affecting groundwater and medium for nonpoint source issues affecting streams.

Lower Grand River (UF11)[137]
The Lower Grand River Watershed is located primarily in Green Lake County but also in Marquette, Columbia, and Dodge Counties. It is 70,011 acres in size and includes 185 miles of streams and rivers, 1,264 acres of lakes, and 13,715 acres of wetlands. The watershed is dominated by agriculture (44%), wetlands (19%), forest (17%), and grassland (14%), and is ranked high for nonpoint source issues affecting groundwater.

Mecan River (UF09)[138]
The Mecan River Watershed is located primarily in Waushara and Marquette Counties, with a tiny area in Green Lake County. The watershed is 94,917 acres in size and contains 166 miles of streams and rivers, 1,837 acres of lakes, and 18,622 acres of wetlands. The watershed is dominated by forest (33%), agriculture (22%), grassland (22%), and wetlands (19%), and is ranked high for nonpoint sources affecting groundwater.

Montello River (UF13)[139]
The Montello River Watershed is in Adams, Marquette, and Waushara counties. The watershed is 86,079 acres in size and contains 148 miles of streams and rivers, over 1,400 acres of lakes and reservoirs, and 13,900 acres of wetlands. The watershed is dominated by forest (37%), agriculture (35%), and wetlands (16%), and is ranked high for nonpoint source issues affecting groundwater and medium for nonpoint source issues affecting streams.

As part of the Upper Fox River Basin, this watershed ultimately drains into Lake Winnebago and then Lake Michigan. The last glaciation had a significant impact on the Montello River Watershed's topography and geology, creating lateral moraines, ground

[136] https://apps.dnr.wi.gov/water/watershedDetail.aspx?code=UF06
[137] https://apps.dnr.wi.gov/water/watershedDetail.aspx?code=UF11
[138] https://apps.dnr.wi.gov/water/watershedDetail.aspx?code=UF09
[139] https://apps.dnr.wi.gov/water/watershedDetail.aspx?code=UF13

moraines, glacio-fluvial landforms, outwash plains, and lake sediments. The diversity of the landscape and soils left by the retreating glaciers still plays an important role in drainage patterns and water quality of the watershed today.

Land use in the Montello River Watershed is dominated by forest, which covers about 37% of the total area. Other land uses in the Montello River Watershed that cover a significant amount of the total area include agriculture (35%), wetlands (16%), and grasslands (4%). Suburban and urban environments are even scarcer in this watershed, with only one percent and one-fifth of one percent, respectively. The watershed is ranked high for nonpoint source issues affecting groundwater and medium for nonpoint source issues affecting streams.

Rivers and streams within the Montello River Watershed are ranked medium for nonpoint source pollution (NPS). The NPS ranking for groundwater and the watershed overall is high. Lakes in this watershed have not yet been ranked for NPS.

Neenah Creek (UF14)[140]
The Neenah Creek Watershed is in Adams, Columbia, and Marquette Counties. It is 110,940 acres in size and includes 199 miles of streams and rivers, 2,104 acres of lakes, and 14,500 acres of wetlands. The watershed is dominated by forest (33%), agriculture (32%), grasslands (19%), and wetlands (13%), and is ranked high for nonpoint source issues affecting groundwater.

White River (UF08)[141]
The White River Watershed is located primarily in Waushara County but extends south to Green Lake and Marquette Counties. The watershed is 95,879 acres in size and contains 156 miles of streams and rivers, 1,017 acres of lakes, and 18,495 acres of wetlands. The watershed is dominated by forest (29%), grassland (27%), agriculture (21%), and wetlands (19%), and is ranked high for nonpoint source issues affecting groundwater.

Mississippi River Basin

Little Roche A Cri Creek (CW01)[142]

[140] https://apps.dnr.wi.gov/water/watershedDetail.aspx?code=UF14
[141] https://apps.dnr.wi.gov/water/watershedDetail.aspx?code=UF08
[142] https://apps.dnr.wi.gov/water/watershedDetail.aspx?code=CW01

The Little Roche-A-Cri Watershed, a 196 square mile watershed, is situated in the southern part of the Central Wisconsin Basin in Adams, Waushara, and Marquette Counties. The Central Wisconsin River Basin contains numerous rock outcroppings and beautiful flowages. The basin is characterized by agricultural activities throughout the basin, with intensive row cropping taking place in the central sands region. The last glaciers to flatten Wisconsin only stretched through part of the basin, consequently affecting the Little Roche-A-Cri Watershed topography. The glaciers created a network of warm and cold-water streams fed by surface and groundwater sources that all connect to the Wisconsin River. The Central Wisconsin River Basin has one of the largest and most diverse arrays of surface water systems in the state.

The Little Roche-A-Cri Creek watershed is currently populated with 2,000 individuals. In contrast to other watersheds in the basin, this watershed has only increased by less than 0.75% since the 1970s. The population projection trend is headed slightly downward for the next 15 years (North Central Wisconsin Regional Planning Commission, 2000; Wisconsin Department of Administration, 2000). According to land survey records from the mid-1800s, original vegetation consisted primarily of woodlands. Current land use in the watershed consists primarily of forested (42%), agriculture (23%), wetland (14%), and grassland (13%). Land use characteristics have changed significantly since European Settlement in Wisconsin, as woodlands, wetlands, and grasslands covered the entire watershed during the Pre-settlement Period. Today, agriculture and forest are the two dominant types, with wetlands and open space and open water, third and fourth, respectively.

Floodplain Regulations

Floodplain regulations have been in place in the cities, towns, and villages of Marquette County for many years. The Department of Natural Resources requires that each municipality approve regulations that meet DNR guidelines. These regulations and guidelines result from the value of Wisconsin lakes and waterways and a desire to preserve them and to protect the people who reside near them. Unregulated development can lead to loss of lives and property during floods.

Chapter 614, Laws of Wisconsin 1965, requires counties to adopt regulations giving all lands within 300 feet of navigable rivers or

streams protection from haphazard development. Under this legislation, Marquette County has adopted a zoning ordinance that gives a measure of protection to watersheds. The law protecting floodplains was created to meet the following objectives:

- Reduce the hazards to life and property from flooding.
- Protect floodplain occupants from a flood that is or may be caused by their own land use, which is or may be undertaken without full realization of the danger.
- Protect the public from the burden of extraordinary financial expenditures for flood control and relief.

Encroachment on floodplains, including structures or fill, reduces the flood-carrying capacity.

To regulate and permit development in Special Flood Hazard Areas (SFHAs), Marquette County requires that a land use permit be obtained before any new development is started within the floodplain. Inspections are conducted to ensure compliance with the permits.

Frequency of Occurrence

Wisconsin has experienced several major floods during the last two decades. The 1973 and 1986 floods revealed that no floodplains or urban areas in Wisconsin can be considered safe from damage. Mill-dams have developed leaks on occasion but have not caused any flooding problems.

Marquette County does have a history of flooding problems. Marquette County has been included in four Presidential Disaster Declarations requests for flooding, the most recent of which are detailed below:[143]

- FEMA-DR-376-WI: On April 27, 1973, the President declared a major disaster because of severe storms and flooding that occurred on April 27, 1973. The declaration was granted for Individual and Public Assistance
- FEMA-DR-994: On July 2, 1993, the President declared a major disaster because of flooding, severe storms, and

[143] http://www.fema.gov/disasters

tornadoes that occurred between June 7 and Aug 25, 1993. The declaration was granted for both Public and Individual Assistance as well as Hazard Mitigation.

- FEMA DR-1526: On June 18, 2004, the President declared a major disaster because of severe storms and flooding that began on May 7th. Marquette County was eligible for both Public and Individual Assistance as well as Hazard Mitigation.

- FEMA 1768-DR-WI: On June 14, 2008, the President declared a major disaster because of severe storms, tornadoes, and flooding that began on June 5. Marquette County was eligible for both Public and Individual Assistance as well as Hazard Mitigation.

The following list summarizes damages attributed to flooding in Marquette County by the National Flood Insurance Program through 18 September 2024:[144]

Marquette County NFIP Loss Claims		
Jurisdiction	**Total Loss**	**Total Payments**
Marquette County	8	$176,967.30
City of Montello	2	$10,185.52

There are no severe repetitive loss properties in Marquette County. There are four repetitive loss properties in Marquette County with one each in the Endeavor (53930) and Portage (53901) zip codes and two in the Montello (53949) zip code. Additionally, there is another in the City of Montello, which is also the 53949 zip code.

Tables showing the flood and flash flood events recorded by the National Weather Service can be found in Appendix B. A careful review of the geography and history of flooding in Marquette County leads to the conclusion that there is a high probability of flooding in the future and a very high probability of damage and losses due to flooding. This flooding could occur due to urban stream flooding, flash flooding, or, less likely, due to a dam failure. It was also determined that there was a very low probability of a dam break in

[144] Information provided by Wisconsin Emergency Management September 2024

the county and a low probability of damage and losses due to a dam break.

The University of Wisconsin-Madison, Nelson Institute for Environmental Studies/ Wisconsin DNR's Wisconsin Initiative on Climate Change Impacts[145] shows a scientific consensus that, "Wisconsin is likely to become a much warmer state over the next few decades…and…our state is also likely to become somewhat wetter, with a modest increase in total precipitation and in the number of intense rainfall events. The amount of climate change varies by season, with winter experiencing the greatest warming and most likely increase in precipitation." The site's information shows that Marquette County is likely to experience warmer weather and an increase in precipitation for all four seasons of the year, with the greatest increases in winter and summer. Additionally, the increased number of intense rainfall events is likely to increase the number and intensity of flooding incidents.

As noted earlier in this plan, the National Risk Index (NRI) tool [146] has been made available by the Federal Emergency Management Agency (FEMA). It calculates a baseline relative risk measurement for 18 natural hazards based on expected annual loss, social vulnerability, and community resilience. Below is data relevant to the hazard discussed in this chapter. It should be noted that the NRI information may not necessarily match the hazard ratings reached by the county and is only being included for reference.

Number of Events	11
Annualized Frequency	0.5
Expo. - Building Value ($)	78,381,858
Expo. - Population	454.78
Expo. - Population Equiv. ($)	3,456,349,602
Expo. - Agricultural Value ($)	2,565,234
Expo. - Total ($)	3,537,296,695
HLR – Buildings ($)	2.55 per 1K
HLR - Population ($)	9.14 per iM
HLR - Agriculture ($)	3.37 per 100
HLR - Overall Rating	Very Low

[145] Trends and Projections | Wisconsin Initiative on Climate Change Impacts (WICCI)
[146] https://hazards.fema.gov/nri/map

EAL - Building Value ($)	91,710
EAL - Population	0
EAL - Population Equiv. ($)	14,479
EAL - Agricultural Value ($)	39,584
EAL - Total ($)	145,773
EAL Score	6.63
EAL Rating	Very Low
Risk Score	6.25
Risk Rating	Relatively Low

"Expo." = Exposure / "HLR" = Historic Loss Ratio / "EAL" = Expected Annual Loss

Vulnerability

After flooding, whether caused by a storm or a dam failure, there is often damage. Potential vulnerabilities due to flooding events can include flooded public facilities and schools, many of which are the community's shelters needed when individual housing is uninhabitable. Utilities are also vulnerable in floods, which can bring down electric lines/poles/transformers, telephone lines, and disrupt radio communications. The loss of communications can impact the effectiveness of first response agencies, which need to communicate via two-way radio to mount emergency response and recovery activities. The public media communications used by emergency managers to provide timely and adequate emergency public information can also be impacted.

Residential structures may suffer from flooded basements, damaged septic systems, and damaged functionals (e.g., HVAC systems, clothes washers, and dryers). Homes may also be impacted by sewer back-up, and if the home is not properly cleaned after a flood, bacterial growth and mold may impact the home's air quality and cause illness among the occupants.

Businesses can suffer building and equipment damage, just like homes. Businesses may lose expensive products stored in basements or other low areas, as well as the ability to operate from their facility. If the facility must close, its owners and employees will most likely suffer economic hardships beyond what their personal losses may have entailed. Agricultural business losses involve the loss of standing crops and harvests that are damaged by flooded storage facilities in the immediate period. On a longer time scale, the

erosion of rich topsoil by floodwaters can degrade the land and impact future crop yields.

Perhaps one of the most expensive types of flood damage is that to roadways, which are washed out, inundated, and/or covered by debris, blocking access to emergency and general public traffic.

Appendix F contains excerpts from the Marquette County HAZUS report. HAZUS-MH uses state-of-the-art geographic information system (GIS) software to map and display hazard data and the results of damage and economic loss estimates for buildings and infrastructure. FEMA HAZUS-MH data were used to estimate the number of structures located within the one-percent chance, or 100-year floodplain, based upon Flood Insurance Rate Maps (FIRMs) published by the Federal Emergency Management Agency (FEMA), the results of which are outlined in the report.

Hazard Mitigation Strategies

Marquette County is committed to remaining compliant with the requirements of the National Flood Insurance Program (NFIP) and all other state and federal laws. According to the NFIP, the following communities participate in the program. [147]

- County of Marquette
- City of Montello
- Village of Endeavor
- Village of Neshkoro
- Village of Oxford
- Village of Westfield

Additional Information Regarding Municipal NFIP Implementation [148]	
City of Montello	
Date joined NFIP	Unavailable
Initial Flood Hazard Boundary Map (FHBM) Identified	12/28/1973

[147] https://www.fema.gov/cis/WI.pdf
[148] https://www.fema.gov/cis/WI.html

Initial Flood Insurance Rate Map (FIRM) Identified	11/16/1990
Current Effective Map Date	12/18/2012
Regular Program Entry Date	11/16/1990
How implemented	Continued reviewing and updating the projects identified in our All-Hazards Mitigation Plan
Village of Endeavor	
Date joined NFIP	Unavailable
Initial Flood Hazard Boundary Map (FHBM) Identified	12/17/1973
Initial Flood Insurance Rate Map (FIRM) Identified	1/3/1990
Current Effective Map Date	12/18/2012
Regular Program Entry Date	1/3/1990
How implemented	Continued reviewing and updating the projects identified in our All-Hazards Mitigation Plan
Village of Neshkoro	
Date joined NFIP	Unavailable
Initial Flood Hazard Boundary Map (FHBM) Identified	8/26/1974
Initial Flood Insurance Rate Map (FIRM) Identified	9/1/1988
Current Effective Map Date	12/18/2012
Regular Program Entry Date	9/1/1988
How implemented	Continued reviewing and updating the projects identified in our All-Hazards Mitigation Plan
Village of Oxford	
Date joined NFIP	Unavailable
Initial Flood Hazard Boundary Map (FHBM) Identified	9/6/1974
Initial Flood Insurance Rate Map (FIRM) Identified	8/16/1988
Current Effective Map Date	12/18/2012
Regular Program Entry Date	8/16/1988
How implemented	Continued reviewing and updating the projects identified in our All-Hazards Mitigation Plan
Village of Westfield	
Date joined NFIP	Unavailable
Initial Flood Hazard Boundary Map (FHBM) Identified	5/24/1974
Initial Flood Insurance Rate Map (FIRM) Identified	1/17/1991
Current Effective Map Date	12/18/2012
Regular Program Entry Date	1/17/1991
How implemented	Continued reviewing and updating the projects identified in our All-Hazards Mitigation Plan

The county's planning and zoning department serves as the flood administrator for the municipalities.

There are no areas in Marquette County that have had special flood areas identified by FEMA but are not in the NFIP program. [149]

The plan is intended to identify areas that are particularly susceptible to flooding, assess the risks, analyze the potential for mitigation, and recommend mitigation strategies where appropriate. The goals of this plan are:

- Goal 1: To reduce, in a cost-effective manner, the loss of lives and property due to these events. Another part of this goal is to promote safety and health in areas that have been or are prone to be flooded.
- Goal 2: To preserve and enhance the quality of life throughout Marquette County by identifying potential property damage risks and recommending appropriate mitigation strategies to minimize potential property damage during/due to flooding.
- Goal 3: To promote countywide planning that avoids transferring the risk from one community to an adjacent community.
- Goal 4: To ensure that all communities in Marquette County participate in the NFIP so that all county residents have access to affordable flood insurance coverage.
- Goal 5: To identify potential funding sources for mitigation projects and form the basis for project grant applications through FEMA's Pre-Disaster Mitigation (PDM) and/or Flood Mitigation Assistance (FMA) programs.

Short-term actions that can lessen the effects of flooding include:

- Issuance of early warnings through flood advisory bulletins.
- Dissemination of instructions to the public through the media.
- Preparation of congregate care facilities.
- Evacuation of people and property.

[149] https://www.fema.gov/cis/WI.html#comm_not_part_id

The county will work with the municipal Public Works departments to identify areas prone to road flooding and discuss mitigation strategies and funding sources. Potential projects identified include:

- County: Highway 22 floods and cuts the county in half. First responders cannot get through and must travel a long distance to get around. People on the south side cannot reach the City of Montello for food, medicine, and health treatments. Options may be to lift the bridge higher or install a new bridge.

- County: Explore options to tie the north and south portions of the county together by Buffalo Lake. This project relates to raising the road profile on County Highway D over Buffalo Lake.

- City of Montello: Repair the spillway on Montello Lake back to the original condition. The city evaluated a strategy for the repair of the spillway after the 2018 flood. The city was unable to fund the project independently but has been earmarking funds since then.

- City of Montello: East Park Street is being re-engineered, and hazard mitigation strategies to decrease flooding impacts should be considered for inclusion. Park Street does not have a curb and gutter, which causes an ongoing water problem. Lack of funding prevents the city from doing the project now. This project does not include the bridge.

- Town of Douglas: A culvert is needed on Dale Drive due to water over the road. The shoulders were shored up with gravel, but a culvert is needed. Officials are monitoring this, as a lot of heavy equipment moves over this road.

- Town of Moundville: The bridge on County Highway O, just west of County Highway F, should be evaluated for potential mitigation strategies due to flooding. It is a timber structure that is prone to debris pile-up. It does not yet qualify for replacement due to condition.

- Town of Neshkoro: Flooding issues on 20th Avenue. The road was raised a year ago, but it continues to be a problem as it is in a marsh. Officials continue to monitor.

- Town of Westfield: Culvert, gravel lift, and paving on 1st Avenue.

- Town of Westfield: Culvert, gravel lift, and paving on 2nd Avenue.

- Town of Westfield: 2nd Avenue south of Elk needs to be raised and a culvert added. This is by the old Jahnke farm.

Planning is an important part of ensuring that the impact of flooding and/or dam failure is as minimal as possible. Existing plans are reviewed on an ongoing basis. The Towns of Oxford and Westfield keep their dam plans updated and provide them to Emergency Management. Dam operators send their plans to Emergency Management; larger dams are updated annually. Emergency Management does not receive a copy of the inspections. There have been no requests for dam exercises in the past five years, but there has been real-time experience due to flooding.

Additional proposed mitigation strategies within Marquette County include:

- Continue to add/update links on the existing county website. Publicize the website to show the community what is available. Increase community outreach and education. Provide information to citizens about flood insurance.

- The Town of Westfield will review its website and add anything necessary.

- Ensure that plans are reviewed and updated regularly. Update official floodplain maps as needed (they were most recently updated in 2012; all communities also updated maps in 2012). Collect information on flood-prone areas.

- Acquire new topographical maps for the entire county with two-foot contour intervals. New aerial photos may be completed during this project period; they may not be LIDAR. Will consider moving to 12 to 18-inch contours if funding allows and there is a need.

- Redo the causeway over the Fox River.

- The Town of Oxford will audit culverts and prioritize those that need repair and would have a greater chance of being impacted by flooding. The culverts are made of cement and are very old. There is concern that there may need to be updates, repairs, and/or replacements.

- Continue to explore if residents express an interest in flood mitigation measures (e.g., buyouts, elevations, floodproofing, etc.), countywide. A full list of potential locations can be found in Appendix E.

- Provide information to citizens about the purchase of flood insurance.

- Enhance stormwater management and erosion control. Effective wetlands management practices help manage stormwater in the county. Opportunities will be explored as problems arise.

- Promote floodproofing of buildings where appropriate and cost-effective.

- Improve planning and regulatory practices. One specific planning aide strategy sought is to establish river gages for Buffalo Lake, Fox River, and Montello River.

Severe Temperatures

Characteristics

Temperature extremes can cause disruption of normal activities for the population, property loss, and even the loss of life, especially among the more vulnerable members of our population, such as children and the elderly.

Physical Characteristics: Heat

Heat emergencies are a result of the combination of very high temperatures and very humid conditions.

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

Figure 2: NOAA's National Weather Service Heat Index

The Heat Index estimates the relationship between these two conditions and reports them as a danger category, as can be seen in the following table.[150]

[150] FEMA, 1997; NWS, 1997

Heat Index and Disorders Table			
Danger Category		**Heat Disorders**	**Apparent Temperatures [°F]**
IV	Extreme Danger	Heatstroke or sunstroke imminent.	>130
III	Danger	Sunstroke, heat cramps, or heat exhaustion are likely; heat stroke is possible with prolonged exposure and physical activity.	105-130
II	Extreme Caution	Sunstroke, heat cramps, and heat exhaustion are possible with prolonged exposure and physical activity.	90-105
I	Caution	Fatigue is possible with prolonged exposure and physical activity.	89-90

The major risks to people due to extreme heat are:

- Heatstroke – a potentially lethal medical emergency where the ability of a person to thermo-regulate is compromised, resulting in the rise of the body's core temperature to above 105°F (Fahrenheit).
- Heat Exhaustion – a less threatening medical condition where the victim complains of dizziness, weakness, and/or fatigue. The victim may have a normal or slightly elevated temperature and usually can be successfully treated with fluids.
- Heat Syncope – a sudden "faint" or loss of consciousness usually brought on by exercising in warmer weather than one is accustomed to, usually with no lasting effect.
- Heat Cramps – muscular cramping brought on by exercising in warmer weather than one is accustomed to, with no lasting effect.

Extreme heat conditions may also affect pets and livestock, decreasing agricultural output by the latter. Crops may suffer reduced yield due to extremely hot conditions.

Physical Characteristics: Cold

Wind chill is a relationship between wind and cold that is based on the rate of heat loss from exposed skin. As the wind speed increases, heat is drawn from the body, driving down skin temperature and eventually core body temperature. The following table illustrates this relationship.[151]

Wind Chill Chart

Wind (mph) \ Temperature (°F)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

The major risks to people due to extreme cold are:

- Hypothermia - occurs when, due to exposure to cold, the body is unable to maintain its proper core temperature. It may occur in temperatures above freezing and may lead to death.
- Frostbite – describes local cooling, usually to an extremity, which occurs when exposure to cold air or liquid causes constriction of the blood vessels. There are three degrees of frostbite:
    - Frostnip – brought on by direct contact with a cold object or exposure to cold air or water. Tissue damage

[151] https://www.weather.gov/safety/cold-wind-chill-chart

is minor, and the response to treatment is usually very good.

- Superficial Frostbite – involves the skin and subcutaneous layers.
- Freezing – is deep frostbite in which the skin, subcutaneous layers, and deeper structures (e.g., muscles, bone, deep blood vessels, organ membranes) of the body are affected and can become frozen.

- Chilblains - lesions that occur from repeated/chronic exposure of bare skin to temperatures of 60°F or lower.
- Trench foot – a condition that occurs when the lower extremities remain in cool water for a prolonged period.

In October 2024, the National Weather Service simplified its cold-weather forecast products[152] to improve the messaging of winter hazards and provide better decision support. They noted that *"These changes seek to clarify that cold can be dangerous with or without wind, addressing a common misconception that extreme cold is only tied to colder temperatures when there is wind. Dangerously cold weather can accompany or follow wintry precipitation, and the cold messaging can be overshadowed by the wintry precipitation."*

Extreme Cold Consolidation and Renaming

- Wind Chill Watches renamed to Extreme Cold Watch
- Wind Chill Warnings renamed to Extreme Cold Warning
- Wind Chill Advisory renamed a Cold Weather Advisory

Freeze Consolidation

- Hard Freeze Watches renamed to Freeze Watch
- Hard Freeze Warnings consolidated to Freeze Warning

[152] https://www.weather.gov/news/243009-cold-hazard-simplification

Frequency of Occurrence: Heat

Wisconsin has been affected by several bouts of extreme heat, including during the Dust Bowl period from 1934-1936. Other heat events occurred in 1979, 1995, 2001, 2011, and 2012.

Tables showing the excessive heat and heat events recorded by the National Weather Service in Marquette County [153] can be found in Appendix B.

It should be noted that during the summer of 2012, much of the country, including Marquette County, experienced a heat wave, resulting in significant droughts across more than half the country as well as increases in heat-related illnesses and deaths. July was the hottest month in US history, eclipsing the record set during the heart of the Dust Bowl in 1936. The worst of the heat was in the Midwest, the Plains, and along the Eastern Seaboard. Most of the contiguous US had record and near-record warmth for the seven-month period, except the Pacific Northwest, which was near average.

[153] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN

With the increase in heat-related illnesses comes an increase in emergency department (ED) admissions across the country. Dehydration, heat exhaustion, and heat stroke were the most common causes for patients' heat-related ED admissions. Most heat-related visits occurred in patients between the ages of 19 and 70. In Wisconsin, there were ten confirmed and possibly 12 heat-related deaths.[154]

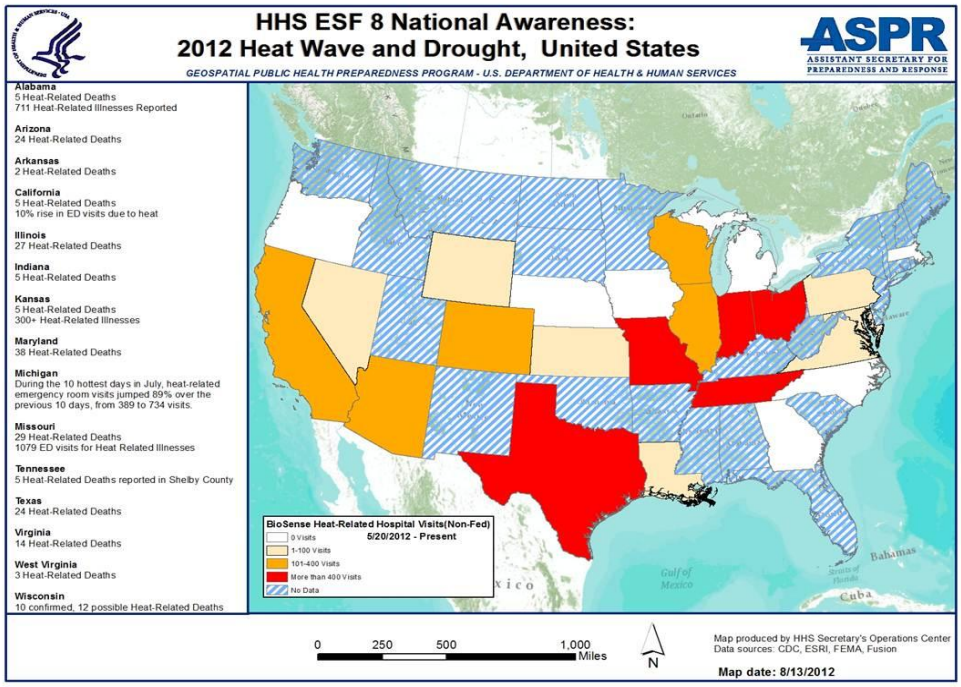


Figure 3: 2012 Heat Wave and Drought Information

According to the State of Wisconsin Hazard Mitigation Plan, extreme heat is the number one weather killer in Wisconsin, with most heat deaths attributed to major heat waves. As can be seen by the historical tables, Marquette County, like the rest of the state, is likely to experience extreme heat events every two to three years with extended, major heat waves occurring about every two decades.

The workgroup therefore felt that there was a medium likelihood of occurrence in any given year. The committee also felt that the loss of property, primarily crop and livestock output, has a very low likelihood of occurring in a drought year. The loss of life or injury to people has a low likelihood of occurrence for the general population

[154] 2012 Heat & Drought Federal Report, HHS ESF 8, UPDATE #2, US Department of Health and Human Services, Assistant Secretary for Preparedness and Response

but the committee recognized that the likelihood increases for certain populations such as the elderly, chronically ill, children, those who work outdoors, and those with limited financial resources (i.e., to pay for air conditioning).

The University of Wisconsin-Madison, Nelson Institute for Environmental Studies/ Wisconsin DNR's Wisconsin Initiative on Climate Change Impacts[155] shows a scientific consensus that, "Wisconsin is likely to become a much warmer state over the next few decades…and…our state is also likely to become somewhat wetter, with a modest increase in total precipitation and in the number of intense rainfall events. The amount of climate change varies by season, with winter experiencing the greatest warming and most likely increase in precipitation." The site's information shows that Marquette County is likely to experience warmer weather and an increase in precipitation, which means that the likelihood of additional severe heat days will increase. This could be even more concerning because of the additional atmospheric moisture, which will make it harder for people and animals to evaporatively cool.

As noted earlier in this plan, the National Risk Index (NRI) tool [156] has been made available by the Federal Emergency Management Agency (FEMA). It calculates a baseline relative risk measurement for 18 natural hazards based on expected annual loss, social vulnerability, and community resilience. Below is data relevant to the hazard discussed in this chapter. It should be noted that the NRI information may not necessarily match the hazard ratings reached by the county and is only being included for reference.

Number of Events	11
Annualized Frequency	0.9
Expo. - Building Value ($)	2,156,432,752
Expo. – Population	15,404
Expo. - Population Equiv. ($)	117,070,376,478
Expo. - Agricultural Value ($)	71,475,000
Expo. - Total ($)	119,298,284,229
HLR – Buildings ($)	1.37 per 10M
HLR - Population ($)	1.46 per 1M
HLR - Agriculture ($)	5.52 per 100K

[155] Trends and Projections | Wisconsin Initiative on Climate Change Impacts (WICCI)
[156] https://hazards.fema.gov/nri/map

HLR - Overall Rating	Very Low
EAL - Building Value ($)	268
EAL - Population	0.02
EAL - Population Equiv. ($)	154,375
EAL - Total ($)	158,220
EAL Score	13.11
EAL Rating	Relatively Moderate
Risk Score	11.14
Risk Rating	Relatively Moderate

"Expo." = Exposure / "HLR" = Historic Loss Ratio / "EAL" = Expected Annual Loss

Frequency of Occurrence: Cold

Wisconsin regularly has extreme cold temperatures as part of its winter climate. Tables that outline extreme cold/wind chill and cold/wind chill events, which have been recorded by the National Weather Service in Marquette County[157] can be found in Appendix B.

After examining this data, the workgroup believed that cold and/or extreme cold has a medium likelihood of occurrence in any given year. Since there are no crops out during the winter and most properties (homes, businesses, barns) are insulated for this climate, the loss of property due to temperature extremes is very low, although individuals may suffer damage due to water main breaks and other such problems. They further believed that the loss of life or injury to people has a low likelihood of occurrence among the general population when there are cold/extreme cold weather events. Again, the workgroup recognized that people who work outdoors, who have limited financial resources, the elderly, the young, and the chronically ill have a higher risk profile.

The Wisconsin Initiative on Climate Change Impacts[158] study also means that Marquette County is likely to have fewer extreme cold weather incidents.

49 & 157 http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN
158 Trends and Projections | Wisconsin Initiative on Climate Change Impacts (WICCI)

As noted earlier in this plan, the National Risk Index (NRI) tool [159] has been made available by the Federal Emergency Management Agency (FEMA). It calculates a baseline relative risk measurement for 18 natural hazards based on expected annual loss, social vulnerability, and community resilience. Below is data relevant to the hazard discussed in this chapter. It should be noted that the NRI information may not necessarily match the hazard ratings reached by the county and is only being included for reference.

Number of Events	6
Annualized Frequency	0.5
Expo. - Building Value ($)	2,156,432,752
Expo. - Population	15,404
Expo. - Population Equiv. ($)	117,070,376,478
Expo. - Agricultural Value ($)	71,475,000
Expo. - Total ($)	119,298,284,229
HLR – Buildings ($)	4.56 per 100M
HLR - Population ($)	1.25 per 1M
HLR - Agriculture ($)	3.76 per 10K
HLR - Overall Rating	Very Low
EAL - Building Value ($)	49
EAL - Population	0.01
EAL - Population Equiv. ($)	72,486
EAL - Agricultural Value ($)	13,269
EAL - Total ($)	85,804
EAL Score	23.62
EAL Rating	Relatively Moderate
Risk Score	21.33
Risk Rating	Relatively Moderate

"Expo." = Exposure / "HLR" = Historic Loss Ratio / "EAL" = Expected Annual Loss

Vulnerability

There has been a trend toward higher temperatures that is expected to continue. As with drought, periods of high temperatures can cause

[159] https://hazards.fema.gov/nri/map

decreased poultry and bovine production rates, which impact the economy of the community's large agricultural base.

More frequent and longer sub-zero stretches have been noted during the winter. These, coupled with concerns about utility failures, can disrupt agriculture, particularly with water supply disruption and with wind chill effects posing a risk to livestock and farmer health. Temperature extremes also pose significant problems for functional needs populations such as the elderly, the young, and the disabled. The primary general effects of extreme cold consist of water lines and mains freezing and breaking, disrupting water supply; shutting down of rural bus lines due to safety risks for children; and school closings, most often due to wind chill concerns.

Vulnerability to temperature extremes is generally assessed on an individual basis, with the most vulnerable sections of our community's population having the greatest risk. These people may include the elderly, the very young, and the chronically ill. People from economically disadvantaged backgrounds, especially those listed in the categories above, are even more vulnerable since they are least able to afford the cost of adequate heating or air conditioning systems.

The Marquette County social services agencies are aware of many of these people who reside in our communities, and they, along with the public health department, have plans and access to economic assistance programs to help these people in times of concern.

Hazard Mitigation Strategies

The goal of severe temperature mitigation activities is to reduce, in a cost-effective manner, the loss of lives and property due to these events. Temperature extremes are difficult for a community to mitigate, and the risks are to the health and safety of citizens, animals, and crops. There are no strategies that need to be employed to reduce damage to buildings and infrastructure.

Marquette County Emergency Management participates in the statewide public information campaigns for Winter and Heat Awareness Weeks each year in spring and fall, and they provide links to personal preparedness information on their website. Information is also shared via press releases, local newspapers, and Senior Centers. Social media platforms such as Facebook and Twitter are also used as communication tools for community outreach.

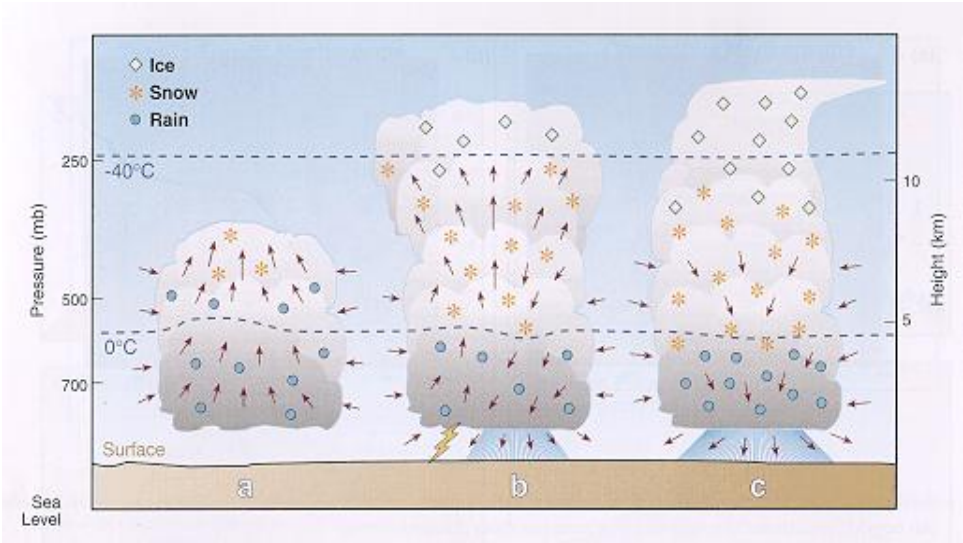
Emergency Management also has plans to support emergency sheltering operations, including promoting and improving the use of cooling centers, and the Marquette County Human Services Department has a protocol to open sheltering services for citizens in need during periods of severe temperatures. A list of centers is regularly updated and includes facilities such as libraries, community centers, and other public places. The centers open/operate as needed. Emergency Management contacts the locations to ensure they still want to be included on the list.

The county and its municipal and private sector partners will continue to review, update, and support these projects over time.

Storms: Thunderstorms, Lightning, & Hail

A thunderstorm is a rain shower during which you hear thunder. Since thunder comes from lightning, all thunderstorms have lightning, and some generate hail or damaging winds. A thunderstorm is classified as “severe” by the National Weather Service when it contains one or more of the following: hail one inch or greater, winds gusting in excess of 50 knots (57.5 mph), or a tornado.

There are three distinct stages of development for thunderstorms (birth, growth, maturity), each of which can be seen in the following schematic. [160]



In the first stage of development, an updraft drives warm air up beyond condensation levels, where clouds form.

The second stage of development occurs as levels of water vapor in the expanding cloud rise past saturation and the air cools sufficiently to form solid and liquid particles of water. At this point, rain or snow begins to fall within the cloud.

A thunderstorm's mature stage is marked by a transition of wind direction within the storm cells. The prevailing updraft that initiated the cloud’s growth is joined by a downdraft generated by

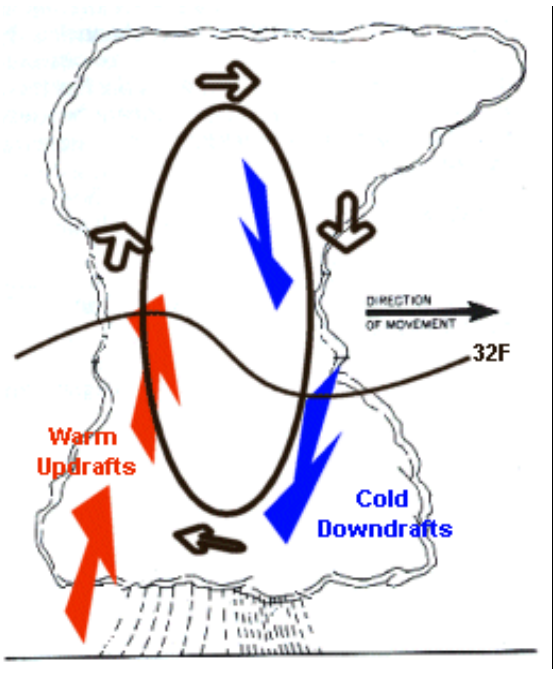
[160] National Weather Service – Flagstaff, Arizona

precipitation. Lightning may occur soon after precipitation begins. Hail and tornadoes may also develop during this stage.[161]

Lightning is a phenomenon associated with thunderstorms; the action of rising and descending air separates and builds up positive and negative charge areas. When the built-up energy is discharged between the two areas, lightning is the result.[162]

Lightning may travel from cloud to cloud, cloud to ground, or, if there are high structures involved, from ground to cloud.

Studies of thunderstorms indicate that two conditions are required for hail to develop: sufficiently strong and persistent updraft velocities and an accumulation of liquid water in a supercooled state in the upper parts of the storm. Hailstones are formed as water vapor in the warm surface layer rises quickly into the cold upper atmosphere. The water vapor is frozen and begins to fall; as the water falls, it accumulates more water vapor. This cycle continues until there is too



[161] National Weather Service – Flagstaff, Arizona
[162] University Corporation for Atmospheric Research [UCAR]

much weight for the updraft to support, and the frozen water falls too quickly to the ground to melt along the way. The graphic below depicts hail formation:[163]

Injury and loss of life are rarely associated with hailstorms. However, extensive property damage is possible, especially to crops.

Physical Characteristics

A thunderstorm often is born, grows, reaches maturity, and dies in a thirty-minute period. The individual thunderstorm cell often travels between thirty and fifty miles per hour. Strong frontal systems may create one squall line after another, each composed of many individual thunderstorm cells. These fronts can often be tracked across the state from west to east with a constant cycle of birth, growth, maturity, and death of individual thunderstorm cells.

The temperatures in a lightning stroke rise to 50,000°F (Fahrenheit). The sudden and violent discharge that occurs in the form of a lightning strike is over in one-millionth of a second.

Lightning damage occurs when humans and animals are electrocuted, fires are caused by a lightning stroke, materials are vaporized along the lightning path, or sudden power surges cause damage to electrical or electronic equipment. Lightning, an underestimated hazard, kills more people in an average year than hurricanes or tornadoes.

Hail may be spherical, conical, or irregular in shape and can range in size from barely visible to grapefruit sized. Hailstones equal to or larger than a penny are considered severe.[164]

[163] Source: NWS, January 10, 2003
[164] NWS, January 10, 2003

Hail Size Estimates[165]	
Size	**Inches in Diameter**
Pea	1/4 inch
Marble/mothball	1/2 inch
Dime/Penny	3/4 inch
Nickel	7/8 inch
Quarter	1 inch
Ping-Pong Ball	1 1/2 inch
Golf Ball	1 3/4 inches
Tennis Ball	2 1/2 inches
Baseball	2 3/4 inches
Teacup	3 inches
Grapefruit	4 inches
Softball	4 1/2 inches

Hail falls in swaths that can be from twenty to one hundred miles long and from five to thirty miles wide. A hail swath is not a large continuous path of hail but generally consists of a series of hail cells that are produced by individual thunderstorm clouds traveling in the same area.

Frequency of Occurrence

Thunderstorm frequency is measured as the number of days per year with one or more incidents. There are approximately 100,000 thunderstorms in the United States every year, and approximately 10% of those are considered severe. Most Wisconsin counties average between 30 and 40 thunderstorm days per year, although a portion of southwestern and south-central Wisconsin average 40 to 50 thunderstorm days per year. In Marquette County, there are typically several severe thunderstorms per year.

Thunderstorms can occur throughout the year, with the highest frequency during the months of May through September. Most storms occur between the hours of noon and midnight. Hailstorms usually occur from May through August, and Wisconsin averages two or three hail days per year. Most hail damage occurs in rural areas because maturing crops are particularly susceptible to bruising and other damage caused by hailstones. The four months of

[165] NWS, January 10, 2003

hailstorm activity correspond to the growing and harvesting seasons for most crops.

Nationwide, forty-five percent of the people killed by lightning have been outdoors, about sixteen percent were under trees, six percent were on heavy road equipment, and thirty-three percent were at various unknown locations. Less than ten percent of the deaths involved individuals inside buildings; these deaths were primarily due to lightning-caused fires.

Wisconsin has a high frequency of property losses due to lightning. Insurance records show that annually, one out of every fifty farms is struck by lightning or has a fire that may have been caused by lightning. Generally, rural fires are more destructive than urban fires because of limited lightning protection devices, isolation, longer response times, and inadequate water supplies.

The probability of thunderstorms occurring in Marquette County is medium, as these storms usually occur one or more times each year during the summer in Wisconsin and Marquette County. The likelihood of damage from thunderstorms is considered low. Damage from thunderstorms is usually a result of hail, lightning, winds, and/or flash flooding that can occur as part of the storm.

The likelihood of damage due to hail is considered high, and damage to roofs, vehicles, and crops would also be considered high. Over the past 25 years, hail has occurred 53 times for an average of just over two times per year.

Marquette County has a very high probability of lightning occurrence; the likelihood of damage due to lightning is considered low. This was determined by recognizing that while lightning usually happens in conjunction with thunderstorms, and that Wisconsin and Marquette County generally have several severe thunderstorms per summer, the specific location of a lightning strike is small when compared to the size of the county overall, which moderates its likelihood in any given location.

The University of Wisconsin-Madison, Nelson Institute for Environmental Studies/ Wisconsin DNR's Wisconsin Initiative on Climate Change Impacts[166] shows a scientific consensus that "Wisconsin is likely to become a much warmer state over the next few decades…and…our state is also likely to become somewhat wetter, with a modest increase in total precipitation and in the number

[166] Trends and Projections | Wisconsin Initiative on Climate Change Impacts (WICCI)

of intense rainfall events. The amount of climate change varies by season, with winter experiencing the greatest warming and most likely increase in precipitation." The site's information shows that Marquette County is likely to experience warmer weather and an increase in precipitation for all four seasons of the year, with the greatest increases in winter and summer. This shows an increased likelihood of severe thunderstorms in spring, summer, and fall in Marquette County. Thunderstorms can generate lightning, hail, tornadoes, and strong winds, which should also increase in frequency.

As noted earlier in this plan, the National Risk Index (NRI) tool [167] has been made available by the Federal Emergency Management Agency (FEMA). It calculates a baseline relative risk measurement for 18 natural hazards based on expected annual loss, social vulnerability, and community resilience. Below is data relevant to the hazard discussed in this chapter. It should be noted that the NRI information may not necessarily match the hazard ratings reached by the county and is only being included for reference.

Lightning

Number of Events	776
Annualized Frequency	35.2
Expo. - Building Value ($)	2,156,433,000
Expo. - Population	15,404
Expo. - Population Equiv. ($)	117,070,400,000
Expo. - Total ($)	119,226,833,000
HLR – Buildings ($)	8.37 per 100M
HLR - Population ($)	5.06 per 1B
HLR - Overall Rating	Very Low
EAL - Building Value ($)	6,267
EAL - Population	0
EAL - Population Equiv. ($)	20,599
EAL - Total ($)	26,866
EAL Score	13.06
EAL Rating	Relatively Low
Risk Score	8.22

[167] https://hazards.fema.gov/nri/map

Risk Rating	Very Low

"Expo." = Exposure / "HLR" = Historic Loss Ratio / "EAL" = Expected Annual Loss

Hail

Number of Events	116
Annualized Frequency	3.6
Expo. - Building Value ($)	2,156,433,000
Expo. - Population	15,404
Expo. - Population Equiv. ($)	117,070,400,000
Expo. - Agricultural Value ($)	71,475,000
Expo. - Total ($)	119,298,308,000
HLR – Buildings ($)	2.62 per 100K
HLR - Population ($)	3.29 per 100M
HLR - Agriculture ($)	1.49 per 1M
HLR - Overall Rating	Relatively Low
EAL - Building Value ($)	201,899
EAL - Population	0
EAL - Population Equiv. ($)	13,855
EAL - Agricultural Value ($)	38,713
EAL - Total ($)	254,467
EAL Score	15.60
EAL Rating	Relatively Moderate
Risk Score	13.52
Risk Rating	Relatively Moderate

"Expo." = Exposure / "HLR" = Historic Loss Ratio / "EAL" = Expected Annual Loss

Tables showing thunderstorm, lightning, and hail events that have been recorded in Marquette County by the National Weather Service[168] can be found in Appendix B. The workgroup believes that there has been more accurate record-keeping and recording since the 1990s.

It should be noted that the table represents only the hail incidents reported to the National Weather Service. One limitation of the source data is that it showed no property or crop loss, death, or

168 http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN

injury, while it is likely that there was some loss incurred. This table from the NWS is obviously not reporting all the incidents of lightning strikes, but those with notable/reportable losses from the past, and can reasonably be inferred to show that there is exposure to potential future losses. The table also shows an increasing frequency in the occurrence of hailstorms.

Vulnerability

Thunderstorms, which often produce hail and lightning and may occasionally spawn tornadoes, high windstorms, or flash flooding, can damage many types of infrastructure. Marquette County's thunderstorm vulnerabilities due to associated hail, lightning, winds, and flood waters are discussed in this and other chapters of this plan.

Lightning, which often occurs in conjunction with thunderstorms and hail, can damage many types of infrastructure, such as electric lines/poles/transformers, telephone lines, and radio communication equipment. These pieces of infrastructure are needed by both first response agencies and the general community to ensure safe transport, warm, safe homes, and good internal and external communications abilities.

Residential and business properties are liable to receive damage either because of a lightning strike causing a fire or other type of direct damage, or by overloading electronic equipment (e.g., computers, televisions) that have not been properly connected to a surge protector. This latter concern is especially important to business and government, which in modern America rely on computers and other electronic equipment to manage the large amounts of data manipulated in our information-based economy.

Lightning can damage agricultural assets, including farm buildings, standing crops, and livestock. It is also one of the major sources of ignition for forests and wildfires.

Hail, typically occurring in conjunction with thunderstorms and lightning, can damage many types of infrastructure. Public and private vehicles (e.g., campers, boats, cars, trucks) are liable to have their windshields cracked, bodies dented, and paint damaged because of hail. This damage can occur, depending on the size of the hail, whether the vehicle is moving through the storm or is stationary. Hail on the roadway can also cause vehicles to slide off the road. Vehicle damage and iced roadways are of particular concern when you consider the need for emergency vehicles such as police cars, fire trucks, and ambulances to quickly move to assist victims in a disaster.

Hail can also damage critical infrastructure such as street signs, electric lines/poles/transformers, telephone lines, and radio communication equipment. These pieces of infrastructure are needed by both first response agencies and the general community to ensure safe transport, warm, safe homes, and good internal and external communications abilities.

Residential and business properties are liable to receive damage to signs, siding, billboards, trees, and windows. Manufactured housing is particularly vulnerable to damage due to its lower construction standards.

Hail can be particularly damaging to agricultural concerns, damaging farm buildings, standing crops, and livestock. As described previously, the agricultural sector is an important economic driver in Marquette County. Hail is a localized phenomenon, and it would be difficult to estimate losses.

Hazard Mitigation Strategies

The goal of thunderstorm, lightning, and hail mitigation activities is to reduce, in a cost-effective manner, the loss of lives and property due to these events in the following ways:

- The goal of mitigating hail is to reduce the amount of financial loss due to these incidents. Insurance is the most widely used

adjustment for crop and property damages due to hail. Hail crop insurance is available from two sources: commercial stock and mutual companies, and the Federal Crop Insurance Corporation (FCIC). Farmers rarely purchase insurance coverage up to the full value of the losses that would result from a severe hailstorm.

- The Marquette County Emergency Management Department provides hail information to the public as part of the spring Severe Weather Awareness Week. Information is shared in location newspapers and at Senior Centers. Social media platforms such as Facebook and Twitter are also used as communication tools for community outreach. Information is put at the Welcome Center and provided at fairs and other events. It will also be placed in racks at the Sheriff's Office and other county and municipal buildings as space is available and/or requested.

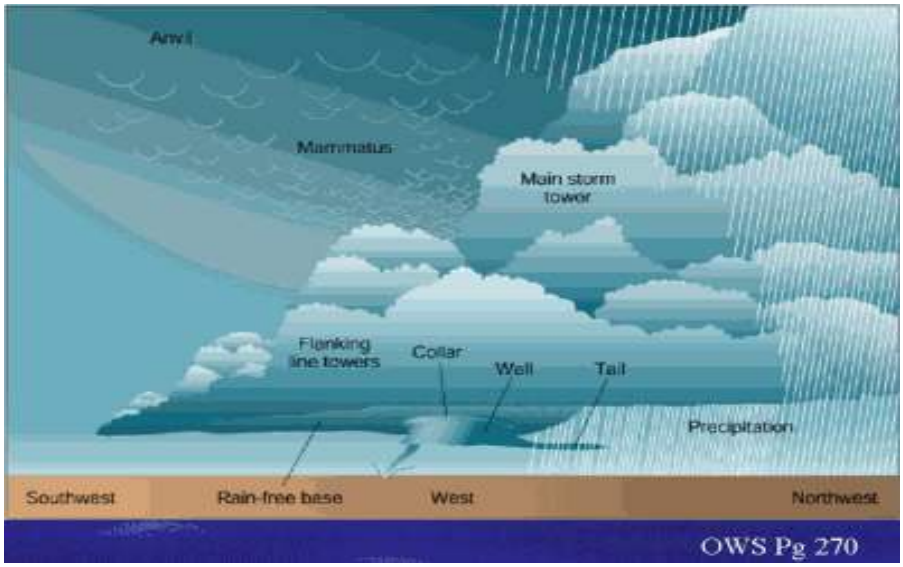
- Federal emergency assistance is available in the form of low-interest loans when a Presidential Disaster is declared or when the United States Department of Agriculture (USDA) declares that a county is eligible for aid. Damage from hailstorms alone is generally not extensive enough to invoke a disaster declaration.

- The use of fire-resistant materials will make existing buildings and future construction less likely to catch fire or will minimize fire damage and spread due to lightning strikes. Surge protectors limit data losses.

The hazard mitigation strategies listed above primarily involve providing information on safety measures and insurance to the public for agricultural concerns and residential and commercial structures. These measures provide basic safety information, but since there is little one can do to prevent damage caused by natural hazards, these measures will do little to reduce damage to existing or future buildings and infrastructure, although the recommended insurance may make recovery easier.

Storms: Tornadoes and High Winds

A tornado is a violently rotating funnel-shaped column of air. The lower end of the column may or may not touch the ground. Average winds in the tornado are between 173 and 250 miles per hour, but winds can exceed 300 miles per hour. It should also be noted that straight-line winds may reach the same speeds and achieve the same destructive force as a tornado.



A derecho is a widespread, long-lived, violent, convectively induced straight-line windstorm that is associated with a fast-moving band of severe thunderstorms, usually taking the form of a bow echo. Derechos blow in the direction of movement of their associated storms; this is like a gust front except that the wind is sustained and generally increases in strength behind the "gust" front. A warm weather phenomenon, derechos occur mostly in summer, especially July, in the northern hemisphere. They can occur at any time of the year and occur as frequently at night as in the daylight hours.

The traditional criteria that distinguish a derecho from a severe thunderstorm are *sustained* winds of 58 mph during the storm as opposed to gusts, high and/or rapidly increasing forward speed, and geographic extent (typically 250 nautical miles in length). In addition, they have a distinctive appearance on radar (bow echo); several unique features, such as the rear inflow notch and bookend vortex

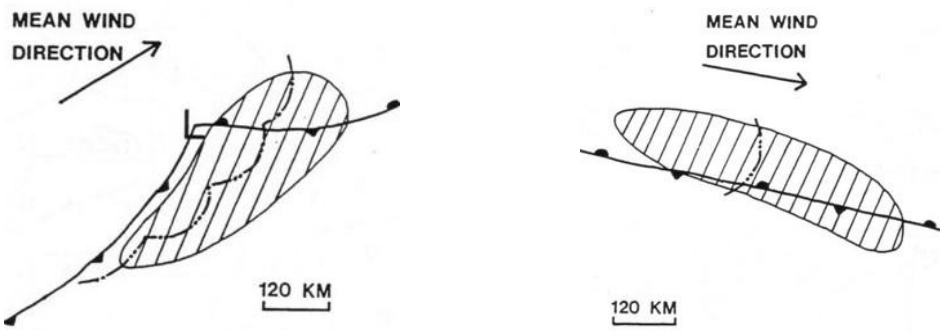
and usually manifest two or more downbursts. There are four types of derechos:[169]

- Serial: Multiple bow echoes embedded in a massive squall line, typically around 250 miles long. This type of derecho is usually associated with a very deep low. Also, because of embedded supercells, tornadoes can easily spin out of these types of derechos.

- Progressive: A small line of thunderstorms takes the bow shape and can travel for hundreds of miles.

- Hybrid: Has characteristics of a serial and progressive derechos. Hybrid derechos are associated with a deep low like serial derechos but are relatively small in size like progressive derechos.

- Low Dewpoint: Occurs in an environment of comparatively limited low-level moisture, with appreciable moisture confined to the mid-levels of the atmosphere.



Physical Characteristics

Tornadoes are visible because low atmospheric pressure in the vortex leads to cooling of the air by expansion and to condensation and formation of water droplets. They are also visible because of the airborne debris and dust in its high winds. Wind and pressure differential are believed to account for ninety percent of tornado damage in most cases. Because tornadoes are associated with storm systems, they usually are accompanied by hail, torrential rain, and intense lightning.

[169] http://en.wikipedia.org/wiki/Derecho

Tornadoes typically produce damage in an area that does not exceed one-fourth mile in width or sixteen miles in length. Tornadoes with track lengths greater than 150 miles have been reported, although such tornadoes are rare.

Tornado damage severity is measured by the Fujita Tornado Scale, which assigns an "F" ("Fujita") value from 0 – 5 to denote the wind speed.

The Fujita Tornado Scale[170]

Category	Wind Speed	Description of Damage
F0	40-72 mph	Light damage. Some damage to chimneys; break branches off trees; push over shallow-rooted trees; damage to sign boards.
F1	73-112 mph	Moderate damage. The lower limit is the beginning of hurricane speed. Roof surfaces peeled off; mobile homes pushed off foundations or overturned; moving autos pushed off roads.
F2	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.
F3	158-206 mph	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; cars lifted off ground and thrown.
F4	207-260 mph	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown off; cars thrown and large missiles generated.
F5	261-318 mph	Incredible damage. Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 100-yards; trees debarked.

On 1 February 2007, the National Weather Service began rating tornadoes using the EF-scale. It is considerably more complicated than the F-scale, and it will allow surveyors to create more precise assessments of tornado severity. Below is a comparison between the Fujita Scale and the EF Scale:

Fujita Scale			Derived EF Scale		Operational EF Scale	
F Number	Fastest ¼ mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	EF Number	3 Second Gust (mph)
0	40-72	45-78	0	65-85	0	65-85
1	73-112	79-117	1	86-109	1	86-110
2	113-157	118-161	2	110-137	2	111-135
3	158-207	162-209	3	138-167	3	136-165
4	208-260	210-261	4	168-199	4	166-200
5	261-318	262-317	5	200-234	5	Over 200

[170] FEMA, 1997

Downburst Characteristics

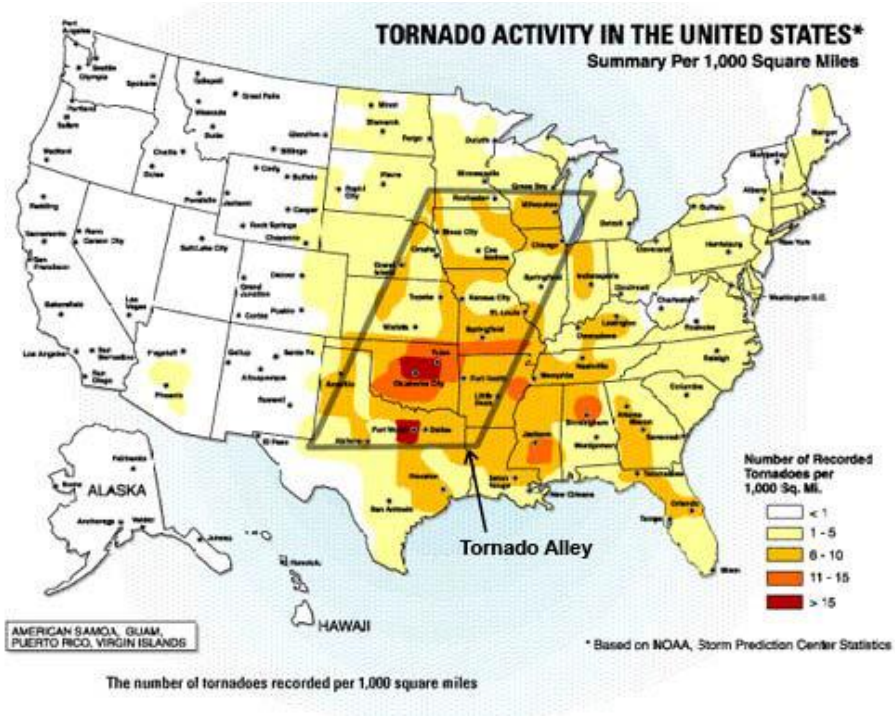
Downburst damage is often highly localized but resembles damage caused by a tornado. In some cases, even an experienced investigator cannot identify the nature of a storm without mapping the direction of the damaging winds over a large area. There are significant interactions between tornadoes and nearby downbursts.

A classic downburst example occurred on 4 July 1977[171] when a severe thunderstorm moved across Northern Wisconsin. Extensive areas of tree and property damage, somewhat like a tornado, were reported. After an aerial survey was completed to map both direction and F-scale intensity of the damaging winds, it was determined that no evidence of a tornado was found anywhere within the path of the damage swath, which was 166 miles long and 17 miles wide. The survey revealed that there were scattered local centers from which straight-line winds diverged outward. These local wind systems were identified as downbursts with at least 25 specific locations recognized by the low-flying aircraft.

Frequency of Occurrence

Wisconsin lies along the northern edge of the nation's tornado belt, which extends northeastward from Oklahoma into Iowa and across to Michigan and Ohio. Winter, spring, and fall tornadoes are more likely to occur in southern Wisconsin than in northern counties.

[171] https://www.spc.noaa.gov/misc/AbtDerechos/casepages/jul41977page.htm



Wisconsin's tornado season runs from the beginning of April through September with the most severe tornadoes typically occurring in April, May and June. Tornadoes have, however, occurred in Wisconsin during every month of the year. Many tornadoes strike in late afternoon or early evening, but they do occur at other times. Deaths, injuries and personal property damage have occurred and will continue to occur in Wisconsin.

Tables showing the frequency of high winds, funnel clouds and tornadoes as reported by the National Weather Service can be found in Appendix B.[172] There has been one funnel cloud and 12 tornadoes reported for the county over the past 25 years, for an average of less than one per year. The probability of Marquette County being struck by a tornado in the future is low and the likelihood of damage from future incidents is very high. The probability of high wind (derecho) and downburst is medium, and the likelihood of damages is very high. All parts of Marquette County are equally susceptible to tornadoes and high winds, although the northwest corner of the county has forested land with a mix of trees that are being killed due to disease (oak wilt); or are being truck-harvested for wood and limbs are left behind.

[172] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN

The University of Wisconsin-Madison, Nelson Institute for Environmental Studies/ Wisconsin DNR's Wisconsin Initiative on Climate Change Impacts[173] shows a scientific consensus that, "Wisconsin is likely to become a much warmer state over the next few decades…and…our state is also likely to become somewhat wetter, with a modest increase in total precipitation and in the number of intense rainfall events. The amount of climate change varies by season, with winter experiencing the greatest warming and most likely increase in precipitation." The site's information shows that Marquette County is likely to experience warmer weather and an increase in precipitation for all four seasons of the year, with the greatest increases in winter and summer. This shows an increased likelihood of severe thunderstorms in spring, summer, and fall in Marquette County. Extra atmospheric energy can increase the frequency and intensity of the severe thunderstorms that generate tornadoes and strong winds.

As noted earlier in this plan, the National Risk Index (NRI) tool [174] has been made available by the Federal Emergency Management Agency (FEMA). It calculates a baseline relative risk measurement for 18 natural hazards based on expected annual loss, social vulnerability, and community resilience. Below is data relevant to the hazard discussed in this chapter. It should be noted that the NRI information may not necessarily match the hazard ratings reached by the county and is only being included for reference.

(Tornadoes)

Number of Events	24
Annualized Frequency	0.3
Expo. - Building Value ($)	2,156,433,000
Expo. - Population	15,404
Expo. - Agricultural Value ($)	71,475,000
Expo. - Population Equiv. ($)	117,070,400,000
Expo. - Total ($)	119,298,308,000
HLR – Buildings ($)	2.93 per 10K
HLR - Population ($)	5.02 per 1M
HLR - Agriculture ($)	9.96 per 100K
HLR - Overall Rating	Very Low

[173] Trends and Projections | Wisconsin Initiative on Climate Change Impacts (WICCI)
[174] https://hazards.fema.gov/nri/map

EAL - Building Value ($)	181,640
EAL - Population	0.02
EAL - Agricultural Value ($)	2,050
EAL - Population Equiv. ($)	169,353
EAL - Total ($)	353,044
EAL Score	13.55
EAL Rating	Relatively Low
Risk Score	12.77
Risk Rating	Relatively Low

"Expo." = Exposure / "HLR" = Historic Loss Ratio / "EAL" = Expected Annual Loss

(Strong Winds)

Number of Events	119
Annualized Frequency	3.7
Expo. - Building Value ($)	2,156,433,000
Expo. - Population	15,404
Expo. - Population Equiv. ($)	117,070,400,000
Expo. - Agricultural Value ($)	71,475,000
Expo. - Total ($)	119,298,308,000
HLR – Buildings ($)	1.41 per 100K
HLR - Population ($)	2.16 per 10M
HLR - Agriculture ($)	2.11 per 10K
HLR - Overall Rating	Relatively Low
EAL - Building Value ($)	110,766
EAL - Population	0.01
EAL - Population Equiv. ($)	92,991
EAL - Agricultural Value ($)	56,494
EAL - Total ($)	260,251
EAL Score	24.39
EAL Rating	Relatively Moderate
Risk Score	13.33
Risk Rating	Relatively Low

"Expo." = Exposure / "HLR" = Historic Loss Ratio / "EAL" = Expected Annual Loss

Vulnerability

Injury to people is a primary concern in tornado and high wind events. Two of the highest risk places are mobile home parks and campgrounds; Marquette County has some of each type of property. Both have high concentrations of people in a small area, generally have structures that provide less protection than standard construction homes, and usually do not provide storm shelters. Other places of concern during these types of events include critical emergency facilities such as hospitals and public works/highway garages, police stations, and fire departments, which contain equipment and services needed by the public after a tornado.

Mobile Home Parks [175] [176]	
Park Name	**Location**
Birchcrest Mobile Home Community	Montello
Call of the Wild Mobile Home Park	Packwaukee
Oak Grove Trailer Park	Neshkoro
Fox Marquette Estates	Buffalo
Fisher's Crooked River Park	Shields
Doeparke's Mobile Home Park	Mecan
Reinke's Lighthouse Mobile Home Park	Montello
Duck Inn Mobile Home Park	Mecan
West Resort Mobile Home Park	Montello
Pine View Estates	Mecan
Witte's Mobile Home Park	Montello
Lake Arrowhead Mobile Home Park	Montello
Draeger's Mobile Home Park	Montello

[175] https://www.mobilehome.net/mobile-home-park-directory/wisconsin/Marquette-county
[176] https://www.mhvillage.com/parks/wi/marquette-county

Krauses's Mobile Home Park	Montello
Kilby Lake Mobile Home Park	Montello
Buffalo Lake Mobile Home Park	Montello
Echoes Resort	Montello
Lakeside Mobile Home Park	Montello
Lakeview Mobile Home Park	Montello
Wilderness Park	Montello
Coon's Deep Lake Mobile Home Park	Oxford
Meadowbrook	Westfield
Marquette Meadows	Packwaukee
Puckaway Shores	Montello

Campgrounds [177]	
Campground Name	**Location**
Lake Mason Campground	Briggsville
Wagon Wheel Campground	Briggsville
Buffalo Lake Camping Resort	Montello
Call of the Wild Campground	Montello
Hunter's Crooked River Campground	Montello
Kilby Lake Campground	Montello
Lakeside Campground	Montello
Lake Arrowhead Campground	Montello
Ox Creek Resort and RV Campground	Montello

[177] https://www.hikercentral.com/campcounty/Wisconsin_Marquette.html and www.google.com

Puckaway Sands Resort	Montello
Sunrise Resort Campground	Montello
Wilderness Campground	Montello
Coon's Deep Lake Campground	Oxford
Camp Fairwood	Westfield
Trails End Campgrounds	Westfield
Paradise Pines	Neshkoro
Lakeview Campground and Bar	Montello
Wildwood Campground	Westfield

Schools, in addition to holding children, are a major type of structure used as community disaster shelters, and their loss might therefore affect the community on several levels (e.g., the death or injury of children, the loss of a community housing shelter). School gymnasiums are often the specific location of the community shelter, but they are especially vulnerable in tornadoes because the large-span roof structure is often not adequately supported.

Community infrastructure, such as power lines, telephone lines, radio towers, and street signs, is often vulnerable to damage from tornadoes and high winds and can be expensive to replace. The loss of radio towers that hold public safety communications repeaters can adversely impact the ability of first responders to mount an effective response; damage to towers that hold public media equipment may adversely impact the ability to distribute adequate public information.

Residential property is likely to have siding and roofing materials removed, windows broken from flying debris, and garages blown down due to light construction techniques. Perhaps one of the largest types of loss on private property is due to tree damage, which is generally not covered by federal disaster assistance.

Business properties are at risk of having damage to infrastructure, including signs, windows, siding, and billboards. Agricultural buildings, such as barns and silos, are also generally not constructed in a manner that makes them wind resistant, which can lead to the loss of livestock and harvest. Standing crops are also at risk from high winds and tornadoes.

Hazard Mitigation Strategies

The goal of tornado and high wind mitigation activities is to reduce, in a cost-effective manner, the loss of lives and property due to these events. Marquette County has a history of damage to buildings and infrastructure due to tornadoes and high winds.

An effective warning system is the single most important resource for alerting the public to a tornado hazard, which is critical to the main goal of saving lives and reducing property losses. Forecasting of tornadoes is difficult, however, because of the suddenness of their onset, their relatively short duration, the extreme variability of a tornado striking area, limited knowledge of tornado dynamics, and the limitations of the weather observation system. Tornado sirens are municipally owned and maintained in Marquette County, although many municipalities are moving away from the use of sirens.

Marquette County Emergency Management promotes the use of National Oceanic and Atmospheric Administration (NOAA) weather radios for public alert and notification and uses the RAVE notification system to relay emergency messages to citizens.

During the past several years, there has been a statewide Tornado Awareness Week in late March or April. Marquette County actively promotes tornado safety public information as well as other summer severe weather public awareness and educational efforts, including applicable links on the county website, local newspapers, businesses, and Senior Centers. Social media platforms are also used as communication tools for community outreach. Marquette County also assists the National Weather Service with sponsoring tornado spotter training and organizing local tornado spotter networks.

The county would like to explore upgrading or building tornado shelters in areas where they are deficient, such as mobile home parks and campgrounds. Possible locations include:

- Marquette County Fairgrounds
- Forest Street Trailer Park in the City of Montello
- Market Street Trailer Park in the Village of Westfield
- Area in the vicinity of Oxford Park and the funeral home (southeast corner) in the Village of Oxford

Additionally, the county will continue to promote active tree management, which is completed as needed by the Highway Department and municipalities.

Storms: Winter

Due to its position along the northern edge of the United States, Wisconsin, including Marquette County, is highly susceptible to a variety of winter weather storm phenomena.

Picture of snow drifts after the “Groundhog Day Blizzard” in 2011.

Physical Characteristics

The National Weather Service descriptions of winter storm elements are:

- Heavy snowfall - Accumulation of six or more inches of snow in a 12-hour period or eight or more inches in a 24-hour period.
- Blizzard - An occurrence of sustained wind speeds in excess of 35 miles per hour (mph) accompanied by heavy snowfall or large amounts of blowing or drifting snow.
- Ice storm - An occurrence of rain falling from warmer upper layers of the atmosphere to the colder ground, freezing upon contact with the ground and exposed objects near the ground.
- Freezing drizzle/freezing rain - The effect of drizzle or rain freezing upon impact on objects with a temperature of 32 degrees Fahrenheit or below.

- Sleet - Solid grains or pellets of ice formed by the freezing of raindrops or the refreezing of largely melted snowflakes. This ice does not cling to surfaces.

- Wind chill - An apparent temperature that incorporates the combined effect of wind and low air temperatures on exposed skin.

In October 2024, the National Weather Service simplified its cold-weather forecast products[178] to improve the messaging of winter hazards and provide better decision support. They noted that *"These changes seek to clarify that cold can be dangerous with or without wind, addressing a common misconception that extreme cold is only tied to colder temperatures when there is wind. Dangerously cold weather can accompany or follow wintry precipitation, and the cold messaging can be overshadowed by the wintry precipitation."*

Extreme Cold Consolidation and Renaming
- Wind Chill Watches renamed to Extreme Cold Watch
- Wind Chill Warnings renamed to Extreme Cold Warning
- Wind Chill Advisory renamed a Cold Weather Advisory

Freeze Consolidation
- Hard Freeze Watches renamed to Freeze Watch
- Hard Freeze Warnings consolidated to Freeze Warning

178 https://www.weather.gov/news/243009-cold-hazard-simplification

In Wisconsin, the winter storm season generally runs from November through March, and Wisconsin residents are most familiar with heavy snowstorms, blizzards, sleet, and ice storms. Most Wisconsin snowfalls are between one and three inches per occurrence, although heavy snowfalls that produce at least ten inches may occur four or five times per season. Northwestern Wisconsin encounters more blizzards than the southeastern portions of the state.

Damage from ice storms can occur when more than half an inch of rain freezes on trees and utility wires, especially if the rain is accompanied by high winds. Another danger comes from the accumulation of frozen rain pellets on the ground during a sleet storm, which can make driving hazardous.

Frequency of Occurrence

Annual snowfall in Wisconsin varies between thirty inches in southern counties to one hundred inches in the north. Storm tracks originating in the southern Rockies or Plains states that move northeastward produce the heaviest precipitation, usually six to twelve inches. Low-pressure systems originating in the northwest (Alberta) tend to produce only light snowfalls of two to four inches. Snowfalls associated with Alberta lows occur more frequently with colder weather.

Although massive blizzards are rare in Wisconsin, blizzard-like conditions often exist during heavy snowstorms when gusty winds cause blowing and drifting of snow. For example, near blizzard conditions existed in Wisconsin in February 2011 when record snowfalls were recorded in many areas, and very strong northeast winds were gusting from 45 to 60 mph for an extended period. While Marquette County was not in the band of heaviest snow in this storm, it has conditions that could spawn such storms.

Both ice and sleet storms can occur at any time throughout the winter season, which is generally considered to be from November to April. Ice storms of disastrous proportions occurred in central Wisconsin in February 1922 and in southern Wisconsin in March 1976. A Presidential Disaster Declaration occurred because of the 1976 storm. Utility crews from surrounding states were called in to restore power, which was off for up to ten days in some areas. Other storms of lesser magnitude caused power outages and treacherous highway conditions.

Tables showing winter storm statistics as reported by the National Weather Service can be found in Appendix B.[179] The tables show that there is little property damage, but this does not consider the public costs of managing the snow and ice, as well as the costs of managing utility repairs to power, telephone, and water lines. There have been three recorded blizzard events for the county over the past 25 years.

The probability that there will be severe winter storms in Marquette County is very high, and the likelihood that those storms will cause significant damage is medium for both snow and ice.

The University of Wisconsin-Madison, Nelson Institute for Environmental Studies/ Wisconsin DNR's Wisconsin Initiative on Climate Change Impacts[180] shows a scientific consensus that, "Wisconsin is likely to become a much warmer state over the next few decades…and…our state is also likely to become somewhat wetter, with a modest increase in total precipitation and in the number of intense rainfall events. The amount of climate change varies by season, with winter experiencing the greatest warming and most likely increase in precipitation." The site's information shows that Marquette County is likely to experience warmer weather and an increase in precipitation for all four seasons of the year, with the greatest increases in winter and summer. This shows a decreased likelihood of severe winter storms in Marquette County. It should be noted that this change does not mean that Marquette County is unlikely to have freezing weather. Instead, it is more likely that the additional atmospheric moisture forecasted will fall as freezing rain, sleet, and ice instead of as snow.

As noted earlier in this plan, the National Risk Index (NRI) tool [181] has been made available by the Federal Emergency Management Agency (FEMA). It calculates a baseline relative risk measurement for 18 natural hazards based on expected annual loss, social vulnerability, and community resilience. Below is data relevant to the hazard discussed in this chapter. It should be noted that the NRI information may not necessarily match the hazard ratings reached by the county and is only being included for reference.

(Winter Weather)

[179] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=55%2CWISCONSIN
[180] Trends and Projections | Wisconsin Initiative on Climate Change Impacts (WICCI)
[181] https://hazards.fema.gov/nri/map

Number of Events	49
Annualized Frequency	4
Expo. - Building Value ($)	2,156,432,752
Expo. - Population	15,404
Expo. - Agricultural Value ($)	71,475,000
Expo. - Population Equiv. ($)	117,070,376,478
Expo. - Total ($)	119,298,284,229
HLR – Buildings ($)	6.98 per 100M
HLR - Population ($)	4.26 per 100M
HLR - Agriculture ($)	1.16 per M
HLR - Overall Rating	Very Low
EAL - Building Value ($)	608
EAL - Population	0
EAL - Agricultural Value ($)	334
EAL - Population Equiv. ($)	20,119
EAL - Total ($)	21,061
EAL Score	14.84
EAL Rating	Relatively Low
Risk Score	11.24
Risk Rating	Relatively Low

"Expo." = Exposure / "HLR" = Historic Loss Ratio / "EAL" = Expected Annual Loss

(Ice Storms)

Number of Events	10
Annualized Frequency	0.1
Expo. - Building Value ($)	2,125,154,265
Expo. - Population	15,282.42
Expo. - Population Equiv. ($)	116,146,357,794
Expo. - Total ($)	118,271,512,059
HLR – Buildings ($)	2.48 per 1M
HLR - Population ($)	5.12 per 10M
HLR - Overall Rating	Very Low
EAL - Building Value ($)	634

EAL - Population	0
EAL - Population Equiv. ($)	8,156
EAL - Total ($)	8,790
EAL Score	9.28
EAL Rating	Very Low
Risk Score	6.76
Risk Rating	Very Low

"Expo." = Exposure / "HLR" = Historic Loss Ratio / "EAL" = Expected Annual Loss

Vulnerability

Winter storms present a serious threat to the health and safety of affected citizens and can result in significant damage to property. Heavy snow or accumulated ice can cause the structural collapse of homes, commercial buildings, and agricultural structures; down power lines; or isolate people from assistance or services by impeding transportation by the general public, emergency responders, and public transportation resources.

The loss of electrical service and/or the blocking of transportation routes can adversely affect the ability of commercial enterprises to conduct business. This economic injury may be felt by both the business owner and employees, unable to work during this period.

Hazard Mitigation Strategies

The goal of winter storm mitigation activities is to reduce, in a cost-effective manner, the loss of lives and property due to these events.

The Marquette County Emergency Operations Plan provides for the coordination of public safety support agencies such as the American Red Cross and for resource acquisitions during winter emergencies.

Winter safety information is prepared and distributed to the media and the public by the Marquette County Emergency Management Department during Winter Awareness Week in November. Preparedness information is shared in local newspapers and at Senior Centers, businesses, and other locations. Social media

platforms are also used as communication tools for community outreach.

During a storm, the public is advised to monitor local radio, television and NOAA weather alert radios for up-to-date forecasts. The Marquette County Emergency Management Department continues to promote and implement modern hazard warning systems. Emergency Management will explore alternatives to increase severe weather warning (e.g., tornado sirens, call-out phone bank).

The hazard mitigation strategies listed above involve providing information on general safety measures to the public, which provides basic safety information, and increasing the road condition information and salt stores. Since response to winter storms is primarily a government and/or corporate function comprised of tasks such as clearing roads of snow and ice and repairing downed utility lines (discussed in the next chapter), these are reasonable measures that can be employed to reduce damages to existing or future buildings and infrastructure.

Utility Failure

A utility emergency is a disruption to the building services, usually defined as electrical power, water, natural gas, and/or sewage, which restricts the ability of people to safely occupy the facility. Electrical power or natural gas outages are often caused by a fuel shortage caused by an oil embargo, power failure, or natural disaster. Disruptions to the water and sewage systems are often the direct result of a natural disaster (e.g., flooding) or are indirect losses due to another failure (e.g., a power outage disrupts the pumping of water and/or sewage).

Physical Characteristics

Modern society is very dependent on electrical power for normal living and is therefore quite disrupted by the loss of power. Most power outages last about fifteen minutes to one hour. If longer, the utilities will inform the local news media of the anticipated duration of the outage. Thunderstorms with lightning are a possible cause of power failure.

Fuel shortages can be caused by localized imbalances in supply. Labor strikes, severe cold weather, or snowstorms can also cause a local shortage.

Utility systems are important in hazard mitigation planning because of the dependency on water, wastewater treatment, gas service, electricity, and communications. Because of this reliance and vulnerability to hazards, utility systems must be identified for this plan.

Utility providers in Marquette County include:

Electricity: Pioneer Power and Light Company / Westfield Milling and Electric Company, WE Energies, Alliant Energy, Adams-Columbia Electric Cooperative, and Eagle Creek Renewable Energy.

Natural Gas: Alliant Energy Wisconsin Gas

Telephone: Verizon, Marquette-Adams Telephone Cooperative, and CenturyLink.

Water/Sewer: The City of Montello has the only public water system in the county. Residents in the county's towns and villages obtain their water supply from private wells. The City of Montello and the Villages of Endeavor, Neshkoro, Oxford, and Westfield all have municipal wastewater treatment facilities. Residents located within Sanitary District No. 1 in the central part of the Town of Packwaukee, on the north side of Buffalo Lake, are also served by public sanitary sewer service.

Rural residents usually heat their homes with propane. During the winter of 2014, there was a propane shortage due to five factors:

1. An increase in the amount of propane used to dry corn due to a late crop harvest, coinciding with heavy rains, depleted supplies last fall.
2. From November 28 to December 18, a major pipeline supplying propane to Wisconsin, Minnesota, and Iowa was temporarily closed for maintenance.
3. Colder-than-normal winter temperatures.
4. An increase in exports of propane.
5. Constrained rail service.

On January 25, 2014, the Governor declared a state of emergency in response to the shortage, and the state provided an estimated $31.2 million in funding to residents of Burnett, Polk, and Washburn Counties. During this period, suppliers were rationing propane, forcing people to use alternative heat sources, which can cause carbon monoxide poisoning or may lead to fires.

Thunderstorms with lightning are a possible cause of power failure. Fuel shortages can be caused by localized imbalances in supply. Labor strikes, severe cold weather, or snowstorms can also cause a local shortage.

The water and sewage systems are most often a function of a municipal system and are usually found in more urbanized areas. Rural water is often provided by individual wells found on each property, and sewage is managed by a septic system, also found on each individual property. Both municipal and individual systems are vulnerable to flooding, which can overwhelm the sewage systems and contaminate both municipal and private wells. Both types of systems are also vulnerable to electrical power loss because the electrical system powers the pumps and lift stations that move and treat the water and sewage.

Frequency of Occurrence

Marquette County has several short power outages per year, but does not have a history of extended power outages. The possibility always exists that a man-made or natural disaster could affect the power system for an extended period.

The workgroup agreed that Marquette County has a low likelihood of utility failures with a high risk of damage, death, or injury due to a loss, except for gas service being very low during summer months. The probabilities depend on the type of utility. Obviously, power outages are more likely to occur and the severity is greater in areas of higher human population (i.e., urban areas) but the loss of power to rural customers, while affecting fewer people, generally lasts longer and can be as life-threatening, especially if a person with functional and access needs (e.g., the elderly, the young, those on special medical equipment) is involved.

Vulnerability

The failure of a utility to function can have a wide-ranging impact in Marquette County. People, especially those with functional and access needs, in residential properties may not be able to safely live in their homes because of inadequate heat, the inability to cook, etc. Businesses, including the utilities themselves, may lose money due to the inability to produce goods and services for which they can bill. While there are generally back-up generators on sewage lift stations in Marquette County, other utilities may also be non-operational due to damaged infrastructure, which can be very expensive to replace and/or repair. Critical infrastructure such as hospitals, schools, and governmental facilities may not be able to operate or may have to

operate at a reduced capacity due to the loss of utility services. Facilities with hazardous materials that are required to report under the Emergency Planning and Community Right-to-Know Act (EPCRA) may not be able to adequately control and contain their chemicals, and there may be a release of hazardous materials that can impact people or the environment.

Agricultural assets may be impacted by the loss of utilities because extreme temperatures reduce the volume of livestock products, and products such as milk may not be able to be properly stored. Modern farms also require a large amount of automation for feeding, watering, and managing the wastes of the facility.

Finally, transportation on roadways may become unsafe due to the loss of directional and streetlights.

Hazard Mitigation Strategies

The goal of utility failure mitigation activities is to reduce, in a cost-effective manner, the loss of lives and property due to these events.

Marquette County has worked directly with the utility companies and emergency management responders in formulating emergency management plans. During a fuel or power shortage, residents, schools, industry, and businesses will be asked to take measures to conserve fuel. If the fuel shortage reaches a critical stage, all non-essential facilities will be closed, and contingency plans will be activated.

In the event of a prolonged power outage, Marquette County has generators available to provide power for radio communication and EOC operation. Evacuation and shelter arrangements have been prepared in case of a severe power outage. Marquette County Emergency Management Department will continually review power needs for emergency operations and provide generators/hook-ups as needed to critical infrastructure.

Additional strategies include:

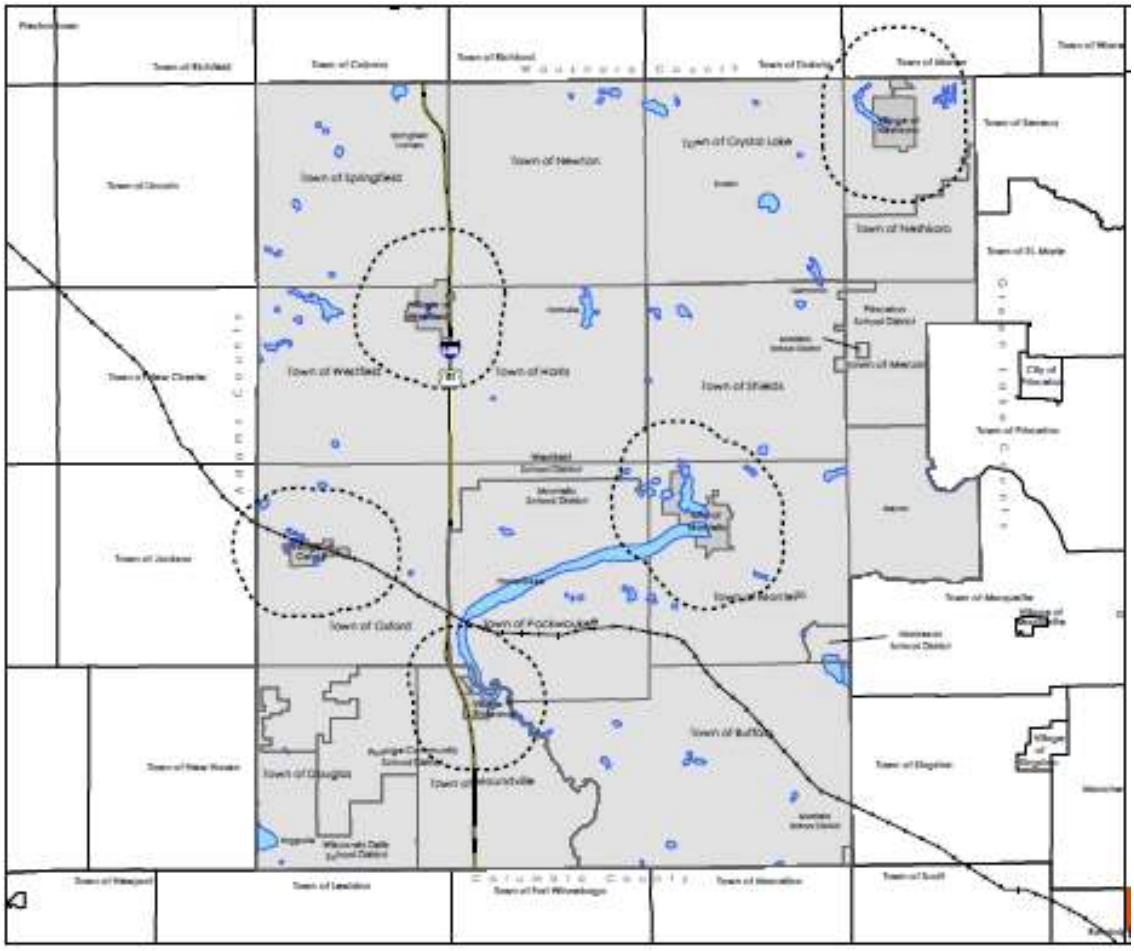
- Assess the power situation in governmental infrastructure and shelters to protect critical facilities and infrastructure. Provide generators/hook-ups as needed.
- Create a plan after the evaluation to include identifying which locations would benefit from an external panel versus a

generator. Potential targets include lift stations, water facilities, fire departments, the Emergency Operations Center, and Public Works buildings. Shelters and schools are fairly well set up, but should still be assessed. The school in Oxford may not have a generator.

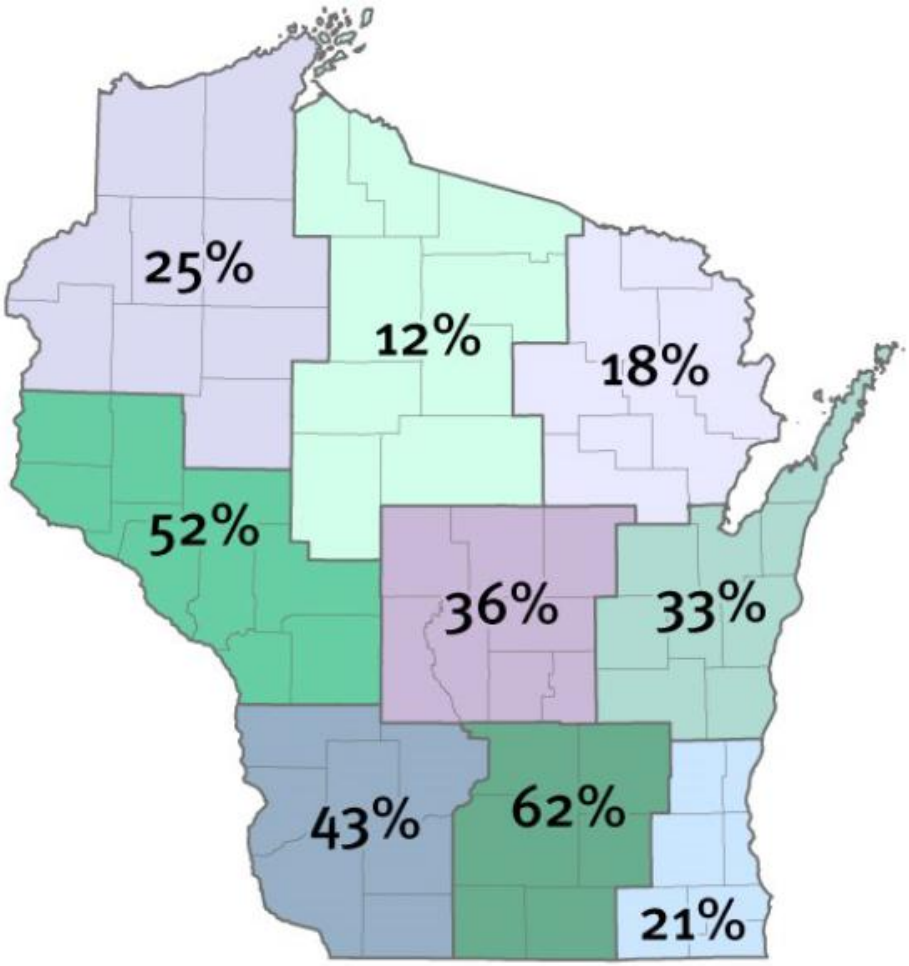
- The Town of Douglas administration and fire department will discuss power failure concerns and determine if mitigation is necessary.
- The City of Montello will purchase a backup generator for the sewer plant using community funds.
- Review existing school shelter plans at the Montello School District and determine if generators will stay or be moved. The school district continues to provide community sheltering, and plans are reviewed regularly. Generators are maintained for emergency power needs.

Appendix A: Maps

Marquette County Municipal Divisions



Percentage of Private Wells with Detectable Herbicides or Herbicide Metabolites (2001)[182]

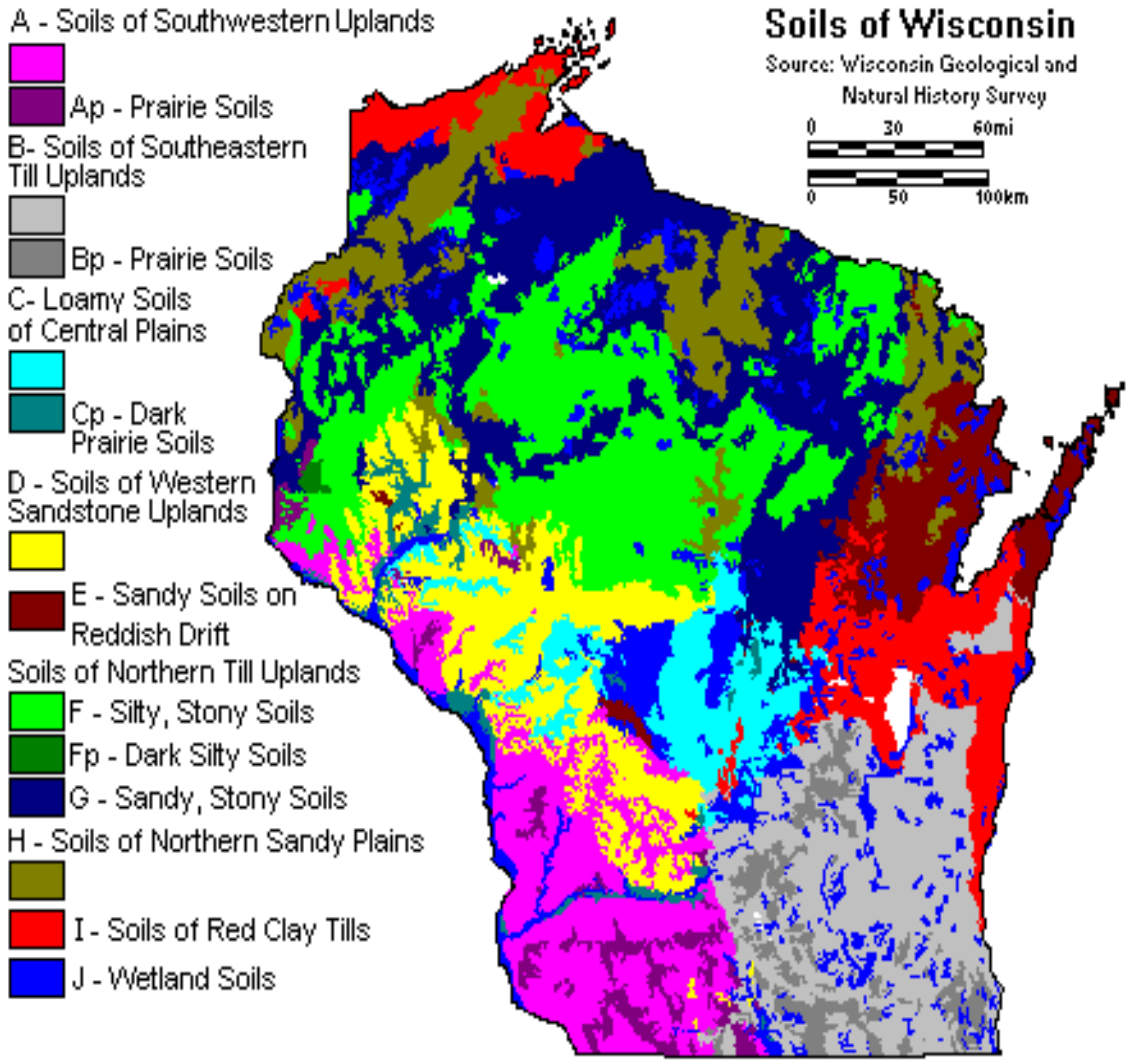


Herbicide data: Wisconsin Department of Agriculture, Trade and Consumer Protection, 2002, Agricultural chemicals in Wisconsin groundwater: final report, *http://www.datcp.state.wi.us/arm/agriculture/land-water/environ_quality/pdf/arm-pub-98.pdf*

Figure created for the "Protecting Wisconsin's Groundwater Through Comprehensive Planning" web site, 2007, *http://wi.water.usgs.gov/gwcomp/*

[182] https://wi.water.usgs.gov/gwcomp/find/marquette/pesticidestate.html

Soils Types[183]

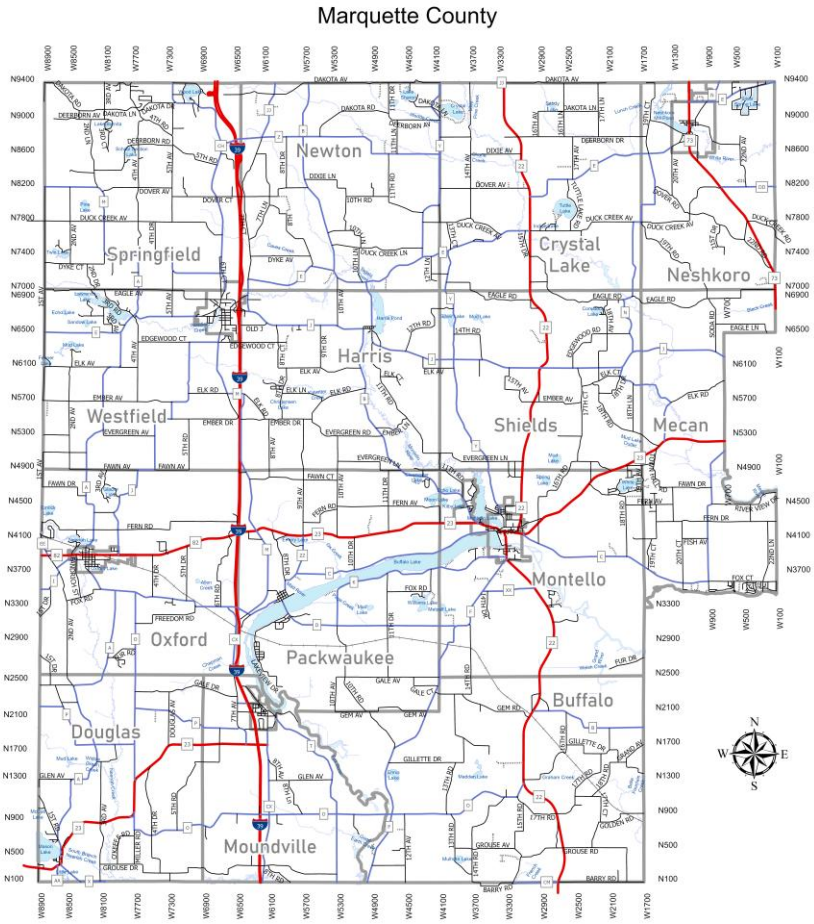


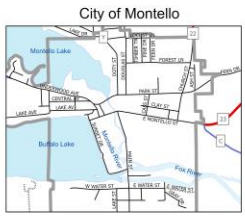
[183] Source: *Soils of Wisconsin* compiled by F. D. Hole, 1973; Wisconsin Geological and Natural History Survey Map, scale (approx.) 1: 3,150,000.

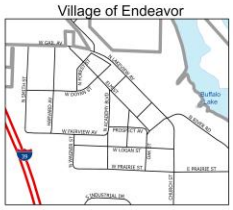
Marquette County Road Functional Classification [184]

[184] https://wisconsindot.gov/Documents/projects/data-plan/plan-res/functional/rural/marquette.pdf

Marquette County Road Network

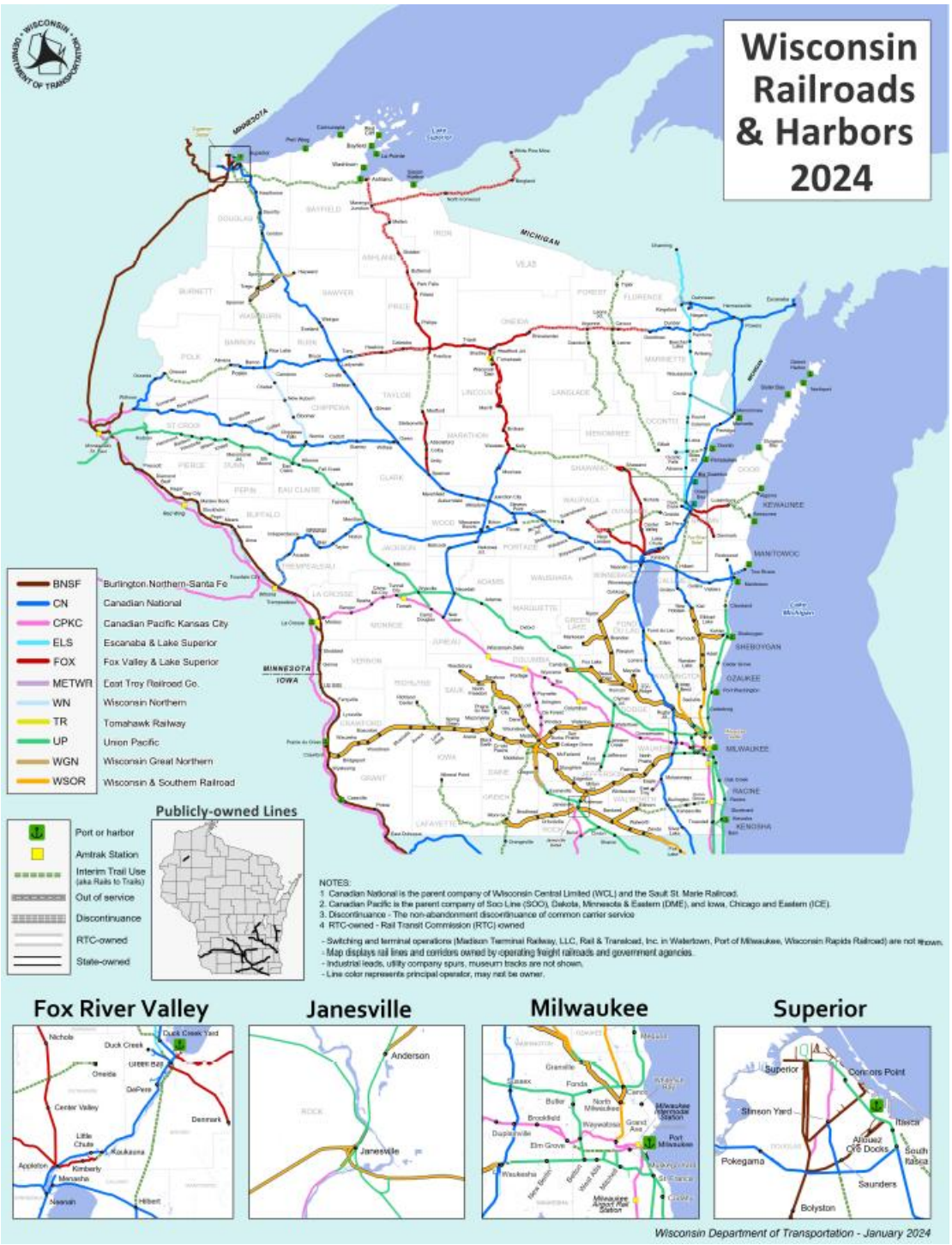






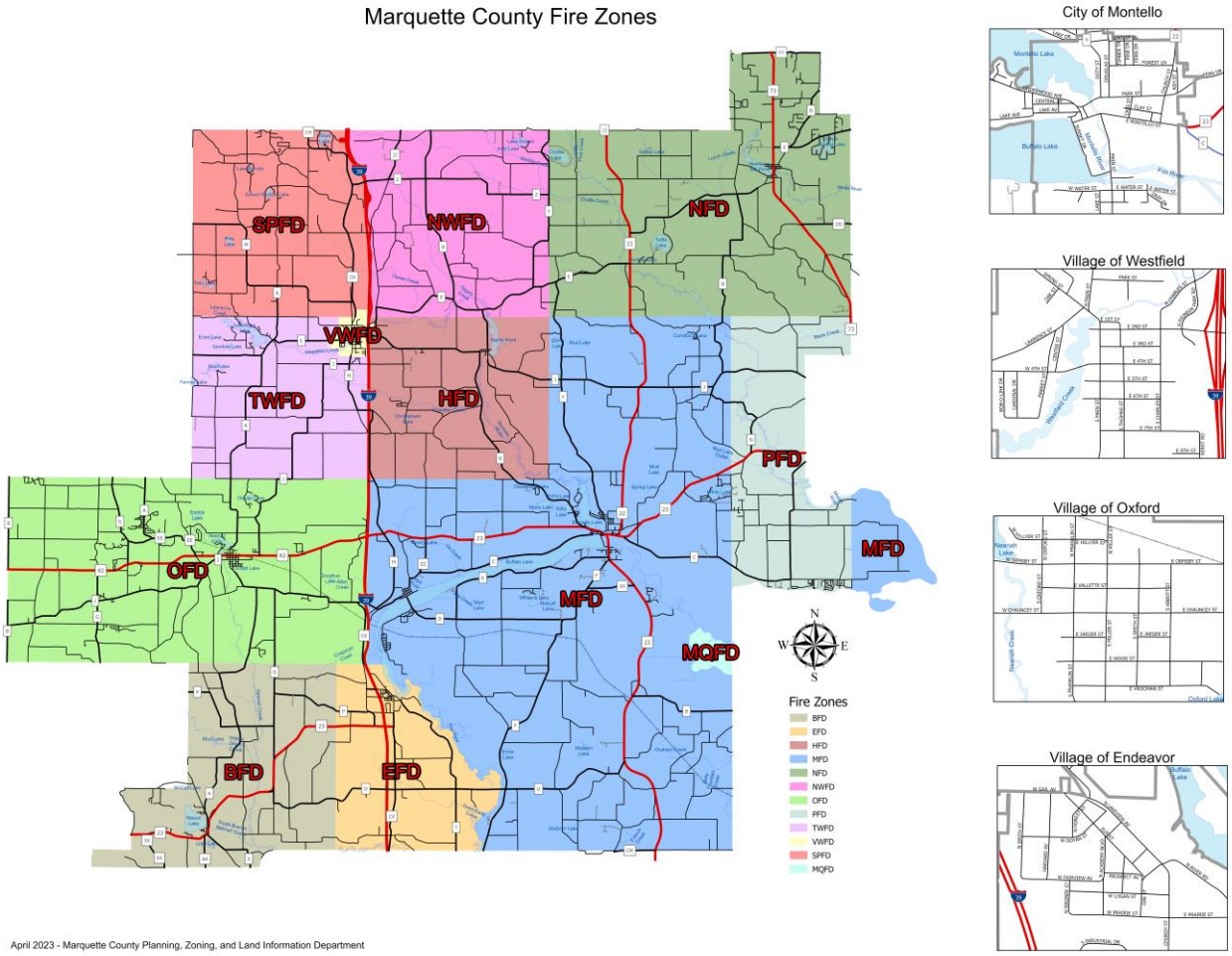
April 2023 - Marquette County Planning, Zoning, and Land Information Department

Wisconsin Railroads and Harbors [185]

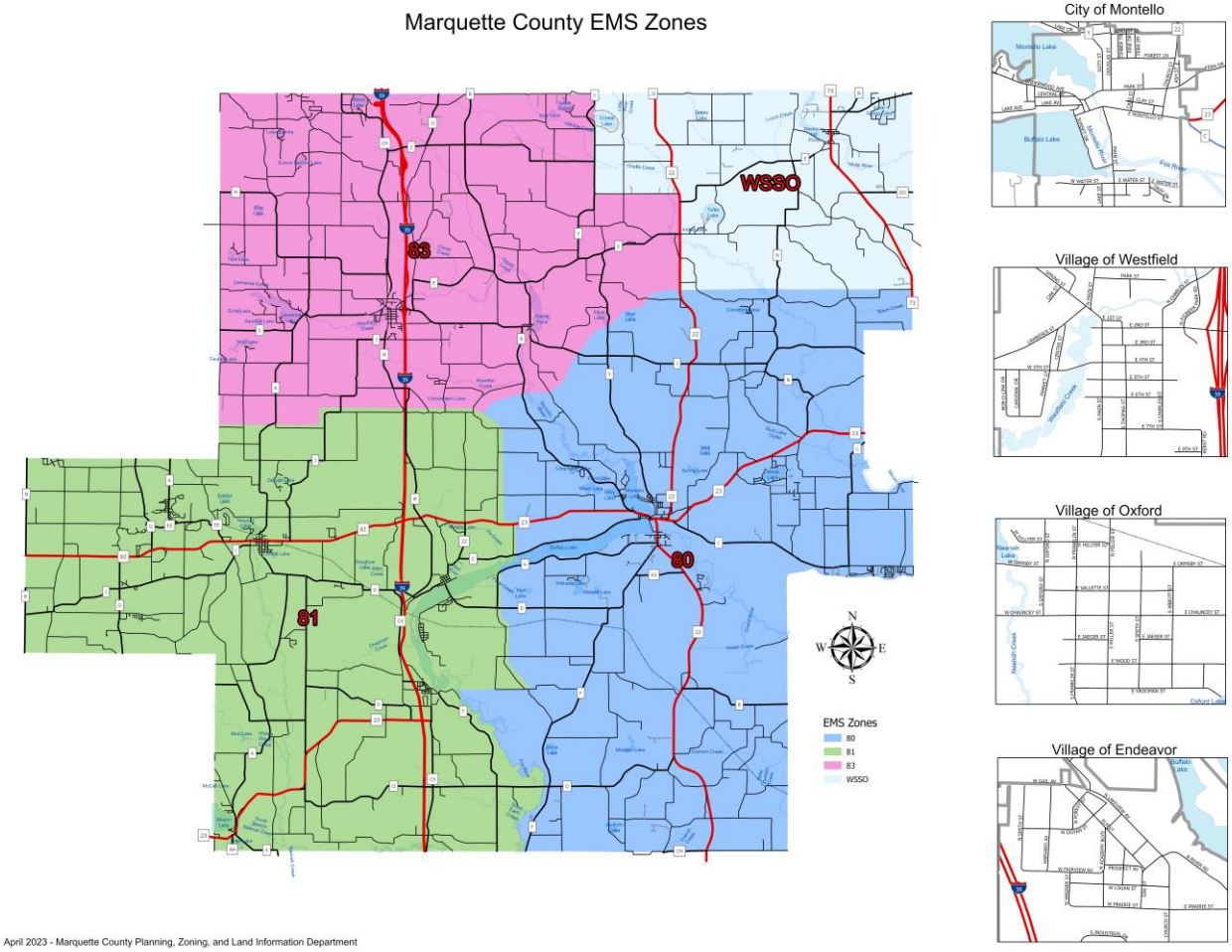


[185] https://wisconsindot.gov/Documents/travel/rail/railmap.pdf

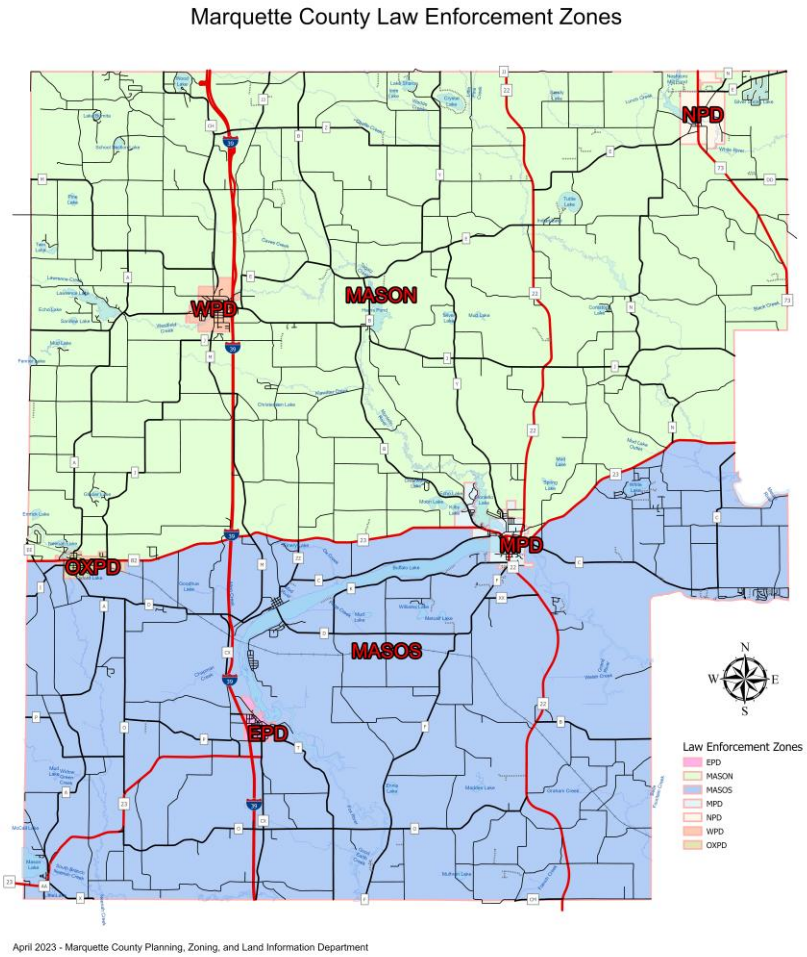
Marquette County Fire Zones



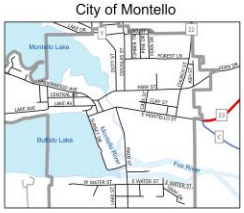
Marquette County EMS Zones



Marquette County Law Enforcement Zones

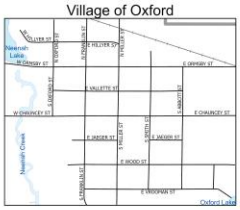


City of Montello

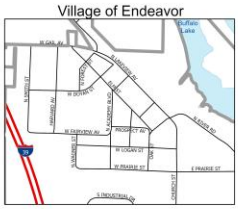


Village of Westfield

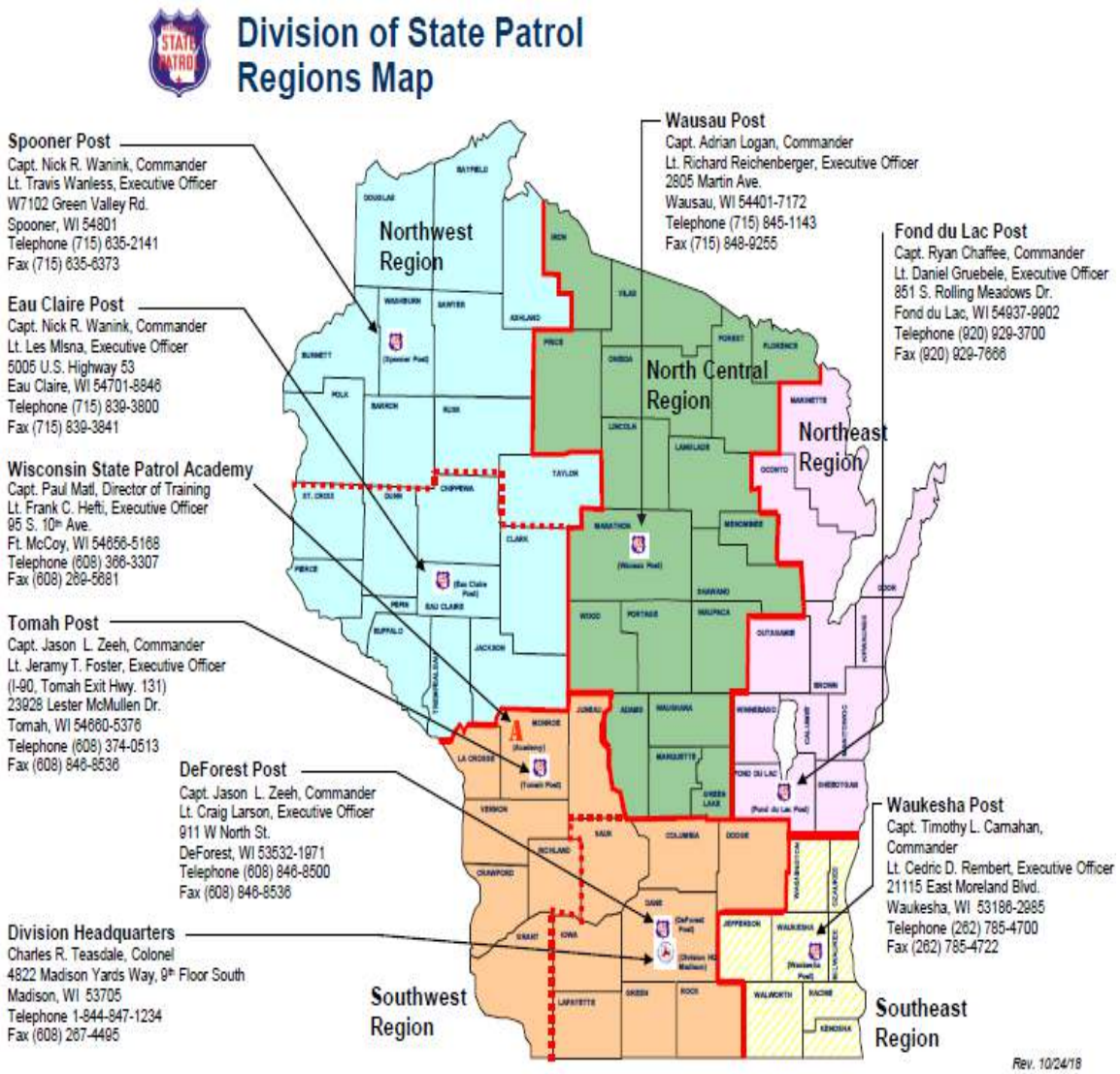
Village of Oxford



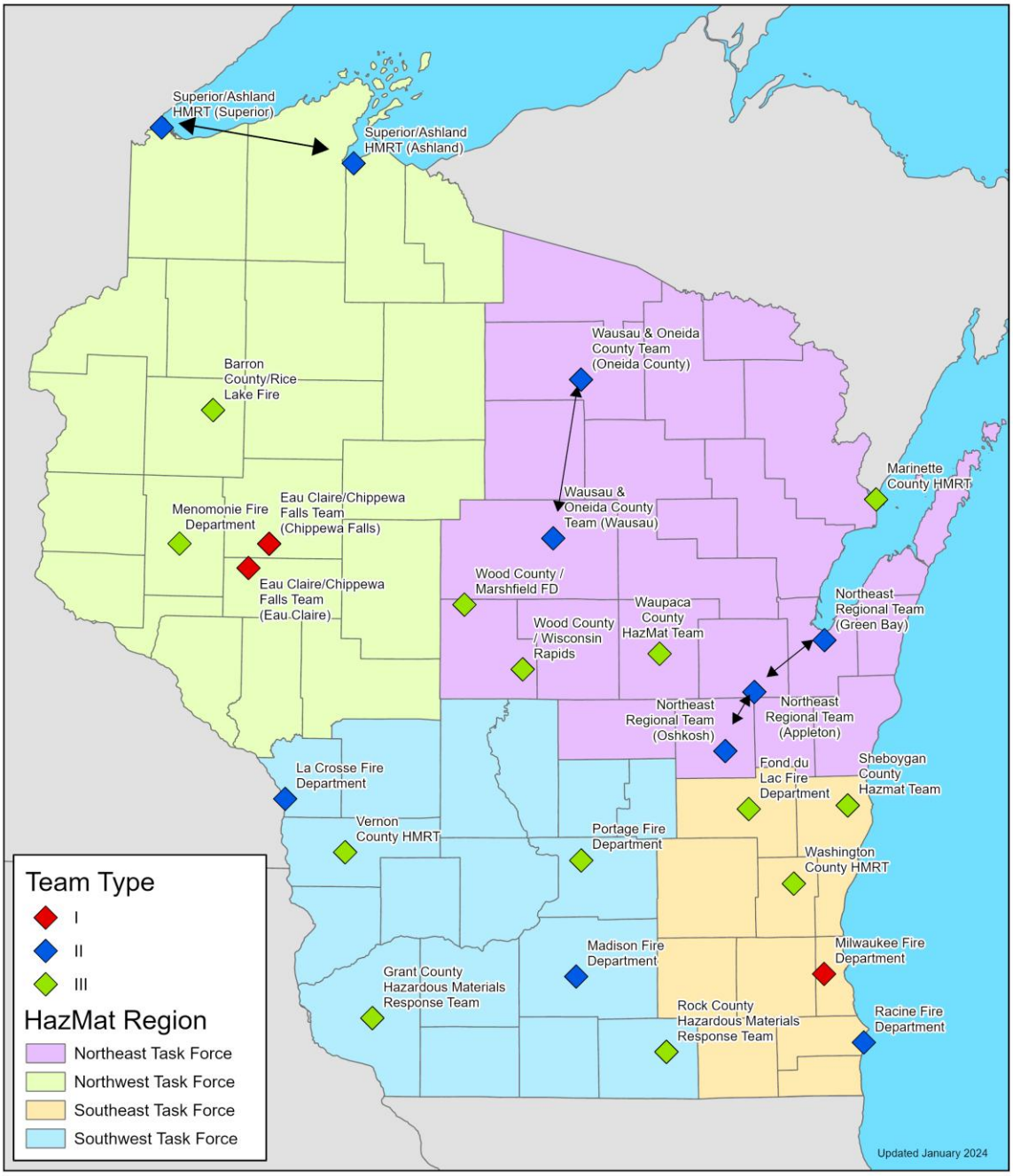
Village of Endeavor



Wisconsin State Patrol Regions

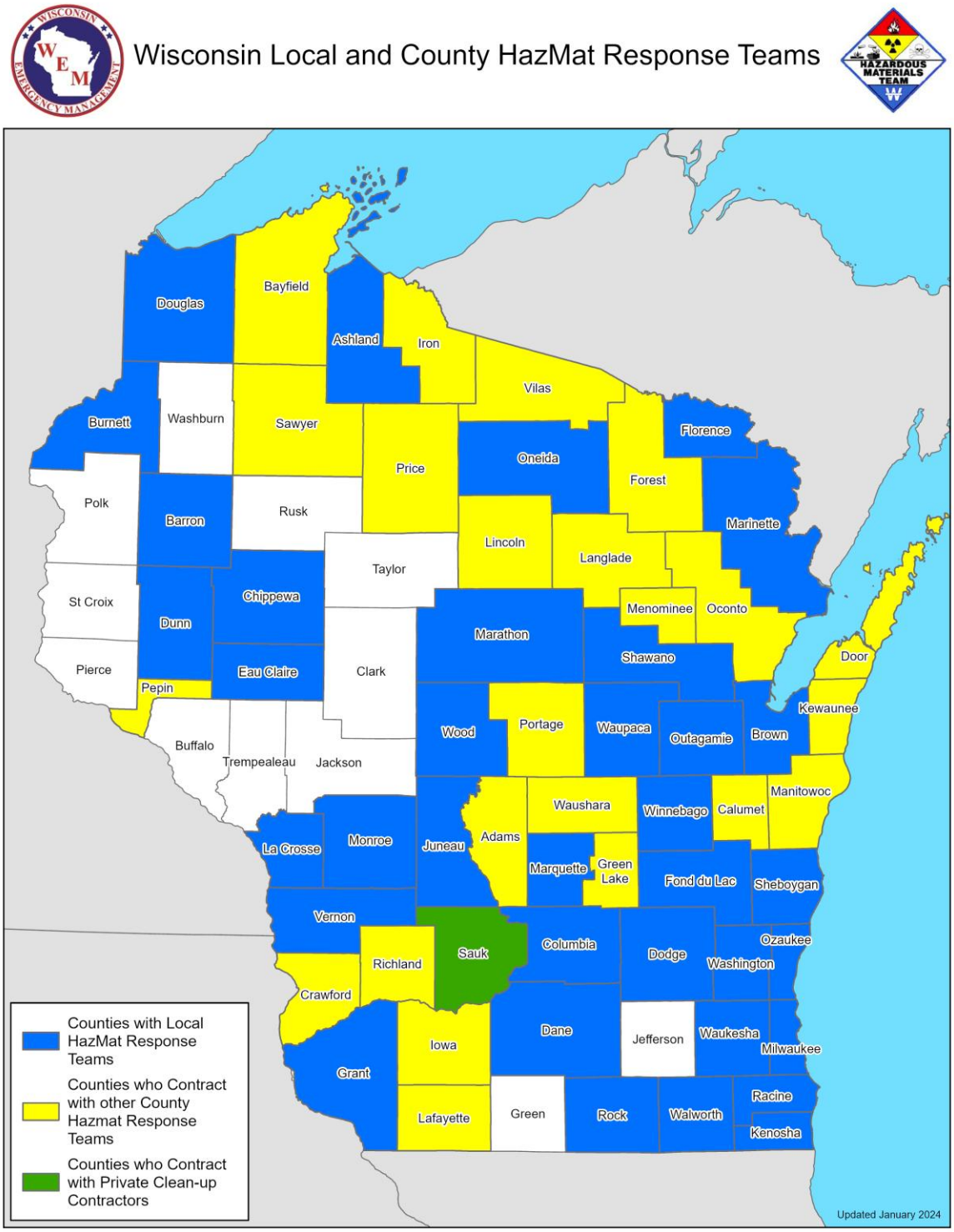


Wisconsin's Regional & County/Local HazMat Response Teams[186]



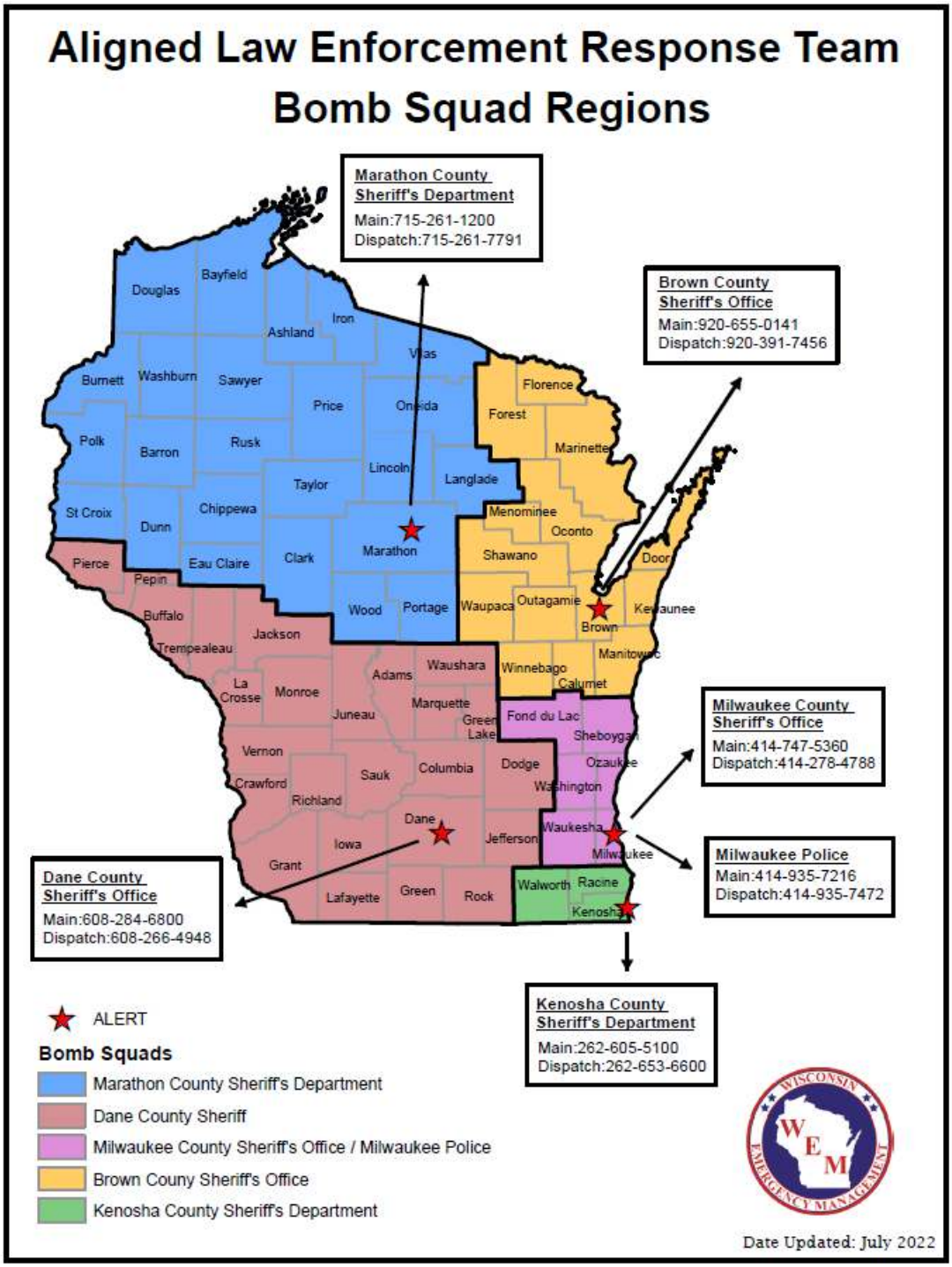
186 https://wem.wi.gov/response-teams/#whmrs

Wisconsin Hazardous Materials Response Teams[187]



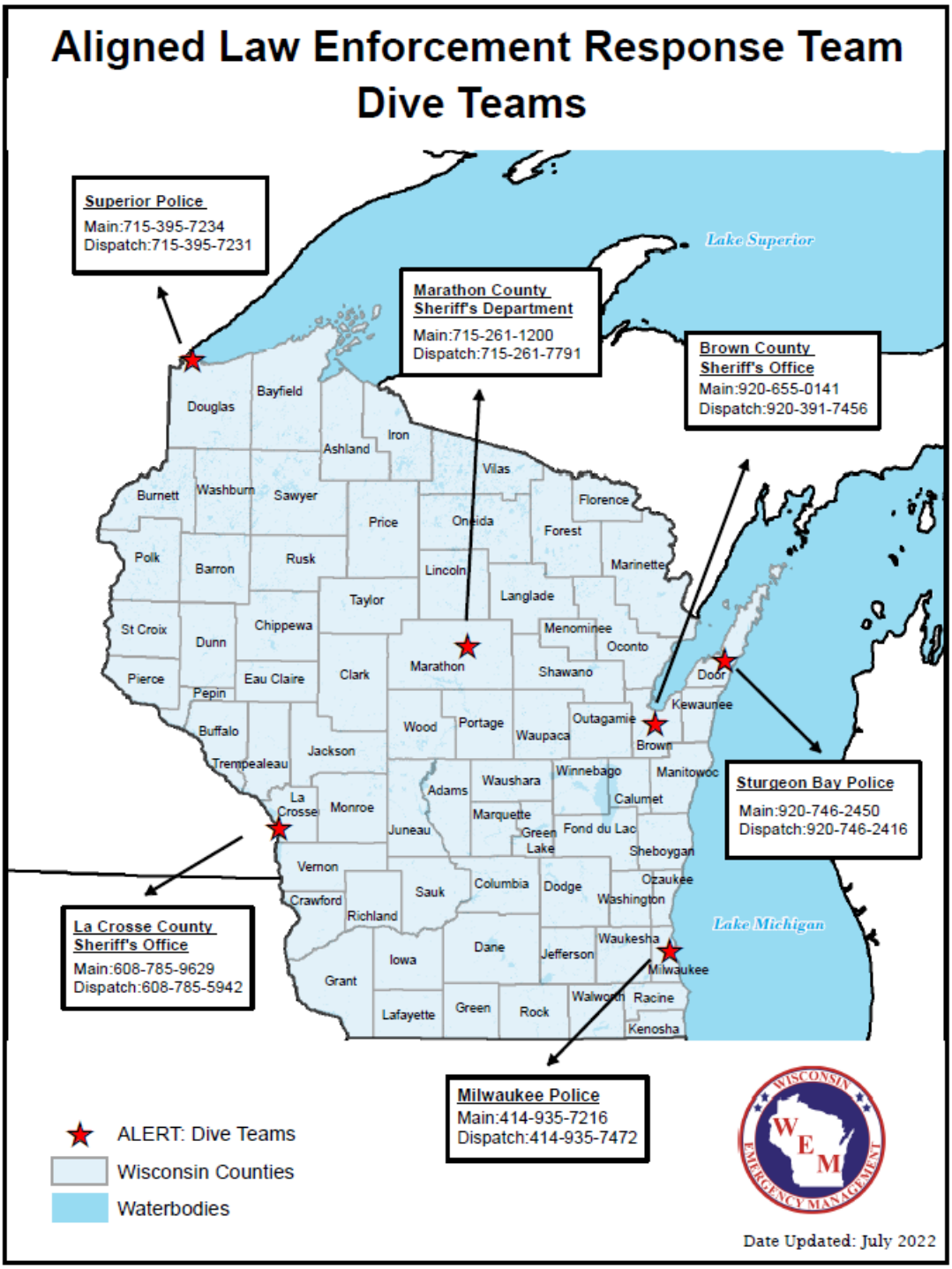
187 https://wem.wi.gov/response-teams/#whmrs

Wisconsin Bomb Squad Regions [188]



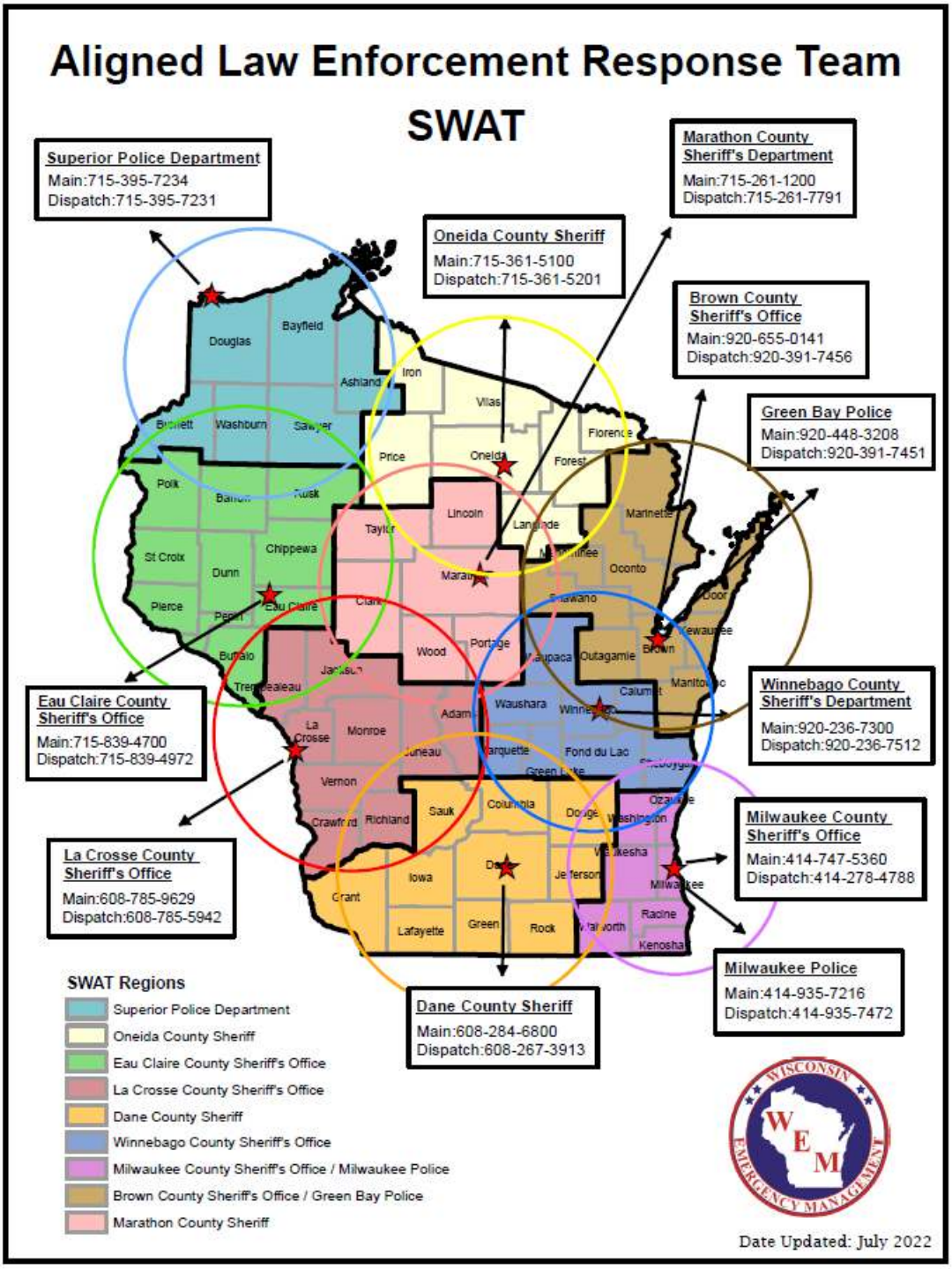
[188] https://wem.wi.gov/wp-content/library/response/ALERT_BombSquad_Map_22.pdf

Wisconsin Dive Teams [189]



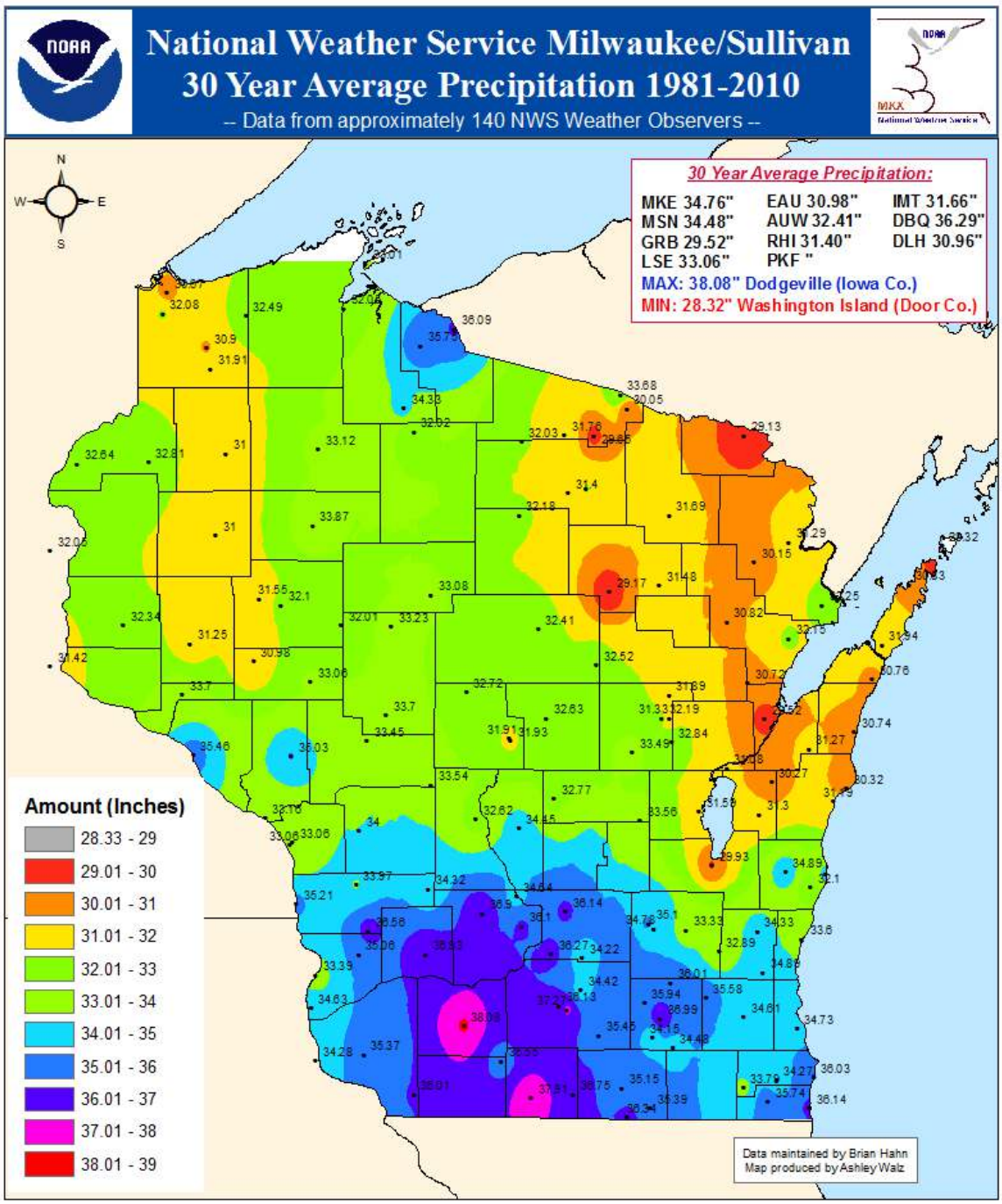
[189] https://wem.wi.gov/wp-content/library/response/ALERT_Dive_Teams_22.pdf

Wisconsin SWAT Regions [190]



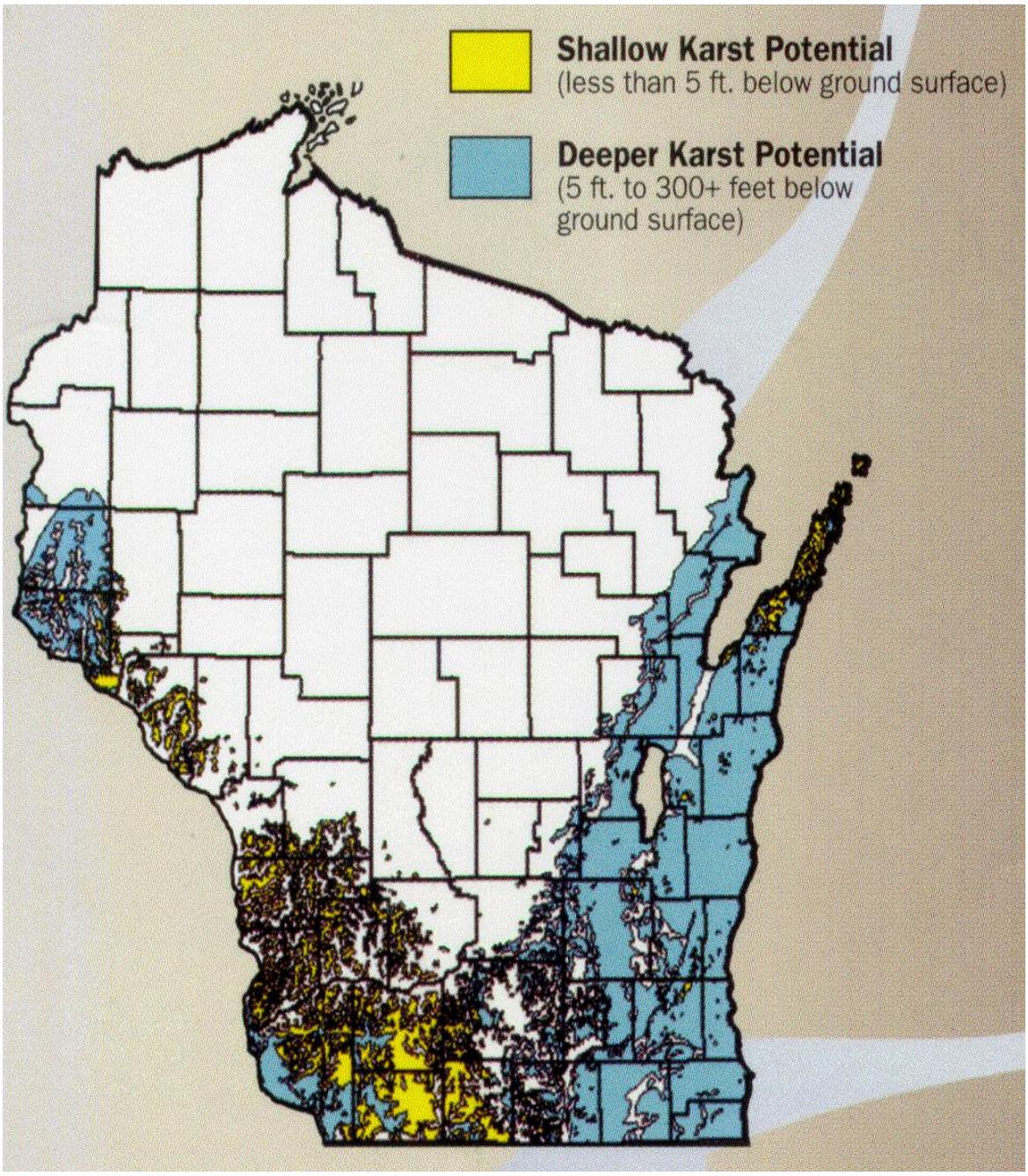
[190] https://wem.wi.gov/wp-content/library/response/ALERT_SWAT_Map_7_22.pdf

Wisconsin 30-Year Average Precipitation [191]



[191] http://www.crh.noaa.gov/images/mkx/climate/avg_30_year_precip.png

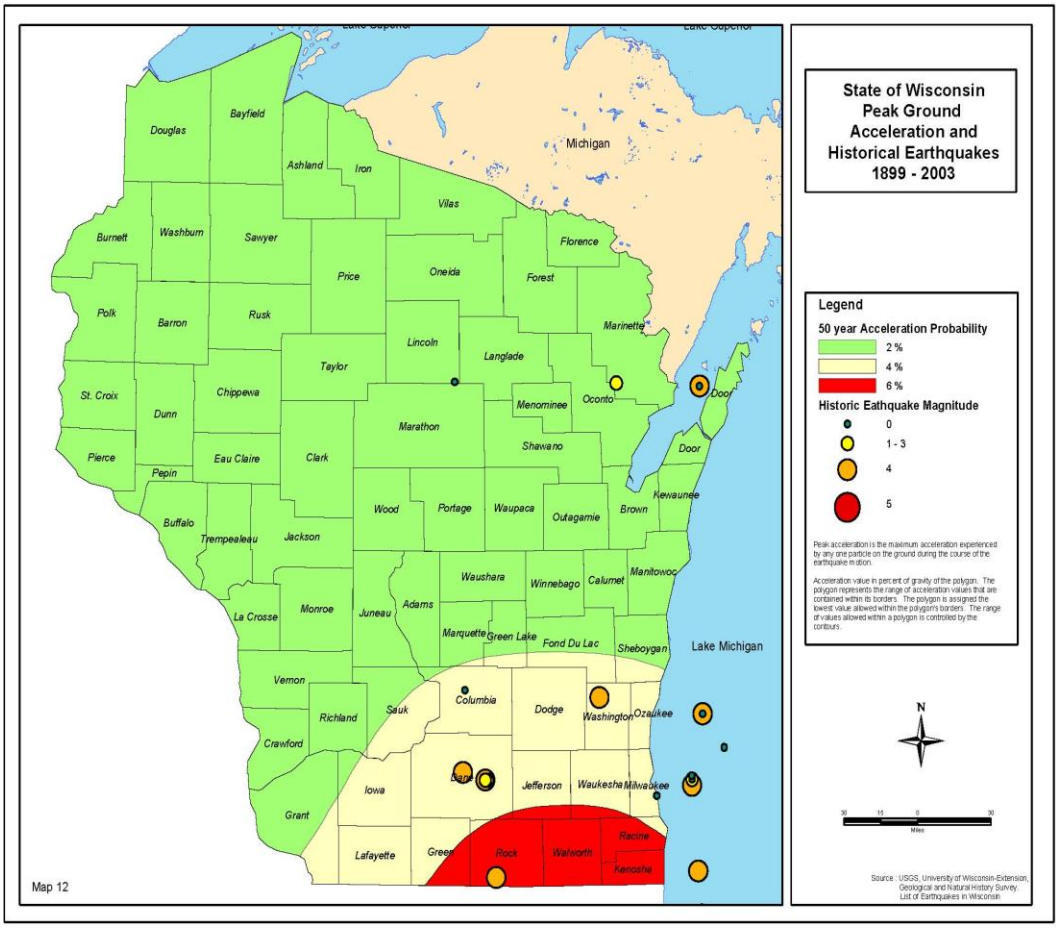
Karst Potential [192]



[192] Wisconsin State Hazard Mitigation Plan

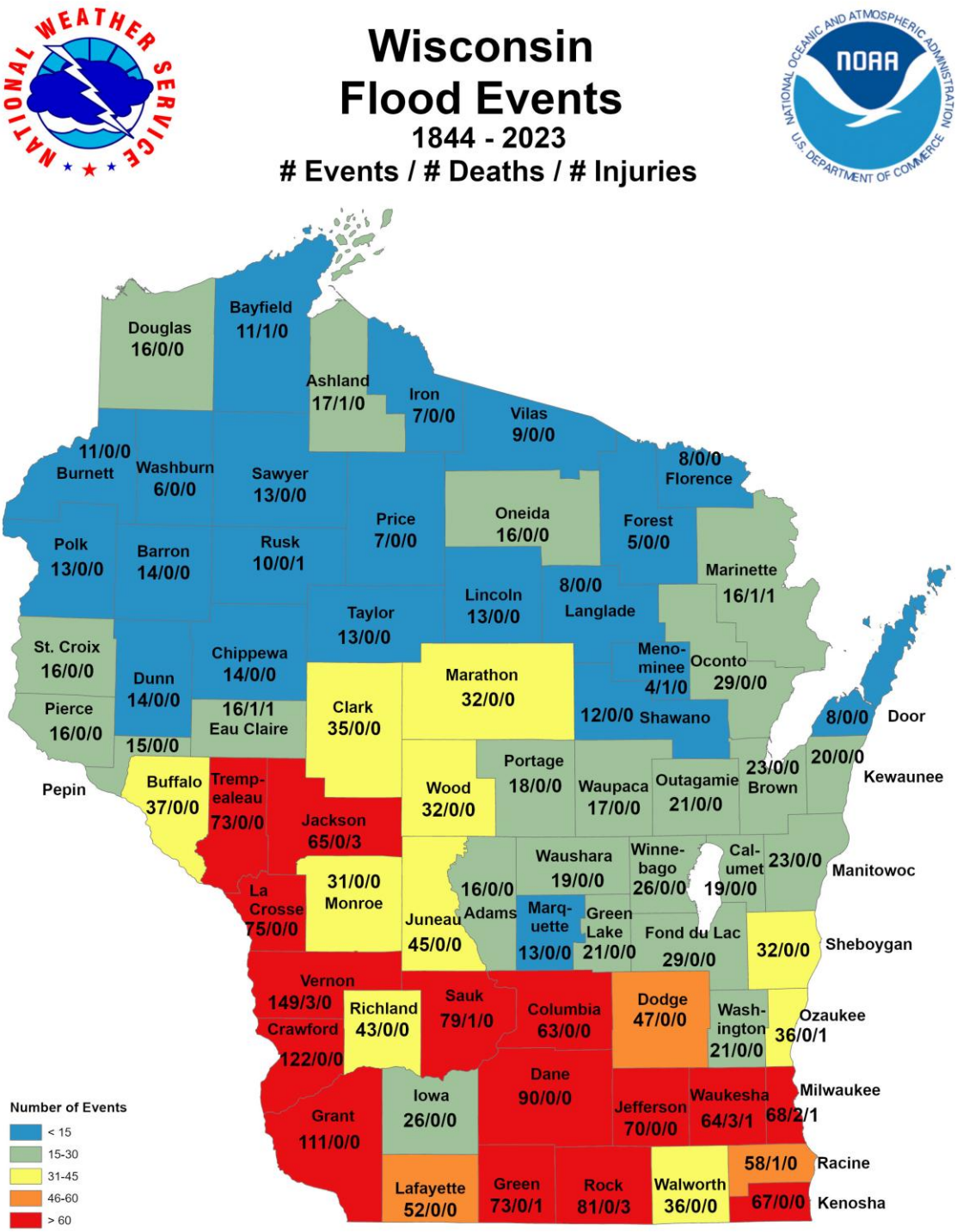
Earthquakes in Wisconsin [193]

Peak Ground Acceleration Contours and Historical Earthquakes in Wisconsin

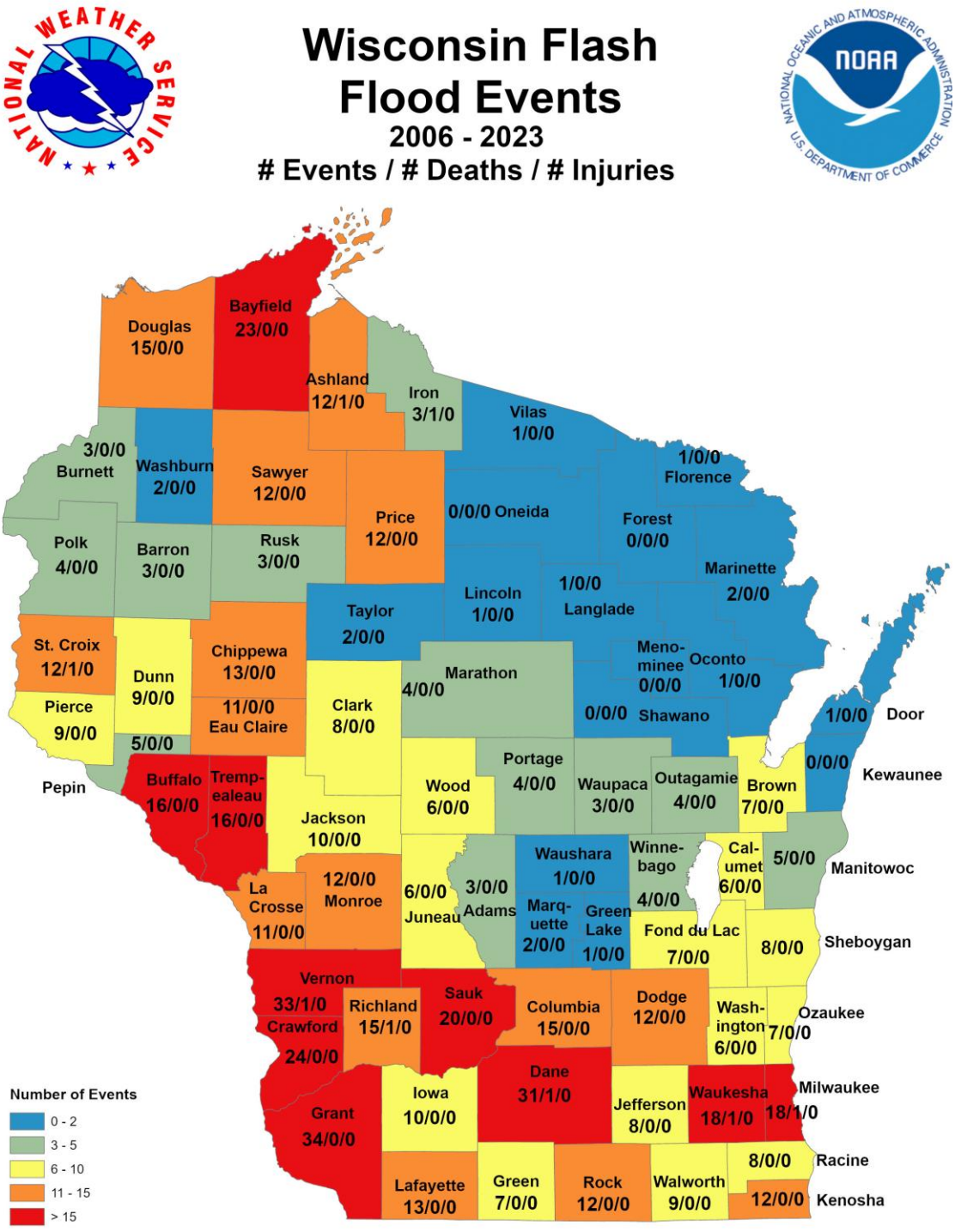


193 Wisconsin State Hazard Mitigation Plan

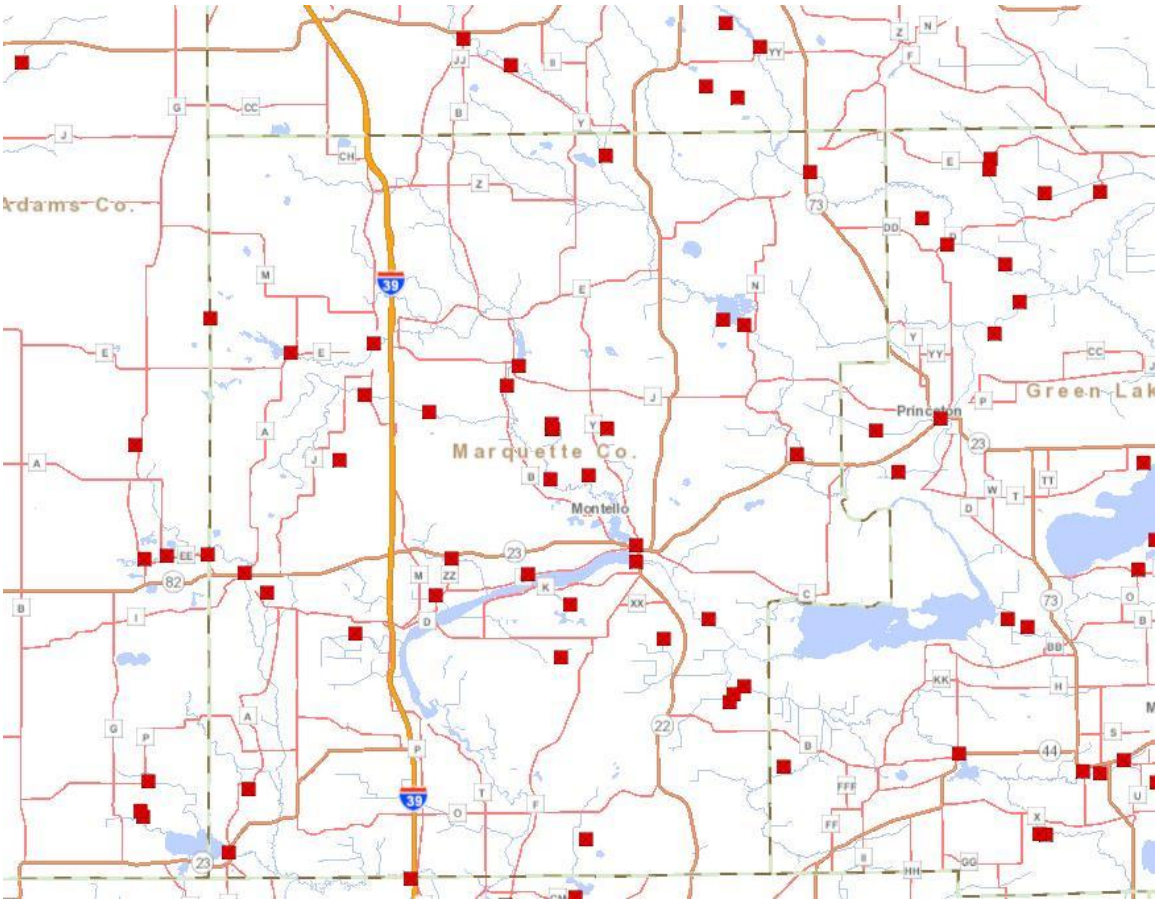
Wisconsin Total Flood Events



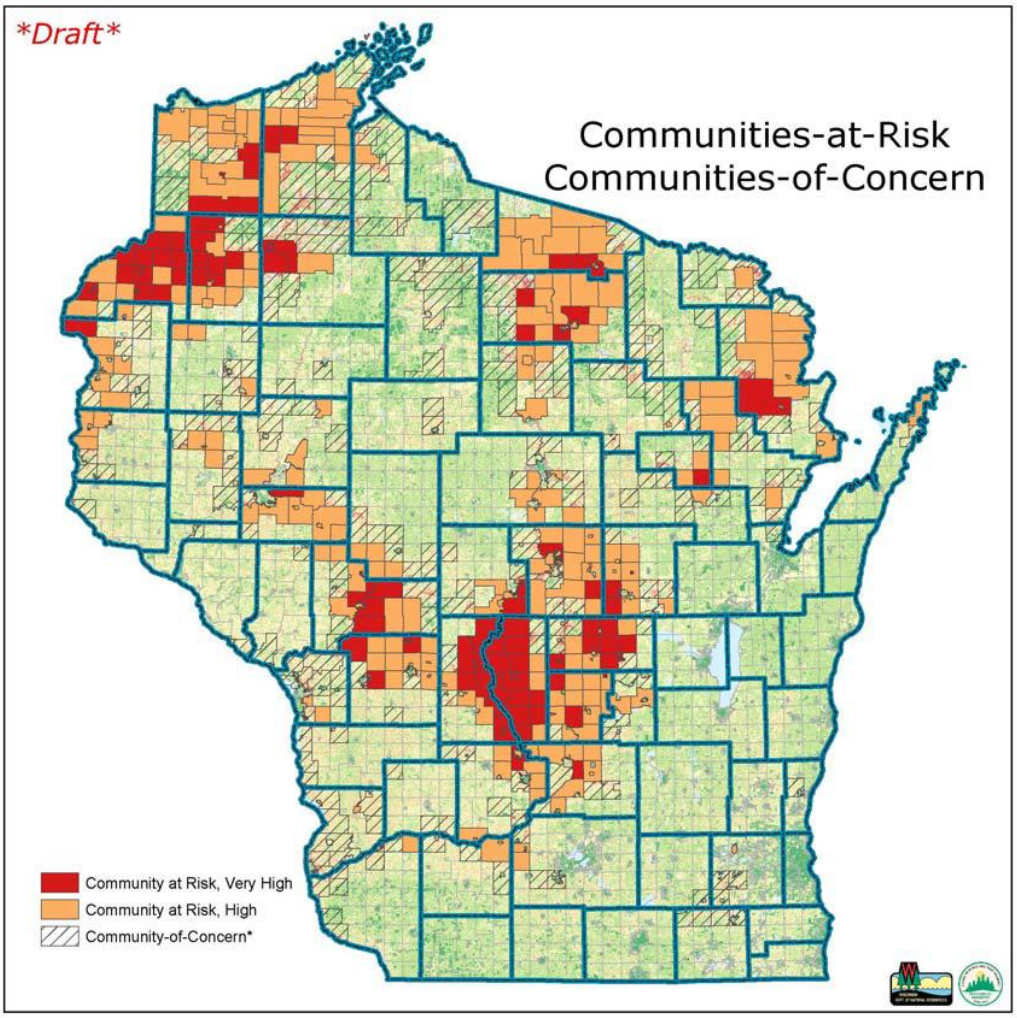
Wisconsin Flash Flood Events



Marquette County Dams



Wildfire Communities at Risk [194]



Introduction to Communities-at-Risk

The purpose of this model is to identify broad areas of the state that are at relatively high exposure to resource damage due to wildfire.

As mandated by the NASF, Wisconsin's Communities-At-Risk are divided into three categories:

1) Very High
2) High
3) Community of Concern*

Defining Community

For Wisconsin, Communities-at-Risk are reported at the MCD (municipal civil division) level*. MCD was chosen due to its identifiable legal boundaries, ease in reporting, and usage in the development of Community Wildfire Protection Plans.

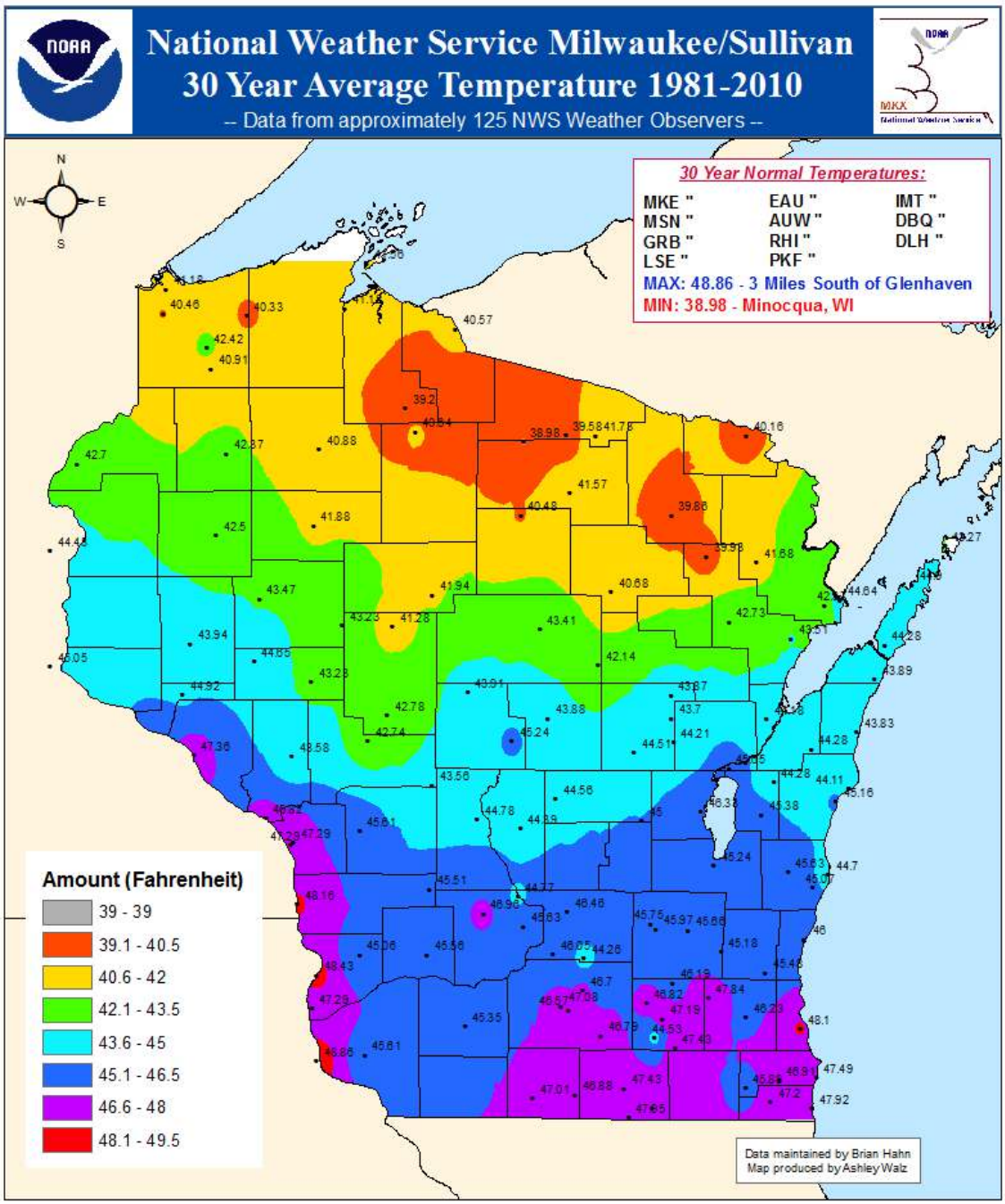
** Menominee County is an exception due to its lack of MCD's (civil townships). Therefore, Menominee county is reported by legal township.*

** A Community of Concern is a Wisconsin DNR concept whereby it is demonstrated that a significant portion of the community (more than 2 adjoining square miles) are at high or very high risk, but where the community as a whole falls below the Community-at-Risk threshold.*

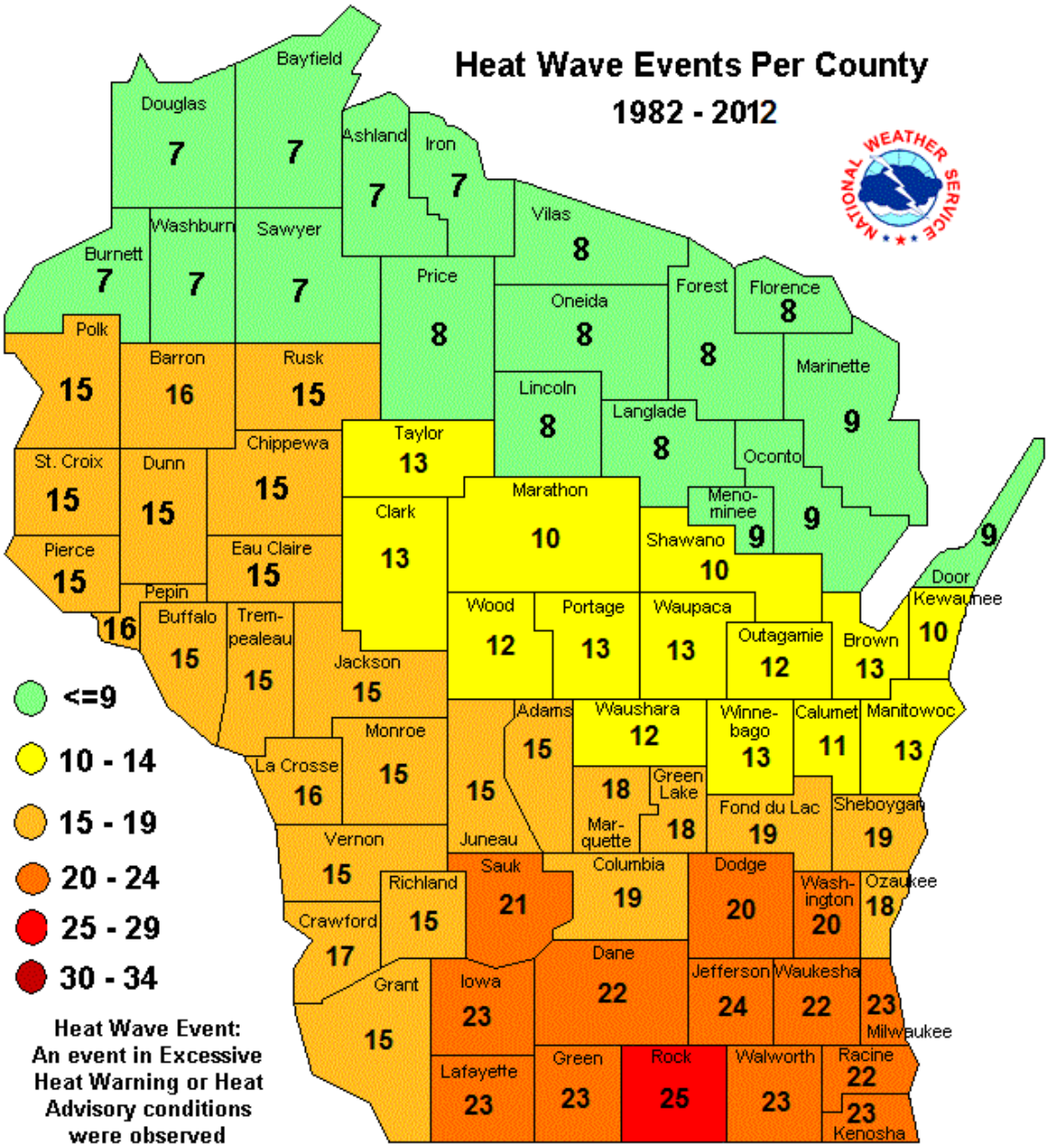
10/5/07

[194] Wisconsin Department of Natural Resources

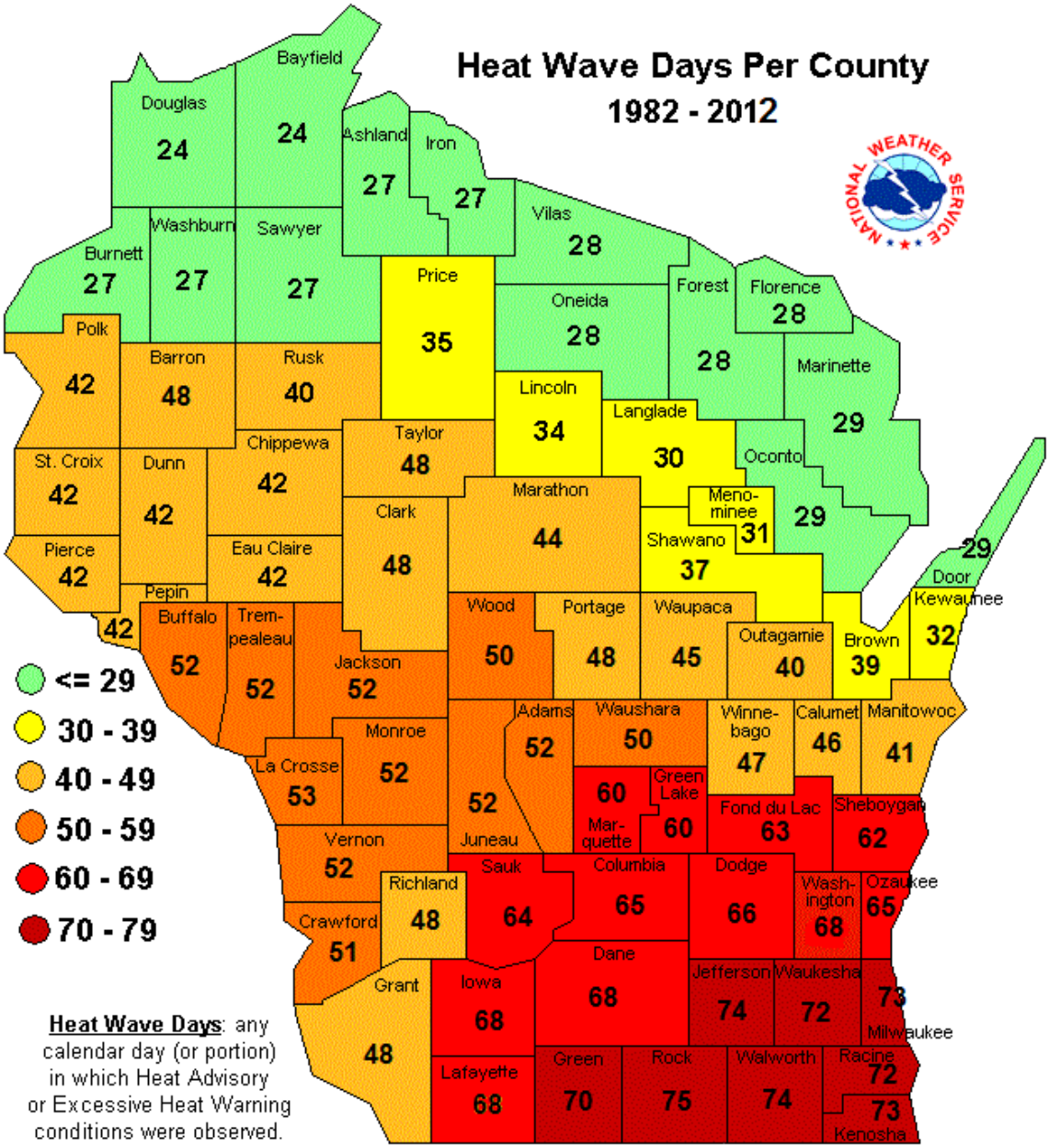
Wisconsin 30 Year Average Temperature



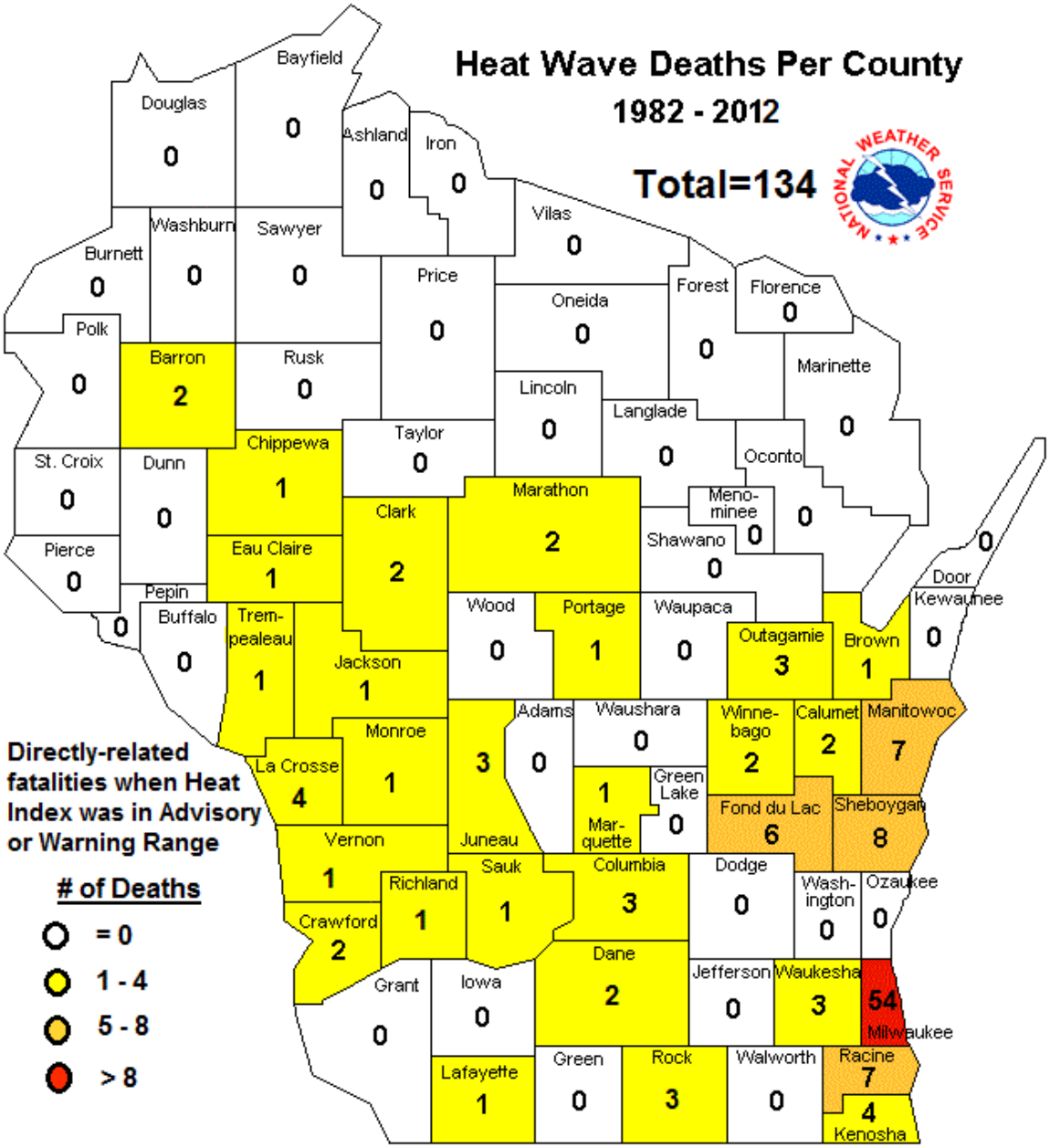
Wisconsin Heat Wave Events



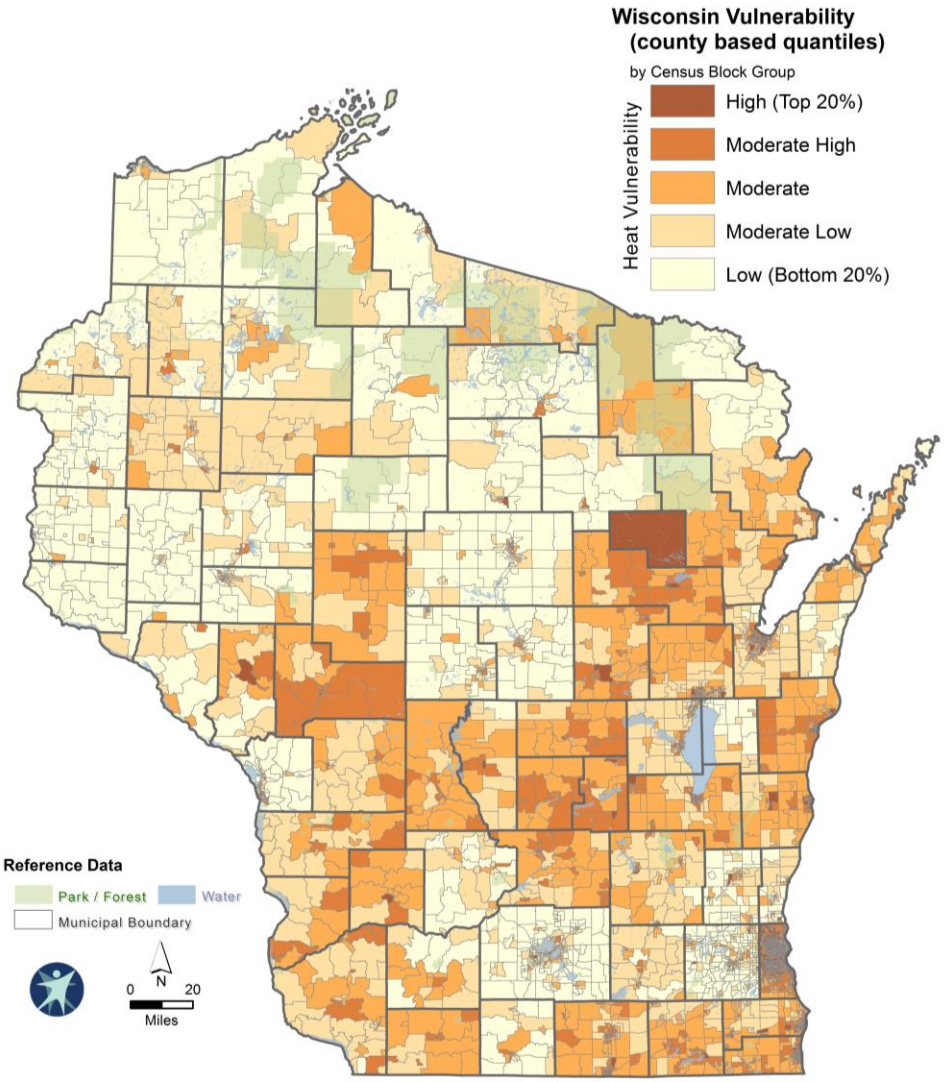
Wisconsin Heat Wave Days



Wisconsin Heat Wave Deaths

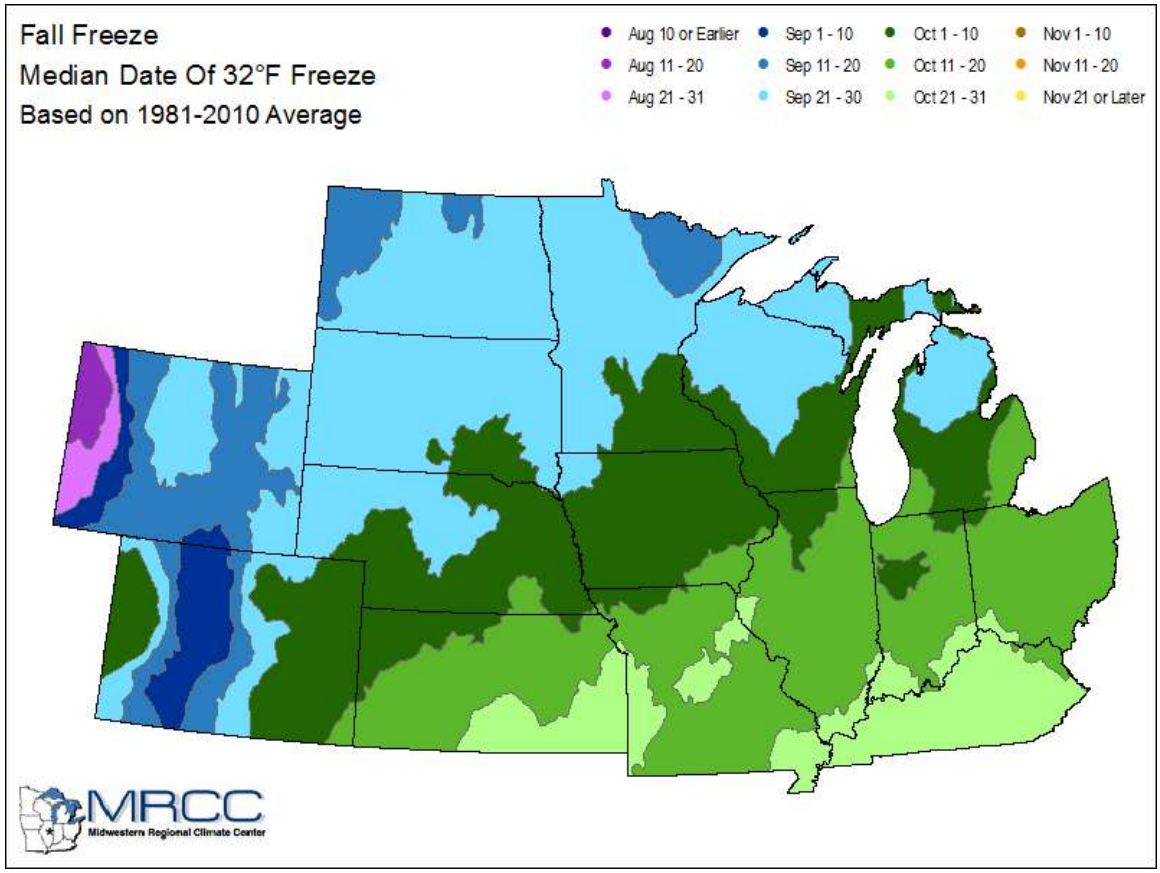


Wisconsin Heat Vulnerability Index[195]



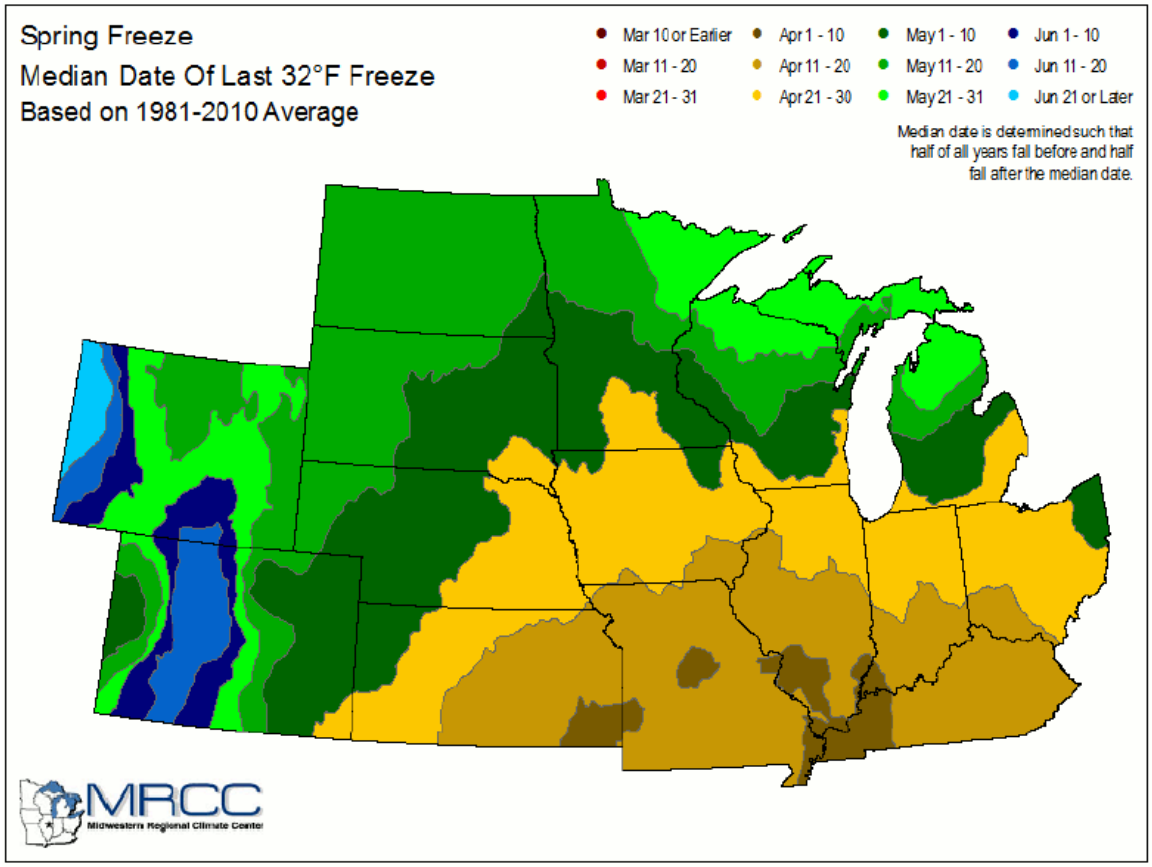
[195] https://www.dhs.wisconsin.gov/images/map-hvi-wi.jpg

Median Date of First Freeze[196]



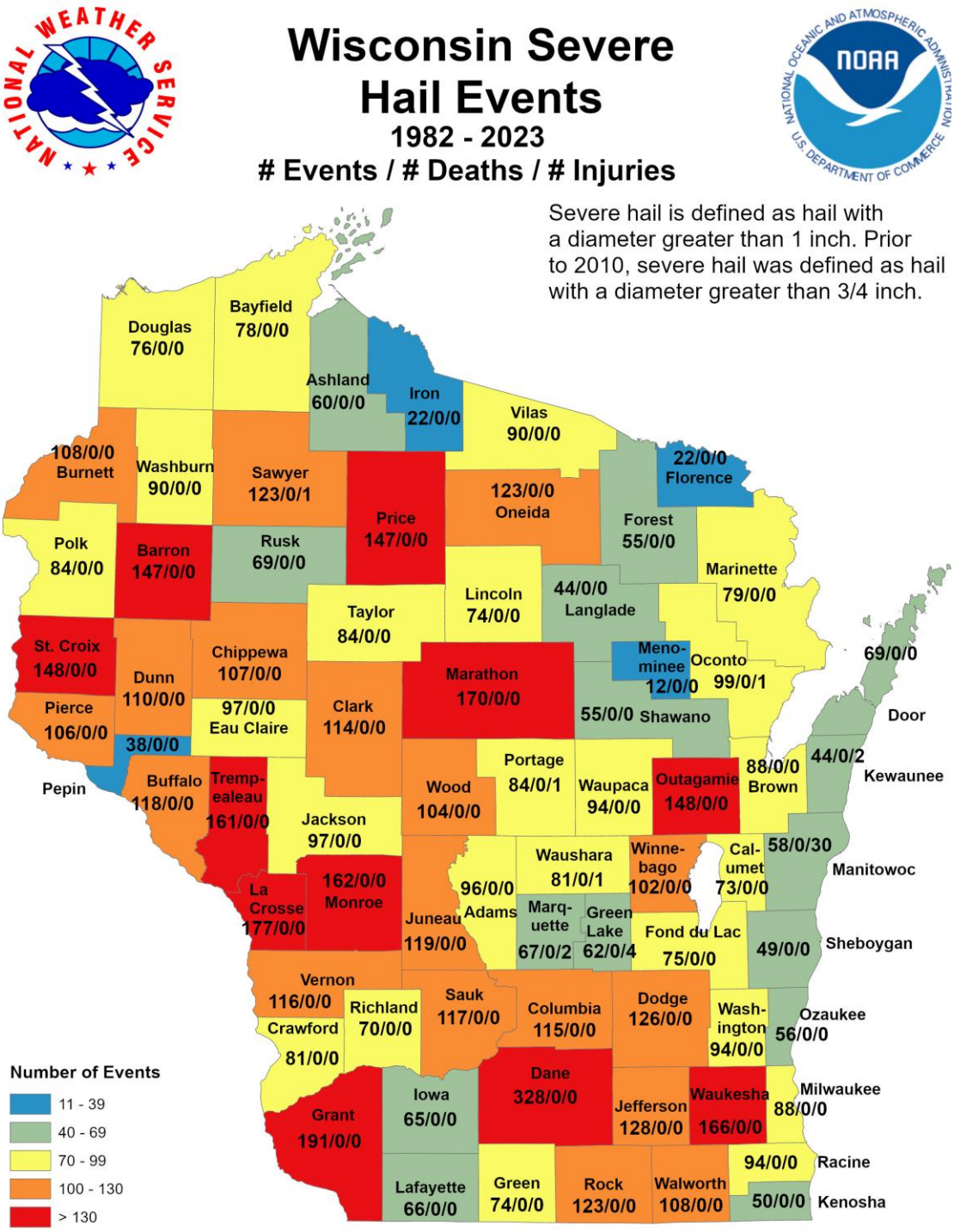
196 http://www.crh.noaa.gov/images/mkx/climate/FallFirstFreeze.png

Median Date of Last Freeze[197]

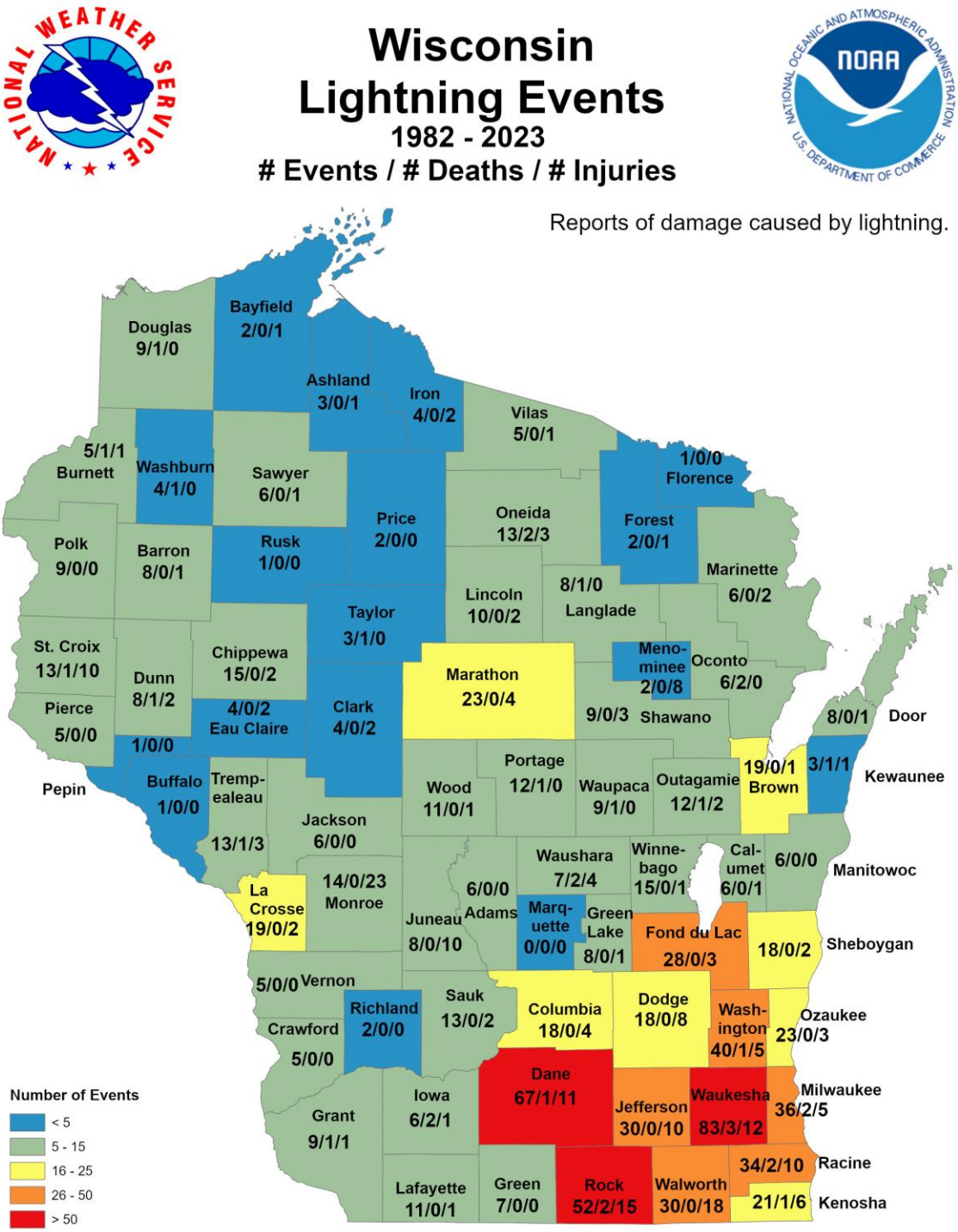


[197] http://www.crh.noaa.gov/images/mkx/climate/springlastfreeze.png

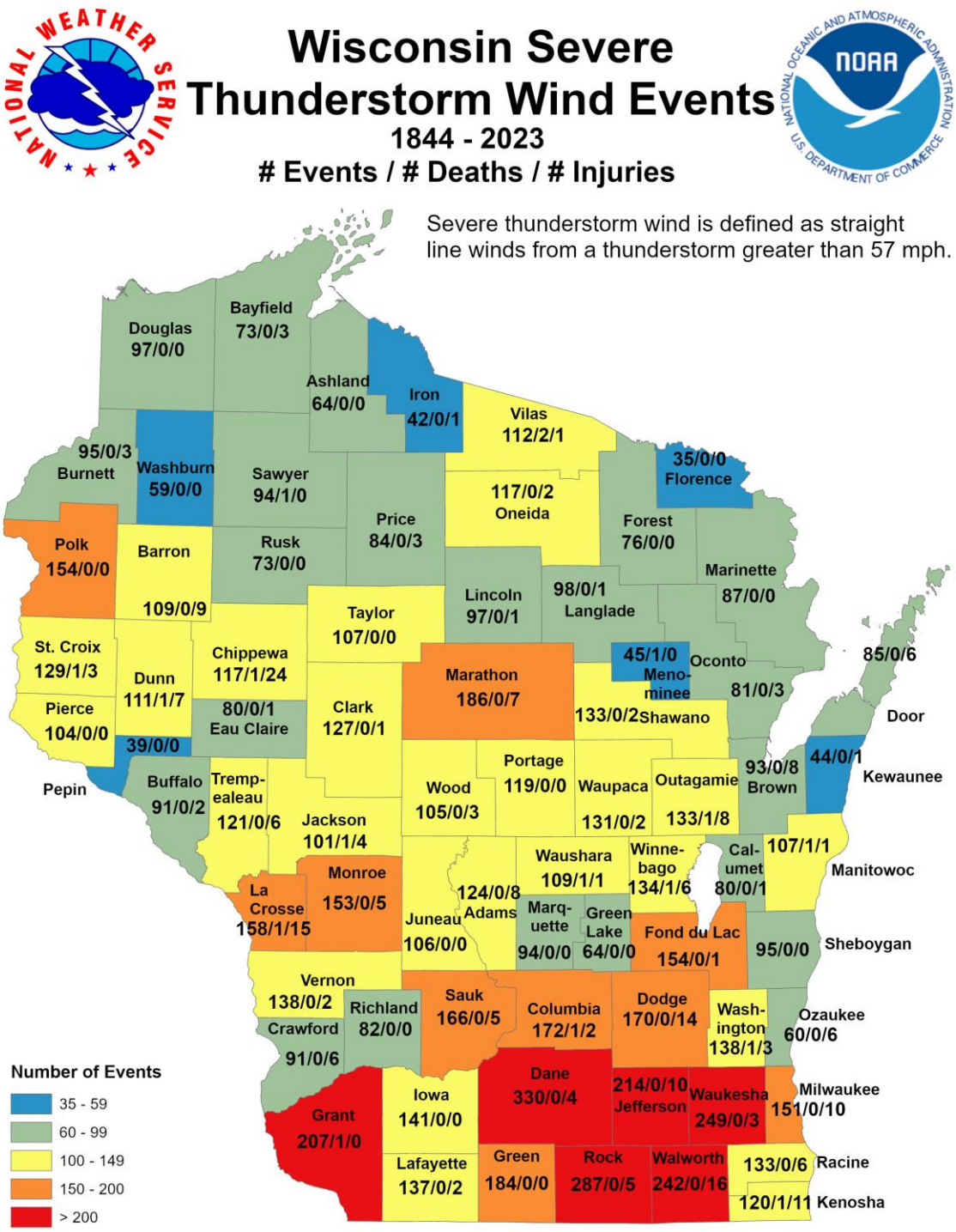
Wisconsin Hail Events



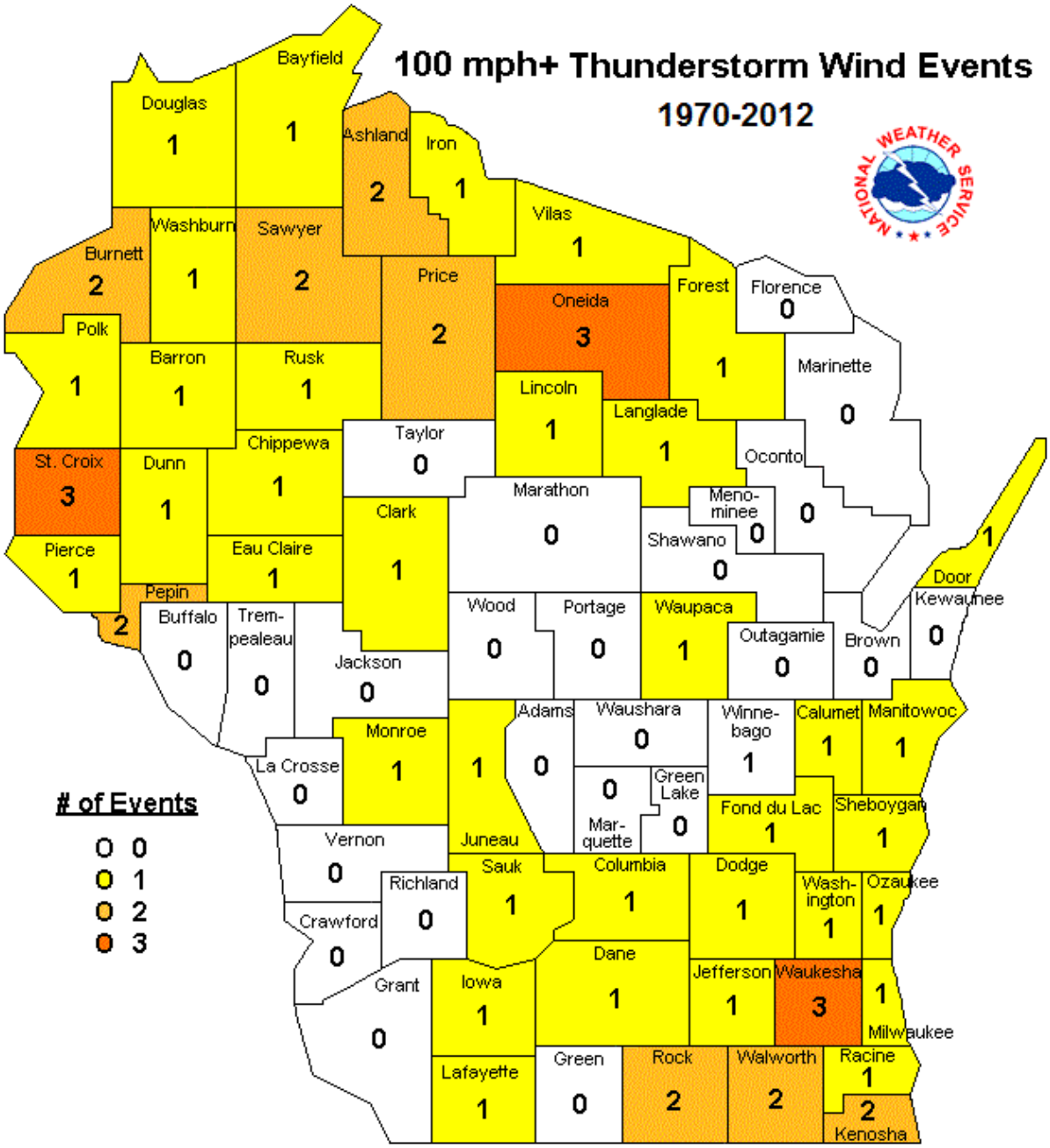
Wisconsin Lightning Events



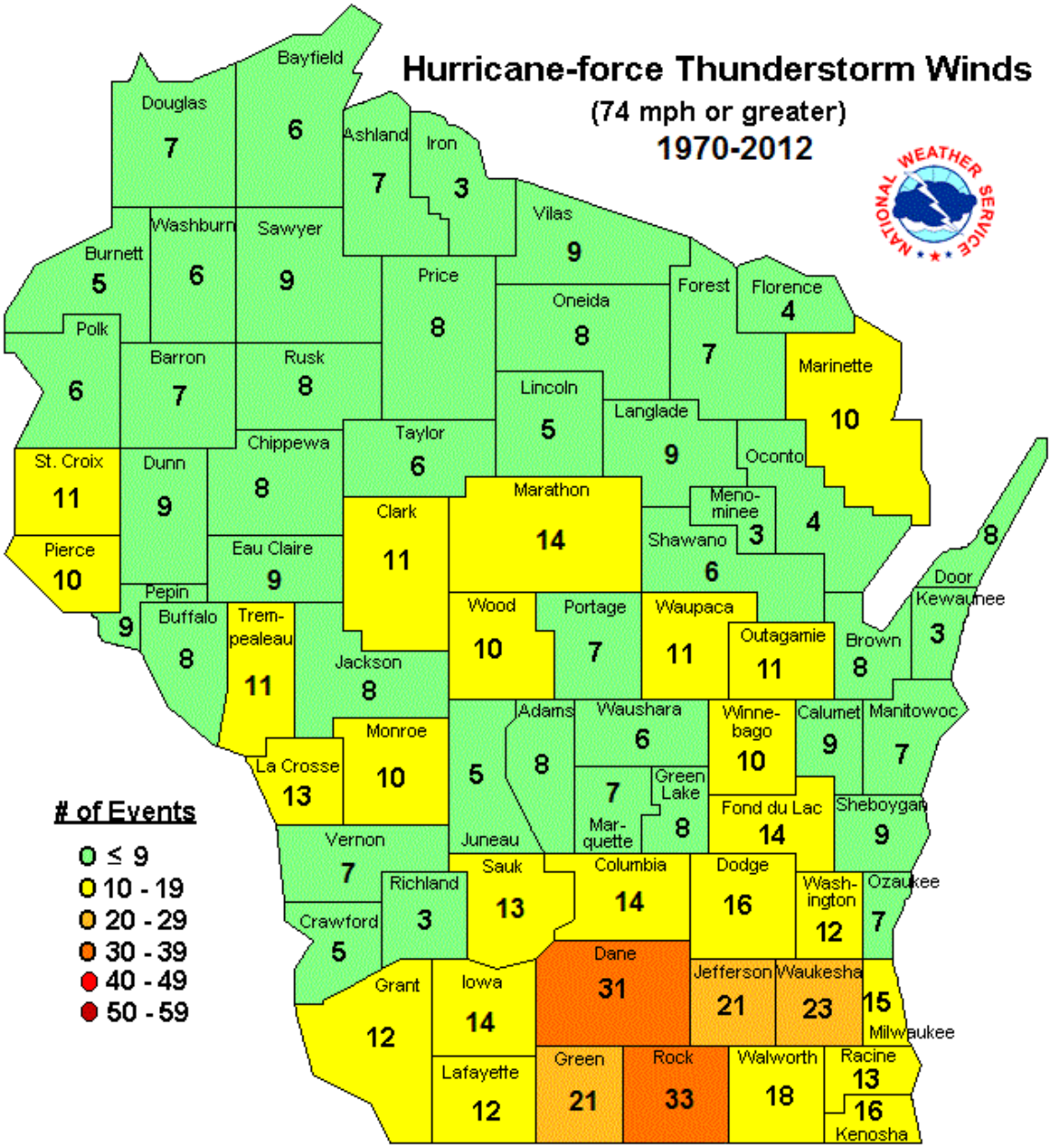
Wisconsin Severe Thunderstorm Winds



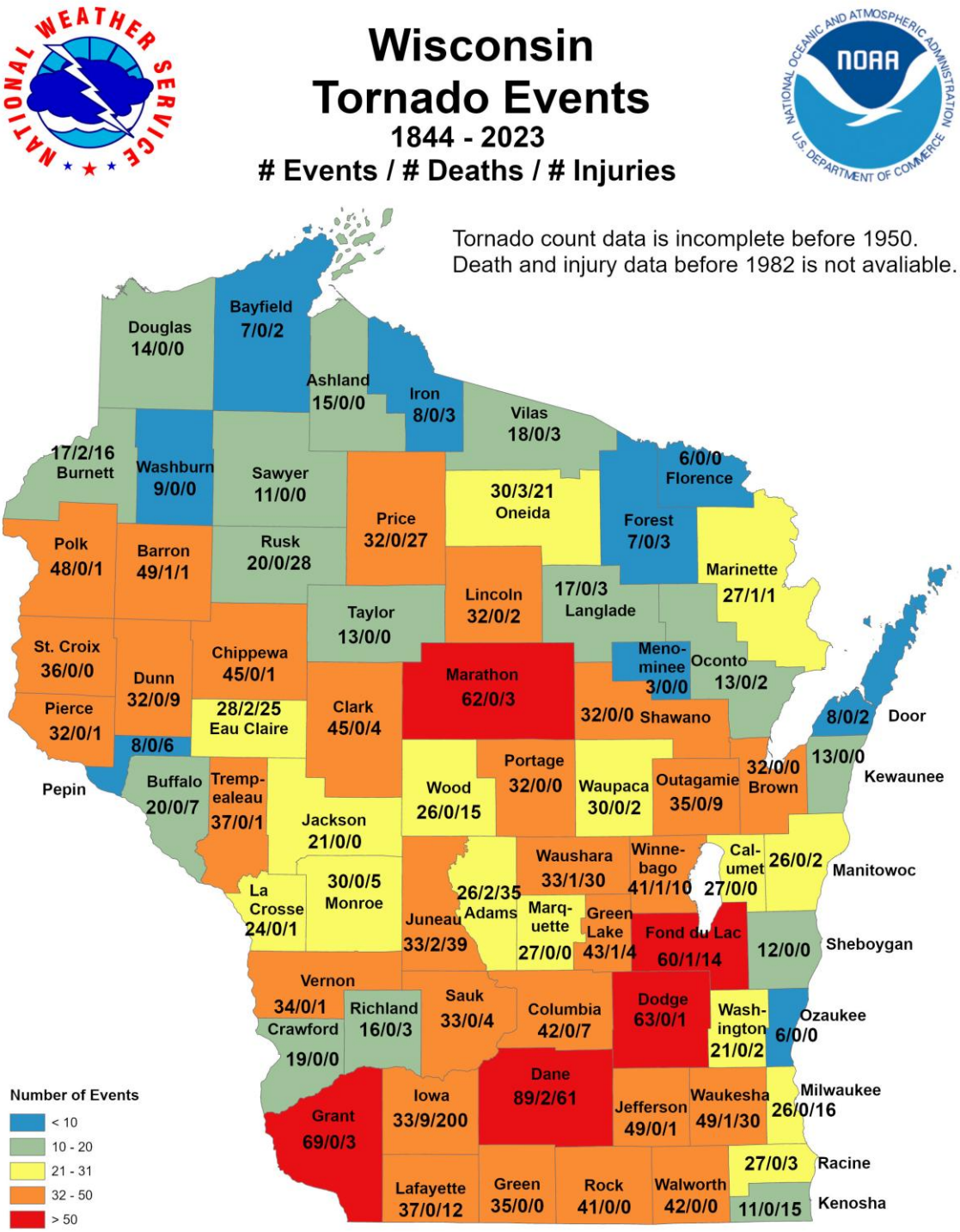
Wisconsin 100+ mph Thunderstorm Wind Events



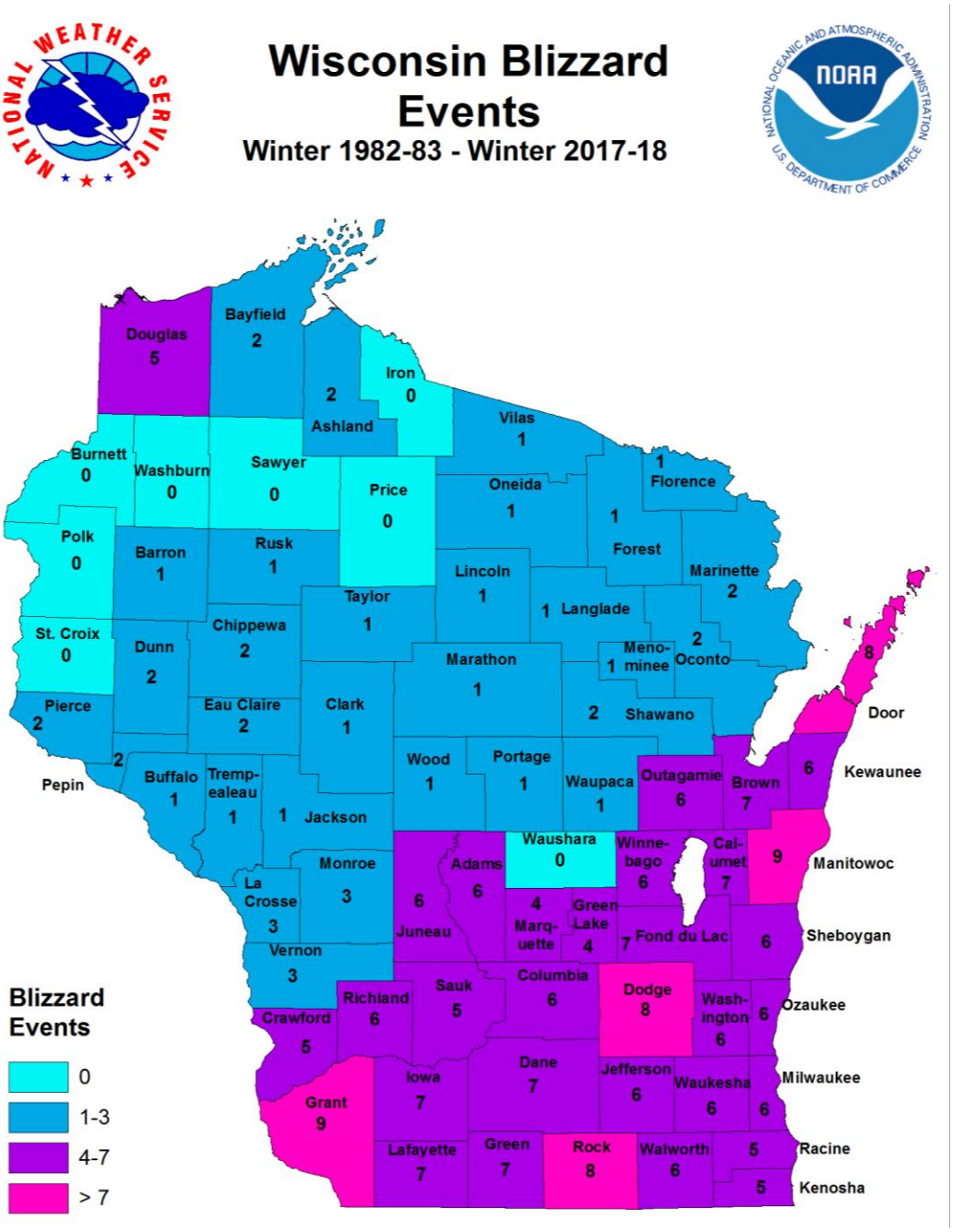
Wisconsin Hurricane-force (74+ mph) Thunderstorm Winds



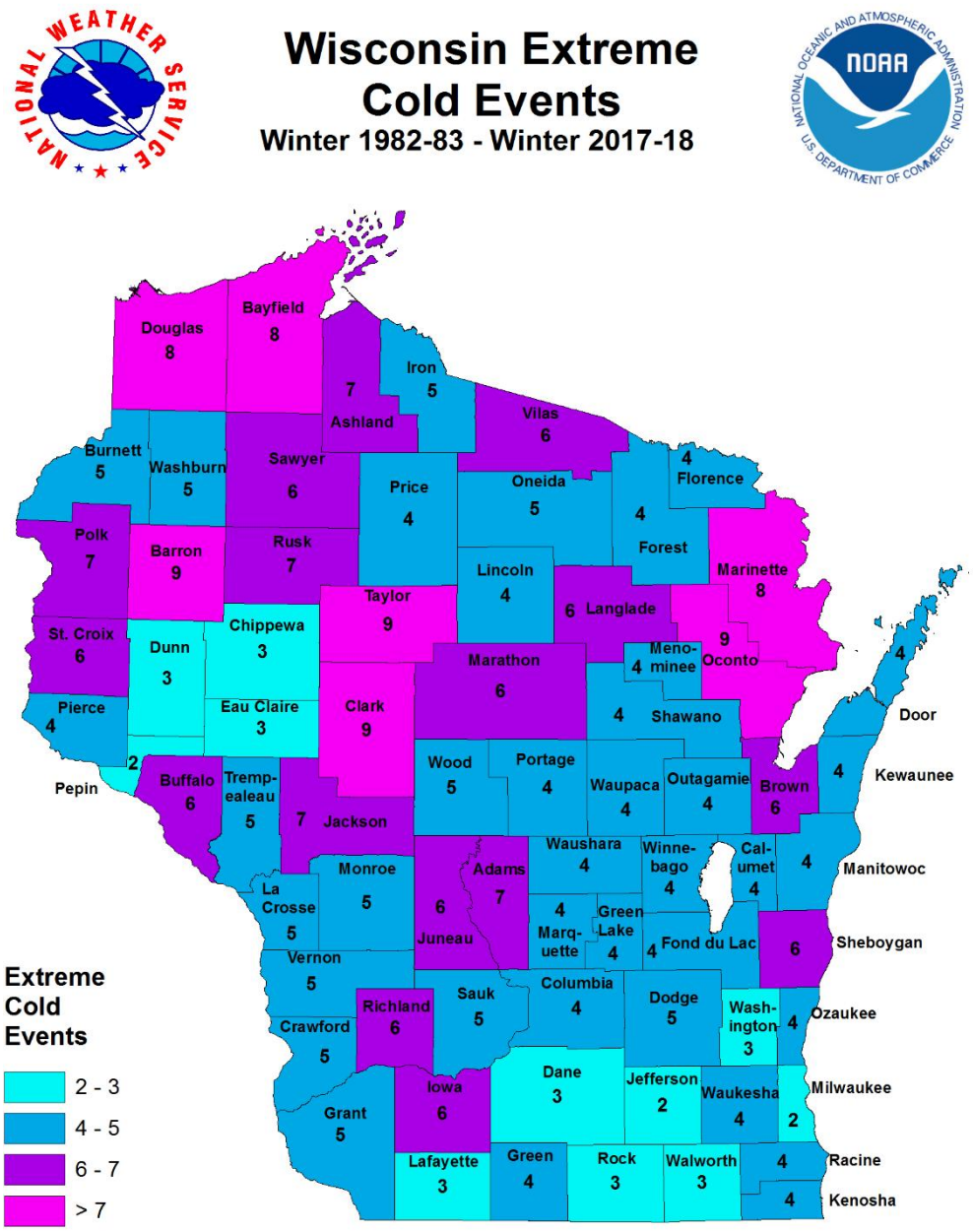
Wisconsin Tornado Events



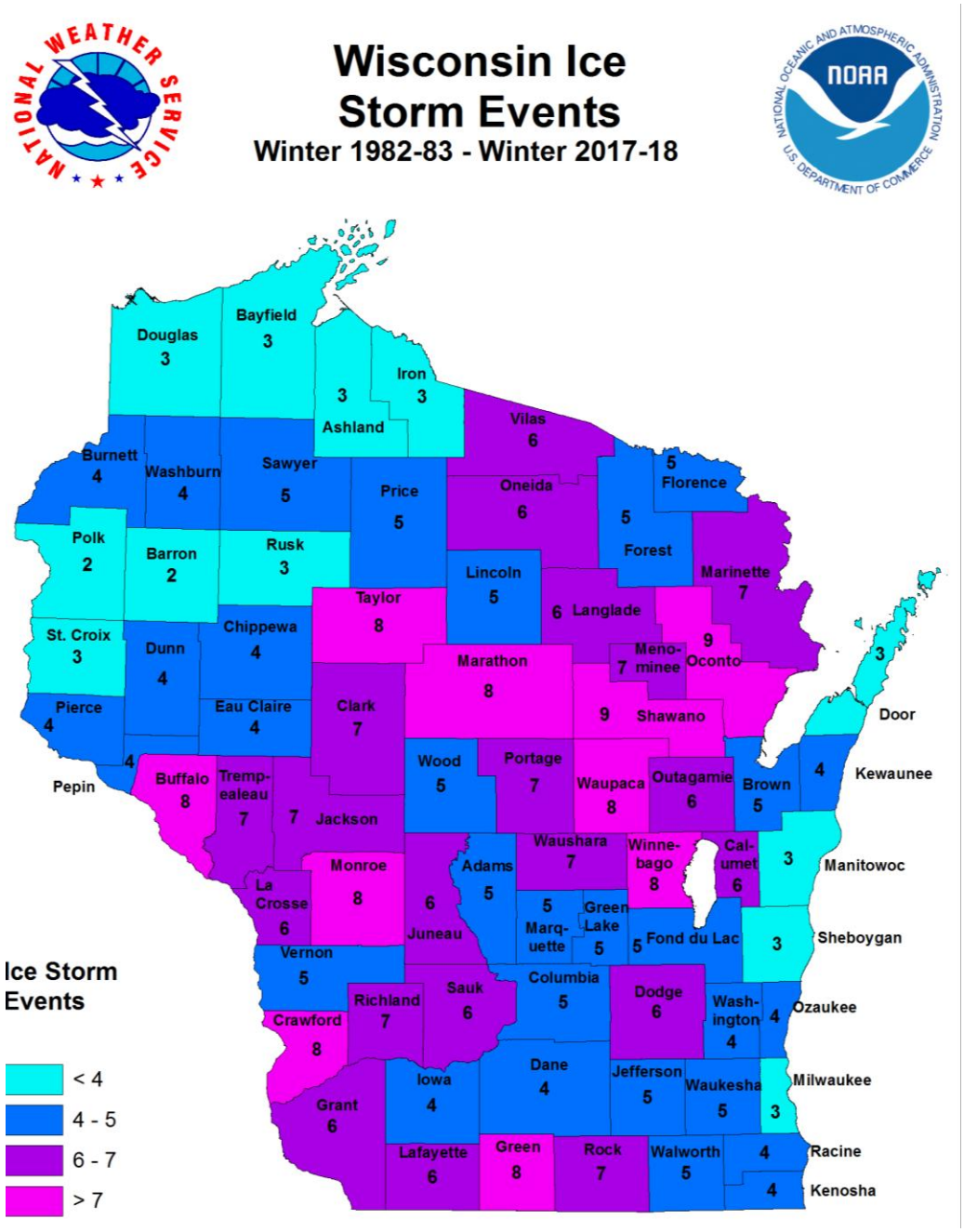
Wisconsin Blizzard Events



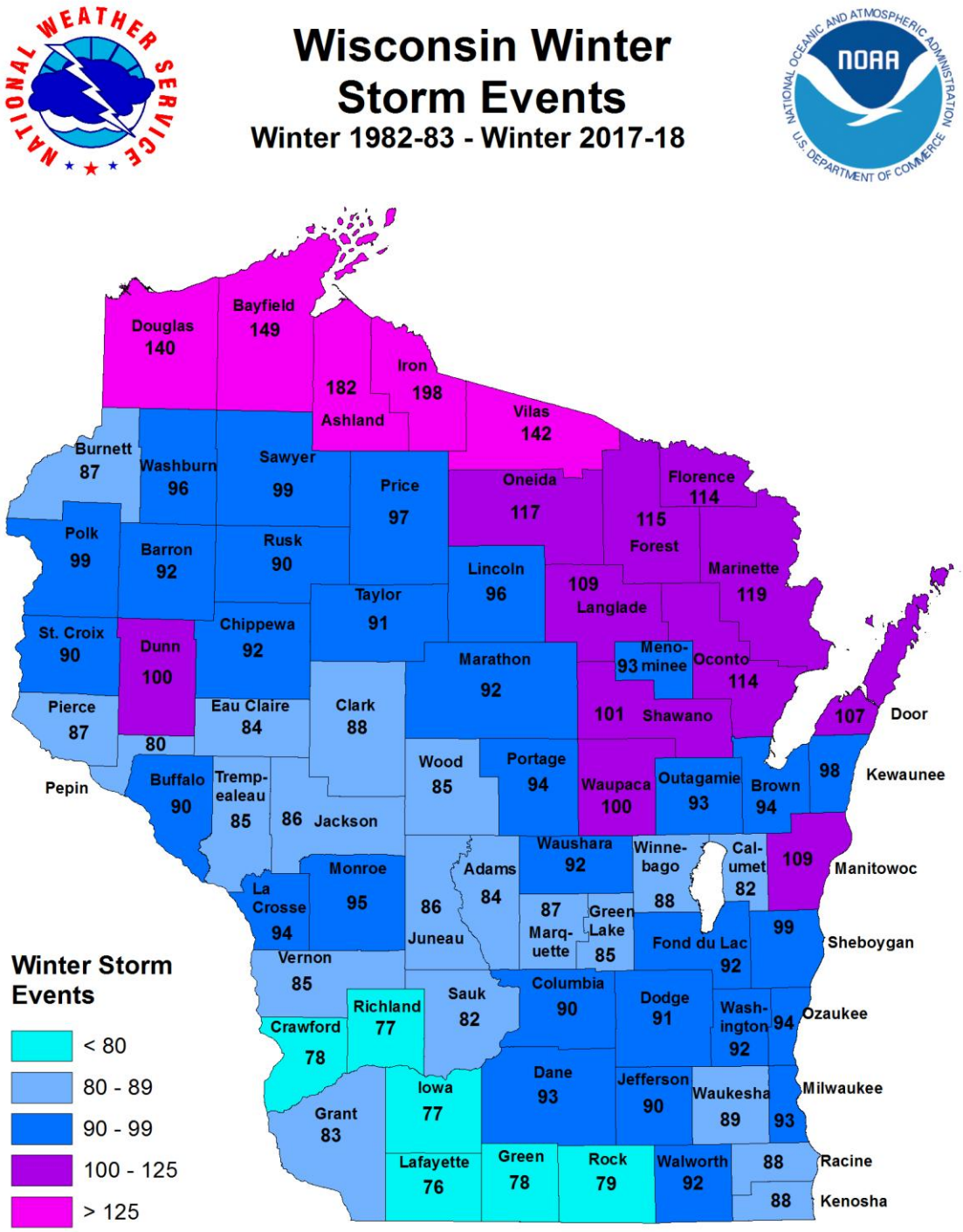
Wisconsin Extreme Cold Events



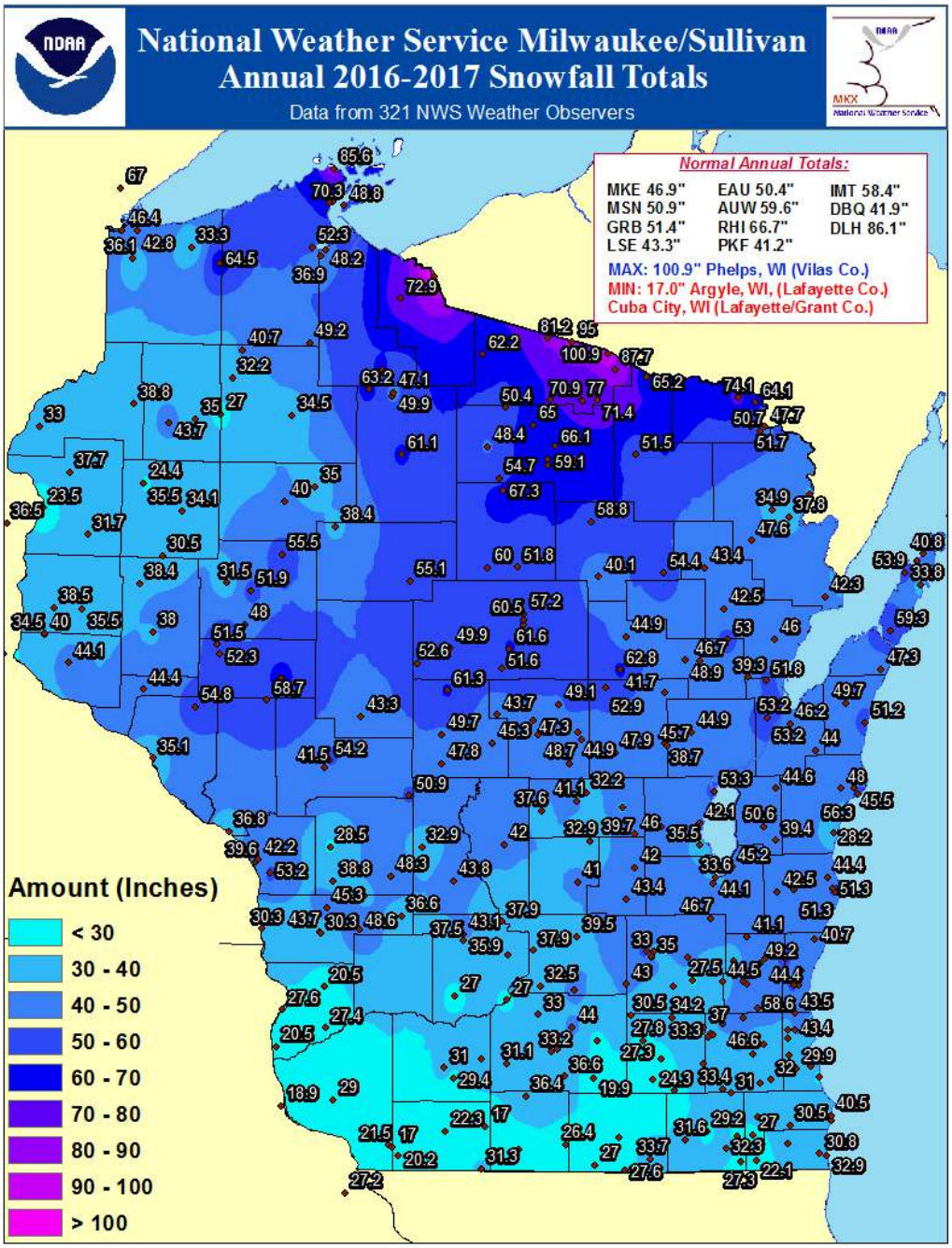
Wisconsin Ice Storm Events



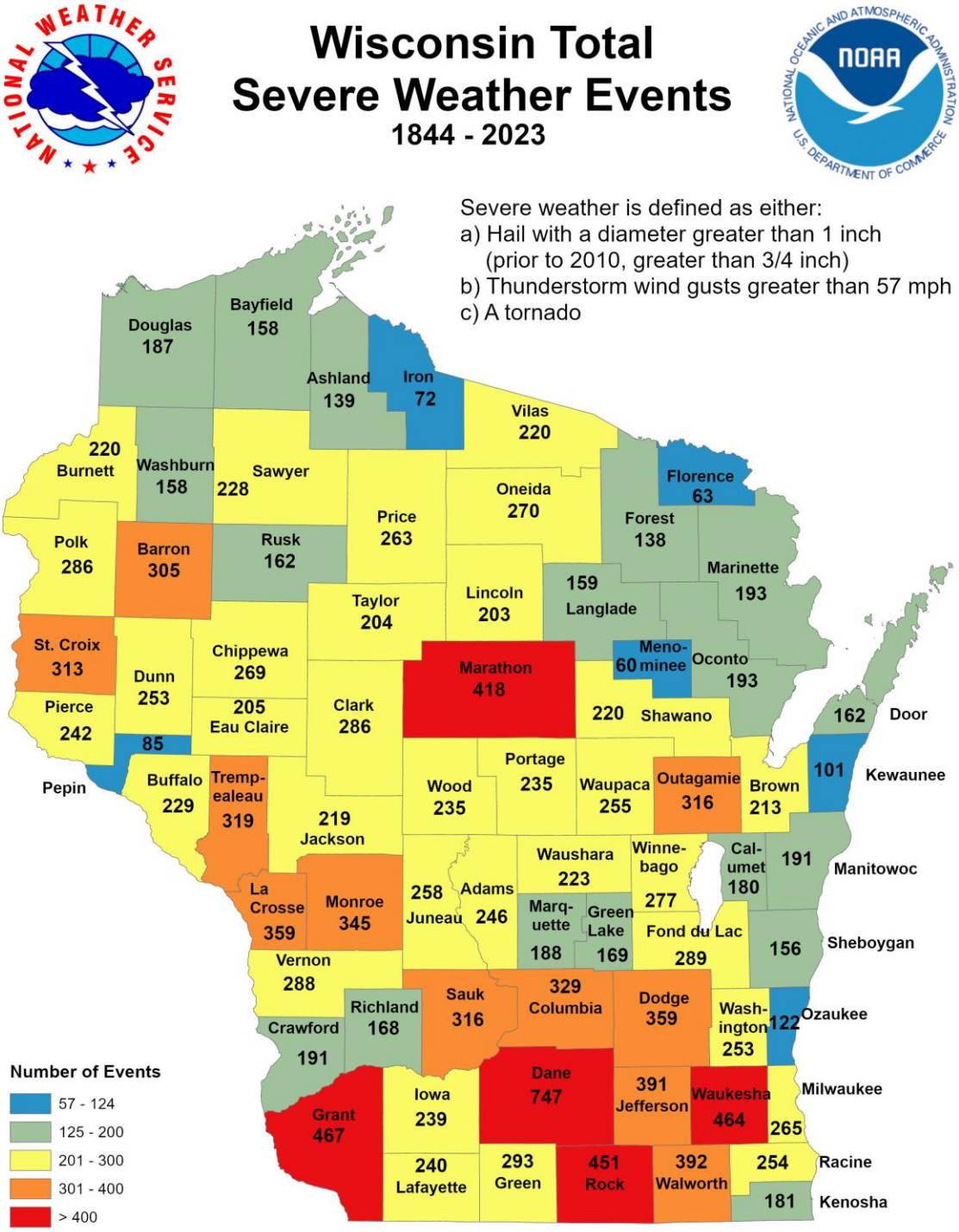
Wisconsin Winter Storm Events



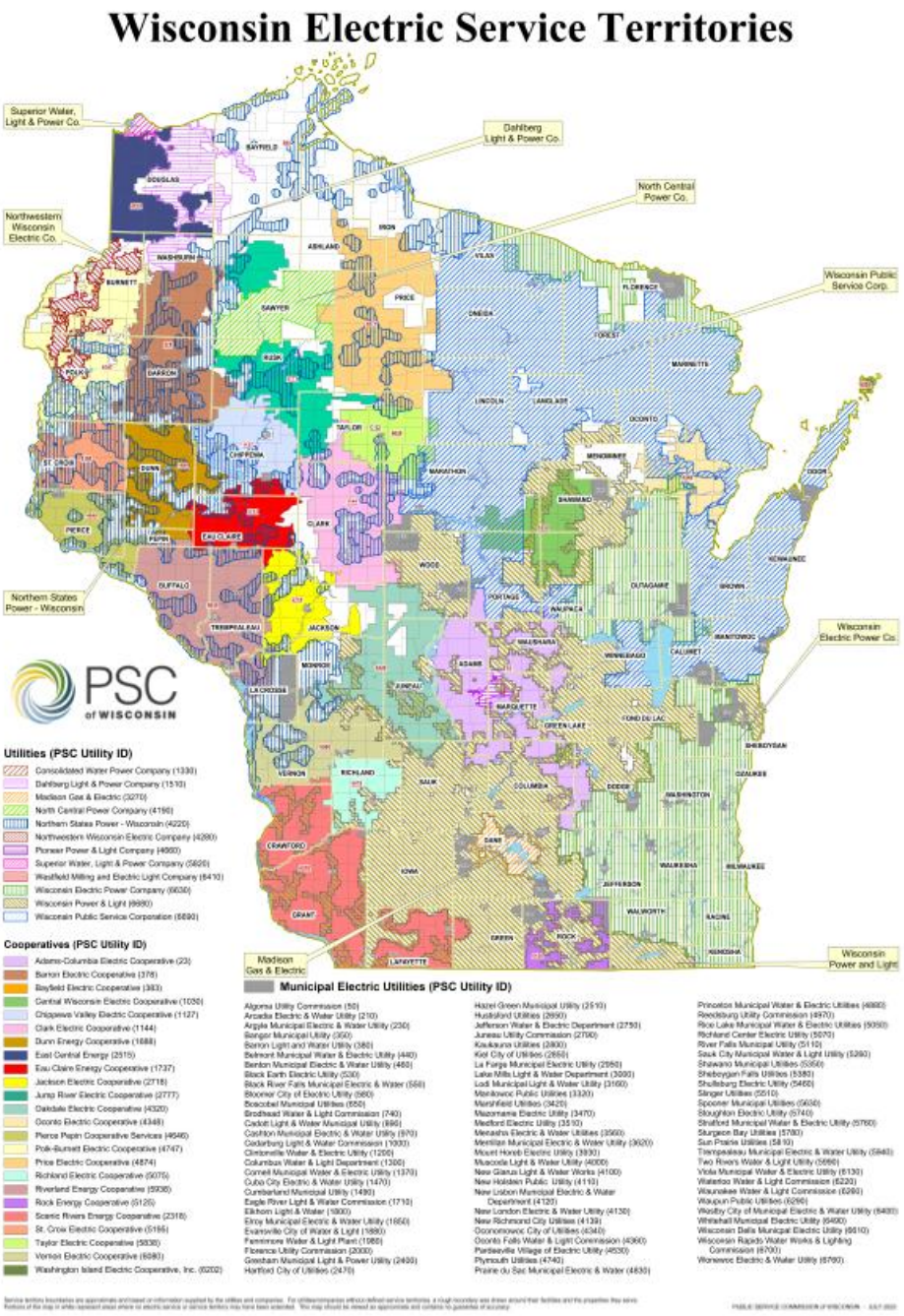
Wisconsin Annual 2016-2017 Snowfall Totals



Wisconsin Total Severe Weather Events

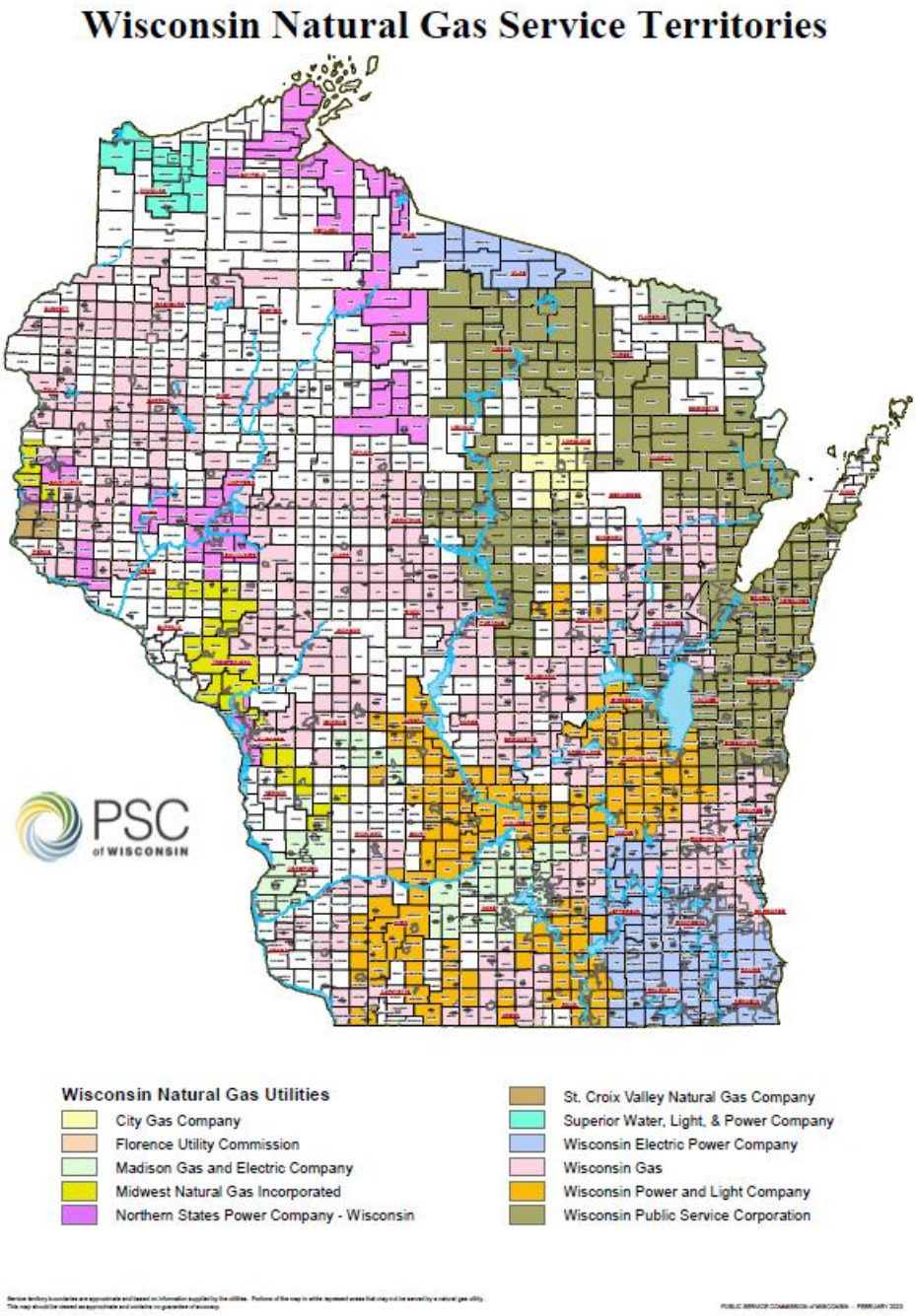


Electric Service Territories[198]



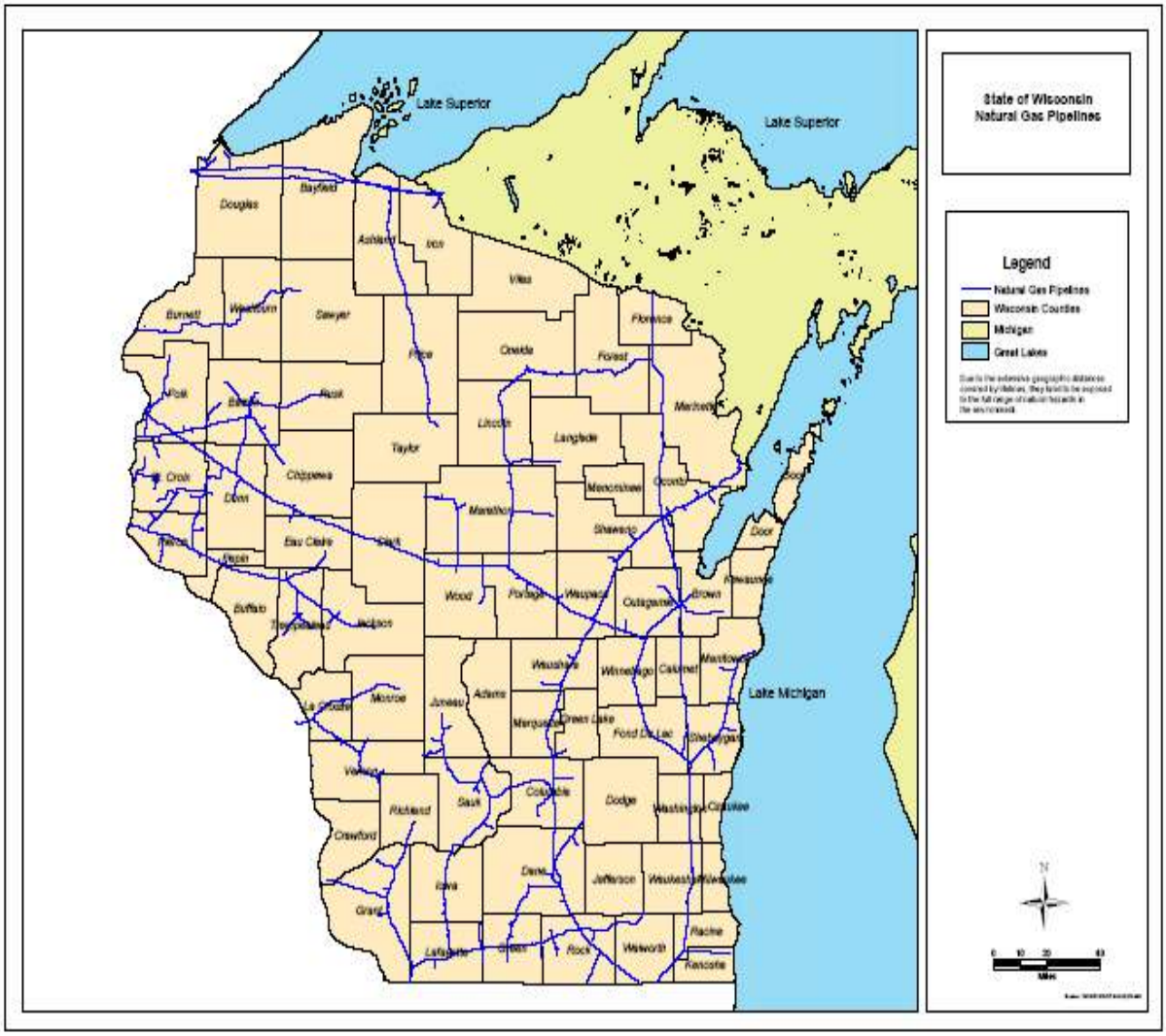
198 https://psc.wi.gov/SiteAssets/Maps/Electric_Service_Territory_30x42_PUBLIC.pdf

Natural Gas Service Territories[199]



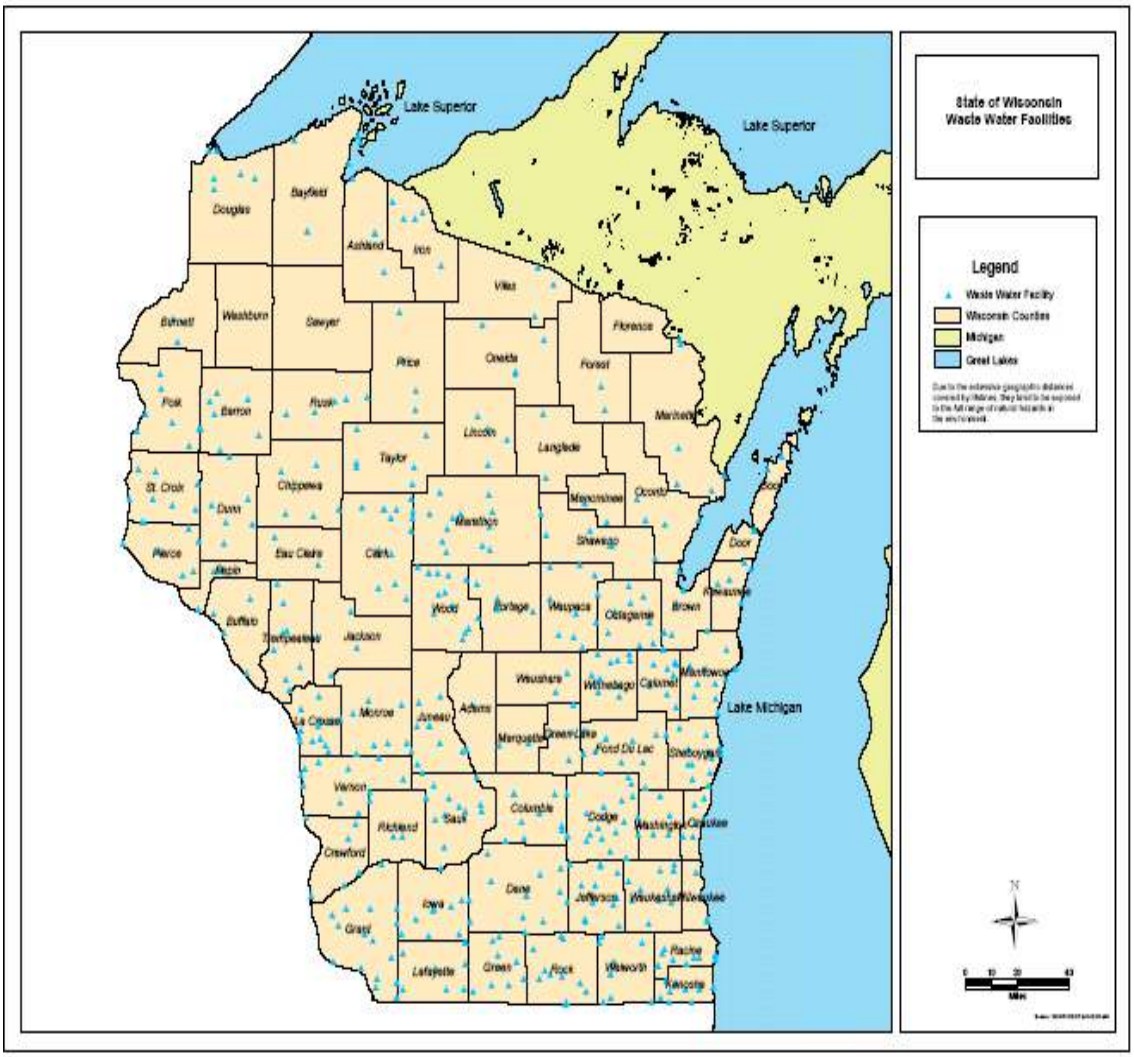
[199] https://psc.wi.gov/SiteAssets/Maps/Natural_Gas_30x42_PUBLIC.pdf

Natural Gas Pipelines [200]



[200] Wisconsin State Hazard Mitigation Plan

Wastewater Facilities [201]



[201] Wisconsin State Hazard Mitigation Plan

Appendix B: Frequency of Occurrence

As noted earlier in this plan, the Marquette County Hazard Mitigation Plan Workgroup reviewed past event records, and an internal workgroup consensus was reached on the anticipated probability of future events, as well as the severity of the effects of those events. The probabilities and severities were designated as "very high," "high," "medium," "low," or "very low" by the workgroup based on their evaluation and experience with the data. This is the main rating system used for this plan as it comes directly from those living in the area and reflects their current impressions, though they note that climate and weather systems are dynamic events.

The workgroup understands that historical weather data provided by the National Weather Service does not include events that may adversely affect their communities but fall below the reporting thresholds. Each weather event was analyzed for historic frequency and averages over the last 25 years (i.e., from 1 January 2000 through 31 December 2024) and is noted below with each hazard.

DROUGHT

*There were **17** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	*Date*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
MARQUETTE COUNTY	8/1/2002	0	0	0	$50K
MARQUETTE COUNTY	9/1/2003	0	0	0	0
MARQUETTE COUNTY	10/1/2003	0	0	0	0
MARQUETTE COUNTY	11/1/2003	0	0	0	0
MARQUETTE COUNTY	12/1/2003	0	0	0	0
MARQUETTE COUNTY	7/1/2005	0	0	0	0
MARQUETTE COUNTY	8/1/2005	0	0	0	0
MARQUETTE COUNTY	9/1/2005	0	0	0	0
MARQUETTE COUNTY	10/1/2005	0	0	0	0
MARQUETTE COUNTY	11/1/2005	0	0	0	0
MARQUETTE COUNTY	7/1/2007	0	0	0	$50K
MARQUETTE COUNTY	8/1/2007	0	0	0	0
MARQUETTE COUNTY	6/26/2012	0	0	0	0
MARQUETTE COUNTY	7/1/2012	0	0	0	0
MARQUETTE COUNTY	8/1/2012	0	0	0	0

MARQUETTE COUNTY	9/1/2012	0	0	0	0
MARQUETTE COUNTY	10/1/2012	0	0	0	0

FLASH FLOOD

*There were **4** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	*Date*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
NESHKORO	6/22/2002	0	0	$10K	0
PACKWAUKEE	5/23/2004	0	0	$50K	$200K
HARRISVILLE	7/3/2007	0	0	$50K	0
ENDEAVOR	6/7/2008	0	0	$8.75M	$2M

FLOOD

*There were **7** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	*Date*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
BRIGGSVILLE	6/1/2000	0	0	$10K	0
MARQUETTE COUNTY	6/1/2004	0	0	$1.2M	$10M
BRIGGSVILLE	9/24/2016	0	0	0	0
BRIGGSVILLE	8/29/2018	0	0	$1K	0
MONTELLO	8/29/2018	0	0	$2M	0
MONTELLO	9/1/2018	0	0	$2K	0
PACKWAUKEE	9/4/2018	0	0	$5K	0

HEAVY RAIN

*There was **1** event reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	*Date*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
MONTELLO	11/1/2003	0	0	0	0

EXCESSIVE HEAT

*There were **6** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	*Date*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
MARQUETTE COUNTY	7/17/2011	1	0	0	0
MARQUETTE COUNTY	7/2/2012	0	0	0	0

MARQUETTE COUNTY	6/29/2018	0	0	0	0
MARQUETTE COUNTY	6/14/2022	0	0	0	0
MARQUETTE COUNTY	8/23/2023	0	0	0	0
MARQUETTE COUNTY	8/26/2024	0	0	0	0

HEAT

*There were **21** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	*Date*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
MARQUETTE COUNTY	7/31/2001	0	0	0	0
MARQUETTE COUNTY	8/6/2001	0	0	0	0
MARQUETTE COUNTY	4/15/2002	0	0	0	0
MARQUETTE COUNTY	6/30/2002	0	0	0	0
MARQUETTE COUNTY	7/1/2002	0	0	0	0
MARQUETTE COUNTY	7/8/2002	0	0	0	0
MARQUETTE COUNTY	7/21/2002	0	0	0	0
MARQUETTE COUNTY	6/23/2009	0	0	0	0
MARQUETTE COUNTY	7/1/2011	0	0	0	0
MARQUETTE COUNTY	6/28/2012	0	0	0	0
MARQUETTE COUNTY	7/16/2012	0	0	0	0
MARQUETTE COUNTY	7/23/2012	0	0	0	0
MARQUETTE COUNTY	7/25/2012	0	0	0	0
MARQUETTE COUNTY	7/16/2013	0	0	0	0
MARQUETTE COUNTY	7/22/2014	0	0	0	0
MARQUETTE COUNTY	7/21/2016	0	0	0	0
MARQUETTE COUNTY	6/16/2018	0	0	0	0
MARQUETTE COUNTY	7/4/2018	0	0	0	0
MARQUETTE COUNTY	7/19/2019	0	0	0	0
MARQUETTE COUNTY	6/21/2022	0	0	0	0
MARQUETTE COUNTY	8/23/2023	0	0	0	0

EXTREME COLD/WIND CHILL

*There were **6** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
MARQUETTE COUNTY	1/30/2008	0	0	0	0
MARQUETTE COUNTY	2/10/2008	0	0	0	0
MARQUETTE COUNTY	1/15/2009	0	0	0	0
MARQUETTE COUNTY	1/6/2014	0	0	0	0
MARQUETTE COUNTY	1/29/2019	0	0	0	0
MARQUETTE COUNTY	12/22/2022	0	0	0	0

COLD/WIND CHILL

*There were **23** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
MARQUETTE COUNTY	12/18/2005	0	0	0	0
MARQUETTE COUNTY	2/17/2006	0	0	0	0
MARQUETTE COUNTY	2/18/2006	0	0	0	0
MARQUETTE COUNTY	2/3/2007	0	0	$1K	0
MARQUETTE COUNTY	1/19/2008	0	0	0	0
MARQUETTE COUNTY	12/15/2008	0	0	0	0
MARQUETTE COUNTY	12/21/2008	0	0	0	0
MARQUETTE COUNTY	1/14/2009	0	0	0	0
MARQUETTE COUNTY	1/24/2009	0	0	0	0
MARQUETTE COUNTY	1/21/2011	0	0	0	0
MARQUETTE COUNTY	1/21/2013	0	0	0	0
MARQUETTE COUNTY	1/3/2014	0	0	0	0
MARQUETTE COUNTY	1/27/2014	0	0	0	0
MARQUETTE COUNTY	1/7/2015	0	0	0	0
MARQUETTE COUNTY	1/9/2015	0	0	0	0
MARQUETTE COUNTY	12/14/2016	0	0	0	0
MARQUETTE COUNTY	12/18/2016	0	0	0	0
MARQUETTE COUNTY	12/25/2017	0	0	0	0
MARQUETTE COUNTY	1/1/2018	0	0	0	0
MARQUETTE COUNTY	2/6/2021	0	0	0	0
MARQUETTE COUNTY	2/13/2021	0	0	0	0

MARQUETTE COUNTY	1/25/2022	0	0	0	0
MARQUETTE COUNTY	1/14/2024	0	0	0	0

HAIL

*There were **53** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	*Date*	*Diameter (inch)*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
GLENOAK	3/8/2000	1.00	0	0	0	0
MONTELLO	3/8/2000	0.75	0	0	0	0
WESTFIELD	5/12/2000	3.00	0	2	$1M	0
GERMANIA	9/2/2000	0.75	0	0	0	0
WESTFIELD	5/14/2001	0.75	0	0	0	0
OXFORD	4/18/2002	0.75	0	0	0	0
ENDEAVOR	4/18/2002	0.75	0	0	0	0
BRIGGSVILLE	5/30/2002	1.00	0	0	0	0
ENDEAVOR	6/21/2002	0.75	0	0	0	0
MONTELLO	5/10/2003	1.00	0	0	0	0
OXFORD	7/31/2003	0.75	0	0	0	0
BRIGGSVILLE	8/28/2003	0.75	0	0	0	0
MONTELLO	5/12/2004	0.75	0	0	0	0
ENDEAVOR	6/16/2004	0.75	0	0	0	0
MONTELLO	6/23/2004	1.75	0	0	$2K	0
ENDEAVOR	6/28/2006	0.75	0	0	0	0
GLENOAK	7/1/2006	1.00	0	0	0	0
WESTFIELD	7/17/2006	0.75	0	0	0	0
BUDSIN	7/17/2006	0.75	0	0	0	0
NESHKORO	7/17/2006	0.88	0	0	0	0
MONTELLO	8/23/2006	0.75	0	0	0	0
OXFORD	8/23/2006	1.75	0	0	0	0
PACKWAUKEE	8/24/2006	1.00	0	0	0	0
WESTFIELD	10/2/2006	1.00	0	0	0	0
WESTFIELD	10/2/2006	0.75	0	0	0	0
WESTFIELD	10/2/2006	0.88	0	0	0	0
WESTFIELD	10/2/2006	0.88	0	0	0	0
MONTELLO	10/2/2006	0.75	0	0	0	0
ENDEAVOR	4/30/2007	0.75	0	0	0	0
PACKWAUKEE	7/3/2007	0.75	0	0	0	0
ENDEAVOR	4/25/2008	0.75	0	0	0	0

MONTELLO	7/23/2009	1.00	0	0	0	0
MONTELLO	9/6/2010	0.75	0	0	0	0
WESTFIELD	5/22/2011	2.00	0	0	0	0
WESTFIELD	5/22/2011	4.25	0	0	0	0
WESTFIELD	5/22/2011	2.75	0	0	0	0
NESHKORO	5/22/2011	1.75	0	0	0	0
ENDEAVOR	6/6/2011	1.00	0	0	0	0
GLENOAK	6/6/2011	1.25	0	0	0	0
OXFORD	5/26/2012	0.88	0	0	0	0
BRIGGSVILLE	5/28/2012	1.75	0	0	0	0
MONTELLO	5/28/2012	1.75	0	0	0	0
MONTELLO	8/1/2014	1.00	0	0	0	0
HARRISVILLE	5/25/2016	0.75	0	0	0	0
WESTFIELD	7/6/2017	1.25	0	0	0	0
WESTFIELD	7/6/2017	1.00	0	0	0	0
WESTFIELD	7/6/2017	1.00	0	0	0	0
WESTFIELD	8/24/2020	1.50	0	0	0	0
PACKWAUKEE	8/24/2020	1.00	0	0	0	0
ENDEAVOR	10/12/2020	0.88	0	0	0	0
WESTFIELD	9/7/2021	1.00	0	0	0	0
OXFORD	5/7/2024	1.00	0	0	0	0
WESTFIELD	6/17/2024	1.50	0	0	0	0

LIGHTNING

*There were **no** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

THUNDERSTORM WIND

*There were **83** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	*Date*	*KTS*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
BRIGGSVILLE	6/1/2000	70	0	0	$40K	0
ENDEAVOR	9/1/2000		0	0	$1K	0
WESTFIELD	9/11/2000		0	0	$2K	0
MONTELLO	4/23/2001	50	0	0	0	0
WESTFIELD	6/11/2001	55	0	0	$15K	0
MONTELLO	6/14/2001	52	0	0	0	0
MONTELLO	6/16/2001	56	0	0	0	0

WESTFIELD	6/16/2001	52	0	0	0	0
MONTELLO	9/7/2001	50	0	0	0	0
ENDEAVOR	9/7/2001	52	0	0	0	0
BRIGGSVILLE	4/18/2002	52	0	0	0	0
BUDSIN	7/30/2002	56	0	0	0	0
BRIGGSVILLE	8/21/2002	56	0	0	0	0
MONTELLO	9/2/2002	56	0	0	0	0
ENDEAVOR	8/20/2003	52	0	0	0	0
PACKWAUKEE	5/12/2004	52	0	0	0	0
MONTELLO	5/12/2004	52	0	0	0	0
ENDEAVOR	6/16/2004	52	0	0	0	0
OXFORD	6/23/2004	57	0	0	0	0
ENDEAVOR	7/16/2004	61	0	0	$1K	0
HARRISVILLE	6/30/2005	56	0	0	0	0
WESTFIELD	7/23/2005	52	0	0	$1K	0
MONTELLO	7/23/2005	56	0	0	$3K	0
HARRISVILLE	7/25/2005	56	0	0	$2K	0
MONTELLO	9/7/2005	52	0	0	0	0
WESTFIELD	9/13/2005	52	0	0	0	0
MONTELLO	9/13/2005	52	0	0	0	0
NESHKORO	9/13/2005	52	0	0	0	0
ENDEAVOR	9/13/2005	56	0	0	0	0
GLENOAK	7/1/2006	56	0	0	$2K	0
COUNTYWIDE	7/30/2006	56	0	0	$5K	0
BRIGGSVILLE	7/30/2006	52	0	0	0	0
WESTFIELD	5/24/2007	56	0	0	$2K	0
ENDEAVOR	5/24/2007	52	0	0	$2K	0
OXFORD	8/11/2007	56	0	0	$100K	0
ENDEAVOR	6/7/2008	56	0	0	$25K	0
WESTFIELD	7/10/2008	56	0	0	$40K	0
MONTELLO	7/16/2008	52	0	0	0	0
WESTFIELD	7/27/2009	56	0	0	$30K	0
BRIGGSVILLE	7/14/2010	52	0	0	0	0
WESTFIELD	8/9/2010	56	0	0	0	0
OXFORD	8/20/2010	56	0	0	0	0
MONTELLO	6/8/2011	56	0	0	0	0
BRIGGSVILLE	6/8/2011	65	0	0	0	0
OXFORD	7/19/2011	52	0	0	$1K	0
WESTFIELD	9/2/2011	58	0	0	$75K	0

BRIGGSVILLE	5/28/2012	74	0	0	$20K	0
MONTELLO	5/28/2012	65	0	0	$20K	0
WESTFIELD	8/16/2012	50	0	0	0	0
OXFORD	5/20/2013	56	0	0	$10K	0
PACKWAUKEE	7/7/2014	50	0	0	$1K	0
BRIGGSVILLE	8/25/2014	50	0	0	$1K	0
OXFORD	7/13/2015	60	0	0	$5K	0
MONTELLO	5/25/2016	50	0	0	$1K	0
GERMANIA	7/21/2016	50	0	0	$3K	0
WESTFIELD	7/21/2016	50	0	0	0	0
HARRISVILLE	6/12/2017	56	0	0	$10K	0
BRIGGSVILLE	6/14/2017	56	0	0	$8K	0
WESTFIELD	6/14/2017	56	0	0	$5K	0
WESTFIELD	6/14/2017	61	0	0	$3K	0
NESHKORO	6/14/2017	56	0	0	$4K	0
MONTELLO	7/6/2017	56	0	0	$4K	0
OXFORD	6/30/2018	50	0	0	$7K	0
HARRISVILLE	7/1/2018	50	0	0	$2K	0
OXFORD	8/28/2018	87	0	0	$300K	$2M
BRIGGSVILLE	6/27/2019	50	0	0	$2K	0
MONTELLO	6/27/2019	50	0	0	$15K	0
OXFORD	6/30/2019	50	0	0	$4K	0
OXFORD	8/7/2019	50	0	0	$500	0
ENDEAVOR	8/7/2019	50	0	0	$500	0
WESTFIELD	6/2/2020	52	0	0	$10K	0
ENDEAVOR	7/19/2020	52	0	0	0	0
WESTFIELD	6/15/2022	70	0	0	0	0
OXFORD	6/15/2022	56	0	0	$6K	0
WESTFIELD	6/15/2022	56	0	0	$1K	0
WESTFIELD	6/15/2022	61	0	0	$5K	0
WESTFIELD	6/15/2022	70	0	0	$8K	0
WESTFIELD	6/15/2022	56	0	0	$7K	0
WESTFIELD	6/15/2022	87	0	0	$200K	0
WESTFIELD	7/23/2022	52	0	0	$3K	0
OXFORD	7/23/2022	52	0	0	$8K	0
MONTELLO	10/12/2022	50	0	0	$1K	0
OXFORD	5/7/2024	50	0	0	$2K	0

HIGH WIND

*There were **4** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	Date	KTS	Deaths	Injuries	Property Damage	Crop Damage
MARQUETTE COUNTY	4/7/2001	50	0	0	0	0
MARQUETTE COUNTY	4/12/2001	52	0	0	0	0
MARQUETTE COUNTY	10/26/2010	50	0	0	$10K	0
MARQUETTE COUNTY	12/15/2021	50	0	0	$3K	0

STRONG WIND

*There were **25** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	Date	KTS	Deaths	Injuries	Property Damage	Crop Damage
MARQUETTE COUNTY	5/24/2000		0	0	0	0
MARQUETTE COUNTY	10/24/2001		0	0	0	0
MARQUETTE COUNTY	12/5/2001		0	0	$5K	0
MARQUETTE COUNTY	11/12/2003	39	0	0	$2K	0
MARQUETTE COUNTY	3/14/2004	39	0	0	$2K	0
MARQUETTE COUNTY	4/18/2004	43	0	0	$5K	0
MARQUETTE COUNTY	12/12/2004	40	0	0	$1K	0
MARQUETTE COUNTY	1/24/2006	39	0	0	$5K	0
MARQUETTE COUNTY	5/11/2006	36	0	0	$1K	0
MARQUETTE COUNTY	2/22/2007	39	0	0	$2K	0
MARQUETTE COUNTY	5/24/2007	39	0	0	$2K	0
MARQUETTE COUNTY	11/5/2007	39	0	0	$3K	0
MARQUETTE COUNTY	5/5/2010	39	0	0	$10K	0
MARQUETTE COUNTY	2/18/2011	26	0	0	$2K	0
MARQUETTE COUNTY	4/15/2011	39	0	0	$3K	0
MARQUETTE COUNTY	9/29/2011	39	0	0	$1K	0
MARQUETTE COUNTY	1/1/2012	45	0	0	$1K	0
MARQUETTE COUNTY	4/8/2012	39	0	0	$1K	0
MARQUETTE COUNTY	1/19/2013	40	0	0	$5K	0
MARQUETTE COUNTY	3/16/2016	43	0	0	$1K	0
MARQUETTE COUNTY	3/8/2017	43	0	0	$5K	0
MARQUETTE COUNTY	12/4/2017	41	0	0	$4K	0
MARQUETTE COUNTY	2/24/2019	40	0	0	$1K	0
MARQUETTE COUNTY	11/27/2019	39	0	0	$5K	0

MARQUETTE COUNTY	4/14/2022	43	0	0	$2K	0

TORNADO

*There were **12** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	*Date*	*Strength*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
PACKWAUKEE	6/23/2004	F2	0	0	$1M	$500k
WESTFIELD	8/18/2005	F1	0	0	$100K	$1K
BRIGGSVILLE	6/7/2008	EF1	0	0	$300K	$50K
GLENOAK	7/27/2009	EF1	0	0	$10K	$10K
GLENOAK	4/30/2010	EF0	0	0	0	0
GLENOAK	4/30/2010	EF0	0	0	0	0
MONTELLO	4/30/2010	EF0	0	0	0	0
ENDEAVOR	10/5/2013	EF0	0	0	$50K	$5K
OXFORD	8/28/2018	EF1	0	0	0	0
PACKWAUKEE	8/28/2018	EF1	0	0	0	0
BUDSIN	5/21/2024	EF0	0	0	$20K	0
BUDSIN	5/21/2024	EF1	0	0	$60K	0

FUNNEL CLOUD

*There was **1** event reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	*Date*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
PACKWAUKEE	6/1/2000	0	0	0	0

WINTER WEATHER

*There were **132** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	*Date*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
MARQUETTE COUNTY	2/3/2003	0	0	0	0
MARQUETTE COUNTY	1/4/2004	0	0	0	0
MARQUETTE COUNTY	1/16/2004	0	0	0	0
MARQUETTE COUNTY	2/8/2004	0	0	0	0
MARQUETTE COUNTY	3/7/2004	0	0	0	0
MARQUETTE COUNTY	12/20/2004	0	0	0	0
MARQUETTE COUNTY	11/15/2005	0	0	0	0

MARQUETTE COUNTY	11/10/2006	0	0	0	0
MARQUETTE COUNTY	1/12/2007	0	0	0	0
MARQUETTE COUNTY	1/14/2007	0	0	0	0
MARQUETTE COUNTY	1/21/2007	0	0	0	0
MARQUETTE COUNTY	3/1/2007	0	0	0	0
MARQUETTE COUNTY	3/2/2007	0	0	0	0
MARQUETTE COUNTY	11/21/2007	0	0	0	0
MARQUETTE COUNTY	12/4/2007	0	0	0	0
MARQUETTE COUNTY	12/23/2007	0	0	0	0
MARQUETTE COUNTY	12/28/2007	0	0	0	0
MARQUETTE COUNTY	1/16/2008	0	0	0	0
MARQUETTE COUNTY	1/21/2008	0	0	0	0
MARQUETTE COUNTY	2/9/2008	0	0	0	0
MARQUETTE COUNTY	11/24/2008	0	0	0	0
MARQUETTE COUNTY	12/16/2008	0	0	0	0
MARQUETTE COUNTY	12/23/2008	0	0	0	0
MARQUETTE COUNTY	12/24/2008	0	0	0	0
MARQUETTE COUNTY	12/25/2008	0	0	0	0
MARQUETTE COUNTY	12/27/2008	0	0	0	0
MARQUETTE COUNTY	1/3/2009	0	0	0	0
MARQUETTE COUNTY	1/12/2009	0	0	0	0
MARQUETTE COUNTY	2/26/2009	0	0	0	0
MARQUETTE COUNTY	12/23/2009	0	0	0	0
MARQUETTE COUNTY	1/7/2010	0	0	0	0
MARQUETTE COUNTY	2/8/2010	0	0	0	0
MARQUETTE COUNTY	12/3/2010	0	0	0	0
MARQUETTE COUNTY	12/9/2010	0	0	0	0
MARQUETTE COUNTY	12/20/2010	0	0	0	0
MARQUETTE COUNTY	1/17/2011	0	0	0	0
MARQUETTE COUNTY	2/21/2011	0	0	0	0
MARQUETTE COUNTY	3/9/2011	0	0	0	0
MARQUETTE COUNTY	11/9/2011	0	0	0	0
MARQUETTE COUNTY	12/29/2011	0	0	0	0
MARQUETTE COUNTY	1/12/2012	0	0	0	0
MARQUETTE COUNTY	1/17/2012	0	0	0	0
MARQUETTE COUNTY	1/22/2012	0	0	0	0
MARQUETTE COUNTY	3/2/2012	0	0	0	0
MARQUETTE COUNTY	12/9/2012	0	0	0	0

MARQUETTE COUNTY	1/27/2013	0	0	0	0
MARQUETTE COUNTY	2/7/2013	0	0	0	0
MARQUETTE COUNTY	2/22/2013	0	0	0	0
MARQUETTE COUNTY	2/26/2013	0	0	0	0
MARQUETTE COUNTY	3/5/2013	0	0	0	0
MARQUETTE COUNTY	3/15/2013	0	0	0	0
MARQUETTE COUNTY	3/18/2013	0	0	0	0
MARQUETTE COUNTY	4/10/2013	0	0	0	0
MARQUETTE COUNTY	12/19/2013	0	0	0	0
MARQUETTE COUNTY	1/10/2014	0	0	0	0
MARQUETTE COUNTY	1/24/2014	0	0	0	0
MARQUETTE COUNTY	1/26/2014	0	0	0	0
MARQUETTE COUNTY	1/26/2014	0	0	0	0
MARQUETTE COUNTY	2/13/2014	0	0	0	0
MARQUETTE COUNTY	2/17/2014	0	0	0	0
MARQUETTE COUNTY	11/24/2014	0	0	0	0
MARQUETTE COUNTY	11/28/2014	0	0	0	0
MARQUETTE COUNTY	12/8/2014	0	0	0	0
MARQUETTE COUNTY	1/8/2015	0	0	0	0
MARQUETTE COUNTY	2/1/2015	0	0	0	0
MARQUETTE COUNTY	1/25/2016	0	0	0	0
MARQUETTE COUNTY	3/1/2016	0	0	0	0
MARQUETTE COUNTY	4/2/2016	0	0	0	0
MARQUETTE COUNTY	12/4/2016	0	0	0	0
MARQUETTE COUNTY	12/10/2016	0	0	0	0
MARQUETTE COUNTY	12/23/2016	0	0	0	0
MARQUETTE COUNTY	1/3/2017	0	0	0	0
MARQUETTE COUNTY	1/10/2017	0	0	0	0
MARQUETTE COUNTY	1/11/2017	0	0	0	0
MARQUETTE COUNTY	1/16/2017	0	0	0	0
MARQUETTE COUNTY	1/24/2017	0	0	0	0
MARQUETTE COUNTY	2/24/2017	0	0	0	0
MARQUETTE COUNTY	3/1/2017	0	0	0	0
MARQUETTE COUNTY	3/12/2017	0	0	0	0
MARQUETTE COUNTY	1/14/2018	0	0	0	0
MARQUETTE COUNTY	2/3/2018	0	0	0	0
MARQUETTE COUNTY	2/22/2018	0	0	0	0
MARQUETTE COUNTY	3/5/2018	0	0	0	0
MARQUETTE COUNTY	4/3/2018	0	0	0	0

MARQUETTE COUNTY	4/18/2018	0	0	0	0
MARQUETTE COUNTY	12/12/2018	0	0	0	0
MARQUETTE COUNTY	12/28/2018	0	0	0	0
MARQUETTE COUNTY	1/15/2019	0	0	0	0
MARQUETTE COUNTY	1/22/2019	0	0	0	0
MARQUETTE COUNTY	2/2/2019	0	0	0	0
MARQUETTE COUNTY	2/5/2019	0	0	0	0
MARQUETTE COUNTY	2/7/2019	0	0	0	0
MARQUETTE COUNTY	2/23/2019	0	0	0	0
MARQUETTE COUNTY	2/26/2019	0	0	0	0
MARQUETTE COUNTY	3/9/2019	0	0	0	0
MARQUETTE COUNTY	4/10/2019	0	0	0	0
MARQUETTE COUNTY	10/30/2019	0	0	0	0
MARQUETTE COUNTY	11/6/2019	0	0	0	0
MARQUETTE COUNTY	12/30/2019	0	0	0	0
MARQUETTE COUNTY	1/17/2020	0	0	0	0
MARQUETTE COUNTY	2/17/2020	0	0	0	0
MARQUETTE COUNTY	11/24/2020	0	0	0	0
MARQUETTE COUNTY	12/27/2020	0	0	0	0
MARQUETTE COUNTY	12/29/2020	0	0	0	0
MARQUETTE COUNTY	1/30/2021	0	0	0	0
MARQUETTE COUNTY	2/4/2021	0	0	0	0
MARQUETTE COUNTY	2/11/2021	0	0	0	0
MARQUETTE COUNTY	2/13/2021	0	0	0	0
MARQUETTE COUNTY	12/10/2021	0	0	0	0
MARQUETTE COUNTY	12/28/2021	0	0	0	0
MARQUETTE COUNTY	12/31/2021	0	0	0	0
MARQUETTE COUNTY	1/5/2022	0	0	0	0
MARQUETTE COUNTY	1/24/2022	0	0	0	0
MARQUETTE COUNTY	2/18/2022	0	0	0	0
MARQUETTE COUNTY	2/21/2022	0	0	0	0
MARQUETTE COUNTY	2/24/2022	0	0	0	0
MARQUETTE COUNTY	3/7/2022	0	0	0	0
MARQUETTE COUNTY	3/31/2022	0	0	0	0
MARQUETTE COUNTY	12/14/2022	0	0	0	0
MARQUETTE COUNTY	12/22/2022	0	0	0	0
MARQUETTE COUNTY	1/11/2023	0	0	0	0
MARQUETTE COUNTY	1/18/2023	0	0	0	0

MARQUETTE COUNTY	1/28/2023	0	0	0	0
MARQUETTE COUNTY	2/9/2023	0	0	0	0
MARQUETTE COUNTY	2/16/2023	0	0	0	0
MARQUETTE COUNTY	3/11/2023	0	0	0	0
MARQUETTE COUNTY	3/25/2023	0	0	0	0
MARQUETTE COUNTY	12/30/2023	0	0	0	0
MARQUETTE COUNTY	1/22/2024	0	0	0	0
MARQUETTE COUNTY	2/15/2024	0	0	0	0
MARQUETTE COUNTY	3/22/2024	0	0	0	0
MARQUETTE COUNTY	4/2/2024	0	0	$4K	0

WINTER STORM

*There were **38** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	*Date*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
MARQUETTE COUNTY	4/7/2000	0	0	0	0
MARQUETTE COUNTY	1/6/2005	0	0	0	0
MARQUETTE COUNTY	1/22/2005	0	0	0	0
MARQUETTE COUNTY	2/20/2005	0	0	0	0
MARQUETTE COUNTY	3/19/2005	0	0	0	0
MARQUETTE COUNTY	2/16/2006	0	0	0	0
MARQUETTE COUNTY	2/23/2007	0	0	0	0
MARQUETTE COUNTY	2/25/2007	0	0	0	0
MARQUETTE COUNTY	4/11/2007	0	0	$10k	0
MARQUETTE COUNTY	12/1/2007	0	0	0	0
MARQUETTE COUNTY	12/22/2007	0	0	0	0
MARQUETTE COUNTY	1/29/2008	0	0	0	0
MARQUETTE COUNTY	2/5/2008	0	0	0	0
MARQUETTE COUNTY	2/17/2008	0	0	0	0
MARQUETTE COUNTY	3/21/2008	0	0	0	0
MARQUETTE COUNTY	12/8/2008	0	0	0	0
MARQUETTE COUNTY	12/18/2008	0	0	0	0
MARQUETTE COUNTY	12/20/2008	0	0	0	0
MARQUETTE COUNTY	3/8/2009	0	0	0	0
MARQUETTE COUNTY	12/8/2009	0	0	0	0
MARQUETTE COUNTY	2/1/2011	0	0	0	0
MARQUETTE COUNTY	2/20/2011	0	0	0	0

MARQUETTE COUNTY	4/19/2011	0	0	0	0
MARQUETTE COUNTY	1/30/2013	0	0	0	0
MARQUETTE COUNTY	12/22/2013	0	0	0	0
MARQUETTE COUNTY	1/14/2014	0	0	0	0
MARQUETTE COUNTY	12/28/2015	0	0	0	0
MARQUETTE COUNTY	2/2/2016	0	0	0	0
MARQUETTE COUNTY	3/23/2016	0	0	0	0
MARQUETTE COUNTY	12/16/2016	0	0	0	0
MARQUETTE COUNTY	4/14/2018	0	0	0	0
MARQUETTE COUNTY	1/27/2019	0	0	0	0
MARQUETTE COUNTY	2/11/2019	0	0	0	0
MARQUETTE COUNTY	2/9/2020	0	0	0	0
MARQUETTE COUNTY	2/22/2023	0	0	0	0
MARQUETTE COUNTY	3/9/2023	0	0	0	0
MARQUETTE COUNTY	1/9/2024	0	0	$5K	0
MARQUETTE COUNTY	1/12/2024	0	0	$7K	0

HEAVY SNOW

*There were **5** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	*Date*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
MARQUETTE COUNTY	12/18/2000	0	0	0	0
MARQUETTE COUNTY	3/2/2002	0	0	0	0
MARQUETTE COUNTY	12/10/2003	0	0	0	0
MARQUETTE COUNTY	2/5/2004	0	0	0	0
MARQUETTE COUNTY	2/14/2008	0	0	0	0

BLIZZARD

*There were **3** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	*Date*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
MARQUETTE COUNTY	2/24/2007	0	0	0	0
MARQUETTE COUNTY	12/11/2010	0	0	0	0
MARQUETTE COUNTY	12/20/2012	0	0	0	0

ICE STORM

*There was **1** event reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	*Date*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
MARQUETTE COUNTY	4/4/2003	0	0	0	0

DENSE FOG[202]

*There were **45** events reported over the 25-year period from 1/1/2000 – 12/31/2024.*

Location	*Date*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
MARQUETTE COUNTY	1/9/2000	0	0	0	0
MARQUETTE COUNTY	2/25/2000	0	0	0	0
MARQUETTE COUNTY	3/20/2000	0	0	0	0
MARQUETTE COUNTY	8/23/2000	0	0	0	0
MARQUETTE COUNTY	8/24/2000	0	0	0	0
MARQUETTE COUNTY	10/24/2000	0	0	0	0
MARQUETTE COUNTY	10/25/2000	0	0	0	0
MARQUETTE COUNTY	1/12/2001	0	0	0	0
MARQUETTE COUNTY	2/24/2001	0	0	0	0
MARQUETTE COUNTY	3/22/2001	0	0	0	0
MARQUETTE COUNTY	4/7/2001	0	0	0	0
MARQUETTE COUNTY	6/7/2001	0	0	0	0
MARQUETTE COUNTY	8/22/2001	0	0	0	0
MARQUETTE COUNTY	10/1/2001	0	0	0	0
MARQUETTE COUNTY	12/2/2001	0	0	0	0
MARQUETTE COUNTY	12/16/2001	0	0	0	0
MARQUETTE COUNTY	2/20/2002	0	0	0	0
MARQUETTE COUNTY	4/13/2002	0	0	0	0
MARQUETTE COUNTY	3/20/2003	0	0	0	0
MARQUETTE COUNTY	3/23/2003	0	0	0	0
MARQUETTE COUNTY	2/25/2004	0	0	0	0
MARQUETTE COUNTY	2/26/2004	0	0	0	0
MARQUETTE COUNTY	12/6/2004	0	0	0	0
MARQUETTE COUNTY	1/12/2005	0	0	0	0

[202] This hazard was not selected for inclusion as an independent hazard; it has minimal effect in the county and there are few hazard mitigation strategies that could be impactful and pass a benefit-cost analysis.

MARQUETTE COUNTY	3/9/2006	0	0	0	0
MARQUETTE COUNTY	5/9/2006	0	0	0	0
MARQUETTE COUNTY	9/14/2006	0	0	0	0
MARQUETTE COUNTY	9/23/2006	0	0	0	0
MARQUETTE COUNTY	12/11/2006	0	0	0	0
MARQUETTE COUNTY	12/21/2006	0	0	0	0
MARQUETTE COUNTY	12/21/2007	0	0	0	0
MARQUETTE COUNTY	1/5/2008	0	0	0	0
MARQUETTE COUNTY	1/7/2008	0	0	0	0
MARQUETTE COUNTY	12/26/2008	0	0	0	0
MARQUETTE COUNTY	3/10/2010	0	0	0	0
MARQUETTE COUNTY	5/21/2010	0	0	0	0
MARQUETTE COUNTY	12/30/2010	0	0	0	0
MARQUETTE COUNTY	8/26/2012	0	0	0	0
MARQUETTE COUNTY	9/4/2012	0	0	0	0
MARQUETTE COUNTY	10/23/2012	0	0	0	0
MARQUETTE COUNTY	11/20/2012	0	0	0	0
MARQUETTE COUNTY	12/2/2012	0	0	0	0
MARQUETTE COUNTY	12/16/2012	0	0	0	0
MARQUETTE COUNTY	1/11/2013	0	0	0	0

Appendix C: Plan Adoptions

This plan has been adopted by Marquette County and its major municipal bodies, including the Marquette County Board, the City of Montello, the Villages of Endeavor, Neshkoro, Oxford, and Westfield, and the Towns of Buffalo, Crystal Lake, Douglas, Harris, Mecan, Montello, Moundville, Neshkoro, Newton, Oxford, Packwaukee, Shields, Springfield, and Westfield. Scanned copies of the municipalities that have adopted this plan are provided below.

U.S. Department of Homeland Security
FEMA Region 5
536 S Clark St
Chicago, IL 60605

FEMA

September 30, 2025

Ms. Heather Thole
State Hazard Mitigation Officer
Wisconsin Emergency Management
2400 Wright Street, P.O. Box 7865
Madison, WI 53707-7865

Dear Ms. Thole:

In accordance with applicable laws, regulations and policy, the Risk Analysis Branch of the FEMA Region 5 Mitigation Division has approved the Marquette County 2025 Hazard Mitigation Plan. Enclosed is the status of all participating jurisdictions (see below).

Mitigation Plans may include additional content to meet Element H: Additional State Requirements or content the local government included beyond applicable FEMA mitigation planning requirements. FEMA approval does not include the review or approval of content that exceeds these applicable FEMA mitigation planning requirements.

The expiration date of the Marquette County 2025 Hazard Mitigation Plan is September 29, 2030.

An approved local mitigation plan, including adoption by the local government, is one of the conditions for applying for and/or receiving FEMA mitigation grants from the following programs:

- Hazard Mitigation Grant Program (HMGP)
- HMGP Post-Fire
- Building Resilient Infrastructure and Communities
- Flood Mitigation Assistance
- Safeguarding Tomorrow Revolving Loan Fund

Having an approved mitigation plan does not mean that mitigation grant funding will be awarded. Specific application and eligibility requirements for the programs listed above can be found in each FEMA grant program's respective policies and annual Notice of Funding Opportunities, as applicable.

Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; the National Flood Insurance Act of 1968, as amended; and National Dam Safety Program Act, as amended; 44 CFR Part 201, Mitigation Planning; and Local Mitigation Planning Policy Guide (FP-206-21-0002).

A draft of the next plan update must be submitted before the end of the approval period. Remember to allow sufficient time to secure funding as well as for the update process, including the review and approval process. Please include time for any revisions, if needed, and for your jurisdiction to formally adopt the plan after the review, if not adopted prior to submission.

This will enable you to remain eligible to apply for and receive funding from FEMA's mitigation grant programs with a mitigation plan requirement. Local governments, including special districts, with a plan status of "Approvable Pending Adoption" are not eligible for FEMA's non-emergency assistance and mitigation grant programs with a mitigation plan requirement.

We look forward to discussing options for implementing this mitigation plan. If there are any questions from either you or the communities, please contact Meg Burrows at (312) 408-5320 or meghan.burrows@fema.dhs.gov.

Sincerely,

John Wethington
Chief, Risk Analysis Branch
Mitigation Division

Enclosure: Plan Participants Status List
Attached is the list of the participating jurisdictions in the referenced Hazard Mitigation Pl

Enclosure: Plan Participant Status List

Attached is the list of participating jurisdictions in the referenced hazard mitigation plan.

Community Name	Jurisdiction Status	Date Approved by FEMA
1) Endeavor village	APA	
2) Marquette County	Approved	9/30/25
3) Montello city	Approved	9/30/25
4) Neshkoro village	Approved	9/30/25
5) Oxford village	Approved	9/30/25
6) Westfield village	Approved	9/30/25

U.S. Department of Homeland Security
FEMA Region 5
536 S Clark St
Chicago, IL 60605

FEMA

January 20, 2026

Ms. Heather Thole
State Hazard Mitigation Officer
Wisconsin Emergency Management
2400 Wright Street, P.O. Box 7865
Madison, WI 53707-7865

Dear Ms. Thole:

In accordance with applicable laws, regulations and policy, the Hazard Mitigation Assistance Community Resilience Branch of FEMA Region 5 has approved the Marquette County 2025 Hazard Mitigation Plan. Enclosed is the status of all participating jurisdictions (see attached).

Mitigation plans may include additional content to meet Element H: Additional State Requirements or content the local government included beyond applicable FEMA mitigation planning requirements. FEMA approval does not include the review or approval of content that exceeds the applicable FEMA mitigation planning requirements.

The expiration date of the Marquette County 2025 Hazard Mitigation Plan is September 30, 2030.

An approved local mitigation plan, including adoption by the local government, is one of the conditions for applying for and/or receiving FEMA mitigation grants from the following programs:

- Hazard Mitigation Grant Program (HMGP)
- HMGP Post-Fire
- Building Resilient Infrastructure and Communities
- Flood Mitigation Assistance
- Safeguarding Tomorrow Revolving Loan Fund

Having an approved mitigation plan does not mean that mitigation grant funding will be awarded. Specific application and eligibility requirements for the programs listed above can be found in each FEMA grant program's respective policies and annual Notice of Funding Opportunities, as applicable.

Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; the National Flood Insurance Act of 1968, as amended; and National Dam Safety Program Act, as amended; 44 CFR Part 201, Mitigation Planning; and Local Mitigation Planning Policy Guide (FP-206-21-0002).

A draft of the next plan update must be submitted before the end of the approval period. Remember to allow sufficient time to secure funding as well as for the update process, including the review and approval process. Please include time for any revisions, if needed, and for your jurisdiction to formally adopt the plan after the review, if not adopted prior to submission.

This will enable you to remain eligible to apply for and receive funding from FEMA's mitigation grant programs with a mitigation plan requirement. Local governments, including special districts, with a plan status of "Approvable Pending Adoption" are not eligible for FEMA's non-emergency assistance and mitigation grant programs with a mitigation plan requirement.

We look forward to discussing options for implementing this mitigation plan. If there are any questions from either you or the communities, please contact Meg Burrows at (312) 408-5320 or meghan.burrows@fema.dhs.gov.

Sincerely,

Megan S. Hart

Megan S. Hart
Branch Chief
Hazard Mitigation Assistance Community Resilience

Enclosure: Plan Participant Status List

Enclosure: Plan Participant Status List

Attached is the list of participating jurisdictions in the referenced hazard mitigation plan.

Community Name	Jurisdiction Status	Date Approved by FEMA
1) Buffalo town	Approved	1/20/26
2) Crystal Lake town	Approved	1/20/26
3) Douglas town	Approved	1/20/26
4) Endeavor village	APA	
5) Harris town	Approved	1/20/26
6) Marquette County	Approved	9/30/25
7) Mecan town	Approved	1/20/26
8) Montello city	Approved	9/30/25
9) Moundville town	Approved	1/20/26
10) Neshkoro town	Approved	1/20/26
11) Neshkoro village	APA	
12) Oxford town	Approved	1/20/26
13) Oxford village	APA	
14) Packwaukee town	Approved	1/20/26
15) Shields town	Approved	1/20/26
16) Springfield town	Approved	1/20/26
17) Westfield town	Approved	1/20/26
18) Westfield village	Approved	9/30/25

STATE OF WISCONSIN
DEPARTMENT OF MILITARY AFFAIRS
DIVISION OF EMERGENCY MANAGEMENT

Phone: 608-242-3000
P.O. Box 7865 · Madison, WI 53707-7865
wem.wi.gov
dma.wi.gov

June 18, 2025

Arron Williams, Director
Marquette County
Emergency Management
77 West Park Street
Montello, WI 53949

Dear Director Williams:

Wisconsin Emergency Management (WEM) has reviewed the *Marquette County Hazard Mitigaiton Plan 2025 Update*. The Federal Emergency Management Agency (FEMA) and WEM have signed a Program Administration by States operational agreement, allowing WEM to review local mitigation plans to ensure they meet the required criteria for a multi-jurisdiction hazard mitigation plan outlined in 44 CFR Part 201.

The local mitigation plan meets all applicable FEMA mitigation planning requirements except its adoption by: Marquette County, City of Montello, Village of Endeavor, Village of Neshkoro, Village of Oxford, and Village of Westfield.

Local governments, including special districts, with a plan status of "Approvable Pending Adoption" (APA) are not eligible for FEMA mitigation grant programs with a mitigation plan requirement. The next step in the approval process is to formally adopt the mitigation plan and send a resolution to the state for submission to FEMA. Sample adoption resolutions can be found in Appendix A of the Local Mitigation Planning and Policy Guide.

An approved local mitigation plan, including adoption by the local government, is one of the conditions for applying for and/or receiving FEMA mitigation grants from the following programs:

- Hazard Mitigation Grant Program
- Flood Mitigation Assistance

Participating jurisdictions that adopt the plan more than one year after APA status has been issued must either:

- Validate that their information in the plan remains current with respect to both the risk assessment (no recent hazard events, no changes in development) and their mitigation strategy (no changes necessary); or
- Make the necessary updates before submitting the adoption resolution to FEMA.

We look forward to receiving the adoption resolution(s) and discussing options for implementing this mitigation plan. If we can help in any way, please contact me at heather.thole@widma.gov.

Sincerely,

Heather Thole

Heather Thole, Alternate GAR
State Hazard Mitigation Officer
Wisconsin Emergency Management

Enclosure

- WEM Plan Review Tool

Cc:

Lenora Borchardt, Emergency Manager/Consultant, EPTEC, Inc.
Steve Fenske, East Central Region Director, WEM

ROLL CALL - COUNTY BOARD OF SUPERVISORS
MARQUETTE COUNTY, WISCONSIN

ROLL CALL

SUPERVISORS	YES	NO
Achterberg	☑	☐
Bennett	☑	☐
Benson	☑	☐
Borzick	☑	☐
Bornhoeft Abstain	☐	☐
Fenner	☑	☐
Frazer	☐	☐
Kempley	☑	☐
Krause	☑	☐
Krentz	☑	☐
Locke	☑	☐
McGwin	☑	☐
Nigbor	☑	☐
Raddatz	☑	☐
Sorensen	☑	☐
Swan	☑	☐
Walters	☑	☐

ADOPTED ☑
DEFEATED ☐

VOTE TALLY	
YES	15
NO	0
ABSENT	1
ABSTAIN	1

INTRODUCED BY:

Committee Recommendation:
Judicial & Public Safety Committee

STATE OF WISCONSIN)
) SS
County of Marquette)

I, Kiley Lloyd, County Clerk of Marquette County, Wisconsin do hereby certify that the above is a true and correct copy of the resolution passed by the Marquette County Board of Supervisors on this date.

8/19/2025
Date

Kiley Lloyd, County Clerk

August 19, 2025, Session Resolution 47-2025

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

WHEREAS, the County of Marquette recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save tax payer dollars; and

WHEREAS, an adopted hazard mitigation plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the County of Marquette and the other local units of government participated jointly in the planning process to update a Hazard Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Marquette County Emergency Management Office;

NOW, THEREFORE, BE IT RESOLVED, that the Marquette County Board of Supervisors of the County of Marquette adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and the Federal Emergency Management Agency will not require re-adopting this resolution.

CITY OF MONTELLO, MARQUETTE COUNTY
RESOLUTION NO. 2025-07
ADOPTION OF MARQUETTE COUNTY HAZARD MITIGATION PLAN

NOTICE TO THE CITY: The Montello City Council does resolve as follows:

WHEREAS, the City of Montello recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted hazard mitigation plan is required by FEMA as a condition of future grant funding for mitigation projects; and

WHEREAS, the City of Montello and County of Marquette along with other local units of government participated jointly in the planning process to update a Hazard Mitigation Plan, which was made available for review via a Legal Notice and a copy of which will reside permanently in the Montello City Hall Clerks Office and Marquette County Emergency Management Office.

NOW, THEREFORE, BE IT RESOLVED, that the City of Montello City Council, Montello, Wisconsin, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management, and the Federal Emergency Management Agency will not require re-adoption of this resolution.

AYES: 8

NAYS: 0

I HEREBY CERTIFY that the foregoing Resolution was introduced by Alderperson Mugler, seconded by Alderperson Schrimpf, and duly adopted by the City of Montello Council of the City of Montello, Marquette County, Wisconsin, at a legal meeting on September 4th, 2025.

By: Ken Streich

Ken Streich, City of Montello Acting Mayor

Attest: Lindsey Machkovich

Lindsey Machkovich, Clerk/Treasurer

RESOLUTION # 2025-0812

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Village of Endeavor recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the Village of Endeavor participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Village Board of the Village of Endeavor, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan with the stipulation of adding Endeavor Police Department as a law enforcement agency and a mitigation plan needs to be provided for the pipeline across I39; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit, on behalf of the Village, the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

Adopted this 14th day of October 2025.

Village of Endeavor

Steve Biba

Steve Biba, President

ATTEST:

Kristina Irwin

Kristina Irwin
Village Clerk/Treasurer

Ayes 111

Nays 0

RESOLUTION TO ADOPT THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Village of Neshkoro in the County of Marquette recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the Village of Neshkoro participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Village of Neshkoro, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit, on behalf of the County, the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

Adopted 10/6/2025

Motion made by: Trustee L. Gohlke **Seconded by: Trustee J. Good**

Vote Tally
Yes _____5_____
No___0_____
Abstain____0____
Absent__0_____

RESOLUTION# 2025-8

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Village of Oxford, Marquette County WI, recognizes the threat that natural hazards post to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the Village of Oxford, Marquette County, WI, participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Village of Oxford Board, Marquette County, WI, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Village of Oxford, Marquette County, WI, Emergency Management Department will submit, on behalf of the Village, the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: Unanimous DATE: 09.10.2025

Certifying Official

VILLAGE OF WESTFIELD
MARQUETTE COUNTY, WI
RESOLUTION # 25:07

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the County of Marquette recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the County of Marquette participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the County Board of the County of Marquette, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit, on behalf of the County, the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

The above and foregoing resolution was offered by ***Vanderhyden***, second by ***Borud***, and duly passed at a regular meeting of the Village Board of the Village of Westfield, WI held on ***September 10th, 2025.***

Nancy Nelson

Nancy Nelson, Village President

ATTEST:

Linda Quinn, Clerk / Treasurer

(Posted: 9/11/25 Westfield Municipal Bldg. / Ethel Everhard Memorial Library, Westfield Super Value)

RESOLUTION # 8/11/2025

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Buffalo recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Buffalo participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Buffalo, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit, on behalf of the Town, the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: 3-0 DATE: 8-11-2025

Scott Kempley -CHAIRMAN
SIGNED:

Laurie Beahm -CLERK
WITNESSED BY:

State of Wisconsin
Marquette County
Town of Crystal Lake

RESOLUTION # 2025-01

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Crystal Lake recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, theTown of Crystal Lake participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Crystal Lake, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit, on behalf of the Township, the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

Dated this 14th day of August 2025.

ATTESTED BY TOWN OF CRYSTAL LAKE

Chairperson: Dennis Fenner

Clerk: Lisa M. Fenner

RESOLUTION # 2-2025

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Douglas recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Douglas participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Douglas, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit, on behalf of the County, the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: X DATE: 8/20/25

Town Clerk

Certifying Official

RESOLUTION # 04-2025

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Harris recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Harris participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Harris, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit, on behalf of the Town, the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

Glenn L. Thalacker, Chairman

Dennis A. Daye, Supervisor I

Dennis F. Kekow, Supervisor II

Attested by:

Darlene A. Wulf, Clerk

9-15-25

Date

RESOLUTION # 02-2025

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Mecan recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Mecan participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Mecan, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit, on behalf of the Town, the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: X DATE: August 13, 2025

Mikael L. Raddatz

Certifying Official

RESOLUTION # 2025-01

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Montello recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Montello participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Montello, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit, on behalf of the Town, the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED:
Aye: Bubolz, Dahlke, Hunter
No: None

DATE: 9-9-25

Eileen Pagenkopf, Clerk
Certifying Official

RESOLUTION # 2025-01

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Moundville recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Moundville participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Moundville, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit, on behalf of the Town, the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: 9-23-25-YES DATE: 9-23-25

Gary Schoppenhorst
Certifying Official

RESOLUTION # 1-2025

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Neshkoro recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Neshkoro participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Neshkoro, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit, on behalf of the Town, the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: 3:0 DATE: 8-13-2025

Certifying Official

RESOLUTION # 202501

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Newton recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Newton participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Newton, adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit, on behalf of the Town, the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED:_____ DATE: 10-21-2025

Christopher Peschel, Chairmain

TOWN OF OXFORD

MARQUETTE COUNTY, WISCONSIN

RESOLUTION # 2025-1

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

Whereas, the Town of Oxford recognizes the threat that natural hazards pose to people and property, and

Whereas, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars, and

Whereas, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects, and

Whereas, the Town of Oxford participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

Now, Therefore, Be It Resolved, that the Town Board of the Town of Oxford, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan, and

Be It Further Resolved, that the Marquette County Emergency Management Department will submit, on behalf of the Town of Oxford, the adopted Hazard Mitigation Pla to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adoption of this resolution.

Passed: September 15, 2025

Keith Wohlfert, Chairman

Mark Maier, Supervisor #1

Stephen Klump, Supervisor #2

Attest: Mary P Walters, Clerk

TOWN OF OXFORD
REGULAR MEETING
SEPTEMBER 15, 2025

The regular meeting of the Town Board of the Town of Oxford was held at the Town Hall on Monday, September 15, 2025 at 6:00 PM. Present were Keith Wohlfert, Mark Maier, Steve Klump, Peggy Russell, Mary Walters and several visitors.

A motion by Klump/Maier to amend the agenda adding approval of the Public Hearing Minutes from August 18, 2025 and then to approve the amended agenda. Motion carried.

A motion by Klump/Maier to approve the minutes from the August 18, 2025 Regular Meeting. Motion carried.

A motion by Maier/Klump to adopt the Marquette County Hazard Mitigation Plan along with Resolution 2025-1. (Attached to minutes). Motion carried.

A motion by Klump/Maier to approve vouchers # 151 – 174. Motion carried.

A motion by Maier/Klump to approve the Treasurer's Report which included the board taking consensus to not enter into a contract with ABT Mailcom for processing of tax bills. The treasurer indicated she felt better about keeping the process in house and would also be less costly. Motion carried.

A motion by Klump/Maier to approve a operator licenses for Nicole Molinari and Tanya Fredrick. Motion carried.

A motion by Wohlfert/Maier to approve a driveway permit for Keith Moore with a culvert required. Motion carried.

A motion by Maier/Klump to approve the Clerk's Report. Motion carried.

The Board set the October meeting for October 15, 2025 at 6:00 PM.

A motion by Maier/Klump to have the Marquette County Highway Department install an additional 24 foot culvert with rip rap and paving at the intersection of Fern Road and Fish Haven Court to not exceed $6500. The board is postponing the clearing and grubbing at this intersection until 2026. Motion carried.

A motion by Maier/Klump to adjourn. Motion carried.

RESOLUTION # 2025-01

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Packwaukee recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Packwaukee participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Packwaukee, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit, on behalf of the Town, the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: 5 yes Ø no DATE: 8/12/2025

Certifying Official

RESOLUTION # 2025-001

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Shields recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Shields participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Shields, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit, on behalf of the Town, the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: X DATE: August 7, 2025

Certifying Official

TOWN OF SPRINGFIELD
MARQUETTE COUNTY, WI
RESOLUTION # 25:01

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the County of Marquette recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the County of Marquette participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the County Board of the County of Marquette, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit, on behalf of the County, the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

The above and foregoing resolution was offered by Drake, second by McLaughlin, and duly passed at a regular meeting of the Town Board of the Town of Springfield, WI held on ***September 10th, 2025.***

Terry Janke
Terry Janke, Town Chairman

ATTEST:
Megan Hockerman
Megan Hockerman, Clerk

(Posted: 9/11/25 (3) Town posting locations & website)

RESOLUTION # 01-2025

ADOPTING THE MARQUETTE COUNTY HAZARD MITIGATION PLAN

FISCAL IMPACT: None

WHEREAS, the Town of Westfield recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all-hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Westfield participated jointly in the planning update process with Marquette County and the other local units of government within the County to prepare an updated Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Town Board of the Town of Westfield, hereby adopts the Marquette County Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Marquette County Emergency Management Department will submit, on behalf of the Town, the adopted Hazard Mitigation Plan to Wisconsin Emergency Management and Federal Emergency Management Agency officials for final review and approval. Minor changes made upon advice from Wisconsin Emergency Management and Federal Emergency Management Agency will not require re-adopting this resolution.

PASSED: 2-1 DATE: 8/18/25

Certifying Official

Appendix D: Report on Previous Mitigation Strategies

Report on Previous Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
All Hazards	Pursue community outreach and education. Continue to add/update Emergency Management Department links on the existing county web site (e.g., ARC, FEMA, WEM) especially focusing on preparedness bulletins. Publicize the website to show the community what is available.	Covered by Dept. annual budget	EM Dept. / SO	Ongoing	Medium	Marquette County and all communities within	• Marquette County has its departments and contact information listed on the county website for easy access. • The Emergency Management Department and Sheriff's Office are designing websites that will be easily updated in case of emergency. • The IC trailer is displayed at the County Fair. *NFIP materials are distributed. • Emergency Information is shared in local newspapers, at Senior Centers, businesses, etc. Facebook and Twitter are also being used as communication tools for community outreach. *The EM website has been updated and will be done again to add link and other information. There will be a fixed website and a social media presence. Public information campaigns occur annually in spring and fall ahead of the severe temperature potentials in summer and winter. This strategy will be carried forward and reviewed again by the end of 2023.*

Report on Previous Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	Explore creating pages or social media to be used for public media campaigns.	Covered by Dept. annual budget	Village Administration	Ongoing	Medium	VIs of Endeavor and Oxford	*VI Oxford has an active website maintained by the Clerk. They also use traditional media outlets such as newspapers. The website is used to provide information and also remind residents about siren tests. Links will direct residents to the main county social media platforms. Will be carried forward.* *VI of Endeavor also has an active website that provides public information.*
	Continue to promote the increased use of National Oceanic and Atmospheric Administration (NOAA) weather radios.	Covered by Dept. annual budget	EM Dept.	Ongoing	Low	Marquette County and all communities within	Annually promoted at booth at County Fair. *EM currently has a cache of weather radios, which they sell for cost and re-order with the proceeds. Use of the radios is regularly promoted. Will be carried forward.*
	Improve coordination and communication among emergency responders.	Unknown	EM Dept. / SO / FD	Ongoing	Medium	Marquette County and all communities within	*This is done on a regular basis through exercises, training, meetings and other activities. EM is part of the Fire Chief's Association and regularly meets with other response groups. Partnerships are strong. Will be removed.*
	Continually update countywide Emergency Access Plan	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Marquette County and all communities within	*With the change of EM Directors, this plan has been incorporated into other standing plans and is no longer needed. Will be removed.*
	Promote and implement modern hazard warning systems.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Marquette County and all communities within	*Most places are removing sirens and residents are moving to phone applications. The county does not own any sirens but does activate them.* *Will be carried forward.*

Report on Previous Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
							Moving forward, this strategy will be reworded to: Continually monitor and update the integrated warning and communication system for technological maintenance and upgrade as the system requires.
	Incorporate new pager warning system.	Costs vary Unknown $2,000 Unknown Unknown	EM Dept.	2012-2015	Medium	Marquette County CI of Montello VI of Oxford Vis of Montello, Neshkoro, and Westfield VI of Endeavor; TNs of Harris and Packwaukee	Warning system is activated through pager tower. It sets off the sirens county-wide with NWS messages from dispatch. • Wilderness Campground in Montello is on the system. • Village of Oxford is on system. • Villages of Montello, Neshkoro, and Westfield are on the system. Village of Endeavor and the Towns of Harris and Packwaukee are exploring the feasibility. *This strategy was accomplished with towers and enhancements to the 9-1-1 system. Will be removed.*
	Provide adequate emergency power sources.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Marquette County and all communities within	*With the change of EM Directors, the focus now is to assess the power situation in governmental infrastructure and shelters, and moving forward this strategy will be changed to reflect that. A plan will be created after the evaluation. One thing to be looked at is which locations would benefit from an external panel versus a generator.* *Potential targets to assess include lift stations, water facilities, fire*

Report on Previous Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
							departments, EOC and Public Works buildings. Shelters and schools are fairly well set-up but will be assessed. The school located in Oxford may not have a generator. *TN of Douglas administration and fire department will discuss power failure concerns and determine if mitigation is needed.* *CI Montello purchased a back-up generator for the sewer plant using community funds.* *Costs will be changed to show that grants will be applied for and other funding opportunities will be sought. Funding is a concern with volunteer fire departments.* *Will be carried forward with the changes noted above; and will also be moved to the Utility Failure section.*
	Explore hookup options and implement emergency power generators as a power supply for county schools to be used as shelters.	Costs vary	Municipal Administration	2010-2015	Medium	VI of Westfield	*Two schools in the Village of Westfield have generators and are exploring hook-up options. Will be carried forward.*
	Explore hookup options and implement emergency power generators as a power supply for county schools to be used as shelters.	Information unavailable	*Municipal Administration*	Complete prior to 2021	*Medium*	*CI Montello*	*This strategy was not in the previous version of this plan but it was noted that the school in Montello obtained a generator through a grant.* *Will be removed.*
	Protect critical facilities and Infrastructure.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Marquette County and all communities within	*This previous mitigation strategy was not well-defined and will be removed and replaced with more detailed strategies.*

Report on Previous Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	Improve planning and regulatory practices.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Marquette County and all communities within	*This is done on a regular basis. Municipalities were advised that any local plans such as Comprehensive or Stormwater plans – anything relating to mitigation – should cross-reference this plan. Will be removed.*
	Update and improve the countywide communications system.	$3.3M	EM Dept.	2015-2016	High	Marquette County and all communities within	• Radio project has passed through the committee, however still needs full board approval. • Project will consist of five new repeater sites (four existing sites), new dispatch, and a few new towers. • There will be interoperability with Columbia County to back up each county's dispatchers. *Completed as noted in the "Incorporate new pager warning system" strategy above and will be removed.*
	Update fiber/IT capabilities for the internet (including video) for county facilities.	$155,000	EM Dept.	2012-2015	High	Marquette County and all communities within	*This has been completed, with fiber being added to Highway, Senior Center, and Human Services facilities. A large portion of the county has been upgraded during the past 5 years.* *TN Douglas also notes that they have fiber capabilities throughout the town now.* *Will be removed.*
Drought and Dust Storms	Continue to provide community outreach and education to farmers during times of drought	Covered by Dept. annual budget	UW-Ext. / FSA	As needed	Low	Marquette County and all communities within	Extension responds with websites and resources ready. *Will be carried forward.*
	Promote the use of best management practices for agriculture and yards.	Covered by Dept.	FSA / UW-Ext.	Ongoing	Low	Marquette County and all communities within	*Will be carried forward, adding Individuals under Responsible Management.*

Report on Previous Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
		annual budget					
	Prepare/publicize water usage regulations for non-farm areas during drought	Covered by annual budget	Municipal Administration	As needed	Low	Marquette County and all communities within	*Will be carried forward.*
Fires: Forest, Grass and Wildfires	Continue to provide outreach efforts and education to homeowners on protecting homes and structures from fires.	Costs vary	Local FD	Ongoing	Low	Marquette County and all communities within	Updated information is shared on the county and municipal websites, in local newspapers, at Senior Centers, businesses, etc. Facebook and Twitter are also being used as communication tools for community outreach. *This is done in October during Fire Prevention Week by fire departments. FDs and the American Red Cross also check fire alarms. Will be carried forward.*
	Support active forest management to minimize the potential for catastrophic fires.	Covered by annual budget	LIO / Zoning Admin. / SO / EM / local FDs	Ongoing	Medium	Marquette County and all communities within	*Communities are sharing Firewise program information where appropriate. Will be carried forward, adding DNR to the Responsible Management.*
	Engage in good land use planning, proper home siting and provide adequate access to homes in fire prone areas.	Covered by annual budget	LIO / Zoning Admin.	Ongoing	Low	Marquette County and all communities within	Local Fire Departments survey region to ensure driveways are wide enough and clear for emergency access. Also observe fire numbers are properly placed and easily visible. *Also part of Firewise. Moving forward, will be combined with the strategy above; and the priority will be changed to Medium for Firewise communities and low for the rest of the county.*
	Conduct DNR wildfire training each spring.	Covered by annual budget	Local FD / DNR	Ongoing	Medium	Marquette County and all communities within	DNR trainings take place each spring. *This continues to take place and will be carried forward.*

Report on Previous Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	Maintain the dry hydrant system.	Covered by annual budget	Local FD	Ongoing	Medium	Marquette County and all communities within	*Community has a number of dry hydrants throughout the county, as needed to supply water for firefighting. This system is managed cooperatively by the county's Fire Chiefs Association.* *During the last plan period, TN Oxford had been looking at putting one in at CX; they continue to evaluate the need and this item will be carried forward.* *Will be carried forward.*
Flooding and Dam Failure	Continue to add/update links on the existing county web site (e.g., NMC, ARC, FEMA, WEM, NFIP). Publicize the website to show the community what is available, and increase community outreach and education.	Covered by Dept. annual budget	LIO / Zoning Admin.	Ongoing	Low	Marquette County and all communities within	• NFIP materials are distributed at county fair. • Preparedness and emergency Information is shared in local newspapers, at Senior Centers, businesses, etc. Facebook and Twitter are also being used as communication tools for community outreach. *In 2018, there was a Presidential disaster declaration for flooding, which primarily affected CI Montello. A lot of outreach and education was done in conjunction with WEM and FEMA.* *All of the above were done on an as-needed basis utilizing methods that would hit the highest concentration of residents. COVID lessened the ability for in-person meetings, and especially getting to the Senior Center. Moving forward, it is expected that there will be a fuller schedule of opportunities and meetings.*

Report on Previous Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
							Twitter is not being used and will be removed. *TN Westfield will review their website and will add anything necessary.* *Will carry forward.*
	Redo the causeway over Fox River.	*$2.5M ($1M DOT grant)*	*Hwy. Dept.*	*2018-2023*	*High*	Marquette County and all communities within	*This strategy was not in the previous version of this plan but the project was started during the previous planning period.* *Will be carried forward.*
	*Ensure that plans are reviewed and updated regularly. Update floodplain maps as new data become available. Collect information on flood prone areas.	~$3,000	Marquette County and municipal administration	Ongoing	Medium	Marquette County and all communities within	• Floodplain maps were updated 2012 • All communities also updated maps 2012 • Mapping will be updated as funding is available. *Will carry forward, adding Planning & Zoning and Land Conservation to Responsible Management.*
	*Acquire new topographical maps for the entire County with two (2) foot contour intervals	~$65,000	LIO / EM Dept.	2028	Medium	Marquette County and all communities within	*New aerial photos may be completed in next project period. They may not be LIDAR. Will consider moving to 12-18" contours if funding allows and there is a need. Will be carried forward.*

Report on Previous Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	*Continue to explore if residents express an interest in flood mitigation measures (e.g., buyouts, elevations, floodproofing, etc.) countywide.	Covered by Dept. annual budget	LIO / Zoning Admin. / EM Dept.	Ongoing	High	Marquette County and all communities within	• FEMA's PDM & FMA grants are potential funding sources for buyout. No opportunities have presented. *Will carry forward*. • Will explore mitigation opportunities to acquire properties as they come up for tax lien sales. *Will carry forward*. • One property currently up for tax lien sale. *Will be removed.*
	*Provide information to citizens about the purchase of flood insurance.	Covered by Dept. annual budget	EM Dept.	Ongoing	Low	Marquette County and all communities within	Will continue to promote at fairs, etc. *This was completed as opportunities were available and will be carried forward; moving up to the public outreach strategy for this hazard.*
	Work with the municipal Departments of Public Works to identify areas prone to road flooding and discuss mitigation strategies and funding sources.	Unknown	County Highway Department	2018	Medium	Marquette County and all communities within	Hwy 22 floods and cuts the county in half. • First responders cannot get through and must travel a long distance to go around. • People on the south side cannot reach the City of Montello for food, medicine, and health treatments. Options may be to lift the bridge higher, install a new bridge (1/2 mile), etc. *This is still a concern but there has been no movement on exploring options, creating plans, and funding project. This will be carried forward.*

Report on Previous Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	• Explore options to tie North and South portions of the county together by Buffalo Lake.	Unknown	County Highway Department	2018	Medium	Marquette County and all communities within	*This project relates to raising the road profile on CTH D over Buffalo Lake. It will start in 2023 (paving) and end in 2024. This will be carried forward with the following changes: Cost $2.5M; $1M state grant, $500K ARPA funding; $500K county funds. Priority changed to High.*
	• *Culvert needed on Dale Drive due to water over the road.*	*Unknown; grants and other sources*	*TN Administration*	*Ongoing*	*Low-Medium*	*TN Douglas*	*This project was not included in the previous plan but was started during the last plan cycle. Shoulders were shored up with gravel but a culvert is needed. Officials are monitoring this, as a lot of heavy equipment moves over this road. Will be carried forward.*
	• *Flooding issues on 20th Avenue*	*Unknown*	*TN Administration*	*Ongoing*	*Medium*	*TN Neshkoro*	*This project was not included in the previous plan but was started during the last plan cycle. The road was raised a year ago but it continues to be a problem as it is located in a marsh. Officials continue to monitor. Will be carried forward.*
	• *2nd Avenue north of Fenner Lake requires additional work to mitigate flooding concerns.*	*Unknown*	*TN Administration*	*Ongoing*	*Medium*	*TN Westfield*	*An equalizer culvert near Fenner Lake was installed and a gravel lift was done in 2020 and paving done in 2021. Project is complete and will be removed.*
	Enhance stormwater management and erosion control.	Covered by Dept. annual budget	LWC / LIO	2018	Medium	Marquette County and all communities within	• Effective wetlands management practices help manage stormwater in county. • Explore opportunities as problems arise. *The Land & Water Conservation Dept. completed a project in the TN Oxford during the last plan period.*

Report on Previous Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
							Carry forward with the project timetable changed to Ongoing.
	Improve planning and regulatory practices.	Covered by Dept. annual budget	LIO / LWC	Ongoing	Medium	Marquette County and all communities within	*Completed as opportunities arise. Communities follow county zoning guidance as required.*
	• Establish river gauges for Buffalo Lake, Fox River, and Montello River.	DNR grant $500-$1,500	LWC & PNZ	2018	Medium		*Originally applied for DNR grant funding in 2011 but it was not received. County has reapplied but has not received assistance to date. Will be carried forward.*
	*Promote floodproofing of buildings where appropriate and cost-effective.	Covered by Dept. annual budget	LIO / Zoning Admin.	Ongoing	Medium	CI of Montello	*There have been no appropriate floodproofing projects identified to date.* *This item will be carried forward in the event projects are identified.*
	Protect water quality.	Covered by Dept. annual budget	LWC	Ongoing	Medium	Marquette County and all communities within	*This item will be carried forward but included under the "Enhance stormwater management and erosion control" strategy above and will be removed as a separate item.*
	Highway O goes underwater often due to flooding. Evaluate and select a flood mitigation strategy.	Unknown	WI DNR	Ongoing	High	CI & TN Montello, Packwaukee, Endeavor, Moundville, Buffalo, and Douglas and parts of Columbia County	*Highway O and Hwy D & Packwaukee (at the causeway) are underwater often. Both flood because five dams upstream open their gates at the same time. It funnels through Montello. Electronic controls or a float system would keep roads from flooding. WI DNR does it manually, and the people are not local. The causeway project is being done by 2025, but the highway is still a problem. DNR is doing a $10M project to work on locks.*
	Promote and implement modern hazard warning systems.	Covered by Dept.	EM Dept.	Ongoing	Medium	Marquette County and all communities within	*This is covered above in a strategy for All Hazards and will be removed.*

Report on Previous Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
		annual budget					
	Create and maintain Emergency Action Plan (EAP) for all county dams.	Costs Vary	LWC	Ongoing	Medium	Marquette County and all communities within	Existing plans are reviewed, trained, and exercised on an ongoing basis. *TN Oxford and TN Westfield keep plans for their dams updated and provide them to EM.* *Dam operators send their updated EAPs to EM. Larger dams are updated annually. EM does not receive a copy of the inspections.* *There have been no requests for dam exercises in the previous 5 years but there has been real-time experience due to flooding.* *Will be carried forward but remove the training and exercising notations above.*
Severe Temperatures	Continue community outreach and education with public information campaigns about severe weather on the website and during Winter and Heat Awareness Weeks.	Covered by Dept. annual budget	Health Dept. / EM Dept.	Ongoing	Medium	Marquette County and all communities within	Preparedness and emergency Information is shared in press releases, local newspapers, at Senior Centers, businesses, etc. Facebook and Twitter are also being used as communication tools for community outreach. *Will be carried forward, adding that public information campaigns occur annually in spring and fall ahead of the severe temperature potentials in summer and winter.*

Report on Previous Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	Promote and improve the use of cooling centers for the public during periods of extreme heat.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Marquette County and all communities within	*A list of centers is regularly updated and includes facilities such as libraries, community centers, and other public places. The centers open/operate as needed. EM makes contact with the locations to ensure they still want to be included on the list. Sites are promoted in conjunction with Public Health, which maintains the list.* *Will be carried forward, changing the responsible management to Public Health and EM; and the Project Timetable will be updated to Ongoing.*
Storms: Hail, Lightning and Thunderstorms	Place thunderstorm, hail and lightning safety materials in county display rack, on the website and during severe weather week increase community outreach and education.	Covered by Dept. annual budget	EM Dept. / municipal admins	Ongoing	Medium	Marquette County and all communities within	Preparedness and emergency Information is shared in local newspapers, at Senior Centers, businesses, etc. Facebook and Twitter are also being used as communication tools for community outreach. *Information is put at the Welcome Center and provided at fairs and other events. It will also be placed in racks at the Sheriff's Office and other county and municipal buildings as space is available and/or requested.* *Will be carried forward, adding that public information campaigns occur annually in spring and fall ahead of the severe temperature potentials in summer and winter.*

Report on Previous Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	Promote and implement modern hazard warning systems. Explore alternatives to increase severe weather warnings (e.g., tornado sirens, call-out phone bank.)	Costs vary	EM Dept.	Ongoing	Medium	Marquette County and all communities within	*This is covered in another strategy, so will be removed from this hazard and rolled in with a similar strategy in the All-Hazards section.*
	Protect critical facilities and infrastructure.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Marquette County and all communities within	*This is an ongoing strategy and will be carried forward but moved to the Utility Failure section.*
	• Review existing school shelter plans at Montello School District. Determine if generators will stay or be moved.		EM Dept.	Ongoing	Medium		*The school district continues to provide community sheltering. Plans are reviewed regularly. Generators are maintained for emergency power needs. This item will be carried forward but moved to the Utility Failure section.*
Storms: Tornadoes and High Winds	Promote tornado awareness, including home safety measures (include website) to increase community outreach and education.	Covered by Dept. annual budget	EM Dept. / municipal admins	Ongoing	Medium	Marquette County and all communities within	• Done during tornado awareness week in April. • Preparedness and emergency Information is shared in local newspapers, at Senior Centers, businesses, etc. Facebook and Twitter are also being used as communication tools for community outreach. *Will be carried forward, adding that public information campaigns occur annually in spring ahead of the severe storm potential in spring and summer.*
	Promote and implement modern hazard warning systems. Explore alternatives to increase severe weather warnings (e.g., tornado sirens, call-out phone bank.)	Costs vary	EM Dept.	Ongoing	Medium	Marquette County and all communities within	*This is covered in another strategy, so will be removed from this hazard and rolled in with a similar strategy in the All-Hazards section.*

Report on Previous Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	Explore upgrading or building tornado shelters in areas where deficient, especially in mobile home parks and campgrounds. • County Fairgrounds, Marquette County. • Fourth Street Trailer Park, City of Montello • Market Street Trailer Park, Village of Westfield	Costs vary. FEMA and CDBG grants are options $350,000-400,000 per shelter	EM Dept. / municipal admins	Ongoing	Medium	Marquette County and all communities within	Use the Department of Commerce's CDBG for funding assistance. *Municipalities have financial constraints. Advised that the value of the land could qualify as an in-kind match. More locations will be added for the new planning period.*
				2018	Medium	Marquette County and all communities within	*A mitigation grant was applied for but funding ran out. Will resubmit when funding is available. Will carry forward and change timetable to Ongoing.*
				2018	Medium	CI of Montello	*Not funded – carry forward.*
				2018	Medium	VI of Westfield	*Not funded – carry forward.*
	Promote active tree management.	Covered by Dept. annual budget	EM Dept. / municipal admins	Ongoing	Medium	Marquette County and all communities within	Done during tornado awareness week in April. *Completed as needed by Highway Department and municipalities.* *Will carry forward, removing the notation above that this is done during tornado awareness week; adding "ongoing maintenance" to the mitigation measure; and changing the Responsible Management to Highway Dept., municipalities, and utility companies.*
	Improve coordination and communication among emergency responders.	Covered by Dept. annual budget	EM Dept. / municipal admins	Ongoing	Medium	Marquette County and all communities within	*Will be removed.*

Report on Previous Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	Conduct weather spotter training for key first responders. Recruit and train additional storm spotters.	Covered by Dept. annual budget	Municipal Administration	Ongoing	High	Marquette County and all communities within	Regularly scheduled in Spring. *This will be carried forward, changing the priority to Low; and the Responsible Management to EM with support of the municipalities.*
Storms: Winter	Promote winter hazards awareness, including home and travel safety measures (including website) to increase community outreach and education	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Marquette County and all communities within	• Done during winter weather awareness week in November. • Preparedness and emergency Information is shared in local newspapers, at Senior Centers, businesses, etc. Facebook and Twitter are also being used as communication tools for community outreach. *This strategy will be carried forward.*
	Promote and implement modern hazard warning systems. Explore alternatives to increase severe weather warning (e.g., tornado sirens, call-out phone bank.)	Costs vary	EM Dept.	Ongoing	Medium	Marquette County and all communities within	*This was done annually. Will be carried forward.*
Utility Failure	Review power needs for emergency operations and provide generators/hook-ups as needed to critical infrastructure.	Covered by Dept. annual budget	EM Dept.	As funding available	High	Marquette County and all communities within.	*This will be carried forward and will include a compilation of similar strategies noted above.*

* Supports the National Flood Insurance Program (NFIP) goals.

ARC = American Red Cross
DNR = Wisconsin Department of Natural Resources
EM Dept. = Marquette County Emergency Management Department
FEMA = Federal Emergency Management Agency
FD = Fire Department
FSA = Federal Farm Service Agency
IC = Incident Command
LIO – Marquette County Land Information Office
LWC = Marquette County Land and Water Conservation Department
NFIP = National Flood Insurance Program

PD = Police Department
SO = Sheriff's Office
UW Ext = University of Wisconsin – Extension Office
WEM = Wisconsin Emergency Management
ZA = Marquette County Zoning Administration

Appendix E: Summary of Mitigation Strategies

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
All Hazards	Pursue community outreach and education. Continue to add/update Emergency Management Department links on the existing county web site (e.g., ARC, FEMA, WEM) especially focusing on preparedness bulletins. Publicize the website to show the community what is available.	Covered by Dept. annual budget	EM Dept. / SO	Ongoing	Medium	Marquette County and all communities within	• Marquette County has its departments and contact information listed on the county website for easy access. • The Emergency Management Department and Sheriff's Office are designing websites that will be easily updated in case of emergency. Links and other information will be added as necessary. • The IC trailer is displayed at the County Fair. *NFIP materials are distributed. • Emergency Information is shared in local newspapers, at Senior Centers, businesses, etc. Facebook and Twitter are also being used as communication tools for community outreach. • There will be a social media presence. • Public information campaigns occur annually in spring and fall ahead of the severe temperature potentials in summer and winter. • This strategy will be reviewed again at the end of 2023.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
		Covered by annual budget	TN Administration	Ongoing	Medium	TN Oxford	The town recognizes the opportunity to use their website more to provide information and links to the main county EM website.
	Explore creating pages or social media to be used for public media campaigns.	Covered by Dept. annual budget	Village Administration	Ongoing	Medium	VIs of Endeavor and Oxford	VI Oxford has an active website maintained by the Clerk. They also use traditional media outlets such as newspapers. The website is used to provide information and also remind residents about siren tests. Links will direct residents to the main county social media platforms. VI of Endeavor also has an active website that provides public information.
	Continue to promote the increased use of National Oceanic and Atmospheric Administration (NOAA) weather radios.	Covered by Dept. annual budget	EM Dept.	Ongoing	Low	Marquette County and all communities within	Annually promoted at booth at County Fair. EM currently has a cache of weather radios, which they sell for cost and re-order with the proceeds. Use of the radios is regularly promoted.
	Promote the use of the RAVE notification system.	Covered by annual budget	CI Administration	Ongoing	High	CI Montello	The city will promote this on their website and social media, with a link to the county EM site.
		Covered by annual budget	TN Administration	Ongoing	High	TN Oxford	The town will promote this on their website and social media, with a link to the county EM site.
		Covered by annual budget	EM	Ongoing	High	Marquette County and all communities within	County EM has links on their website for residents to sign up and it is promoted whenever opportunities are available. Municipalities will be asked to provide links on their websites and social media; and will link back to the EM site.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	Continually monitor and update the integrated warning and communication system for technological maintenance and upgrade as the system requires. Promote and implement modern hazard warning systems. Explore alternatives to increase severe weather warnings (e.g., tornado sirens, call-out phone bank.)	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Marquette County and all communities within	Most places are removing sirens and residents are moving to phone applications. The county does not own any sirens but does activate them.
	Siren upgrades	$30K for new siren and $26K annually for maintenance	CI DPW	Ongoing	High	CI Montello	Have four sirens that are old, cost $2,500 per year plus connection. Are $3-4K each to work with the county system. If upgraded, the one siren on the hill would get a higher reach.
	Install a generator for emergency services support	TBD	VI Admin	Ongoing	High	VI Westfield	Want to install generator for emergency services support (continuity of operations planning)
	Install a generator for emergency services support	TBD	VI Admin	Ongoing	Medium-High	VI Oxford	The Village's library, senior center, Clerk/Treasurer, and Police Department are all in one building. Necessary for powering the building, continuity of operations and community support.
	Explore hookup options and implement emergency power generators as a power supply for county schools to be used as shelters.	Costs vary	Municipal Administration	2023-2028	Medium	VI of Westfield	Two schools in the Village of Westfield have generators and are exploring hook-up options.
Drought and Dust Storms	Continue to provide community outreach and education to farmers during times of drought	Covered by Dept. annual budget	UW-Ext. / FSA	As needed	Low	Marquette County and all communities within	Extension responds with websites and resources ready.
	Promote the use of best management practices for agriculture and yards.	Covered by Dept. annual budget	FSA / UW-Ext., Individuals	Ongoing	Low	Marquette County and all communities within	

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	Prepare/publicize water usage regulations for non-farm areas during drought	Covered by annual budget	Municipal Administration	As needed	Low	Marquette County and all communities within	
Fires: Forest, Grass and Wildfires	Continue to provide outreach efforts and education to homeowners on protecting homes and structures from fires.	Costs vary	Local FD	Ongoing	Low	Marquette County and all communities within	Updated information is shared on the county and municipal websites, in local newspapers, at Senior Centers, businesses, etc. Facebook and Twitter are also being used as communication tools for community outreach. This is done in October during Fire Prevention Week by fire departments. FDs and the American Red Cross also check fire alarms.
	Support active forest management to minimize the potential for catastrophic fires by engaging in good land use planning, proper home siting and provide adequate access to homes in fire prone areas.	Covered by annual budget	LIO / Zoning Admin. / SO / EM / local FDs / DNR	Ongoing	Medium for Firewise communities and Low for the rest of the county	Marquette County and all communities within	Communities are sharing Firewise program information where appropriate. Local Fire Departments survey region to ensure driveways are wide enough and clear for emergency access. Also observe fire numbers are properly placed and easily visible.
	Conduct DNR wildfire training each spring.	Covered by annual budget	Local FD / DNR	Ongoing	Medium	Marquette County and all communities within	DNR training takes place each spring.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	Maintain the dry hydrant system.	Covered by annual budget	Local FD	Ongoing	Medium	Marquette County and all communities within	The community has a number of dry hydrants throughout the county, as needed to supply water for firefighting. This system is managed cooperatively by the county's Fire Chiefs Association. During the last plan period, TN Oxford had been looking at putting one in at CX; they continue to evaluate the need.
Flooding and Dam Failure	Continue to add/update links on the existing county web site (e.g., NMC, ARC, FEMA, WEM, NFIP). Publicize the website to show the community what is available and increase community outreach and education. Provide information to citizens about the purchase of flood insurance.	Covered by Dept. annual budget	LIO / Zoning Admin.	Ongoing	Low	Marquette County and all communities within	• NFIP materials are distributed at county fair. • Preparedness and emergency Information is shared in local newspapers, at Senior Centers, businesses, etc. Facebook is also being used as communication tools for community outreach. TN Westfield will review their website and will add anything necessary.
	Audit culverts and prioritize those that are in need of repair and would have a greater chance of being impacted by flooding.	TBD based on audit findings	TN Administration	Ongoing	High	TN Oxford	Culverts are made of cement and very old. There is concern that there may need to be updates, repairs, and/or replacements.
	Redo the causeway over Fox River.	$2.5M ($1M DOT grant)	Hwy. Dept.	2023-2028	High	Marquette County and all communities within	
	*Ensure that plans are reviewed and updated regularly. Update floodplain maps as new data become available. Collect information on flood prone areas.	~$3,000	Marquette County and municipal administration, Planning and Zoning, Land Conservation	Ongoing	Medium	Marquette County and all communities within	• Floodplain maps were updated 2012 • All communities also updated maps 2012 • Mapping will be updated as funding is available.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	*Acquire new topographical maps for the entire County with two (2) foot contour intervals	~$65,000	LIO / EM Dept.	2028	Medium	Marquette County and all communities within	New aerial photos may be completed during this project period. They may not be LIDAR. Will consider moving to 12-18" contours if funding allows and there is a need.
	*Continue to explore if residents express an interest in flood mitigation measures (e.g., buyouts, elevations, floodproofing, etc.) countywide.	Covered by Dept. annual budget	LIO / Zoning Admin. / EM Dept.	Ongoing	High	Marquette County and all communities within	• FEMA's PDM and FMA grants are potential funding sources for buyout. No opportunities have been presented. • Will explore mitigation opportunities to acquire properties as they come up for tax lien sales.
	• Consider hazard mitigation strategies to alleviate flooding on Island Drive.	TBD	TN Administration	Ongoing	Medium	CI Montello	There are properties that reached or exceeded the 50% rule that may qualify for a buyout. They were impacted worse during the 2018 flood.
	• Properties on the Fox River in TN Moundville flood and should be considered for mitigation.	TBD	TN Administration	Ongoing	Medium	TN Moundville	Approximately 12 mobile homes should be considered for a possible buyout and voluntary relocation.
	• Property(ies) on the White River south of the VI Neshkoro have flooding concerns due to shoreline erosion.	TBD	TN Administration	Ongoing	Medium	TN Neshkoro	Will refer to Land & Water Conservation for shore stabilization.
	• Home on the corner of two CTH I and 2nd is prone to flooding.	TBD	TN Administration	Ongoing	Medium	TN Oxford	This property is on the corner of two roads and does not drain. House is on a slab and downhill. The front yard is a low spot and floods. Not on water and would probably not qualify for hazard mitigation grants as this is more of a run-off problem.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	Work with the municipal Departments of Public Works to identify areas prone to road flooding and discuss mitigation strategies and funding sources.	Unknown	County Highway Department	2028	Medium	Marquette County and all communities within	Hwy 22 floods and cuts the county in half. • First responders cannot get through and must travel a long distance to go around. • People on the south side cannot reach the City of Montello for food, medicine, and health treatments. Options may be to lift the bridge higher, install a new bridge (1/2 mile), etc.
	• Explore options to tie North and South portions of the county together by Buffalo Lake.	$2.5M - $1M state grant, $500K ARPA funding; $500K county funds.	County Highway Department	2024	High	Marquette County and all communities within	This project relates to raising the road profile on CTH D over Buffalo Lake. It will start in 2023 (paving) and end in 2024.
	• Culvert needed on Dale Drive due to water over the road.	Unknown; grants and other sources	TN Administration	Ongoing	Low-Medium	TN Douglas	Shoulders were shored up with gravel but a culvert is needed. Officials are monitoring this, as a lot of heavy equipment moves over this road.
	• Flooding issues on 20th Avenue	Unknown	TN Administration	Ongoing	Medium	TN Neshkoro	The road was raised a year ago but it continues to be a problem as it is located in a marsh. Officials continue to monitor.
	• 1st Ave – Culvert, Gravel Lift and Paving	$49,749.44	TN Administration	Ongoing	Medium	TN Westfield	
	• 2nd Ave – Culvert, Gravel Lift and Paving	$36,925.97	TN Administration	Ongoing	Medium	TN Westfield	
	• Bridge on CTH O, just west of CTH F should be evaluated for potential	$2M	TN Moundville, CO Highway Dept.	2023-2028 but will monitor	Medium-High	TN Moundville	Timber structure that is prone to debris pile-up. Does not qualify for replacement yet due to condition.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	mitigation strategies due to flooding. • Repair spillway on Montello Lake back to the original condition.	Different phases have projected costs from $150,000 - $1M plus	CI Administration and CI Public Works Dept.	2023-2028	Medium	CI Montello	The city evaluated a strategy for the repair of the spillway after the 2018 flood. The city was unable to fund the project independently in one year but has been earmarking funds since then.
	• E. Park Street is being re-engineered and hazard mitigation strategies to decrease flooding impacts should be considered for inclusion.	$1M	CI Administration	2023-2028	Medium	CI Montello	Park St. does not have a curb and gutter, which causes an ongoing water problem. Lack of funding prevents the city from doing the project now. This project does not include the bridge.
	• 2nd Avenue south of Elk needs to be raised and a culvert added.	TBD	TN Administration	Ongoing	Medium	TN Westfield	This is by the old Jahnke farm.
	Enhance stormwater management and erosion control and protect water quality.	Covered by Dept. annual budget	LWC / LIO	Ongoing	Medium	Marquette County and all communities within	• Effective wetlands management practices help manage stormwater in county. • Explore opportunities as problems arise.
	UW-Stevens Point well testing	As covered by grant funding (ARPA)	UW-Stevens Point & County	2024-2025	High	Marquette County and all communities within	
	Improve planning and regulatory practices.	Covered by Dept. annual budget	LIO / LWC	Ongoing	Medium	Marquette County and all communities within	Completed as opportunities arise. Communities follow county zoning guidance as required.
	• Establish river gauges for Buffalo Lake, Fox River, and Montello River.	DNR grant $500-$1,500	LWC & PNZ	2088	Medium		Originally applied for DNR grant funding in 2011 but it was not received. County has reapplied but has not received assistance to date.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	*Promote floodproofing of buildings where appropriate and cost-effective.	Covered by Dept. annual budget	LIO / Zoning Admin.	Ongoing	Medium	CI of Montello	There have been no appropriate floodproofing projects identified to date.
	Create and maintain Emergency Action Plan (EAP) for all county dams.	Costs Vary	LWC	Ongoing	Medium	Marquette County and all communities within	Existing plans are reviewed on an ongoing basis, TN Oxford and TN Westfield keep plans for their dams updated and provide them to EM. Dam operators send their updated EAPs to EM. Larger dams are updated annually. EM does not receive a copy of the inspections. There have been no requests for dam exercises in the previous 5 years but there has been real-time experience due to flooding.
Severe Temperatures	Continue community outreach and education with public information campaigns about severe weather on the website and during Winter and Heat Awareness Weeks.	Covered by Dept. annual budget	Health Dept. / EM Dept.	Ongoing	Medium	Marquette County and all communities within	Preparedness and emergency Information is shared in press releases, local newspapers, at Senior Centers, businesses, etc. Facebook and Twitter are also being used as communication tools for community outreach. Public information campaigns occur annually in spring and fall ahead of the severe temperature potentials in summer and winter.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	Promote and improve the use of cooling centers for the public during periods of extreme heat.	Covered by Dept. annual budget	EM Dept. and Public Health	Ongoing	Medium	Marquette County and all communities within	A list of centers is regularly updated and includes facilities such as libraries, community centers, and other public places. The centers open/operate as needed. EM makes contact with the locations to ensure they still want to be included on the list. Sites are promoted in conjunction with Public Health, which maintains the list.
Storms: Thunderstorms, Lightning and Hail	Place thunderstorm, hail and lightning safety materials in county display rack, on the website and during severe weather week increase community outreach and education.	Covered by Dept. annual budget	EM Dept. / municipal admins	Ongoing	Medium	Marquette County and all communities within	Preparedness and emergency Information is shared in local newspapers, at Senior Centers, businesses, etc. Facebook and Twitter are also being used as communication tools for community outreach. Information is put at the Welcome Center and provided at fairs and other events. It will also be placed in racks at the Sheriff's Office and other county and municipal buildings as space is available and/or requested. Public information campaigns occur annually in spring ahead of the severe storm potential in spring and summer.

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
Storms: Tornadoes and High Winds	Promote tornado awareness, including home safety measures (include website) to increase community outreach and education.	Covered by Dept. annual budget	EM Dept. / municipal admins	Ongoing	Medium	Marquette County and all communities within	• Done during tornado awareness week in April. • Preparedness and emergency Information is shared in local newspapers, at Senior Centers, businesses, etc. Facebook and Twitter are also being used as communication tools for community outreach. Public information campaigns occur annually in spring ahead of the severe storm potential in spring and summer.
	Explore upgrading or building tornado shelters in areas where deficient, especially in mobile home parks and campgrounds. • County Fairgrounds, Marquette County.	Costs vary. FEMA and CDBG grants are options $350,000-400,000 per shelter	EM Dept. / municipal admins	Ongoing	Medium	Marquette County and all communities within	Use the Department of Commerce's CDBG for funding assistance. Municipalities have financial constraints. The value of the land could qualify as an in-kind match.
				Ongoing	Medium	Marquette County and all communities within	A mitigation grant was applied for but funding ran out. Will resubmit when funding is available. This location has been used as a shelter in the past. EM provides shelter information via its website and social media.
	• Fourth Street Trailer Park, City of Montello			2028	Medium	CI of Montello	
	• Market Street Trailer Park, Village of Westfield			2028	Medium	VI of Westfield	
	• Area in the vicinity of Oxford Park and Funeral Home (in the SE Corner) is a possible location.			Ongoing	Medium	VI Oxford	

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
	Promote active tree management and ongoing maintenance.	Covered by Dept. annual budget	Highway Dept., municipalities, and utility companies.	Ongoing	Medium	Marquette County and all communities within	Completed as needed by Highway Department and municipalities.
	Conduct weather spotter training for key first responders. Recruit and train additional storm spotters.	Covered by Dept. annual budget	EM Dept. with support of the municipalities	Ongoing	Low	Marquette County and all communities within	Regularly scheduled in Spring.
Storms: Winter	Promote winter hazards awareness, including home and travel safety measures (including website) to increase community outreach and education	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Marquette County and all communities within	• Done during winter weather awareness week in November. • Preparedness and emergency Information is shared in local newspapers, at Senior Centers, businesses, etc. Facebook and Twitter are also being used as communication tools for community outreach.
Utility Failure	Provide adequate emergency power sources with a focus to assess the power situation in governmental infrastructure and shelters. Provide generators/hook/ups as needed. Create a plan after the evaluation to include identifying which locations would benefit from an external panel versus a generator.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Marquette County and all communities within	Potential targets to assess include lift stations, water facilities, fire departments, EOC and Public Works buildings. Shelters and schools are fairly well set-up but will be assessed. The school located in Oxford may not have a generator. TN of Douglas administration and fire department will discuss power failure concerns and determine if mitigation is needed. CI Montello purchased a back-up generator for the sewer plant using community funds. Costs will be changed to show that grants will be applied for

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
							and other funding opportunities will be sought. Funding is a concern with volunteer fire departments.
	Review power needs for emergency operations and provide generators/hook-ups as needed to critical infrastructure.	Covered by Dept. annual budget	EM Dept.	As funding available	High	Marquette County and all communities within.	
	Evaluate upgrading the emergency power supply (e.g., generator) for emergency sheltering at the Westfield Schools.	As funding available - TBD	EM Dept. and School	Ongoing	Very High	TN Westfield	Westfield School District is over 20 years old and has an undersized generator. It is also an emergency community shelter.
	Add well on the south side of the City of Montello to diversify the water source and minimize the potential for contamination.	$1.5M-2M to construct	City Admin	Ongoing	Very High	CI Montello	The city has two wells, 500 feet apart, for municipal water. Any contamination takes out the whole city. Want one on the south side with a different aquifer.
	Determine of the Breakbush Reservoir would be able to provide water for emergency needs.	TBD	Marquette County	Ongoing	Low	Marquette County and all communities within	Create a plan if deemed feasible. Has reservoir and might be able to provide water in a power outage for firefighting or other needs.
	Protect critical facilities and infrastructure.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Marquette County and all communities within	
	Review existing school shelter plans at Montello School District. Determine if generators will stay or be moved.	Covered by Dept. annual budget	EM Dept.	Ongoing	Medium	Marquette County and all communities within	The school district continues to provide community sheltering. Plans are reviewed regularly. Generators are maintained for emergency power needs.

* Supports the National Flood Insurance Program (NFIP) goals.

ARC = American Red Cross
DNR = Wisconsin Department of Natural Resources

EM Dept. = Marquette County Emergency Management Department
FEMA = Federal Emergency Management Agency
FD = Fire Department
FSA = Federal Farm Service Agency
IC = Incident Command
LIO – Marquette County Land Information Office
LWC = Marquette County Land and Water Conservation Department
NFIP = National Flood Insurance Program
PD = Police Department
SO = Sheriff's Office
UW Ext = University of Wisconsin – Extension Office
WEM = Wisconsin Emergency Management
ZA = Marquette County Zoning Administration

Appendix F: HAZUS Vulnerability Assessment

Marquette County, Wisconsin
Flood Risk Assessment

Executive Summary

Disasters impacting the State of Wisconsin have increased over recent years with multiple presidential disaster declarations being issued. Several of these disasters involved flooding and its impacts. 2018 was the second wettest year for the State of Wisconsin and is a part of a trend that has shown record precipitation over the past 5 years and is the wettest 5 years on record for the State (2017 (9th wettest), 2016 (3rd wettest), 2015 (22nd wettest), 2014 (10th wettest). As a result, communities must consider mitigation actions that can build community resilience for future flood risks. To identify the most affective mitigation actions, local and State groups must first understand what is vulnerable and at risk. To achieve this, Wisconsin's Division of Emergency Management (WEM) elected to conduct an analysis of the flood related risks and vulnerabilities to communities throughout Wisconsin.

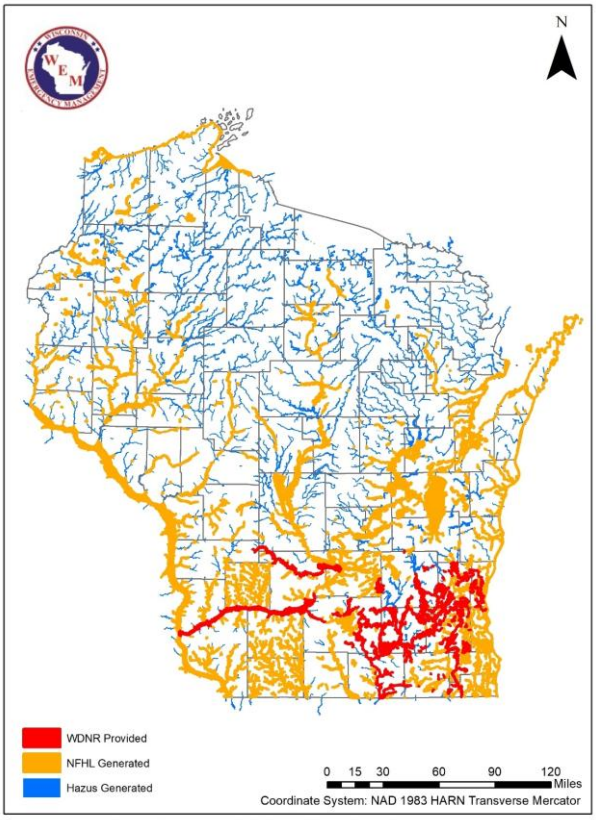
This project was completed by the Space Science and Engineering Center at the University of Wisconsin (SSEC) in collaboration with The Polis Center at IUPUI. The project team leveraged Hazus-MH Release 4.2.3, a powerful flood damage and loss modeling software developed by the Federal Emergency Management Agency (FEMA). They also leveraged existing geospatial flood hazard datasets that have been developed throughout the State.

Flood Hazard Data

For each county in the study, the team either developed new data or leveraged existing flood depth grid geospatial data representing the extent and depth of water for the 1% annual chance flood. Where possible, the team leveraged flood depth grids created by the Wisconsin Department of Natural Resources or generated by the University of Wisconsin from digital flood insurance rate map products. Where these data were unavailable, the team generated new 1% annual chance flood depth grids using FEMA's Hazus-MH version 4.2.3.

Marquette County's 1% annual chance flood hazard data in this study included datasets from the Wisconsin Department of Natural Resources and FEMA's National Flood Hazard Layer.

Figure 1 shows the distribution of 1% annual chance flood hazard data source providers across the State of Wisconsin.



Sources: Hazus-MH, 2021; FEMA Map Service Center, 2021; Wisconsin Emergency Management, 2021; Wisconsin Department of Natural Resources 2021

Figure 4: Sources for the 1% annual chance flood.

Loss Estimates

The following information summarizes the modeled impacts of the 1% annual return period flood.

Building Damage, Content, and Inventory Losses

Estimated counts of damaged buildings, building losses, building content losses, and building inventory losses are reported for Marquette County in Table 1 and for the State of Wisconsin in Table 2.

Marquette County				
Occupancy	**Number of Damaged Buildings**	**Building Loss ($)**	**Content Loss ($)**	**Inventory Loss ($)**
Residential	42	$4,882,000	$2,054,000	0
Commercial	1	$1,050,000	$4,102,000	$68,000
Industrial	0	$763,000	$2,168,000	$479,000
Agricultural	0	$95,000	$347,000	$41,000
Education	0	0	0	0
Government	0	$240,000	$1,008,000	0
Religion	0	$11,000	$133,000	0
Total	**43**	**$7,041,000**	**$9,812,000**	**$588,000**

Table 1: Potential building, content, and inventory damages for Marquette County resulting from a 1% annual chance flood.

State of Wisconsin				
Occupancy	**Number of Damaged Buildings**	**Building Loss ($)**	**Content Loss ($)**	**Inventory Loss ($)**
Residential	14,740	$1,974,371,000	$978,198,000	0
Commercial	174	$407,405,000	$1,225,884,000	$29,606,000
Industrial	74	$246,242,000	$620,732,000	$100,396,000
Agricultural	2	$21,618,000	$63,165,000	$7,216,000
Education	4	$18,473,000	$111,599,000	0
Government	10	$13,060,000	$70,942,000	0
Religion	1	$21,679,000	$149,489,000	0
Total	**15,005**	**$2,702,848,000**	**$3,220,009,000**	**$137,218,000**

Table 2: Potential building, content, and inventory damages for the State of Wisconsin resulting from a 1% annual chance flood.

Loss estimates were calculated using the aggregated building inventory provided with Hazus-MH 4.2.3. This inventory is reported by Hazus-MH provided 2010 census blocks that have been modified to remove unpopulated areas such as vacant land, forests, and lakes. Hazus-MH assumes buildings are evenly distributed across each census block. For example, if 10% of a census block area is covered by floodwaters, it is assumed that 10% of the inventory in the census block is within the flooded area.

Economic losses consider the cost of materials and labor required to rebuild. Additionally, the Hazus-MH inventory reflects variations in foundation types, first floor elevations, and other factors that may mitigate potential flood damages.

Figure 2 illustrates the modeled distribution of total potential building losses that may result from the 1% annual chance flood. Losses represented in Figure 2 are restricted to building losses and do not consider the costs of contents or inventory.

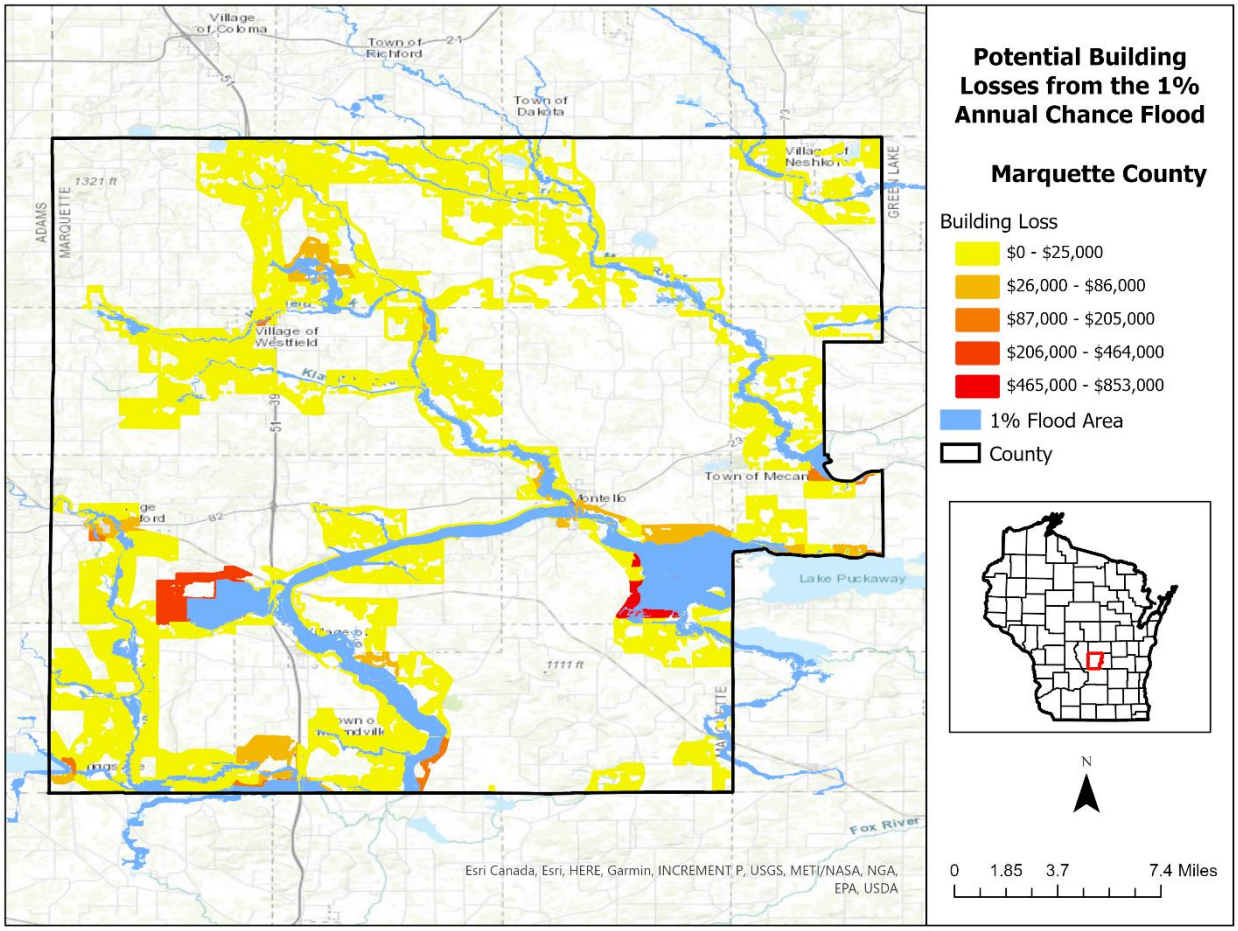


Figure 5: Potential building losses in Marquette County resulting from the 1% annual chance flood.

Displaced Population

A total of 124,777 persons are at risk of being displaced from a 1% annual chance flood in the State of Wisconsin. In Marquette County, 314 people are expected to be displaced in from the 1% flood. This estimate was derived from the same modified census block inventory used to estimate building damages. Population is assumed to be evenly distributed across each census block.

Essential Facilities

Essential facilities in Hazus-MH 4.2.3 are defined as fire stations, police stations, care facilities such as hospitals and clinics, K-12 schools and universities and emergency operation centers.

This study evaluated essential facilities expected to sustain slight, moderate, or severe damage. For purposes of this study, facilities with less than 10% damage to the building were considered slightly damaged, facilities with over 10% but less than 50% damage to the building were considered moderately damaged and facilities with over 50% damage to the building were considered severely damaged. Damages to building contents and inventory were not considered as part of this study.

Table 3 lists the facilities at risk from a 1% annual chance flood and Figure 3 illustrates the location of each facility within Marquette County.

Marquette			
Facility Name	**Facility Type**	**Building Damage**	**Damage Category**
Montello Fire Department	Fire Station	Less than 10%	Slight
Montello Police Department	Police Station	Less than 10%	Slight

Table 3: Potential essential facility damage in Marquette County resulting from the 1% annual chance flood.

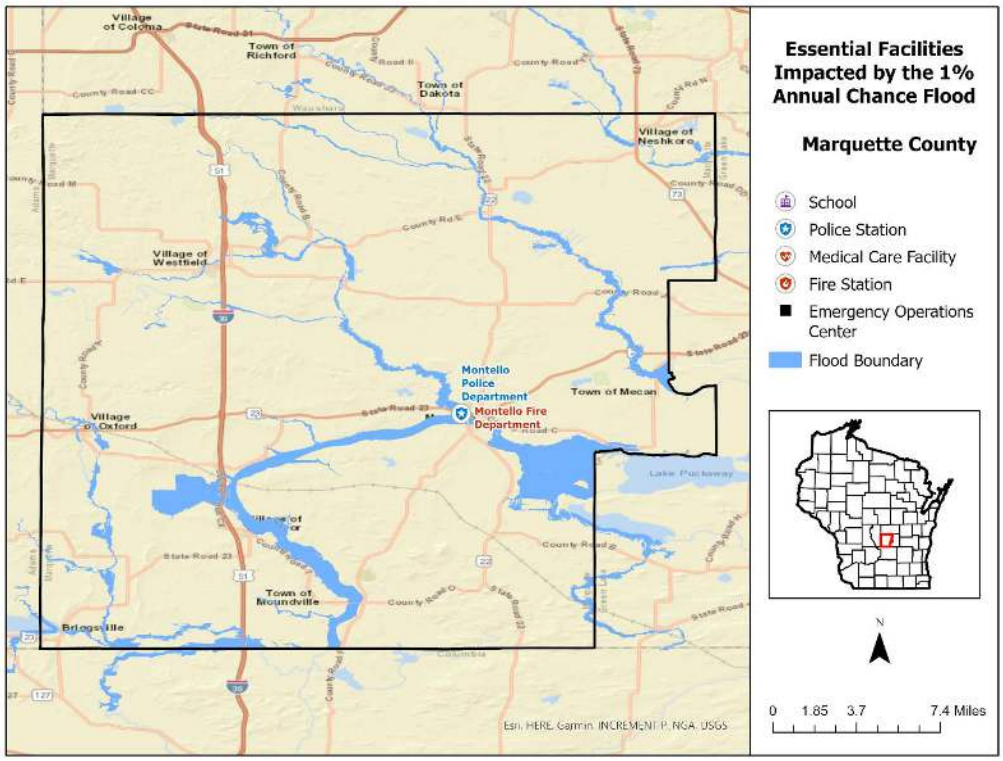


Figure 6: Locations of potentially damaged essential facilities in Marquette County resulting from the 1% annual chance flood.

Table 4 reports the distribution of the 60 essential facilities that might receive slight or moderate damage resulting from a 1% annual chance flood in the State of Wisconsin. No essential facilities in Wisconsin were found to be susceptible to severe building damage from the 1% annual chance flood.

State of Wisconsin		
Facility Type	**Total facilities at least slightly damaged**	**Total facilities at least moderately damaged**
Fire Stations	14	9
Police Stations	8	6
Care Facilities	0	1
Schools	20	1
Emergency Operation Centers	0	1

Table 4: Potential essential facility damage in the State of Wisconsin resulting from the 1% annual chance flood.

Appendix G: Community Input

Marquette County believes in the importance of gathering public input from interested parties in the community. To achieve this goal, the Emergency Management Department took every opportunity available to use various methods to publicize the opportunity for people to participate in the planning process and to gather input from interested parties. The table that follows outlines the major opportunities that were created to discuss the plan. The table includes dates of workgroup meetings, meetings with public officials and media opportunities for the all-hazards pre-disaster mitigation plan.

DATE	SUMMARY OF OPPORTUNITY
8/20/21 & 2/13/23	All municipalities received the PDM survey and cover letter (attached). Municipalities were encouraged to complete the survey at open meetings, and most did, receiving public comment as the survey was completed.
8/20/21	Press release given to all media in Marquette County. The releases invited public participation in the planning process but none participated.
Q4 2021	Marquette Co. PDM informational brochure (attached) was distributed throughout the community at public locations.
6/2/22 and 6/5/22	First workgroup meeting to review/rank the vulnerabilities, review the planning process, the previous plan, and to discuss the plan update, including new hazmit strategies.
8/11/22	Second workgroup meeting to review/rank the vulnerabilities, review the planning process, the previous plan, and to discuss the plan update, including new hazmit strategies.
9/5/24	Third workgroup meeting with required BRIC expanded invitation list review the planning process, the previous plan, and to discuss the plan update, including new hazmit strategies.
Q2 2025	Plan sent to the county emergency management directors from contiguous counties requesting review, comments, and edits.
Q3 – 4 2025	Each municipality posted the discussion and adoption of the updated hazmit plan per WI state law. Plan was discussed and adopted in a public meeting.

Q3 2025	Legal Public Notice printed notifying the public of the public review and comment period

One of the main ways people were made aware of the plan was the publication of a brochure (following) that was widely distributed in the public buildings around the community, including the City/County Courthouse and the library. The purpose of this brochure was to provide a general overview of the mitigation planning process, the impetus for planning, and the scope of the final result.

Date: 20 August 2021
To: Town, Village or City Leader
County Department Manager
From: Aaron Williams, Emergency Management Director
Re: Hazard Mitigation Plan Workgroup

The Marquette County Emergency Management Office has received a grant from the Federal Emergency Management Agency (FEMA) and Wisconsin Emergency Management to complete an update of the Hazard Mitigation Plan for Marquette County because as with any plan, it needs to be evaluated and updated on a regular basis to outline progress and to set a roadmap for future mitigation efforts.

The plan reviews the risks for various natural disasters within Marquette County and creates a plan for addressing these risks in a cost-effective way. As I am sure you are aware, Marquette County has received several federal disaster declarations in recent history and we are at continued risk for future events such as flooding, high winds and tornados; this planning is intended to help reduce potential future losses. Also, the federal government requires that communities have a current hazard mitigation plan as one criterion for eligibility for some types of grants so it is critical that this plan is completed and kept updated on schedule.

This requires significant input from stakeholder agencies and the public during the planning process. In order for you agency to be eligible for **future FEMA mitigation funding you agency must participate in these planning sessions**. I have contracted with Lenora Borchardt, EPTEC, INC., to assist me with completing this update. In order to be eligible for FEMA mitigation funding your **municipality must send at least one representative** to be a member of our planning team. Team members will be asked to be available to assist the contractor answering questions needed to complete the plan and to attend these occasional meetings.

Our first workgroup meeting is scheduled for (date) from (start/end times) at (location). I look forward to your municipality's participation in this process so that we may keep your community eligible for future hazard mitigation grant funding. Please feel free to contact me with any questions at (608) 297-3022.

Sincerely,

Aaron Williams, Director
Marquette County Emergency Management

Date: 20 August 2021
To: Town, Village or City Leader
County Department Manager
From: Aaron Williams, Emergency Management Director
Re: Hazard Mitigation Plan Update

Marquette County, like the rest of the State of Wisconsin, is vulnerable to a variety of disasters. Wisconsin has incurred disaster-related damages totaling nearly $3 billion in the last three decades, with almost half of that occurring in the 1990s alone. These losses can be reduced through mitigation activities. It is estimated that for every dollar spent on mitigation, $2 to $3 in future damages can be avoided. Hazard mitigation breaks the cycle of damage and repair.

Mitigation actions reduce or eliminate the long-term risk to human life and property from hazards. These preventative actions can be simple such as elevating a furnace in a basement that sometimes has water on the floor. Mitigation can also have a comprehensive approach such as relocating buildings out of the floodplain or strengthening critical facilities to prevent wind damage and provide stronger shelter.

In an effort to better prepare Marquette County to manage its vulnerability to disaster Marquette County Emergency Management applied for and received a hazard mitigation planning update grant. This goal of this grant is to complete an approvable updated plan, which will serve as a roadmap that outlines potential cost-effective hazard mitigation activities, some of which might be available for future grant funding.

The plan is designed to look at the risks and vulnerabilities that the county faces from natural disaster and to highlight mitigation strategies that might reduce future losses to life and property. As part of this planning process, I need your help.

The first step is asking that you please place an item on your **next** municipal meeting agenda to complete the attached survey. This very short survey will help us to identify the concerns that you have in your municipality and to capture ideas that you have for making your community safer and more disaster resistant. Please return your completed surveys to me **by** December 31, 2021.

After receiving your surveys, the information will be incorporated into the draft plan, which is being guided by a workgroup of interested agencies and public members. I would like to extend an offer for anyone from your leadership council, your municipal staff or your general community to contact me if they would like to join the workgroup.

Finally, after the workgroup has a final draft, we will be sending copies of the plan to each of you for final review and adoption. It is important to note two things:

- Adoption of this plan will not cost your community anything. You will not be committing to completing any of the projects listed; instead it is a list of triaged ideas that can be accomplished should the funding and will to complete them become available.
- If you do not adopt this plan, your community will not be eligible to apply for and receive mitigation project funding in the future.

Let me thank you in advance for the assistance that you are providing. This small investment of your time will help make our community a safer, healthier and more disaster-resistant community for years to come.

If you are interested in more information about the plan or would like to provide input into the plan, please feel free to contact me at (608) 297-3022 or by email at awilliams@co.marquette.wi.us

20 August 2021

For More Information, Contact Aaron Williams (608-297-3022)
For Immediate Release

Marquette County Receives A Hazard Mitigation Planning Update Grant

(Montello, WI) Marquette County, like the rest of the State of Wisconsin, is vulnerable to a variety of disasters. Wisconsin has incurred disaster-related damages totaling nearly $3 billion in the last three decades, with almost half of that occurring in the 1990s alone. These losses can be reduced through mitigation activities. It is estimated that for every dollar spent on mitigation, $2 to $3 in future damages can be avoided. Hazard mitigation breaks the cycle of damage and repair.

Mitigation actions reduce or eliminate the long-term risk to human life and property from hazards. These preventative actions can be simple such as elevating a furnace in a basement that sometimes has water on the floor. Mitigation can also have a comprehensive approach such as relocating buildings out of the floodplain or strengthening critical facilities to prevent wind damage and provide stronger shelter.

In an effort to better prepare Marquette County to manage its vulnerability to disaster, Aaron Williams, Marquette County Emergency Management Director, applied for and received a hazard mitigation planning update grant. The goal of this grant is to update an approvable plan, which will serve as a roadmap that outlines potential cost-effective hazard mitigation activities, some of which might be available for future grant funding.

The plan is designed to look at the risks and vulnerabilities that the county faces from natural disaster and to highlight mitigation strategies that might reduce future losses. As part of this planning process, Williams is assembling a workgroup to review and guide the planning activities. The workgroup is reviewing initial background information about Marquette County and has begun identifying strategies that might help.

Williams stated, "I am very excited about this part of the planning process. The input from the workgroup can have long-lasting impacts, making Marquette County safer and more disaster resistant."

FEMA has recognized the importance of having members of the community involved in the process and Williams would like to ensure that all interested members of the community have an opportunity to provide input into the plan. If you are interested in more information or would like to provide input into the plan, please contact Aaron Williams at 608-297-3022.

###

Workgroup Meeting Rosters

6/2/2022 Day

- Dawn Calnin, CI Montello
- Mary Walters, TN Oxford and County Board
- Ron Barger, County Administrator
- Gary Sorenson, VI Oxford
- Brian Trebiatowski, County Highway Department
- John (unknown last name)

6/2/2022 Night

- Jeff Buchholz, TN Westfield
- Karen Wampler, TN Douglas
- Mark Milbrandt, TN Neshkoro
- Patrick Hamilton, TN Westfield and LEPC
- Steve Klump, TN Oxford Fire Department and Hazmat Team
- Chris Peschel, TN Newton Fire Department

- TN Shields
- John (unknown last name)

Date: 29 July 2022
To: Town, Village or City Leader
County Department Manager
From: Aaron Williams, Emergency Management Director
Re: Hazard Mitigation Plan Workgroup

As you are aware, the Marquette County Emergency Management Office has received a grant from the Federal Emergency Management Agency (FEMA) and Wisconsin Emergency Management to complete an update of the Hazard Mitigation Plan for Marquette County. **We have scheduled our second and final workgroup meeting, which will take place via Zoom, on August 11, 2022.** Morning and afternoon sessions are available.

The plan reviews the risks for various natural disasters within Marquette County and creates a plan for addressing these risks in a cost-effective way. As I am sure you are aware, Marquette County has received several federal disaster declarations in recent history and we are at continued risk for future events such as flooding, high winds, and tornados; this planning is intended to help reduce potential future losses. Also, the federal government requires that communities have a current hazard mitigation plan as one criterion to be eligible for some types of grants so it is critical that this plan is completed and kept updated on schedule.

This requires significant input from stakeholder agencies and the public during the planning process. For your agency to be eligible for certain **future FEMA mitigation grants, your agency must participate in these planning sessions**. I have contracted with Lenora Borchardt, EPTEC, INC., to assist me with completing this update. Team members will be asked to be available to assist the contractor in answering questions needed to complete the plan and to attend these planning meetings.

In the first meeting, we completed our risk assessment and discussed potential mitigation strategies (i.e., projects) for all the hazards except for flooding. The goal of this session is to focus on flooding and to capture any ideas that have come up since the first session. Please come prepared to discuss your community's project ideas.

Morning session from 0830 to 1030
https://us02web.zoom.us/j/87647827155?pwd=R3ViRVRzT1NIVUFsbnQrZis4V1Fwdz09

Meeting ID: 876 4782 7155
Passcode: 543855

Evening session from 1730 until 1930
https://us02web.zoom.us/j/84422596656?pwd=cVdPcFlYR1pjQjhrSFp4djZvandOdz09

Meeting ID: 844 2259 6656
Passcode: 515864

For Either Meeting:
Dial by your location
+1 312 626 6799 US (Chicago)
+1 646 931 3860 US

I look forward to your municipality's participation in this process so that we may keep your community eligible for future hazard mitigation grant funding. Please feel free to contact me with any questions at (608) 297-3022.

Sincerely,

Lt. Aaron Williams

Aaron Williams, Director
Marquette County Emergency Management

Workgroup Meeting Rosters

8/11/2022 Day

- Mary Walters, TN Oxford and County Board
- Mark Milbrandt, TN Neshkoro
- Karen Wampler, TN Douglas
- Brian Trebiatowski, County Highway Department
- Ron Barger, County Administrator
- John Bennett, TN Westfield
- Dawn Calnin, CI Montello

8/11/2022 Night

- Pat Hamilton, TN Westfield

- Steve Klump, TN Oxford

Date: 13 February 2023
To: Town, Village or City Leader
County Department Manager
From: Aaron Williams, Emergency Management Director
Re: Hazard Mitigation Plan Update

Marquette County, like the rest of the State of Wisconsin, is vulnerable to various disasters. Wisconsin has incurred disaster-related damages totaling nearly $3 billion in the last three decades, with almost half of that occurring in the 1990s alone. These losses can be reduced through mitigation activities. It is estimated that for every dollar spent on mitigation, $2 to $3 in future damages can be avoided. Hazard mitigation breaks the cycle of damage and repair.

Mitigation actions reduce or eliminate the long-term risk to human life and property from hazards. These preventative actions can be simple such as elevating a furnace in a basement that sometimes has water on the floor. Mitigation can also have a comprehensive approach such as relocating buildings out of the floodplain or strengthening critical facilities to prevent wind damage and provide stronger shelter.

In an effort to better prepare Marquette County to manage its vulnerability to disaster Marquette County Emergency Management applied for and received a hazard mitigation planning update grant. This goal of this grant is to complete an approvable updated plan, which will serve as a roadmap that outlines potential cost-effective hazard mitigation activities, some of which might be available for future grant funding.

The plan is designed to look at the risks and vulnerabilities that the county faces from natural disaster and to highlight mitigation strategies that might reduce future losses to life and property. As part of this planning process, I need your help.

The first step is asking that you please place an item on your **next** municipal meeting agenda to complete the attached survey. This very short survey will help us to identify the concerns that you have in your municipality and to capture ideas that you have for making your community safer and more disaster resistant. Please return your completed surveys to me **by** 28 February 2023.

After receiving your surveys, the information will be incorporated into the draft plan, which is being guided by a workgroup of interested agencies and public members. I would like to extend an offer for anyone from your leadership council, your municipal staff or your general community to contact me if they would like to join the workgroup.

Finally, after the workgroup has a final draft, we will be sending copies of the plan to each of you for final review and adoption. It is important to note two things:

- Adoption of this plan will not cost your community anything. You will not be committing to completing any of the projects listed; instead it is a list of triaged ideas that can be accomplished should the funding and will to complete them become available.
- If you do not adopt this plan, your community will not be eligible to apply for and receive mitigation project funding in the future.

Let me thank you in advance for the assistance that you are providing. This small investment of your time will help make our community a safer, healthier and more disaster-resistant community for years to come.

If you are interested in more information about the plan or would like to provide input into the plan, please feel free to contact me at (608) 297-3022 or by email at awilliams@co.marquette.wi.us

RE: PDM plan update

Aaron Williams <awilliams@co.marquette.wi.us>
Fri 9/29/2023 11:26 AM
To:Lenora Borchardt <LenoraBorchardt@hotmail.com>

Lenora,

Here is a list of contacts that I came up with using your requested groups:

Whole Community Outreach

Westfield School District	michelle.johnson@westfieldpioneers.org
Montello School District	ecalnin@montelloschools.org
Westfield Chamber of Commerce	lb4twin@hotmail.com
Montello Rotary Club	montellorotary@gmail.com
Westfield Lions	thompson1952steve@gmail.com
Oxford Lions	voxwwtf@maqs.net
Marquette Community Church	pastormike@mmcmontello.org
St. John the Baptist Church	sjbgsparishoffice@gmail.com
United Migrant Opportunity Services	info@umos.org

Let me know what else you may need.

Have a good weekend,

Aaron

PLANNING MEETING INVITE FOR 9/5/2024

Planning Meeting 9/5

Aaron Williams <awilliams@co.marquette.wi.us>

Tue 8/27/2024 2:31 PM

To:dawncalnin@cityofmontello.com <dawncalnin@cityofmontello.com>;mariep@cityofmontello.com <mariep@cityofmontello.com>;pwdir.kohnke@cityofmontello.com <pwdir.kohnke@cityofmontello.com>; mayorjimhoudek@cityofmontello.com <mayorjimhoudek@cityofmontello.com>;voxwwtf@maqs.net <voxwwtf@maqs.net>;emockler@villageofwestfieldwi.com <emockler@villageofwestfieldwi.com>;Kiley Lloyd <klloyd@co.marquette.wi.us>;Keri Solis <ksolis@co.marquette.wi.us>;Jean Potter <jpotter@co.marquette.wi.us>; Megan Stalker <mstalker@co.marquette.wi.us>;Ken Borzick <kborzick@co.marquette.wi.us>;Judi Nigbor <jnigbor@co.marquette.wi.us>;Jane Gervais (emmgmt@co.adams.wi.us) <emmgmt@co.adams.wi.us>; allen.luchini@co.waushara.wi.us <allen.luchini@co.waushara.wi.us>;gpodoll@cityofberlin.net <gpodoll@cityofberlin.net>;Fenske, Steve <steve.fenske@widma.gov>;phamilton@brakebush.com <phamilton@brakebush.com>;ecalnin@montelloschools.org <ecalnin@montelloschools.org>;Dennis Dahlke <pioneerpowerquote@gmail.com>;kflyte@villageofwestfieldwi.com <kflyte@villageofwestfieldwi.com>;Michelle Johnson <michelle.johnson@westfieldpioneers.org>;gbubolz@arimon.com <gbubolz@arimon.com>;Karen Wampler (karenwampler2015@gmail.com) <karenwampler2015@gmail.com>;Dennis Fenner <dfenner@co.marquette.wi.us>;Mike Raddatz <mraddatz@co.marquette.wi.us>;Scott Kempley <skempley@co.marquette.wi.us>;Lance Achterberg <lachterberg@co.marquette.wi.us>;Brian Trebiatowski <btrebiatowski@co.marquette.wi.us>;Laura.Waldvogel@famhealth.com <Laura.Waldvogel@famhealth.com>; damaris.thome@dpi.wi.gov <damaris.thome@dpi.wi.gov>;adt34lz@gmail.com <adt34lz@gmail.com>; villagereetz@gmail.com <villagereetz@gmail.com>;Ron Barger <rbarger@co.marquette.wi.us>;Mandy Stanley, CSW, MPA <mstanley@co.marquette.wi.us>;Jayme Sopha <jsopha@co.marquette.wi.us>;Paul Van Treeck <pvantreeck@co.marquette.wi.us>;endeavorpres@gmail.com <endeavorpres@gmail.com>; chairperson@townofwestfieldwi.com <chairperson@townofwestfieldwi.com>;Gary <moundville1@outlook.com>; Larry Henke <lastchance94@hotmail.com>;Chris Peschel <thepeschels@gmail.com>; kwohlfert@townofoxfordwi.com <kwohlfert@townofoxfordwi.com>;bclmeyer@maqs.net <bclmeyer@maqs.net>; mayorjimhoudek@cityofmontello.com <mayorjimhoudek@cityofmontello.com>;rep.dallman@legis.wi.gov <rep.dallman@legis.wi.gov>

Cc:lenoraborchardt@hotmail.com <lenoraborchardt@hotmail.com>;Aaron Williams <awilliams@co.marquette.wi.us>;Joseph Konrath <jkonrath@co.marquette.wi.us>;Kari Tomlin <ktomlin@co.marquette.wi.us>;Michael Kowalski <mkowalski@co.marquette.wi.us>;Scott Johnston <sjohnston@co.marquette.wi.us>

I would like to invite you to attend a short meeting next week Thursday September 5th, at the Marquette County Sheriff's Office public safety meeting room. As part of this meeting, we will be discussing the Multi-Hazard Mitigation plan for Marquette County. You have been invited because of your role or position and we are seeking your input in our plan.

What:	Marquette County Hazard Mitigation Planning
When:	September 5th, 2024 1pm-3pm
Where:	Marquette County Sheriff's Office 67 W Park St. Montello, WI 53949

Hope to see you there,

Lt. Aaron Williams
Director of Emergency Management
Marquette County Sheriff's Office
Montello, WI

PLANNING MEETING 9/5/2024

Hazard Mitigation Planning Meeting

Marquette County Sheriff's Office
Public Safety Training Room
September 5, 2024
1pm-3pm

Attendee	Role/Jurisdiction
Jayne Lentz-Stewart	Adams County EM
Aaron Williams	Marquette County EM
LENORA BORCHARDT	BATEC
Ron Barger	Co. Administration
Megan Stalker	Land Information Director
Dennis Dahlke	Pioneer Power and Light
Mike Radlatz	Town of Mecan chair
Sharon Galonski	Chair, Town of Westfield
PAT HAMILTON	BRAKEBUSH BROS INC.
MARY WALTERS	Town of Oxford
Michelle Johnson	School District of Westfield.
Dawn Calnin	City of Montello
Gary Sorensen	Village of Oxford
Sarah Jensen	Health Dept
Gary Schoppenhorst	Town of Moundville / Chair
Demaris Thome	DPI.
Mandy Stanley	Human Services Director
Glen Bubolz	TOWN OF MONTELLO CHAIRMAN
Ken Borzick	CBC town of Shields
Scott Kipley	Chair Buffalo Town Ship

Appendix G: Community Input

Hazard Mitigation Planning Meeting

Marquette County Sheriff's Office
Public Safety Training Room
September 5, 2024
1pm-3pm

Attendee	Role/Jurisdiction
Keri Solis	Economic Development
Michael Kohnke	City of Montello D.P.W
Paul Van Treeck	B&G Marquette County

EMAIL REQUESTING INPUT (ENGLISH) 9/5/2024

Date: 5 September 2024
To: Whole Community Planning Partner
From: Lt. Aaron Williams, EM Director
Re: Hazard Mitigation Plan Update

Marquette County, like the rest of the State of Wisconsin, is vulnerable to a variety of disasters. Wisconsin has incurred disaster-related damages totaling nearly $3 billion in the last three decades, with almost half of that occurring in the 1990s alone. These losses can be reduced through mitigation activities. It is estimated that for every dollar spent on mitigation, up to $6 in future damages can be avoided. Hazard mitigation breaks the cycle of damage and repair.

Mitigation actions reduce or eliminate the long-term risk to human life and property from hazards. These preventative actions can be simple, such as elevating a furnace in a basement that sometimes has water on the floor. Mitigation can also have a comprehensive approach, such as relocating buildings out of the floodplain or strengthening critical facilities to prevent wind damage and provide stronger shelter.

To better prepare our community to manage its vulnerability to disaster, Marquette County Emergency Management applied for and received a FEMA hazard mitigation planning update grant. This grant aims to update an approvable plan, which will serve as a roadmap that outlines potential cost-effective hazard mitigation activities, some of which might be available for future grant funding.

The plan outlines the risks and vulnerabilities that the county faces from natural disasters and highlights mitigation strategies that might reduce future losses. As part of this planning process, we are asking you if you have any concerns (i.e., risks or vulnerabilities) and/or hazard mitigation projects that you would like included in the plan.

We recognize the importance of having members of the community involved in the process and would like to ensure that all interested members of the community have an opportunity to provide input into the plan. If you are interested in more information or would like to provide input into the plan, please contact Lt. Aaron Williams at 920-297-3022 or by email at awilliams@co.marquette.wi.us before September 20, 2024. Thank you!

EMAIL REQUESTING INPUT (SPANISH) 9/5/2024

Fecha: 5 de septiembre de 2024
Para: Socio de Planificación de Toda la Comunidad
De: Lt. Aaron Williams, Director de EM
Re: Actualización del Plan de Mitigación de Riesgos

El Condado de Marquette, como el resto del Estado de Wisconsin, es vulnerable a una variedad de desastres. Wisconsin ha sufrido daños relacionados con catástrofes por un total de casi 3.000 millones de dólares en las últimas tres décadas, casi la mitad de los cuales se produjeron sólo en la década de 1990. Estas pérdidas pueden reducirse mediante actividades de mitigación. Se calcula que por cada dólar gastado en mitigación pueden evitarse hasta 6 dólares en daños futuros. La mitigación de riesgos rompe el ciclo de daños y reparaciones.

Las acciones de mitigación reducen o eliminan el riesgo a largo plazo de los peligros para la vida humana y la propiedad. Estas acciones preventivas pueden ser sencillas, como elevar un horno en un sótano que a veces tiene agua en el suelo. La mitigación también puede tener un enfoque integral, como la reubicación de edificios fuera de la llanura aluvial o el refuerzo de instalaciones críticas para evitar daños por viento y proporcionar un refugio más sólido.

Para preparar mejor a nuestra comunidad para gestionar su vulnerabilidad ante los desastres, la Gestión de Emergencias del Condado de Marquette solicitó y recibió una subvención de la FEMA para actualizar la planificación de la mitigación de riesgos. El objetivo de esta subvención es actualizar un plan aprobable, que servirá como hoja de ruta que describa las posibles actividades rentables de mitigación de riesgos, algunas de las cuales podrían estar disponibles para futuras subvenciones.

El plan describe los riesgos y vulnerabilidades a los que se enfrenta el condado ante las catástrofes naturales y destaca las estrategias de mitigación que podrían reducir las pérdidas futuras. Como parte de este proceso de planificación, le preguntamos si tiene alguna preocupación (es decir, riesgos o vulnerabilidades) y/o proyectos de mitigación de peligros que le gustaría que se incluyeran en el plan.

Reconocemos la importancia de que los miembros de la comunidad participen en el proceso y nos gustaría asegurarnos de que todos los miembros interesados de la comunidad tengan la oportunidad de contribuir al plan. Si está interesado en obtener más información o le gustaría contribuir al plan, póngase en contacto con Aaron Williams en el 920-297-3022 o por correo electrónico a awilliams@co.marquette.wi.us antes del 20 de septiembre de 2024. Muchas gracias

MARQUETTE COUNTY NATURAL HAZARDS PREPAREDNESS & MITIGATION QUESTIONNAIRE

1. In the past five years, has your community experienced a natural disaster such as a severe windstorm, flood, wildfire, earthquake, etc.?

Event	When event last occurred:				
	Within past year	1-5 years ago	5-15 years ago	More than 15 years ago	Never
Drought	TN Shields			TN Douglas	TN Harris TN Neshkoro
Dust Storm					TN Douglas TN Harris TN Neshkoro TN Shields
Earthquake					TN Douglas TN Harris TN Neshkoro TN Shields
Flood		CO Highway CI Montello TN Douglas TN Oxford TN Shields TN Westfield	TN Douglas TN Neshkoro		TN Harris
Lakeshore Erosion	TN Douglas	TN Douglas	TN Douglas TN Shields	TN Douglas	TN Douglas TN Harris TN Neshkoro
Landslide/ Debris Flow					TN Douglas TN Harris TN Neshkoro TN Shields
Wildfire	TN Oxford TN Shields		TN Neshkoro		TN Douglas TN Harris
Windstorm/ Tornado	TN Douglas TN Douglas	CO Highway TN Oxford TN Shields		TN Neshkoro	TN Harris
Severe Winter Storm		CO Highway TN Oxford	TN Douglas TN Neshkoro	TN Douglas TN Shields	TN Harris
Other:					
Other:					

2. For which of the following natural disasters do you think your community is at risk? (Check the appropriate box for each hazard.)

Event	Extremely Concerned	Very Concerned	Concerned	Somewhat Concerned	Not Concerned
Drought		TN Douglas TN Shields	TN Harris TN Neshkoro		TN Oxford TN Westfield
Dust Storm			TN Douglas TN Neshkoro		TN Harris TN Oxford TN Shields TN Westfield
Earthquake			TN Neshkoro		TN Douglas TN Harris TN Oxford TN Shields TN Westfield
Flood		TN Neshkoro	CO Highway TN Douglas TN Harris	CI Montello TN Oxford TN Shields TN Westfield	
Erosion		TN Douglas TN Neshkoro	TN Harris TN Shields	TN Oxford TN Westfield	
Landslide/ Debris Flow				TN Neshkoro TN Westfield	TN Douglas TN Harris TN Oxford TN Shields
Wildfire	TN Douglas TN Neshkoro	TN Shields	TN Harris TN Westfield	TN Oxford	
Windstorm/ Tornado		TN Harris TN Neshkoro	CO Highway TN Douglas TN Shields TN Westfield	TN Oxford	
Severe Winter Storm/ Ice Storm		TN Douglas TN Harris TN Neshkoro	CO Highway	TN Oxford TN Shields TN Westfield	
Other:					
Other:					

3. Has your community had damage to facilities or infrastructure? If yes, please describe the damage.
(e.g., roads, public buildings, utilities)

CO Highway: Overtopping CTH D causeway and CTH D west of CTH F. Also closing of STH 22 by DOT.
TN Douglas: Roads – culverts washed – Gale, 1st.
TN Harris: None.
TN Neshkoro: Road repair from flooding.

TN Oxford: Downed trees, culvert washout, roadway/shoulder damage.
TN Shields: Roads.
TN Westfield: 1st and 2nd Avenue road – Fenners Lake flooding.

4. **What facilities or infrastructure in your community do you think are especially vulnerable to damage during a natural disaster?**

   CO Highway: CTH D causeway due to saturation of base material and significant traffic.
   CI Montello: Downtown area, dams, homes on river.
   TN Douglas: Town roads and fire station/town hall.
   TN Harris: Roads, bridges, dam, fire station, town hall.
   TN Neshkoro: Bridges, culverts, roads. Town hall building.
   TN Oxford: Downed trees, culvert washout, roadway/shoulder damage.
   TN Shields: Electrical grid and road infrastructure.
   TN Westfield: Culverts, road blockage from windstorms.

5. **How important do you think each of the following projects are in mitigating (i.e., lessening the impacts of) a natural disaster in your community?**

Project	Very Important	Somewhat Important	Neutral	Not Very Important	Not Important
Protecting private property	CI Montello TN Westfield	CO Highway TN Oxford TN Shields	TN Harris TN Neshkoro		TN Douglas
Protecting critical facilities (hospitals, fire stations, etc.)	CO Highway CI Montello TN Harris TN Oxford TN Westfield	TN Douglas TN Neshkoro			
Preventing development in hazard areas	TN Oxford	CO Highway TN Harris TN Neshkoro TN Westfield	CI Montello TN Douglas		
Enhancing the function of natural features (streams, wetlands)	TN Westfield	CO Highway TN Neshkoro TN Oxford	CI Montello TN Douglas TN Harris TN Shields		

Protecting historical and cultural landmarks	CI Montello	CO Highway TN Neshkoro TN Oxford TN Shields TN Westfield	TN Douglas TN Harris		
Promoting cooperation among public agencies, citizens, non-profit organizations and businesses	CI Montello TN Harris TN Oxford TN Shields	CO Highway TN Douglas TN Neshkoro TN Westfield			
Protecting and reducing damage to utilities	CO Highway CI Montello TN Harris TN Oxford TN Shields	TN Neshkoro TN Westfield	TN Douglas		
Strengthening emergency services	CO Highway CI Montello TN Douglas TN Harris TN Neshkoro TN Oxford TN Westfield	TN Shields			

6. **Do you have any community building projects (e.g., subdivisions, office/industrial parks, roads) slated to be built in the near future? If so, please describe it (e.g., project name, location, type, size)?**

   CO Highway: CTH D causeway, reconstruction; Raise road 2.5'. Replace culverts. Paved shoulder, Parks Love/gravel shoulder. $2.5 million potential 2023 construction.
   CI Montello: No.
   TN Douglas: None.
   TN Harris: Fire equipment storage; additional/updated fire station, town hall.
   TN Neshkoro: No.
   TN Oxford: Unaware of any such projects currently.
   TN Shields: No.
   TN Westfield: No.

7. **What ideas do you have for your community to mitigate natural disasters?**

   CO Highway: Causeway reconstruction; CTH O bridge replacement/profile increase.
   TN Douglas: We already have safeguards at dam site: Stop logs; hydraulic failure safeguards; and natural waste disbursement area east of dam and downtown.

TN Harris: Support from neighboring communities for all services; any sort of conservation programs to prevent flooding, erosion, road damage and property damage. Natural disaster warnings for the public; prevent loss of life or injuries.
TN Neshkoro: Board members should go on an annual road tour with the Marquette County Highway Commissioner to survey the condition of roads and bridges; and identify any potential problems.
TN Oxford: Nice approach with teamwork. Build and improve on an already highly functioning system.
TN Westfield: Road maintenance – i.e., ditches and culverts clean to aid in storm water run-off; tree removal and brushing along roads to prevent roads from being blocked in severe weather conditions.

ROAD PROJECT FORMS RETURNED, NOTING NEW PROJECTS:

- CO Highway
- TN Westfield

ROAD PROJECT FORMS RETURNED, NOTING NO PROJECTS:

- TN Douglas
- TN Harris
- TN Neshkoro
- TN Oxford

15 July 2025

Dear Town, Village, City, and County Community Leader:

The State of Wisconsin has endured billions of dollars in damages over the past three decades due to various disasters, including severe weather and flooding events, major snowstorms, and powerful tornadoes. While the costs of each disaster may vary greatly, the impact is always the hardest at the local level, impacting our communities the most.

Hazard mitigation breaks the cycle of damage and repair by reducing or eliminating the long-term risk to human life and property caused by the potential hazards. In fact, for every dollar spent on mitigation activities, approximately $6.00 in future damages is avoided. These preventative actions may be as simple as elevating a furnace in a basement to prevent flood damage. Mitigation efforts may also take a more comprehensive approach, such as relocating buildings from the floodplain or strengthening critical facilities to prevent wind damage and provide stronger shelter.

Marquette County Emergency Management applied for, received, and has now updated the Marquette County Hazard Mitigation Plan through a Pre-Disaster Mitigation (PDM) planning grant to mitigate Marquette County's vulnerability to disaster better. The revised plan serves as a roadmap that outlines potential cost-effective hazard mitigation activities, some of which might be available for future grant funding. The plan highlights the risks and vulnerabilities Marquette County faces from natural disasters and highlights mitigation strategies, selected by a local workgroup, that may reduce future losses.

As this project nears completion, we are sending copies of the final updated plan and a draft resolution template for you to use for the re-adoption of the Marquette County Hazard Mitigation Plan. Please note:

1. **Adoption of this plan will <u>not</u> cost your community anything**. You will not be committing to completing any of the projects listed; instead, it is a list of triaged ideas that could be accomplished should the funding and will to complete them become available.
2. **If you do not adopt this plan, <u>your community will not be eligible to apply for and receive mitigation project funding</u> in the future**.

Please include adoption of this resolution on your next meeting agenda and provide a copy of the final resolution to me at the email address below as soon as it is passed. If you have any questions or comments regarding this plan update, please feel free to contact me at (608) 297-3022 or by email at awilliams@co.marquette.wi.us

Thank you for your assistance with completing the Marquette County Hazard Mitigation Plan. This small investment of your time will help make our community safer, healthier, and more disaster-resistant for years to come.
Respectfully,

Aaron Williams, Director
Marquette County Emergency Management

14 July 2025

For More Information, Contact Aaron Williams, (608) 297-3022

For Immediate Release

MARQUETTE COUNTY DRAFT HAZARD MITIGATION PLAN UPDATE AVAILABLE FOR REVIEW

(Montello, WI) Marquette County, like the rest of the State of Wisconsin, is vulnerable to a variety of disasters. Wisconsin has incurred disaster-related damages totaling $3 billion in the last three decades, but future losses can be reduced through mitigation activities. A recent study by the Multi-hazard Mitigation Council shows that each average dollar spent on mitigation saves society in excess of six dollars. Since 1993, more than 400 disasters have occurred in the United States, affecting communities in all 50 states, costing the country over $500 million per week, and killing over 24,000 people. Mitigation actions reduce or eliminate the long-term risk to human life and property from hazards. These preventative actions can be as simple as elevating a furnace in a basement that sometimes has water on the floor. Mitigation can also have a comprehensive approach, such as relocating buildings out of the floodplain or strengthening critical facilities to prevent wind damage and provide stronger shelter.

To better prepare Marquette County to manage its vulnerability to disasters, Marquette County Emergency Management applied for, received, and has completed a pre-disaster mitigation (PDM) update planning grant. This plan update will serve as a roadmap that outlines potential cost-effective hazard mitigation activities, some of which might be available for future grant funding. The updated plan outlines the risks and vulnerabilities that the county faces from natural disasters and highlights mitigation strategies that might reduce future losses. The completed draft hazard mitigation plan update is available during business hours (8:00 am – 4:00 pm) at the Marquette County Clerk's Office at 77 W. Parks Street, Montello, for review and public comment until 4 August 2025.

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Outlook

Hazard Mitigation Plan

From Aaron Williams <awilliams@co.marquette.wi.us>

Date Wed 7/30/2025 1:14 PM

To townshipofbuffalo@yahoo.com <townshipofbuffalo@yahoo.com>; Lisa Fenner <clerk@town.crystallake.wi.gov>; Harris Town Clerk <harristownclerk@maqs.net>; cgemoll@townofmecanwi.gov <cgemoll@townofmecanwi.gov>; Eileen Napralla <naptire@yahoo.com>; moundvilleclerk@yahoo.com <moundvilleclerk@yahoo.com>; Cheryl Milbrandt <clerk.neshkoro@gmail.com>; Town of Newton/ Dawn Weishaar <townclerknewton@gmail.com>; mwalters@townofoxfordwi.com <mwalters@townofoxfordwi.com>; oxfordtownship@maqs.net <oxfordtownship@maqs.net>; Tara Sommersberger <clerk@townofpackwaukee.org>; lzellmer@townofshields-wi.gov <lzellmer@townofshields-wi.gov>; Town Springfield <twnspringfield@gmail.com>; clerk@townofwestfieldwi.com <clerk@townofwestfieldwi.com>; voeclerk <voeclerk@villageofendeavor.org>; villageclerk@neshkorowi.gov <villageclerk@neshkorowi.gov>; voxford@maqs.net <voxford@maqs.net>; Linda Quinn <lquinn@villageofwestfieldwi.com>; dawncalnin@cityofmontello.com <dawncalnin@cityofmontello.com>; clerk.townofdouglas@gmail.com <clerk.townofdouglas@gmail.com>; Deputy Clerk <dep-clerk@marquettecountywi.gov>

Cc Kiley Lloyd <klloyd@marquettecountywi.gov>; lenoraborchardt@hotmail.com <lenoraborchardt@hotmail.com>

2 attachments (15 MB)

Marquette Co Haz Mit Plan 2025 (draft).pdf; Adoption Cover Letter.pdf;

Clerks,

I am reaching out to you regarding the County Hazard Mitigation plan. It is in final draft form and will be under review/public comment for two weeks. After that the plan will move forward to be adopted by the county. I've attached a pdf of the plan. I also have a hard copy in my office for your municipality. Please let me know the best way to get it to you.

I would encourage all of you to adopt the county's plan as your own in your next board meeting. I can assist you with that process as needed.

If you have any questions please let me know,

Lt. Aaron Williams
EM Director
Marquette County
608-297-3022 desk

MARQUETTE COUNTY EMERGENCY MANAGEMENT
67 W PARK STREET MONTELLO, WI 53949
608-297-3022

24 July 2025

Dear Town, Village, City, and County Community Leader:

The State of Wisconsin has endured billions of dollars in damages over the past three decades due to various disasters, including severe weather and flooding events, major snowstorms, and powerful tornadoes. While the costs of each disaster may vary greatly, the impact is always the hardest at the local level, impacting our communities the most.

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Marquette County Emergency Management applied for, received, and has now updated the Marquette County Hazard Mitigation Plan through a Pre-Disaster Mitigation (PDM) planning grant to mitigate Marquette County's vulnerability to disaster better. The revised plan serves as a roadmap that outlines potential cost-effective hazard mitigation activities, some of which might be available for future grant funding. The plan highlights the risks and vulnerabilities Marquette County faces from natural disasters and highlights mitigation strategies, selected by a local work group, that may reduce future losses.

LT. AARON R. WILLIAMS
DIRECTOR OF EMERGENCY MANAGEMENT
awilliams@co.marquette.wi.us

MARQUETTE COUNTY EMERGENCY MANAGEMENT
67 W PARK STREET MONTELLO, WI 53949
608-297-3022

As this project is nearing completion, we are sending copies of the final updated plan and a draft resolution template for you to use for the re-adoption of the Marquette County Hazard Mitigation Plan. Please note:

1. **Adoption of this plan will not cost your community anything.** You will not be committing to completing any of the projects listed; instead, it is a list of triaged ideas that could be accomplished should the funding and will to complete them become available.
2. **If you do not adopt this plan, your community will not be eligible to apply for and receive mitigation project funding in the future.**

Please include adoption of this resolution on your next meeting agenda and provide a copy of the final resolution to me at the email address below as soon as it is passed. If you have any questions or comments regarding this plan update, please feel free to contact me at (608) 297-3022 or by email at awilliams@co.marquette.wi.us

Thank you for your assistance with completing the Marquette County Hazard Mitigation Plan. This small investment of your time will help make our community safer, healthier, and more disaster-resistant for years to come.

Respectfully,

Aaron Williams, Director
Marquette County Emergency Management

MARQUETTE COUNTY EMERGENCY MANAGEMENT
67 W PARK STREET MONTELLO, WI 53949
608-297-3022

Public Notice

Marquette County has completed the draft of a Hazard Mitigation Plan Update, prepared in accordance with the Disaster Mitigation Act of 2000 (Public Law 106-390; DMA2K). The draft is available for public review and comment during business hours at the Marquette County Clerk's Office, 77 W. Park Street, Montello until August 14, 2025.

If you have questions related to this notice or its application in Marquette County, call the Marquette County Emergency Management office at (608) 297-3022.

LT. AARON R. WILLIAMS
DIRECTOR OF EMERGENCY MANAGEMENT
awilliams@co.marquette.wi.us

MARQUETTE COUNTY EMERGENCY MANAGEMENT
67 W PARK STREET MONTELLO, WI 53949
608-297-3022

Date: 20 January 2026

To: Marquette County Municipal Partner

From: Lt. Aaron Williams, EM Director

Re: Hazard Mitigation Plan Update

Like the rest of the State of Wisconsin, Marquette County is vulnerable to various disasters. Wisconsin has incurred disaster-related damages totaling nearly $3 billion over the last three decades, with almost half of that amount occurring in the 1990s alone. These losses can be reduced through mitigation activities. It is estimated that for every dollar spent on mitigation, up to $6 in future damages can be avoided. Hazard mitigation breaks the cycle of damage and repair.

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Marquette County Emergency Management applied for and received a FEMA Hazard Mitigation Planning Update grant to prepare our community to better manage its disaster vulnerability. This grant aims to update an approvable plan, which will serve as a roadmap outlining potential cost-effective hazard mitigation activities, some of which may be available for future grant funding. The plan outlines the risks and vulnerabilities that the county faces from natural disasters and highlights mitigation strategies that might reduce future losses.

The plan is now complete. Enclosed, you will find a jump drive containing an electronic version of this document. This version is almost identical to the printed copy of the draft plan you received earlier. The main difference is the addition of the adoptions and approvals in the appendices. I recommend keeping both copies as a reference for the extent of the plan's five-year lifespan. It will be helpful as mitigation and grant opportunities arise.

If you have questions or would like to explore a hazard mitigation project, please contact me at 608-297-3022 or via email at awilliams@marquettecountywi.gov.

LT. AARON R. WILLIAMS
DIRECTOR OF EMERGENCY MANAGEMENT
awilliams@marquettecountywi.gov

Governmental & Public Input

Planning creates a way to solicit and consider input from diverse interests. Successful community mitigation begins with a commitment from government officials throughout the county.

Involving stakeholders is essential to building community-wide support for the plan. In addition to emergency managers, the planning process involves other government agencies (e.g., zoning, floodplain management, public works, community and economic development), businesses, civic groups, environmental groups and schools. Vital information provided by these groups helps insure that the plan is workable within the framework of the community's priorities.

Adoption of the Plan

Local units of government participating in a multi-jurisdictional planning process must adopt the final plan for the municipality to be eligible for future mitigation funds including grants available through FEMA. **Local units (i.e., towns, villages, cities) that do not participate would be ineligible to receive such funds** until such time that they meet these requirements and adopt a plan.

History

Floods and storms have killed over 2,000 people in the U.S. in the last decade. Hundreds of disasters have occurred in the past 25 years, costing the country millions of dollars every week.

Mitigation Planning Facts

► A 2019 study has shown that mitigation saves society an average of $6 for every $1 spent through federal mitigation grant programs.

► Rigorous building standards in communities across the country are saving $11 per $1 spent simply by adopting model codes. Other building measures save $4 per $1 spent.

► Hazard mitigation plans and projects reduce overall risks to the population and structures while also reducing reliance on funding from actual disaster declarations.

► According to the National Oceanographic and Atmospheric Administration, cumulative costs for weather and climate disasters in the United States during 2017 were $306.2 billion - making it the costliest year ever.

NOTES:_____

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Pre-Disaster Mitigation Planning

Creating Safe,

Sustainable

Communities

Prepared by:
Marquette County Emergency Management
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What is Hazard Mitigation?

Hazard mitigation is sustained action taken to reduce or eliminate long-term risk to people and their property from hazards.

Floods, ice storms, tornadoes and forest/wild fires – these are all functions of the natural environment and only become hazardous when they threaten our "built" environment with destruction. These hazards will occur one day. When this happens, the results can be appreciably different from past outcomes if our community takes action today.

Risk Reduction

The goal of risk reduction is to reduce the risk to life and property, which includes existing structures and future construction, in the pre- and post-disaster environments. This is achieved through regulations, local ordinances, land use and building practices and mitigation projects that reduce or eliminate long-term risk from hazards and their effects.

Why Develop A Plan?

Mitigation plans form the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction and repeated damage. The planning process is as important as the plan itself. It creates a framework for risk-based decision-making to reduce damages to lives, property and the economy from future disasters.

State, tribal and local governments are required to develop a hazard mitigation plan as a condition for receiving certain types of non-emergency disaster assistance. The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended by the Disaster Mitigation Act of 2000, provides the legal basis for state, local and tribal governments to undertake a risk-based approach to reducing risks from natural hazards through mitigation planning.

Like many other people, the residents of Merkel, Texas didn't think much about flooding. Besides, it had not flooded in Merkel for 45 years. It wasn't until the heavy summer rains came that residents realized flooding can hit anyone, at any time. After the flooding finally subsided, officials knew they had to do something: mitigate.

Required Information

- Flood maps
- Identification of potential hazards
- History of occurrences
- Hazard impact projections
- Location of critical facilities
- Identification of high-risk facilities (schools, fire station, nursing homes, etc.)
- Location of repetitive loss structures
- Development & prioritization of mitigation projects
- Other materials as identified

Hazard Mitigation Planning Process

1. **Organize Resources-** From the start, communities should focus the resources needed for a successful mitigation planning process. Essential steps include identifying and organizing interested members of the community, particularly those with the technical expertise required during the planning process.

2. **Assess Risks-** Communities next need to identify the characteristics and potential consequences of natural hazards. It is important to understand how much of the community can be affected by specific hazards and what the likely impacts would be for important community assets.

3. **Develop a Mitigation Plan-** Armed with an understanding of the risks posed by natural hazards, communities need to determine what their priorities should be and then look at possible ways to avoid or minimize the undesired effects. The result is a natural hazard mitigation plan and strategy for implementation.

4. **Implement the Plan & Monitor Progress-** Communities can bring the plan to life in a variety of ways ranging from implementing specific mitigation projects to changes in the day-to-day operation of the local government. To ensure the success of an on-going program, it is critical that the plan remains effective. Thus, it is important to conduct periodic evaluations and make revisions as needed.

APORTES GUBERNAMENTALES Y PÚBLICOS

La planificación es un proceso organizado para solicitar y considerar aportes de diversos intereses. Involucrar a las partes interesadas es esencial para generar apoyo para el plan en toda la comunidad. Además de los administradores de emergencias, el proceso de planificación involucra a agencias locales y estatales (por ejemplo, obras públicas y administración de llanuras aluviales); agencias que tienen autoridad para regular el desarrollo; comunidades vecinas; empresas y academia; organizaciones privadas de servicios públicos y principales empleadores; y organizaciones comunitarias y sin fines de lucro que trabajan directamente y/o brindan apoyo a poblaciones desatendidas y socialmente vulnerables.

La información vital que proporcionan estos grupos ayuda a garantizar que el plan sea viable dentro del marco de las prioridades de la comunidad.

ADOPCIÓN DEL PLAN

Las unidades locales de gobierno que participan en un proceso de planificación multijurisdiccional deben adoptar el plan final para que el municipio sea elegible para fondos de mitigación futuros, incluyendo las subvenciones disponibles a través de FEMA. **Las unidades locales (es decir, pueblos, aldeas, ciudades) que no participen serán inelegibles para recibir dichos fondos** hasta que cumplan con estos requisitos y adopten un plan.

HISTORIA

Inundaciones y tormentas han matado a más de 2.000 personas en EE.UU. en la última década. Cientos de desastres han ocurrido en los últimos 25 años, costándole al país millones semanalmente.

DATOS SOBRE LA PLANIFICACIÓN DE MITIGACIÓN

► Un estudio de 2019 ha demostrado que la mitigación ahorra a la sociedad un promedio de $6 por cada $1 gastado a través de programas federales de subvenciones para mitigación.

► Los rigurosos estándares de construcción en comunidades de todo el país están ahorrando $11 por cada $1 gastado, simplemente por adoptar códigos modelo. Otras medidas de construcción ahorran $4 por cada $1 gastado.

► Los planes y proyectos de mitigación de riesgos reducen los riesgos generales para la población y las estructuras, al mismo tiempo que disminuyen la dependencia de los fondos provenientes de declaraciones de desastres reales.

► Según la Administración Nacional Oceánica y Atmosférica, los costos acumulativos de desastres climáticos y meteorológicos en Estados Unidos de 2021 a 2023 fueron de $433 mil millones, continuando la tendencia de costos de desastres cada vez más altos.

NOTAS: _____

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Planificación de Mitigación antes de Desastres

Creando Comunidades Seguras y Sostenibles

Preparado por:

Marquette County
Emergency Management
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¿QUÉ ES LA MITIGACIÓN DE RIESGOS?

La mitigación de riesgos es una acción sostenida que se toma para reducir o eliminar el riesgo a largo plazo para las personas y sus propiedades a partir de peligros.

Las inundaciones, las tormentas de hielo, los tornados y los incendios forestales son todas funciones del entorno natural y solo se convierten en peligros cuando amenazan nuestro entorno "construido" con destrucción. Estos peligros ocurrirán algún día. Cuando esto suceda, los resultados pueden ser notablemente diferentes de los resultados pasados si nuestra comunidad toma medidas hoy.

REDUCCIÓN DEL RIESGO

La reducción del riesgo tiene como objetivo disminuir el riesgo para la vida y la propiedad, incluyendo estructuras existentes y futuras construcciones, tanto en entornos previos como posteriores a desastres. Esto se logra mediante regulaciones, ordenanzas locales, prácticas de uso del suelo y construcción, y proyectos de mitigación que reducen o eliminan los riesgos a largo plazo provenientes de peligros y sus efectos.

¿POR QUÉ DESARROLLAR UN PLAN?

Los planes de mitigación forman la base de la estrategia a largo plazo de una comunidad para reducir las pérdidas por desastres y romper el ciclo de daño por desastres, reconstrucción y daños repetidos. El proceso de planificación es tan importante como el plan en sí. Crea un marco para la toma de decisiones basada en el riesgo para reducir los daños a vidas, propiedades y la economía de futuros desastres.

Los gobiernos estatales, tribales y locales están obligados a desarrollar un plan de mitigación de riesgos como condición para recibir ciertos tipos de asistencia para desastres no emergentes. La Ley Robert T. Stafford de Alivio de Desastres y Asistencia de Emergencia (Ley Pública 93-288), enmendada por la Ley de Mitigación de Desastres del 2000, proporciona la base legal para que los gobiernos estatales, locales y tribales adopten un enfoque basado en el riesgo para reducir los riesgos de desastres naturales mediante la planificación de mitigación.

Como muchas otras personas, los residentes de Merkel, Texas, no pensaban mucho en las inundaciones. Además, no había habido inundaciones en Merkel durante 45 años. No fue hasta que llegaron las fuertes lluvias de verano que los residentes se dieron cuenta de que las inundaciones podrían afectar a cualquiera en cualquier momento. Después de que las inundaciones finalmente disminuyeron los funcionarios sabían que tenían que hacer algo: mitigar.

INFORMACION REQUERIDA

- Mapas de Inundaciones
- Identificación de peligros potenciales
- Historial de ocurrencias
- Proyecciones de impacto de riesgos
- Ubicación de instalaciones críticas
- Identificación de instalaciones de alto riesgo (escuelas, estaciones de bomberos, hogares de ancianos, etc.)
- Ubicación de estructuras con pérdidas repetitivas
- Desarrollo y priorización de proyectos de mitigación
- Otros materiales identificados

PROCESO DE PLANIFICACIÓN DE MITIGACIÓN DE RIESGOS

1 . **Organizar Recursos:** Desde el principio, las comunidades deben centrarse en los recursos necesarios para un proceso de planificación de mitigación exitoso. Los pasos esenciales incluyen identificar y organizar a los miembros de la comunidad interesados, especialmente aquellos con la experiencia técnica requerida durante el proceso de planificación.

2 . **Evaluar los Riesgos:** Las comunidades deben identificar a continuación las características y las posibles consecuencias de los peligros naturales. Es crucial entender cuánto de la comunidad puede ser afectado por peligros específicos y los impactos probables en los activos importantes de la comunidad.

3 . **Desarrollar un Plan de Mitigación:** Armadas con una comprensión de los riesgos que representan los peligros naturales, las comunidades necesitan determinar sus prioridades y luego examinar posibles formas de evitar o minimizar los efectos no deseados. El resultado es un plan de mitigación de riesgos naturales y una estrategia para su implementación.

4 . **Implementar el Plan y Monitorear el Progreso:** Las comunidades pueden dar vida al plan de diversas maneras, que van desde la implementación de proyectos de mitigación específicos hasta cambios en el funcionamiento diario del gobierno local. Para garantizar el éxito de un programa en curso, el plan debe permanecer efectivo. Por lo tanto, realizar evaluaciones periódicas y realizar revisiones según sea necesario es importante.

Appendix H: Inter-Revision Updates

This plan will undergo major revisions every five years per the FEMA requirements. Marquette County has recognized that there may be information that should be added to the plan between the five-year updates, but that the costs of continuous updates, printing, and distribution can be excessive. This section is designed to hold the information that is gathered between the five-year updates. It is felt that only having to reproduce and distribute one section between updates will lessen the costs to the county.

Potential Areas of Concern Identified:

- No additional concerns have been identified to date.