Chapter 1: Planning Area Description

Rural Electric Cooperatives are integral to the State of Wisconsin and its communities. It is imperative to mitigate damages to Rural Electric Cooperative infrastructure. This annex ensures that participating Rural Electric Cooperatives may apply for hazard mitigation funds to prevent loss of function and damage in rural Wisconsin.

Introduction

Rural Electric Cooperatives (RECs) are private, independent electric utilities, owned by the members they serve in rural America. Electric cooperatives operate much like a food cooperative or a credit union, where each organization is an independent utility owned by its customers. As democratically governed businesses, electric cooperatives are organized under the Cooperative or Rochdale Principles, affixing them in the communities they serve and ensuring close regulation by their customers. Utility rates are determined independently through a board elected by members of the cooperative. If annual revenues exceed costs, members may receive a credit. Nationally, investor-owned utilities maintain about half of all electric distribution lines, publicly owned utilities maintain about 7 percent, and cooperatives maintain the remaining 43 percent.

Electric cooperatives are currently the only utilities in the country that rely on government and other loans to finance capital construction. Unlike municipal or investor owned utilities, they do not receive tax-exempt financing or revenue bonds. Cooperatives repay loans monthly with interest.

History

Electric cooperatives across the nation emerged from the creation of the Rural Electrification Administration (REA), a Depression-era agency created in 1935. The REA administered an unemployment relief program that transformed into a low-interest government loan program with the mission of electrifying rural America. The REA was created with an expectation that investor-owned utilities would take advantage of the federal low-interest loans to expand their infrastructure to rural America. However, it was largely ordinary people coming together to form non-profit, member-owned and controlled cooperative utilities. The first electric cooperative in Wisconsin energized its system in the spring of 1937 and the last cooperative energized its system in 1945. Today, there are 25 electric cooperatives in Wisconsin that generate, transmit and distribute electric power.

Wisconsin Cooperatives

The demographics of Wisconsin's electric cooperative service territories are significantly different from the state's investor-owned and municipal utilities due to their rural origins. In Wisconsin, electric cooperatives have far fewer services (customers) per mile of electric line, and proportionally have more line miles and larger service areas than nearly all other utilities operating in the state. Wisconsin's electric cooperatives

collectively serve more than 267,000 consumers; maintain more than 49,000 miles of power lines, and have a line density of 5.8 customers per mile of line (excluding transmission)[1].

Due to the demographics of electric cooperative service territories, cooperative power infrastructure crosses vast geographies and is potentially susceptible to many natural disaster events conceivable for Wisconsin. To provide power to many of Wisconsin's rural residents and some smaller cities and villages, cooperative infrastructure crosses through national, state, local, and privately owned forests; the state's driftless area; agricultural lands; and on rare occasions, into our waterways to provide power to islands and other isolated areas.

Plan Participants

Thirteen of the 25 Wisconsin Rural Electric Cooperatives have agreed to participate in the REC Hazard Mitigation Plan Annex. The following Table 1.1 lists the participating cooperative, the counties in which they operate, the miles of distribution line and the # of services. Map 1.1 demonstrates the complexity of electrification in the State of Wisconsin.

Table 1.1
Rural Electric Cooperative Annex Participants

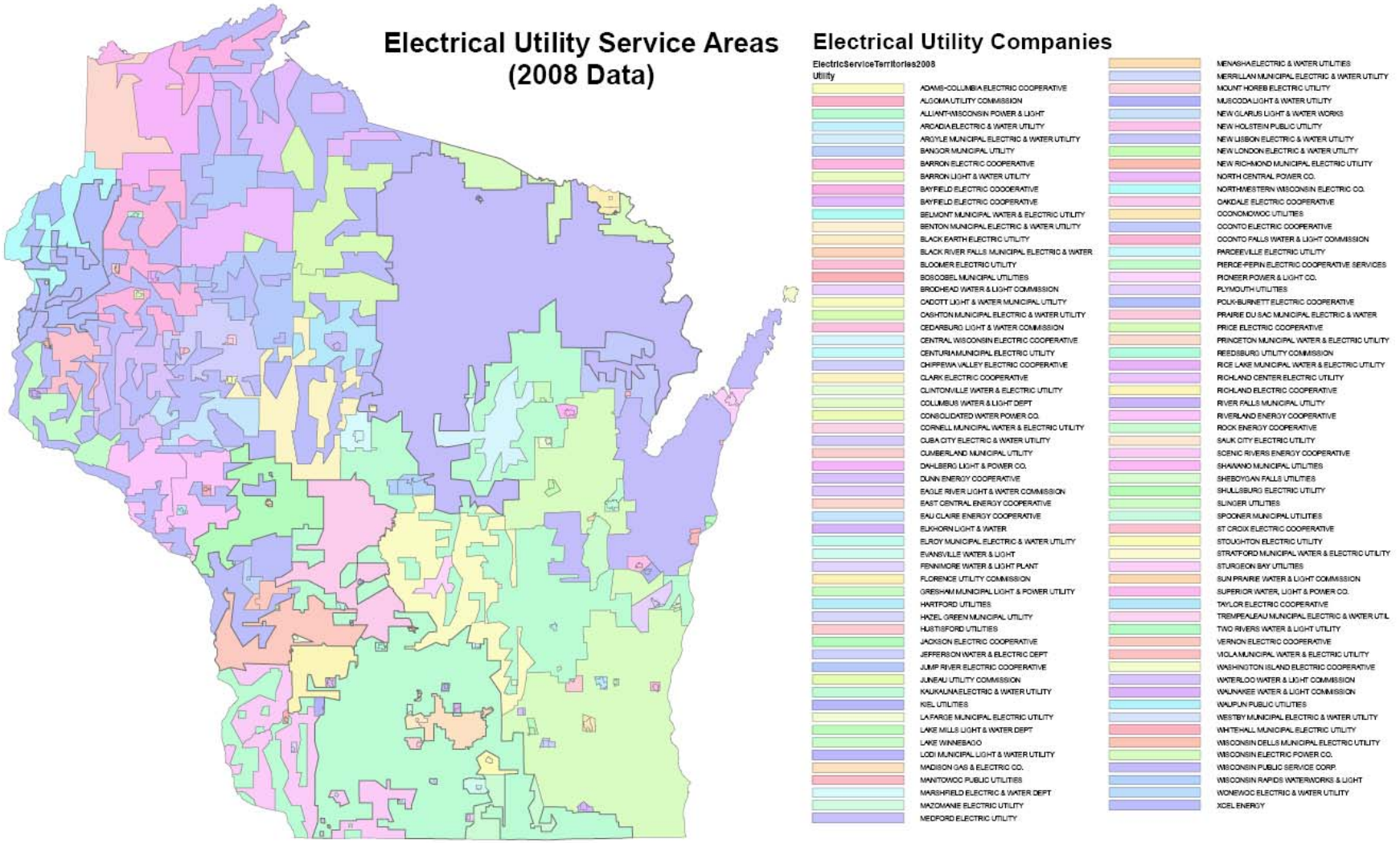
Cooperative Name	Counties with Services	Miles of Distribution Line	Number of Services
Adams-Columbia Electric Cooperative	Adams	5,286	36,891
	Columbia		
	Dane		
	Dodge		
	Green Lake		
	Jefferson		
	Marquette		
	Portage		
	Sauk		
	Waupaca		
	Waushara		
	Wood		
Barron Electric Cooperative	Barron	3,068	17,749
	Washburn		
	Burnett		
	Chippewa		
	Dunn		
	Polk		

[1] Wisconsin Electric Cooperative Association, *WECA Member Demographics*, 2008.

	Rusk		
	Sawyer		
Central Wisconsin Electric Cooperative	Waupaca	1,406	7,137
	Shawano		
	Marathon		
	Portage		
Clark Electric Cooperative	Clark	1,968	8,852
	Taylor		
	Marathon		
	Jackson		
	Wood		
	Chippewa		
East Central Energy	Burnett	996	4,941
	Douglas		
	Washburn		
Eau Claire Energy Cooperative	Eau Claire	1,617	10,347
	Chippewa		
	Dunn		
	Pepin		
	Buffalo		
	Trempealeau		
	Jackson		
Jackson Electric Cooperative	Jackson	1,409	6,137
	Monroe		
	La Crosse		
	Clark		
	Trempealeau		
	Eau Claire		
Jump River Electric Cooperative	Rusk	1,707	9,125
	Sawyer		
	Taylor		
	Chippewa		
	Barron		
	Price		
Oakdale Electric Cooperative	Monroe	2,661	15,918
	Juneau		
	Jackson		
	Sauk		
	Wood		
Pierce Pepin Cooperative Services	Pierce	1,204	6,857
	Pepin		
	St. Croix		
	Buffalo		
Richland Electric Cooperative	Richland	957	3,276
	Crawford		
	Vernon		

	Sauk		
Riverland Energy Cooperative	Trempealeau	3,218	14,394
	Buffalo		
	La Crosse		
	Eau Claire		
	Pepin		
	Jackson		
Scenic Rivers Energy Cooperative	Grant	3,432	11,233
	Lafayette		
	Crawford		
	Green		
	Richland		
	Vernon		
	Iowa		

Map 1.1
Electrification in the State of Wisconsin



Chapter 2: Planning Process

Plan Development

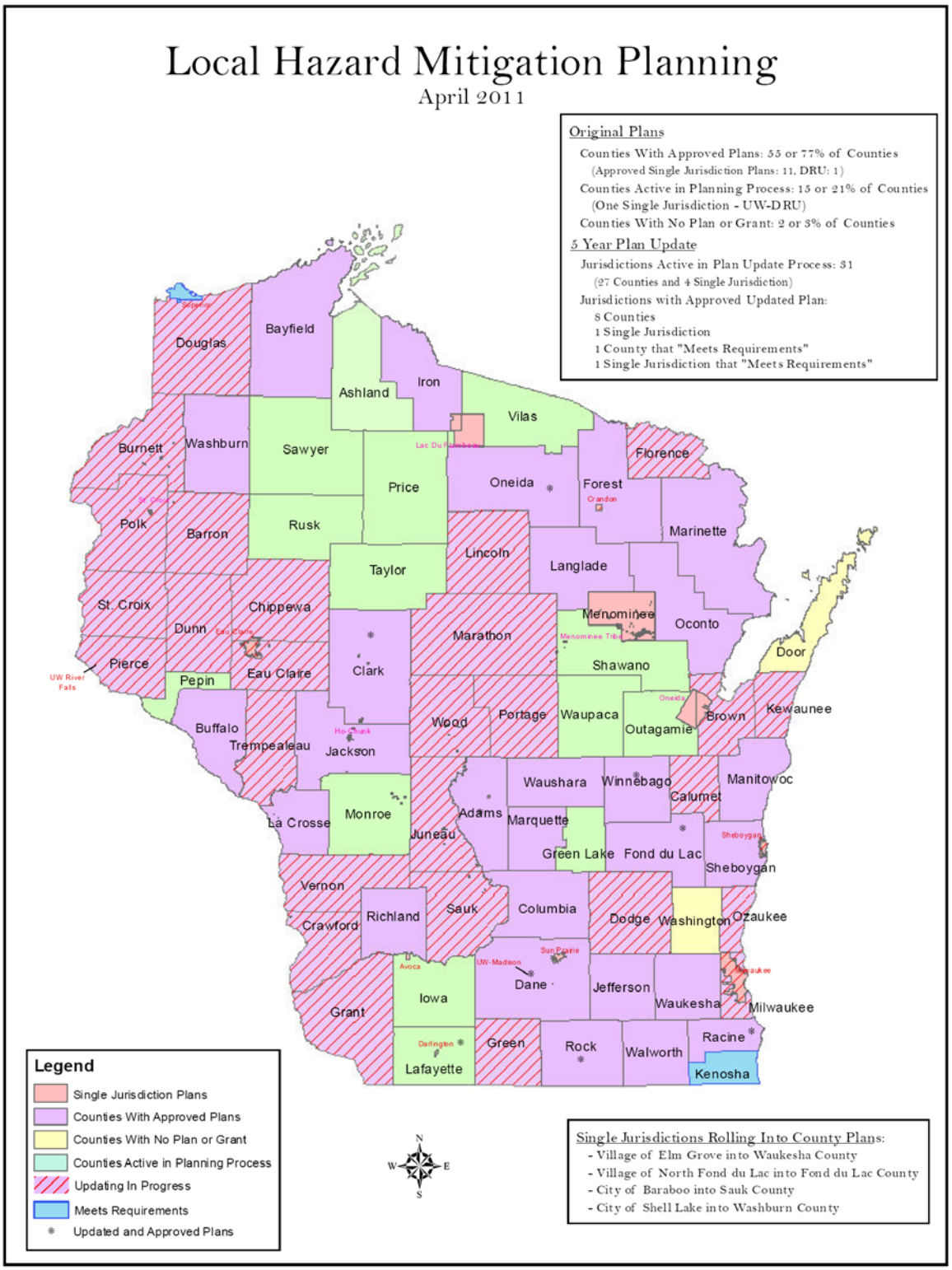
The development of this plan was initiated by Wisconsin Emergency Management and the Cooperative Network. This annex is needed for many reasons which include:

- Rural Electric Cooperatives are allowed to apply for FEMA's Pre-Disaster Mitigation (PDM) Grant Program and Hazard Mitigation Grant Program (HMGP) as subapplicants with an approved Rural Electric Cooperative Annex.
- By establishing a formal hazard mitigation planning process for electric cooperatives, an emphasis is made on reducing the impact of natural disaster.
- Development of a hazard mitigation plan annex allow for RECs to develop a plan, even though the cooperative may be in a county that does not have a plan or is not developing a county hazard mitigation plan.

The State of Wisconsin has been very active in mitigation planning over the last decade. Map 2.1 identifies those counties and single jurisdictions hazard mitigation planning status in the State of Wisconsin. In comparing Map 1.1 (Electrification in the State of Wisconsin) and Map 2.1 (Hazard Mitigation Planning in the State of Wisconsin), it is easy to see that a Rural Electric Cooperative Hazard Mitigation Annex helps simplify the political jurisdiction complexities by focusing on the mitigation needs of the Rural Electric Cooperatives.

Initial discussions of development of an electric cooperative annex to the State of Wisconsin's Hazard Mitigation Plan began in late 2007. Several electric cooperatives in the State had been recipients of hazard mitigation funding. With the enactment of the of the Disaster Mitigation Act of 2000, future funding of cooperative hazard mitigation projects would be contingent upon the inclusion of these projects in an all-hazards mitigation plan. Wisconsin Emergency Management approached Cooperative Network (at that time Wisconsin Federation of Cooperatives) to gage the interest of the state's electric cooperatives in developing an electric cooperative annex to the State of Wisconsin Hazard Mitigation Plan.

Map 2.1
Hazard Mitigation Planning in the State of Wisconsin



Thirteen of the state's electric cooperatives have entered into a Memorandum of Understanding with Wisconsin Emergency Management that included the following:

- Joint development of an electric cooperative annex for the inclusion in the State of Wisconsin's Hazard Mitigation Plan
- Identification of natural hazards that have the potential of affecting an electric cooperative's infrastructure
- Conducting an assessment of vulnerabilities of the infrastructure to these hazards and mitigation measures to reduce these vulnerabilities
- Active participation in the periodic review, evaluation, and update of the electric cooperative annex.

Appendix A includes copies of the Memorandum of Understanding documents executed by each cooperative and Wisconsin Emergency Management.

Disaster Mitigation Act of 2000

The development of an electric cooperative annex to the State of Wisconsin Hazard Mitigation is in response to the passage of the Disaster Mitigation Act of 2000 (DMA2K), which was signed into law by the U.S. Congress on October 30, 2000. The goal of the legislation includes reducing losses and future public and private expenditures, and improving response and recovery from disasters. Public Law 106-390 amended the Robert T. Stafford Relief and Emergency Assistance Act. The Act requires that local governments, tribal organizations, and states prepare an all-hazard mitigation plan in order to be eligible for funding from the FEMA Pre-Disaster Mitigation (PDM) Assistance Program, Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA) Grant Program and the Severe Repetitive Loss (SRL) Grant Program. Subapplicants, such as electric cooperatives, are only eligible for funding provided their projects are included in a local or state all-hazards mitigation plan approved by the Federal Emergency Management Agency. The Act requires that natural hazards, such as flooding or severe weather, be addressed in the risk assessment and vulnerability analysis sections of the all-hazard mitigation plan.

Benefits of Hazard Mitigation Planning

Hazard mitigation planning serves as a useful tool for electric cooperatives, county emergency management offices, and Wisconsin Emergency Management to develop consensus around a plan of action to reduce or eliminate the long-term risk to human life and property from natural hazards.

Specifically, the development of this plan is intended to:

- Increase awareness of risks and utility infrastructure vulnerabilities to natural hazards.
- Establish hazard mitigation goals.
- Identify strategies to help implement mitigation measures.
- Establish priorities for the use of cooperative and public resources to mitigate hazards.
- Enable cooperative, as subapplicants, to seek hazard mitigation funding from the Federal Emergency Management Agency.
- Improve recovery efforts related to natural disasters.
- Minimize public safety concerns and power supply disruptions to persons served by electric cooperatives.

Planning Process

Planning Overview

Wisconsin Emergency Management began an outreach effort involving Cooperative Network, the state trade association representing Wisconsin's electric cooperatives and the state's electric cooperative managers. Following these early meetings, 13 RECs entered into an agreement with Wisconsin Emergency Management to begin the development of an electric cooperative annex to the State of Wisconsin Hazard Mitigation Plan. Development of the electric cooperative annex began in September 2008 with the creation of a subcommittee of the Wisconsin Rural Electric Cooperative Line Superintendents Association.

Following the creation of a draft electric cooperative annex in April 2011, respective local emergency management offices were contacted for their feedback and coordination of local mitigation planning activities for those counties with all-hazard mitigation plans or those counties in the process of developing a plan. The counties contacted include:

Counties with Annex Participating RECs			
Adams	Dunn	Marathon	Sawyer
Barron	Eau Claire	Marquette	Shawano
Buffalo	Grant	Monroe	St. Croix
Burnett	Green	Pepin	Taylor
Chippewa	Green Lake	Pierce	Trempealeau
Clark	Iowa	Polk	Vernon
Columbia	Jackson	Portage	Washburn
Crawford	Jefferson	Price	Waupaca
Dane	Juneau	Richland	Waushara
Dodge	La Crosse	Rusk	Wood
Douglas	Lafayette	Sauk	

Hazard Mitigation Planning Committee

This annex was prepared under the guidance of the Wisconsin Rural Electric Cooperative Line Superintendents Association Hazard Mitigation Subcommittee. Members of the subcommittee include:

Name	Affiliation

This group held meetings on:

Meeting Dates

This group provided feedback throughout the process, established a uniform process for each cooperative to conduct a unique risk and vulnerability assessment, and provided guidance to electric cooperatives for identifying the prioritizing hazard mitigation projects. The group also helped define mitigation goals and was responsible for the overall development and submission of the final annex.

Stakeholder Involvement

On April 19, 2011, the draft cooperative annex was presented to WECA Managers Meeting for additional input and suggestions.

Public Involvement and Review Process

Two public meetings will be held in May 2011. One meeting will be held in northern Wisconsin (Wausau) and the other meeting will be held for the southern counties in Madison. The meetings will publicly noticed in major state newspapers as well as noticed on WEM's website. Addition public participation techniques will be explored such as providing REC customers with public comment forms in the monthly electric bill. In addition, a draft of the REC was posted to WEM's website on April 21, 2011 for public comment.

Plan Adoption

The final annex was submitted for approval and inclusion in the State of Wisconsin Hazard Mitigation Plan. The State of Wisconsin Hazard Mitigation was approved on _____. After the plan and annex were approved, each

participationg Rural Electric Cooperative adopted the annex. The adoptions can be found in Appendix 4.

Incorporated Plans, Studies, Reports and Technical Data

The following is a list of some primary references and data sources use for the preparation of this Annex:

- The State of Wisconsin Hazard Mitigation Plan
- Wisconsin's Electric Cooperatives 2009 Directory and Handbook
- The National Oceanic and Atmospheric Administration (NOAA) National Database of U.S. Storm Events
- Storm Data from National Weather Service, Milwaukee-Sullivan Office

CHAPTER 3: HAZARD PROFILES

Note: For the purposes of future plan updates, the cut-off date for including new hazard events is December 31, 2010. The 2014 plan update will include new events from January 1, 2011-December 31, 2013.

A. DETERMINATION OF HAZARDS AND RELATIVE RISK

1. Methodology

Twelve of the electric cooperatives (with the exception of Clark Electric Cooperative) conducted a risk and vulnerability assessment using the IT Recovery Plan for Electric Cooperatives. This software was developed by the National Rural Cooperative Association and Cooperative Research Network and uses a logical and systematic process to identify natural disaster business risks and quantify vulnerability. Identification of natural disaster risks and a cooperative's vulnerability is based on a combination of existing knowledge, rational observations, and prior experience. The software uses six parameters to quantify the degree of risk for each natural disaster hazard including:

- Probability
- Speed of onset
- Forewarning
- Duration
- Economic impact
- Level of concern

$$\text{Relative Risk} = \frac{(\text{Probability x Economic Impact})\,(\text{Speed of onset} + \text{Forewarning} + \text{Duration})}{\text{Level of Concern}}$$

Each parameter is further classified by a list of criteria to establish significance and assign a numeric value to quantify its weight rating. When the relevance of each parameter has been determined for an identified natural disaster hazard, the software calculates a relative risk value and then rates it against all other natural disaster hazards identified. Each parameter is further defined as follows:

Probability: Probability is expressed as the chance of a particular event occurring within the next five years. The table below summarizes the numerical scoring system used. Natural threats assigned a value of zero were not evaluated any further.

Likelihood of event occurring within 5 years	Chance Measured in Percentages	Value Assigned
Event not applicable	0%	0
Minimal likelihood	1-5%	1
Minor likelihood	6-20%	2
Moderately likely	21-50%	3

Highly likely	51-75%	4
Almost certain	Greater than 75%	5

Speed of Onset: Quantifies how quickly a threat can start and uses the following table:

Criteria	Value Assigned
Onset of threat is slow	1
Onset of threat is fast	2

Forewarning: *Q*uantifies the amount of advanced notice to prepare for a threat and uses the following table:

Criteria	Value Assigned
Forewarning of threat is likely	1
Forewarning of threat is unlikely	2

Duration: Quantifies to impact of how long a threat is likely to last and uses the following table:

Criteria	Value Assigned
Duration of threat is short.	1
Duration of threat is long	2

Economic Impact: Economic impact is weighted against the estimated loss or actual loss of a relevant experience, and the size of the electric cooperative determined by its population. Based on these criteria, a cooperative either uses Table A if they have less than 10,000 members, or Table B if they 10,000 to 40,000 members. There are no electric distribution cooperatives with more than 40,000 members in Wisconsin.

Table A

Economic Loss (Cooperatives With Less Than 10,000 Members)	Value Assigned
Less than $1,000	1
$1,000-$5,000	2
$5,001-$20,000	3
$20,001-$50,000	4
Greater than $50,000	5

Table B

Economic Loss	Value Assigned

(Cooperatives With 10,000 to 40,000 Members)	
Less than $1,000	1
$1,000-$5,000	2
$5,001-$20,000	3
$20,001-$50,000	4
Greater than $50,000	5

Level of Concern—Measures cooperative's overall ability to respond to a threat. The value is a composite of several considerations, including past experiences, capabilities, availability of resources, magnitude of the threat, and other unique considerations.

Criteria	Value Assigned
Not Concerned	5
Somewhat Concerned	4
Concerned	3
Very Concerned	2
Extremely Concerned	1

Clark Electric Cooperative used a vulnerability and risk assessment matrix called the Iowa Electric Cooperative Association Vulnerability Risk Assessment. This assessment tool incorporates a number of foreseeable natural and human actions that could significantly disrupt business functions.

Similar to the risk and vulnerability assessment tool developed by the National Rural Cooperative Association and Cooperative Research Network, this model uses a number of anticipated scenarios that are either a result of human actions or natural occurrences. The assessment process is based on the identification of critical business facilities and the potential impact of their loss. Specifically, critical facilities are categorized as an asset that if lost would (1) result in significant loss of life, (2) impact public health, (3) impact a large number of services for an extended period of time, (4) have a detrimental impact on the reliability or operability of the energy grid, (5) or cause a financial stress that could jeopardize the cooperative's ability to function. This vulnerability and risk assessment method follows a six step process and includes:

1. Identification of critical facilities and loss impact.
2. Identification of existing controls for each critical asset.
3. Characterization of critical asset threats.
4. Assessment of critical asset vulnerabilities.
5. Determination of foreseeable risks and their weighted significance.
6. Identification of mitigation strategies, costs, and trade-offs.

Appendix 2 includes a summary page for each electric cooperative that lists the potential natural disaster hazards and associated relative risk as calculated using the software developed by the Cooperative Research Network. Appendix 3 contains a collective list of all natural hazards identified by the cooperatives and the average relative risk factor by disaster type.

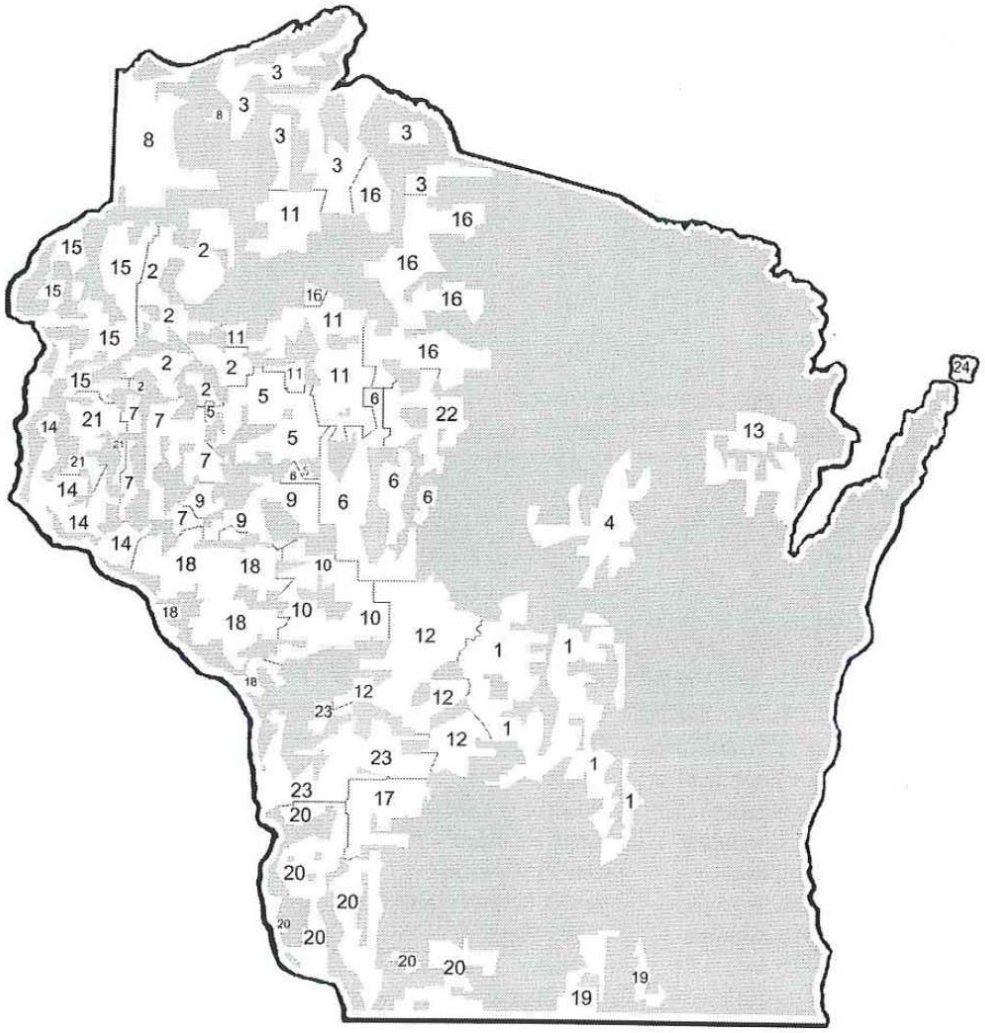
2. Location of Rural Electric Cooperatives

Map 3.1 highlights the 25 Rural Electric Cooperatives in the State of Wisconsin. Cooperative service territory in Wisconsin encompasses approximately 1/3 of the state's total surface area or approximately 18,000 square miles. Thirteen of the 25 electric cooperatives participated in the 2011 annex. On Map 3.1, the cooperatives include numbers 1 (Adams-Columbia Electric Cooperative), 2 (Barron Electric Cooperative), 4 (Central Wisconsin Electric Cooperative), 6 (Clark Electric Cooperative), 8 (East Central Energy), 9 (Eau Claire Energy Cooperative), 10 (Jackson Electric Cooperative), 11 (Jump River Electric Cooperative), 12 (Oakdale Electric Cooperative), 14 (Pierce Pepin Cooperative Services), 17 (Richland Electric Cooperative), 18 (Riverland Energy Cooperative), and 20 (Scenic Rivers Energy Cooperative.)

Map 3.1

Wisconsin Electric Cooperatives

Approximate Service Areas



1. Adams–Columbia Electric Co-op
2. Barron Electric Co-op
3. Bayfield Electric Co-op
4. Central Wisconsin Electric Co-op
5. Chippewa Valley Electric Co-op
6. Clark Electric Co-op
7. Dunn Energy Co-op
8. East Central Energy
9. Eau Claire Energy Co-op
10. Jackson Electric Co-op
11. Jump River Electric Co-op
12. Oakdale Electric Co-op
13. Oconto Electric Co-op
14. Pierce Pepin Cooperative Services
15. Polk–Burnett Electric Co-op
16. Price Electric Co-op
17. Richland Electric Co-op
18. Riverland Energy Co-op
19. Rock Energy Co-op
20. Scenic Rivers Energy Co-op
21. St. Croix Electric Co-op
22. Taylor Electric Co-op
23. Vernon Electric Co-op
24. Washington Island Electric Co-op

B. HAZARD PROFILES

The participating cooperatives have reviewed hazards affecting their geographic areas and through detailed threat analysis (Appendix 2 and 3) have identified six natural hazards posing the most risk to their jurisdictions. The hazards include winter storms, severe thunderstorms and high winds, tornadoes, lightening, hail and wildfire. Appendix 3 highlights the probability/likelihood of the hazard affecting a Rural Electric Cooperative.

1. Severe Winter Storms

Nature of Hazard

Winter storms vary in size and strength and include heavy snowstorms, blizzards, freezing rain, sleet, ice storms, and considerable blowing and drifting snow conditions. Winter storm occurrences tend to be very disruptive to transportation and commerce.

A variety of weather phenomena and conditions can occur during winter storms. For clarification, the following are National Weather Service approved descriptions of winter storm elements:

- 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, or frequent wind gusts, equal to or in excess of 35 mph accompanied by heavy snowfall or large amounts of blowing or drifting snow.
- Ice storm**:** An occurrence when rain falls from warmer upper layers of the atmosphere to the colder ground, freezing upon contact with the ground and exposed objects near the ground. Ice accumulations of ¼ inch or more within 12 hours constitutes an ice storm in Wisconsin.
- Freezing drizzle/freezing rain**:** 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.

The following maps illustrate the history of winter storm events for the counties of the REC's participating in this plan.

NEED FROM NWS (Map 3.2)

Significant Recent Winter Storm Events

December 2000 was one of the 10 coldest Decembers on record for most of Wisconsin. In addition to low temperatures, record or near-record snow depths of 15 to 34 inches occurred in much of the southern part of the State during December. As a result of record snowfalls, 13 counties received a Presidential Emergency Declaration.

The 2007-08 winter season was “one-for-the-ages.” Numerous winter storms, including a couple blizzards and 4 ice storms, pounded the southern half of the state. Winter snowfall totals of 70 to 122 inches across the southern counties established new all-time winter snowfall records at many locations. These totals were roughly 200 to 240% of normal. The worst storm of the winter occurred on

February 5-6, 2008 southeast of a line from Dubuque, Iowa to Madison to Sheboygan when 12 to 21 inches of snow combined with northeast winds of 20 to 30 mph and some gusts to 50 mph to create near-blizzard conditions. Major vehicle backups occurred in both southbound and northbound lanes on Interstate 39/90 in Dane and Rock Counties after several trucks could not make it up hills during intense thunder snowfall rates of 1 to 2 inches per hour at the height of the storm. At least 1,548 vehicles and trucks were stranded for 10 to 20 hours thanks to snowfalls of 18 to 21 inches in that area.

2. Severe Thunderstorms / High Winds

Nature of Hazard

Thunderstorm events are generated by instability in the atmosphere, sufficient moisture, and rising motion to form clouds and rain. They are characterized by precipitation in the form of rain, lightning, hail, downbursts, and tornadoes. On occasions, thunderstorms can occur in winter during heavy snow events. Typically, Wisconsin thunderstorms are approximately 15 miles across and last for about 30 minutes, but events of longer duration or with high rates of precipitation can lead to flooding. The National Weather Service (NWS) classifies a thunderstorm as severe if winds reach or exceed 58 mph; the storm produces a tornado or produces hail at least 3/4-inch in diameter.

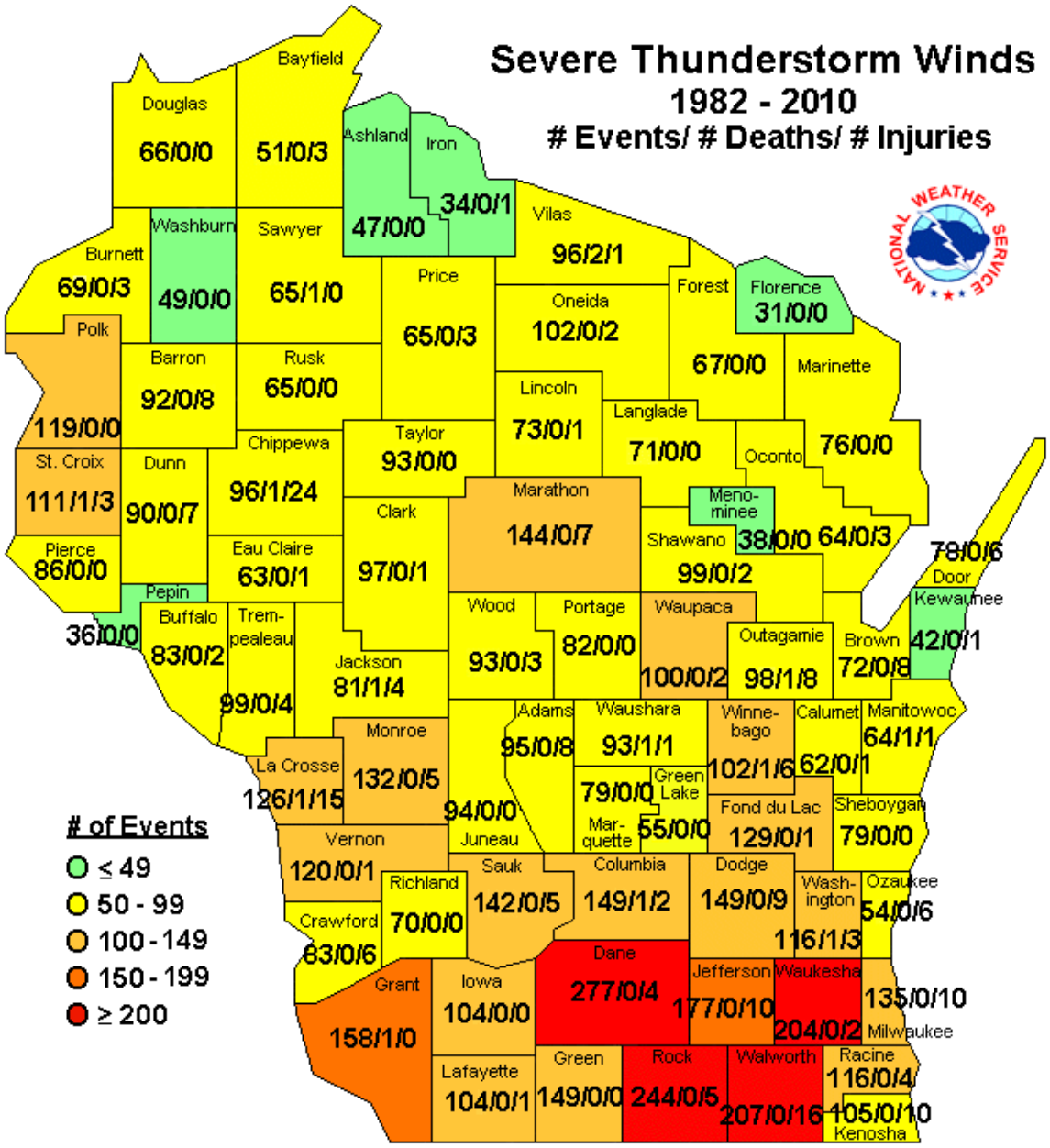
Downburst winds are strong, high winds created by falling rain and associated sinking air. Typically, in severe storms, these winds can reach speeds of 60 to 100 mph. Micro-bursts, concentrated versions of downbursts, can have speeds up to 150 mph. Severe damage can result from downbursts and micro-bursts.

Thunderstorms and their associated severe weather can occur throughout Wisconsin during any month of the year, but their highest frequency is from May through September. They also occur most often between noon and 10:00 p.m. The peak hour for severe thunderstorms is typically 6 to 7 p.m. Wisconsin averages 30-45 days each year with thunderstorms.

Thunderstorms typically produce high winds. A county-by-county count of severe thunderstorm wind events can be seen in Map 3.3. Within each county are three numbers: the first number is the number of severe thunderstorm wind events in that county, followed by the number of directly-related fatalities and directly-related injuries.

Southern Wisconsin has the greatest number of severe thunderstorm wind events. Larger counties will tend to have a greater number of events due to their size.

Map 3.3



Significant Recent Wisconsin Thunderstorm Events

During the early morning hours of Sunday, May 31, 1998, south-central and southeast Wisconsin experienced a “derecho” (a widespread and long-lived, violent, convectively-induced windstorm that is associated with a fast-moving band of severe thunderstorms). Incredibly powerful, hurricane-force high winds, with peak gusts of 100 to 128 mph tore through 12 counties, while another 8 counties had peak gusts of 30 to 80 mph.

Utility companies and Emergency Managers stated that the May 31st event was the most damaging, widespread, straight-line thunderstorm wind event to affect southern Wisconsin in the past 100 years. Estimated monetary damage for all 20 counties was $55.85 million for residential or mobile homes, businesses, utilities buildings, agriculture buildings, signs, street lights, billboards, campers, and boats. Hundreds of power poles were snapped or pushed over by the winds or falling trees/branches. At one time, approximately 60,000 customers in south-central Wisconsin and 170,000 in southeast Wisconsin were without electricity. Some residences and businesses were without power for as long as five or six days due to the deluge of utility repairs and a shortage of replacement power poles.

On August 13, 2007, a large swath of severe thunderstorm wind damage occurred from just west of New Richmond to the Glenwood City area. This swath of damage occurred within an approximately two to four mile width between these two cities. Some general reports include: 109 homes damaged or severely damaged, 48 barns damaged or severely damaged. Two barns were reported destroyed.. A house was also rendered uninhabitable. The entire village of Hammond and some outlying areas were without power for approximately 12 hours. Damage was over $35 million to properties and $10 million to crops.

3. Tornadoes

Nature of Hazard

A tornado is a violently rotating column of air (vortex) extending from the base of a convective (usually cumulonimbus) cloud to the ground. Most tornadoes in the U.S. are weak (80% of them) and cause little to minor damage. However, the strong and violent tornadoes (the other 20%) can cause extensive, severe damage.

Tornado categories are now measured on an enhanced Fujita scale or EF Scale. The wind speed is determined based on 28 damage indicators such as building type, structures and trees. For each indicator, there are 8 degrees of damage ranging from the beginning of visible damage to complete destruction of the indicator. More detail is available at: www.erh.noaa.gov/rah/news/content/Enhanced.Fujita.Scale.Overview.html.

Table 3.1 below compares the winds in the original F-scale and the operational EF-scale that is currently in use by the NWS.

Table 3.1 Enhance Fujita Tornado Scale		
Category	**F-Scale Wind Speed**	**EF-Scale Wind Speed**
EF0 (weak)	40-72 mph	65-85
EF1 (weak)	73-112 mph	86-110
EF2 (strong)	113-157 mph	111-135
EF3 (strong)	158-206 mph	136-165
EF4 (violent)	207-260 mph	166-200
EF5 (violent)	261-318 mph	>200

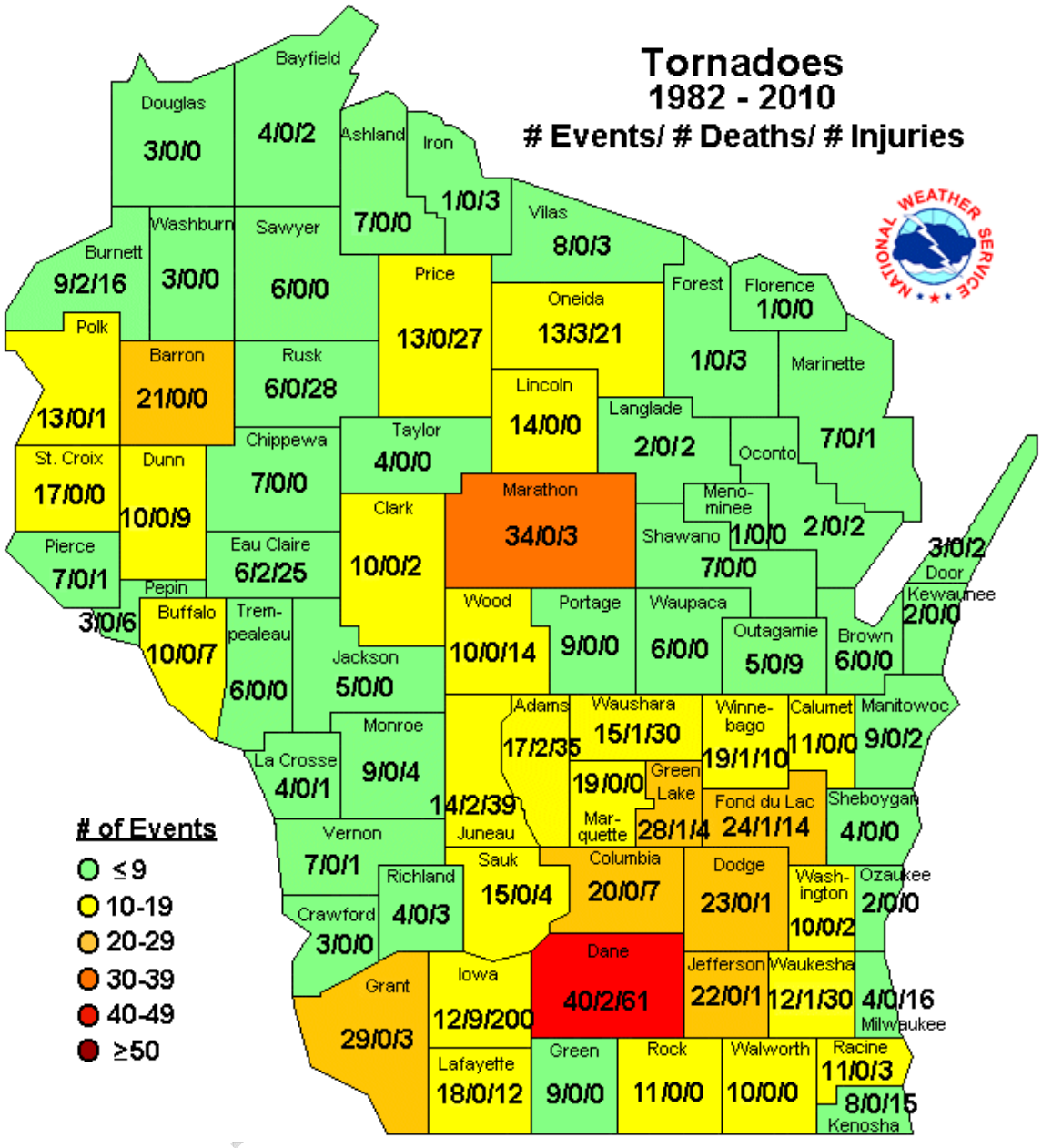
Source: NWS Storm Prediction Center, Norman, OK

Wisconsin lies along the northern edge of the nation's maximum frequency belt for tornadoes, called "tornado alley" by some, which extends northeastward from Oklahoma into Iowa and then across to Illinois and southern Wisconsin. Broadly speaking, the southern portions of Wisconsin have a higher frequency of tornadoes; however, every county in Wisconsin has had tornadoes and is susceptible to a tornado disaster.

History of Tornadoes in REC Counties

Several Rural Electric Co-op (REC) counties have had severe tornadoes. Some of these counties include Barron, Chippewa, Clark, Columbia, Dane, Dodge, Grant, Jefferson, Lafayette, Marathon, Polk, and Sauk. Dane, Dodge, Grant and Marathon Counties have had the most with 63, 56, 56, and 51 respectively. Map 3.4 shows the number of tornado events per REC County from 1982-2010.

Map 3.4



Significant Recent Wisconsin Tornado Events

On Jun 21, 2010, an EF2 tornado developed about 1.9 miles west-southwest of the Village of Eagle and moved east through the southern part of the Village and dissipated about on the northwest side of Mukwanago Park. Fifteen people sustained minor injuries. One hundred thirty-four homes received minor damage, 67 homes had major damage, and 8 homes were destroyed. Another 75 homes were minimally affected. One

business received major damage, while 18 businesses had minor damage Tornado uprooted or damaged thousands of trees, and at least three dozen vehicles were damaged or totaled. At Old World Wisconsin, an outdoor museum operated by the Wisconsin Historical Society near Eagle, about 2500 tress were damaged at this site alone.

4. Lightning

Nature of Hazard

Lightning typically occurs as a by-product of a thunderstorm. The action of rising and descending air in a thunderstorm separates positive and negative charges, with lightning the result of the buildup and discharge of energy between positive and negative charge areas. Water and ice particles may also affect the distribution of the electrical charge. In only a few millionths of a second, the air near a lightning strike is heated to 50,000°F, a temperature hotter than the surface of the sun. Thunder is the result of the very rapid heating and cooling of air near the lightning that causes a shock wave.

The hazard posed by lightning is significantly underrated. Lightning is the most dangerous and frequently encountered weather hazard that most people in the United States experience annually. High winds, rainfall, and a darkening cloud cover are the warning signs for possible cloud-to-ground lightning strikes. While many lightning casualties happen at the beginning of an approaching storm, more than half of lightning deaths occur after a thunderstorm has passed. The lightning threat diminishes after the last sound of thunder, but may persist for more than 30 minutes. When thunderstorms are in the area, but not overhead, the lightning threat can exist when skies are clear. Lightning has been known to strike more than 10 miles from the storm in an area with clear sky above.

According to the National Oceanic and Atmospheric Administration (NOAA), an average of 20 million cloud-to-ground flashes has been detected every year in the continental United States. About half of all flashes have more than one ground strike point, so at least 30 million points on the ground are struck on the average each year. (NOAA, July 7, 2003).

To the general public, lightning is often perceived as a minor hazard. However, lightning-caused damage, injuries and deaths establish lightning as a significant hazard associated with any thunderstorm in any part of the state. Damage from lightning occurs in four ways:

(1) Electrocution/severe shock of humans and animals;
(2) Vaporization of materials along the path of the lightning strike;
(3) Fire caused by the high temperatures associated with lightning (10,000-60,000°F); and

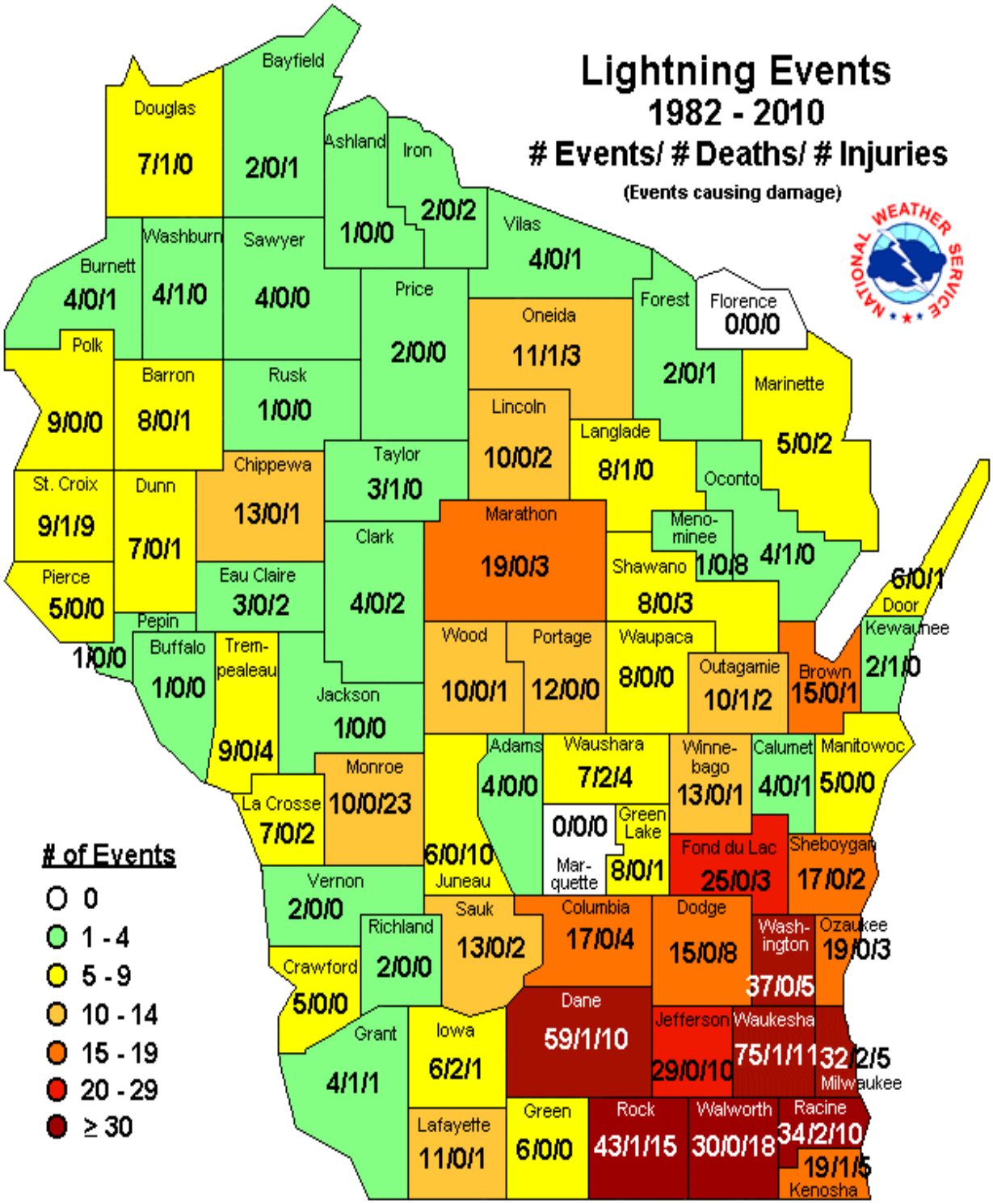
(4) The sudden power surge that can damage electrical/electronic equipment.

Lightning History

Wisconsin has a high frequency of property losses due to lightning. Insurance statistics show that two out of every 100 farms are struck by lightning or have a fire that may have been lightning-caused each year. It is estimated that in northern Wisconsin there are between two and five lightning-caused fires per million acres of forested lands every year.

Map 3.5 shows the county-by-county lightening event count across Wisconsin for the period of 1982-2010. These numbers are undercounts since a number of lightning strikes and resultant fatalities, injuries, or fires are not reported in newspapers. In each county are three numbers: the first number is the number of lightning events that resulted in fires or fatalities or injuries as reported in newspapers or by Emergency Managers. The second number is the number of directly-related fatalities, and the third number is the number of directly-related injuries due to lightning. Larger and more populated counties tend to have more reported lightning events.

Map 3.5


Lightning Events
1982 - 2010
Events/ # Deaths/ # Injuries
(Events causing damage)
NATIONAL WEATHER SERVICE
Douglas 7/1/0
Bayfield 2/0/1
Ashland 1/0/0
Iron 2/0/2
Vilas 4/0/1
Forest 2/0/1
Florence 0/0/0
Marinette 5/0/2
Oconto 4/1/0
Burnett 4/0/1
Washburn 4/1/0
Sawyer 4/0/0
Price 2/0/0
Oneida 11/1/3
Polk 9/0/0
Barron 8/0/1
Rusk 1/0/0
Lincoln 10/0/2
Langlade 8/1/0
St. Croix 9/1/9
Dunn 7/0/1
Chippewa 13/0/1
Taylor 3/1/0
Marathon 19/0/3
Meno-minee 1/0/8
Shawano 8/0/3
Pierce 5/0/0
Pepin 1/0/0
Eau Claire 3/0/2
Clark 4/0/2
Door 6/0/1
Kewaunee 2/1/0
Buffalo 1/0/0
Trem-pealeau 9/0/4
Jackson 1/0/0
Wood 10/0/1
Portage 12/0/0
Waupaca 8/0/0
Outagamie 10/1/2
Brown 15/0/1
La Crosse 7/0/2
Monroe 10/0/23
Juneau 6/0/10
Adams 4/0/0
Waushara 7/2/4
Winne-bago 13/0/1
Calumet 4/0/1
Manitowoc 5/0/0
Marquette 0/0/0
Green Lake 8/0/1
Fond du Lac 25/0/3
Sheboygan 17/0/2
Vernon 2/0/0
Richland 2/0/0
Sauk 13/0/2
Columbia 17/0/4
Dodge 15/0/8
Wash-ington 37/0/5
Ozaukee 19/0/3
Crawford 5/0/0
Grant 4/1/1
Iowa 6/2/1
Dane 59/1/10
Jefferson 29/0/10
Waukesha 75/1/11
Milwaukee 32/2/5
Lafayette 11/0/1
Green 6/0/0
Rock 43/1/15
Walworth 30/0/18
Racine 34/2/10
Kenosha 19/1/5
# of Events
0
1 - 4
5 - 9
10 - 14
15 - 19
20 - 29
≥ 30

5. Hail

Nature of Hazard

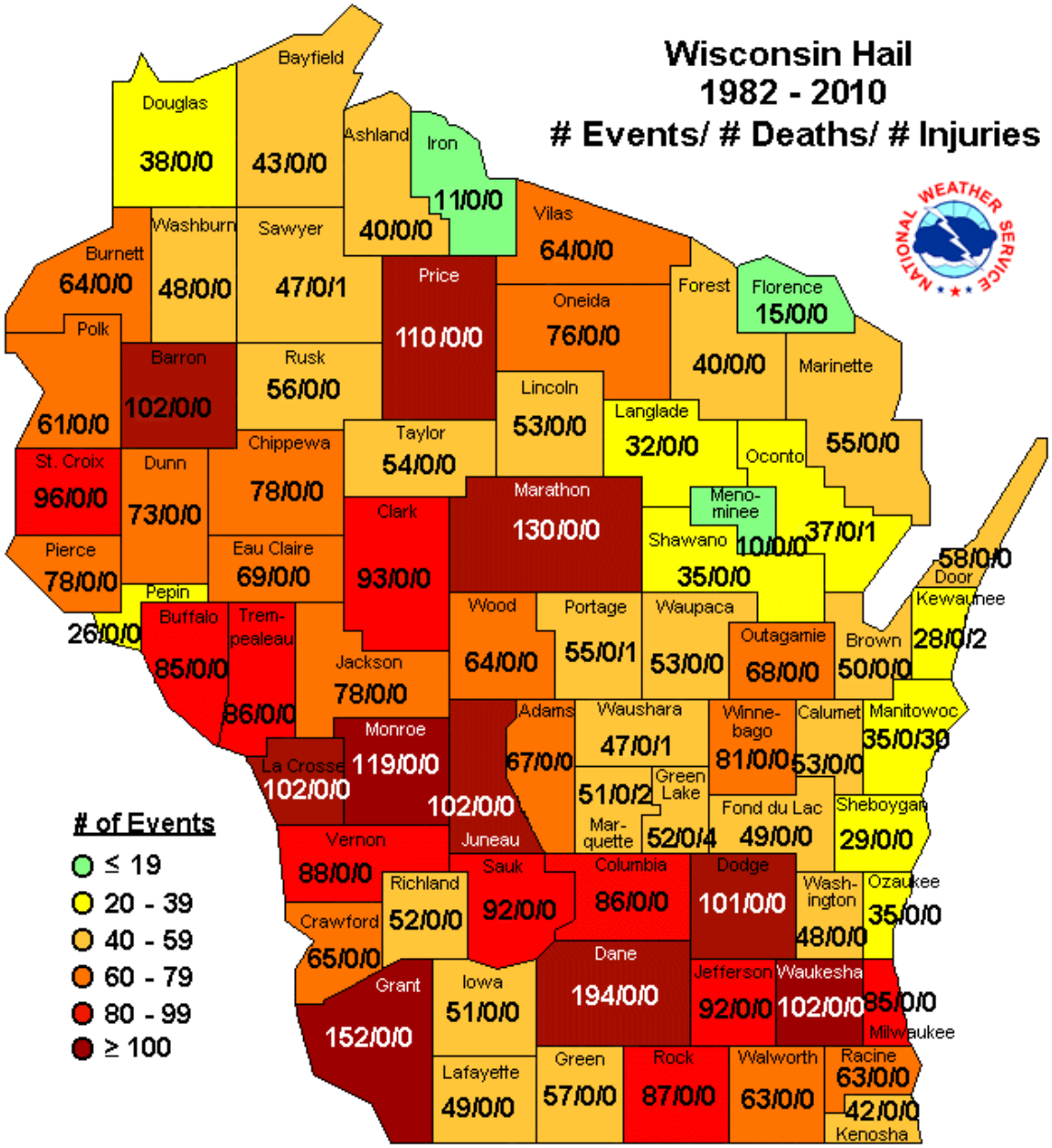
Hail can develop within thunderstorms when strong currents of rising air, known as updrafts, carry water droplets high within the storm. The cold air aloft causes the water droplets to freeze. As the frozen droplet begins to fall toward the ground, rising currents within the storm lifts the ice again. The hailstone gains an ice layer and grows increasingly larger with each ascent. Eventually the hailstone becomes too heavy for the updraft to support, and it falls to the ground.

The size of hailstones varies and is a direct consequence of the severity and size of the thunderstorm. The higher the temperatures and the greater the amount of evaporated moisture in the air at the Earth's surface (i.e., the greater the instability of the atmosphere), the greater the strength of the updrafts. Stronger updrafts can keep hailstones suspended for longer periods of time, resulting in more up and down trips and assuring larger hailstones at ground level. Hailstones vary widely in size from ¼ inch to 4½ inches. Note that penny size hail (0.75 inch in diameter) or larger is considered severe.

Wisconsin experiences about one to three hail days per year across any given area. In general, central and southern Wisconsin have more days with hail, and parts of west-central have more days (2-3) with hail. The months of maximum hailstorm frequency are May through September, with approximately 85% of hailstorms occurring during this period. All counties of the participating REC's are at risk for hail damage.

Map 3.6 shows the number of hailstorm events (hailstone diameter of ¾ inch or larger) that occurred in each Wisconsin county from 1982 to 2007, including the number of deaths and injuries attributed to those large hail events. Fewer number of severe hail events are reported across the far northern and far eastern parts of the state – perhaps related to the fact that the cool lake breezes from Lake Michigan and Lake Superior dampen the energy level of thunderstorms.

Map 3.6



Significant Recent Wisconsin Hail Events

Wisconsin's first-ever $100 million dollar hailstorm took place on May 12, 2000 when a single storm moved across the central part of the state from south of La Crosse through the Lake Winnebago area to Manitowoc and eventually to Lake Michigan. Ten counties were pounded with hailstones one to three inches in diameter during the morning hours. Damage to property and crops was estimated at $122 million.

On April 13, 2006, three hail-producing severe thunderstorms affected southern Wisconsin. Hail, up to 4.25 inches in diameter, fell across a large swath from Mineral Point (Iowa County) to north of Milwaukee. Based on insurance company information, the April 13, 2006, hailstorms resulted in total damage of about $420 million, making it the most costly hailstorm day in Wisconsin weather history.

6. Wildfire

Nature of Hazard

Chapter 26.01(2) of Wisconsin State Statutes define forest fires as any "uncontrolled, wild or running fires burning in forest, marsh, field, cutover, or other lands or involving farm, city, or village property and improvements incidental to the uncontrolled, wild, or running fires occurring on forest, marsh, field, cutover, or other lands." These fires often begin unnoticed, can spread quickly, and are usually signaled by dense smoke that may fill the area for miles around. Wildfires in Wisconsin are primarily human-caused through acts such as burning yard debris, arson, or campfires. They can also be caused by natural events such as lightning.

Every year, more than 2,500 wildfires occur in Wisconsin, causing thousands of dollars of damage to property, and destroying natural resources. Dozens of structures are damaged or destroyed and hundreds more are threatened. It can be surmised that there is a 100% probability that there will be at least one fire in Wisconsin every year.

Most Wisconsin wildfires occur in spring in the months of April and May, although under the right conditions, they can occur at any time of the year. The season length and peak months may vary from year to year. Land use, vegetation, amount of combustible materials present, and weather conditions such as wind, low humidity, and lack of precipitation are the chief factors determining the number of fires and acreage burned. Generally, fires are more likely when vegetation is dry from a winter with little snow and/or a spring and summer with sparse rainfall. Wildfires are capable of causing significant injury, death, and damage to property. A recent inventory showed that 46 percent of the state, 16 million acres is covered with forests. The potential for property damage from fire increases each year as more properties are developed on wooded land and increased numbers of people use these areas.

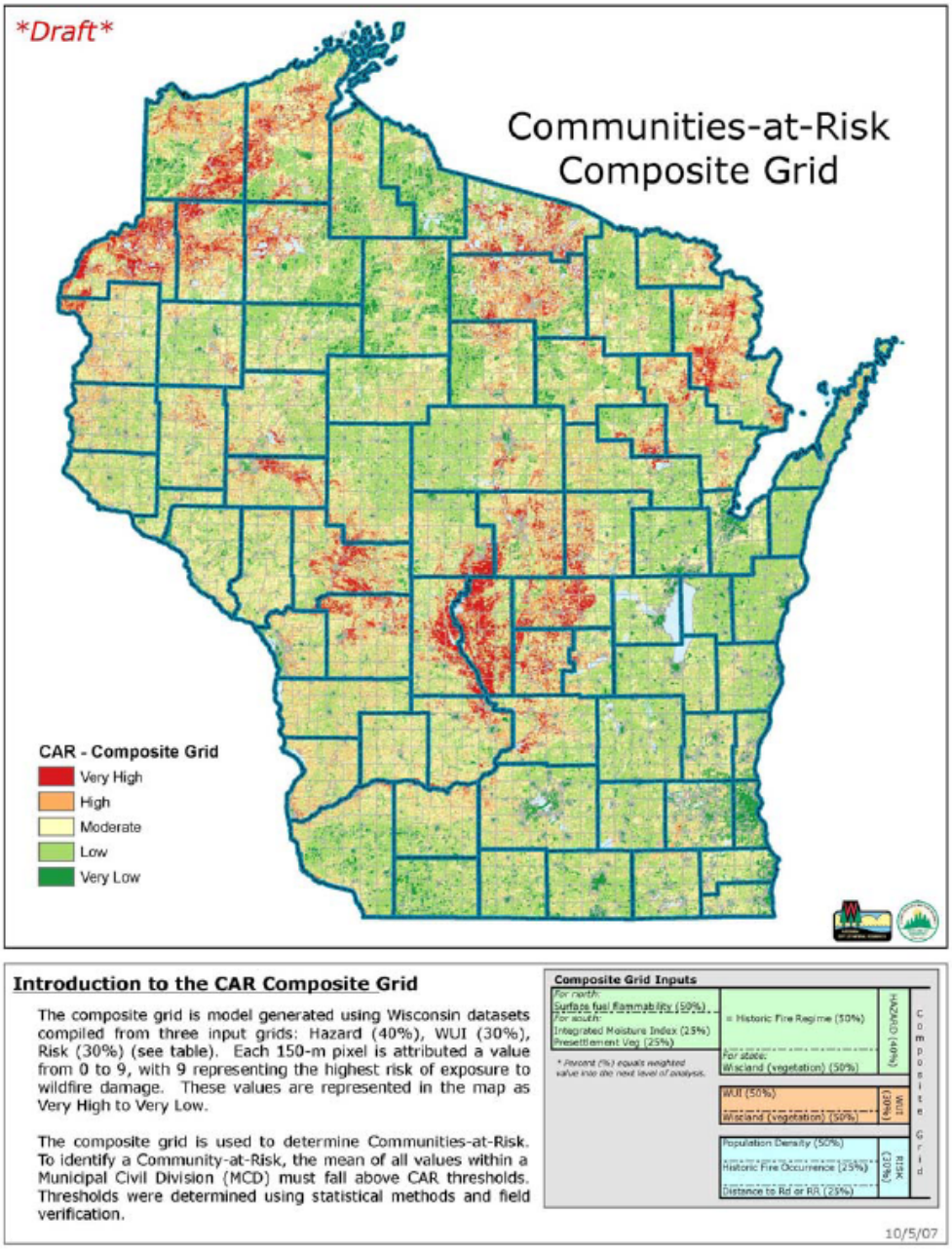
Wisconsin Communities-at-Risk and Communities of Concern

The Wisconsin Department of Natural Resources (WIDNR) in cooperation with its federal and tribal partners has performed a state-wide assessment of wildfire vulnerability. The assessment was based on the National Association of State Foresters' "Field Guidance for Identifying and Prioritizing Communities-at-Risk."

In addition, the WIDNR 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.

Map 3.7 shows the areas of the state that are at risk and of concern for wildfire events.

Map 3.7



Significant Recent Wisconsin Wildfire Events

1977
The entire state suffered two years of severe drought. Nearly 49,000 acres burned in 1977 alone. Over 170 structures were destroyed or damaged. Jackson, Washburn, Douglas and Wood Counties were the worst hit. Notable fires in 1977 were the Saratoga fire in Wisconsin Rapids, 6,159 acres and 90 buildings burned; the Brockway fire in the Black River Falls area, 17,590 acres burned; and the Five-mile fire in Washburn and Douglas counties, 13,375 acres and 83 buildings burned.

1980
Over two days in April, the Ekdall Church fire in Burnett County and the Oak lake fire in Washburn County burned over 16,000 acres and destroyed more than 200 buildings.

2003
The Crystal Lake fire in Marquette and Waushara counties burned 572 acres. Several buildings were destroyed and nearly 200 were threatened.

2005
On May 5th, the Cottonville Fire burned a swath of one and one-half miles wide and seven miles long through the towns of Big Flats, Preston, and Colburn. There were nine year-round residences, 21 seasonal homes, and at least 60 outbuildings destroyed in the 3,410 acres fire.

Chapter 4: Mitigation Goals and Strategies

Mitigation Goals

Please comment on the REC goals. RECs may want to use these however they should be tailored to RECs.

1. Minimize human, economic and environmental disruption and reduce the potential for injury and loss of life from natural hazards.
2. Enhance public education about disaster preparedness and resilience, and expand public awareness of natural hazards.
3. Encourage and promote continued comprehensive hazard mitigation planning and implementation of the plan.
4. Support coordination and collaboration among federal, state, and local authorities, and non-governmental organizations regarding hazard mitigation activities.
5. Improve the disaster resistance of buildings, structures, and infrastructure whether new construction, expansion or renovation.

Mitigation Strategy Prioritization Process

Each cooperative has identified at least one (1) hazard mitigation project that minimizes the economic impact of natural disasters to their infrastructure. Greater emphasis is given to projects:

- with a timeframe of one and a half years or more
- that address previous documented damages
- with a high frequency of natural disaster occurrences
- where a significant number of persons are affected
- that minimize the loss of service to emergency responders
- which significantly minimize the cost of power disruptions and/or the time it takes to restore services.

Before a project is implemented, a cost benefit review will be conducted to ensure that the benefits of a project outweigh the costs.

Mitigation Strategy Action Plan

Please refer to Table 4.1 for mitigation actions.

Table 4.1
Wisconsin Electric Cooperatives All Hazards Mitigation Plan

Hazards of Concern	Mitigation Measures	Estimated Cost in Today's Dollars	Cooperative and County or Counties	Responsible Party for Implementation	Priority Ranking (1-5 or H, M, L)	Projected Timetable
High winds, ice storm, blizzard, tornadoes	Badger West Substation Project--Install a new substation on a separate feed to strengthen system reliability. Circuit serves approximately 4,500 consumers.	$1,000,000	Adams-Columbia Electric Cooperative and Adams County	Adams-Columbia Electric Cooperative		2010
Lighting damage to equipment; loss of transmission infrastructure due to high winds, ice storms or tornadoes	Doylestown & Columbus Tie Project--interconnect two substations by installing 6.32 miles of three phase underground. Strengthen system reliability. Circuits serves 1,400 consumers	$635,000	Adams-Columbia Electric Cooperative and Columbia County	Adams-Columbia Electric Cooperative		2011
High winds, ice storms, blizzard, and tornadoes	Roslin & Lewiston Tie Project--convert 5.28 miles of single phase overhead distribution to three phase underground. Enhancement would provide an underground backup feeder between the substations. Circuits serve 2,350 consumers.	$530,000	Adams-Columbia Electric Cooperative and Columbia County	Adams-Columbia Electric Cooperative		2011
High winds, ice storms, blizzard, and tornadoes	Cambria & Roslin Tie Project--convert 5.28 miles of single phase overhead distribution to three phase underground. Enhancement would provide an underground backup feeder between the substations. Circuits serve 2,440 consumers.	$530,000	Adams-Columbia Electric Cooperative and Columbia County	Adams-Columbia Electric Cooperative		2011
High winds, ice storms, and tornadoes	Wicks Landing Project--bury 8.29 miles of single phase overhead line. Line has a history of wind-related outages and serves approximately 50 consumers.	$378,000	Adams-Columbia Electric Cooperative and Green Lake County	Adams-Columbia Electric Cooperative		2010
High winds, ice storms, and tornadoes	North Shore Drive Project--bury 1.0 miles of single phase overhead line. Line has a history of wind-related outages and serves approximately 50 consumers.	$45,000	Adams-Columbia Electric Cooperative and Marquette County	Adams-Columbia Electric Cooperative		2011
High winds, ice storms, forest fire, lightning, tornado, electrical storm, blizzard	Long Lake Project--bury 3.1 miles of single phase line along west side of lake. History of outages from weather events.	$310,992	Barron Electric Cooperative and Washburn County	Barron Electric Cooperative		2010-2012

High winds, ice storms, forest fire, lightning, tornado, electrical storm, blizzard	Cable Lake Project--bury 3.5 miles of single phase line around the lake. History of outages from weather events.	$351,120	Barron Electric Cooperative and Washburn County	Barron Electric Cooperative		2010-2012
High winds, ice storms, forest fire, tornado	Chequamegon-Nicolet Switch # 20--bury 3 miles of single-phase. History of outages and longer than average response times due to physical location and distance.	$225,000	Clark Electric Cooperative and Taylor County	Clark Electric Cooperative		
High winds, ice storms, forest fire, tornado	Chequamegon-Nicolet Switch # 240 bury 3.2 miles of single-phase. History of outages and longer than average response times due to physical location and distance.	$240,000	Clark Electric Cooperative and Taylor County	Clark Electric Cooperative		
High winds, ice storms, forest fire, tornado	Chequamegon-Nicolet Switch #30 bury 3 miles of single-phase. History of outages and longer than average response times due to physical location and distance.	$225,000	Clark Electric Cooperative and Taylor County	Clark Electric Cooperative		
High winds, ice storms, forest fire, tornado	Chequamegon-Nicolet Switch # 219 bury 2.5 miles of single-phase. History of outages and longer than average response times due to physical location and distance.	$187,500	Clark Electric Cooperative and Taylor County	Clark Electric Cooperative		
High winds, ice storms, forest fire, tornado	Chequamegon-Nicolet Switch # 109 bury 2.5 miles of single-phase. History of outages and longer than average response times due to physical location and distance.	$187,500	Clark Electric Cooperative and Taylor County	Clark Electric Cooperative		
High winds, ice storms, lightning, tornado, blizzard, forest fire	Bardon substation (Phase 4)--bury 2.5 miles of single phase overhead line. History of repeated outages due to weather-releated events.	$105,250	East Central Energy, Douglas County	East Central Energy		2010
High winds, ice storms, lightning, tornado, blizzard, forest fire	Bardon substation (Phase 3)--bury 3 miles of single phase overhead line. History of repeated outages due to weather-releated events.	$126,300	East Central Energy, Douglas County	East Central Energy		2010
High winds, ice storms, and tornadoes	Replace overhead power lines w/ underground, Interstate 94 Location: T27N-R10W-Sec.25; 600 ft. single phase	$12,620	Eau Claire Energy Cooperative, Eau Claire County	Eau Claire Energy Cooperative		2008-2018 (conditional)
High winds, ice storms, and tornadoes	Replace overhead power lines w/ underground, Interstate 94 Location: T26N-R9W-Sec.03; 900 ft. three phase	$55,260	Eau Claire Energy Cooperative, Eau Claire County	Eau Claire Energy Cooperative		2008-2018 (conditional)

High winds, ice storms, and tornadoes	Replace overhead power lines w/ underground, Interstate 94 Location: T26N-R08W-Sec.06; 500 ft. three phase	$34,705	Eau Claire Energy Cooperative, Eau Claire County	Eau Claire Energy Cooperative		2008-2018 (conditional)
High winds, ice storms, and tornadoes	Replace overhead power lines w/ underground, Interstate 94 Location: T26N-R08W-Sec.06; 640 ft. three phase	$39,283	Eau Claire Energy Cooperative, Eau Claire County	Eau Claire Energy Cooperative		2008-2018 (conditional)
High winds, ice storms, and tornadoes	Replace overhead power lines w/ underground, Interstate 94 Location: T26N-R08W-Sec.07; 500 ft. single phase	$11,430	Eau Claire Energy Cooperative, Eau Claire County	Eau Claire Energy Cooperative		2008-2018 (conditional)
High winds, ice storms, and tornadoes	Replace overhead power lines w/ underground, Interstate 94 Location: T26N-R08W-Sec.08; 550 ft.single phase	$12,025	Eau Claire Energy Cooperative, Eau Claire County	Eau Claire Energy Cooperative		2008-2018 (conditional)
High winds, ice storms, and tornadoes	Replace overhead power lines w/ underground, Interstate 94 Location: T26N-R08W-Sec.27; 500 ft. single phase	$11,430	Eau Claire Energy Cooperative, Eau Claire County	Eau Claire Energy Cooperative		2008-2018 (conditional)
High winds, ice storms, and tornadoes	Replace overhead power lines w/ underground, Interstate 94 Location: T25N-R08W-Sec.03; 545 ft. single phase	$11,965	Eau Claire Energy Cooperative, Eau Claire County	Eau Claire Energy Cooperative		2008-2018 (conditional)
High winds, ice storms, and tornadoes	Replace overhead power lines w/ underground, Interstate 94 Location: T25N-R08W-Sec.11; 400 ft. three phase	$32,210	Eau Claire Energy Cooperative, Eau Claire County	Eau Claire Energy Cooperative		2008-2018 (conditional)
High winds, ice storms, and tornadoes	Replace overhead power lines w/ underground, Interstate 94 Location: T25N-R08W-Sec.24; 550 ft. single phase	$12,025	Eau Claire Energy Cooperative, Eau Claire County	Eau Claire Energy Cooperative		2008-2018 (conditional)
High winds, ice storms, and tornadoes	Replace overhead power lines w/ underground, Interstate 94 Location: T27N-R10W-Sec.25; 600 ft. single phase	$12,620	Eau Claire Energy Cooperative, Eau Claire County	Eau Claire Energy Cooperative		2008-2018 (conditional)
High winds, ice storms, and tornadoes	Replace overhead power lines w/ underground, Interstate 94 Location: T25N-R07W-Sec.19; 575 ft. single phase	$12,323	Eau Claire Energy Cooperative, Eau Claire County	Eau Claire Energy Cooperative		2008-2018 (conditional)
High winds, ice storms, and tornadoes	Replace overhead power lines w/ underground, Interstate 94 Location: T25N-R07W-Sec.29; 470 ft. three phase	$33,956	Eau Claire Energy Cooperative, Eau Claire County	Eau Claire Energy Cooperative		2008-2018 (conditional)
High winds, ice storms, and tornadoes	Replace overhead power lines w/ underground, Interstate 94 Location: T24N-R06W-Sec.19; 700 ft.	$13,810	Eau Claire Energy Cooperative, Jackson	Eau Claire Energy Cooperative		2008-2018 (conditional)

	single phase		County			
High winds, ice storms, and tornadoes	Replace overhead power lines w/ underground, Interstate 94 Location: T24N-R06W-Sec.32; 650 ft. single phase	$13,215	Eau Claire Energy Cooperative, Jackson County	Eau Claire Energy Cooperative		2008-2018 (conditional)
High winds, ice storms, and tornadoes	Replace overhead power lines w/ underground, Interstate 94 Location: T24N-R07W-Sec.11; 500 ft. three phase	$40,580	Eau Claire Energy Cooperative, Trempealeau County	Eau Claire Energy Cooperative		2008-2018 (conditional)
Tornadoes, high winds, and ice storms	Replace overhead power lines w/ underground, Interstate 94 Location: 4C05; 1030 ft. single phase	$18,540	Jackson Electric Cooperative and Jackson County	Jackson Electric Cooperative		2008-2018 (conditional)
Tornadoes, high winds, and ice storms	Replace overhead power lines w/ underground, Interstate 94 Location: 4C04; 1090 ft. single phase	$19,620	Jackson Electric Cooperative and Jackson County	Jackson Electric Cooperative		2008-2018 (conditional)
Tornadoes, high winds, and ice storms	Replace overhead power lines w/ underground, Interstate 94 Location: 4C09; 890 ft. single phase	$16,020	Jackson Electric Cooperative and Jackson County	Jackson Electric Cooperative		2008-2018 (conditional)
Tornadoes, high winds, and ice storms	Replace overhead power lines w/ underground, Interstate 94 Location: 4C16; 1060 ft. three phase	$19,080	Jackson Electric Cooperative and Jackson County	Jackson Electric Cooperative		2008-2018 (conditional)
Tornadoes, high winds, and ice storms	Replace overhead power lines w/ underground, Interstate 94 Location: 4C22; 700 ft. single phase	$12,600	Jackson Electric Cooperative and Jackson County	Jackson Electric Cooperative		2008-2018 (conditional)
Tornadoes, high winds, and ice storms	Replace overhead power lines w/ underground, Interstate 94 Location: 5C01; 1300 ft. three phase	$23,400	Jackson Electric Cooperative and Jackson County	Jackson Electric Cooperative		2008-2018 (conditional)
Tornadoes, high winds, and ice storms	Replace overhead power lines w/ underground, Interstate 94 Location: 5C01; 870 ft. single phase	$15,660	Jackson Electric Cooperative and Jackson County	Jackson Electric Cooperative		2008-2018 (conditional)
Tornadoes, high winds, and ice storms	Replace overhead power lines w/ underground, Interstate 94 Location: 5D07/08; 890 ft. single phase	$16,020	Jackson Electric Cooperative and Jackson County	Jackson Electric Cooperative		2008-2018 (conditional)
Tornadoes, high winds, and ice storms	Replace overhead power lines w/ underground, Interstate 94 Location: 5D27; 930 ft. three phase	$16,740	Jackson Electric Cooperative and Jackson County	Jackson Electric Cooperative		2008-2018 (conditional)
Tornadoes, high winds, and ice storms	Replace overhead power lines w/ underground, Interstate 94 Location: 5F27; 1000 ft. three phase	$18,000	Jackson Electric Cooperative and Jackson County	Jackson Electric Cooperative		2008-2018 (conditional)

Tornadoes, high winds, and ice storms	Replace overhead power lines w/ underground, Interstate 94 Location: 6E09; 860 ft. single phase	$15,480	Jackson Electric Cooperative and Jackson County	Jackson Electric Cooperative		2008-2018 (conditional)
Tornadoes, high winds, and ice storms	Replace overhead power lines w/ underground, Interstate 94 Location: 6E24; 1200 ft. three phase	$21,600	Jackson Electric Cooperative and Jackson County	Jackson Electric Cooperative		2008-2018 (conditional)
Tornadoes, high winds, and ice storms	Replace overhead power lines w/ underground, Interstate 94 Location: 7F02/03; 1100 ft. single phase	$19,800	Jackson Electric Cooperative and Jackson County	Jackson Electric Cooperative		2008-2018 (conditional)
Tornadoes, high winds, and ice storms	Replace overhead power lines w/ underground, Interstate 94 Location: 7G20; 900 ft. two phase	$16,200	Jackson Electric Cooperative and Jackson County	Jackson Electric Cooperative		2008-2018 (conditional)
Tornadoes, high winds, and ice storms	Replace overhead power lines w/ underground, Interstate 94 Location: 7G28; 1050 ft. single phase	$18,900	Jackson Electric Cooperative and Jackson County	Jackson Electric Cooperative		2008-2018 (conditional)
High winds, ice storms, tornadoes, forest fire	Barns Line Project--bury 2.22 miles of single phase overhead line. This line traverses terrian that is very difficult to access resulting in prolong response times.	$94,000	Jump River Electric Cooperative and Rusk County	Jump River Electric Cooperative		2011-2014
Cold wave, blizzard and forest fire	Moreland & Comstock Road Line Project--upgrade 0.64 miles of existing underground line that serves 50 customers. This line is suceptable to cold weather influences (heaves) and due to it location is very difficult to access.	$45,000	Jump River Electric Cooperative and Sawyer County	Jump River Electric Cooperative		2011-2014
High winds, ice storms, tornadoes, forest fire	Westboro Line Project (County Road O)--bury 1.15 miles of single phase overhead line. This line is located in portions of the Chequamegon National Forest and is in terrian that is very difficult to reach.	$50,000	Jump River Electric Cooperative and Taylor County	Jump River Electric Cooperative		2011--2013
High winds, ice storms, lightning, tornado, blizzard, forest fire	Elm Creek Project--bury 1.9 miles of single phase. Much of the line is inaccessible by trucks; improve restoration of service time	$95,390	Pierce Pepin Cooperative Services and Pepin County	Pierce Pepin Cooperative Services		2009-2010
High winds, ice storms, lightning, tornado, blizzard, forest fire	Highway 35 project--bury 4 miles of three phase line serving as backfeed tie for Lund Substation. Remote, nearly inaccesible segment of line serving 36 residences	$387,796	Pierce Pepin Cooperative Services and Pepin County	Pierce Pepin Cooperative Services		2009-2010
High winds, ice storm, forest fire and tornadoes	Upper Byrds Creek Project (from County Road X)--bury 5.22 miles of single phase line. Line is an important tie for substation and has documented outages due to high winds	$208,800	Richland Electric Cooperative and Richland County	Richland Electric Cooperative		2010-2012

High winds, ice storm, lightning and tornadoes	Middle Byrds Creek Project (beginning at 2753)--bury 1.88 miles of single phase overhead line. Line serves 100 consumers and has a history high wind related outages.	$75,200	Richland Electric Cooperative and Richland County	Richland Electric Cooperative		2010-2012
High winds, ice storm, forest fire, lightning, torrential rains, and tornadoes	Eagle Cave Line Project--bury 4.23 miles of single phase overhead line that traverses a dense forest area. Line serves a campground, a tourist attraction, and others. Power in this area is espically important for notifying public of impending storms. Line has a history of outages.	$169,200	Richland Electric Cooperative and Richland County	Richland Electric Cooperative		2010-2012
High winds, ice storm, lightning, flooding and tornadoes	Dog Hollow and Upper Willow Watershed Line Project--bury 3.63 miles of single phase overhead line. History of outages related to high winds.	$145,200	Richland Electric Cooperative and Richland County	Richland Electric Cooperative		2010-2012
High winds, ice storm, forest fire and tornadoes	Gault Hollow Line Project--bury 3.2 miles of single phase overhead line. Line provides an alternate system tie in the event other sections of the system are damaged. History of outages related to high winds.	$128,000	Richland Electric Cooperative and Richland County	Richland Electric Cooperative		2010-2012
High winds, ice storms, and forest fire	Sand Branch Road-Muscoda Project (G01-012)--construct 4.85 miles of new overhead line along an improved roadway to replace existing line. Existing line is inaccessible with mechanical equipment and has a history of outages related to weather events.	$140,844	Scenic Rivers Energy Cooperative and Grant County	Scenic Rivers Energy Cooperative		2013
High winds, ice storms, flooding, and forest fire	Rockville Road--Harrison Township (G16-030)--bury 4.6 miles of single phase overhead line. Line is inaccessible with mechanical equipment and has had a history of outages.	$133,584	Scenic Rivers Energy Cooperative and Grant County	Scenic Rivers Energy Cooperative		2013
High winds, ice storms, flooding, and forest fire	Wyalusing Area-Wyalusing Township Project (G53 and 54)--bury 6.62 miles of the C-phase and 2.32 miles of the A-phase. Lines are inaccessible with mechanical equipment and has had a history of outages.	$259,622	Scenic Rivers Energy Cooperative and Grant County	Scenic Rivers Energy Cooperative		2013

Chapter 5: Mitigation Annex Maintenance, Monitoring and Approval

Mitigation Annex Maintenance

After each disaster, the annex (in coordination with the State of Wisconsin Hazard Mitigation Plan) will be reviewed. In addition, an update of the annex will coincide with the three-year plan update of the State of Wisconsin Hazard Mitigation Plan.

In the next annex update, additional Rural Electric Cooperatives may elect to participate. New Rural Electric Cooperatives will be required to complete a risk assessment and participate in the plan update process. Continuing Rural Electric Cooperatives will be required to reassess the risk assessment, review identified mitigation strategies for progress, and participate in the overall planning process.

Mitigation Annex Monitoring

With the help of the Cooperative Network, the plan will be monitored by the Hazard Mitigation staff of Wisconsin Emergency Management. While Wisconsin Emergency Management will be the lead in monitoring this plan on a three-year cycle, it is of utmost importance that Rural Electric Cooperatives and the Cooperative Network provide progress reports of complete mitigation strategies.

Mitigation Annex Incorporation into Other Planning Mechanisms

It is the goal of Wisconsin Emergency Management that this annex be incorporated into the existing local (county and single jurisdiction) hazard mitigation plans. This annex serves as a link between local hazard mitigation planning and the State of Wisconsin Hazard Mitigation Plan.

It is the hope of Wisconsin Emergency Management that local (county and single jurisdiction) plans take information directly from this plan and incorporate it into its own plan.

Mitigation Annex Future Public Participation

In future updates of the State of Wisconsin Hazard Mitigation Plan and Rural Electric Cooperative Annex, there will be several opportunities for public to comment. Similar to the initial development, citizens will be able to attend public meetings and comment on the plan (posted to WEM's website.)

Appendix 1:
Copies of Memorandum of Understanding between Rural Electric Cooperatives and Wisconsin Emergency Management

(forthcoming)

Appendix 2:
Rural Electric Cooperatives Threat Analyses

2.1 WORKSHEET—THREAT ANALYSIS—NATURAL THREATS

Version #:_____

Completed by: Brenda Schwertsig--Adams Columbia Title: IT Coordinator Date: 10/21/08

Approved by:_____ Title:_____ Date:_____

CLICK POST-IT FOR ALLOWABLE RANGES	Probability	Speed of Onset	Forewarning	Duration	Economic Impact	Level of Concern	Relative Risk
Avalanche: Rock	0.00					1.00	0.00
Avalanche: Snow	0.00					1.00	0.00
Blizzard	4.00	2.00	1.00	2.00	2.00	3.00	13.33
Cold Wave	4.00	2.00	1.00	2.00	1.00	5.00	4.00
Crop Failure	0.00					1.00	0.00
Drought	0.00					1.00	0.00
Earthquake (Magnitude 5 or more)	0.00					1.00	0.00
Electrical Storm/Lightning: Fire	5.00	2.00	1.00	1.00	3.00	5.00	12.00
Flood: Dam Burst	2.00	2.00	2.00	1.00	2.00	5.00	4.00
Flood: Flash	1.00	2.00	1.00	1.00	2.00	5.00	1.60
Flood: Predictable/Seasonal	1.00	1.00	1.00	2.00	2.00	5.00	1.60
Flood: Sea and Lake Surges	0.00					1.00	0.00
Flood: Tsunami (Tidal Wave)	0.00					1.00	0.00
Fog	4.00	2.00	1.00	1.00	1.00	5.00	3.20
Forest Fire/Smoke	3.00	2.00	2.00	1.00	2.00	5.00	6.00
Frost	3.00	1.00	1.00	2.00	1.00	4.00	3.00
Hail	2.00	2.00	1.00	1.00	1.00	4.00	2.00
Heat Wave	3.00	1.00	1.00	2.00	5.00	3.00	20.00
High Winds (70+ mph)	4.00	2.00	1.00	1.00	5.00	3.00	26.67
Hurricane/Typhoon	0.00					1.00	0.00
Ice Storm	4.00	2.00	1.00	2.00	5.00	2.00	50.00
Land Subsidence/Liquefaction	1.00	1.00	1.00	2.00	2.00	5.00	1.60
Landslide/Mudslide	1.00	2.00	2.00	1.00	1.00	5.00	1.00
Lightning: Electrical Disruption	4.00	2.00	2.00	1.00	2.00	2.00	20.00
Magnetic Storms (Sun Spots)	1.00	1.00	2.00	2.00	1.00	5.00	1.00
Sandstorm	1.00	1.00	1.00	1.00	1.00	5.00	0.60
Tornado	5.00	2.00	2.00	1.00	5.00	3.00	41.67
Torrential Rains	3.00	2.00	1.00	2.00	3.00	4.00	11.25
Volcanic Activity	0.00					1.00	0.00
1	0.00					1.00	0.00
2	0.00					1.00	0.00
3	0.00					1.00	0.00

2.1 WORKSHEET—THREAT ANALYSIS—NATURAL THREATS

Version #:_____

Completed by: Susan Dau--Barron Electric Title: General Manager / Staff Assistant Date: 10/24/08

Approved by:_____ Title:_____ Date:_____

CLICK POST-IT FOR ALLOWABLE RANGES	Probability	Speed of Onset	Forewarning	Duration	Economic Impact	Level of Concern	Relative Risk
Avalanche: Rock	0.00					1.00	0.00
Avalanche: Snow	0.00					1.00	0.00
Blizzard	4.00	2.00	1.00	2.00	2.00	1.00	40.00
Cold Wave	5.00	1.00	1.00	2.00	2.00	5.00	8.00
Crop Failure	0.00					1.00	0.00
Drought	0.00					1.00	0.00
Earthquake (Magnitude 5 or more)	1.00	2.00	2.00	1.00	5.00	1.00	25.00
Electrical Storm/Lightning: Fire	5.00	2.00	2.00	2.00	3.00	2.00	45.00
Flood: Dam Burst	0.00					1.00	0.00
Flood: Flash	2.00	2.00	2.00	2.00	2.00	1.00	24.00
Flood: Predictable/Seasonal	0.00					1.00	0.00
Flood: Sea and Lake Surges	0.00					1.00	0.00
Flood: Tsunami (Tidal Wave)	0.00					1.00	0.00
Fog	5.00	2.00	2.00	2.00	1.00	5.00	6.00
Forest Fire/Smoke	5.00	2.00	2.00	2.00	3.00	2.00	45.00
Frost	5.00	1.00	1.00	2.00	1.00	5.00	4.00
Hail	5.00	2.00	2.00	1.00	1.00	5.00	5.00
Heat Wave	4.00	1.00	1.00	2.00	1.00	5.00	3.20
High Winds (70+ mph)	4.00	2.00	2.00	2.00	5.00	1.00	120.00
Hurricane/Typhoon	0.00					1.00	0.00
Ice Storm	4.00	2.00	2.00	2.00	5.00	1.00	120.00
Land Subsidence/Liquefaction	0.00					1.00	0.00
Landslide/Mudslide	0.00					1.00	0.00
Lightning: Electrical Disruption	5.00	2.00	2.00	2.00	3.00	4.00	22.50
Magnetic Storms (Sun Spots)	1.00	1.00	1.00	2.00	1.00	5.00	0.80
Sandstorm	0.00					1.00	0.00
Tornado	5.00	2.00	2.00	1.00	4.00	1.00	100.00
Torrential Rains	3.00	2.00	2.00	2.00	1.00	4.00	4.50
Volcanic Activity	0.00					1.00	0.00
1						1.00	0.00
2						1.00	0.00
3						1.00	0.00

2.1 WORKSHEET—THREAT ANALYSIS—NATURAL THREATS

Version #: 1

Completed by: Stacy Pethke--Central WI Electric Title: Accountant Date: 7/30/08

Approved by: Kevin Kurtzwell Title: Operations Supervisor Date: 7/30/08

CLICK POST-IT FOR ALLOWABLE RANGES	Probability	Speed of Onset	Forewarning	Duration	Economic Impact	Level of Concern	Relative Risk
Avalanche: Rock	0.00					1.00	0.00
Avalanche: Snow	0.00					1.00	0.00
Blizzard	3.00	1.00	1.00	2.00	2.00	3.00	8.00
Cold Wave	2.00	1.00	1.00	2.00	1.00	4.00	2.00
Crop Failure	3.00	1.00	2.00	1.00	1.00	4.00	3.00
Drought	3.00	1.00	1.00	2.00	1.00	4.00	3.00
Earthquake (Magnitude 5 or more)	1.00	2.00	2.00	1.00	5.00	5.00	5.00
Electrical Storm/Lightning: Fire	4.00	2.00	2.00	1.00	2.00	3.00	13.33
Flood: Dam Burst	1.00	2.00	2.00	1.00	2.00	5.00	2.00
Flood: Flash	2.00	2.00	1.00	2.00	3.00	4.00	7.50
Flood: Predictable/Seasonal	0.00					1.00	0.00
Flood: Sea and Lake Surges	0.00					1.00	0.00
Flood: Tsunami (Tidal Wave)	0.00					1.00	0.00
Fog	4.00	2.00	1.00	2.00	1.00	5.00	4.00
Forest Fire/Smoke	2.00	2.00	2.00	1.00	2.00	4.00	5.00
Frost	5.00	2.00	1.00	2.00	1.00	5.00	5.00
Hail	4.00	2.00	1.00	2.00	2.00	3.00	13.33
Heat Wave	5.00	1.00	1.00	2.00	1.00	5.00	4.00
High Winds (70+ mph)	4.00	2.00	1.00	2.00	2.00	4.00	10.00
Hurricane/Typhoon	0.00					1.00	0.00
Ice Storm	4.00	2.00	1.00	2.00	2.00	3.00	13.33
Land Subsidence/Liquefaction	0.00					1.00	0.00
Landslide/Mudslide	0.00					1.00	0.00
Lightning: Electrical Disruption	3.00	2.00	2.00	1.00	1.00	3.00	5.00
Magnetic Storms (Sun Spots)	0.00					1.00	0.00
Sandstorm	0.00					1.00	0.00
Tornado	3.00	2.00	1.00	2.00	5.00	3.00	25.00
Torrential Rains	1.00	2.00	1.00	2.00	1.00	5.00	1.00
Volcanic Activity	0.00					1.00	0.00
1						1.00	0.00
2						1.00	0.00
3						1.00	0.00

2.1 WORKSHEET—THREAT ANALYSIS—NATURAL THREATS

Version #: 2008

Completed by: Jan Lahtonen--East Central Energy Title: Loss Control & Emergency Date: 11/6/08

Approved by: _____ Title: _____ Date: _____

CLICK POST-IT FOR ALLOWABLE RANGES	Probability	Speed of Onset	Forewarning	Duration	Economic Impact	Level of Concern	Relative Risk
Avalanche: Rock	1.00	2.00	2.00	1.00	1.00	5.00	1.00
Avalanche: Snow	1.00	2.00	1.00	1.00	1.00	4.00	1.00
Blizzard	4.00	1.00	1.00	2.00	2.00	2.00	16.00
Cold Wave	4.00	1.00	1.00	2.00	1.00	4.00	4.00
Crop Failure	0.00					5.00	0.00
Drought	2.00	1.00	1.00	2.00	1.00	4.00	2.00
Earthquake (Magnitude 5 or more)	0.00					1.00	0.00
Electrical Storm/Lightning: Fire	5.00	2.00	1.00	2.00	1.00	2.00	12.50
Flood: Dam Burst	1.00	2.00	2.00	1.00	1.00	5.00	1.00
Flood: Flash	1.00	2.00	2.00	1.00	1.00	5.00	1.00
Flood: Predictable/Seasonal	1.00	1.00	1.00	2.00	1.00	4.00	1.00
Flood: Sea and Lake Surges	0.00					5.00	0.00
Flood: Tsunami (Tidal Wave)	0.00					5.00	0.00
Fog	3.00	1.00	1.00	2.00	1.00	5.00	2.40
Forest Fire/Smoke	2.00	2.00	2.00	2.00	1.00	4.00	3.00
Frost	5.00	1.00	1.00	2.00	1.00	4.00	5.00
Hail	5.00	2.00	1.00	2.00	1.00	2.00	12.50
Heat Wave	4.00	1.00	1.00	2.00	1.00	4.00	4.00
High Winds (70+ mph)	4.00	2.00	1.00	1.00	2.00	2.00	16.00
Hurricane/Typhoon	0.00					5.00	0.00
Ice Storm	4.00	1.00	1.00	1.00	2.00	2.00	12.00
Land Subsidence/Liquefaction	0.00					5.00	0.00
Landslide/Mudslide	1.00	2.00	2.00	1.00	1.00	5.00	1.00
Lightning: Electrical Disruption	5.00	2.00	1.00	1.00	1.00	3.00	6.67
Magnetic Storms (Sun Spots)	1.00	1.00	1.00	2.00	1.00	5.00	0.80
Sandstorm	0.00					5.00	0.00
Tornado	2.00	2.00	1.00	1.00	1.00	3.00	2.67
Torrential Rains	3.00	2.00	1.00	2.00	1.00	4.00	3.75
Volcanic Activity	0.00					5.00	0.00
1						1.00	0.00
2						1.00	0.00
3						1.00	0.00

2.1 WORKSHEET—THREAT ANALYSIS—NATURAL THREATS

Version #: 1

Completed by: Richard Kelly--Eau Claire Energy Title: Manager Safety and Loss Control Date: 4/26/05

Approved by: _____ Title: _____ Date: _____

CLICK POST-IT FOR ALLOWABLE RANGES	Probability	Speed of Onset	Forewarning	Duration	Economic Impact	Level of Concern	Relative Risk
Avalanche: Rock	0.00					1.00	0.00
Avalanche: Snow	0.00					1.00	0.00
Blizzard	1.00	2.00	1.00	2.00	2.00	4.00	2.50
Cold Wave	3.00	2.00	1.00	2.00	1.00	5.00	3.00
Crop Failure	2.00	1.00	1.00	2.00	1.00	5.00	1.60
Drought	2.00	1.00	1.00	2.00	1.00	5.00	1.60
Earthquake (Magnitude 5 or more)	0.00					1.00	0.00
Electrical Storm/Lightning: Fire	2.00	2.00	2.00	2.00	4.00	3.00	16.00
Flood: Dam Burst	2.00	1.00	1.00	2.00	3.00	4.00	6.00
Flood: Flash	1.00	2.00	1.00	2.00	3.00	4.00	3.75
Flood: Predictable/Seasonal	2.00	1.00	1.00	2.00	1.00	5.00	1.60
Flood: Sea and Lake Surges	0.00					1.00	0.00
Flood: Tsunami (Tidal Wave)	0.00					1.00	0.00
Fog	2.00	2.00	1.00	2.00	2.00	4.00	5.00
Forest Fire/Smoke	2.00	2.00	2.00	2.00	3.00	5.00	7.20
Frost	2.00	1.00	1.00	2.00	1.00	5.00	1.60
Hail	2.00	2.00	1.00	1.00	1.00	4.00	2.00
Heat Wave	2.00	1.00	1.00	2.00	2.00	4.00	4.00
High Winds (70+ mph)	2.00	2.00	2.00	1.00	4.00	3.00	13.33
Hurricane/Typhoon	0.00					1.00	0.00
Ice Storm	2.00	1.00	1.00	2.00	5.00	3.00	13.33
Land Subsidence/Liquefaction	0.00					1.00	0.00
Landslide/Mudslide	0.00					1.00	0.00
Lightning: Electrical Disruption	2.00	2.00	2.00	1.00	2.00	3.00	6.67
Magnetic Storms (Sun Spots)	1.00	1.00	1.00	2.00	1.00	3.00	1.33
Sandstorm	0.00					1.00	0.00
Tornado	2.00	2.00	1.00	1.00	3.00	3.00	8.00
Torrential Rains	1.00	2.00	1.00	2.00	2.00	3.00	3.33
Volcanic Activity	0.00					1.00	0.00
1						1.00	0.00
2						1.00	0.00
3						1.00	0.00

2.1 WORKSHEET—THREAT ANALYSIS—NATURAL THREATS

Version #: 1

Completed by: Richard Kelly--Jackson Electric Title: Manager Safety and Loss Control Date: 4/26/05

Approved by: _____ Title: _____ Date: _____

CLICK POST-IT FOR ALLOWABLE RANGES	Probability	Speed of Onset	Forewarning	Duration	Economic Impact	Level of Concern	Relative Risk
Avalanche: Rock	0.00					1.00	0.00
Avalanche: Snow	0.00					1.00	0.00
Blizzard	1.00	2.00	1.00	2.00	2.00	4.00	2.50
Cold Wave	3.00	2.00	1.00	2.00	1.00	5.00	3.00
Crop Failure	2.00	1.00	1.00	2.00	1.00	5.00	1.60
Drought	2.00	1.00	1.00	2.00	1.00	5.00	1.60
Earthquake (Magnitude 5 or more)	0.00					1.00	0.00
Electrical Storm/Lightning: Fire	2.00	2.00	2.00	2.00	4.00	3.00	16.00
Flood: Dam Burst	2.00	1.00	1.00	2.00	3.00	4.00	6.00
Flood: Flash	1.00	2.00	1.00	2.00	3.00	4.00	3.75
Flood: Predictable/Seasonal	2.00	1.00	1.00	2.00	1.00	5.00	1.60
Flood: Sea and Lake Surges	0.00					1.00	0.00
Flood: Tsunami (Tidal Wave)	0.00					1.00	0.00
Fog	2.00	2.00	1.00	2.00	2.00	4.00	5.00
Forest Fire/Smoke	2.00	2.00	2.00	2.00	3.00	5.00	7.20
Frost	2.00	1.00	1.00	2.00	1.00	5.00	1.60
Hail	2.00	2.00	1.00	1.00	1.00	4.00	2.00
Heat Wave	2.00	1.00	1.00	2.00	2.00	4.00	4.00
High Winds (70+ mph)	2.00	2.00	2.00	1.00	4.00	3.00	13.33
Hurricane/Typhoon	0.00					1.00	0.00
Ice Storm	2.00	1.00	1.00	2.00	5.00	3.00	13.33
Land Subsidence/Liquefaction	0.00					1.00	0.00
Landslide/Mudslide	0.00					1.00	0.00
Lightning: Electrical Disruption	2.00	2.00	2.00	1.00	2.00	3.00	6.67
Magnetic Storms (Sun Spots)	1.00	1.00	1.00	2.00	1.00	3.00	1.33
Sandstorm	0.00					1.00	0.00
Tornado	2.00	2.00	1.00	1.00	3.00	3.00	8.00
Torrential Rains	1.00	2.00	1.00	2.00	2.00	3.00	3.33
Volcanic Activity	0.00					1.00	0.00
1						1.00	0.00
2						1.00	0.00
3						1.00	0.00

2.1 WORKSHEET—THREAT ANALYSIS—NATURAL THREATS

Version #: 1

Completed by: Lori Larsen--Jump River Electric Title: General Manager Date: 10/31/08

Approved by: _____ Title: _____ Date: _____

CLICK POST-IT FOR ALLOWABLE RANGES	Probability	Speed of Onset	Forewarning	Duration	Economic Impact	Level of Concern	Relative Risk
Avalanche: Rock	0.00					1.00	0.00
Avalanche: Snow	0.00					1.00	0.00
Blizzard	5.00	1.00	1.00	2.00	3.00	4.00	15.00
Cold Wave	5.00	1.00	1.00	2.00	2.00	4.00	10.00
Crop Failure	3.00	1.00	1.00	2.00	1.00	5.00	2.40
Drought	3.00	1.00	1.00	2.00	1.00	5.00	2.40
Earthquake (Magnitude 5 or more)	0.00					1.00	0.00
Electrical Storm/Lightning: Fire	5.00	2.00	2.00	2.00	3.00	3.00	30.00
Flood: Dam Burst	1.00	2.00	2.00	2.00	5.00	3.00	10.00
Flood: Flash	3.00	2.00	2.00	2.00	2.00	4.00	9.00
Flood: Predictable/Seasonal	2.00	1.00	1.00	2.00	1.00	5.00	1.60
Flood: Sea and Lake Surges	0.00					1.00	0.00
Flood: Tsunami (Tidal Wave)	0.00					1.00	0.00
Fog	4.00	2.00	2.00	2.00	1.00	5.00	4.80
Forest Fire/Smoke	4.00	2.00	2.00	2.00	3.00	3.00	24.00
Frost	5.00	1.00	1.00	2.00	1.00	5.00	4.00
Hail	4.00	2.00	2.00	1.00	2.00	4.00	10.00
Heat Wave	4.00	1.00	1.00	2.00	2.00	5.00	6.40
High Winds (70+ mph)	5.00	2.00	2.00	2.00	5.00	4.00	37.50
Hurricane/Typhoon	0.00					1.00	0.00
Ice Storm	5.00	2.00	1.00	2.00	5.00	4.00	31.25
Land Subsidence/Liquefaction	0.00					1.00	0.00
Landslide/Mudslide	0.00					1.00	0.00
Lightning: Electrical Disruption	5.00	2.00	2.00	2.00	3.00	4.00	22.50
Magnetic Storms (Sun Spots)	0.00					1.00	0.00
Sandstorm	0.00					1.00	0.00
Tornado	4.00	2.00	2.00	1.00	5.00	3.00	33.33
Torrential Rains	4.00	2.00	2.00	2.00	4.00	4.00	24.00
Volcanic Activity	0.00					1.00	0.00
1						1.00	0.00
2						1.00	0.00
3						1.00	0.00

2.1 WORKSHEET—THREAT ANALYSIS—NATURAL THREATS

Version #: 1.0

Completed by: Jeff Olson--Pierce Pepin Co-op Title: Vice President, Engineering & IT Date: 10/9/08

Approved by: _____ Title: _____ Date: _____

CLICK POST-IT FOR ALLOWABLE RANGES	Probability	Speed of Onset	Forewarning	Duration	Economic Impact	Level of Concern	Relative Risk
Avalanche: Rock	0.00					1.00	0.00
Avalanche: Snow	0.00					1.00	0.00
Blizzard	3.00	1.00	1.00	2.00	2.00	4.00	6.00
Cold Wave	4.00	1.00	1.00	2.00	3.00	2.00	24.00
Crop Failure	1.00	1.00	1.00	2.00	2.00	4.00	2.00
Drought	1.00	1.00	1.00	2.00	3.00	5.00	2.40
Earthquake (Magnitude 5 or more)	0.00	2.00	2.00	1.00	5.00	1.00	0.00
Electrical Storm/Lightning: Fire	3.00	2.00	1.00	2.00	2.00	4.00	7.50
Flood: Dam Burst	1.00	2.00	1.00	2.00	3.00	4.00	3.75
Flood: Flash	2.00	2.00	1.00	2.00	3.00	2.00	15.00
Flood: Predictable/Seasonal	2.00	1.00	1.00	2.00	3.00	3.00	8.00
Flood: Sea and Lake Surges	0.00					1.00	0.00
Flood: Tsunami (Tidal Wave)	0.00					1.00	0.00
Fog	2.00	2.00	1.00	2.00	2.00	4.00	5.00
Forest Fire/Smoke	1.00	2.00	2.00	2.00	1.00	5.00	1.20
Frost	3.00	2.00	1.00	2.00	2.00	4.00	7.50
Hail	4.00	2.00	1.00	1.00	2.00	3.00	10.67
Heat Wave	4.00	1.00	1.00	2.00	3.00	2.00	24.00
High Winds (70+ mph)	5.00	2.00	1.00	1.00	5.00	3.00	33.33
Hurricane/Typhoon	0.00					1.00	0.00
Ice Storm	3.00	2.00	1.00	2.00	4.00	2.00	30.00
Land Subsidence/Liquefaction	0.00					1.00	0.00
Landslide/Mudslide	0.00					1.00	0.00
Lightning: Electrical Disruption	4.00	2.00	1.00	1.00	3.00	3.00	16.00
Magnetic Storms (Sun Spots)	0.00					1.00	0.00
Sandstorm	0.00					1.00	0.00
Tornado	2.00	2.00	1.00	1.00	5.00	4.00	10.00
Torrential Rains	0.00					1.00	0.00
Volcanic Activity	0.00					1.00	0.00
1						1.00	0.00
2						1.00	0.00
3						1.00	0.00

2.1 WORKSHEET—THREAT ANALYSIS—NATURAL THREATS

Version #: 1

Completed by: Shannon Clark--Richland Electric Title: CEO & General Manager Date: 8/1/08

Approved by: _____ Title: _____ Date: _____

CLICK POST-IT FOR ALLOWABLE RANGES	Probability	Speed of Onset	Forewarning	Duration	Economic Impact	Level of Concern	Relative Risk
Avalanche: Rock	1.00	2.00	2.00	1.00	2.00	5.00	2.00
Avalanche: Snow	0.00	2.00	2.00	1.00	2.00	5.00	0.00
Blizzard	3.00	2.00	1.00	2.00	4.00	2.00	30.00
Cold Wave	5.00	2.00	1.00	2.00	3.00	3.00	25.00
Crop Failure	3.00	1.00	1.00	2.00	3.00	1.00	36.00
Drought	3.00	1.00	1.00	2.00	3.00	4.00	9.00
Earthquake (Magnitude 5 or more)	1.00	2.00	2.00	1.00	5.00	5.00	5.00
Electrical Storm/Lightning: Fire	5.00	2.00	1.00	1.00	3.00	2.00	30.00
Flood: Dam Burst	2.00	2.00	2.00	1.00	4.00	3.00	13.33
Flood: Flash	3.00	2.00	1.00	1.00	4.00	2.00	24.00
Flood: Predictable/Seasonal	5.00	2.00	1.00	2.00	5.00	2.00	62.50
Flood: Sea and Lake Surges	0.00	2.00	1.00	2.00	1.00	5.00	0.00
Flood: Tsunami (Tidal Wave)	0.00	2.00	2.00	1.00	1.00	5.00	0.00
Fog	5.00	2.00	2.00	2.00	1.00	5.00	6.00
Forest Fire/Smoke	1.00	2.00	2.00	2.00	2.00	5.00	2.40
Frost	5.00	2.00	1.00	2.00	1.00	5.00	5.00
Hail	5.00	2.00	2.00	1.00	4.00	3.00	33.33
Heat Wave	5.00	2.00	1.00	2.00	4.00	3.00	33.33
High Winds (70+ mph)	5.00	2.00	2.00	1.00	5.00	1.00	125.00
Hurricane/Typhoon	0.00	2.00	1.00	2.00	5.00	5.00	0.00
Ice Storm	3.00	2.00	2.00	2.00	5.00	5.00	18.00
Land Subsidence/Liquefaction	0.00	2.00	2.00	1.00	2.00	2.00	0.00
Landslide/Mudslide	1.00	2.00	2.00	1.00	3.00	2.00	7.50
Lightning: Electrical Disruption	4.00	2.00	2.00	1.00	5.00	1.00	100.00
Magnetic Storms (Sun Spots)	1.00	2.00	1.00	2.00	2.00	5.00	2.00
Sandstorm	0.00	2.00	2.00	1.00	1.00	5.00	0.00
Tornado	3.00	2.00	1.00	1.00	5.00	1.00	60.00
Torrential Rains	3.00	2.00	1.00	2.00	5.00	1.00	75.00
Volcanic Activity	0.00	2.00	1.00	2.00	1.00	5.00	0.00
1						1.00	0.00
2						1.00	0.00
3						1.00	0.00

2.1 WORKSHEET—THREAT ANALYSIS—NATURAL THREATS

Version #:_____

Completed by: Daniel J Stelpflug --Scenic Rivers Title: Director of Operations Date: 5/12/05

Approved by: Richard E Kolb Title: Manager Date:_____

CLICK POST-IT FOR ALLOWABLE RANGES	Probability	Speed of Onset	Forewarning	Duration	Economic Impact	Level of Concern	Relative Risk
Avalanche: Rock	0.00					1.00	0.00
Avalanche: Snow	0.00					1.00	0.00
Blizzard	2.00	2.00	1.00	2.00	2.00	4.00	5.00
Cold Wave	2.00	2.00	1.00	2.00	1.00	5.00	2.00
Crop Failure	0.00					1.00	0.00
Drought	0.00					1.00	0.00
Earthquake (Magnitude 5 or more)	0.00					1.00	0.00
Electrical Storm/Lightning: Fire	1.00	2.00	2.00	1.00	1.00	5.00	1.00
Flood: Dam Burst	0.00					1.00	0.00
Flood: Flash	1.00	2.00	1.00	1.00	1.00	5.00	0.80
Flood: Predictable/Seasonal	1.00	2.00	1.00	1.00	1.00	5.00	0.80
Flood: Sea and Lake Surges	0.00					1.00	0.00
Flood: Tsunami (Tidal Wave)	0.00					1.00	0.00
Fog	1.00	2.00	1.00	1.00	1.00	5.00	0.80
Forest Fire/Smoke	1.00	2.00	1.00	1.00	1.00	5.00	0.80
Frost	5.00	1.00	1.00	2.00	1.00	5.00	4.00
Hail	3.00	2.00	1.00	1.00	1.00	5.00	2.40
Heat Wave	2.00	2.00	1.00	2.00	1.00	5.00	2.00
High Winds (70+ mph)	2.00	2.00	1.00	2.00	2.00	4.00	5.00
Hurricane/Typhoon	0.00					1.00	0.00
Ice Storm	1.00	2.00	1.00	2.00	3.00	1.00	15.00
Land Subsidence/Liquefaction	0.00					1.00	0.00
Landslide/Mudslide	0.00					1.00	0.00
Lightning: Electrical Disruption	3.00	2.00	1.00	1.00	1.00	4.00	3.00
Magnetic Storms (Sun Spots)	0.00					1.00	0.00
Sandstorm	0.00					1.00	0.00
Tornado	2.00	2.00	1.00	1.00	3.00	3.00	8.00
Torrential Rains	0.00					1.00	0.00
Volcanic Activity	0.00					1.00	0.00
1						1.00	0.00
2						1.00	0.00
3						1.00	0.00

2.1 WORKSHEET—THREAT ANALYSIS—NATURAL THREATS

Version #: 8/09

Completed by: Richard Kelly, Oakdale Electric Coop. Title: Manager, Safety and Loss Control Date: 8/12/09

Approved by: _____ Title: _____ Date: _____

CLICK POST-IT FOR ALLOWABLE RANGES

	Probability	Speed of Onset	Forewarning	Duration	Economic Impact	Level of Concern	Relative Risk
Avalanche: Rock	1.00	2.00	1.00	1.00	1.00	5.00	0.80
Avalanche: Snow	0.00					1.00	0.00
Blizzard	1.00	1.00	1.00	2.00	3.00	4.00	3.00
Cold Wave	2.00	1.00	1.00	2.00	3.00	4.00	6.00
Crop Failure	2.00	1.00	1.00	2.00	4.00	5.00	6.40
Drought	1.00	1.00	1.00	2.00	2.00	4.00	2.00
Earthquake (Magnitude 5 or more)	0.00					1.00	0.00
Electrical Storm/Lightning: Fire	5.00	2.00	2.00	1.00	2.00	4.00	12.50
Flood: Dam Burst	1.00	2.00	2.00	2.00	2.00	4.00	3.00
Flood: Flash	1.00	2.00	2.00	2.00	2.00	4.00	3.00
Flood: Predictable/Seasonal	1.00	1.00	1.00	2.00	1.00	5.00	0.80
Flood: Sea and Lake Surges	0.00					1.00	0.00
Flood: Tsunami (Tidal Wave)	0.00					1.00	0.00
Fog	2.00	2.00	1.00	2.00	3.00	4.00	7.50
Forest Fire/Smoke	1.00	2.00	2.00	2.00	4.00	4.00	6.00
Frost	1.00	1.00	1.00	2.00	1.00	5.00	0.80
Hail	1.00	1.00	2.00	1.00	3.00	4.00	3.00
Heat Wave	2.00	2.00	1.00	2.00	2.00	4.00	5.00
High Winds (70+ mph)	2.00	2.00	2.00	1.00	5.00	3.00	16.67
Hurricane/Typhoon	0.00					1.00	0.00
Ice Storm	1.00	2.00	1.00	2.00	5.00	3.00	8.33
Land Subsidence/Liquefaction	0.00					1.00	0.00
Landslide/Mudslide	0.00					1.00	0.00
Lightning: Electrical Disruption	2.00	2.00	2.00	2.00	3.00	4.00	9.00
Magnetic Storms (Sun Spots)	1.00	2.00	2.00	2.00	1.00	5.00	1.20
Sandstorm	0.00					1.00	0.00
Tornado	2.00	2.00	1.00	1.00	3.00	4.00	6.00
Torrential Rains	3.00	2.00	1.00	2.00	3.00	4.00	11.25
Volcanic Activity	0.00					1.00	0.00
1 Powerline falls onto Interstate 90 or 94	3.00	2.00	2.00	2.00	5.00	4.00	22.50
2						1.00	0.00
3						1.00	0.00

2.1 WORKSHEET—THREAT ANALYSIS—NATURAL THREATS

Version #: 8/09

Completed by: Richard Kelly, Riverland Energy Coop. Title: Manager, Safety and Loss Control Date: 8/12/09

Approved by: _____ Title: _____ Date: _____

CLICK POST-IT FOR ALLOWABLE RANGES

	Probability	Speed of Onset	Forewarning	Duration	Economic Impact	Level of Concern	Relative Risk
Avalanche: Rock	2.00	2.00	1.00	1.00	2.00	4.00	4.00
Avalanche: Snow	0.00					1.00	0.00
Blizzard	1.00	1.00	1.00	2.00	3.00	4.00	3.00
Cold Wave	2.00	1.00	1.00	2.00	3.00	4.00	6.00
Crop Failure	2.00	1.00	1.00	2.00	4.00	5.00	6.40
Drought	1.00	1.00	1.00	2.00	2.00	4.00	2.00
Earthquake (Magnitude 5 or more)	0.00					1.00	0.00
Electrical Storm/Lightning: Fire	5.00	2.00	2.00	1.00	2.00	4.00	12.50
Flood: Dam Burst	3.00	2.00	2.00	2.00	2.00	3.00	12.00
Flood: Flash	3.00	2.00	2.00	2.00	2.00	4.00	9.00
Flood: Predictable/Seasonal	3.00	1.00	1.00	2.00	3.00	3.00	12.00
Flood: Sea and Lake Surges	0.00					1.00	0.00
Flood: Tsunami (Tidal Wave)	0.00					1.00	0.00
Fog	2.00	2.00	1.00	2.00	3.00	4.00	7.50
Forest Fire/Smoke	1.00	2.00	2.00	2.00	4.00	4.00	6.00
Frost	1.00	1.00	1.00	2.00	1.00	5.00	0.80
Hail	1.00	1.00	2.00	1.00	3.00	4.00	3.00
Heat Wave	2.00	2.00	1.00	2.00	2.00	4.00	5.00
High Winds (70+ mph)	2.00	2.00	2.00	1.00	5.00	3.00	16.67
Hurricane/Typhoon	0.00					1.00	0.00
Ice Storm	1.00	2.00	1.00	2.00	5.00	3.00	8.33
Land Subsidence/Liquefaction	0.00					1.00	0.00
Landslide/Mudslide	1.00	2.00	2.00	1.00	2.00	4.00	2.50
Lightning: Electrical Disruption	2.00	2.00	2.00	2.00	3.00	4.00	9.00
Magnetic Storms (Sun Spots)	1.00	2.00	2.00	2.00	1.00	5.00	1.20
Sandstorm	0.00					1.00	0.00
Tornado	2.00	2.00	1.00	1.00	3.00	4.00	6.00
Torrential Rains	3.00	2.00	1.00	2.00	3.00	3.00	15.00
Volcanic Activity	0.00					1.00	0.00
1 Power lines fall across interstate	2.00	2.00	2.00	2.00	5.00	4.00	15.00
2						1.00	0.00
3						1.00	0.00

Risk Assessment – Category

Sorted By Category	**Risk Ranking**	High 75 and above Medium 40 - 74 Low 39 and below												1 = Human Actions 2 = Natural Occurrence
Business functions problems due to fire - Coffeemaker overheated causing fire	[redacted]	A	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	1
Business functions problems due to fire - Overload circuit causing fire	[redacted]	B	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	1
Business functions problems due to fire - Improper storage of combustible materials	[redacted]	C	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	1
Business functions problems due to fire - Truck engine fire after hours in garage	[redacted]	D	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	1
Business functions problems due to Tornado - Central Office hit by tornado	[redacted]	A	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Business function problems due to Flooding - Central Office affected by flooding of roads	[redacted]	A	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Business function problems due to Flooding - Water pipe breaks in Central Office	[redacted]	B	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Business functions problems due to human actions - Office set on fire by angry member	[redacted]	A	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	1
Business functions problems due to human actions - Central Office damaged by car hitting building	[redacted]	B	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	1
Business functions problems due to human actions - Central Office affected by bomb threat	[redacted]	C	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	1
Business functions affected due to personnel affected by pandemic flu - Several Office personnel sick	[redacted]	A	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Business functions affected due to personnel affected by pandemic flu - Flu impacting operations sickness/deaths	[redacted]	B	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Distribution System facilities affected due to fire - Substation fire un-know origin	[redacted]	A	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Distribution System facilities affected due to fire - Person burning ditches causes substation fire	[redacted]	B	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	1
Distribution System facilities affected due to fire in National Forest	[redacted]	C	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Distribution System facilities affected due to fire in National Forest	[redacted]	D	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	1
Distribution System facilities affected due to tornado - Residential area damaged by tornado	[redacted]	A	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Distribution System facilities affected due to tornado in National Forest	[redacted]	B	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Distribution System facilities affected due to flooding - Flash flood damaged URD because of washout area	[redacted]	A	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Distribution System facilities affected due to ice storm - Ice storm damage to localized area causing downed poles	[redacted]	A	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Distribution System facilities affected due to ice storm in National Forest	[redacted]	B	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Distribution System facilities affected due to human actions - Substation transformer shot by angry customer	[redacted]	A	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	1
Distribution System facilities affected due to human actions - Transmission & distribution poles are vandalized	[redacted]	B	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	1
Distribution System facilities affected due to human actions - vehicle hits transmission line pole causing damage	[redacted]	C	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	1
Distribution System facilities affected due to personnel affected by pandemic flu - Several linemen sick, ice storm hits area	[redacted]	A	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Distribution System facilities affected due to personnel affected by pandemic flu when ice storm hits area	[redacted]	B	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Communication problems due to fire - Substation fire affects distribution lines feeding radio stations	1.3.4.1	A	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Communication problems due to human action - Human cause fire affects substation and distribution lines feeding radio stations	1.3.4.1	B	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	1
Communication problems affected due to tornado - Tornado damages microwave system used for Cooperative Communications	1.3.4.2	A	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Communication problems due to ice storm - Ice storm damages distributions lines cause loss of power communication sites	1.3.4.5	A	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Communication problems due to human action -Vandalism of communication equipment at substation	1.3.4.6	A	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	1
Communication problems due to human action - Someone shoots communication equipment in substation	1.3.4.6	B	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	1
Communication problems due to human action - A vehicle strikes a communication tower's transformer	1.3.4.6	C	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	1
Communication problems due to human action - TDS has equipment problems that affect Cooperative communications	1.3.4.6	D	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	1
Communication problems affected due to personnel affected by pandemic flu - Employee's) sick and we are having IT problems	1.3.4.7	A	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2
Communication problems affected due to personnel affected by pandemic flu	1.3.4.7	B	C	[redacted]	X	T	[redacted]	X	V	[redacted]	=	Risk	[redacted]	2

Back-Up generation affected due to fire - Fire occurs in area where backup generator in housed.		A		C		X	T		X	V		=	Risk		2
Back-Up generation affected due to fire - The backup generator catches fire during a startup test period		B		C		X	T		X	V		=	Risk		2
Back-Up Generation affected due to tornado - A tornado strikes building causing damage backup generator is damaged		A		C		X	T		X	V		=	Risk		2
Back-Up generation affected due to human action - A disgruntle employee vandalize backup generator		A		C		X	T		X	V		=	Risk		1
Transmission problems affecting system - Xcel Enengy losess transmisison lines which feeds our critical load substation	3.1.4.1.	A		C		X	T		X	V		=	Risk		2
Transmission problems affecting system - Regional collapse of transmission system affects criticle load substation	3.1.4.1.	B		C		X	T		X	V		=	Risk		2
Transmission problems affecting system -request for portable substation from DPC can not be fullfiled	3.1.4.2.	A		C		X	T		X	V		=	Risk		2
Transmission problems affecting system - URD fault	3.1.4.3.	A		C		X	T		X	V		=	Risk		2
Transmission problems affecting system - A vehicle hits/damages URD cabinets	3.1.4.4.	A		C		X	T		X	V		=	Risk		1
Transmission problems affecting system - A person intentionally causes damage to transmission line feeding critical loads	3.1.4.4.	B		C		X	T		X	V		=	Risk		1
Transmission problems affecting system - A person shoots a substation transformer casuing damage to critical load substation	3.1.4.4.	C		C		X	T		X	V		=	Risk		1
Transmission problems due to weather issues - Weather issue causes substation problem that feeds Enbridge pipeline	3.2.4.1.	A		C		X	T		X	V		=	Risk		2
Transmission problems due to weather issues - Unknown issues cause substation problem that feeds Enbridge pipeline	3.2.4.1.	B		C		X	T		X	V		=	Risk		2
Transmission problems affecting system -request for portable substation from DPC can not be fullfiled	3.2.4.2.	A		C		X	T		X	V		=	Risk		1
Transmission problems affecting system - A person intentionally causes damage to transmission line feeding critical loads	3.2.4.3.	A		C		X	T		X	V		=	Risk		1
Transmission problems affecting system - A person shoots a substation transformer casuing damage to critical load substation	3.2.4.3.	B		C		X	T		X	V		=	Risk		1
Mass Communication facilities affected due to fire at substation that feeds radio station tower		A		C		X	T		X	V		=	Risk		2
Business functions problems due to fire - Ditch burning causes transformer poles to be damaged service radio station towers		B		C		X	T		X	V		=	Risk		1
Mass Communication problems affected due to tornado - Distribution services damaged that serves radion station tower		A		C		X	T		X	V		=	Risk		2
Mass Communication problems due to ice storm - Ice storm damage affects distrution line service radio station tower		A		C		X	T		X	V		=	Risk		2
Transmission problems affecting system - A person shoots a transformer casuing damage to transformer serving radio tower		A		C		X	T		X	V		=	Risk		1
Business functions problems due to mechanical - Computer server hard disks fail		A		C		X	T		X	V		=	Risk		1
Business functions problems - A computer virus has infected the main server		B		C		X	T		X	V		=	Risk		1
Business functions problems - A Cooperative employee embezzles Cooperative funds		A		C		X	T		X	V		=	Risk		1
Business functions affected due to personnel affected by pandemic flu		A		C		X	T		X	V		=	Risk		2
Business functions affected due to personnel affected by pandemic flu		B		C		X	T		X	V		=	Risk		2
Business functions problems due to mechanical - Computer server hard disks fail		A		C		X	T		X	V		=	Risk		1
Business functions problems - A computer virus has infected the main server		B		C		X	T		X	V		=	Risk		1
Business functions problems - A Cooperative employee embezzles Cooperative funds		A		C		X	T		X	V		=	Risk		1
Business functions affected due to personnel affected by pandemic flu		A		C		X	T		X	V		=	Risk		2
Business functions affected due to personnel affected by pandemic flu		B		C		X	T		X	V		=	Risk		2
Business functions problems - Cooperative employee notices a white powder while opening mail	4.3.4.1.	A		C		X	T		X	V		=	Risk		1
Business functions affected due to personnel affected by pandemic flu	4.3.4.2.	A		C		X	T		X	V		=	Risk		2
Business functions affected due to personnel affected by pandemic flu	4.3.4.2.	B		C		X	T		X	V		=	Risk		2

Risk Assessment – Risk Score

Sorted By Category

Risk Ranking High 75 and above; Medium 40 - 74; Low 39 and below

1 = Human Actions

2 = Natural Occurrence

Business functions affected due to personnel affected by pandemic flu - Flu impacting operations sickness/deaths		B	C	X	T		X	V		=	Risk		2
Distribution System facilities affected due to fire in National Forest		C	C	X	T		X	V		=	Risk		2
Distribution System facilities affected due to fire in National Forest		D	C	X	T		X	V		=	Risk		1
Distribution System facilities affected due to tornado in National Forest		B	C	X	T		X	V		=	Risk		2
Distribution System facilities affected due to human actions - Transmission & distribution poles are vandalized		B	C	X	T		X	V		=	Risk		1
Distribution System facilities affected due to personnel affected by pandemic flu when ice storm hits area		B	C	X	T		X	V		=	Risk		2
Communication problems affected due to personnel affected by pandemic flu unable to process	1.3.4.7.	B	C	X	T		X	V		=	Risk		2
Business functions affected due to personnel affected by pandemic flu		B	C	X	T		X	V		=	Risk		2
Business functions affected due to personnel affected by pandemic flu	[illegible]	B	C	X	T		X	V		=	Risk		2
Business functions problems due to Tornado - Central Office hit by tornado		A	C	X	T		X	V		=	Risk		2
Distribution System facilities affected due to ice storm in National Forest		B	C	X	T		X	V		=	Risk		2
Back-Up Generation affected due to tornado		A	C	X	T		X	V		=	Risk		2
Business functions problems due to human actions - Central Office affected by bomb threat		C	C	X	T		X	V		=	Risk		1
Distribution System facilities affected due to tornado - Residential area damaged by tornado		A	C	X	T		X	V		=	Risk		2
Distribution System facilities affected due to personnel affected by pandemic fluwhen ice storm hits area		A	C	X	T		X	V		=	Risk		2
Business functions problems due to human actions - Office set on fire by angry member		A	C	X	T		X	V		=	Risk		1
Business functions problems - Cooperative employee notices a white powder while opening mail	4.3.4.1.	A	C	X	T		X	V		=	Risk		1
Business functions affected due to personnel affected by pandemic flu	4.3.4.2.	A	C	X	T		X	V		=	Risk		2
Distribution System facilities affected due to ice storm causing downed poles		A	C	X	T		X	V		=	Risk		2
Transmission problems affecting system - A person intentionally causes damage to transmission system	3.2.4.3.	A	C	X	T		X	V		=	Risk		1
Business functions affected due to personnel affected by pandemic flu - Several Office personnel sick		A	C	X	T		X	V		=	Risk		2
Business functions affected due to personnel affected by pandemic flu		A	C	X	T		X	V		=	Risk		2
Business functions affected due to personnel affected by pandemic flu	[illegible]	A	C	X	T		X	V		=	Risk		2
Transmission problems affecting system - A person intentionally causes damage to transmission system	3.1.4.4.	B	C	X	T		X	V		=	Risk		1
Transmission problems affecting system - A person caused damage to critical load substation	3.2.4.3.	B	C	X	T		X	V		=	Risk		1
Transmission problems affecting system -request for portable substation from DPC can not be fullfiled	3.2.4.2.	A	C	X	T		X	V		=	Risk		1
Mass Communication problems affected due to tornado - Distribution services damaged		A	C	X	T		X	V		=	Risk		2
Mass Communication problems due to ice storm - Ice storm damage affects radio station tower		A	C	X	T		X	V		=	Risk		2
Business functions problems due to fire - Ditch burning causes transformer poles to be damaged		B	C	X	T		X	V		=	Risk		1

Business functions problems - A computer virus has infected the main server		B	C	X	T	X	V	=	Risk		1
Business functions problems - A computer virus has infected the main server		B	C	X	T	X	V	=	Risk		1
Business functions problems due to fire - Improper storage of combustible materials		C	C	X	T	X	V	=	Risk		1
Business functions problems due to human actions - Central Office damaged by car hitting building		B	C	X	T	X	V	=	Risk		1
Distribution System facilities affected due to flooding - Flash flood damaged URD because of washout area		A	C	X	T	X	V	=	Risk		2
Communication problems affected due to tornado - Tornado damages microwave system		A	C	X	T	X	V	=	Risk		2
Transmission problems affecting system - Regional collapse of transmission system	3.1.4.1.	B	C	X	T	X	V	=	Risk		2
Distribution System facilities affected due to fire - Substation fire un-know origin		A	C	X	T	X	V	=	Risk		2
Communication problems due to fire - Substation fire affects distribution lines feeding radio stations		A	C	X	T	X	V	=	Risk		2
Business functions problems - A Cooperative employee embezzles Cooperative funds		A	C	X	T	X	V	=	Risk		1
Business functions problems - A Cooperative employee embezzles Cooperative funds		A	C	X	T	X	V	=	Risk		1
Business functions problems due to fire - Coffeemaker overheated causing fire		A	C	X	T	X	V	=	Risk		1
Business functions problems due to fire - Overload circuit causing fire		B	C	X	T	X	V	=	Risk		1
Business functions problems due to fire - Truck engine fire after hours in garage		D	C	X	T	X	V	=	Risk		1
Back-Up generation affected due to human action - A disgruntle employee vandalize backup generator		A	C	X	T	X	V	=	Risk		1
Distribution System facilities affected due to human actions - Substation transformer shot by angry customer		A	C	X	T	X	V	=	Risk		1
Transmission problems affecting system - A person shoots a transformer casuing damage to transformer		A	C	X	T	X	V	=	Risk		1
Business function problems due to Flooding - Central Office affected by flooding of roads		A	C	X	T	X	V	=	Risk		2
Communication problems affected due to personnel affected by pandemic flu - we are having IT problems		A	C	X	T	X	V	=	Risk		2
Communication problems due to ice storm - cause loss of power to communication sites		A	C	X	T	X	V	=	Risk		2
Transmission problems due to weather issues - Unknown issues cause substation problem that feeds Enbridge	3.2.4.1.	B	C	X	T	X	V	=	Risk		2
Distribution System facilities affected due to human actions - vehicle hits transmission line pole causing damage		C	C	X	T	X	V	=	Risk		1
Communication problems due to human action -Vandalism of communication equipment at substation		A	C	X	T	X	V	=	Risk		1
Communication problems due to human action - Someone shoots communication equipment in substation		B	C	X	T	X	V	=	Risk		1
Transmission problems affecting system - URD fault	3.1.4.3.	A	C	X	T	X	V	=	Risk		2
Transmission problems affecting system - A vehicle hits/damages URD cabinets	3.1.4.4.	A	C	X	T	X	V	=	Risk		1
Transmission problems due to weather issues - Weather issue causes substation problem that feeds Enbridge	3.2.4.1.	A	C	X	T	X	V	=	Risk		2
Mass Communication facilities affected due to fire at substation that feeds radio station tower		A	C	X	T	X	V	=	Risk		2
Back-Up generation affected due to fire - Fire occurs in area where backup generator in housed.		A	C	X	T	X	V	=	Risk		2
Back-Up generation affected due to fire - The backup generator catches fire during a startup test period		B	C	X	T	X	V	=	Risk		2
Business function problems due to Flooding - Water pipe breaks in Central Office		B	C	X	T	X	V	=	Risk		2
Communication problems due to human action - A vehicle strikes a communication tower's transformer		C	C	X	T	X	V	=	Risk		1
Transmission problems affecting system -request for portable substation from DPC can not be fullfiled	3.1.4.2.	A	C	X	T	X	V	=	Risk		2
Communication problems due to human action - TDS has problems		D	C	X	T	X	V	=	Risk		1
Transmission problems affecting system - Xcel Enengy losess transmisison lines	3.1.4.1.	A	C	X	T	X	V	=	Risk		2
Transmission problems affecting system - A person shoots a substation transformer casuing damage	3.1.4.4.	C	C	X	T	X	V	=	Risk		1
Distribution System facilities affected due to fire - Person burning ditches causes substation fire		B	C	X	T	X	V	=	Risk		1
Communication problems due to human action - Human cause fire affects substation and distribution lines		B	C	X	T	X	V	=	Risk		1
Business functions problems due to mechanical - Computer server hard disks fail		A	C	X	T	X	V	=	Risk		1
Business functions problems due to mechanical - Computer server hard disks fail		A	C	X	T	X	V	=	Risk		1
Business functions affected due to personnel affected by pandemic flu	4.3.4.2.	B	C	X	T	X	V	=	Risk		2

Risk Assessment – Human Actions

Sorted By Category	Risk Ranking	High 75 and above / Medium 40 – 74 / Low 39 and below												1 = Human Actions / 2 = Natural Occurrence
Distribution System facilities affected due to fire in National Forest		D	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	100.00	1
Distribution System facilities affected due to human actions - Transmission & distribution poles are vandalized		B	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	100.00	1
Business functions problems due to human actions - Central Office affected by bomb threat		C	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	91.67	1
Business functions problems due to human actions - Office set on fire by angry member		A	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	75.00	1
Business functions problems - Cooperative employee notices a white powder while opening mail	4.3.4.1.	A	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	69.44	1
Transmission problems affecting system - A person intentionally causes damage to transmission lines	3.2.4.3.	A	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	55.56	1
Transmission problems affecting system - A person intentionally causes damage to transmission lines	3.1.4.4.	B	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	45.83	1
Transmission problems affecting system - A person shoots a substation transformer casuing damage	3.2.4.3.	B	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	44.44	1
Transmission problems affecting system -request for portable substation from DPC can not be fullfiled	3.2.4.2.	A	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	41.67	1
Business functions problems due to fire - Ditch burning causes transformer poles to be damaged	[illegible]	B	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	38.89	1
Business functions problems - A computer virus has infected the main server		B	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	37.50	1
Business functions problems - A computer virus has infected the main server	[illegible]	B	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	37.50	1
Business functions problems due to fire - Improper storage of combustible materials		C	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	33.33	1
Business functions problems due to human actions - Central Office damaged by car hitting building		B	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	33.33	1
Business functions problems - A Cooperative employee embezzles Cooperative funds		A	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	30.56	1
Business functions problems - A Cooperative employee embezzles Cooperative funds	4.2.4.2.	A	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	30.56	1
Business functions problems due to fire - Coffeemaker overheated causing fire		A	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	29.17	1
Business functions problems due to fire - Overload circuit causing fire		B	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	29.17	1
Business functions problems due to fire - Truck engine fire after hours in garage		D	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	29.17	1
Back-Up generation affected due to human action - A disgruntle employee vandalize backup generator	[illegible]	A	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	28.65	1
Distribution System facilities affected due to human actions - Substation transformer shot by angry customer		A	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	27.78	1
Transmission problems affecting system - A person shoots a transformer casuing damage to transformer		A	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	[illegible]	1
Distribution System facilities affected due to human actions - vehicle hits transmission line pole causing damage		C	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	11.11	1
Communication problems due to human action -Vandalism of communication equipment at substation	1.3.4.6.	A	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	11.11	1
Communication problems due to human action - Someone shoots communication equipment in substation	1.3.4.6.	B	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	11.11	1
Transmission problems affecting system - A vehicle hits/damages URD cabinets	3.1.4.4.	A	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	8.33	1
Communication problems due to human action - A vehicle strikes a communication tower's transformer	1.3.4.6.	C	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	6.25	1
Communication problems due to human action - TDS has problems	1.3.4.6.	D	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	5.56	1
Transmission problems affecting system - A person shoots a substation transformer casuing damage	3.1.4.4.	C	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	4.17	1
Distribution System facilities affected due to fire - Person burning ditches causes substation fire		B	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	2.78	1
Communication problems due to human action - Human cause fire affects substation and distribution lines	1.3.4.1.	B	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	2.78	1
Business functions problems due to mechanical - Computer server hard disks fail		A	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	2.78	1
Business functions problems due to mechanical - Computer server hard disks fail	[illegible]	A	C	[illegible]	X	T	[illegible]	X	V	[illegible]	=	Risk	2.78	1

Risk Assessment – Natural Occurrence

Sorted By Category

Risk Ranking High 75 and above; Medium 40 - 74; Low 39 and below

1 = Human Actions

2 = Natural Occurrence

Business functions affected due to personnel affected by pandemic flu - Flu impacting operations sickness/deaths		B	C	X	T		X	V		=	Risk		2
Distribution System facilities affected due to fire in National Forest		C	C	X	T		X	V		=	Risk		2
Distribution System facilities affected due to tornado in National Forest		B	C	X	T		X	V		=	Risk		2
Distribution System facilities affected due to personnel affected by pandemic flu		B	C	X	T		X	V		=	Risk		2
Communication problems affected due to personnel affected by pandemic flu	1.3.4.7.	B	C	X	T		X	V		=	Risk		2
Business functions affected due to personnel affected by pandemic flu		B	C	X	T		X	V		=	Risk		2
Business functions affected due to personnel affected by pandemic flu	[illegible]	B	C	X	T		X	V		=	Risk		2
Business functions problems due to Tornado - Central Office hit by tornado		A	C	X	T		X	V		=	Risk		2
Distribution System facilities affected due to ice storm in National Forest		B	C	X	T		X	V		=	Risk		2
Back-Up Generation affected due to tornado - backup generator is damaged	[illegible]	A	C	X	T		X	V		=	Risk		2
Distribution System facilities affected due to tornado - Residential area damaged by tornado		A	C	X	T		X	V		=	Risk		2
Distribution System facilities affected due to personnel affected by pandemic flu		A	C	X	T		X	V		=	Risk		2
Business functions affected due to personnel affected by pandemic flu	4.3.4.2.	B	C	X	T		X	V		=	Risk		2
Business functions affected due to personnel affected by pandemic flu	4.3.4.2.	A	C	X	T		X	V		=	Risk		2
Distribution System facilities affected due to ice storm - causing downed poles		A	C	X	T		X	V		=	Risk		2
Business functions affected due to personnel affected by pandemic flu - Several Office personnel sick		A	C	X	T		X	V		=	Risk		2
Business functions affected due to personnel affected by pandemic flu		A	C	X	T		X	V		=	Risk		2
Business functions affected due to personnel affected by pandemic flu	[illegible]	A	C	X	T		X	V		=	Risk		2
Mass Communication problems affected due to tornado - Distribution services damaged		A	C	X	T		X	V		=	Risk		2
Mass Communication problems due to ice storm - Ice storm damage affects distrution line		A	C	X	T		X	V		=	Risk		2
Distribution System facilities affected due to flooding - Flash flood damaged URD because of washout area		A	C	X	T		X	V		=	Risk		2
Communication problems affected due to tornado - Tornado damages microwave system	1.3.4.2.	A	C	X	T		X	V		=	Risk		2
Transmission problems affecting system - Regional collapse of transmission system	3.1.4.1.	B	C	X	T		X	V		=	Risk		2
Distribution System facilities affected due to fire - Substation fire un-know origin		A	C	X	T		X	V		=	Risk		2
Communication problems due to fire - Substation fire affects distribution lines feeding radio stations	1.3.4.1.	A	C	X	T		X	V		=	Risk		2
Business function problems due to Flooding - Central Office affected by flooding of roads		A	C	X	T		X	V		=	Risk		2
Communication problems affected due to personnel affected by pandemic flu - we are having IT problems	1.3.4.7.	A	C	X	T		X	V		=	Risk		2
Communication problems due to ice storm - Ice storm damages distributions lines	1.3.4.5.	A	C	X	T		X	V		=	Risk		2
Transmission problems due to weather issues - Unknown issues cause substation problem that feeds Enbridge	3.2.4.1.	B	C	X	T		X	V		=	Risk		2
Transmission problems affecting system - URD fault	3.1.4.3.	A	C	X	T		X	V		=	Risk		2
Transmission problems due to weather issues - Weather issue causes substation problem that feeds Enbridge	3.2.4.1.	A	C	X	T		X	V		=	Risk		2
Mass Communication facilities affected due to fire at substation that feeds radio station tower		A	C	X	T		X	V		=	Risk		2
Back-Up generation affected due to fire - Fire occurs in area where backup generator in housed.	[illegible]	A	C	X	T		X	V		=	Risk		2
Back-Up generation affected due to fire - The backup generator catches fire during a startup test period		B	C	X	T		X	V		=	Risk		2
Business function problems due to Flooding - Water pipe breaks in Central Office		B	C	X	T		X	V		=	Risk		2
Transmission problems affecting system -request for portable substation from DPC can not be fullfiled	3.1.4.2.	A	C	X	T		X	V		=	Risk		2
Transmission problems affecting system - Xcel Enengy losess transmisison lines	3.1.4.1.	A	C	X	T		X	V		=	Risk		2

Appendix 3:
Identified Natural Hazards and Relative Risks

Electric Cooperative Risk and Vulnerability Threat Analysis

Relative Risk by Cooperative

Risks	Adams-Columbia Electric	Barron Electric	Central Wisconsin Electric	East Central Energy	Eau Claire Energy	Jackson Electric	Jump River Electric	Pierce Pepin Energy	Richland Electric	Scenic Rivers Energy
Avalanche: Rock	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	2.00	0.00
Avalanche: Snow	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Blizzard	13.33	40.00	8.00	16.00	2.50	2.50	15.00	6.00	30.00	5.00
Cold Wave	4.00	8.00	2.00	4.00	3.00	3.00	10.00	24.00	25.00	2.00
Crop Failure	0.00	0.00	3.00	0.00	1.60	1.60	2.40	2.00	36.00	0.00
Drought	0.00	0.00	3.00	2.00	1.60	1.60	2.40	2.40	9.00	0.00
Earthquake (5+)	0.00	25.00	5.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00
Electrical Storm/Lightning: Fire	12.00	45.00	13.33	12.50	16.00	16.00	30.00	7.50	30.00	1.00
Flood: Damn Burst	4.00	0.00	2.00	1.00	6.00	6.00	10.00	3.75	13.33	0.00
Flood:Flash	1.60	24.00	7.50	1.00	3.75	3.75	9.00	15.00	24.00	0.80
Flood: Predictable/Seasonal	1.60	0.00	0.00	1.00	1.60	1.60	1.60	8.00	62.50	0.80
Fog	3.20	6.00	4.00	2.40	5.00	5.00	4.80	5.00	6.00	0.80
Forest Fire/Smoke	6.00	45.00	5.00	3.00	7.20	7.20	24.00	1.20	2.40	0.80
Frost	3.00	4.00	5.00	5.00	1.60	1.60	4.00	7.50	5.00	4.00
Hail	2.00	5.00	13.33	12.50	2.00	2.00	10.00	10.67	33.33	2.40
Heat Wave	20.00	3.20	4.00	4.00	4.00	4.00	6.40	24.00	33.33	2.00
High Winds (70+ mph)	26.67	120.00	10.00	16.00	13.33	13.33	37.50	33.33	125.00	5.00
Ice Storm	50.00	120.00	13.33	12.00	13.33	13.33	31.25	30.00	18.00	15.00
Land Subsidence/Liquefaction	1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Land Slide/Mudslide	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	7.50	0.00
Lightning: Electric Disruption	20.00	22.50	5.00	6.67	6.67	6.67	22.50	16.00	100.00	3.00
Magnetic Storms (Sun Spots)	1.00	0.80	0.00	0.80	1.33	1.33	0.00	0.00	2.00	0.00
Sandstorm	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tornado	41.67	100.00	25.00	2.67	8.00	8.00	33.33	10.00	60.00	8.00
Torrential Rains	11.25	4.50	1.00	3.75	3.33	3.33	24.00	0.00	75.00	0.00

Top 5 Relative Risk Rankings	
Highest	High Winds
2nd	Ice Storm
3rd	Tornado
4th	Lightning/Electric Disruption
5th Highest Risk	Lightning/Fire

Collective Averages
0.30
0.10
13.83
8.50
4.66
2.20
3.50
18.33
4.61
9.04
7.87
4.22
10.18
4.07
9.32
10.49
40.02
31.62
0.16
0.95
20.90
0.73
0.06
29.67
12.62

Appendix 4:
Rural Electric Cooperative Adoptions

(forthcoming)

Appendix 5:
Public Participation and Meeting Documentation