Hazard Mitigation Plan

Richland County, Wisconsin

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Table of Contents

Introduction and Background

The Richland County Hazard Mitigation Plan is intended to provide strategies for reducing susceptibility to future damage to public and private infrastructure in the county. The Richland County Emergency Management Office applied for and received a hazard mitigation planning grant in 2008. This grant program is sponsored by the Federal Emergency Management Agency (FEMA) and is administered by the state Department of Military Affairs - Wisconsin Emergency Management (WEM). The procedures utilized in preparing this plan are based on guidance provided by FEMA and WEM and should therefore be considered consistent with the requirements and procedures in the Disaster Mitigation Act of 2000.

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

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

- A profile and analysis of past hazardous events

- An assessment of vulnerability of community assets
- Potential hazard mitigation strategies
- Methods for building community support and ensuring plan adoption

Plan Overview

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

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

Previous Planning Efforts and Legal Basis

The Richland County Emergency Management Office has completed and regularly updates the Richland County Hazard Analysis. This Hazard Analysis identifies all likely natural and technological hazards that might or have occurred within the county. The Hazard Analysis does not generally include detailed mitigation strategies for the identified hazards.

The Richland County Comprehensive Plan (v. July 17, 2007) was used as one source document for this plan. There have also been plans and ordinances completed by individual Richland County departments or municipalities, some of which were also used as reference materials for this plan, including:

Richland County Zoning and Sanitation Department Ordinances
http://www.co.richland.wi.us/departments/zoning/ordinances/index.htm

Zoning
Sanitation
Non-Metallic
Land Division
County Addressing
Tri-County Airport
Shoreland/Wetland
Floodplain

All townships have floodplain, shoreland and wetland zoning administered through the Richland County Zoning Office. Additionally, all townships are covered under the following ordinances:
Floodplain
Shoreland/Wetland
Land Division
Sanitation
Non-metallic

City of Richland Center Planning and Zoning
http://www.ci.richland-center.wi.us/Planning_%20Zoning.htm

Chapters 400 through 411	Zoning Ordinance
Chapter 448	Land Division and Subdivision Ordinance
Chapter 452	Floodplain and Wetland Zoning
Chapter 475	Extraterritorial Zoning

Plan Preparation, Adoption and Maintenance

The Richland County Emergency Management Director contracted with Emergency Planning, Training and Exercise Consulting (EPTEC, Inc.) to draft this plan. A Hazard Mitigation Committee was organized to oversee the completion of this plan. The committee members include:

- D. Gudgeon, Richland County Emergency Management
- J. Heinen, Richland County LEPC
- H. Pedley, Richland County Zoning/GIS
- L. Fowler, Mayor, City of Richland Center
- J. Liska, Village of Viola
- D. Baker, Water/Wastewater Dept., Village of Viola
- D. Bender, City Utilities Electric
- L. Hallett, Richland Electric Cooperative
- L. Borchardt, EPTEC, Inc. (Contractor)

Additionally, T. Shea from the National Weather Service (NWS) attended a meeting and provided valuable input to the plan. An informational brochure was created and copies were distributed throughout the community. Meetings were held with chief elected officials from each municipality to explain and gather input regarding the program (e.g., previous occurrences, mitigation strategies.) The committee met several times, first to evaluate and incorporate input from local officials and then to review and provide input on the progress of the plan. A general meeting was held to review the plan with members of the public, local officials, academia and business and industry leaders. The plan was distributed to the County Emergency Management Directors from Crawford, Grant, Iowa, Sauk and Vernon Counties. A copy of the mitigation brochure and a list of meeting dates and informational sessions to gather public and official input can be viewed in Appendix E.

The Richland County Hazard Mitigation Plan Workgroup reviewed the past events records (generally gathered from the National Weather Service) and a consensus was reached on the anticipated probability of future events. This probability was designated as "high," "medium" or "low" by the workgroup.

The workgroup also, after reviewing the draft plan, selected the potential mitigation projects, which are listed in Appendix C (Summary of Mitigation Strategies), and discussed in more detail in each chapter's Hazard Mitigation Strategies section. The workgroup participants were given the *Mitigation Ideas: Possible Mitigation Measures by Hazard Type* (Mitigation Ideas, FEMA-R5, 9/02) booklet as an aid to generating ideas. All of the ideas generated during the workgroup meetings were incorporated into the plan and can be found in the Hazard Mitigation Strategies section of each chapter and are summarized in Appendix C. Based on the information collected, each of these projects was assigned a "high," "medium" or "low" priority.

Meetings were held with the municipal leaders advising them of the need to formally adopt this plan as a prerequisite for future mitigation funding eligibility. A draft has been sent to Wisconsin Emergency Management (WEM) for review and tentative approval. Based on WEM's comments, a final draft plan has been completed and a general meeting has been held to review the plan with members of the public, local officials and business and industry leaders.

A resolution also has been passed by the Richland County Board, the City of Richland Center; the Villages of Boaz, Cazenovia, Lone Rock, Viola and Yuba and the Towns of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow. Scanned copies of the adoption resolutions can be found in Appendix B. The final plan has been submitted to WEM for review and certification and notice of acceptance has been received of FEMA plan approval as of XXX.

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

If information is received between the five-year update periods (e.g., comprehensive or capital improvement plans) that might be included, it will be added to Appendix F: Inter-Revision Updates. The Richland County Emergency Management Office maintains responsibility and is the point of contact for all issues regarding this plan. Municipalities can contact the County Emergency Management Director to add updated local information to Appendix F.

Physical Characteristics of Richland County

General Community Introduction

The earliest inhabitants were probably the Native American Mound Builders. They built many different types of mounds, many of them located near the Wisconsin River. There is a concentration of these mounds located on land now owned by the Ho-Chunk Nation. Later, the Sauk, Fox, Winnebago and Potawatomi Indians inhabited the county.

Historical records show that Black Hawk crossed the county just before he made his last stand at Bad Axe during the Black Hawk War of 1832. Black Hawk's band and the pursuing military ventured into this unknown terrain of steep ridges and valleys. Following nearby Mill Creek, some of the band headed over these rugged hills known as the Ocooch Mountains. Along the way, many Indians died from exhaustion, starvation and battle wounds. (https://www.wisconsinhistory.org) The Ocooch Mountains, it should be noted, are not mountains at all but rather a region of timber-covered hills, lush valleys and sandstone formations in unglaciated southwestern Wisconsin. The name is said to have come from a small band of Indians called the Ocoche, and Ocooch is generally defined as meaning a place to hunt or fish or find nourishment. Some say the region's boundaries are defined by the Kickapoo River watershed; in rough terms it is the area midway between Madison and La Crosse, stretching from Spring Green on the south to Viroqua on the north, with Richland Center about in the middle.

The first white men who came to the county settled near the Wisconsin River in the area now known as Port Andrews in 1840. The different ethnic groups that settled in certain areas of the county are still evident today in the names of the people. The Norwegians settled the Five Points area, the Germans near Bear Valley, Keyesville and Cazenovia, the Czechs near Yuba, the Irish near Bear Valley and the Yankees in Richland Center.

The quotation below is taken from *History of Crawford and Richland Counties, Wisconsin* – Union Publishing Company - Springfield, IL – 1884.

An article published in the Richland county Observer, written by W M Fogo, thus speaks of the capabilities of the county: While the county is well adapted to almost everything known to agricultural economy, its best hold is stock raising. No section of the State is better adapted to it; the hills and valleys and crystal brooks affording convenient range, protection and water. Until recent years the farmers have paid but little attention to this industry, but latterly they are engaging in it extensively, and there are numerous fine herds and flocks, which are rapidly increasing in number and quality as the years roll on. The industries of the county are farming, in all its various forms; butter and cheesemaking; lumbering, principally in fine hard woods; milling, manufacturing of various kinds, and nearly all of the varied mechanic arts and employments. There are some twenty grist, thirty saw, and two woolen mills within the county. Many good water powers exist all over the county, quite a number of which remain to be improved. The villages of the county are: Richland Centre, Lone Rock, Sextonville, Richland City, Orion, Eagle Corners, Port Andrew, Excelsior, Boaz, Viola, West Lima, Spring Valley, Woodstock, Rockbridge, Stalwart, Cazenovia, Loyd and Ithaca.

The first school that was taught in the county, we are led to believe, was in the year 1847, by a man from Pennsylvania, but whose name has entirely escaped the memory of our informants. This pioneer school was held in a room of the house of Peter Kinder, in Richwood town, and is believed to have been a subscription one as no records are extant, showing the formation of a school district so early. However, in 1849, a building was erected for the accommodation of a district school on the land now owned by Mr Garner, on section 27, of the town of Richwood, and a little west of the village of Port Andrew, and during the years 1849 and 1850 Mary Melanthey, now Mrs Joseph Elliott, presided over its destinies, as school mistress. This is no doubt the first district school in Richland County.

The first postoffice within the limits of the county was established at a place called Sand Prairie about one and a half miles west of the village of Port Andrew, on land now owned by H J Clark, lying in the town of Richwood. This was about 1845, and Johnson Young was the postmaster. John Kincannon had the first contract for carrying the mail thither, we believe, from Mineral Point, and he brought it on his back, going and coming afoot, which seems to have been the usual method of travel in those days. The business of saw-milling being a large one in the county, it would probably be of interest to say that the first structure of that description ever erected was built

by Estes & Parrish, in the fall of 1841, and was located at or near the site of the mills now known as Rodolf's, on Mill or Eagle creek, in the town of Eagle. The first grist-mill was built at Sextonville, in the years 1851-2, by Jacob Krouskop. Prior to this time the settlers had oft-times to go fifty and seventy-five miles to mill with the little grain they had to grind. The first physician to locate within the county was Dr Hartshorn, whose settlement at Law's or Gage's ferry, precedes any other in point of time.

Settlements were begun in all parts of the county by the beginning of 1850, and the population by that time was, according to the census returns, between 900 and 1000; during the next decade the flood of emigration, for which that period has been noted all over the northwest, rapidly filled up the waste places of this county, until in 1860, the government census placed the number of inhabitants at 9732. During the late Civil War, the emigration here, as everywhere else, came to a stand still, and the large amount of enlistments from this locality, and the large death rate in Wisconsin regiments, in the field, kept down any remarkable increase in the population, until after the close of the rebellion when immigration received a new impetus, and the number of the population has steadily grown from then until the present day.

In those early days rude log cabins, scattered throughout the county, stood on little clearings, surrounded by the dense wilderness of trees that covered the whole land, as with a mantle; but in the years that have passed, these cabins have given way to fine, comfortable frame, and in many instances palatial brick residences. There are many yet living, whose eyes have beheld these wonderful transformations, but alas, many, very many of these early pioneers have never lived to realize or enjoy the full fruition of their days of toil and hardship. The roll of those whose feet have crossed (t)he dark river is a long one. Still, in the days when they faced all the trials of a frontier life, and battled with stern nature, to keep the wolf from the door, these hardy pioneers enjoyed much pleasure in their rude way. In the language of one of these heroes of the outpost: "It is the mistaken notion of modern aristocracy, that happiness dwells only with wealth and fine equipage. Some of us can point to our log cabins, at least in memory, as our independent homes, where true content and happiness brooded over the domestic circle, and sincere gratitude gave relish to the most homely fare."

Contrast the Richland County of 1845-6 with the same as it is to-day [1884]. Then it was a dense, almost unbroken wilderness, an

umbrageous desert with only here and there the scattered clearings of a few adventurous frontiersmen; and now it is largely cleared up, with good farms, fine farm houses and barns, commodious and numerous school houses and churches on every hand. In those days, the early settlers were poor in purse and struggling against fearful odds and almost insurmountable obstacles, to hew for themselves and their posterity, homes out of the forests, and all nature seemed uncongenial and seemed to turn a frowning face upon all their efforts. To-day, the inhabitants are prosperous and thrifty, and live in comparative ease and comfort. Then the "blazed" track through the woods was their only pathway or road, and the rivers and streams were crossed on the felled tree or by the still more primitive fashion of swimming; now, broad highways intersect the county and good bridges span its streams, and comfort and luxury are seen on every hand. Then, seventy miles to mill was the rule, and now the iron horse brings the necessaries of life almost to the very door.

The population has grown to the current 2007 U.S. Census Bureau estimated number of 18,142 residents. The county seat of Richland Center has 5,102 residents. The face of Richland County is changing. There are more non-resident landowners, fewer dairy farms, less hay being grown and more cash grain crops being grown. Data from the Wisconsin Agriculture Statistics show a decrease in hay and an increase in corn and soybean acres over a 10-year period. (Richland County Land and Water Resource Management Plan, 2007)

(http://www.jsonline.com/story/index.aspx?id=372956)

Plan Area

Richland County covers 586 square miles of land area with rivers, streams, creeks and lakes covering approximately 3 square miles. The elevation at Richland Center is 731 feet above sea level. There are approximately 18,142 residents in Richland County.

One simple way to describe the state of Wisconsin is to divide it into two parts: the Driftless Area and the Glaciated Region. A large part of the Driftless Area is hilly. It preserves most of the types of topography that formerly existed throughout Wisconsin. The Glaciated Region is mostly a plain. Glacial erosion and glacial

deposition, wave work, postglacial stream erosion and other processes have greatly modified the topography originally made by the weathering and pre-glacial stream work. Richland County lies within the Driftless Area.

Richland County lies within the western upland geographical province. Most of the region is a thoroughly-dissected upland, not a flat-topped or sloping surface as in northern Wisconsin or the region near Lake Michigan. The average elevation of the hilltops above sea level is about 1100 feet in St. Croix and Pierce counties in northwestern Wisconsin, 1280 feet in Vernon County, and 900 to 1200 feet in Grant County. The uplands thus stand 100 to 200 feet above the Eastern Ridges and Lowlands to the southeast and 200 to 350 feet above the Central Plain to the northeast side. From the upland itself, the strongest topographic features of the region are the great trenches or gorges of the Mississippi and Wisconsin Rivers and their numerous branches. The gorge of the Mississippi is incised more than 500 feet below the level of the upland ridges. (http://www.wisconline.com)

Richland County is bordered on the east by Sauk County, on the south by Grant and Iowa Counties, on the west by Crawford and Vernon Counties and on the north by Sauk County and Vernon County.

In Wisconsin, there are three types of sub-county, full-service local government units: towns, which are unincorporated, and villages and cities, which are incorporated. Richland County contains the City of Richland Center; the Villages of Boaz, Cazenovia, Lone Rock, Viola and Yuba and the Towns of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow. (See Appendix A for a map of Richland County.) The County and all municipalities except for the …. have adopted the plan (Copies of the adoptions can be found in Appendix B.)

It should be noted that the Village of Viola is also partially in Vernon County. The Village has a close relationship with both county emergency management offices but will focus it attention on, funnel mitigation ideas to and will adopt the Richland County plan. The Village of Viola is represented in this plan in its entirety (i.e., including that small portion of land and population in Vernon County).

Geology

The geology of the county consists of outcroppings of limestone near or at the top of the bluffs with substratum sandstone. The county consists of steep hillsides, fertile valleys and an abundance of springs. Most of south/southwest Wisconsin's bedrock is sedimentary rock, consisting of sandstone and shale or limestone.

Mineral resources are divided into two categories, metallic and non-metallic resources. Metallic resources in the region include lead and zinc but there is no evidence of metallic mining in Richland County. Non-metallic resources include sand, gravel and limestone. Limestone for road building is one of the most significant non-metallic geologic resources in the area today. (Richland County Comprehensive Plan, 2007)

The Prairie Du Chien dolomite is present on the west side of Richland County along Highway 14. Near Bosstown, the Tunnel City sandstone appears. In the small village of Boaz, Wisconsin's first recorded discovery of a mastodon skeleton was made in 1897 by four farm boys. The Dorsch family excavated it and in 1915 sold it for display in the University of Wisconsin's Geology Museum, where it can be seen today.

Three miles east of the Boaz junction on Highway 14, the road divides and passes over another ridge where the Cambrian Jordan sandstone is well exposed. Five miles beyond lies Richland Center on the Pine River, which has cut deeply enough to expose the same older Cambrian formations that are exposed at La Crosse. At the south edge of Richland Center, a quarry on the north side of the road exposes the Tunnel City and overlying Jordan formations. Tunnel City strata here are rich in glauconitic greensands and storm deposits. Storm waves first eroded the sea bottom, concentrating flat sandstone pebbles, which were then covered with undulatory, laminated deposits. Pine Natural Bridge, a keyhole cut through Cambrian sandstones, is 8 miles north of Richland Center.

Continuing south from Richland Center on U.S. 14, white sandstones of the older Cambrian Wonewoc formation appear in roadcuts. East of Gotham, U.S. 14 passes over the broad outwash plains of the Wisconsin River Valley. (Dott/Attig 2004)

Topography

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

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

(http://www.uwex.edu/sco/state.html)

Richland County is in a region of timber-covered hills, lush valleys and sandstone formations in unglaciated southwestern Wisconsin referred to as the Ocooch Mountains. The name is said to have come from a small band of Indians called the Ocoche, and Ocooch is generally defined as meaning a place to hunt or fish or find nourishment. Some say the region's boundaries are defined by the Kickapoo River watershed; in rough terms it is the area midway between Madison and La Crosse, stretching from Spring Green on the south to Viroqua on the north, with Richland Center about in the middle. (http://www.jsonline.com/story/index.aspx?id=372956)

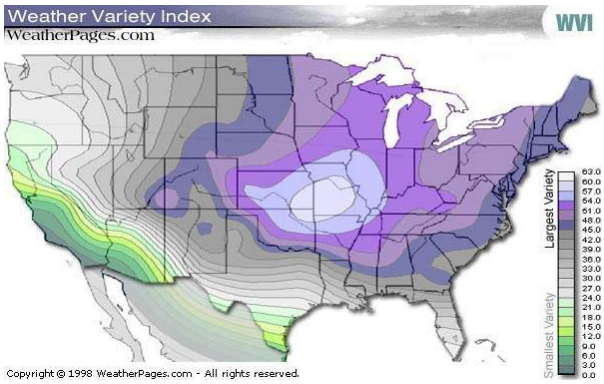
Richland County lies halfway between La Crosse to the northwest and Madison to the southeast, in the heart of southwest Wisconsin's unglaciated hill country. The formation of the richly sculptured landscape began millions of years ago when an ancient sea covered the land. Over time, the sea deposited hundreds of feet of limestone and sandstone over the state. As the sea gradually receded, the main drainage basins were formed, consisting of the Mississippi and Wisconsin rivers and their tributaries. These rivers and their branches began an erosive action, forming deep gorges in the layers of rock, which continued until the glacial period began. Four glaciers advanced and retreated, covering all but the southwestern part of the state. The land that later became Richland County is located almost in the center of this unglaciated area.

(http://www.hiddenvalleys.com/data/brochure_pdf/RichlandCounty.pdf)

Elevations in the county range from 715 feet above sea level (ASL) at Gotham near the Wisconsin River to about 913 feet ASL in Richland Center. The area is dominated by a rolling topography between uplands and lowland river and creek valleys.

Climate

The Wisconsin climate is notoriously varied, which can be seen in the following graphic that rated each city on variations in temperature, precipitation, storms (thunderstorms, hail, tornadoes, etc.), snow and other factors. Richland County is between Madison, WI, which ranked 8th and La Crosse, WI ranked 27th in variability out of 277 cities.



http://www.weatherpages.com/variety/main.html

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

The average annual temperature varies from 39^{o}F in the north to about 50^{o}F in the south with statewide extreme records of 114^{o}F (Wisconsin Dells, 7/13/1936) and minus 55^{o}F (Couderay, 2/2/1996 & 2/4/1996). The extremes of temperature recorded by the National Weather Service in Richland Center range from -46 degrees Fahrenheit (F) on 30 January 1951 to 110 degrees F on 14 July 1936. During more than one-half of the winters, temperatures fall to minus 40^{o}F or lower and almost every winter temperatures of minus 30^{o}F or colder are reported from northern stations. Summer temperatures above 90^{o}F average two to four days in northern counties and about 14 days in southern districts, including Richland County. During marked cool outbreaks in summer months, the central lowlands occasionally report freezing temperatures.

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

The long-term mean annual precipitation ranges from 30 to 34 inches over most of the Western Uplands and Northern Highlands, then diminishes to about 28 inches along most of the Wisconsin Central Plain and Lake Superior Coastal area. The higher average

annual precipitation coincides generally with the highest elevations, particularly the windward slopes of the Western Uplands and Northern Highlands. Thunderstorms average about 30 per year in northern Wisconsin to about 40 per year in southern counties and occur mostly in the summer. Occasional hail, wind and lightning damage are also reported.

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

Month	Normal Maximum Temperature	Normal Minimum Temperature	Average Temperature	Precipitation	Snowfall
JAN	26.6	5.3	15.9	1.18"	10.6"
FEB	32.8	11.3	22.0	1.15"	7.7"
MAR	44.2	23.0	33.6	2.16"	5.4"
APR	58.0	33.8	45.9	3.91"	2.4"
MAY	70.9	44.3	57.6	3.82"	0.0"
JUN	79.8	53.7	66.8	4.34"	0.0"
JUL	84.1	58.6	71.3	4.79"	0.0"
AUG	81.3	56.5	68.9	4.34"	0.0"
SEP	73.0	47.9	60.5	3.69"	0.0"
OCT	61.4	36.1	48.7	2.26"	0.1"
NOV	44.3	24.5	34.4	2.54"	4.9"
DEC	31.2	12.1	21.7	1.29"	9.4"
Year	57.3	33.9	45.6	35.46"	40.5"

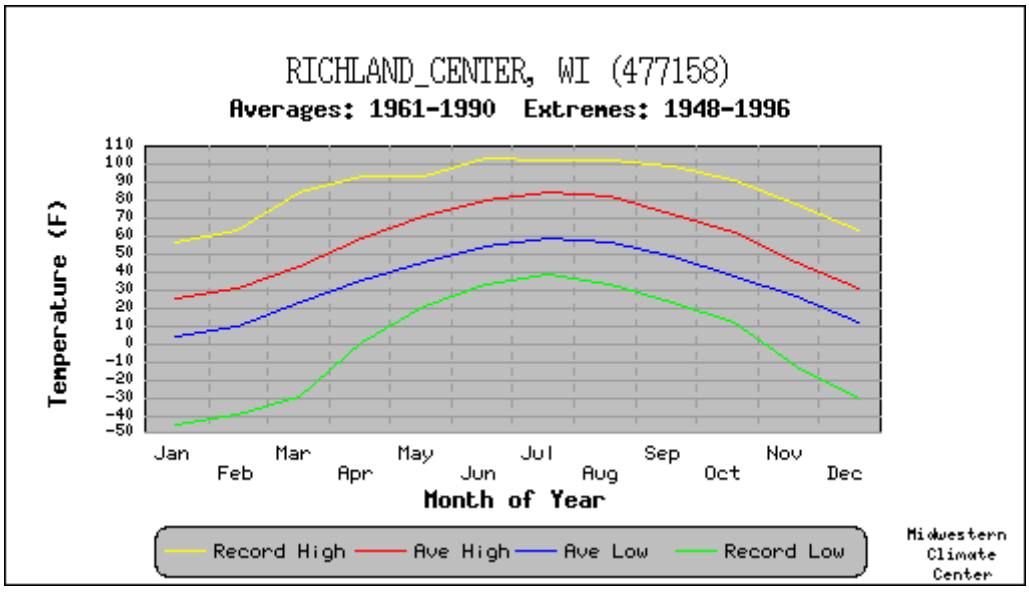
Basic climatology figures for Richland Center, WI based on normals from a 30-year period (1971-2000). NOAA/NWS-LaCrosse, Natural Hazards Assessment for Richland County, WI (v. Jan. '09) p.9

The average growing season is defined as the number of days following the last 32^{o}F freeze in the spring through the beginning of fall. Richland County's growing season averages 138 days. Shallow lakes normally freeze in late November and remain frozen until late March or early April.

http://www.uwex.edu/sco/state.html

Climate Normals	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Ave Daily High (F°)	25.2	31.1	43.3	58.5	70.5	79.8	84.7	81.5	72.5	61.7	44.9	30.2
Ave Daily Low (F°)	4.2	9.6	23.0	34.8	45.0	53.7	58.9	56.3	48.4	37.3	25.6	11.9
Growing Degree Days	1	3	39	163	366	523	657	595	395	208	39	3
Heating Degree Days	1559	1249	986	549	256	51	6	28	147	488	891	1364
Cooling Degree Days	0	0	0	0	33	105	217	152	12	8	0	0
Ave Precipitation (")	1.03	1.12	2.21	3.39	3.71	3.85	3.93	3.94	4.12	2.35	2.31	1.54
Ave Snowfall (")	8.8	7.3	7.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	3.9	10.6

Data from the weather station at Richland Center, latitude 43°20' N, longitude 90°23' W, elevation 728 ft.
http://www.wisconline.com/counties/richland/climate.html



Midwestern Regional Climate Center

Other miscellaneous climatological facts for the Richland County/ City of Richland Center provided by the NOAA/NWS-LaCrosse, Natural Hazards Assessment for Richland County, WI (v. Jan. '09) p.9 include:

- Warmest year on record – 1931 (51.4F)
- Warmest month on record – July 1955 (78.2F)
- Warmest day on record – July 14, 1936 (110F)
- Greatest number of days with 90F or warmer – 1921 (51 times)

- Coldest year on record – 1996 (42.3F)
- Coldest month on record – January 1977 (2.5F)
- Coldest day on record – January 30, 1951 (-46F)
- Greatest number of days at 0F or colder – 2008 (53 times)

- Wettest year on record – 2007 (52.68")
- Wettest month on record – August 2007 (20.81")
- Wettest day on record – October 22, 1943 (5.90")
- Driest year on record – 1958 (17.49")
- Driest month on record – March 1996 (0.00")

- Highest seasonal snowfall on record – 2007/08 (74.5")
- Highest monthly snowfall on record – January 1929 (38.1")
- Highest one-day snowfall on record – March 28, 1931 (15.0")
- Least seasonal snowfall on record – 1924/25 (8.1")

Hydrology

The land in Wisconsin drains into Lake Superior, Lake Michigan and the Mississippi River. The Mississippi and St. Croix Rivers form most of the western boundary. About one-half of the northwestern portion of the state is drained through the Chippewa River, while the remainder of this region drains directly into the Mississippi or St. Croix Rivers and into Lake Superior. The Wisconsin River has its source at a small lake nearly 1,600 feet above mean sea level on the Upper Michigan boundary and drains most of central Wisconsin. Most of its tributaries also spring from the many lakes in the north. Except for the Rock River, a Mississippi River tributary which flows through northern Illinois, eastern Wisconsin drains into Lake Michigan. Richland County drains into the Mississippi River via the Wisconsin River, which flows along the southern edge of the county.

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

http://www.uwex.edu/sco/state.html

Groundwater reservoirs are recharged by direct precipitation. Spring is a prime time for recharge because evapotranspiration is low and melting snow and rainfall infiltrate and percolate the water table on unfrozen ground. Fall is another prime time for high recharge. During the summer, groundwater levels drop because precipitation is lower causing losses to evaporation and transpiration to exceed precipitation. In addition, groundwater is lost to surface waters by discharge in the form of springs (DeVaul, 1967.) The winter period normally lacks infiltration because of frozen ground.

Water resources, (both surface and groundwater) are one of the most commonly used natural resources, serving intrinsic and essential functions in the community. Plants, animals, and people all consume water on a daily basis. Over 70% of all Wisconsin, communities (that is, every two out of three state citizens) rely on groundwater not only for domestic use but also for agriculture, industrial uses, recreational purposes, etc. All Richland County residents use groundwater for domestic water consumption. Water is one of the most easily contaminated resources. Because of its mobile nature, contaminants can travel far from their source through the water cycle. Contaminants in the water cycle coming from a variety of sources are commonly known as non-point source pollution (NPSP). Non-point source pollution comes from many diffuse sources such as agriculture runoff, leaking septic systems, road salt and road building, parking lots, lawn and golf course runoff, all of which directly impact water resources. Point source pollution comes from identifiable sources such as a single factory or overflow from a sewage treatment facility.

Richland County includes major rivers such as the Wisconsin River, Pine River and the Willow and Knapp Creeks. These watercourses provide recreational opportunities such as fishing, boating, swimming and passive recreational opportunities like bird watching and sun bathing. The rivers and their feeder streams provide

habitat for fish, mussels, insects and other wildlife. (Richland County Land and Water Resource Management Plan, 2007)

Soil Types

Soils types, with specific and unique characteristics, directly influence land uses. Richland County's soil survey was updated and made available in 2001. Fifty-five different soil types are found throughout Richland County. During the soil survey update nine newly describe soils were found in Richland County. The Richland County Land Conservation Department extensively uses the soils information. The updated soil survey information can be found on-line at http://websoilsurvey.nrcs.usda.gov/app/.

Wetlands

Because wetlands provide many benefits to the environment, several municipal, state and federal ordinances/regulations protect wetland areas. The basic concept associated with these laws is that wetland areas on any property can not be disturbed without a permit. Wetlands store flood waters and filter water from precipitation before it enters lakes and streams. Some wetlands also recharge local groundwater aquifers. By slowing water movement, wetlands reduce the likelihood that heavy rainfall or spring snowmelt will cause erosion and flooding. Wetlands retain eroded soil and hold nutrients that would otherwise promote excessive weed growth and algae blooms in lakes and streams. These nutrients, when held in the wetlands, produce a heavy growth of vegetation that provides nesting sites, food and cover for waterfowl, small mammals and many other types of wildlife. Wetlands also provide recreational opportunities for humans (wildlife observation, hiking, hunting, etc).

There are three basic factors in determining whether or not a property is a wetland:

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

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

Wetlands serve a variety of functions, including playing an important role in stormwater management and flood control, filtering pollutants, recharging groundwater, providing a habitat for many wildlife species and plants and offering open space and passive recreational opportunities. Wetlands include all marshes, swamps, fens, bogs and those areas excluded from cultivation or other uses because they are intermittently wet. Richland County is in the Western Coulee and Ridge ecological landscape, as defined by the 2002 Land Legacy Report put out by the WI DNR. This landscape is characterized by highly eroded and unglaciated topography. Because of the hilly terrain, wetlands in Richland County are primarily associated with rivers and streams of the area, not in generally level or upland areas.

The Wisconsin Wetland Inventory (WWI) was completed in 1985. Pre-European settlement wetland figures estimate the state had about 10 million acres of wetlands. Based on aerial photography from 1978-79, the WWI shows approximately 5.3 million acres of wetlands remaining in the state representing a loss of about 47% of original wetland acreage. This figure does not include wetlands less than 2 or 5 acres in size (minimum mapping unit varies by county). Because the original WWI utilized aerial photographs taken in the summer, some wetlands were missed. In addition, wetlands that were farmed as of the date of photography used and then later abandoned due to wet conditions were not captured as part of the WWI. (Wetland data in this inventory is to the county level only.) According to the 1978-79 data, Richland County was 4.1% wetland (Richland County Comprehensive Plan, 2007)

http://www.dnr.state.wi.us/org/water/fhp/wetlands/acreage.shtml

Land Use

According to the Wisconsin Department of Revenue 2004 Statement of Assessments, Richland County land use is as follows:

- Residential 2.2%
- Commercial 0.3%
- Manufacturing 0.2%

- Agricultural 68.3%
- Undeveloped 5.8%
- AG-Forest 1.5%
- Forest 20.8%
- Other (Federal, State, County, School, Cemetery) 1.0%

Currently, the dominant land use in Richland County is agriculture followed by forest. The total land area is 314,121 acres.

Richland County has many natural areas including:

- The Bear Creek Fishery Area is located on 798 acres in Sauk and Richland Counties.
- The Knapp Creek Unit – Lower Wisconsin – State Riverway is located on 5,001 acres and features deer, waterfowl and fishing.
- The Lower Wisconsin State Riverway is located on 960 acres and features wildlife, fishing and canoeing.
- The Willow Creek Fishery Area is located on 300 acres and features wildlife and fishing.
- The Pine River Public Hunting Grounds is located on 2,345 acres and features wildlife, biking and hiking.
- Hub City Bog is an unusual tamarack bog island and tall shrub community. A pine/hemlock relict and associated shaded cliffs are also present. This uncommon Driftless Area bog was formed in an oxbow lake left by the meandering Pine River. To the east of the bog is Soules Creek which flows at the base of a 75-foot sandstone cliff. The north-facing cliff supports a northern forest of hemlock, white pine and yellow birch with a ground cover of Labrador-tea, trailing arbutus, bunchberry, wintergreen and Sullivant's cool-wort. The tamaracks in the bog have suffered nearly 70 percent mortality due to an infestation of larch bark beetle. However, some tamarack reproduction is taking place. Many springs are present in the tamarack swamp. Most typical bog plants are absent, although sphagnum moss and some very showy species are found. Hub City Bog is owned by the University of Wisconsin and was designated a State Natural Area in 1970.
- Richwood Bottoms, located on 190 acres, features one of the best swamp white oak dominated floodplain forests along the Lower Wisconsin Riverway with some of the largest oaks reaching two feet in diameter. The extensive bottomland forest varies from a typical southern wet-mesic forest along the river to a drier bottom forest located on

sandy alluvial ridges divided by swales. Swamp white oaks with basswood dominates the low ridges while the flats contain silver maple with American elm, green ash and river birch. Also present are hackberry and bitternut hickory. The understory includes buttonbush, cardinal flower, wood nettle, ostrich fern, royal fern, lance-leaf fog-fruit, false nettle and groundnut. Poison ivy is common throughout. This area provides good quality habitat for wildlife that requires isolated blocks of mature forest including the three state-threatened birds which nest here: red-shouldered hawk (Buteo lineatus), Kentucky warbler (Oporornis formosus), and cerulean warber (Dendroica cerulea). Richwood Bottoms is owned by the DNR and was designated a State Natural Area in 1991.

- Smith Slough and Sand Prairie, located on 375 acres, contains a large complex of plant communities located in the Wisconsin River floodplain on alluvial sand deposits that fluctuate no more than 6 feet in topography. The site hosts a shallow seepage-fed oxbow lake that has become hydrologically isolated from the river. Lying south and west of the lake is a large undisturbed complex of sedge meadow, shrub-carr and aquatic emergents that grades into big blue-stem dominated sand prairie and swamp white oak savanna on slightly elevated ridges. On the sand terraces along the lake is a narrow band of black oak barren with a ground flora of sedges, big and little blue-stem and cream wild indigo. On higher ground is an area of open sand and old dunes that are now stabilized by false heather, black oak and river birch. Also present is a bottomland hardwood forest dominated by swamp white oak with silver maple, green ash, American elm and river birch in lower swales and swamp white oak, red oak, basswood and yellowbud hickory on slightly higher ground. Some trees are in excess of 4 feet in diameter. Of note is a plant species of special concern --the small forget-me-not (Myosotis laxa). Animal species of concern include the state-endangered starhead topminnow (Fundulus notti) and goldeye (Hiodon alosoides); state-threatened Blanding's turtle (Emydoidea blandingii) and least darter (Etheostoma microperca). Smith Slough and Sand Prairie is owned by the DNR and was designated a State Natural Area in 1991.
- Located on 270 acres of Wisconsin River sand terraces, Gotham Jack Pine Barrens contains the largest and best remaining black oak and Jack pine barrens in Richland County. Also present is a floodplain forest of young timber

and a small, shallow oxbow lake of high water quality, a sedge and grass dominated wet meadow, dry sand prairie and open sand blows. The barrens region is located on undulating terrain composed of very old sand blows and dunes and is recovering from past grazing. The tree canopy is quite closed and the understory remains nearly shrub-free with a ground layer dominated by sedges. Some areas are still moderately rich in native species including big and little blue-stem, Indian grass, prairie cord grass, green milkweed, silky aster, flax-leaved aster, prairie coreopsis, gray goldenrod, rough blazing-star, goat's-rue and bird's-foot violet. The floodplain forest is composed of silver maple, green ash, river birch, swamp white oak and American elm. The unusual wet meadow is dominated by cord grass, blue-joint grass, rushes and sedges and contains no shrubs and is nearly devoid of forbs. The area contains numerous rare plants and animals. Plant species of concern are small forget-me-not (Myotis laxa), poppy mallow (Callirhoe triangulata) and sycamore (Plantanus occidentalis). Animal species of concern are the tiger beetle (Cicindela patruela ustulata) and flat floater freshwater mussel (Anodonata suborbiculata). Gotham Jack Pine Barrens is owned by the DNR and was designated a State Natural Area in 1994.

- Orion Mussel Beds, located on 20 acres, features a narrow corridor of Wisconsin River bottom and adjacent shoreline that is critical habitat for numerous rare animals. Fifteen rare animals are known from this site including mussels, mayflies, dragonflies, beetles and fish. The river bottom contains a rock and gravel substrate with underwater sandstone ledges, which contrasts with the shifting sands that are more typical of the Lower Wisconsin River bottom. The firm substrate that supports these species is restricted to a very narrow zone beginning at the shoreline extending south over the course of 4.2 miles. A diversity of rare mussels are found here including the state-threatened rock pocketbook (Arcidens confragosus), monkeyface (Quadrula metanevra) and wartyback (Q. nodulata) and the federally-endangered Higgins’ eye (Lampsilis higginsii). Rare invertebrates include the smoky shadowfly (Neurocordulia molesta), elusive clubtail (Stylurus notatus), Knobel’s riffle beetle (Stenelmis knobeli) and Wallace’s deepwater mayfly (Spinadis wallacei). Uncommon fish include the mud darter (Etheostoma asprigene) and western sand darter (E. clarum). Orion Mussel Beds is owned by the DNR and was designated a State Natural Area in 1996.

- Bear Creek Sedge Meadow, located on 80 acres, contains two separate parcels--both sedge meadow communities with Bear Creek flowing through them. Also present is some shallow marsh along the creek. Both are recovering well from past grazing. Sedges are dominant and forbs are present in higher than normal densities. Cat-tail and bulrush are found in the wettest areas while the highest ground supports wet prairie vegetation. The midwestern endemic plant, glade mallow (Napaea dioica), is present along the creek. Other plants include blue-joint grass, sweet Indian-plantain, swamp aster, marsh marigold, swamp thistle, boneset, bottle gentian, mountain mint and cup-plant. Breeding birds include wood duck, sandhill crane, belted kingfisher, alder flycatcher, willow flycatcher, sedge and marsh wren, common yellowthroat and swamp sparrow. Clean water flows through the meadows suggesting the possibility of groundwater seepage. Bear Creek Sedge Meadow is owned by the DNR and was designated a State Natural Area in 2002.
- Ash Creek Community Forest, a 350-acre park, is Richland County's largest. It offers four miles of primitive hiking and cycling trail and a three-mile stretch of Class One trout stream.
- Krouskop Park is located in Richland Center. The Pine River flows through this 37-acre park, providing access to miles of fishing and canoeing. The park has three pools for swimming, diving and wading; a lighted athletic complex that includes football and softball fields, a basketball court, three tennis courts and two sand volleyball courts. The park also provides a large picnic area with six shelters and grills, six horseshoe courts, two gazebos, playground equipment and a bandstand with live summer entertainment.
- Miner Hill Trail Park features fifty scenic acres of scenic along a walking trail that wanders past five overlooks and an old quarry, through woods and open meadows, to the top of a bluff with a panoramic view of the city and countryside. Along the way, hikers will find resting and picnic spots.
- Pier Natural Bridge Park is located at Hwy. 80 North, Rockbridge, in Richland County. The park obtains its name from the Pier family, who donated the land to Richland County to preserve the site as a park. The site has a very unusual geological feature - a half-mile long "finger" of blocked and layered sandstone rising nearly 60 feet above the flood plain of two merging valleys. This narrow finger is topped by tall pines and covered with green shrubs. The

West Branch of the Pine River meets with the Main Branch underneath this rock formation, which forms a Natural Bridge. The Park has two historical markers - one indicating the unique rock formation and the other recognizing the significance of the Blackhawk Wars in this area. The park has a man-made tunnel which allows visitors to walk through the rock formation to the West Branch of the Pine River. There are also stairs to walk to the top of the rock formation to view the surrounding area.

- Following an abandoned railbed, the 14.8 mile-long Pine River Trail leads from Richland Center to Lone Rock. This easy-graded rail trail invites hikers and cyclers in spring, summer and fall and snowmobilers in winter.
- Eagle Cave is Wisconsin's largest Onyx Cave and is located near Richland Center.

http://www.rclrs.net/ParkCommission/

Vegetation

Vegetation across the county consists of mostly sugar maple, basswood and elm. In southeast Richland County, mostly bur oak, white oak and elm dominate. Along the Wisconsin River in southwest Richland County, willow, soft maple and ash are the predominate species.

http://www.wisconline.com/counties/Richland/index.html

Demographics

Human Settlement Patterns

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

The geology of Richland County is clearly displayed by the outcropping of limestone near or at the tops of the bluffs and hills, often forming caves and fantastic shapes where exposed to the elements. This limestone overlies a substratum of sandstone that was easily quarried and used for building purposes. Early settlers sometimes used the caves as homes until they could build a cabin. The heavily timbered hillsides and ridges provided the pioneers with building lumber and a cash crop at taxpaying time. Most of the early homes were built as close as possible to springs for a constant supply of water. The first immigrants were well aware of the fertility of the soil. They used the adjective "rich" in naming much of the area. Richland County, Richland Center, Richland City (now Gotham) and the Towns of Richland, Richwood and Richmond (now Orion) all became part of the county's heritage. A melting pot of ethnic groups – the Norwegians settled the Five Points area, the Germans settled near Bear Valley, Cazenovia and Keyesville, the Czechs populated the Yuba community and Yankee businessmen settled in Richland Center.

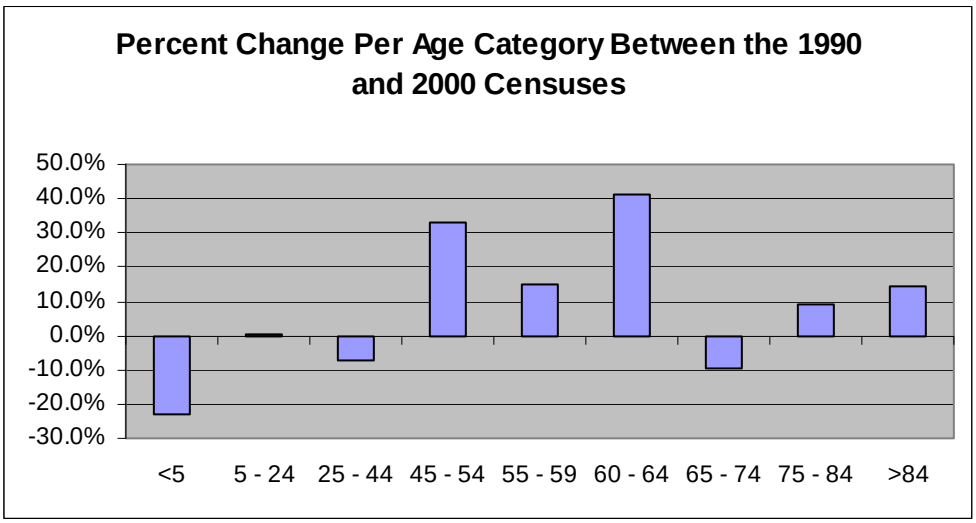
http://www.hiddenvalleys.com/data/brochure_pdf/RichlandCounty.pdf

Population

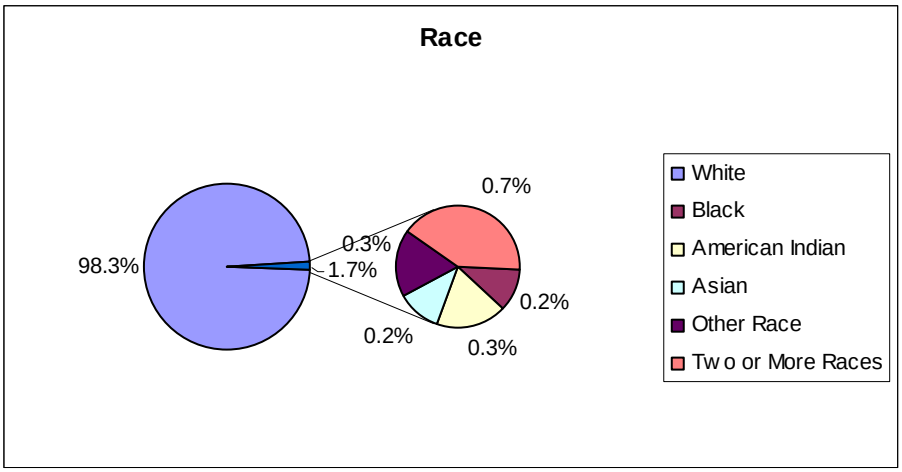
In recent decades, Richland County has experienced modest development. The development has been accompanied by a slow population increase of 3.5% in 17 years. In 1990, the county was home to 17,521 people; in 2000, there were 17,924 and according to the 2007 U.S. Census Bureau estimate, there are 18,142 people currently residing in Richland County.

According to the 2000 U.S. census report, there are 7,118 households in Richland County with an average of 2.48 people per household. This is an increase of 525 households over the 1990 census when 6,593 households were reported. The 1999 U.S. census numbers indicate that the median household income is $33,998 and that the per capita income is $17,042. Approximately 10% of the people live below the poverty line. The 2000 census also indicated that there are approximately 8,164 housing units within the county.

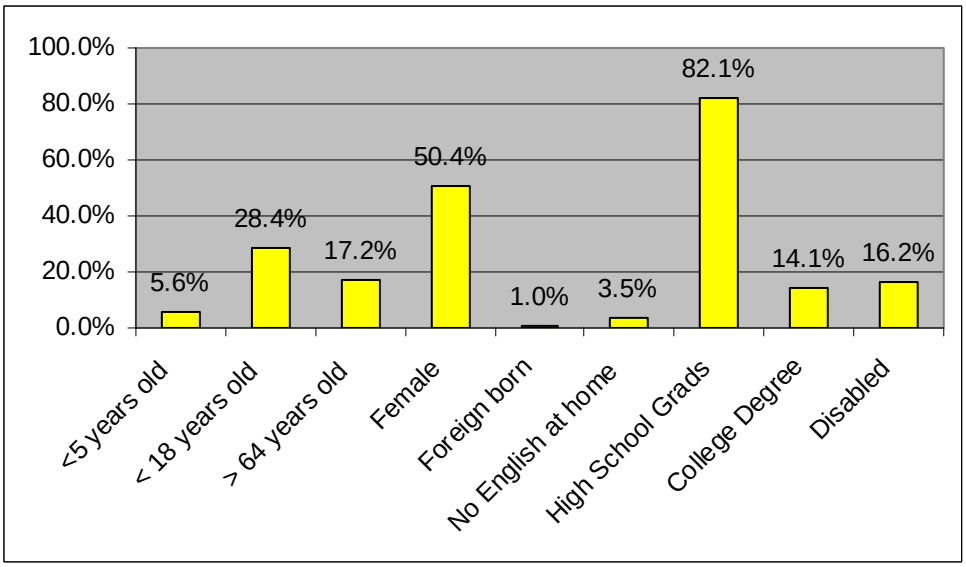
The population of Richland County rose from 17,521 to 17,924 between the 1990 and 2000 censuses. This is an increase of 403 people or a population growth rate of 2.3%.



According to the 2000 U.S. Census, the overwhelming majority of people in Richland County reported that they were white. People of Hispanic or Latino origin were counted as a subcategory of those reporting that they were white, as another race or as two or more races. These groups totaled 1% of those categories. There are no Native American tribal lands located within Richland County.



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



Richland County contains the City of Richland Center; the Villages of Boaz, Cazenovia, Lone Rock, Viola, and Yuba and the Towns of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow.

Transportation Network

Richland County has a good transportation network. A U.S. highway and state (STH) and county (CTH) roads connect the population centers. US 14 runs through center of the county and connects Gotham and Richland Center to La Crosse to the northwest and Madison to the southeast. STH 80 runs north-south through the center of the county and passes through Richland Center. STH 60 runs east-west across the southern portion of the county, roughly following the Wisconsin River. STH 193 connects STH 80 and STH 60 near the Wisconsin River. STH 58 runs north south along the eastern side of Richland County and connects Cazenovia and Ithaca. STH 171 runs west from Boaz into Crawford County. STH 56 connects Viola in the northwest portion of the county to Richland Center, near the center of the county. STH 130 runs north south from east central Richland County to Lone Rock. Richland County has an extensive county road system including CTH A, B, C, D, E, F, G, H, I, K, M, N, O, Q, S, T, U, V, W, X, Z, AA, BB, CC, DD, EE, II, JJ, KK, MM, NN, OO, UU, ZZ, BR, SR and TB.

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

Public Safety Support

Medical

The Richland County Office of Emergency Management, city and county emergency services responders, hospital emergency staff and various departments have developed medical and mass casualty plans. These plans will be used in the event of a disaster.

Richland County communities are served by a complete range of health facilities and health professionals, including the Richland Hospital and associated Richland Medical Center Clinic. In addition, the 3 area hospitals U.W. Hospital, Meriter Hospital and St. Mary's Hospital are readily accessible to Richland County residents. Gunderson Lutheran Hospital in La Crosse is available to the residents in the northwest corner of the county. These health care facilities will coordinate with responding agencies to ensure the

best utilization of services and the least injury or loss of life from a disaster situation. It should also be noted that area hospitals have reciprocal verbal agreements for transferring critical patients during a disaster.

Richland County relies on a mix of volunteer, paid-on-call and paid staff to provide pre-hospital emergency medical services to it Richland Center and its villages and towns. (See Richland County Ambulance Zones Map in Appendix A for district boundary details – *that information is currently not there*.) Details for some pre-hospital medical units and their staffing are listed below:

- Richland County Ambulance Service provides primary 911 EMT-Basic (BLS) and Intermediate Tech (ALS) services to 12 townships, 2 villages and the city of Richland Center and services pproximately 16,500 residents. The service area is approximately 300 square miles. Richland County Ambulance service staffs two ambulances 24/7, 365 days a year. A third ambulance is on standby.
- Cazenovia Area Rescue Squad
  Highway 58
  Cazenovia, WI 53924
  (608)983-2840
  License Level: EMT-Basic
- Kickapoo Valley Rescue Squad
  213 N Turner St
  Viola, WI 54664
  (608)627-1810
  License Level: EMT-Basic
- Lone Rock Rescue Unit
  220 E Pearl St
  Lone Rock, WI 53556
  (608)583-2951
  License Level: EMT-Basic
- Richland County Ambulance Service
  181 W Seminary St
  Richland Center, WI 53581
  (608)647-6474
  License Level: EMT-Basic

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

Fire Service

Richland County is serviced by the following fire departments:

- Blue River Fire Department
- Cazenovia Fire Department
- LaFarge Fire Department
- Lone Rock Fire Department
- Muscoda Fire Department
- Richland Center Fire Department
- Viola Fire Department
- Yuba Fire Department

These fire departments are staffed by firefighters who attend regularly-scheduled training activities. (See Richland County Fire Zones Map in Appendix A for district boundary details)

Richland County is serviced by the Tri-County Hazardous Materials Team (Level B), which also services Crawford and Vernon Counties from its base in Viroqua. For Level A Hazardous Materials response, the La Crosse Regional Hazardous Materials Team which is part of the Wisconsin Regional Hazardous Materials Response Team Network, provides services. This network was established with the unanimous support of the legislature and Governor Tommy G. Thompson. Act 104 created a tiered system of hazardous material response. Regional Teams to respond to the most serious of spills and releases requiring the highest level of protective gear and training or was of such a quantity or magnitude as to exceed local capability and County Teams to handle incidents which require a lesser level of protection.

The La Crosse Regional Hazardous Materials Team specializes in responding to chemical, biological, radiological, nuclear and explosive incidents. These incidents may be caused by accidental or intentional acts. The team is able to rapidly deploy to assist local responders and the Incident Commander by providing trained responders and equipment that will help isolate the incident, begin mitigation operations and provide decontamination.

The La Crosse Regional Hazmat Team is staffed with twenty-eight personnel, twenty-five from the La Crosse Fire Department and three from the Onalaska Fire Department. The Team is tasked by the State of Wisconsin to cover a nine county response area in west central Wisconsin including: Buffalo, Crawford, Jackson, Juneau, La Crosse, Monroe, Richland, Trempealeau and Vernon.

Within this area, the team covers 6,648 square miles of land, 121 miles of interstate highway, 90 miles of the Mississippi River, 2 Mississippi River Ports, 287 miles of railroad track and approximately 300,000 people.

Law Enforcement

The City of Richland Center has its own police department. The Richland County Sheriff's Department provides deputies for the rest of the county. (See the Richland County Police Zones and the Richland County ESN Zones Maps in Appendix A for district boundary details.) Also, the Wisconsin State Patrol provides limited coverage from their district office. Additional details for some law enforcement agencies and their staffing are listed below:

- Richland County Sheriff's Office: The Richland County Sheriff's Office provides law enforcement services within the county, providing primary service to several municipalities.
- Richland Center Police Department: Law enforcement services are provided by 11 officers.
- Lone Rock Police Department: Provides services with two officers.
- Viola Police Department: Police services are provided by one officer.

Archaeological and Historical Resources

The Wisconsin Historical Society has a listing of archaeological sites that have been identified in Richland County; this list is available to governmental agencies upon request. The National Register of Historic Places also includes a listing of 16 locations in Richland County. As mitigation projects are considered, the county is committed to ensuring that archaeological and historical sites are preserved.

Historic Sites		
Historic Site Name	**Street Address**	**Municipality**
A.D. German Warehouse	316 S. Church St.	Richland Center
Bloyer Mound Group	State Highway 60	Orion Township
Bowen, Julia B. and Fred P. House	220 E. Union Street	Richland Center
Clipped Wing Eagle Mound	Restricted	Eagle Township
Coumbe, John Farmstead	Junction of STH 60 & CTH X	Richwood Township
Court Street Commercial Historic District	Roughly bounded by Mill, Church, Haseltine & Main Sts	Richland Center
Cunningham Lane Bridge	Hansberry Lane near Fancy Cr.	Rockbridge Township
Eagle Township Mound Group	Restricted	Eagle Township
Fiedler, Henry and Louisa House	Putnam and Washington Sts.	Orion Township
Hunting Eagle Mound	Restricted	Eagle Township
Richland Center Archeological District	Restricted	Richland Center
Richland Center City Auditorium	182 N. Central Ave.	Richland Center
Shadewald I Mound Group	Restricted	Eagle Township
Shadewald II Mound Group	Restricted	Eagle Township
Syttende Mai Site	Restricted	Richland Township
Tippesaukee Farm Rural Historic District (Boundary Increase)	Jct. of STH 60 and CTH X	Richwood Township

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

Hazard Analysis

The following sections identify those hazards that have occurred or could occur in Richland County. Each includes a description of a hazard and its frequency of occurrence. Also included is a section that describes the general vulnerabilities of the community and its infrastructure to each particular type of hazard. More detailed and specific analyses will be conducted as projects are identified for inclusion in grant applications. As part of the application process, the methodology of data collection and future development patterns will be addressed. Estimates of potential dollar losses and the methodology used to arrive at those estimates will also be described during this application process.

The National Oceanic and Atmospheric Administration (NOAA)/National Weather Service (NWS) LaCrosse Office created a Natural Hazards Assessment for Richland County in January 2009. This document outlines, using their historical data, hazards faced in the county. This document served as a source for information for this plan and is a valuable adjunct to other state and local hazard assessments. It can be found online at http://www.crh.noaa.gov/images/arx/nathaz/RIChazards.pdf

Wisconsin Emergency Management (WEM) develops and maintains the Hazard Analysis for the State of Wisconsin. The State Hazard Analysis describes all hazards that have occurred or are most likely to occur within the state. The analysis includes the frequency of occurrence, potential impacts and suggested actions to mitigate the hazard. This hazard analysis is the basis for the development of all emergency management plans. The State Hazard Analysis is updated and distributed on a biennial basis to county emergency government coordinators and other emergency management participants.

The Richland County Emergency Management Director develops and annually updates a listing of all hazards that have occurred or could occur within the county. This listing includes the definition, frequency of occurrence and actions to mitigate the hazard. In general, the threat of most hazards is consistent throughout the county. The only hazard where there were differences identified within the county was for flooding and for that hazard, specific locations are identified.

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

Each community will be given a copy of the plan to use as a reference during their own preparedness activities (i.e., planning, training, permitting, zoning). The county, which has its own comprehensive plan representing all of the jurisdictions except for the Towns of Forest, Ithaca and Marshall will reference this mitigation plan and its contents in the next scheduled plan update. The Towns of Forest, Ithaca and Marshall completed their own comprehensive plans and will also be provided a copy of this mitigation plan for reference in their next updates. Members of the County Zoning and municipal departments were included on the Hazard Mitigation Workgroup and are aware of the benefits and requirements to utilizing this plan as they go about their preparedness activities.

All Hazards

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

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

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

Vulnerability

Perhaps the largest risk that falls under the all-hazards banner is the continuing challenge of securing funding to keep up with the rapid technological changes and advances in the public safety communications infrastructure.

Another vulnerability is the fact that not all agencies that work together in disaster response and recovery can communicate with one another (i.e., are interoperable). Local first response agencies

are on the same band (i.e., VHF) and are generally able to communicate with one another but the school bus system, critical as a resource for transportation and evacuation in disaster operations is on the UHF band. Also the amateur radio group (ARES/RACES) that provides back-up communications in a disaster is also on the UHF band.

One other point of vulnerability is that the main community radio station (WRCO FM & AM) for the county, which broadcasts all local emergency and public information messages in disasters, is in an area that easily floods. In previous flood, radio station personnel were rescued from the station in boats. This concern was somewhat mitigated because back-up broadcast equipment was installed in the County EOC in 2008 to provide emergency broadcast capability. This is not the optimal situation for either the station or the EOC.

Hazard Mitigation Strategies

In general, most of the projects that can be done with current budgetary dollars are not capital improvement projects and are not very expensive. Projects that require significant capital outlays are, for the most part, grant-dependent. Since the profile (e.g., economic, geographic) of an area may change between the identification of a project in this plan and the availability of grant funds, projects will be identified within the plan and be slated for detailed study and analysis at such time as grants become available. The detailed study will identify the types and numbers of existing and future structures, the potential dollar losses to vulnerable structures and the lead agency or department who will manage the project. At that point, grant-eligible projects will be evaluated using the appropriate grant criteria for factors such as:

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

The hazard mitigation strategies listed below are not “bricks and mortar” changes. Rather, they are enhancements to computer and radio equipment and plans that allow better communication with the public in times of crisis and therefore do not reduce effects for existing or future buildings and infrastructure.

Public Alert and Notification

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

- Facilities, systems and procedures to activate warning and communication capabilities,

- Systems to support communications, including:

    - Sirens to warn the public. The current status of sirens in the county is:

        - Richland Center has four sirens and they need two more at approximately $15,000 each.
        - Viola has two sirens and they need one more at approximately $15,000 each.
        - Sextonville, Gotham, Rock Bridge and Hub City would all like sirens at approximately $15,000 each.
        - Lone Rock and Cazenovia each have a siren that has to be activated by a person pushing an on-site button for 15 seconds. They would like to tie the activation of these sirens into dispatch. The cost of this would be approximately $7,000 each.

        - The county would like also to explore installing audible warning/talking" sirens at campgrounds at approximately $20,000 each.

    - Telephone and radio to notify public personnel

    - Local television, radio and newspaper to spread warning information. To improve this capability, the county and the City of Richland Center would like to assist the main, privately-owned community radio station (WRCO 100.9 FM & 1450 AM) with moving to a more secure location out of the danger of flooding. A mitigation grant application was submitted (under the 2008 flooding declaration mitigation dollars) to Wisconsin Emergency Management. The estimated cost of this high-priority project is $480,000 total with the City of Richland Center supplying 12.5%, or $60,000.

  - Local law enforcement, fire and rescue communications
  - An emergency communications center.

- Richland County Sheriff's Office to receive and distribute warning information to the public and emergency management agencies.

During an emergency, the general public receives information by sirens, NOAA weather radio, local broadcast or printed media, door-to-door notification by emergency services personnel and a mobile public address system. It should be noted that the ability to use the NOAA weather radio system for an expanded list of emergency messages is a positive move that makes this alert and warning tool even more valuable. As a result, Richland County will continue to promote increased use of these radios among the public as a high priority project using current departmental funding.

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

Richland County should be capable of the following:

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

Richland County will prepare facilities, systems and procedures to activate warning and communication. During an emergency, Richland County will deliver prompt and accurate warnings to businesses and residents.

Communications Technology/Interoperable Communications

The county budget to maintain communications systems has thus far been sufficient and it as technology improves and additional interoperability grant funding is made available, the County Emergency Management Department and the Sheriff's Office will monitor and improve the system as able. Richland County has recognized the need to improve communications and has generally provides local funding, matched with grants as awarded, for one improvement project per year:

- 2005
    - Added amateur radio (ARES/RACES) support infrastructure and generator back-up to the County Emergency Operations Center (EOC)
    - Upgraded the consoles in the 911 Dispatch Center
- 2006 – Purchased as satellite phone for the EOC
- 2007 – Upgraded the EOC's information technology
- 2008 - Purchased and installed a projector, wireless internet, a Davis weather station and amateur radio upgrades for the EOC
- 2009
    - Radio Over Internet Protocol (ROIP) and Spillman were installed in the 911 Dispatch Center in March
    - Purchase and install a paging base station in the EOC. (scheduled)

The county would like to complete the following interoperability projects as funding allows:

- Continue to improve the interoperable communications capability of the County EOC and the County 911 Dispatch Center. As these high priority projects are identified and costs projections are made, the county will seek grant funding to help meet costs. Those that can be funded with local funding will be pursued.

- The County would also like to create a disaster communications plan that can serve as the initial, basic template for parsing out channels to first responder ICS elements in a disaster situation. This medium priority task can be accomplished using current department funding.

- Improve interoperability with the public school bus systems (i.e., the Ithaca, Weston and Kickapoo Districts). Ithaca and Weston do not have any radio capabilities and Kickapoo should be moved from the UHF radio band to the VHF radio band so that they can communicate with other responders in a disaster. This low priority project will be sought as funding allows.

- Richland County received a $347,000 grant from the Wisconsin Public Service Commission (PSC) to upgrade the 911 Dispatch Center so that staff might be able to locate emergency calls being generated from a cellular telephone. Grant funds were used to purchase software from Spillman to help better manage address data. The grant also provided funding to improve GIS data layers used by the 911 Dispatch Center. This high priority project was completed, ahead of its 2010 scheduled date, in April 2009.

- The county is installing a new server and software to facilitate data sharing between Zoning and the Sheriff's Office Dispatch Center for better access to the GIS mapping layers used by the dispatch center to support emergency operations. This $117,000, high-priority project is being funded by Richland County money and is scheduled for completion in 2009.

- The county would like to install a Reverse 911 system for county residents. This system allows officials to call local telephones, divided as determined by the officials, with a prerecorded emergency message. The county has conducted a cost-benefit analysis on this project and it was determined to be cost-prohibitive at this time. Staff will continue to monitor the technology and its costs to see if this project becomes feasible.

The radio communication system owned and used by the Village of Viola is not reliable primarily due to terrain issues. This radio system is used by the public safety agencies in the Village including the Viola Fire Department, which also covers the Towns of Bloom, Forest, Marshall, Sylvan. The village, with county assistance and

support, would like to upgrade or relocate the tower to provide more reliable access. This project would cost approximately $30,000 and is dependent on the receipt of grant funding.

Website

Geographic information system (GIS) mapping data is available from the Richland County website. The County Emergency Management Office also has a general webpage at http://www.co.richland.wi.us/floodinfo/flood2008/index.html and has, in past disasters, been able to post links to disaster-specific information from FEMA, to volunteer, etc. In recognition of the importance of this communication tool, especially in pre-planning activities, county offices will review their web pages to ensure that important information and links for general preparedness topics are available from agencies such as the Department of Homeland Security/FEMA, the American Red Cross and Wisconsin Emergency Management. The county currently uses the website for warnings but would like to expand and use it for preparedness bulletins as well. An important part of this component is to ensure that the public is made aware of the expanded resources on the county website. This medium to high project will be funded with current budgetary allocations.

The county would also like to purchase and install three more weather data collected stations. The goal would be to purchase web-enabled devices that could share information with the National Weather Service as well as provide current information to citizens via the county preparedness website. One of the stations would be placed on the ARES tower in the northwest corner, which is also the highest point, in the county. Each unit costs approximately $500 plus it will take an additional $750 - $1,000 per unit for installation.

Community Volunteer Organizations

Richland County has worked with a variety of volunteer groups including Alert Cadet, which is a father/son group that takes training in standard first aid, CPR, the Incident Command System (ICS) and chainsaw safety. This group volunteered to do firewood and snow removal for mobile homes in Winter, 2007.

The county also uses the Amateur Radio Emergency Services (ARES) and the Radio Amateur Civil Emergency Services (RACES)

local volunteer group and their equipment to provide communications support in disaster situations.

Using current funding, Richland County, through the Emergency Management Office, will continue to support the proper integration of voluntary groups into structured disaster response.

Drought and Dust Storms

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

Dust storms result from a combination of high winds and dry, loose soil conditions. While high winds and periods of drought have each occurred in Richland County, there has never been a recorded dust storm event. Since natural hazards that have occurred in the past are more likely to occur in the future, it is unlikely that a dust storm event will occur in Richland County. This assertion is further bolstered by the fact that there is very little irrigation done within the county and that the soils in Richland County are not prone to blowing. While there are concerns about topsoil erosion and some mitigation activities may be planned that would reduce the effects of these types of events, they will not be a major focus of this plan.

Physical Characteristics

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

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

climates can be represented in the same way and wet periods can also be monitored using the SPI.

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

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

http://www.drought.unl.edu/whatis/indices.htm#spi

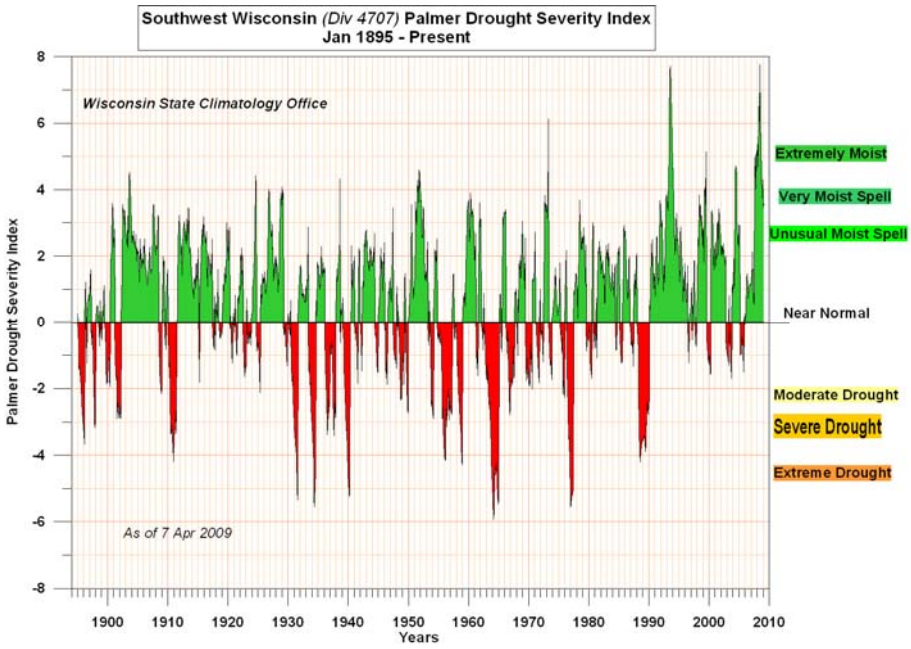
The Palmer Index is an older scale and is used more often by governmental organizations. It is effective in determining long-term drought (i.e., over several months) and is not as good with short-term forecasts (i.e., weeks.) It uses a zero as normal; drought is shown in terms of negative numbers and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

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

Frequency of Occurrence

Drought is a relatively common phenomenon in Wisconsin and has occurred statewide in 1895, 1910, 1939, 1948, 1958, 1976, 1988, 1992, 2003 and 2005. According to the NOAA/NWS-LaCrosse Natural Hazards Assessment for Richland County, periods of "abnormally dry to moderate drought conditions can occur quite frequently" while "severe to extreme droughts occur far less frequently." (p.8) The 1976 drought received a Presidential Emergency Declaration with damage to 64 Wisconsin counties, including Richland. Estimated losses of $624 million primarily affected the agricultural sector. Reports show that Richland County was as affected as the rest of the state in this drought, receiving money for emergency feed programs for livestock and for increased fire protection of its wilderness areas. It should be noted that only 19% ($119,434,924) of this loss was compensated by any federal program.

The Palmer Index chart for the years between January, 1895 and April 7, 2009 in Southwestern Wisconsin, which includes Richland County, follows:



http://www.aos.wisc.edu/~sco/clim-watch/graphics/pdsi-ts-07-l.gif

On July 15, 2005, the Governor declared a drought emergency for the entire state of Wisconsin. This declaration, the first since August 2003, allowed farmers access to additional water for crop

irrigation. The National Weather Service did not record any drought or dust storm events for Richland County between 1 January 1950 and 31 December 2008:

Considering past occurrences, it can be surmised that Richland County has a low probability of drought occurrence in the future and the likelihood of damage due to drought is considered low for agricultural losses and low for other types of losses.

Vulnerability

Droughts and dust storms could impact Richland County disproportionately because approximately 68% of the land area is used for agricultural activities. Drought generally impacts farm output by reducing crop yields and the health and product output (e.g., milk) of livestock. As a result, a drought will seriously impact the economy of the entire county. Dust storms impact farms in the long term by blowing away the top levels of soil, which are the richest. This could economically impact the county by reducing its long-term viability for farming. Drought is also a major risk factor for wildfire.

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

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

Hazard Mitigation Strategies

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

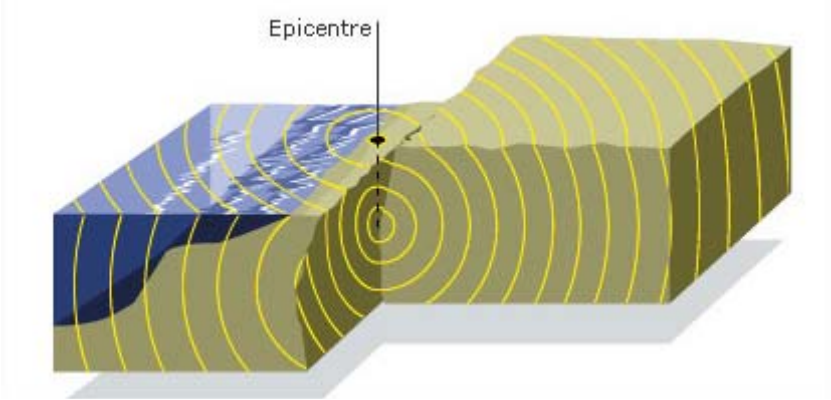
Richland County farmers can contact the Richland County U.W. Extension Office and the Department of Agriculture Stabilization and Conservation Service (ASCS) for information and guidance related to drought and the purchase of crop insurance. Various federal and state publications are available regarding ground water movement, the hydrologic cycle and irrigation methods. These agencies are also the lead agencies for obtaining emergency food and water supplies for agricultural use and for providing information regarding crop insurance. The Wisconsin Department of Natural Resources (DNR) also can provide assistance and permits for stream pumping for farms.

Municipalities and the county will work together to ensure that drought considerations are included in emergency plans and will provide emergency information to homeowners as needed. The County Emergency Management Department will also place a link to the National Weather Service – LaCrosse drought index on the preparedness website.

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

Earthquakes

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



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

Physical Characteristics

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

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

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

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

Earthquake PGA, Magnitude and Intensity Comparison Table

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

Wald, Quitoriano, Heaton and Kanamori, 1999

Most of Wisconsin's occurrences have not been severe, with only one registering 5.1 on the Richter Scale.

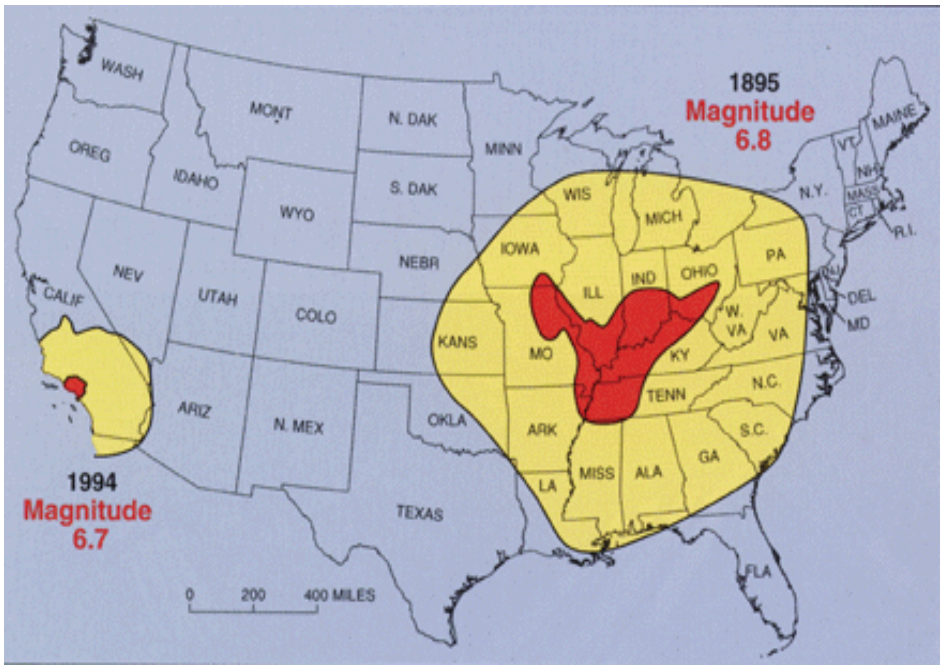
Frequency of Occurrence

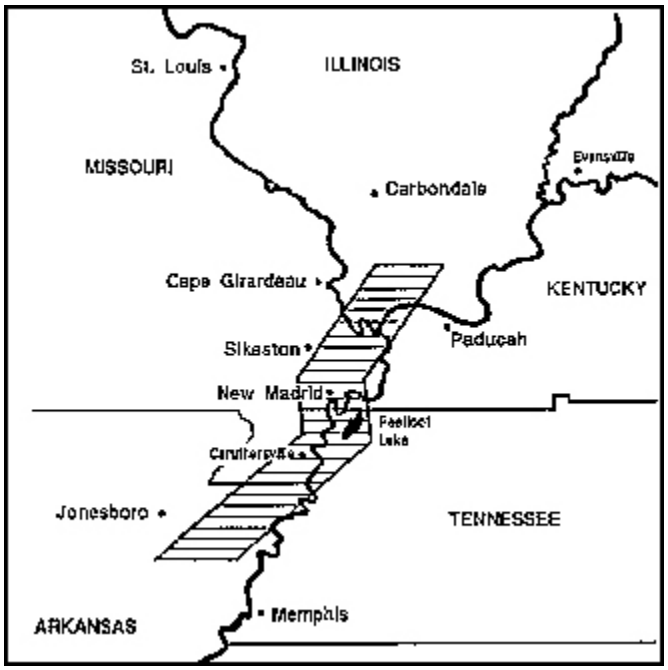
Earthquakes that have affected Wisconsin from 1899 to 1987 are listed in the table that follows. The most severe earthquake in Wisconsin was the record earthquake of 1811, centered along the New Madrid Fault. Most earthquakes that do occur in Wisconsin are very low in intensity and can hardly be felt. These very minor earthquakes are fairly common, occurring every few years. Events of moderate magnitude have occurred in locations in Illinois and Michigan. Those and other stronger earthquakes centered in other parts of the country have been felt primarily in Southern Wisconsin.

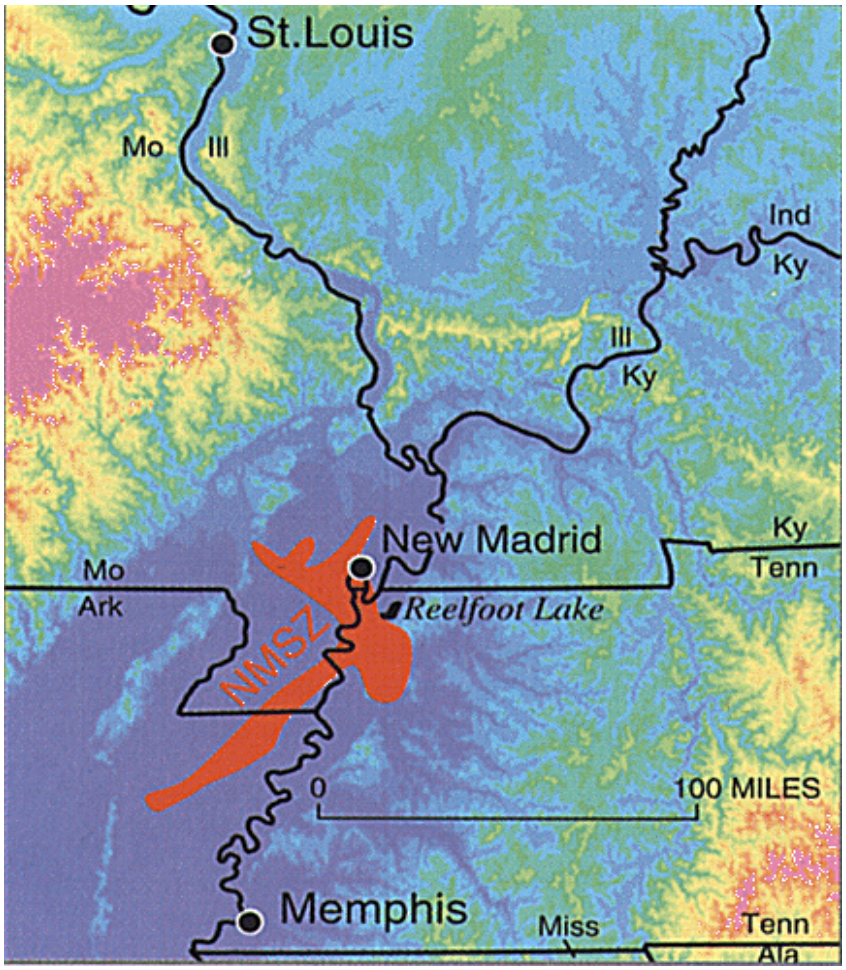
Date	Location	Latitude North	Longitude West	Maximum Intensity	Magnitude
10/12/1899	Kenosha	42° 34’	87° 50’	II	3.0
3/13/1905	Marinette	45° 08’	87° 40’	V	3.8
4/22/1906	Shorewood	43° 03’	87° 55’	II	3.0
4/24/1906	Milwaukee	43° 03’	87° 55’	III	--
1/10/1907	Marinette	45° 08’	87° 40’	III	--
5/26/1909	Beloit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

The nearest major active fault is the New Madrid Fault, stretching along the central Mississippi River Valley in Missouri. In recent years, considerable attention has focused on seismic activity in the New Madrid seismic zone that lies within the central Mississippi Valley, extending from northeast Arkansas through southeast

Missouri, western Tennessee and western Kentucky to southern Illinois. Scientists at the Center for Earthquake Information have computed a set of probabilities that estimates the potential for different magnitude earthquakes to occur at the New Madrid Fault. Even an 8.3 magnitude earthquake at the New Madrid Fault, however, would cause only minor damage in the southeastern corner of Wisconsin. At this time it is not possible to predict the exact date, duration or magnitude of an earthquake.







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

Vulnerability

Any impact in the community from earthquake would likely be due to a few broken windows and personal effects that fell in the

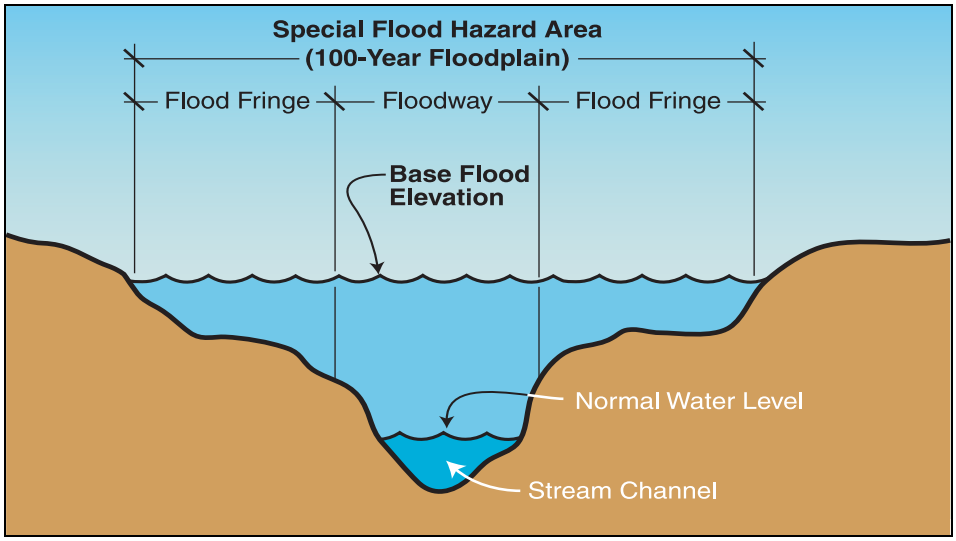
earthquake. The damage to critical infrastructure and buildings would be negligible.

Hazard Mitigation Strategies

Since Richland County is not likely to suffer directly from a severe earthquake, the community impacts are not considered significant and mitigation planning for this hazard is not necessary. The goal for this section of the plan is therefore to educate on the very low risks of earthquake damage in Richland County.

Flooding and Dam Failure

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



FEMA, August 2001

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

Physical Characteristics

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

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

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

Richland County Flooding 2008
http://www.co.richland.wi.us/floodinfo/flood2008/slideshow/html/helper.htm

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

Terms commonly used when referring to flooding are "100-year flood" and "flood plain." A "100-year flood" is defined as the flood water level that can be expected to occur or to be exceeded in a given location once every 100 years. There is a one percent chance of a flood of such magnitude or greater occurring in any given year. The DNR, working with local zoning offices, has designated flood plain areas as those places where there is the greatest potential for flooding. In February, 2006 FEMA also completed a Flood Insurance Study to revise and update information on the existence and severity of flood hazards in

Richland County and its municipalities. (The document is available from the Richland County Emergency Management Office.)

Flooding may also occur due to a dam breach or overflow. Dams are barriers built across a waterway to store, control or divert water; a dam failure is a failure of the dam that causes downstream flooding. Failures may be caused by technological events (e.g., materials failure) or by natural events (e.g., landslide, earthquake) with flooding being the most common result.

Richland County has 155 small, uncontrolled agricultural dams included in the Wisconsin Department of Natural Resources (DNR) database:

Dam Official Name	Type	Latitude	Longitude	Owner Type	Waterway Name
PARFREY	LARGE	43.33552	-90.39138	CITY	PINE
RODOLF	LARGE	43.2235529	-90.4662658	VILL	MILL CREEK
CAZENOVIA	LARGE	43.5253504	-90.1962239	VILL	LITTLE BARABOO R
MILL CREEK 3	LARGE	43.33387	-90.57271	LCD	CORE HOLLOW CREEK
MILL CREEK 1B	LARGE	43.3665249	-90.4963991	LCD	CREEK 9 6 TR EAST BRANCH MILL
MILL CREEK 13A	LARGE	43.38228	-90.50309	LCD	EAST BRANCH MILL CREEK
MILL CREEK 13B	LARGE	43.39135	-90.4974	LCD	TR EAST BRANCH MILL CREEK
MILL CREEK 10	LARGE	43.45369	-90.56542	LCD	CREEK 11 16 TR MILL CREEK
MILL CREEK 22	LARGE	43.4069852	-90.6116748	LCD	TR WEST BRANCH MILL CREEK
SCHOLTEN	LARGE	43.2303176	-90.3614392	PRIV	TR WISCONSIN
BERNS, DANIEL	SMALL	43.3603423	-90.2118889	PRIV	SPRING FLOW FROM JACQUISH HOL
HUFFMAN BROTHERS	LARGE	43.4480658	-90.3777808	PRIV	TR-WEST BRANCH PINE
BRIMSTONE GROUP	LARGE	43.2358061	-90.5294261	PRIV	TR-WISCONSIN RIVER
MEINHARDT	LARGE	43.4607938	-90.2983422	PRIV	TR-HAWKINS CREEK
PETERSON	LARGE	43.2497691	-90.5539983	PRIV	TR-STREAM 24-9
BERNSTEIN	LARGE	43.3925912	-90.4578401	PRIV	TR-HORSE CREEK
BARRETT	LARGE	43.38399	-90.5754	PRIV	NON-NAV TRIB TO W.BR.MILL CR.
CALHOUN	LARGE	43.5303833	-90.3249362	PRIV	NO WATERWAY
CRUSON SLOUGH	LARGE	43.1932059	-90.2394625	DNR	TR-WISCONSIN RIVER
MOTT	LARGE	43.4099522	-90.283935	PRIV	TR-WHEAT HOLLOW CREEK
JORDON #1	LARGE	43.4650178	-90.2801378	PRIV	TR-HAWKINS CREEK
JORDON #2	LARGE	43.46215	-90.28454	PRIV	TR-HAWKINS CREEK

Dam Official Name	Type	Latitude	Longitude	Owner Type	Waterway Name
JORDAHL	LARGE	43.4608027	-90.3658489	PRIV	UNNAMED
NORTH PORK MANURE PIT	LARGE	43.45052	-90.54525	PRIV	COULTER HOLLOW CR
MIKE MEREDITH	SMALL	43.2435487	-90.5335189	PRIV	BRIMSTONE HOLLOW CREEK
ITHACA MILL	SMALL	43.3412656	-90.2866741	PRIV	WILLOW CREEK
BAMBOS, IRWIN J.	SMALL	43.213158	-90.3069855	PRIV	GULLEY
BENTON, WILLIAM	SMALL	43.3574723	-90.5635674	PRIV	TR-W.BRANCH MILL CREEK
BLANCHARD,LEIGHTON	SMALL	43.3698832	-90.3484487	PRIV	TR-9-9 TRIBUTARY
BROKOP,ALFRED	SMALL	43.513731	-90.2451371	PRIV	TR-BAUER VALLEY CREEK
BUTTON, DICK	SMALL	43.2898293	-90.4565453	PRIV	GULLY
CARROLL, DANIEL J	SMALL	43.4732253	-90.3437923	PRIV	TR-SOULES CREEK
DEITZ, ROBERT	SMALL	43.4773757	-90.3681994	PRIV	TR-PINE RIVER
DANIELS, PATRICK	SMALL	43.5293777	-90.2830843	PRIV	TR-CAZENOVIA BRANCH CREEK
DEFILLIPPO, LOUIS	SMALL	43.4741418	-90.4729857	PRIV	TR-BLOOM 26-9
DENNIS, JACK	SMALL	43.3047669	-90.5378016	PRIV	GULLY
DUERKSEN, BARBARA	SMALL	43.4622382	-90.516141	PRIV	GULLY
EL PAC RANCH INC NO.1	SMALL	43.4358212	-90.5504816	PRIV	MILL CREEK
EL PAC RANCH INC NO.2	SMALL	43.4354062	-90.5512217	PRIV	MILL CREEK
FARNSWORTH, WALLACE	SMALL	43.44754	-90.5125504	PRIV	TR-FANCY CREEK
FIEDLER, RICHARD	SMALL	43.3368689	-90.347019	PRIV	TR-SPRING CREEK
FRUIT, GARLAND	SMALL	43.3938353	-90.4517826	PRIV	GULLY
HENRY, RAYMOND NO.1	SMALL	43.4395523	-90.4002317	PRIV	NOT A WATERCOURSE
HENRY, RAYMOND NO.2	SMALL	43.4400097	-90.4008147	PRIV	TR-ROCK RIDGE 15-7
HOUSNER, R.E.	SMALL	43.4691763	-90.3562085	PRIV	TR-PINE RIVER
JERRETT, GARY	SMALL	43.552389	-90.2836832	PRIV	NON- NAV TR. CAZENOVIA BRANCH
JOHNSON, ROGER	SMALL	43.5252629	-90.5877698	PRIV	TR-CAMP CREEK
KADERAVEK,JOHN	SMALL	43.4733302	-90.2092309	PRIV	TR-WILLOW
KENN, EDWARD	SMALL	43.5265092	-90.2353477	PRIV	NOT A WATERCOURSE
MILLER, CECIL K.	SMALL	43.5412472	-90.6261875	PRIV	GULLY
MURPHY, JOHN	SMALL	43.3984456	-90.5633217	PRIV	TR-PINE VALLEY CREEK
NACHTIGAL, JAMES	SMALL	43.5226469	-90.4352266	PRIV	TR-PINE RIVER
OATES, HOWARD	SMALL	43.4073367	-90.6555302	PRIV	TR-KNAPP CREEK
OLSON, DARRELL	SMALL	43.2615422	-90.318569	PRIV	GULLY
PETERSEN,LORENZ	SMALL	43.3660866	-90.3245009	PRIV	WILLOW CR.
REIMANN, CARL	SMALL	43.243951	-90.4148502	PRIV	GULLY
ROHN, WILLIAM JR.	SMALL	43.4141459	-90.3837139	PRIV	TR-PINE RIVER
KAUFFMAN,JOHN	SMALL	43.3871946	-90.5253758	PRIV	BR MILL CREEK
ROBB, JAMES G	SMALL	43.416497	-90.2435687	PRIV	TR-WILLOW CREEK
ANDERSON,HARDEN NO.1	SMALL	43.2735104	-90.5403476	PRIV	TR-MILL CREEK

Dam Official Name	Type	Latitude	Longitude	Owner Type	Waterway Name
ANDERSON,HARDEN NO.3	SMALL	43.2690626	-90.5349659	PRIV	DRY RUN
ANDERSON, LAVAUGHN	SMALL	43.5336959	-90.4498583	PRIV	TR-PINE RIVER
BARTH,JOHN H.	SMALL	43.4752308	-90.3502536	PRIV	TR-SOWLES CREEK
BENNETT,MARTIN	SMALL	43.5087215	-90.4504504	PRIV	UNNAMED STREAM
BERNS,DANIEL	SMALL	43.5429721	-90.6200444	PRIV	TR-GOOSE CREEK
BLOOD,CHARLIE W.	SMALL	43.4564974	-90.4022881	PRIV	TR-WEST BRANCH PINE RIVER
BRIDGEMAN,R.J.	SMALL	43.2319073	-90.5077495	PRIV	TR-WISCONSIN RIVER
CAMPBELL,RODERICK	SMALL	43.4931669	-90.3556293	PRIV	TR-MELANCTHON CREEK
COOPER,GERALD	SMALL	43.382332	-90.3374551	PRIV	TR-BUCK CREEK
DAHL, ARTHUR H.	SMALL	43.4646995	-90.5914547	PRIV	TR-MILL CREEK
EWING, LEE	SMALL	43.2942702	-90.401154	PRIV	TR-ASH CREEK
FARNSWORTH, WALLACE	SMALL	43.4473099	-90.5144531	PRIV	TR-FANCY CREEK
FUHLBRUGGER, HENRY	SMALL	43.5226171	-90.4732714	PRIV	TR-WEST BRANCH-PINE RIVER
GEIMER, ROBERT J.	SMALL	43.4214331	-90.5642427	PRIV	TR-MILL CREEK
GOMER, ROBERT	SMALL	43.4015999	-90.3391615	PRIV	INTERMITTENT STREAM
GRASSMAN,LOUIS J.	SMALL	43.3814738	-90.2497085	PRIV	TR-WILLOW CREEK
JORDAHL, HAROLD	SMALL	43.4668929	-90.414626	PRIV	TR-WEST BRANCH PINE RIVER
MARONIC,JOHN	SMALL	43.5322673	-90.4522552	PRIV	TR-PINE RIVER
MOE, GILMAN	SMALL	43.4419732	-90.2381059	PRIV	NON-NAV TRIB. TO WILLOW CR.
OLER,LLOYD	SMALL	43.3622639	-90.3139041	PRIV	WILLOW CR.
PITTMAN,ROBERT	SMALL	43.3614894	-90.4585438	PRIV	TR-BRUSH CREEK
REED, ROBERT	SMALL	43.5006203	-90.6579258	PRIV	TR-KICKAPOO RIVER
RIPLEY,CLIFFORD	SMALL	43.4067493	-90.2287936	PRIV	TR-WILLOW CREEK
RUDERSDORF, RAY	SMALL	43.2890405	-90.4722319	PRIV	TR-ASH CREEK
SCHWARTING,WILLIAM	SMALL	43.3763293	-90.3377312	PRIV	TR-PINE RIVER
SOMMER JR, EUGENE	SMALL	43.306467	-90.4721843	PRIV	TR-HOOSIER HOLLOW CREEK
STRAIGHT, BEN	SMALL	43.3826947	-90.4154353	PRIV	TR-HORSE CREEK
SYMONS, JOHN	SMALL	43.4299697	-90.5055546	PRIV	UNNAMED
ZIETZ, FRED	SMALL	43.4302801	-90.4208648	PRIV	NO WATERWAY
KOOIMAN, DIRK	SMALL	43.4295478	-90.2622066	PRIV	UNNAMED
BREWER,V.W.	SMALL	43.4391032	-90.353884	PRIV	TR-PINE RIVER
HOUSNER, DR.R.E.	SMALL	43.4652537	-90.3555251	PRIV	TR-PINE RIVER
GROH, RUPERT	SMALL	43.3501686	-90.5282821	PRIV	TR-MILL CREEK
WASHO,NORMAN	SMALL	43.4980617	-90.3510075	PRIV	TR MALANCTHON CREEK
DAVIS, CORY	SMALL	43.3281389	-90.4287242	PRIV	CENTER CREEK

Dam Official Name	Type	Latitude	Longitude	Owner Type	Waterway Name
BROWN,DEWEY	SMALL	43.4620078	-90.4253587	PRIV	TR WEST BR PINE RIVER
FISK, LLOYD	SMALL	43.4029382	-90.3091914	PRIV	TR LITTLE WILLOW RIVER
ROVELSTAD,STAN	SMALL	43.4253608	-90.5296766	PRIV	TR MILL CREEK
DONNELY, JAMES J	SMALL	43.4650778	-90.4521052	PRIV	TR WEST BRANCH PINE RIVER
MILL CREEK 6	SMALL	43.4110593	-90.6082606	PRIV	WEST BRANCH-MILL CREEK
TAVE,STUART M.	SMALL	43.3619718	-90.6607367	PRIV	KNAPP CREEK
BOWEN, FRANK	SMALL	43.3740191	-90.3828588	PRIV	PINE RIVER
HALINK, ALLEN	SMALL	43.3249591	-90.4584731	PRIV	GULLY TO BRUSH CREEK
PITTMAN, ROBERT & LICK, MORSE	SMALL	43.3519596	-90.4612908	PRIV	GULLY TO BRUSH CREEK
PITTMAN, R. AND BUROKER, E.	SMALL	43.345756	-90.4608646	PRIV	GULLY TO BRUSH CREEK
GOPLIN, DONALD	SMALL	43.3331092	-90.4387611	PRIV	GULLY TO BRUSH CREEK
HUTH, CARL	SMALL	43.3572691	-90.465544	PRIV	GULLY TO BRUSH CREEK
HENRY,RAY	SMALL	43.4382316	-90.3986519	PRIV	TR-PINE
LOUIS, JOHN	SMALL	43.31486	-90.2607762	PRIV	TR WILLOW CR.
ROHN, CLARENCE	SMALL	43.2659885	-90.2666448	PRIV	TR-PINE
WILLIAMS-KINNEY	SMALL	43.2729085	-90.6453573	PRIV	TR-KNAPP CR
ANDERSON, JOYCE	SMALL	43.5353379	-90.6403782	PRIV	GULLY TO GOOSE CK
WALTHER, LEVI	SMALL	43.3266128	-90.5748112	PRIV	GULLY TO CORE HOLLOW CREEK
WILSON, CHARLES	SMALL	43.4646373	-90.5074144	PRIV	UNNAMED TRIB TO FANCY CREEK
ACCOMANDO, FRANK	SMALL	43.3087135	-90.5042134	PRIV	TR-FOX HOLLOW CR
UNBEHAUM, JOHN	SMALL	43.3792337	-90.4518458	PRIV	TR-HORSE CR
BERGMAN, FRED	SMALL	43.4002244	-90.3161348	PRIV	TRIB. TO LITTLE WILLOW CR.
KELLER, ALEXANDER	SMALL	43.340635	-90.4443038	PRIV	TRIB TO BRUSH CREEK
SEBRANEK,LARRY	SMALL	43.2382044	-90.2245628	PRIV	BEAR CREEK
FRUIT,GARLAND	SMALL	43.3954154	-90.4618842	PRIV	HORSE CREEK
TRIGGS, JOE	SMALL	43.3857058	-90.4990966	PRIV	GULLY TO MILL CREEK
SEEP, WILLIAM	SMALL	43.486912	-90.2732025	PRIV	TRIB. HAWKINS CREEK
CHITWOOD, RUBY	SMALL	43.2260846	-90.5852395	PRIV	WISCONSIN RIVER
STAFFORD, RAYMOND	SMALL	43.3440731	-90.3218589	PRIV	
SCOVILLE, LEVI	SMALL	43.5498434	-90.3385187	PRIV	RICHARDSON HOLLOW CREEK
ANDERSON, FAYE NO.1	SMALL	43.4070752	-90.2991398	PRIV	GULLY
ANDERSON, FAYE NO.2	SMALL	43.4012663	-90.2987216	PRIV	GULLY
ANDERSON, FAYE NO.3	SMALL	43.40866	-90.30376	PRIV	GULLY
ANDERSON, FAYE NO.4	SMALL	43.4076726	-90.3009386	PRIV	GULLV
HUEBSCH	SMALL	43.3492709	-90.209021	PRIV	PUMPKIN HOLLOW CREEK (NON NAV
FLICKINGER	SMALL	43.5081578	-90.6574094	PRIV	TRIB KICKAPOO R

Dam Official Name	Type	Latitude	Longitude	Owner Type	Waterway Name
STANFORD KIM WILLIAMS POND	SMALL	43.5180522	-90.3912352	PRIV	PINE R. - TRIB
PAVLOVIC	LARGE	43.5112896	-90.6076048	PRIV	CAMP CR TRIB - UNNAMED
JUDSON DAM	SMALL	43.5086214	-90.3555151	PRIV	JUDSON SPRING
LOOMIS, NEIL	SMALL	43.4604281	-90.4931315	PRIV	TRIB OF FANCY CREEK
RICHLAND CENTER		43.3491384	-90.385853	CITY	
WILSON DAM	SMALL	43.4606622	-90.6406629	PRIV	
SPENCER DAM	SMALL	43.4498712	-90.2114121	PRIV	
LUTTIG DAM	SMALL	43.3762698	-90.4941903	PRIV	
BAILEY DAM	SMALL	43.4042991	-90.4288077	PRIV	TRIB TO FANCY CREEK
DUREN'S MILL DAM		43.5208045	-90.2175379		LITTLE BARABOO RIVER
EXCELSIOR DAM		43.253729	-90.6088536		KNAPP CREEK
TWIN BLUFFS DAM		43.2801884	-90.3036565		WILLOW CREEK
CAMP CREEK DAM		43.4978249	-90.7690742		CAMP CREEK
BOAZ DAM		43.3304327	-90.5279147		MILL CREEK
YUBA DAM		43.5285573	-90.4200956		WHITE PINE RIVER
LONE ROCK MILLS DAM		43.2054858	-90.2358465		BEAR CREEK
GREENE	SMALL	43.4489715	-90.2105038	PRIV	
MILL CREEK 9A	LARGE	43.44162	-90.57774	LCD	MILL CREEK OFFSTREAM
SEBRANEK,LARRY	SMALL	43.2310541	-90.2272194	PRIV	BEAR CR.
SPEAR, DR J.I.	SMALL	43.36623	-90.3664	PRIV	TR-PINE RIVER
CUNNINGHAM, JAMES	SMALL			PRIV	U/N TRIB TO LITTLE BARABOO R
ALBRECHT, RICHARD DAM	SMALL	43.3915571	-90.3374431	PRIV	U/N TRIB. TO PINE RIVER
FAIRBROTHER, MERWIN	SMALL	43.4572621	-90.4134081	PRIV	U/N TRIBUTARY TO W BR. PINE R
HOFFMAN, JOHN		43.3775589	-90.6125104	PRIV	U/N TRIB. TO W. BR. MILL CR

Most of these dams are small, mill-type dams under the jurisdiction of the DNR; many are privately owned. There are no dams in other counties that pose a significant flooding risk to the citizens of Richland County.

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

Watersheds

Richland County has seven watersheds. The maps in Attachment D show the hydrologic profile and the 100-year flood plains for the entire county. Following is a brief description of each watershed:

Middle Kickapoo River

The Middle Kickapoo River Watershed is located in central Vernon County but it also includes portions of south central Monroe County and northwest Richland County. This watershed includes all streams that flow to the Kickapoo River between Ontario and Readstown. The topography of the Middle Kickapoo River Watershed is quite severe with steep wooded hillsides and narrow valleys which limits the majority of farmland in this watershed to the ridgetops. Only a small portion of the Middle Kickapoo River Watershed contains wetlands and they are concentrated along the Kickapoo River, Weister Creek and Warner Creek. An abundance of trout streams drain this watershed. Recently the section of the Kickapoo River in this watershed was classified as Class II trout.

Upper Pine River Watershed

The 188.5 square mile Upper Pine River watershed lies mostly in north central Richland County with a small portion in Vernon County. Streams in the watershed have a high gradient and water quality is generally good. Nearly all of the streams in the watershed are cold water streams and can support trout and other cold water species. Like other watersheds in the Lower Wisconsin Basin, agriculture is the dominant land use in the watershed. Currently, the overall trend in Richland County is from intensive agriculture to hobby farming. The exception to this transition in land use is near the upper end of the Pine River. There are few wetland complexes in the watershed. Many of them are wet meadows adjacent streams that have been degraded by grazing or cultivation. One exception to this is a northern bog wetland complex near Hub City. This type of wetland is very rare in this part of the state.

Crossman Creek and Little Baraboo Watershed

The Crossman Creek and Little Baraboo River Watershed lies in northwestern Sauk County, southern Juneau County, northeastern

Richland County and the southeast corner of Vernon County. It is also in the driftless, or unglaciated, region of Wisconsin. The dominant land use in the watershed is agriculture. Forest and grassland also cover a large portion of the watershed.

Knapp Creek Watershed

The Knapp Creek watershed covers approximately 154 square miles and is located in the driftless area of western Richland and eastern Crawford counties. There are no major municipalities in the watershed and overall population in 2000 was estimated to be fewer than 2,000. Most of the streams in the watershed drain to Knapp Creek. Knapp Creek empties into the Wisconsin River above Boscobel. Land cover in the watershed is mostly broad leaf deciduous forest, although a large portion of the watershed is used for agricultural production.

Mill and Indian Creek Watershed

This watershed is located in the unglaciated, or driftless, area of the state. Most of the streams in the watershed are tributary to Mill Creek which flows into the Wisconsin River by Muscoda. Many of these tributaries, particularly above Boaz, are trout streams. As with other watersheds in the basin, land use is predominately agricultural. Away from the Wisconsin River, wetlands are few and many of them have been grazed or cultivated. The only municipality in the watershed is the village of Boaz.

Willow Creek Watershed

The Willow Creek Watershed covers 160.5 square miles in Richland County. The watershed is within the driftless, or unglaciated, part of Wisconsin and major water resources in the watershed are Willow Creek and the section of the Pine River from Brush Creek at Richland Center downstream to the Wisconsin River. Richland Center is the main municipality in the watershed. Land cover in the watershed is primarily broad-leaf deciduous forest and agriculture. There are few wetland complexes in the watershed away from the Wisconsin River floodplain. These are usually adjacent streams and suffer from the effects of grazing or cultivation. There are some locally important, relatively undisturbed wetlands at the junctures of some of the larger streams.

Bear Creek Watershed

The Bear Creek watershed drains 126.5 square miles. Bear Creek, the main water resource in the watershed, drains to the Wisconsin River in southeastern Richland and southwestern Sauk counties. The southern portion of watershed lacks surface water features. Much of the watershed is in the driftless, or unglaciated, area of the state. The largest municipalities in the watershed are Lone Rock and Spring Green. The largest percentage of land cover in the watershed is broadleaf deciduous forest. Agriculture, particularly dairying, is the largest land use in the watershed. There are significant grassland, forest land and wetlands in the watershed. These small wetland complexes are typically wet meadows and are adjacent to the streams in the watershed. Some of the wetlands are locally significant for waterfowl as well as for other wildlife species.

http://dnr.wi.gov/org/gmu/lowerwis/watersheds.htm

Floodplain Regulations

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

Chapter 614, Laws of Wisconsin 1965, requires counties to adopt regulations giving all lands within 300 feet of navigable rivers or streams protection from haphazard development. Under this legislation, Richland County has adopted a zoning ordinance which gives a measure of protection to watersheds. The law protecting flood plains was created to meet the following objectives:

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

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

Frequency of Occurrence

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

Richland County does have a history of flooding problems, especially along the Wisconsin and Pine Rivers. Richland County has been included in nine Presidential Disaster Declarations requests for flooding, the most recent of which are detailed below:

- FEMA-1236-DR-WI: On July 24, 1998 the President declared a major disaster as a result of Severe Storms, Straight-Line Winds, Tornadoes, Heavy Rain and Flooding. Richland County received Public Assistance (PA) only.
- FEMA-1332-DR-WI: On July 23, 2000 the President declared a major disaster as a result of severe storms, tornadoes and flooding occurring from May 26, 2000 – July 19, 2000. Richland County received PA and Individual Assistance (IA).
- FEMA-1526-DR-WI: On June 19, 2004 the President declared a major disaster as a result of severe storms and flooding occurring from May 7, 2004 – July 3, 2004. Richland County received IA only.
- FEMA-1719-DR-WI: On August 26, 2007 the President declared a major disaster as a result of severe storms, tornadoes and flooding occurring from August 18-31, 2007. Richland County received IA & PA.
- FEMA-1768-DR-WI: On June 14, 2008 the President declared a major disaster as a result of severe storms, tornadoes and flooding occurring from June 5 – July 25, 2008. Richland County received IA & PA.

Following is a table with the 22 flood events recorded by the National Weather Service between 1 January 1950 and 31 December 2008:

Date	Location	Type	Death/Injury	Property Damage	Crop Damage
5/3/1993	Richland	Flood	Death/Injury: 0	5K	5K
2/20/1994	Viola	Flood	Death/Injury: 0	0	0
6/16/1996	Rockbridge	Flash Flood	Death/Injury: 0	250K	200K
3/30/1998	Richland Center	Urban/sml Stream Fld	Death/Injury: 0	0	0
6/27/1998	Richland Center	Flash Flood	Death/Injury: 0	15K	0
6/28/1998	Countywide	Flood	Death/Injury: 0	0	25K
6/10/1999	Southeast Portion	Flash Flood	Death/Injury: 0	25K	40K
5/31/2000	Countywide	Flash Flood	Death/Injury: 0	45K	30K
6/1/2000	Countywide	Flood	Death/Injury: 0	400K	140K
7/26/2000	North Portion	Flash Flood	Death/Injury: 0	30K	15K
5/8/2002	Richland Center	Flash Flood	Death/Injury: 0	4K	0
7/6/2002	West Portion	Flash Flood	Death/Injury: 0	1K	3K
5/21/2004	Countywide	Flash Flood	Death/Injury: 0	75K	50K
5/23/2004	Countywide	Flash Flood	Death/Injury: 0	30K	35K
8/18/2007	Richland Center	Flash Flood	Death: 1 Injury: 0	8.8M	300K
8/19/2007	Viola	Flood	Death/Injury: 0	150K	50K
8/19/2007	Yuba	Flash Flood	Death/Injury: 0	750K	25K
8/19/2007	Richland Center	Flood	Death/Injury: 0	100K	50K
6/7/2008	Cazenovia	Flash Flood	Death/Injury: 0	1.1M	1.0M
6/8/2008	Viola	Flood	Death/Injury: 0	2.2M	1.0M
6/8/2008	Sand Prairie	Flood	Death/Injury: 0	2.4M	1.0M
6/12/2008	Sand Prairie	Flash Flood	Death/Injury: 0	28K	3K

The following list summarizes damages attributed to flooding in Richland County by the National Flood Insurance Program through 31 January 2009.

Site	Dates of Loss	Building Claim ($)	Contents Claim ($)
S. Grove St. Richland Center	8/19/2007 6/9/2008	$13,541.65	$0.00
STH 80 Richland Center	8/18/2007 6/8/2008	$39,218.73	$0.00
CTH E Muscoda	9/14/1992 6/1/2000 8/19/2007	$52,886.43	$25,670.28
CTH D Cazenovia	8/19/2007 6/7/2008	$9,519.22	$0.00
W. Turner Ave. Viola	8/18/2007 6/8/2008	$79,807.14	$0.00

A careful review of the geography and history of flooding in Richland County leads to the conclusion that there is a very high probability of flooding in the future and a very high probability of damage and losses due to flooding. This flooding could occur due to river flooding, flash flooding or less likely, a dam failure.

Vulnerability

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

Residential structures may suffer from flooded basements, damaged septic systems and damaged functionals (e.g., HVAC systems, clothes washers and driers). Homes may also be impacted by sewer back-up and, if the home is not properly cleaned

after a flood, bacterial growth and mold may impact the home's air quality and cause illness among the occupants.

Businesses can suffer building and equipment damage similar to homes. Businesses may lose expensive product stored in basement or other low areas as well as the ability to operate from their facility. If the facility must close, its owners and employees will most likely suffer economic hardships beyond what their personal losses may have entailed. Agricultural business losses involve the loss of standing crops and harvests that are damaged by flooded storage facilities in the immediate time period. On a longer time scale, the erosion of rich topsoil by floodwaters can degrade the land and impact future crop yields.

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

Richland County flooding, June, 2008.

Richland County sustained several major flooding events causing more than $9 million in flood-related damage in 2007. The costs due to extensive flood damage in 2008 have not been fully totaled for public assistance and over 275 homes were eligible for Individual and Households Program (IHP) aid worth $824,041.47 as of September 12, 2008.

According to the Wisconsin Hazard Mitigation Plan, Richland County flood loss estimations for residential, commercial and government structures in Special Flood Hazard Areas [SFHA] for a two-foot flood are:

	Residential	Commercial	Government
Number of Structures	543	3	0
Average Value	$74,550	$2,664,925	$1,665,550
Total Potential Loss	$8,094,728	$2,664,925	$0

This data was gathered with the use of Digital FIRMS or Q3 data, which is not available for Richland County.

Another way to look at vulnerability is to look at the number of claims against the National Flood Insurance Program (NFIP) over the last thirty years. Richland County has had 38 claims (including -- properties with repetitive losses) with $70,559 in building claims and $15,692 in contents claims for a total of $86,251. The Wisconsin Hazard Mitigation Plan lists Richland County 36th (of 72 possible counties) when losses claimed were ranked according to claim amount. The county places 23rd when ranked according to the number of claims submitted.

The Wisconsin Hazard Mitigation Plan also projects future risk for Richland County based on a 30-year horizon. The results show annual claims averaging $2,875 and future risk at $35,679. When ordered by projected future flood risk, Richland County ranks 36th in Wisconsin.

Hazard Mitigation Strategies

The purpose of the flood mitigation portion of the plan is to identify areas that are particularly susceptible to flooding, assess the risks, analyze the potential for mitigation and recommend mitigation strategies where appropriate. With that in mind, the plan goals are:

- Goal 1: To reduce, in a cost effective manner, the loss of lives and property due to these events. Another part of this goal is to promote safety and health in areas that have been or are prone to be flooded.
- Goal 2: To preserve and enhance the quality of life throughout Richland County by identifying potential property

damage risks and recommending appropriate mitigation strategies to minimize potential property damage during/due to flooding.

- Goal 3: To promote countywide planning that avoids transferring the risk from one community to an adjacent community.
- Goal 4: To encourage all communities in Richland County to participate in the NFIP so that all county residents have access to affordable flood insurance coverage.
- Goal 5: To identify potential funding sources for mitigation projects and form the basis for project grant applications through FEMA's Pre-Disaster Mitigation (PDM) and/or Flood Mitigation Assistance (FMA) programs.

Richland County and its municipalities are committed to remaining compliant with the requirements of the National Flood Insurance Program (NFIP) and all other state and federal laws. According to the NFIP, the following communities participate in the program.

- Richland County
- City of Richland Center
- Village of Boaz
- Village of Lone Rock
- Village of Viola
- Village of Yuba

There are no areas in Richland County which have had special flood areas identified by FEMA but are not in the NFIP program. One related hazard mitigation strategy selected is to inform the public about the availability of flood insurance; this task will be carried out by the County Emergency Management Office by placing a link to information on the website.

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

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

- Evacuation of people and property.

Temporary protective measures such as sandbagging, protection of buildings and other structures and cut-off of gas and electricity may also be implemented.

The current emphasis in flood mitigation is on long-range actions. Such actions include the adoption of proper floodplain zoning ordinances and land-use planning. The county and all of its municipalities except for the Towns of Forest, Ithaca and Marshall have completed and adopted a comprehensive plan, which is the blueprint for how the community will develop and grow. The towns mentioned above chose to complete comprehensive plans in a separate process. It is expected that this plan will work with the comprehensive plans to guide community development.

The county and its municipalities also continue to work with and support the DNR as they provide education to the municipalities regarding restrictions on development/road work in flood plains. The Wisconsin DNR is holding regional meetings with FEMA, Richland County, the Wisconsin DOT, the Wisconsin Counties Association and the Wisconisin Towns Association regarding road construction in floodplains. In January, 2009, the Towns Association met and distributed floodplain maps for each town to help with planning activities. The county also adopted (in 2008) the updated flooding ordinances required by the Wisconsin DNR. The City of Richland Center has also adopted these ordinances and the paperwork is currently at the DNR awaiting final processing.

Another important data review and update project in the county is to continue to update the county's GIS mapping capabilities; as part of on-going improvements, current county floodplain maps were made available to the public via the website as of 2008. Digital orthophotography is used throughout Wisconsin for vital purposes such as emergency planning and response, government decision-making and sound land-use policy development. The county has aerial photos that were completed in 2005 as part of a multi-county consortium. The Wisconsin Regional Orthopotography Consortium (WROC) is forming to build a multi-participant program to acquire digital orthoimagery (2' intervals) and elevation data throughout Wisconsin in 2010.

Other preparedness projects that would be led by the Richland County Emergency Management Department include:

- Continue disseminating public information materials related to flooding via placing printed information in racks and adding links to the webpage.

- Review and update preparedness measures (i.e., plans, training, exercising, public information) regarding county dams. The county completed a dam shadow plan on five dams and all but one ordinance was updated. The Emergency Operations Plan (EOP) was also updated to reflect the new information.

- Place a link on the website that that will show the monitoring of the ground water level at the Koch well (http://groundwaterwatch.usgs.gov/AWLSites.asp?S=431840090203201&ncd=). This well is a fairly reliable predictor of local flooding.

- Explore the feasibility of purchasing and installing flood gauges on the Pine River (buy one and upgrade two) and on Mill Creek (buy two). The paths of these two waterways affect many of the municipalities in the county and when they overflow, roads and residents are affected. The county could install manual-reading gauges at no cost as part of a program where the County Highway Department works with the National Weather Service to build, install and create a procedure for monitoring them. The Village of Viola currently has a manual-read gauge and would like to stay with that. The County would eventually like to install automatic gauges that could be monitored remotely via a website. This website would be linked to the county's preparedness page to make the information available to all residents. The City of Richland Center has river gauges at Rockbridge and in Richland Center that are off-line currently. The City would also like to automate both of their current gauges and the new one being installed at Yuba. Richland County submitted a pre-application for additional and upgraded gauges to the Wisconsin Emergency Management Hazard Mitigation program but the application was denied. There is the possibility of partnering with the NWS and/or the U.S. Geological Survey (USGS) for sharing the costs of these installations and upgrades.

Richland County has a history of expensive damage to buildings and infrastructure due to floods. In addition to the strategies listed above that deal with public information and planning, the

community can make current and future buildings and infrastructure more disaster-resistant by:

- Targeting flood-prone structures for buy-out and converting the land to open, public lands. This also eliminates future damages by preventing building on this land. Current projects of interest include:
    - Richland County assisted with the buyout (using Community Development Block Grant (CDBG) funding of two repetitive loss properties (RLP). These projects were closed on 31 December 2008.
    - Securing funding, relocating and demolishing the WRCO 100.9 FM and 1450 AM radio station, the Community Center and five private properties in the City of Richland Center. A 2008 Hazard Mitigation Grant application was submitted for the buyout of the radio station ($523,700), the Community Center ($700,000) and one property on W. Seminary Street ($145,000).
    - Continue monitoring three to four properties in the City of Richland Center that are on the periphery of major flooding hazard areas.
- Elevating structure and/or infrastructure out of the way of flood waters or installing other flood mitigation measures. Current projects of interest include:
    - Securing funding and assisting with the elevation of five properties in the City of Richland Center on:
        - S. Stewart St ($110,040.03)
        - S. Grove St. ($117,040.30)
        - S. Grove St. ($110,040.03)
        - S. Grove St. ($117,040.03)
        - W. Seminary St. ($45,812.53)
    - Begin exploring elevating 10-15 homes along Wisconsin Street in the Village of Viola.
    - Raising the interceptor so that flood waters will not inundate the new 6” wastewater pump. There is a history of problems that have caused the village to discharge into the Kickapoo River as they did for ten days in the 2008 flooding. With this mitigation measure, 50 residences (12 with major damage and the rest with minor damage) would have had no problems in the 2008 flooding.

- Installing shut-offs in sewer lines (laterals) in the Village of Viola to keep water from flooding 20-30 properties. Downtown Viola floods regularly causing sanitary sewers to overrun. The Village acquired a 6" pump in the last flood and that has helped to keep up with the water. In these incidents, the flood waters flow over the basement walls of 20-30 properties to drain into and flood the sanitary sewers. These valves would shut off the water going into the sewer lines from each building, protecting approximately 100 structures, many of which house senior citizens and small, local businesses that get sewer backflow in floods.

- Complete dam upgrade projects identified by the Wisconsin DNR, as listed:

  - **Mill Creek #1B- "Huth Dam"**

    ⇒ SE ¼ of Section 4, Township 10N, Range 1W
    ⇒ Built in 1962
    ⇒ Needs floodplain zoning below dam (hydraulic shadow) (dam failure shadow)
    ⇒ No dwellings within dam failure shadow
    ⇒ No upgrades to structure needed

  - **Mill Creek #13A- "Luttig Dam"**
    ⇒ SW ¼ of Section 33, Township 11N, Range 1W
    ⇒ Built in 1962
    ⇒ Needs floodplain zoning below dam
    ⇒ 1 dwelling within dam failure shadow 0.54' above lowest adjacent grade and first floor elevation of the house at the intersection of County Hwy Z and Tuck-A-Way. Needs flood proofing
    ⇒ Dam needs upgrading to principle and emergency spillways for significant or high hazard dam.
      - ❖ Principle spillway is not capable of passing the flow required as defined by NR 333, for a significant or high hazard dam
      - ❖ Dam is not capable of passing the total flow required for a significant or high hazard dam through a combination of the principle and emergency spillways.

  - **Mill Creek #13B- "Durst Dam" "Brown Dam"**

- ⇒ NE ¼ of Section 33, Township 11N, Range 1W
- ⇒ Built in 1962
- ⇒ Needs floodplain zoning below dam
- ⇒ 1 dwelling within dam failure shadow 0.55' above lowest adjacent grade for house located north of County Hwy Z Bridge
- ⇒ The dam is capable for passing flow for a high hazard dam. No upgrade to structure needed.

o **Mill Creek #3- "Ewers Dam"**

- ⇒ NE ¼ of Section 23, Township 10N, Range 2W
- ⇒ Built in 1959
- ⇒ No floodplain zoning within the hydraulic shadow
- ⇒ Not capable of passing flow through principle and auxiliary spillway for a high hazard dam
- ⇒ Capable of passing flows of low hazards
- ⇒ No dwellings with dam failure shadow

o **Mill Creek #9A- "Brindley Dam"**

- ⇒ NW ¼ of the SE ¼ of Section 11, Township 11N, Range 2W
- ⇒ Built in 1965
- ⇒ No floodplain zoning within the hydraulic shadow
- ⇒ Were dwellings in the dam failure shadow.
  - ❖ House located at the junction of tributary was destroyed by fire. Basement and foundation were removed
  - ❖ Houses located north of bend and south east of bend in County Hwy E were floodproofed.
- ⇒ Principle spillway is not capable of passing flow required for a high or significant hazard dam.
- ⇒ Emergency and principle spillway together may not be capable of passing high hazard flows
- ⇒ Dam is capable of passing a significant hazard flow through a combination of auxiliary and principle spillways

o **Mill Creek #10- "Dosch Dam"**

- ⇒ SW ¼ of Section 1, Township 11N, Range 2W
- ⇒ Built in 1965
- ⇒ No floodplain zoning within the dam failure shadow
  - ❖ Were 4 dwellings within dam failure shadow

- ❖ Old house was torn down and burned
- ❖ Deed restriction on garage- can't be used as an apartment
- ❖ Houses located north of bend and south east of bend in County Hwy E were flood proofed.

⇒ Dam principle spillway was upgraded and dam repaired

o **Mill Creek #6- "Robbins Dam"**

⇒ SE ¼ Section 21, Township 11N, Range 2W
⇒ Built in 1960
⇒ No floodplain within dam failure shadow
⇒ 6 dwellings in dam failure shadow

- ❖ House on east side of County Hwy G just below dam. 5.8' above low adjacent grade
- ❖ House at corner of Gibbs Rd and Hwy G. 3.5 ' above lowest adjacent grade
- ❖ Shop at U.S. Hwy 14 and Coppernoll Hollow Rd. 5.9' above lowest adjacent grade
- ❖ Sawshop on Coppernoll Hollow Road. 5.9' above lowest adjacent grade
- ❖ House 4.0' above lowest adjacent grade
- ❖ Farmhouse 7.8' above lowest adjacent grade

⇒ The dam is not capable of safely passing the flow for a high hazard dam. Needs upgrading.

o **Mill Creek #22- "Popp Dam"**

⇒ NE ¼ of Section 28, Township 11N, Range 2W
⇒ Built in 1960
⇒ No floodplain zoning within the dam failure shadow
⇒ 5 dwelling with dam failure shadow

- ❖ House at Gibbs Rd and County Hwy G 4.2'
- ❖ Shop at U.S. Hwy 14 and Coppernoll Hollow Rd 7.3'
- ❖ Sawshop on Coppernoll Hollow Rd 6.4'
- ❖ House 4.5'
- ❖ Farm house 8.2'

⇒ Dam is not capable of safely passing the flow required for a high hazard dam. The principle spillway is not capable of passing the entire 100 year flood without water flowing over the auxiliary

spillway. 1000 year flood would overtop the dam. Dam needs upgrading.

- Assist, as requested and able, with the City of Richland Center business doing flood mitigation improvements.

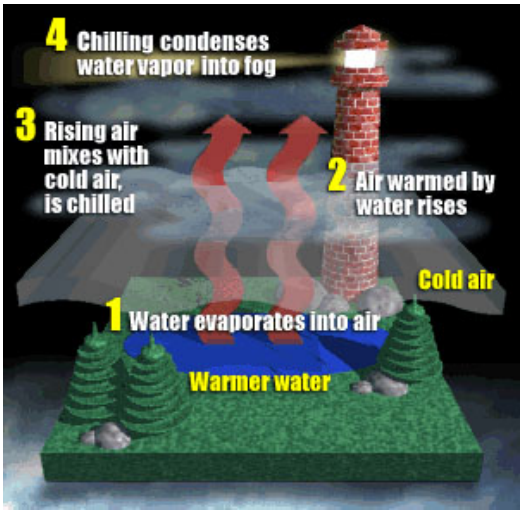
- Pre-identifying infrastructure (roads, bridges, culverts, shoulders) prone to flooding and directing current and future budgetary dollars towards making the infrastructure disaster-resistant as it is scheduled for routine maintenance. Some roadways that have been identified as needing upgrades roadways to prevent future flooding damage include:

    - Highway 80 – flooding caused the K-rails to float into the road requiring replacement. Road needs improved drainage. This is a main north/south trunk road that runs along with Hwy 14.
    - Hwy 131 & Chadwick Hollow Rd – This road needs to be widened, needs its banks stabilized and needs a bigger culvert at the lower end. Chadwick Hollow Rd is the only road that will provide access to Viola during flooding (30-45 days in 2008 floods). The road starts in Vernon Co but that part has no problems.
    - County Y is prone to flood damage but it does not provide the only access to any areas.
    - The Town of Aiken roads are built in bad terrain. Rains cause about 40 miles of roads to be covered in mud, which requires scraping by the town.
    - CTH AA between STH 80 and CTH SR – pave shoulders of overflow areas to prevent damage to the rest of the road during flooding.
    - CTH SR east of STH 80 – Raise a 300’ section of SR and add 1 or 2 drainage pipes to keep water off of the road.
    - CTH D west of STH 80 – pave shoulders or overflow areas to prevent damage to the road.
    - CTH JJ from STH 14 to the Sauk County line – improve drainage to keep water off of the road.
    - CTH F south of CTH U – the overflow is in very bad shape and needs to be repaved.

Fog

Fog, at its most basic definition, is a cloud based on the ground rather than in the atmosphere.

http://www.fi.edu/weather/events/fog.html



Physical Characteristics

Fog occurs when the air near the ground is saturated with moisture and condenses on tiny particles suspended in the air. These particles are called cloud condensation nuclei and actually attract water vapor molecules to their surfaces. Once condensation occurs on these tiny surfaces, the resulting liquid drops can remain suspended in the air because their weight causes them to descend slowly to the ground or be carried around by wind. The dew-point temperature, or saturation vapor pressure, can be reached by either adding more water vapor to the air or cooling the air down to the dew-point temperature. Fog is classified by the dominant formation process and exists as long as processes continue to maintain saturated conditions. There are several basic types of fog:

- Radiation Fog is caused by cooling close to the earth's surface. The earth gives off long-wave radiation which on a clear night travels out into space. If the temperature drops to the dew point close to the ground, radiation fog can form. Radiation fog is also known as ground fog. The fog

normally disappears soon after sunrise as the sun's warmth evaporates it.

  - Valley Fog is one type of Radiation Fog that forms in mountain valleys during winter and can be more than 1,500 feet thick. Often, the winter sun is not strong enough to evaporate the fog during the day. When the air cools again the following night, the fog often becomes thicker, which makes it even harder for the sun to burn it off the following day. These fogs can last for several days until strong winds blow the moist air out of the valley. The tendency for cool, dense air to pool at the bottom of valleys also enhances valley fog.

- Advection Fog results from the movement (advection) of warm, moist air from the south over a colder land mass. During the winter this is common when snow covers much of the Midwest. The snow cools the bottom portion of the moist airmass often resulting in condensation. The thickest advection fog usually forms during nights with light winds because humid air near the ground is not mixed with the drier air above. With light winds, the fog near the ground can become thick and reduce visibilities to zero; usually the fog burns off during the day but it can last many days if it is thick enough to block out the sun’s light. This type of fog can occur almost anywhere in the United States, especially during winter warm-ups and early spring thaws. It can be widespread and very dangerous to commuters and aircraft travel.

- Evaporation Fog around Wisconsin is caused by cold air crossing over warmer bodies of water. The water evaporates its moisture into the colder air which immediately condenses it into clouds and fog. This is what looks like steam over Lake Michigan, inland lakes and rivers on a cold autumn or winter day. This rising fog can be found above thermal pools in Yellowstone National Park and is what you see when cool rain hits hot pavement. This may also be called “steam fog” or “sea smoke” when it forms over oceans. Sometimes this fog is lifted quickly and forms rotating whirls of fog known as *steam devils*.

- Upslope Fog is common near the Rockies, including the Denver area. If the winds are out of the east, the air flows up as it rises in elevation approaching the mountains. This

can cool the air to its dew point and result in widespread fog.

- Rain Fog is created when late afternoon or evening showers and thunderstorms during the spring and summer leave the ground soaked just as the sun sets. Though the rain usually stops overnight, the high humidity level created by the rainfall will not allow the moisture to evaporate and as a result, fog forms. This occurs especially at times when there are light winds. As the air warms up the next morning, this rain-enhanced fog will usually burn off by midday.
- Precipitation Fog forms when rain or snow falls. As precipitation falls into drier air below the cloud, the liquid drops or ice crystals evaporate or sublimate directly into water vapor. The water vapor increases the moisture content of the air while cooling the air. This often saturates the air below the cloud and allows fog to form.

http://www.jsonline.com/weather/wtmj/fogtypes.stm,
http://www.usatoday.com/weather/tg/wadvfog/wadvfog.htm,
http://www.usatoday.com/weather/tg/wfallfog/wfallfog.htm,
http://www.usatoday.com/weather/tg/wrainfog/wrainfog.htm,
http://www.usatoday.com/weather/wfog.htm, http://www.cimms.ou.edu/~cortinas/1014/l12_3.html

Frequency of Occurrence

Some locations on this planet have weather conditions that are conducive to making fog frequently such as:

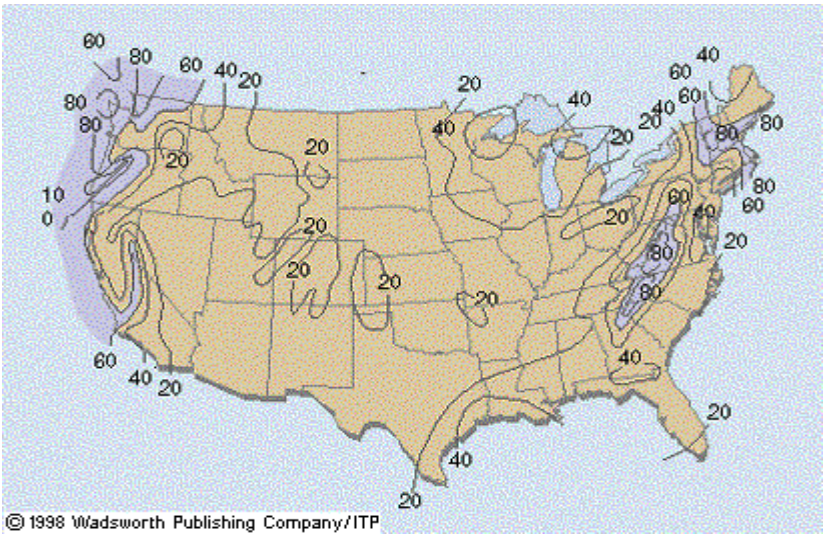
- San Francisco, California has an average of 18 days of heavy fog each year.
- Cape Disappointment, Washington is the foggiest place on the western U.S. coast with an average of 106 days of heavy fog per year.
- The foggiest area on the east coast of the United States is found along the rockbound coast of Maine. Moose Peak Lighthouse on Mistake Island, at an elevation of 72 feet, averages 1580 hours of heavy fog each year. Many other locations have problems with fog, such as Eastport, Maine with 65 days annually and Portland, with 55 days of heavy fog each year.
- Inland areas with regular heavy fog include parts of the Appalachian Mountains such as a peak area in West Virginia that averages over 100 days each year. Elkins, at

an elevation of 1948 feet has about 81 days annually with heavy fog.

- Milwaukee averages about 26 days with some heavy fog and this is comparable to the fog seen in Richland County.

http://www.jsonline.com/weather/wtmj/fogplaces.stm

Average Annual Number of Days with Heavy Fog in the United States



Richland County is geographically susceptible to valley fog, which is most common in the late summer and early fall months. On calm nights, colder air settles into valleys leading to colder low temperatures compared to ridge top locations. The National Weather Service did not report any fog events in the county between 1 January 1950 and 31 December 2008 although it should be noted that the second deadliest crash (tied with Washington County on 12 February 1997) in the state attributed to fog occurred in Richland County on 27 July 1940; eight people were killed.

Considering its geographical location, Richland County has a moderate probability of fog occurrence in the future and the likelihood of damage (i.e., death and/or injury) due to fog is considered low.

Vulnerability

Perhaps the largest vulnerability to fog is due to automobile traffic crashes. According to the Wisconsin Department of Transportation, dense fog contributes to hundreds of car accidents per year in the

state. Following are the Wisconsin Department of Transportation's statistics for fog-related traffic crashes from 1999-2004:

Death and Injury Statistics for Fog-Related Traffic Crashes						
	1999	**2000**	**2001**	**2002**	**2003**	**2004**
Total Crashes	1259	1008	1066	595	772	1141
Fatal Crashes	14	12	19	12	11	16
People Killed	15	13	22	22	11	19
Injury Crashes	528	445	425	238	274	423
People Injured	777	643	593	372	391	615
Property Damage Crashes	717	551	622	345	487	702

Traffic Conditions at the Time of Fog-Related Traffic Crashes						
	1999	**2000**	**2001**	**2002**	**2003**	**2004**
Total Crashes	1259	1008	1066	595	772	1141
Daylight	467	340	295	158	257	398
Dark/Lighted	130	107	130	324	80	140
Dark/Unlit	547	439	491	46	343	456
Dusk	9	18	16	56	7	16
Dawn	99	101	126	9	77	122
Unknown Light Conditions	7	3	8	2	8	9

Fog-related incidents can cause death, injury and property loss to the vehicle owners and occupants and their insurance companies. Responding governmental agencies also may suffer losses due to the cost of response, for damage done to roadways and structures due to fires and for potential injuries to responders working in a reduced-visibility zone. Citizens may be impacted by the closure of roadways and delay of activities; businesses may suffer losses due to the absence of workers due to delay, injury and/or death and because of the delay of product on the roadways and direct loss of product in the crash (e.g., due to fire).

Hazard Mitigation Strategies

The goal of fog mitigation activities is to reduce the loss of lives and property due to these incidents. There are few cases where infrastructure would be impacted by fog so there is little that the community can do to plan future buildings and infrastructure in a

way that will mitigate these problems. Most mitigation measures will involve public information about the largest dangers: automobile and boating crashes.

The Richland County Emergency Management Department will use current budget dollars to place a link on their website's preparedness page and place brochures in safety-themed public information racks to explain safe driving procedures for driving in the fog. The Sheriff's Office will also release public service announcements (PSAs) on the local radio station (WRCO 100.9 FM and 1450 AM) when conditions warrant.

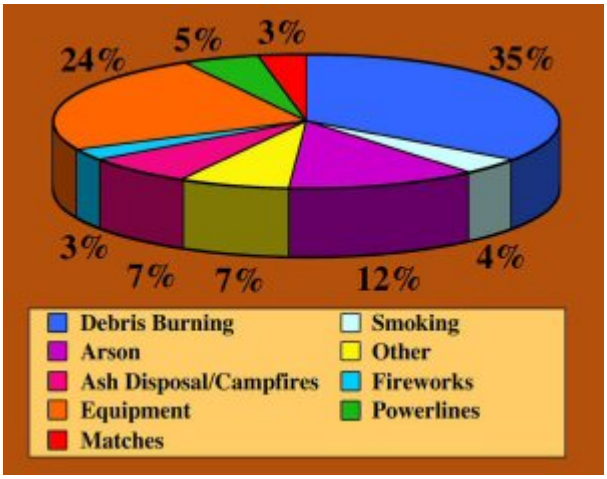
Forest and Wildfires

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

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

Physical Characteristics

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



Source: http://dnr.wi.gov/org/land/forestry/fire/fire-ps.htm

Bear Creek Fishery Area, Knapp Creek Unit – Lower Wisconsin – State Riverway, Willow Creek Fishery Area, Pine River Public

Hunting Grounds, Hub City Bog, Richwood Bottoms, Orion Mussel Beds, Bear Creek Sedge Meadows, Gotham Jack Pine Barrens and Smith Slough and the Sand Prairie are the natural areas in Richland County. The DNR is responsible for forest fires on state lands and they are supported by and work closely with local fire departments on other forest and wildfires.

Frequency of Occurrence

While the total number of open fires in Wisconsin has decreased over the years, the potential danger to lives and property remains due to the increased encroachment of development into previously open lands. Overall, the probability for a forest fire in Richland County is moderate and the probability of a wildfire is moderate. The probability of damage from forest or wildfire is also considered low to moderate. There has been one statewide wildfire event recorded since 1950 by the National Weather Service. This event occurred on 23 April 1994 and caused no injuries or deaths but did cause $500,000 in crop and property damage (each).

Vulnerability

Forest and wildfires can impact the ecology of the open lands. According to the 2007 Richland County Land and Water Resources Management Plan approximately 50% of Richland County is in forestry use. Richland County, which has many natural areas, would be greatly impacted by a wildfire and a disruption from fire could erase the usability of this habitat for wildlife and/or recreational purposes for many years. The Town of Orion is the most heavily wooded area in the county and the Towns of Buena Vista, Eagle and Ridgewood each also have a significant coverage of pine, locust and oak forest in sandy soils.

Hazard Mitigation Strategies

Government at all levels is developing mitigation programs in fire control and fire fighting tactics with the goal of protecting lives and property from loss due to forest and wildfire. Local fire departments attend regular trainings on fire-fighting tactics to keep their skills honed. The County Emergency Management Department assists local departments and their staff with available grant applications

for training, exercising, equipment and planning as able and requested.

The emergency management office also partners with the local fire departments to provide information about fire safety and other mitigation strategies (e.g., protecting structures from wildfires), especially during Fire Safety Week in October of each year.

The Wisconsin Department of Natural Resources (DNR) has a satellite forestry office in the City of Richland Center and the main office, where the majority of the rangers work and heavy equipment and supplies are stored, is in Spring Green (approximately 24 miles/35 minutes away in Iowa County). The DNR offers annual training to local fire departments and they conduct a controlled burn exercise activity rotated around the area each March.

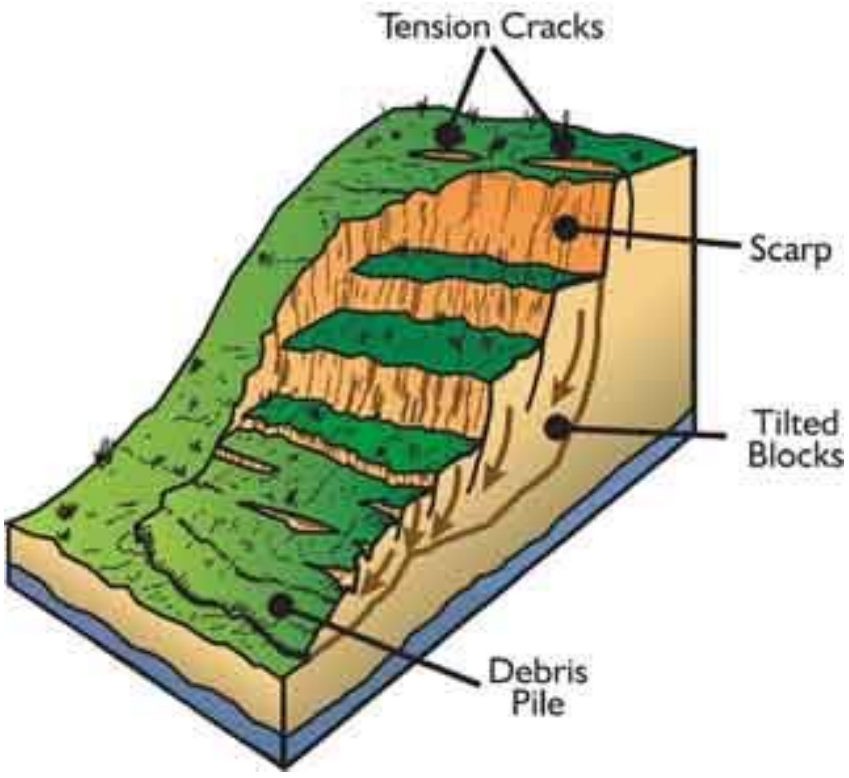
The hazard mitigation strategies listed above are designed to reduce damages to existing or future buildings and infrastructure by providing information on general fire safety measures to the public for residential and commercial structures and providing ongoing training to the firefighters who fight these types of fires.

Landslide

The term landslide includes a wide range of ground movement such as rock falls, deep failure of slopes and shallow debris flows. Although gravity acting on an over-steepened slope is the primary reason for a landslide, there may be other contributing factors. Factors likely to be seen in Richland County include:

- erosion by rivers or lakes creating over-steepened slopes
- rock and soil slopes being weakened through saturation by snowmelt or heavy rains
- excess weight from the accumulation of rain or snow, stockpiles of rock or ore, waste piles or from man-made structures stressing weak slopes to failure

http://landslides.usgs.gov/html_files/nlic/page5.html



This illustration shows the parts of a general landslide.

This picture shows landslide damage to a roadbed similar to that found in flash flood events in Richland County.
http://www.geology.enr.state.nc.us/Landslide%20web%20version/Geologic_hazards_landslides/Landslides_main.htm

Physical Characteristics

Landslides may include any combination of natural rock, soil or artificial fill and are classified by the type of movement and the type of material. The types of movement are slides, flows, lateral spreads and falls and topples; a combination of two or more landslide movements is a complex movement:

- Slides: straight or rotating downward displacements along one or more failure surfaces of soil or rock as a single intact mass or a number of pieces
- Flows: a rapid, downhill mass movement of a “slurry” comprised of loose soil, rocks, organic matter, air and water
- Lateral spreads: large movements of rock, fine-grained soils or granular soils distributed laterally

- Falls and Topples: masses of rocks or material that rapidly detach from a steep slope or cliff that free-fall, roll or bounce.

Almost any steep or rugged terrain is susceptible to landslides under the right conditions. The most hazardous areas are steep slopes on ridges, hills and mountains; incised stream channels and slopes excavated for buildings and roads. Slide potentials are enhanced where slopes are destabilized by construction, heavy rainfall, floods or river erosion. Debris flows generally occur during intense rainfall on water saturated soil. Surface runoff channels along roadways and below culverts are common sites of debris flows.

Landslides often occur together with other major natural disasters thereby exacerbating relief and reconstruction efforts:

- Floods and landslides are closely related and both involve precipitation, runoff and ground saturation that may be the result of severe thunderstorms.
- Landslides into a reservoir may indirectly compromise dam safety or a landslide may even affect the dam itself.
- Wildfires may remove vegetation from hillsides, significantly increasing runoff and landslide potential.

Landslide from fire damage in CO (http://landslides.usgs.gov/html_files/landslides/slides/slide15.htm)

Sinkholes can form naturally in areas with karst geology (i.e., areas with limestone or other bedrock that can be dissolved by water). As the limestone rock under the soil dissolves over time from rainfall or flowing groundwater, a hollow area may form underground into which surface soil can sink. Sinkholes also can be caused by

human activity such as collapsed, abandoned underground mines. Even though sinkholes have not been a factor in any natural disaster, identifying areas with karst conditions is important for not only public safety and protection of structures but because karst features provide direct conduits to groundwater. Areas with karst conditions are vulnerable to groundwater contaminants from pollutants entering a sinkhole, fissure or other karst feature.

Enlarged fracture in Brown County, WI (http://www.uwex.edu/wgnhs/enlargedjoint.htm)

Frequency of Occurrence

According to the U.S. Geological Survey, landslides are a widespread geologic hazard, occurring in all 50 states where they cause on average $1 to $2 billion in damages and more than 25 fatalities annually. Landslides pose serious threats to highways; railroads and structures that support fisheries, tourism, timber harvesting, mining and energy production. Expanding urban development and other land uses have increased the incidence of landslide disasters in the United States.

According to the NOAA/National Weather Service – LaCrosse Natural Hazards Assessment of Richland County (v. Jan. 2009), seven to thirteen inches of rain fell during the evening of August 18, 2007 leading to widespread flash flooding with one death and property and crop damage in excess of $9 Million. During this storm, reports of landslide were common.

http://www.crh.noaa.gov/images/arx/nathaz/RIChazards.pdf

There have been no recent reports of major landslide in Richland County although local officials reported that due to cutting roadways into the hills, storm water does rush down the bluff causing debris to wash onto the roadways. Wisconsin Emergency Management has determined that Richland County has a low susceptibility potential. (See the map in Appendix A.) This leads to a rating of a low likelihood in the county.

The karst potential map in Appendix A shows that Richland County has a shallow karst features throughout the entire county. The presence of this geologic feature supports the high probability of complications (e.g., sinkholes, fissures to groundwater) to residents. The good news is that the complications due to karst geology have a low probability of causing significant damage, injury or death.

Sinkhole in Monroe County, WI (http://www.uwex.edu/wgnhs/cavesink.htm)

Vulnerability

The most likely consequences of landslides in Richland County would be damage to structures built on or near eroding bluffs. The most common hazard in these events is when rocks and other debris wash down the bluffs and onto roads, posing a hazard for motorists. This danger would be exacerbated in a flash flood where the remains of the normally-stable base were quickly and forcefully eroded by fast-moving water as was seen in the August 18, 2007 flash flooding incident.

Cincinnati, Ohio (http://landslides.usgs.gov/html_files/landslides/slides/slide8.htm)

Karst geology, which has been identified in Richland County, can lead to sinkholes under structures such as homes, businesses, roadways and railroads causing economic losses and possible injury to residents and the community.

Hazard Mitigation Strategies

The goal of landslide mitigation activities is to reduce, in a cost effective manner, the loss of lives and property due to these events. Although the physical cause of many landslides cannot be removed, geologic investigations, good engineering practices and effective enforcement of land-use management regulations can reduce landslide hazards. Karst features should be considered in land use planning, stormwater management and hazardous materials planning to avoid possible damage to structures due to sinkholes or contamination of groundwater. Richland County will continue to work with its municipal partners to ensure that areas at risk of landslide and karst-related complications are identified (scheduled by 2010) and appropriate mitigation strategies such as improved/increased signage, retaining walls and increased lighting in areas of concern are employed as appropriate.

Coordination and cooperation among the private sector and various state, county and municipal planning and zoning departments will reduce effects on existing and future buildings and infrastructure by ensuring that safety is regulated and engineered into them.

Severe Temperatures

Characteristics

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

Physical Characteristics: Heat

Heat emergencies are a result of the combination of very high temperatures and very humid conditions. The Heat Index estimates the relationship between these two conditions and reports them as a danger category, as can be seen in the following table.

Heat Index and Disorders Table

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

FEMA, 1997; NWS, 1997

The major risks to people due to extreme heat are:

- Heatstroke – a potentially lethal medical emergency where the ability of a person to thermo-regulate is compromised resulting in the rise of the body's core temperature to above 105°F (Fahrenheit).

- Heat Exhaustion – a less threatening medical condition where the victim complains of dizziness, weakness and/or fatigue. The victim may have a normal or slightly elevated temperature and usually can be successfully treated with fluids.

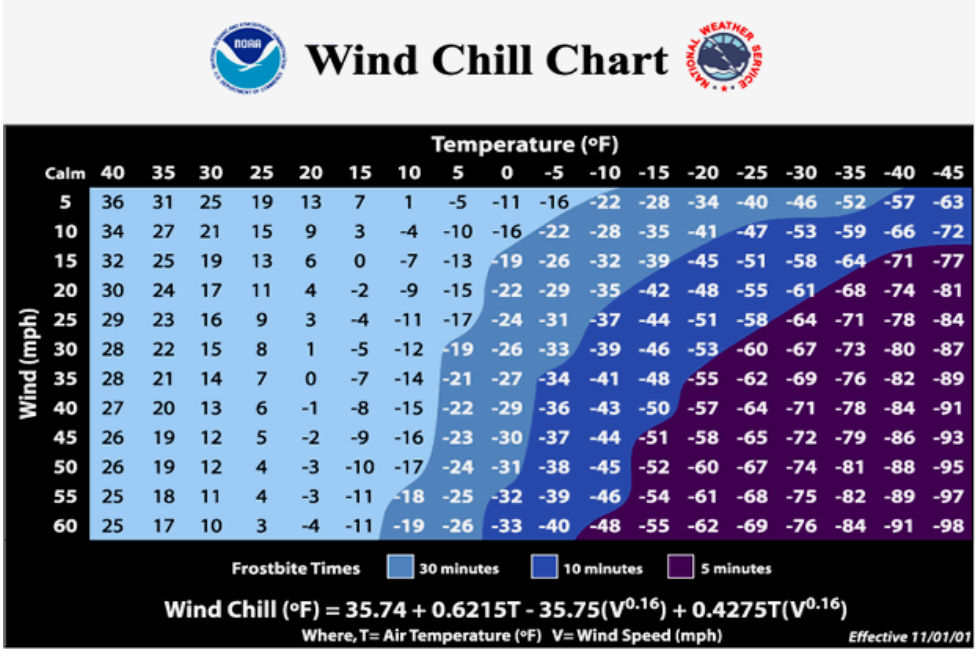
- Heat Syncope – a sudden “faint” or loss of consciousness usually brought on by exercising in warmer weather than one is accustomed to, usually no lasting effect.

- Heat Cramps – muscular cramping brought on by exercising in warmer weather than one is accustomed to, no lasting effect.

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

Physical Characteristics: Cold

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



National Weather Service: http://www.nws.noaa.gov/om/windchill/index.shtml

The National Weather Service – LaCrosse issues Wind Chill Advisories when wind chill readings of -20° F to -34° F are

expected. Wind Chill Warnings are issued when wind chill values at or below -35° F are expected or occurring.

The major risks to people due to extreme cold are:

- Hypothermia – occurs when, due to exposure to cold, the body is unable to maintain its proper core temperature. It may occur in temperatures above freezing and may lead to death.
- Frostbite – describes local cooling, usually to an extremity, which occurs when exposure to cold air or liquid causes constriction of the blood vessels. There are three degrees of frostbite:
    - Frostnip – brought on by direct contact with a cold object or exposure to cold air or water. Tissue damage is minor and response to treatment is usually very good.
    - Superficial Frostbite – involves the skin and subcutaneous layers.
    - Freezing – is deep frostbite in which the skin, subcutaneous layers and deeper structures (e.g., muscles, bone, deep blood vessels, organ membranes) of the body are affected and can become frozen.
- Chilblains - lesions that occur from repeated/chronic exposure of bare skin to temperatures of 60°F or lower.
- Trench foot – a condition that occurs when the lower extremities remain in cool water for a prolonged period of time.

Frequency of Occurrence

Richland County, like all of Wisconsin, experiences great swings in seasonal temperature extremes. According to the National Weather Service (NWS), the upper Midwest is subject to arctic cold outbreaks that lead to sub-zero temperatures which occur 21 times per winter on average, usually in January or February. Average lows in these months are in the single digits and record lows are

colder than -20° F most days. In 1996, the Richland Center area went nine consecutive days with low temperatures at or below -12° F, with six consecutive days of low temperatures ranging from -32° F to -38° F during that period. On January 30, 2008 a wind chill of -38° F was recorded in Richland Center.

The upper Midwest also gets occasional weather patterns that favor prolonged heat and humidity, leading to heat waves. June through August are usually the warmest months with average high temperatures in the 80s and record highs above 100° F most days.

Following is a table that shows the top five most extreme cold and hot temperatures as recorded in Richland Center by the NWS as of January 2009.

TEMPERATURE EXTREMES AT RICHLAND CENTER, WI			
COLDEST LOWS		WARMEST HIGHS	
Low	Date	High	Date
-46° F	1/30/1951	110° F	7/14/1936
-40° F	2/2/1951	109° F	7/13/1936
-40° F	2/20/1929	108° F	7/12/1936
-39° F	1/15/1963	105° F	7/11/1936
-38° F	2/4/1996	104° F	7/29/1941

There have been 13 heat waves with no fatalities in Richland County since 1982 and seven excessive heat events recorded in Richland County by the National Weather Service between 1 January 1950 and 31 December 2008, which are outlined below:

Date	Location	Type	Death	Injury	Property Damage	Crop Damage
6/14/1994	Statewide	Heat Wave	0	0	0	0
10/12/1995	Statewide	Record Warmth	0	0	0	0
7/4/1999	Richland County	Excessive Heat	0	0	0	0
7/23/1999	Richland County	Excessive Heat	0	0	0	0
7/28/1999	Richland County	Excessive Heat	1	0	0	0
7/31/2001	Richland County	Excessive Heat	2	0	0	0
8/1/2001	Richland County	Excessive Heat	0	0	0	0

Following is a chart that outlines eight severe cold events that have been recorded by the National Weather Service in Richland County between 1 January 1950 and 31 December 2008:

Date	Location	Type	Death	Injury	Property Damage	Crop Damage
1/13/1994	Statewide	Cold	0	0	0	0
12/9/1995	Richland County	Cold	2	21	0	0
1/16/1997	Richland County	Extreme Windchill	0	0	0	0
2/2/2007	Richland County	Extreme Cold/wind Chill	0	0	0	0
1/30/2008	Richland County	Extreme Cold/wind Chill	0	0	0	0
2/10/2008	Richland County	Extreme Cold/wind Chill	0	0	0	0
12/14/2008	Richland County	Cold/Wind Chill	0	0	0	0
12/21/2008	Richland County	Cold/Wind Chill	0	0	0	0

Temperature extremes, both cold and hot, have a medium likelihood of occurrence in any given year. The loss of property due to temperature extremes is not likely but loss of life or injury to people has a low likelihood of occurrence in the general population and a moderate likelihood among vulnerable populations.

Vulnerability

According to the NWS, since 1982 there have been 27 fatalities and 42 direct injuries from cold weather in Wisconsin. In the same time period, there have been 115 fatalities directly and another 95 indirectly related to heat waves in Wisconsin. Vulnerability to temperature extremes is generally assessed on an individual basis with the most vulnerable sections of our community's population having the greatest risk. These people may include the elderly, the very young and the chronically ill. People from economically disadvantaged backgrounds, especially those listed in the categories above, are even more vulnerable since they are least able to afford the cost of adequate heating or air conditioning systems.

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

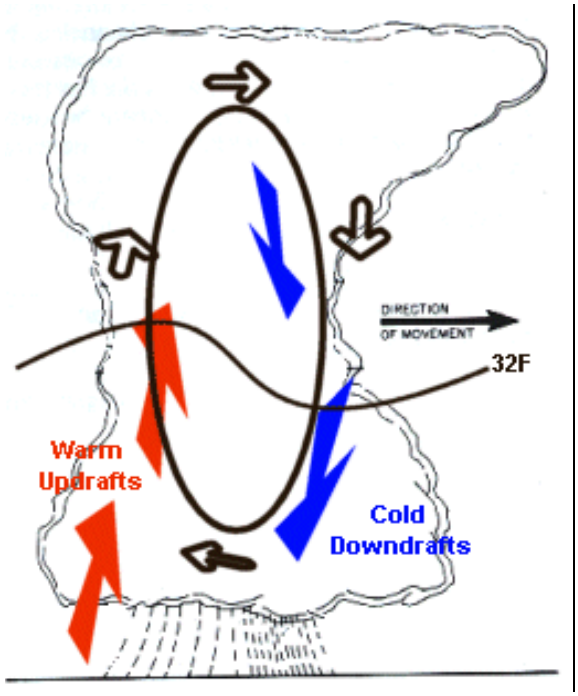
Hazard Mitigation Strategies

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

The Richland County Emergency Management Office participates in the statewide public information campaigns for Winter and Heat Awareness Weeks each year and will provide more links to personal preparedness information on its website. Emergency Management and the Public Health Department also provide public service announcements (PSAs) on the local radio station (WRCO 100.9 FM and 1450 AM) when needed.

Storms: Hail

Studies of thunderstorms indicate that two conditions are required for hail to develop: sufficiently strong and persistent up-draft velocities and an accumulation of liquid water in a super-cooled state in the upper parts of the storm. Hailstones are formed as water vapor in the warm surface layer rises quickly into the cold upper atmosphere. The water vapor is frozen and begins to fall; as the water falls, it accumulates more water vapor. This cycle continues until there is too much weight for the updraft to support and the frozen water falls too quickly to the ground to melt along the way. The graphic below depicts hail formation:



Source: NWS, January 10, 2003

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

Physical Characteristics

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

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

NWS, January 10, 2003

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

Frequency of Occurrence

Hailstorms usually occur from May through August, with June being the peak month, and Wisconsin averages two or three hail days per year. The most common time for hail is between 1:00 – 9:00 p.m. but it can occur at any time of the day. As can be seen in the Map in Appendix A, from 1982 – 2007, Richland County had 41 hail events but fortunately none have led to loss of life or injury. Based on historical patterns, Richland County has a low to moderate probability of hail occurrence but the likelihood of damage due to hail is considered low.

Most hail damage occurs in rural areas because maturing crops are particularly susceptible to bruising and other damage caused by hailstones. The four months of hailstorm activity correspond to the growing and harvesting seasons for most crops. According to the NWS, on May 12, 2000 hail the size of baseballs fell in the Hub City and Viola areas. Large hail also hit Richland Center in 1974 and there have been 44 large hail (> ¾") events in the county since 1982. Following is a table that shows the 55 hail events recorded

by the National Weather Service between 1 January 1950 and 31 December 2008.

Date	Location	Death	Injury	Property Damage	Crop Damage	Misc.
5/9/1963	Richland County	0	0	0	0	0.75 in.
5/13/1974	Richland County	0	0	0	0	0.75 in.
6/14/1974	Richland County	0	0	0	0	2.75 in.
6/14/1974	Richland County	0	0	0	0	1.75 in.
5/16/1977	Richland County	0	0	0	0	1.00 in.
9/1/1984	Richland County	0	0	0	0	0.75 in.
9/1/1984	Richland County	0	0	0	0	0.75 in.
9/1/1984	Richland County	0	0	0	0	1.75 in.
5/14/1985	Richland County	0	0	0	0	0.75 in.
7/9/1985	Richland County	0	0	0	0	1.50 in.
4/24/1989	Richland County	0	0	0	0	1.00 in.
5/30/1989	Richland County	0	0	0	0	1.00 in.
9/9/1994	Cazenovia	0	0	0	0	1.00 in.
9/9/1994	Sextonville	0	0	0	0	0.75 in.
5/16/1995	Yuba	0	0	0	0	1.75 in.
7/31/1995	Richland Center	0	0	0	0	0.00 in.
9/30/1995	Lone Rock	0	0	0	0	0.75 in.
5/12/1998	Gotham	0	0	0	0	0.75 in.
6/20/1998	Port Andrew	0	0	0	25K	0.75 in.
6/20/1998	Cazenovia	0	0	0	0	0.75 in.
5/12/2000	Viola	0	0	0	20K	1.75 in.
5/12/2000	Hub City	0	0	15K	35K	2.50 in.
5/31/2000	Cazenovia	0	0	0	0	0.75 in.
9/11/2000	Richland Center	0	0	0	3K	0.75 in.
4/11/2001	Richland Center	0	0	0	0	0.75 in.
6/11/2001	Richland Center	0	0	0	0	0.75 in.
6/18/2001	Viola	0	0	0	3K	1.00 in.
4/18/2002	Ithaca	0	0	0	0	0.75 in.
4/18/2002	Bosstown	0	0	0	0	1.00 in.
4/18/2002	Viola	0	0	0	0	1.00 in.
5/8/2002	Richland Center	0	0	0	0	0.75 in.
5/30/2002	Richland Center	0	0	0	0	0.75 in.
8/17/2002	Bosstown	0	0	0	0	0.75 in.
5/10/2003	Richland Center	0	0	0	0	1.00 in.
6/25/2003	Gillingham	0	0	0	0	0.75 in.
6/28/2003	Boaz	0	0	0	1K	1.00 in.
7/31/2003	Travera	0	0	0	0	0.75 in.
4/17/2004	Boaz	0	0	0	0	0.75 in.
6/23/2004	Bosstown	0	0	0	5K	0.88 in.
8/26/2004	Gillingham	0	0	0	0	0.75 in.
5/24/2006	Richland Center	0	0	1K	0	1.00 in.
6/6/2006	Bloom City	0	0	0	0	0.75 in.

Date	Location	Death	Injury	Property Damage	Crop Damage	Misc.
6/6/2006	Neptune	0	0	1K	0	0.88 in.
7/9/2006	Ashridge	0	0	0	0	0.75 in.
8/23/2006	Cazenovia	0	0	20K	50K	1.75 in.
8/24/2006	Sextonville	0	0	0	2K	0.88 in.
8/24/2006	Port Andrew	0	0	0	0	0.75 in.
8/25/2006	Bunker Hill	0	0	0	0	0.75 in.
8/25/2006	Cazenovia	0	0	0	3K	0.88 in.
10/4/2006	Richland Center	0	0	15K	30K	1.75 in.
10/4/2006	Richland Center	0	0	0K	0K	0.75 in.
3/21/2007	Gillingham	0	0	0K	0K	1.00 in.
6/28/2008	Basswood	0	0	0K	0K	0.75 in.
6/28/2008	Twin Bluffs	0	0	0K	0K	1.00 in.
6/28/2008	Twin Bluffs	0	0	0K	0K	0.75 in.

Vulnerability

Hail, typically occurring in conjunction with thunderstorms and lightning, can damage many types of infrastructure. Public and private vehicles (e.g., campers, boats, cars, trucks) are liable to have their windshields cracked, bodies dented and paint damaged as a result of hail that usually larger than 1". This damage can occur, depending on the size of the hail, whether the vehicle is moving through the storm or is stationary. Hail on the roadway can also cause vehicles to slide off the road. Vehicle damage and iced roadways are of particular concern when you consider the need for emergency vehicles such as police cars, fire trucks and ambulances to quickly move to assist victims in a disaster.

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

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

Hail can be particularly damaging to agricultural concerns, including farm buildings, standing crops and livestock.

Hazard Mitigation Strategies

The goal of mitigating for hail is to reduce the amount of financial loss due to these incidents. Insurance is the most widely used adjustment for crop and property damages due to hail. Hail crop insurance is available from two sources: commercial stock and mutual companies and the Federal Crop Insurance Corporation (FCIC). Farmers rarely purchase insurance coverage up to the full value of the losses that would result from a severe hailstorm.

The Richland County U. W. Extension Office distributes information on various hail insurance options. In the event of major damage, a team composed of county and federal agricultural agency representatives and the county emergency management director have primary responsibility for assessing and documenting hail damage.

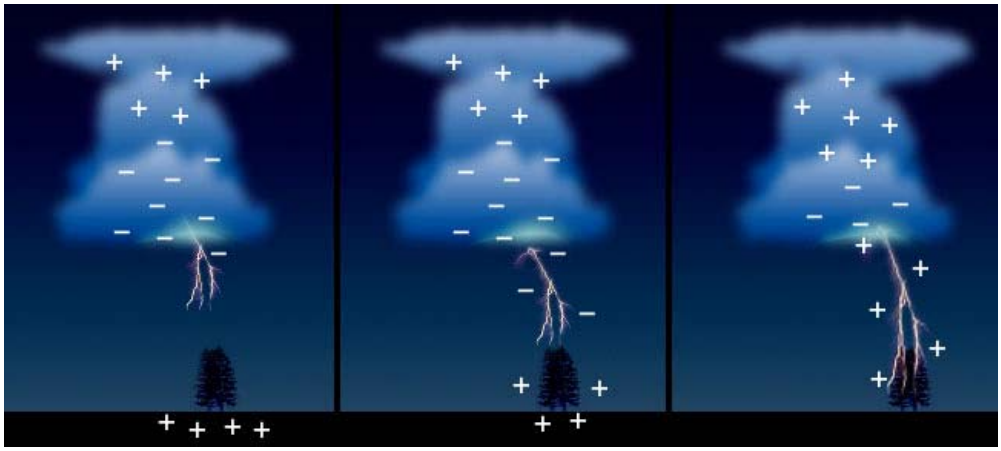
The Richland County Emergency Management Office provides hail information to the public as part of the spring severe weather awareness week. The office also provides information about hail on the website and in display racks. The Public Health Department and Emergency Management Department also issue joint public service announcements (PSAs) on the local radio station (WRCO 100.9 FM and 1450 AM) when needed. Federal emergency assistance is available in the form of low-interest loans when a Presidential Disaster is declared or when the United States Department of Agriculture (USDA) declares that a county is eligible for aid. Damage from hailstorms alone is generally not extensive enough to invoke a disaster declaration.

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

Storms: Lightning

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

Formation of Lightning



University Corporation for Atmospheric Research [UCAR]

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

Physical Characteristics

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

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

Frequency of Occurrence

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

Wisconsin has a high frequency of property losses due to lightning. The NWS quotes the Vaisala Group saying that an average of 300,000 cloud-to-ground strikes hit Wisconsin per year. Nationally, Wisconsin ranks 28th in lighting related fatalities with 6 deaths reported between 1998 and 2007 but non in Richland County. Insurance records show that annually one out of every fifty farms has been struck by lightning or had a fire which may have been caused by lightning. Generally, rural fires are more destructive than urban fires because of limited lightning protection devices, isolation, longer response times and inadequate water supplies.

According to the Wisconsin State Hazard Mitigation Plan, from 1982 – 2007, Richland County reported 2 lightning events but fortunately none have led to loss of life or injury. Richland County, as can be seen in the map in Appendix A, has a low probability of lightning occurrence in Wisconsin. The likelihood of damage due to lightning is therefore considered very low.

There were no lightning events recorded by the National Weather Service between 1 January 1950 and 31 December 2008.

Vulnerability

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

Residential and business properties are liable to receive damage either as a result of a lightning strike causing a fire or other type of direct damage or by overloading electronic equipment (e.g., computers, televisions) that have not been properly connected to a

surge protector. The latter concern is especially important to business and government, which in modern America rely on computers and other electronic equipment to manage the large amounts of data manipulated in our information-based economy.

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

Hazard Mitigation Strategies

The goal of lightning mitigation activities is to reduce, in a cost effective manner, the loss of lives and property due to these events. The two primary ways to effectively reduce lightning losses are modifying human behavior and protecting structures (e.g., using fire resistant materials in building construction). The use of fire resistant materials will make existing buildings and future construction less likely to catch fire or will minimize fire damage and spread due to lightning strike. Surge protectors limit data losses.

The Richland County Emergency Management Office has awareness and educational materials on the above topics in a display rack and will be placing links on the webiste that inform the public of safety procedures to follow during a lightning storm. Severe summer weather safety information is also emphasized during Tornado Awareness Week.

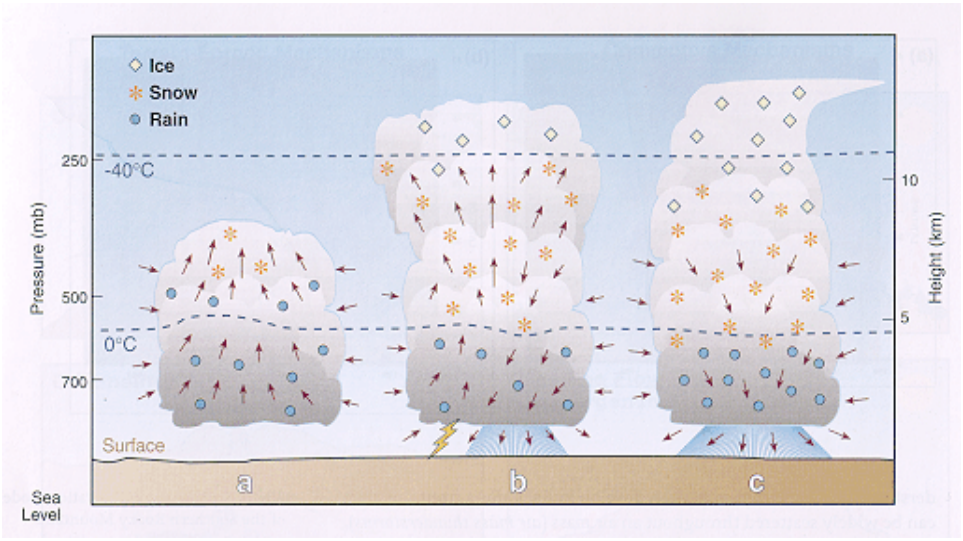
Storms: Thunderstorms

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

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

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

A thunderstorm's mature stage is marked by a transition of wind direction within the storm cells. The prevailing updraft which initiated the cloud's growth is joined by a downdraft generated by precipitation. Lightning may occur soon after precipitation begins. Hail and tornadoes may also develop during this stage.



National Weather Service - Flagstaff

Physical Characteristics

A thunderstorm often is born, grows, reaches maturity and dies in a thirty-minute period. The individual thunderstorm cell often travels between thirty and fifty miles per hour. Strong frontal systems may create one squall line after another, each composed of many

individual thunderstorm cells. These fronts can often be tracked across the state from west to east with a constant cycle of birth, growth, maturity and death of individual thunderstorm cells. The National Weather Service considers a thunderstorm severe when it produces wind gusts of 58 mph (50 knots) or higher, ¾" diameter hail and/or a tornado.

Frequency of Occurrence

Thunderstorm frequency is measured as the number of days per year with one or more incidents. There are approximately 100,000 thunderstorms in the United States every year and approximately 10% of those are considered severe (i.e., has at least ¾" hail, winds of at least 58 mph or a tornado). Most Wisconsin counties, including Richland County, averages 38 thunderstorm days per year although a portion of southwestern and southwestern Wisconsin average 40 to 50 thunderstorm days per year. In Richland County there are typically several severe thunderstorms per year and as the map in Appendix A shows, the county experienced 66 thunderstorms between 1982 – 2007 with no deaths or injuries recorded. Thunderstorms can occur throughout the year with the highest frequency during the months of May through September. Most severe thunderstorm winds occur in June or July between 4:00 – 8:00 p.m. but they can occur at other times.

The probability of thunderstorms occurring in Richland County is high as can be seen in the table below. Damage from thunderstorms usually is a result of the hail, lightning, winds and/or flash flooding that can occur as part of the storm. The likelihood of damage from these causes is in discussed in the appropriate chapters.

NWS SEVERE THUNDERSTORM ALERTS		
Year	**WATCHES**	**WARNINGS**
2008	12	8
2007	13	7
2006	27	12
2005	15	5
2004	15	4
2003	11	6
2002	19	6
2001	13	3

2000	15	7
1999	13	3

The NWS-LaCrosse reports that there have been 71 damaging wind reports since 1982 in Richland County including one system in 1998 where several squall lines with wind gusts in excess of 85 mph knocked down hundreds of trees, damaged buildings and disrupted electrical service to many communities. The following chart lists the 83 thunderstorms and high wind events that have been recorded in Richland County by the National Weather Service between 1 January 1950 and 31 December 2008.

Date	Location	Type	Death	Injury	Property Damage	Crop Damage
5/9/1963	Richland County	Tstm Wind	0	0	0	0
6/20/1974	Richland County	Tstm Wind	0	0	0	0
9/7/1980	Richland County	Tstm Wind	0	0	0	0
7/3/1983	Richland County	Tstm Wind	0	0	0	0
7/3/1983	Richland County	Tstm Wind	0	0	0	0
7/3/1983	Richland County	Tstm Wind	0	0	0	0
8/16/1983	Richland County	Tstm Wind	0	0	0	0
4/27/1984	Richland County	Tstm Wind	0	0	0	0
4/27/1984	Richland County	Tstm Wind	0	0	0	0
9/1/1984	Richland County	Tstm Wind	0	0	0	0
9/1/1984	Richland County	Tstm Wind	0	0	0	0
9/24/1984	Richland County	Tstm Wind	0	0	0	0
10/16/1984	Richland County	Tstm Wind	0	0	0	0
10/16/1984	Richland County	Tstm Wind	0	0	0	0
10/16/1984	Richland County	Tstm Wind	0	0	0	0
10/16/1984	Richland County	Tstm Wind	0	0	0	0
10/16/1984	Richland County	Tstm Wind	0	0	0	0
7/29/1987	Richland County	Tstm Wind	0	0	0	0
5/24/1989	Richland County	Tstm Wind	0	0	0	0
6/26/1989	Richland County	Tstm Wind	0	0	0	0
6/26/1989	Richland County	Tstm Wind	0	0	0	0
6/26/1989	Richland County	Tstm Wind	0	0	0	0
8/4/1989	Richland County	Tstm Wind	0	0	0	0
4/27/1990	Richland County	Tstm Wind	0	0	0	0
8/25/1992	Richland County	Tstm Wind	0	0	0	0
5/23/1994	Gotham	Tstm Wind	0	0	0	5K
7/11/1994	West Lima	Tstm Wind	0	0	0	5K
6/7/1995	Richland Center	Tstm Wind	0	0	0	0
7/31/1995	Boaz	Tstm Wind	0	0	0	0
8/28/1995	Richland Center	Tstm Wind	0	0	0	0
8/7/1996	Viola	Tstm Wind	0	0	0K	0
8/7/1996	Yuba	Tstm Wind	0	0	1K	0

Date	Location	Type	Death	Injury	Property Damage	Crop Damage
8/7/1996	Richland Center	Tstm Wind	0	0	0K	0
1/16/1997	Richland County	Extreme Windchill	0	0	0	0
4/5/1997	Richland Center	Tstm Wind	0	0	5K	0
4/6/1997	Richland County	High Wind	0	0	45K	0
6/15/1997	Richland Center	Tstm Wind	0	0	10K	0
6/15/1997	Bear Valley	Tstm Wind	0	0	20K	0
7/1/1997	Richland Center	Tstm Wind	0	0	8K	0
9/16/1997	Richland Center	Tstm Wind	0	0	25K	0
5/31/1998	Viola	Tstm Wind	0	0	0	0
6/18/1998	Viola	Tstm Wind	0	0	1K	0
6/18/1998	Richland Center	Tstm Wind	0	0	30K	0
6/18/1998	Bloom City	Tstm Wind	0	0	15K	10K
6/27/1998	Yuba	Tstm Wind	0	0	20K	1K
7/19/1998	Richland Center	Tstm Wind	0	0	12K	0
7/20/1998	Boaz	Tstm Wind	0	0	10K	25K
11/10/1998	Richland County	High Wind	1	2	1.7M	0
5/16/1999	Richland Center	Tstm Wind	0	0	20K	0
6/1/2000	Cazenovia	Tstm Wind	0	0	5K	0
6/1/2000	Cazenovia	Tstm Wind	0	0	1K	0
10/25/2001	Richland County	High Wind	0	0	0	0
7/4/2003	Richland Center	Tstm Wind	0	0	2K	2K
8/20/2003	Lone Rock	Tstm Wind	0	0	0	0
6/10/2005	Richland Center	Tstm Wind	0	0	0K	0
6/24/2005	Richland Center	Tstm Wind	0	0	0K	0
6/29/2005	Richland Center	Tstm Wind	0	0	2K	0
6/29/2005	Richland Center	Tstm Wind	0	0	1K	0
6/29/2005	Richland Center	Tstm Wind	0	0	3K	0
7/25/2005	Five Pts	Tstm Wind	0	0	2K	5K
5/24/2006	Richland Center	Tstm Wind	0	0	1K	0
5/24/2006	Richland Center	Tstm Wind	0	0	4K	0
7/1/2006	Richland Center	Tstm Wind	0	0	0	0
7/1/2006	Richland Center	Tstm Wind	0	0	1K	0
7/20/2006	Cazenovia	Tstm Wind	0	0	1K	0
2/2/2007	Richland County	Extreme Cold/wind Chill	0	0	0K	0K
7/3/2007	Neptune	Tstm Wind	0	0	2K	3K
7/3/2007	Ithaca	Tstm Wind	0	0	6K	3K
8/21/2007	Richland Center	Tstm Wind	0	0	2K	0K
9/18/2007	Yuba	Tstm Wind	0	0	5K	0K
9/18/2007	Richland Center	Tstm Wind	0	0	6K	0K
9/18/2007	Richland Center	Tstm Wind	0	0	8K	0K
9/21/2007	Ithaca	Tstm Wind	0	0	1K	0K
9/21/2007	Ashridge	Tstm Wind	0	0	0K	0K

Date	Location	Type	Death	Injury	Property Damage	Crop Damage
1/30/2008	Richland County	Extreme Cold/wind Chill	0	0	0K	0K
2/10/2008	Richland County	Extreme Cold/wind Chill	0	0	0K	0K
6/7/2008	Hub City	Tstm Wind	0	0	1K	0K
6/7/2008	Cazenovia	Tstm Wind	0	0	1K	3K
7/10/2008	Richland Center	Tstm Wind	0	0	3K	1K
7/25/2008	Bosstown	Tstm Wind	0	0	1K	0K
7/25/2008	Gotham	Tstm Wind	0	0	4K	0K
12/14/2008	Richland County	Cold/wind Chill	0	0	0K	0K
12/21/2008	Richland County	Cold/wind Chill	0	0	0K	0K

Vulnerability

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

Hazard Mitigation Strategies

The goal of thunderstorm mitigation activities is to reduce, in a cost effective manner, the loss of lives and property due to these events. The Richland County Emergency Management Office has developed severe weather safety information that it disseminates to the public in a display rack and will provide online with the goal of protecting the lives and property of citizens. During Tornado Awareness Week, there is extensive media coverage of safety tips. The Emergency Management Department also provides public service announcements (PSAs) to the local radio station (WRCO 100.9 FM and 1450 AM).

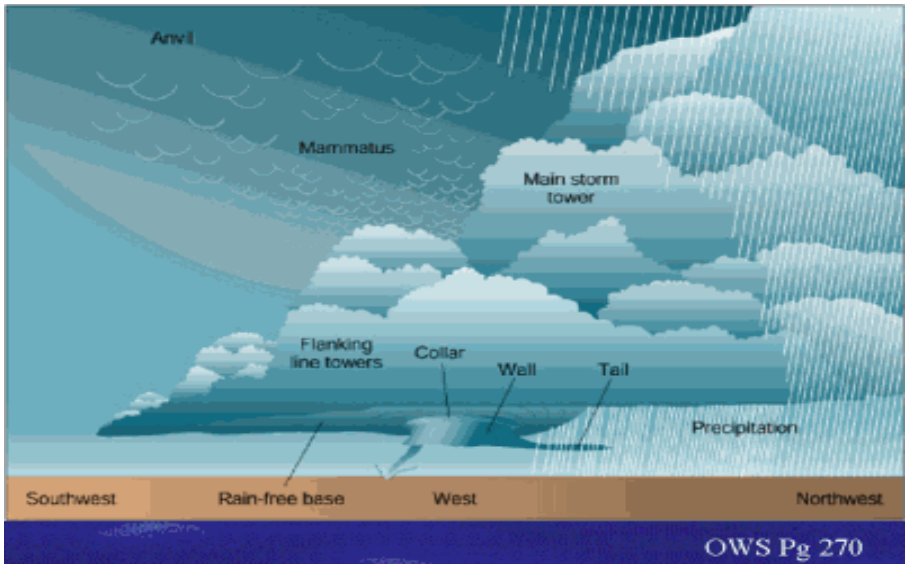
The County Emergency Management Department also provides advice and other assistance to local event boards, the University of Wisconsin – Richland Center Campus and senior residence facilities (e.g., nursing homes, assisted living) regarding safety issues. This is especially important for some of the local events, such as the Star-Spangled Celebration and the State High School Rodeo, which can draw 15,000 – 20,000 people to the community.

The Emergency Management Department has been active in helping these boards, upon request, and received a letter of commendation for their work monitoring for severe weather during the Star-Spangled Celebration.

The damage to buildings and infrastructure in a thunderstorm is generally caused by components of the storm such as hail, flooding, lightning or wind. A discussion of strategies to reduce effects on existing and future buildings and infrastructure is discussed in the chapters that discuss each of these components in detail.

Storms: Tornadoes and High Winds

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



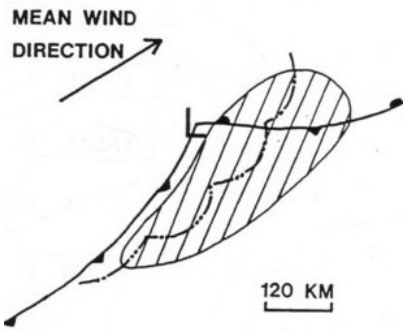
A derecho is a widespread, long-lived, violent, convectively-induced straight-line windstorm that is associated with a fast-moving band of severe thunderstorms usually taking the form of a bow echo. Derechos blow in the direction of movement of their associated storms; this is similar to a gust front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

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

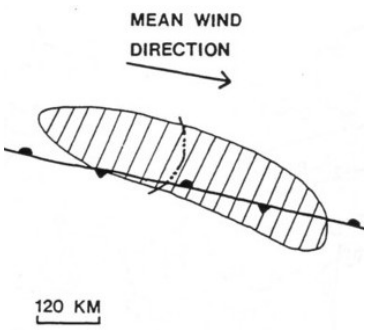
- Serial: Multiple bow echoes embedded in a massive squall line typically around 250 miles long. This type of derecho is usually associated with a very deep low. Also because of embedded supercells, tornadoes can easily spin out of these types of derechos.

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

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



Serial Derecho



Progressive Derecho

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

Physical Characteristics

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

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

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

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

FEMA, 1997

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

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

Downburst Characteristics

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

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

Frequency of Occurrence

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

Wisconsin's tornado season runs from the beginning of April through September with the most severe tornadoes typically occurring in April, May and June. Richland County has had tornadoes from the months of May through October, with most (6) occurring in August. Tornadoes have, however, occurred in Wisconsin during every month except February. Many tornadoes strike in late afternoon or early evening (i.e., from 3:00 – 9:00 p.m.) but they do occur at other times. Deaths, injuries and personal property damage have occurred and will continue to occur in Wisconsin. Richland County has recorded four deaths and 111 injuries due to tornadoes since 1850.

According to the National Weather Service, Richland County had one funnel cloud, no water spouts and twelve tornadoes between 1 January 1950 and 31 December 2008. Between these dates, the county had no deaths, nine injuries and approximately $3.5 million in damages due to these storms. The probability of Richland County being struck by a tornado in the future is high and the likelihood of damage from future tornadoes is also high. All parts of Richland County are equally susceptible to tornadoes.

Date	Location	Type	Mag	Death	Injury	Property Damage	Crop Damage
7/3/1951	Richland County	Tornado	F2	0	0	25K	0
5/8/1964	Richland County	Tornado	F2	0	0	0K	0

Date	Location	Type	Mag	Death	Injury	Property Damage	Crop Damage
5/8/1964	Richland County	Tornado	F2	0	2	250K	0
9/3/1964	Richland County	Tornado	F3	0	4	250K	0
8/1/1967	Richland County	Tornado	F1	0	0	25K	0
6/13/1972	Richland County	Tornado	F1	0	0	25K	0
8/11/1972	Richland County	Tornado	F1	0	0	25K	0
6/26/1973	Richland County	Tornado	F1	UKN	UKN	UKN	UKN
5/8/1988	Richland County	Tornado	F2	0	0	250K	0
8/18/2005	Viola	Tornado	F2	0	3	2.5M	75K
8/18/2005	Orion	Tornado	F0	0	0	100K	25K
5/24/2006	Richland Center	Tornado	F0	0	0	5K	0
3/31/2007	Richland Center	Funnel Cloud	NA	0	0	0K	0K

According to the NWS historical records, Richland County has never had an F5/EF5 tornado and they have only had one F4/EF4. This tornado occurred in May, 1918 when a tornado formed in northeastern Iowa and tracked across southwestern Wisconsin. The storm hit Lone Rock, killing four people and destroying much of the town before collapsing near Baraboo. On August 18, 2005 another significant tornado, one of 27 recorded in Wisconsin on that day, hit the Village of Viola causing major damage and injuring three people. The storm continued east, destroying additional trees and structures before lifting west of Hub City.

Vulnerability

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

Schools, in addition to holding children, are the major type of structure used as community disaster shelters and their loss might therefore affect the community on several levels (e.g., the death or injury of children, the loss of a community housing shelter). School gymnasiums are often the specific location of the community

shelter but they are especially vulnerable in tornadoes because the large-span roof structure is often not adequately supported.

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

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

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

The Wisconsin Hazard Mitigation Plan estimated tornado losses for Richland County. The table below shows the reported costs due to tornado damages plus the state's estimates of future risk. When sorted for total future risk, Richland County ranks 56th (of 72 counties in Wisconsin.) When sorted for structural and contents damages Richland County ranks 62th and when sorted for injury and mortality damages Richland County ranks 56h.

	Manufactured Housing	Non-Engineered Wood Frame	Combined	Total Annual Damage
Injury and Mortality Damages	$421,202	$2,870,626	$3,291,828	$3,327,866
Structural and Contents Damage	$2,413	$33,625	$36,038	$3,327,866
Total Annual Damage	$423,614	$2,904,252	$3,327,866	$3,327,866
Total Future Risk	$5,257,054	$36,041,762	$41,298,816	$41,298,816

The Wisconsin Hazard Mitigation Plan also estimated losses for Richland County from straight-line winds. The table below shows the reported costs due to straight-line wind damage plus the state's estimates of future risk. When sorted for total future risk, Richland County ranks 63rd. When sorted for either structural and contents damages Richland County ranks 67th and when sorted for injury and mortality damages, Richland County ranks 57th.

	Manufactured Housing	Non-Engineered Wood Frame	Combined	Total Annual Damage
Injury and Mortality Damages	$98,313	$356,811	$455,124	$3,786,241
Structural and Contents Damage	$182,349	$3,148,768	$3,331,117	$3,786,241
Total Annual Damage	$280,661	$3,505,580	$3,786,241	$3,786,241
Total Future Risk	$3,483,004	$43,504,243	$46,987,247	$46,987,247

Hazard Mitigation Strategies

The goal of tornado and high wind mitigation activities is to reduce, in a cost effective manner, the loss of lives and property due to these events. Richland County has some history of damage to buildings and infrastructure due to tornadoes and high winds. Some strategies below will deal with public information and alert and notification while others will enable the community to make current and future buildings and infrastructure more disaster-resistant by enacting more "bricks and mortar" solutions.

An effective warning system is the single most important resource for alerting the public to a tornado hazard, which is critical to the main goal of saving lives and reducing property losses. Forecasting of tornadoes is difficult, however, because of the suddenness of their onset, their relatively short duration, the extreme variability of a tornado striking area, limited knowledge of tornado dynamics and the limitations of the weather observation system. Tornado sirens are municipally owned and maintained in Richland County although some are activated by the county. A fuller discussion of the improvements to the warning sirens in the county can be found in the All-Hazards Section of this plan. The Emergency Management Office promotes the use of NOAA weather radios for public alert and notification. The office also

continues to evaluate various technologies to determine if they can be effectively integrated into the county's alert and notification systems.

During the past several years, there has been a statewide Tornado Awareness Week in late March or April. Media information packets are distributed to reemphasize and alert the public to tornado warning procedures. Richland County actively promotes tornado safety public information as well as other summer severe weather public awareness and educational efforts and will include applicable links on the county website's preparedness page specifically aimed at schools, homes and businesses. Richland County also assists the National Weather Service (NWS) with sponsoring tornado spotter training and in organizing local tornado spotter networks. The NWS also works with the county to provide a tornado packet of public information that includes a county map with a vulnerability analysis.

As part of the tornado preparedness program, the county plans to work with the municipalities to explore the feasibility of increasing the wind resistance of the roofs of community storm shelters. Most municipalities in Richland County have adopted the state's uniform building codes. Richland County would like to encourage the enforcement of these local building codes that improve a current or future structure's ability to withstand greater wind velocities. This should be facilitated by the fact that in late 2003, the Governor signed a law requiring municipalities to use a uniform building code inspection.

The county recognizes that mobile home parks and campgrounds are particularly vulnerable locations for people and property during a tornado. To help mitigate the danger, the county is considering projects that include:

- Providing information to builders and owners of manufactured and mobile homes, via a website link, regarding the use of tie-downs with ground anchors. This relatively inexpensive strategy reduces the damage to these homes in lower F-scale tornadoes.
- Providing information to mobile home park owners and park/campground operators, via a website link, about providing permanent storm shelters in the communities. One style of shelter holds approximately ten people and costs $3,000. There are mobile home parks in the City of Richland Center and in the Villages of Lone Rock, Sextonville and Viola and in the Town of

Rockbridge. The Alma Springs, Flying J and Eagle Cave are the campgrounds in the county. The Eagle Cave campground is in the County's NWS-identified "tornado alley" and is a priority for providing information. The county would also be willing to partner with these private agencies to seek grant funding, such as U.S. Department of Commerce Community Development Block Grant (CDBG) grants for these types of improvements.

Storms: Winter

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

Physical Characteristics

The National Weather Service descriptions of winter storm elements are:

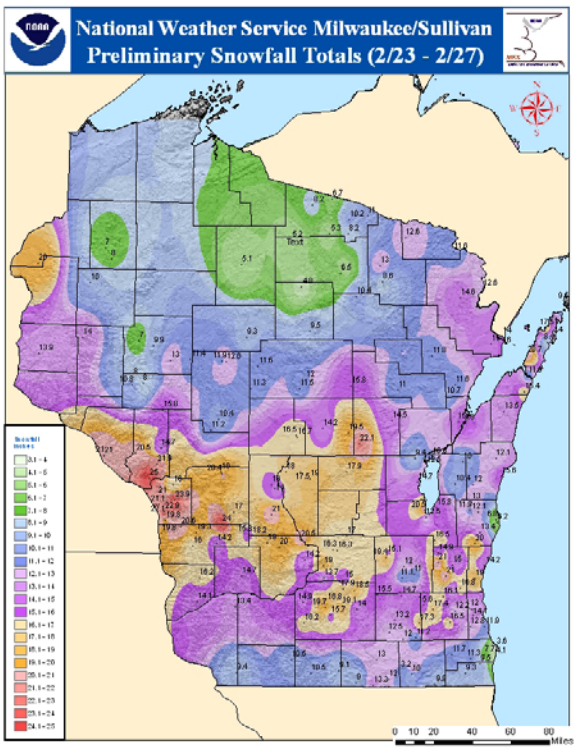
- Heavy snowfall - Accumulation of six or more inches of snow in a 12-hour period or eight or more inches in a 24-hour period.
- Blizzard - An occurrence of sustained wind speeds in excess of 35 miles per hour (mph) accompanied by heavy snowfall or large amounts of blowing or drifting snow.
- Ice storm - An occurrence of rain falling from warmer upper layers of the atmosphere to the colder ground, freezing upon contact with the ground and exposed objects near the ground.
- Freezing drizzle/freezing rain - Effect of drizzle or rain freezing upon impact on objects with a temperature of 32 degrees Fahrenheit or below.
- Sleet - Solid grains or pellets of ice formed by the freezing of raindrops or the refreezing of largely melted snowflakes. This ice does not cling to surfaces.
- Wind chill - An apparent temperature that incorporates the combined effect of wind and low air temperatures on exposed skin.

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

Northwestern Wisconsin encounters more blizzards than the southeastern portions of the state.

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

Frequency of Occurrence



Annual snowfall in Wisconsin varies between thirty inches in southern counties to one hundred inches in the north. In Wisconsin, the bulk of snow in falls between December and March and the largest winter storms tend to form over the souther Rockies or the central or southern Plains, then move northeast towards the western Great Lakes producing usually six to twelve inches. Low pressure systems originating in the northwest (Alberta) tend to produce only light snowfalls of two to four inches. Snowfalls associated with Alberta lows occur more frequently with colder weather. Richland Center has a 30 year average of 40.5 inches of snow annually and since 1982, an average of four winter storms impact the area each season. There have been a total of 4 documented deaths and 49 injuries as a direct result from winter storms in Wisconsin since 1982.

Although massive blizzards are rare in Wisconsin, blizzard-like conditions often exist during heavy snowstorms when gusty winds cause blowing and drifting of snow. Near blizzard conditions existed in Wisconsin in January 1979 when record snowfalls were

recorded in many areas and wind speeds gusted to over thirty miles per hour. The terrain of Richland County limits the number of true blizzards (three since 1982) but heavy snow, blowing snow, ice and sleet all regularly occur. The table below shows the top five season snowfalls as recorded in Richland Center by the NWS.

TOP FIVE SEASONAL SNOWFALLS IN RICHLAND CENTER	
YEAR	SNOWFALL
2007-2008	74.5”
1950-1951	73.3”
1958-1959	72.1”
1928-1929	71.1”
1970-1971	70.3”

According to the National Weather Service, there are occasions in Richland County where milder daytime temperatures in valleys produce rain when a wintry mix or snow is falling on ridges and blowing snow is also more common on ridge tops. The record for one-day snowfall in Richland Center was 15.0 inches set on March 28, 1931. On February 23-25, 2007, a major winter storm impacted Richland County. Heavy snow, including lightning, brought over a foot of snow (12.8”) over a two day period. Winds also increased and created major blowing and drifting. Some sleet and freezing rain fell during the middle of the storm, followed by another round of heavy snow and blizzard conditions. December 2008 was also very snowy, with 30.8” making it the 2nd snowiest December recorded. March can also be a snowy month and, although snowfall may be less frequent, heavy wet snow can form from large spring storms. In 1959, a total of 31.9” of snow fell in March alone.

Both ice and sleet storms can occur at any time throughout the winter season from November to April. Ice storms (1/4” of ice or more) can occur but are relatively rare with only 6 occurrences since 1982. Ice storms of disastrous proportions occurred in central Wisconsin in February 1922 and in southern Wisconsin in March 1976. A Presidential Disaster Declaration occurred as a result of the 1976 storm. Utility crews from surrounding states were called in to restore power, which was off for up to ten days in some areas. Other storms of lesser magnitude caused power outages and treacherous highway conditions.

The probability that there will be severe winter storms in Richland County is medium and the likelihood that those storms will cause significant damage is also medium. The following table details Richland County's 44 winter storm statistics (i.e., snow and ice events) as reported by the National Weather Service including human loss and injury and property damage estimates from 1 January 1950 through 31 December 2008.

Date	Location or County	Type	Death	Injury	Property Damage	Crop Damage
1/13/1993	Statewide	Heavy Snow	0	0	0	0
1/16/1994	West-central; South-c	Heavy Snow	0	0	0	0
1/26/1994	All But Far Northwest	Heavy Snow/ice Storm	0	0	0	0
2/22/1994	Southern Half Of Wisc	Heavy Snow	0	0	0	0
2/25/1994	Southern Half Of Wisc	Heavy Snow	0	0	0	0
3/6/1995	Richland	Heavy Snow	0	0	0	0
4/9/1995	Richland	Heavy Snow	0	0	0	0
11/26/1995	Central And Southern	Heavy Snow	0	1	0	0
12/13/1995	Southern Wisconsin	Glaze	0	0	0	0
11/20/1996	Richland	Winter Storm	0	0	100K	0
12/23/1996	Richland	Winter Storm	0	0	0	0
1/15/1997	Richland	Winter Storm	0	0	0	0
2/4/1997	Richland	Winter Storm	0	0	0	0
3/13/1997	Richland	Winter Storm	0	0	0	0
1/4/1998	Richland	Ice Storm	0	14	67K	0
3/8/1998	Richland	Winter Storm	0	0	0	0
1/1/1999	Richland	Winter Storm	0	6	0	0
3/8/1999	Richland	Winter Storm	0	0	0	0
12/11/2000	Richland	Winter Storm	0	0	0	0
12/18/2000	Richland	Winter Storm	0	0	0	0
2/7/2001	Richland	Ice Storm	0	0	0	0
2/8/2001	Richland	Winter Storm	0	0	0	0
2/24/2001	Richland	Ice Storm	0	0	0	0
3/1/2002	Richland	Winter Storm	0	0	0	0
2/2/2003	Richland	Winter Storm	0	0	0	0
3/4/2003	Richland	Winter Storm	0	0	0	0
4/7/2003	Richland	Winter Storm	0	0	0	0
12/9/2003	Richland	Winter Storm	0	0	0	0
2/5/2004	Richland	Winter Storm	0	0	0	0
1/4/2005	Richland	Winter Storm	0	0	0	0
1/21/2005	Richland	Winter Storm	0	0	0	0

Date	Location or County	Type	Death	Injury	Property Damage	Crop Damage
3/17/2005	Richland	Winter Storm	0	0	0	0
2/15/2006	Richland	Winter Storm	0	0	0	0
1/21/2007	Richland	Heavy Snow	0	0	0K	0K
2/23/2007	Richland	Winter Storm	0	0	0K	0K
4/10/2007	Richland	Winter Storm	0	0	0K	0K
12/22/2007	Richland	Winter Storm	0	0	0K	0K
1/21/2008	Richland	Heavy Snow	0	0	0K	0K
2/5/2008	Richland	Winter Storm	0	0	0K	0K
2/14/2008	Richland	Heavy Snow	0	0	0K	0K
2/17/2008	Richland	Winter Storm	0	0	0K	0K
3/21/2008	Richland	Heavy Snow	0	0	0K	0K
12/8/2008	Richland	Winter Storm	0	0	0K	0K
12/18/2008	Richland	Winter Storm	0	0	0K	0K

Vulnerability

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

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

Hazard Mitigation Strategies

The goal of winter storm mitigation activities is to reduce, in a cost effective manner, the loss of lives and property due to these events. Communities prepare for severe winter weather by ensuring that plowing and sanding equipment is operational and available to handle potential emergencies. Funding is budgeted for the overtime hours of extra personnel but in a large emergency this may not be adequate. Redundant communication modes (e.g., radio, telephone) exist between government, police, fire, EMS, hospitals and highway departments. The Richland County

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

Winter safety information is prepared and distributed to the media and the public by the Richland County Emergency Management Office during Winter Awareness Week in November. Preparedness information is also available from display racks in the courthouse and will be included on the preparedness page of the website. During a storm, the public is advised to monitor local radio, television and NOAA weather alert radios for up-to-date forecasts and the Sheriff's Office will release public service announcements (PSAs) on the local radio station (WRCO 100.9 FM and 1450 AM).

The hazard mitigation strategies listed above primarily involve providing information on general safety measures to the public. These measures provide basic safety information but, since the response to winter storms is primarily a government and/or corporate function comprised of tasks such as clearing roads of snow and ice and repairing downed utility lines, there are few measures that can be employed to reduce damages to existing or future buildings and infrastructure.

Utility Failure

A utility emergency usually means an electrical power or natural gas outage or a fuel shortage caused by an oil embargo, power failure or natural disaster.

Physical Characteristics

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

Except for three locations, the majority of Richland County is part of the Alliant/ Wisconsin Power and Light Company, which serves the southern and eastern sections of the county, or the Richland Electric Cooperative, which serves the north and western portions of the county. The other electric utilities are the Richland Center Electric Utility serving an area immediately around the City of Richland Center, the Viola Municipal Water and Electric Utility and the Muscoda Water and Light Utility, which serves a small area at the south-central portion of the County adjacent to the Village of Muscoda. One major East-West and two North-South electric transmission lines cross the County. There are eight electrical substations located along these lines in the County. The Northern Natural Gas Pipeline runs north/south through the county up to Richland Center. Natural gas is provided to roughly half the county by a number of providers including Madison Gas and Electric, Wisconsin Gas and Midwest Natural Gas, Inc. Refer to Alliant Energy, the Richland Electric Cooperative, the Richland Center Electric Utility, Muscoda Light and Water Utility, Madison Gas and Electric, Wisconsin Gas and Midwest Natural Gas for more detailed information on and mapping of power plants and transmission lines.

Electrical substation

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

Frequency of Occurrence

Richland County has several short power outages (i.e., lasting less than six hours) per year but does not have a history of extended power outages. The possibility always exists that a man-made or natural disaster could affect the power system for an extended period of time.

In general, Richland County has a medium likelihood of utility failures with a low risk of damage, death or injury due to a loss. Obviously, power outages are more likely to occur and the severity is greater in areas of higher human population (i.e., urban areas) but the loss of power to rural customers, while affecting fewer people, generally lasts longer and can be as life-threatening, especially if a person with special needs (e.g., the elderly, the young, those on special medical equipment) is involved.

Vulnerability

The failure of a utility to function can have wide-ranging impact in Richland County. People, especially at-risk/special needs populations, in residential properties may not be able to safely live in their homes because of inadequate heat, the inability to cook, etc. Businesses, including the utilities themselves, may lose money due to the inability to produce goods and services for which they can bill. Other utilities also may depend on electricity to provide their service (e.g., sewer lift pump stations require electricity to operate); Richland County generally does not have generator back-up for water or sewer equipment. Other utilities may also be non-operational due to their own damaged infrastructure, which can be very expensive to replace and/or repair. Critical infrastructure such as hospitals, schools and governmental facilities may not be able to operate or may have to operate at a reduced capacity due to the loss of utility services. EPCRA facilities may not be able to adequately control and contain their chemicals and there may be a release of hazardous materials that can impact people or the environment.

Agricultural assets may be impacted by the loss of utilities because extreme temperatures reduce the volume of livestock products and products such as milk may not be able to be properly stored.

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

Hazard Mitigation Strategies

The goal of utility failure mitigation activities is to reduce, in a cost effective manner, the loss of lives and property due to these events. Richland County has worked directly with the utility companies and emergency responders to formulate emergency management plans. During a fuel or power shortage, residents, schools, industry and businesses will be asked to take measures to conserve fuel. If the fuel shortage reaches a critical stage, all non-essential facilities will be closed and contingency plans will be activated.

In the event of a prolonged power outage, Richland County has generators available to provide power for radio communication and EOC operation. Evacuation and shelter arrangements have been prepared in case of a severe power outage. It should be noted that

schools are often top choices as community disaster shelters but none of the county's schools have back-up generators. The Richland County Emergency Management Office would like to complete a feasibility study (including a cost-benefit analysis) to selectively upgrade shelter facilities for electricity needs in Richland Center (the middle and high schools), Lone Rock and Viola.

Other projects include:

- Purchase and install permanent, 2500KW back-up generators to raise the large, heavy bay doors so that the heavy public works equipment can get out in a disaster. Generators are needed at the County Highway Shop and at the Richland Electric Co-op Service Center; each will cost approximately $50,000.

- There are six sewer lift-station locations in the City of Richland Center, none of which have generator back-up. The city would like to install two permanent generators and to have four, trailer-mounted portable generators to address this need. This grant-funded project will require $35,000 to $40,000 per unit for the two permanent generators and approximately $90,000 each for the four portable generators and trailers.

- There are three electrical improvement projects that the City Utilities of Richland Center (Electric) would like to accomplish, which would cost a total of $400,000:

    - Provide a loop electric feed for a circuit on the east end of the City of Richland Center. This would benefit all of the electrical users and residents by providing a loop electric feed on that circuit, which would improve reliability for the entire east end of the city. This area includes the sewer lift station at Richland Square and at the Richland Center Foundry, which do not have back-up power sources. This would impact the city's electrical users plus those that use the sewer but not the city's electrical service (e.g., Pine Valley Manor). The loop would also provide additional reliability for Well #7, which provides water and fire protection for the city's east side. There are also plans for a water reservoir to be located behind the Outdoor Theater, which would also benefit from the system.

- Install a loop feed system into the North Industrial park, which would support the back-up of Wells #6, 7 and 8 as well as the Campus, Allison Park and North Industrial Park Lift Stations. It would also provide a third contingency back-up to the Richland Hospital should other power lines be damaged.

- Build several small pieces of line as back-ups to support the West Water Reservoir, Schmitt Woodland Hills, the Old Medical Center and the remainder of the Cairns Addition.

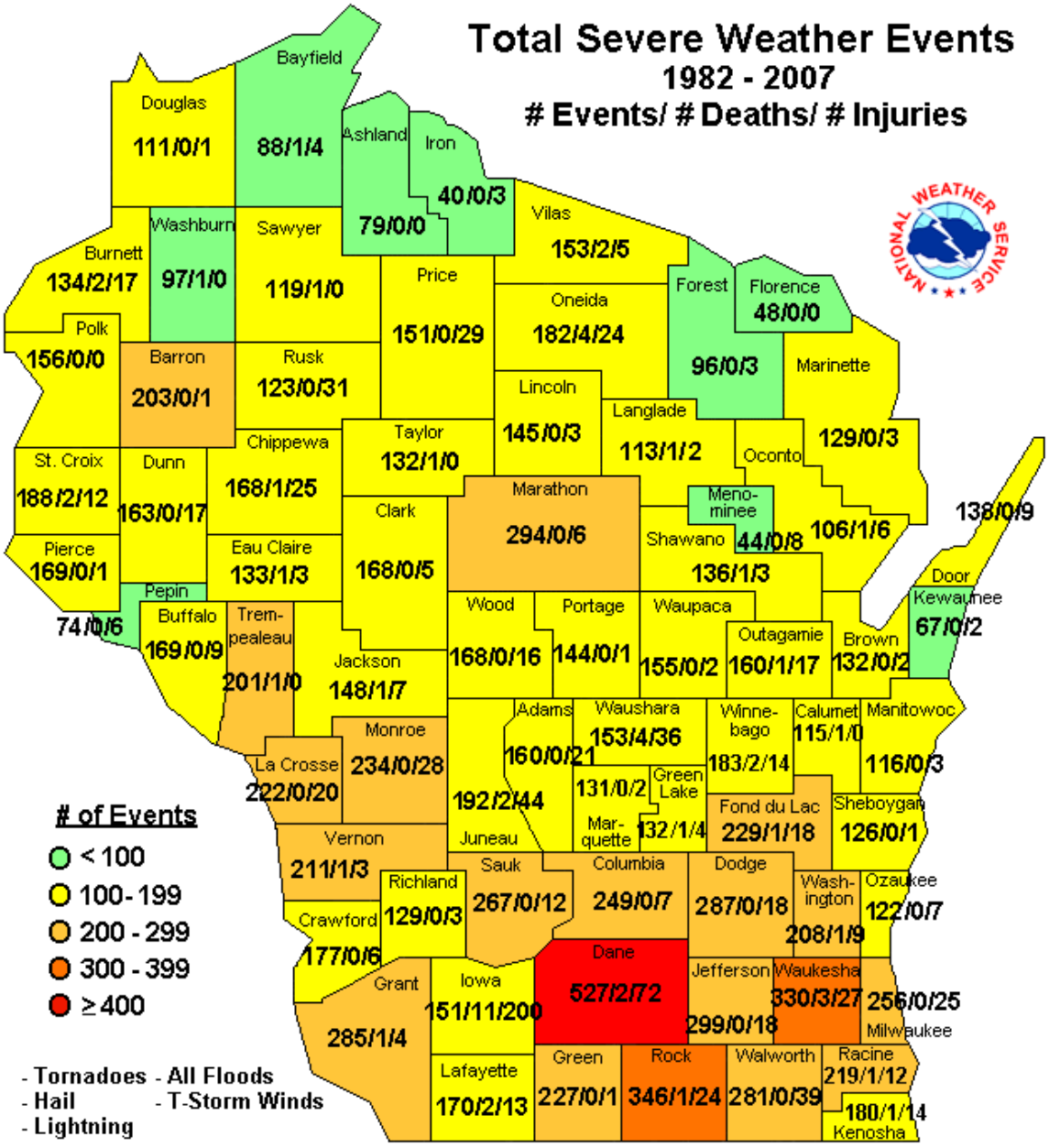
- The Richland Electric Cooperative would like to replace overhead primary electrical lines with underground lines
  - Project 2751.52.53 – 5.22 miles of SW Richland Co (Upper Byrds Creek from junction of CTH X). The area has experienced repeated, extensive outages caused by high wind and complicated by the forested nature of the area. Outages impact the entire substation circuit. Secondary hazards include tornadoes and ice storms. Cost is $208,800.
  - Proj. 2756.57 – 1.88 mi in SW Richland Co (Middle Byrds Creek beginning at 2753). This area has experienced repeated outages due to high wind. Outage impact over 100 consumers. Secondary hazards include tornadoes, lightning and ice storms. Cost is $75,200.
  - Proj. 2761.62.3.4 – 4.23 mi in SW Richland Co (Eagle Cave region). This area is a tourist attraction with a campground. The loss of power results in the loss of communications to forewarn people of impending storms. Remote, right-of-way subject to multiple hazards including high wind, tornado, lightning and torrential rains. Cost is $169,200.
  - Proj. 4626.31 – 3.63 miles in central Richland Co (Dog Hollow and Upper Willow Watershed). Repeated and extensive outages caused by high winds which impacts many consumers. Secondary hazards include tornadoes, lightning, ice storms and small floods. Cost is $145,200.
  - Proj. 1718.19 – 3.2 mi in NW Richland Co (Gault Hollow). Extensive outage history due to high wind and specific terrain. Integral tie line to mitigate other system damage. Cost is $128,000.

Coastal Erosion, Hurricane, Tsunami and Volcano

Due to the geographic location of Wisconsin and/or Richland County, these natural hazards are not considered to be a risk and will not have mitigation strategies associated with them.

Appendix A: Maps

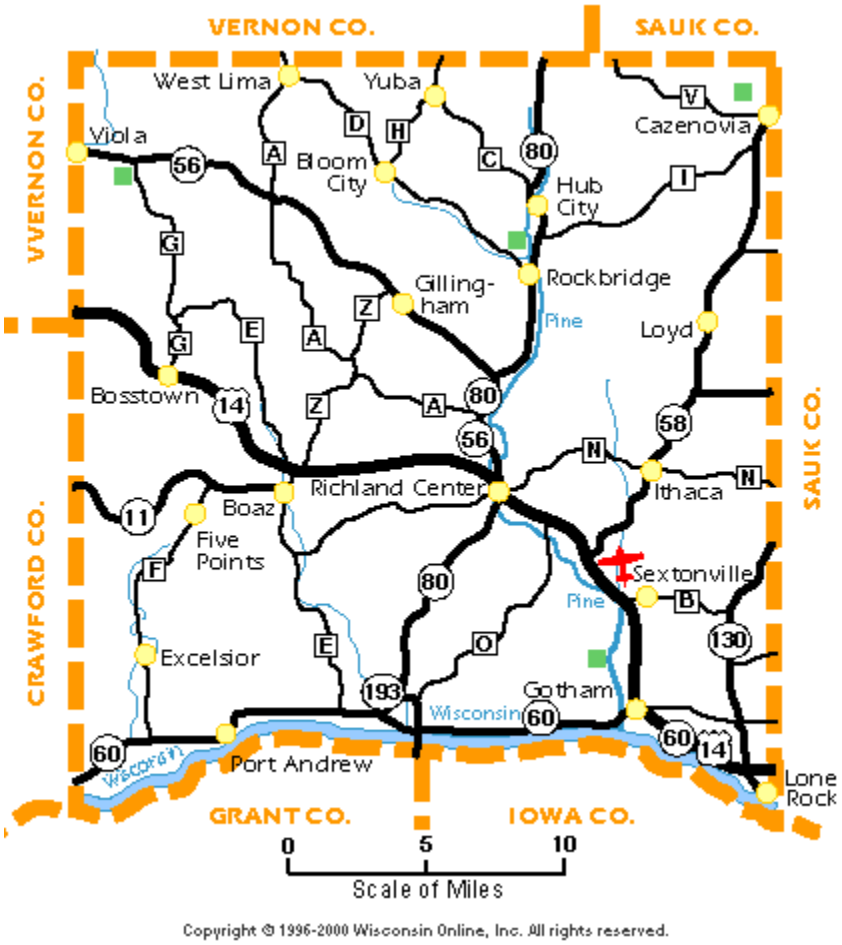
Wisconsin Total Severe Weather Events



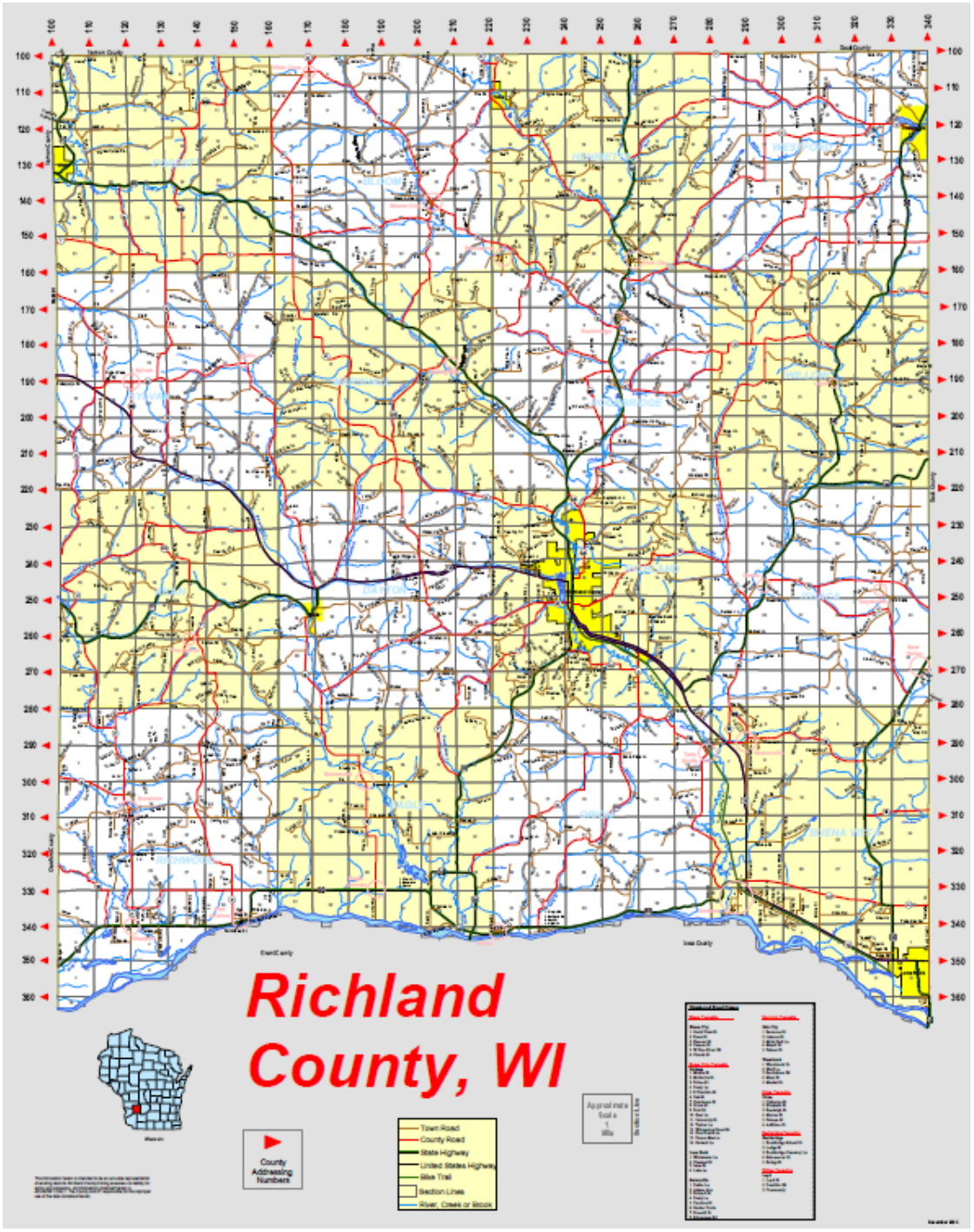
Wisconsin Emergency Management, http://emergencymanagement.wi.gov/docview.asp?docid=13595&locid=18

Richland County Base Map

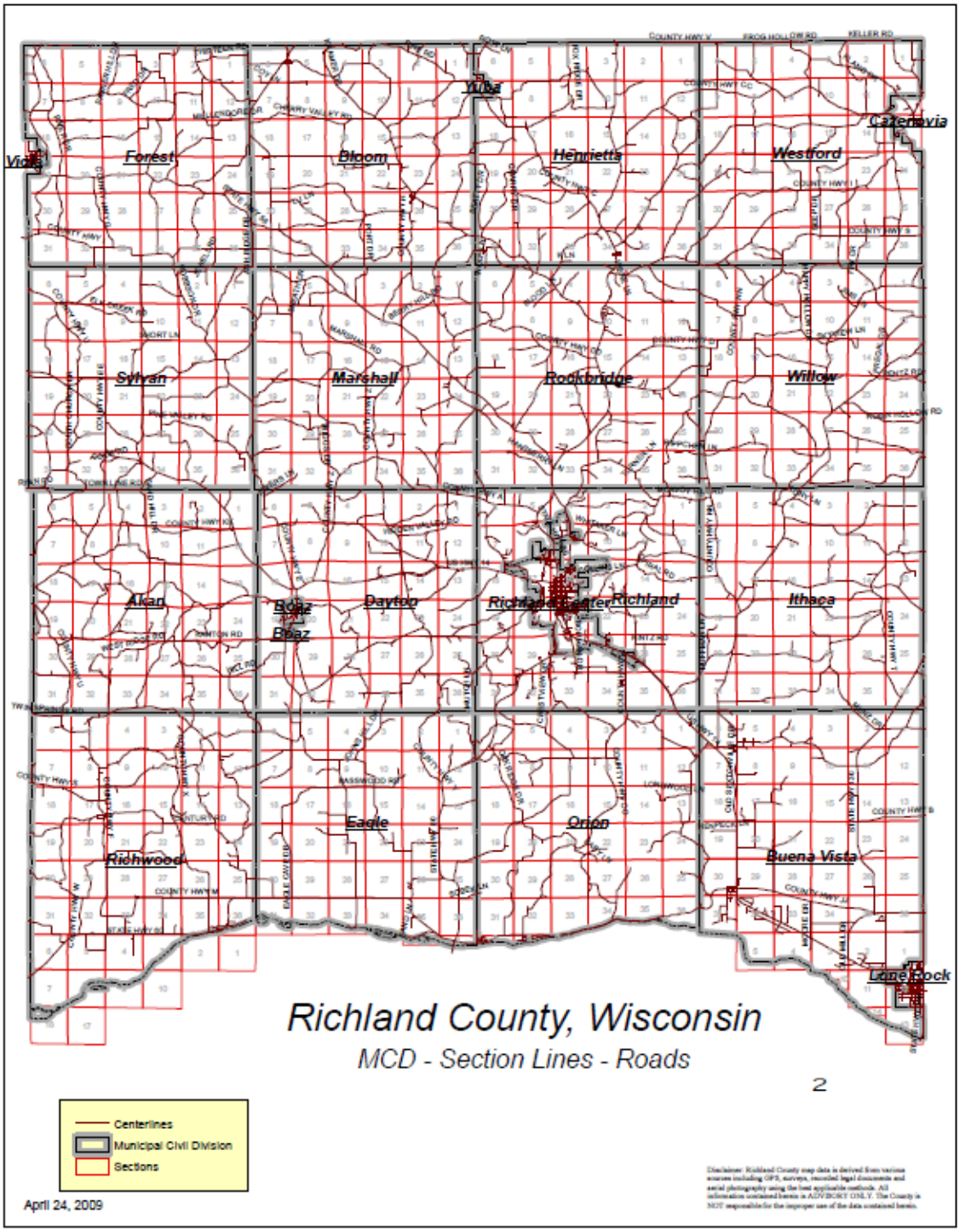
Map of Richland County, Wisconsin



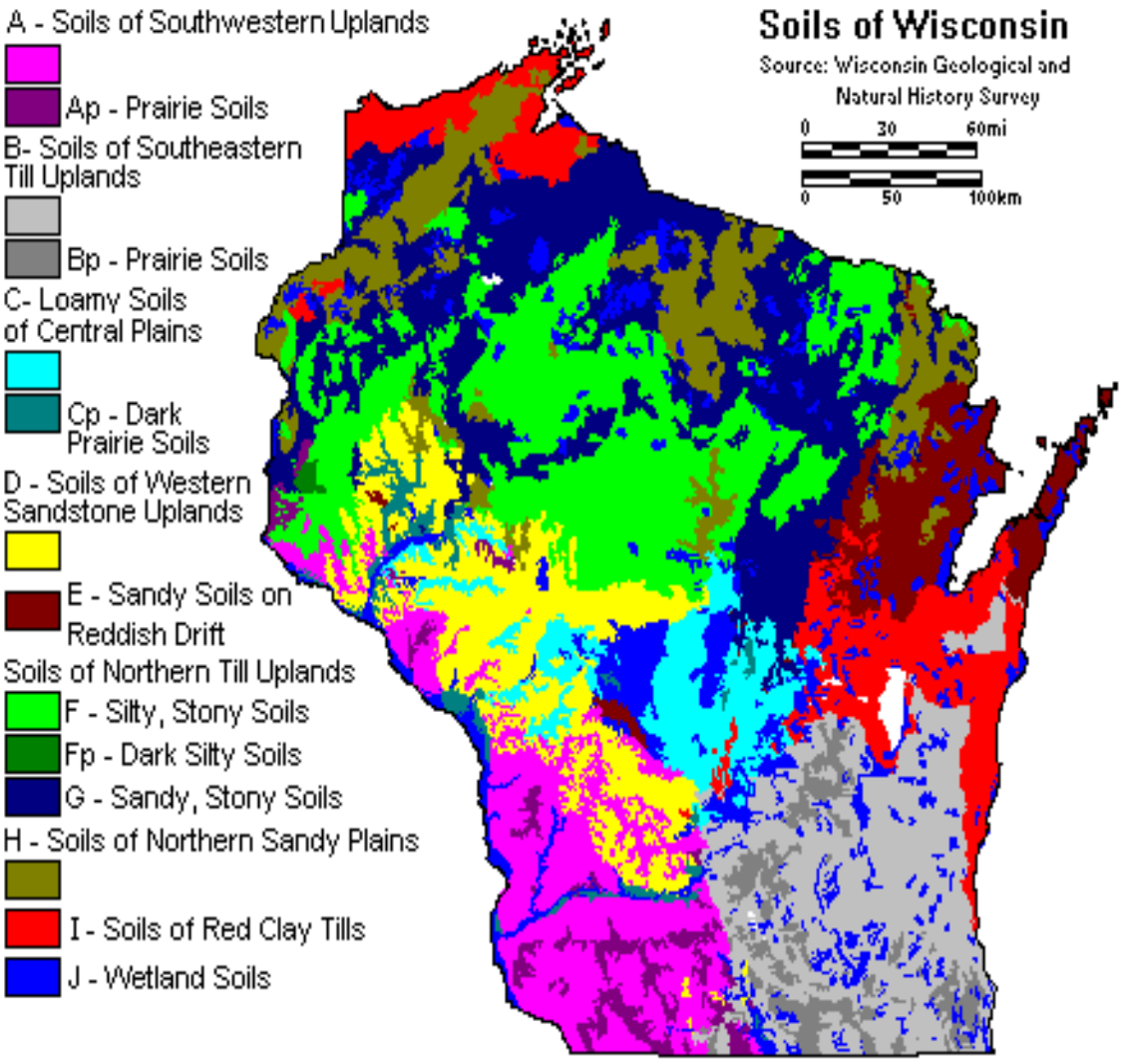
Richland County Master Highway Map



Richland County Civil Divisions Map

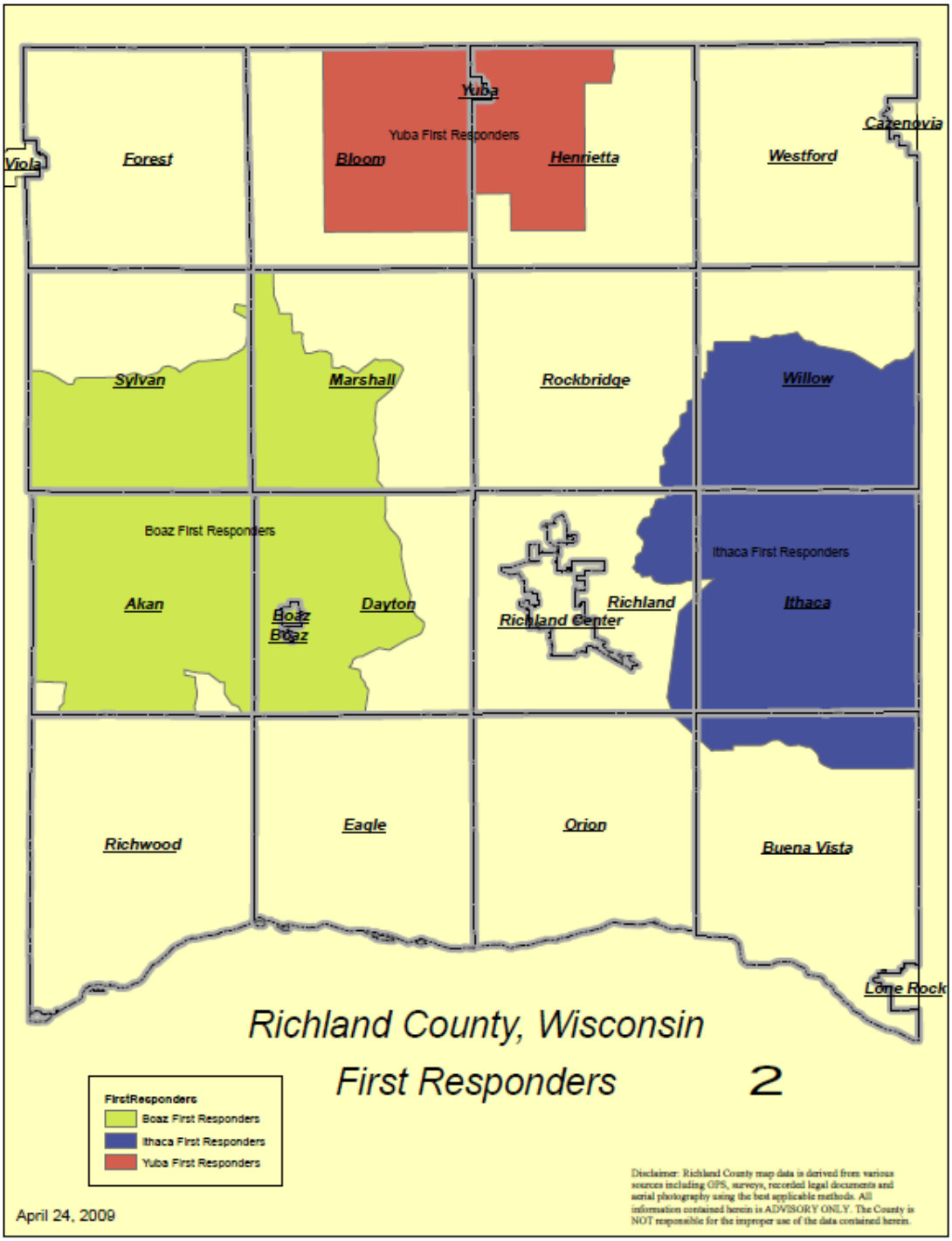


Soils Types



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

Richland County First Responders



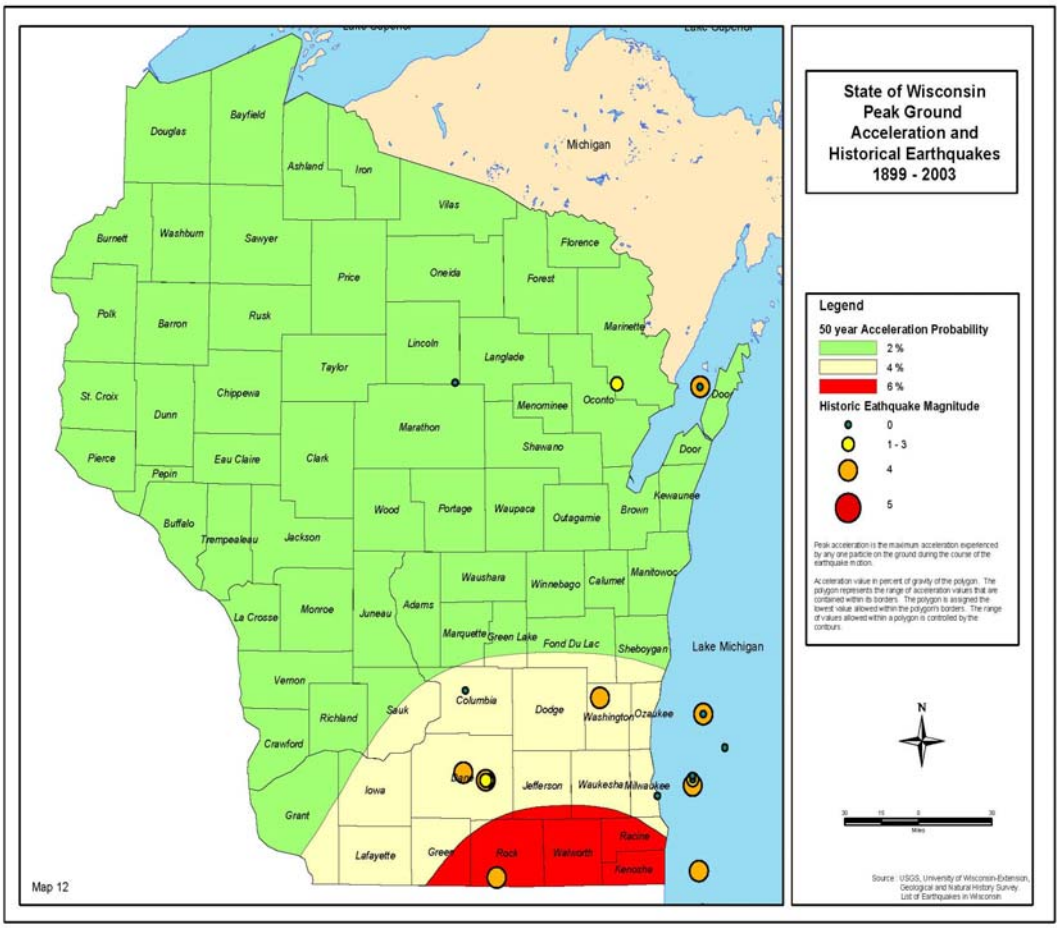
Richland County Ambulance Districts

Richland County Fire Districts

Richland County Law Enforcement Districts

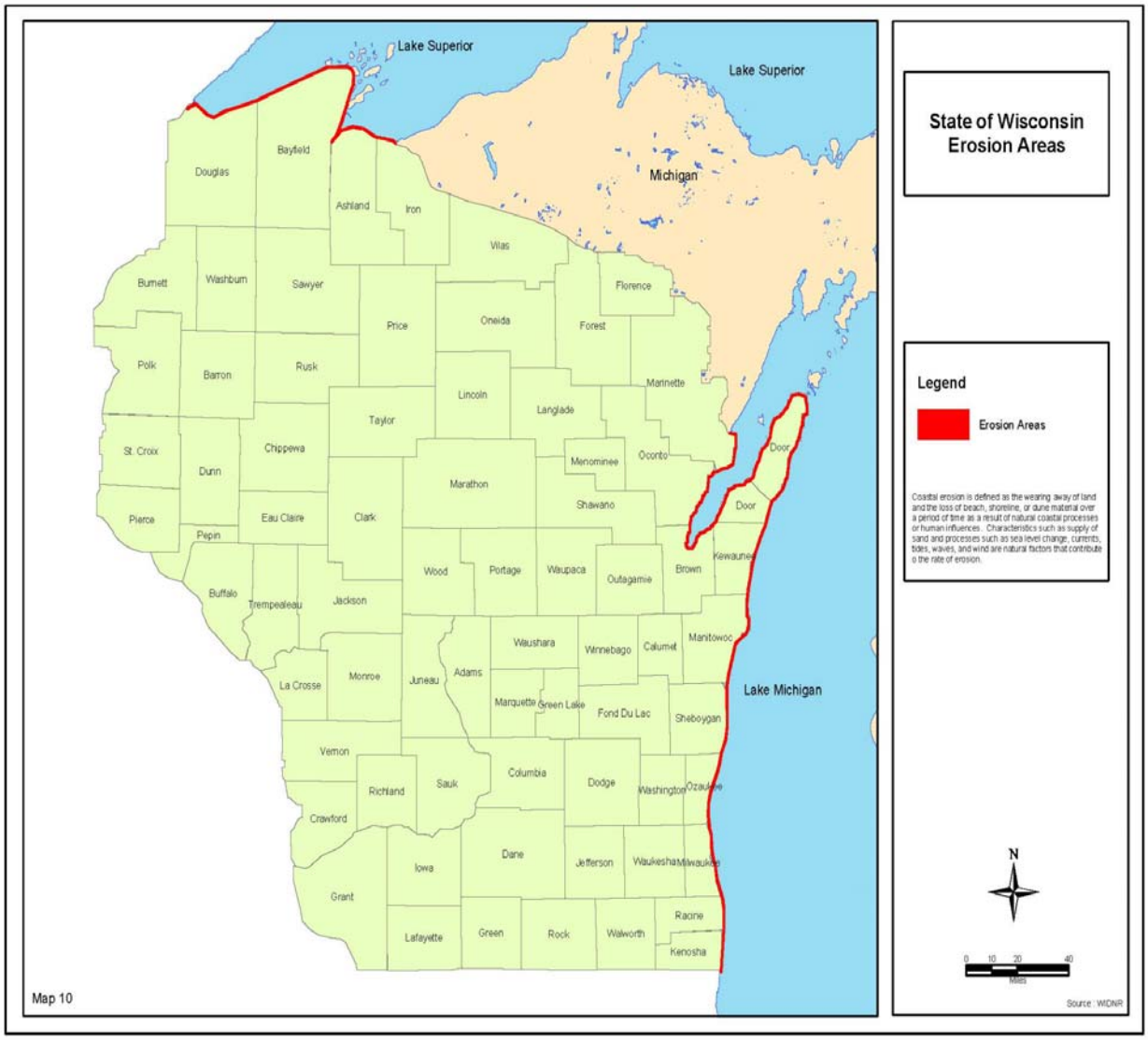
Earthquakes in Wisconsin

Peak Ground Acceleration Contours and Historical Earthquakes in Wisconsin

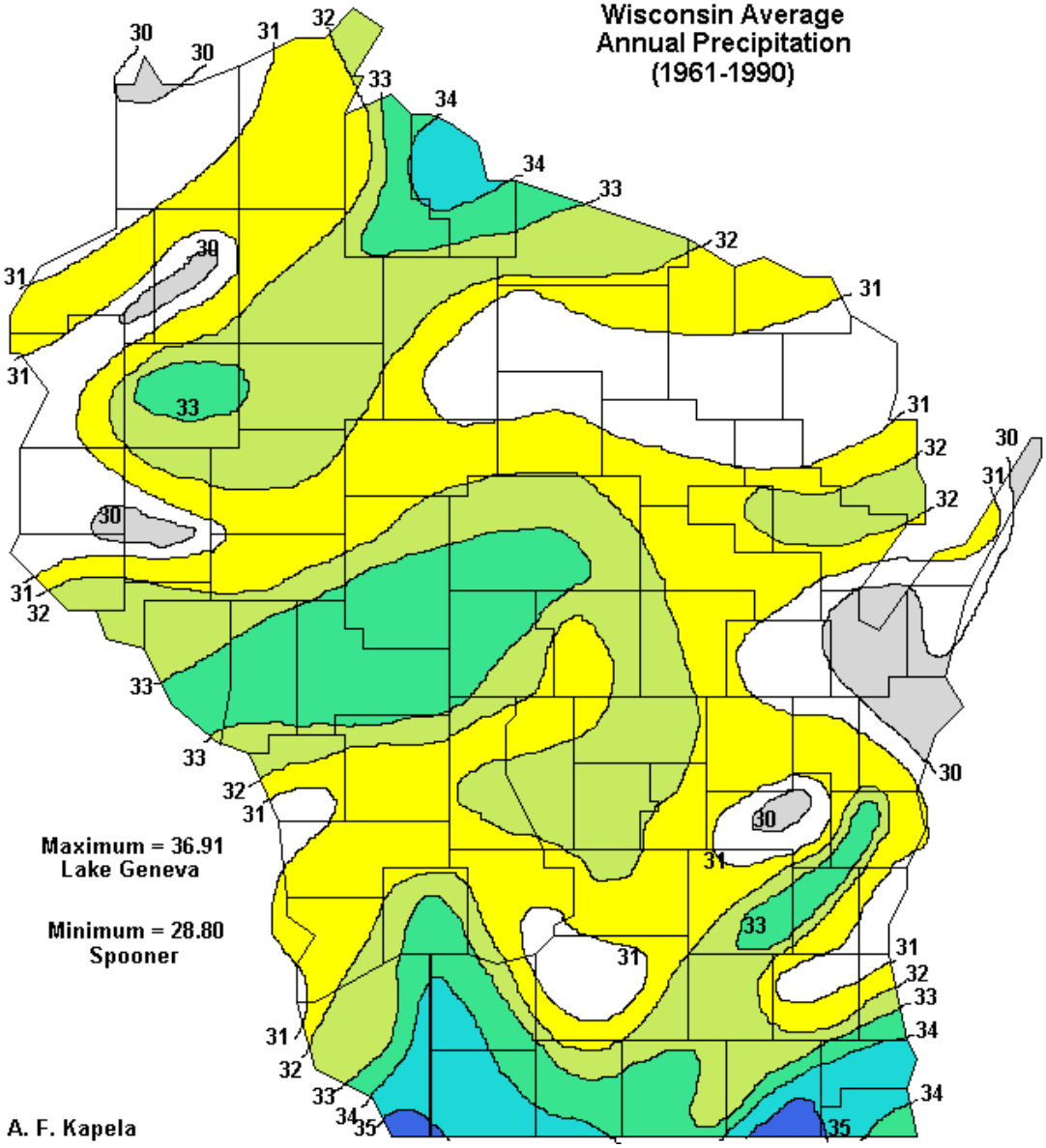


Wisconsin State Hazard Mitigation Plan, 2004, page 4-64

Erosion Areas in Wisconsin

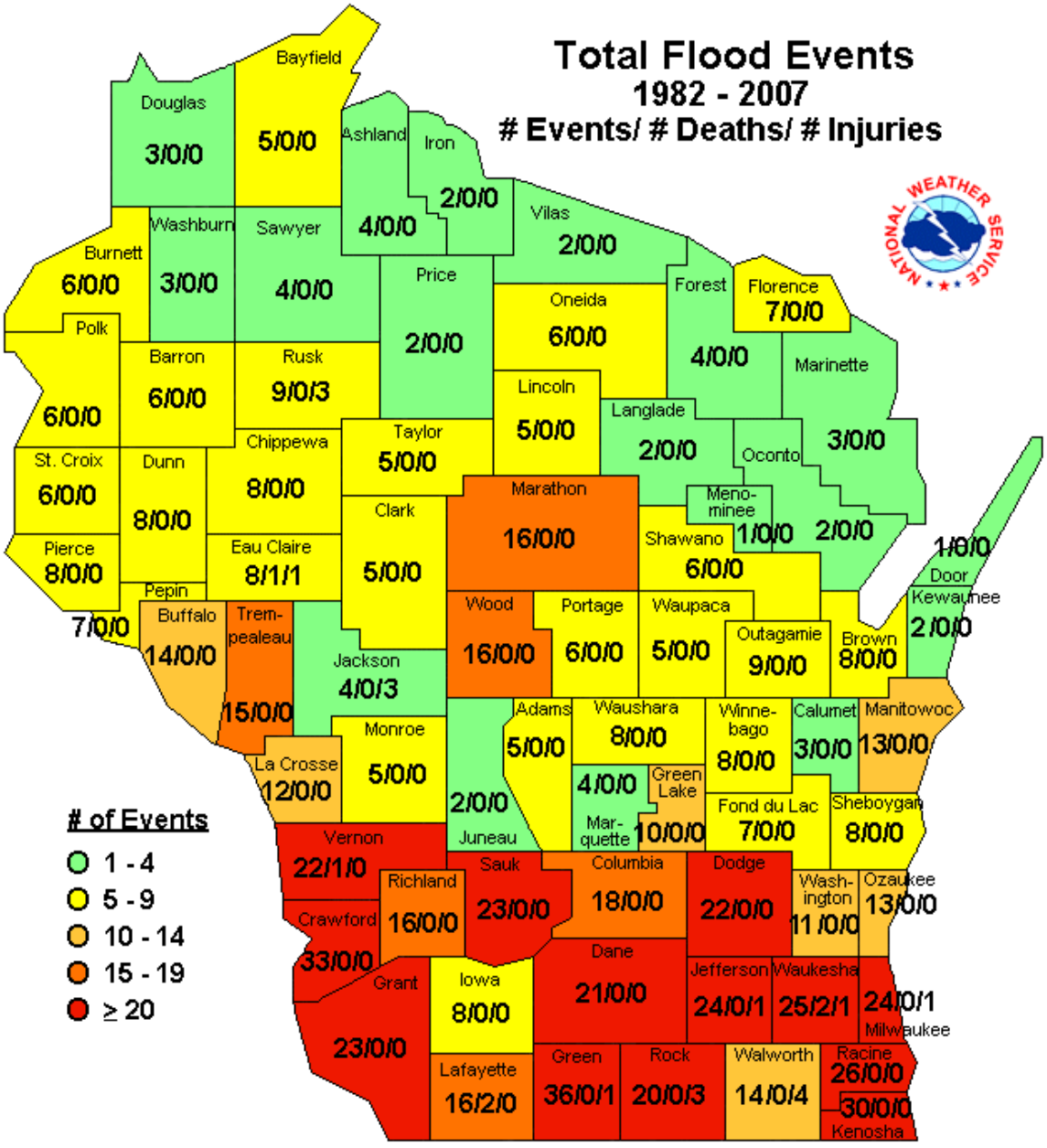


Wisconsin Annual Precipitation



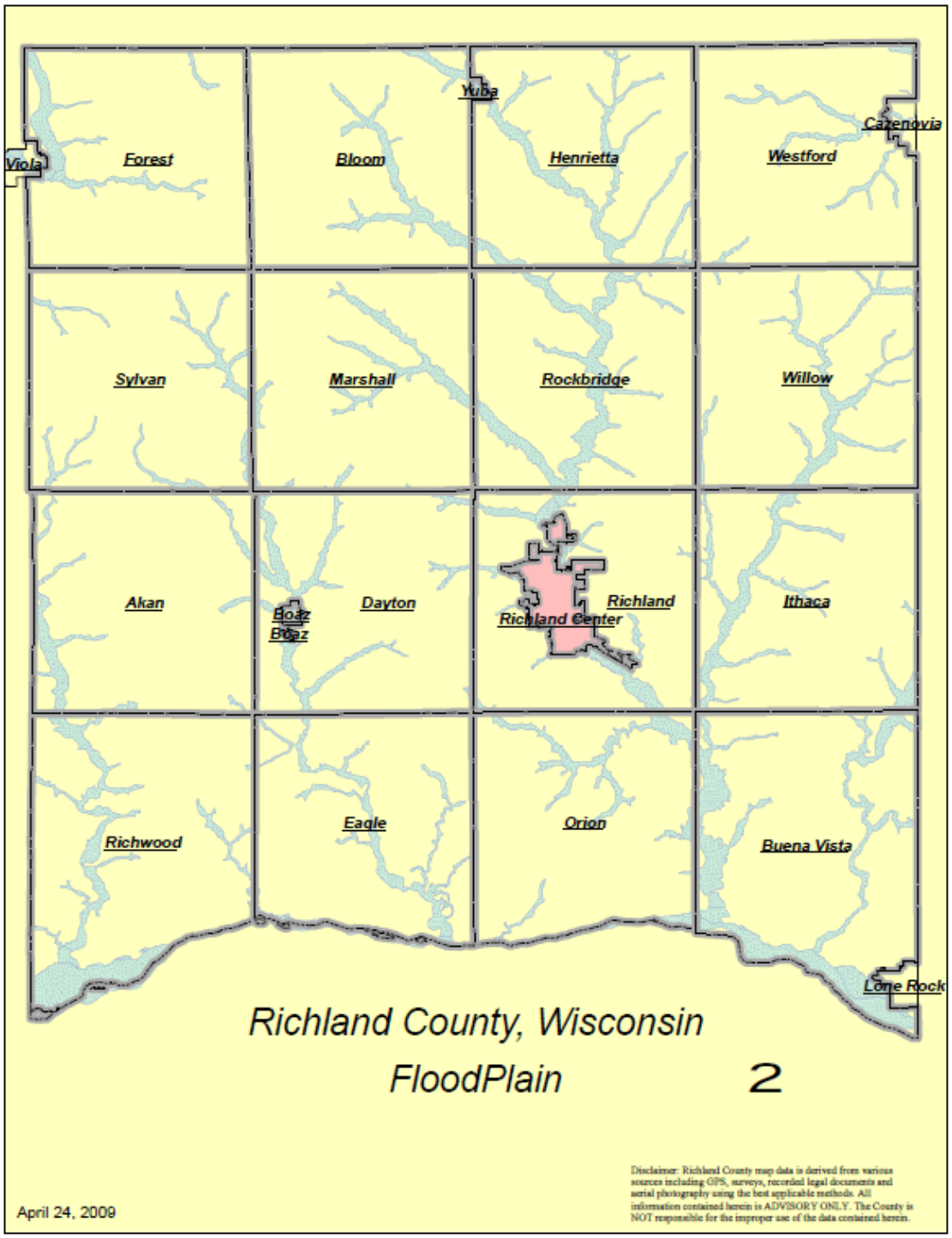
Source: http://www.uwex.edu/sco/state.html

Wisconsin Total Flood Events

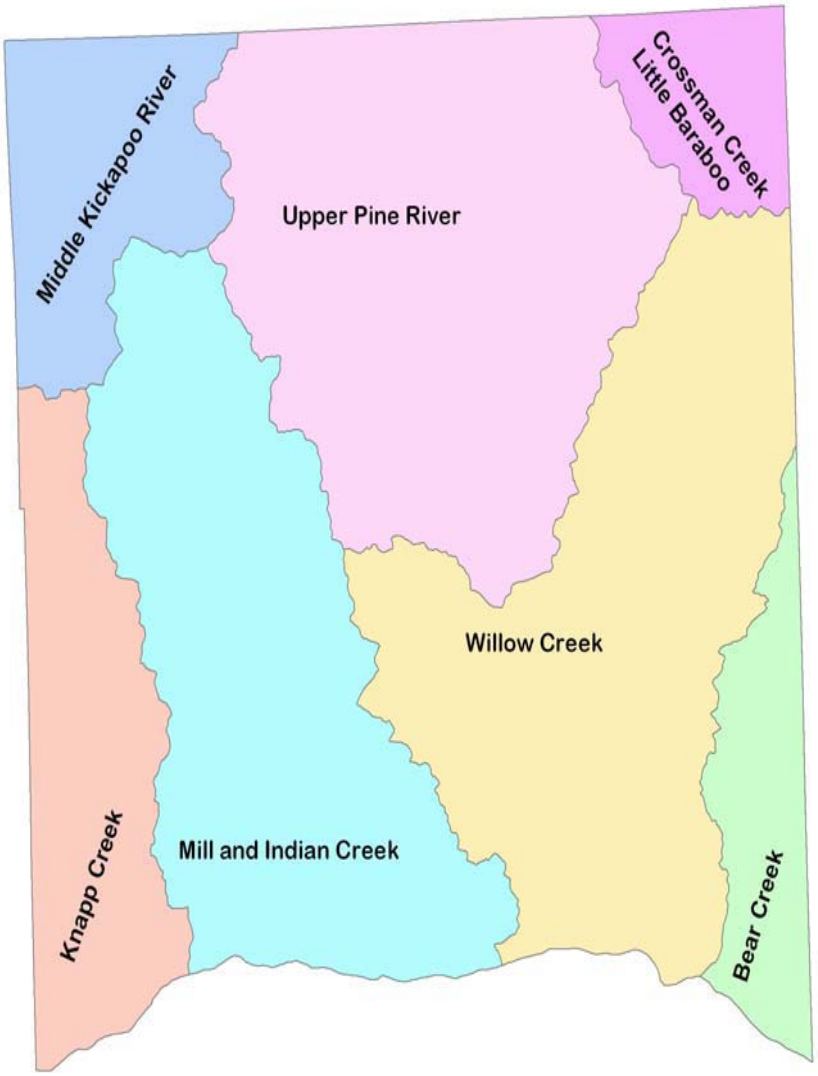


Wisconsin Emergency Management, http://emergencymanagement.wi.gov/docview.asp?docid=13591&locid=18

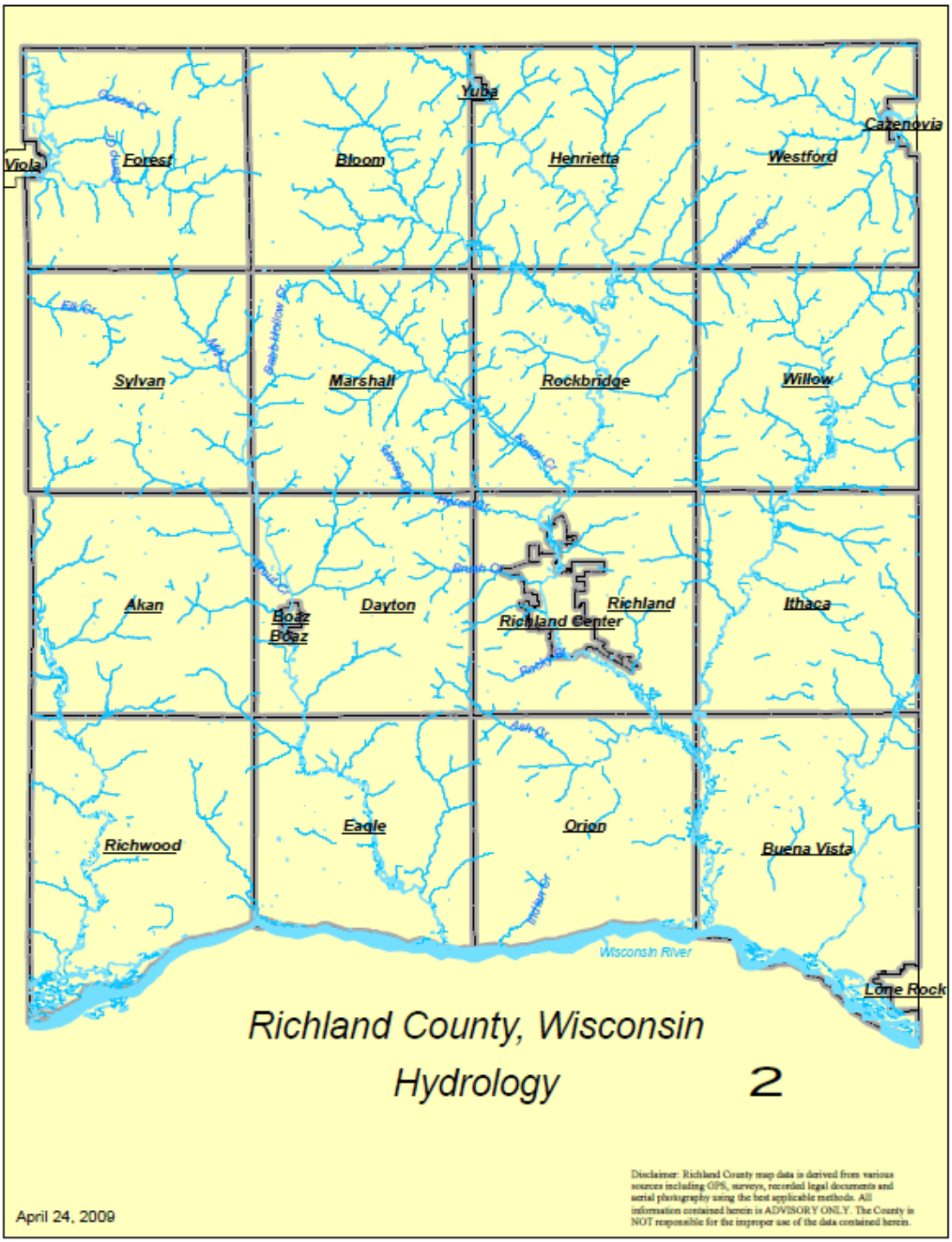
Richland County Floodplain



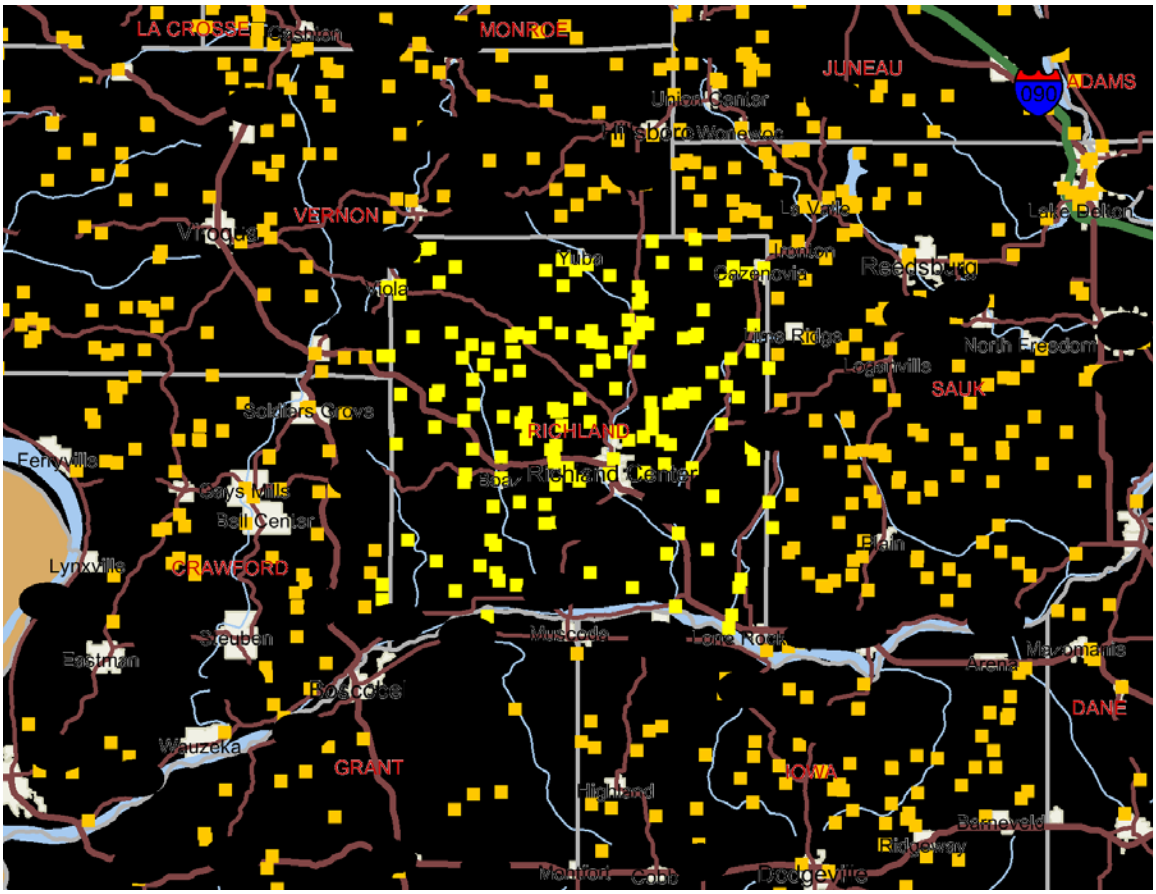
Richland County Watersheds



Richland County Hydrology



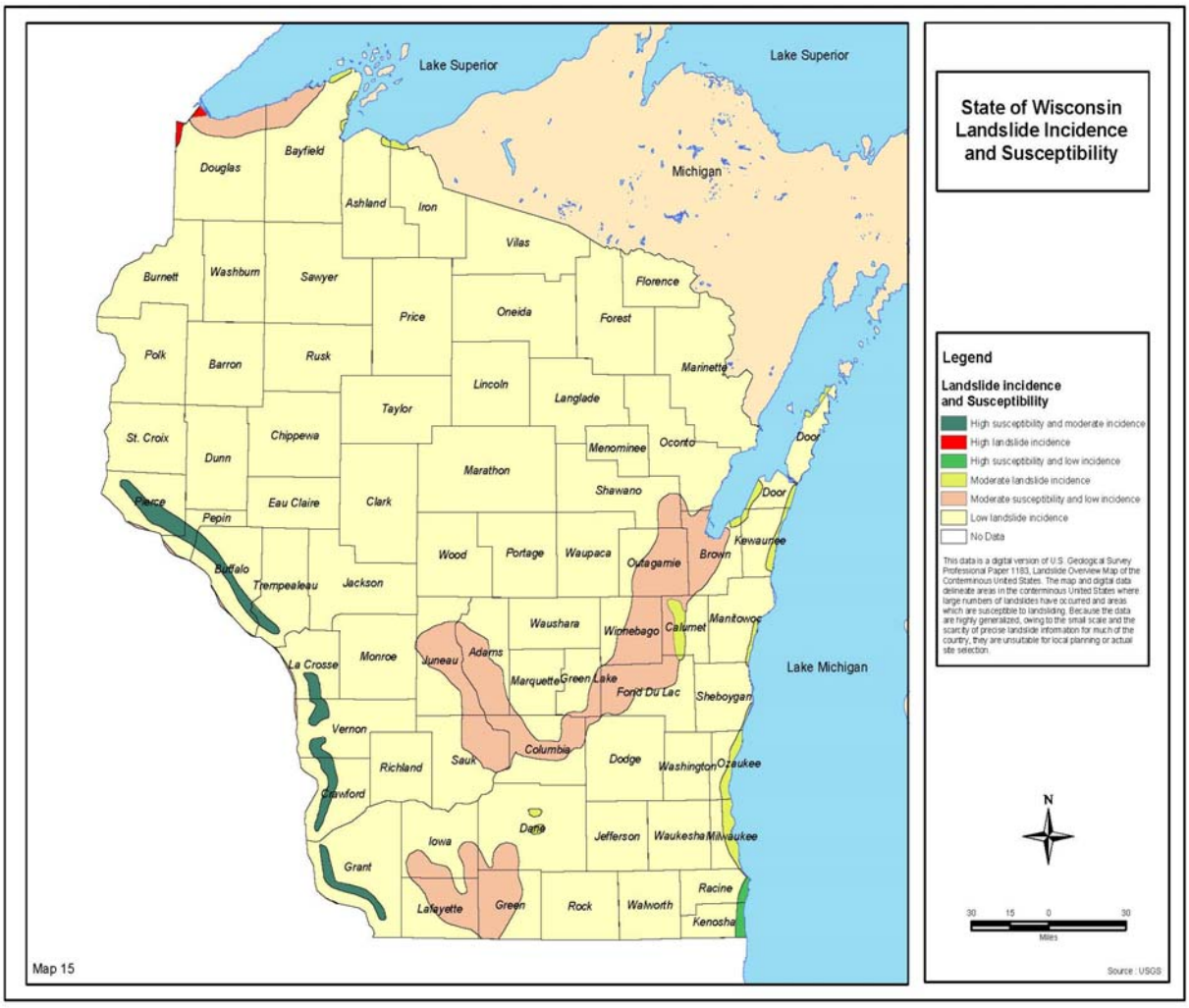
Richland County Dams



http://dnrmaps.wisconsin.gov/imf/imf.jsp?site=SurfaceWaterViewer

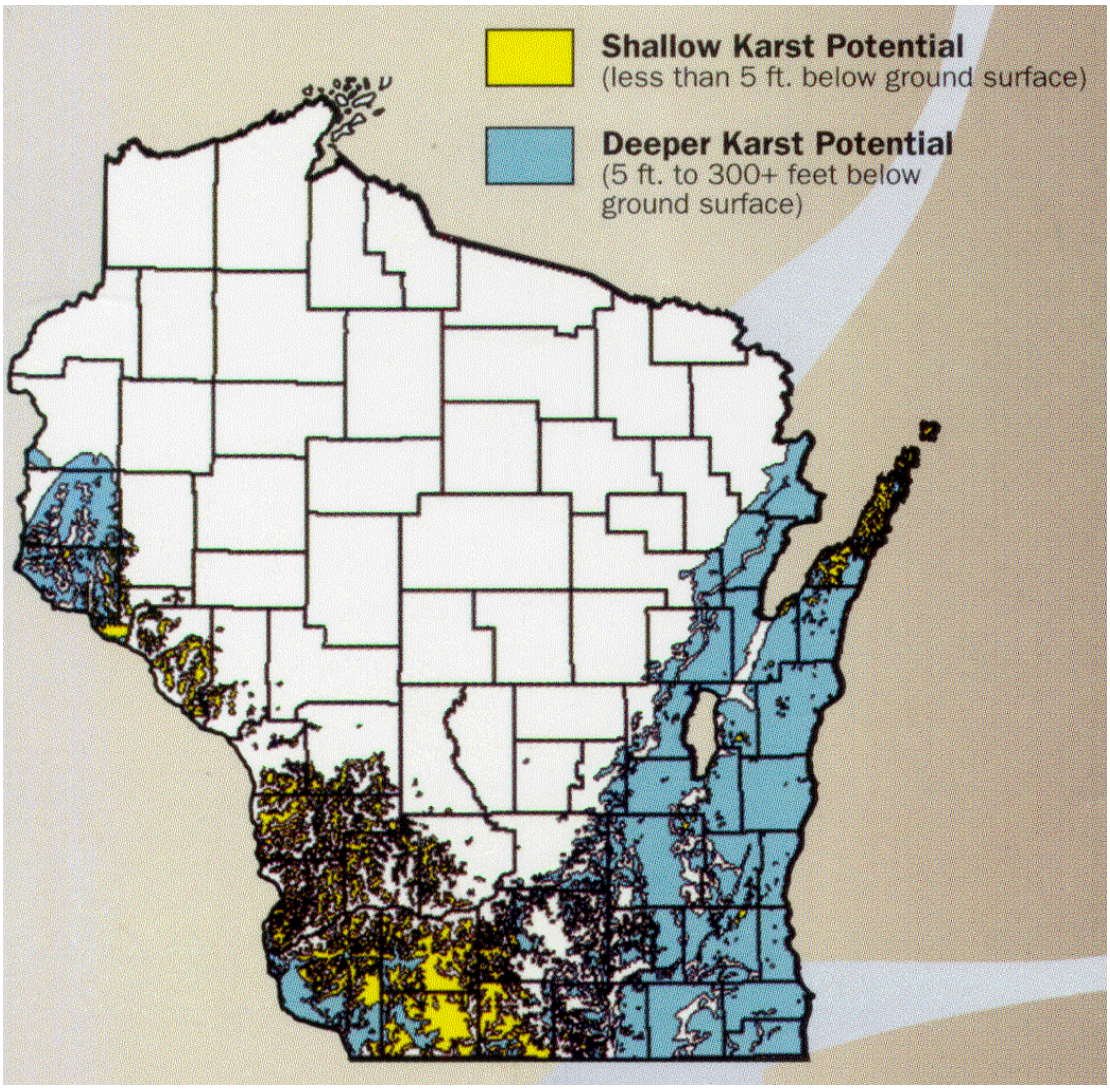
Richland County Critical Facilities

Landslide Incidence and Susceptibility



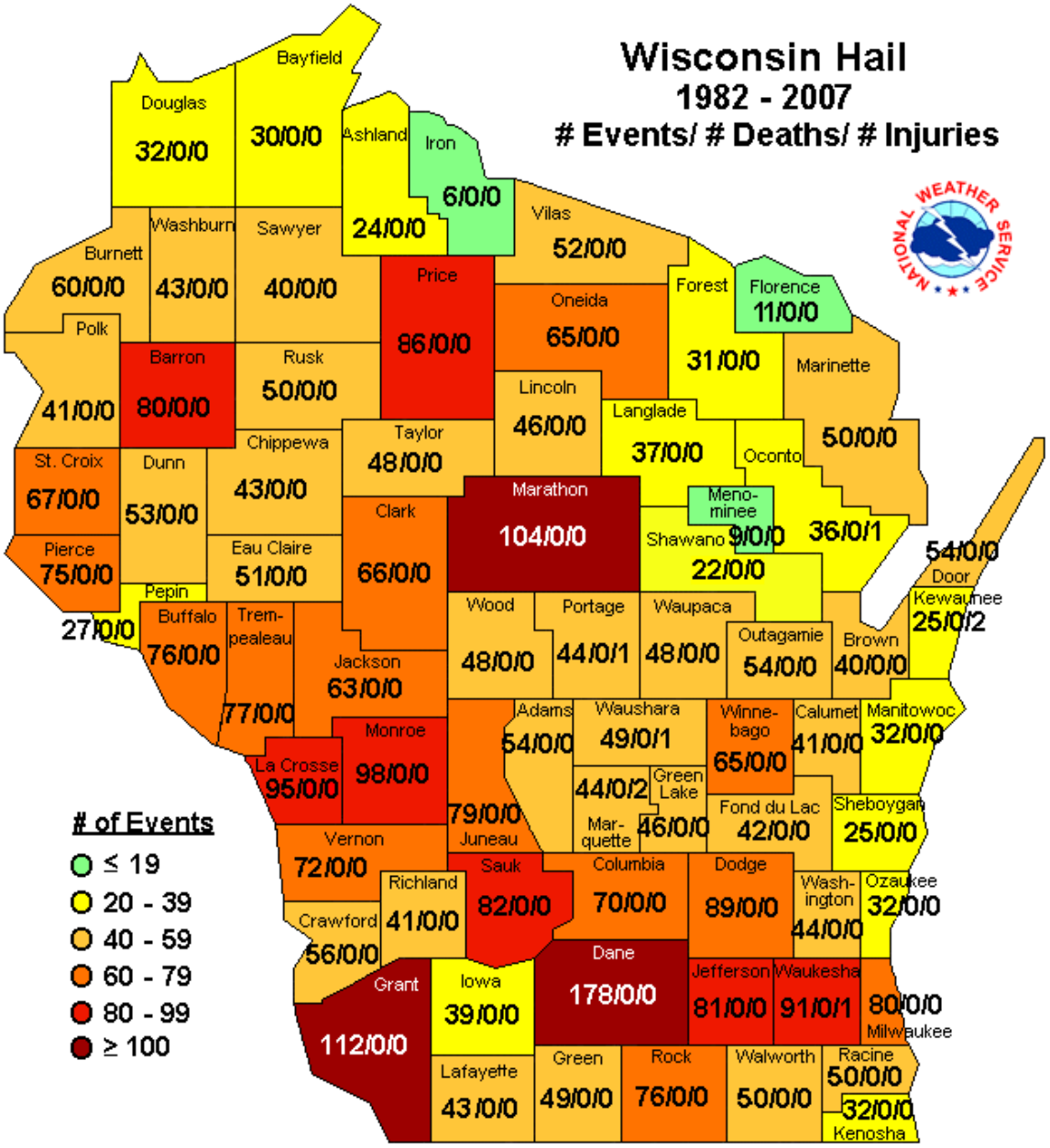
Wisconsin State Hazard Mitigation Plan, 2004, page 4-83

Karst Potential



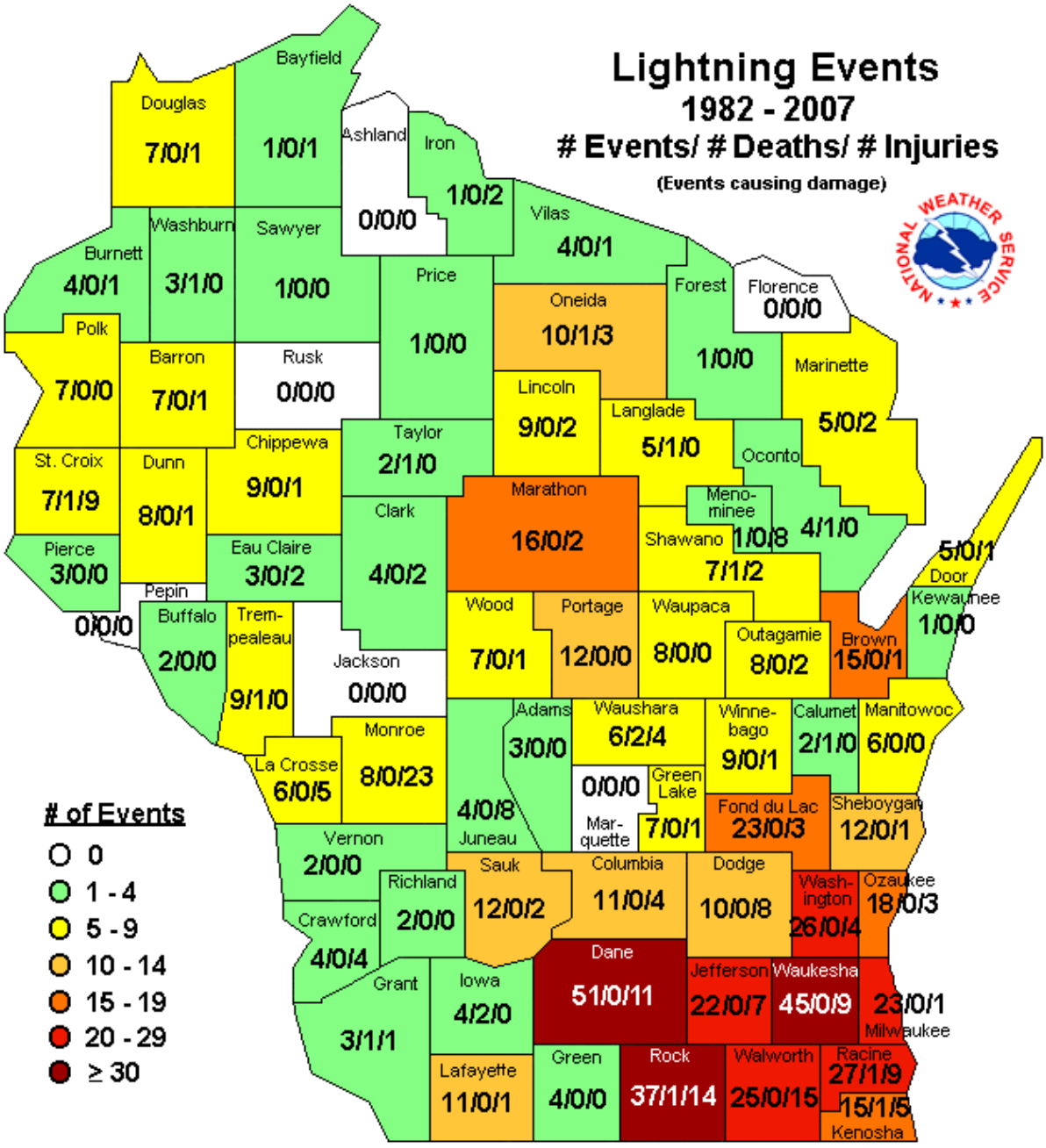
Wisconsin State Hazard Mitigation Plan, 2004, page 4-84

Wisconsin Hail



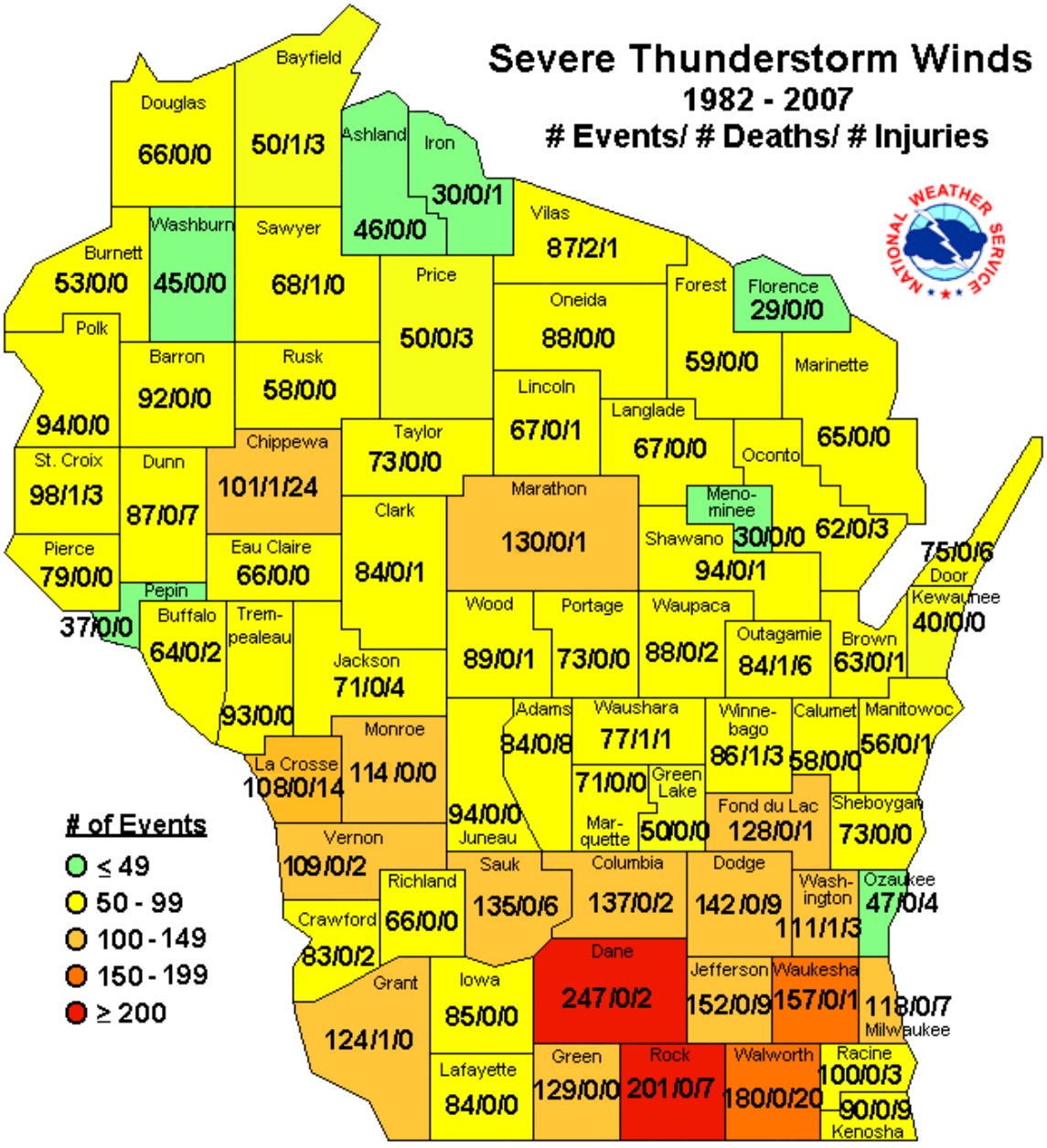
Wisconsin Emergency Management, http://emergencymanagement.wi.gov/docview.asp?docid=13592&locid=18

Wisconsin Lightning



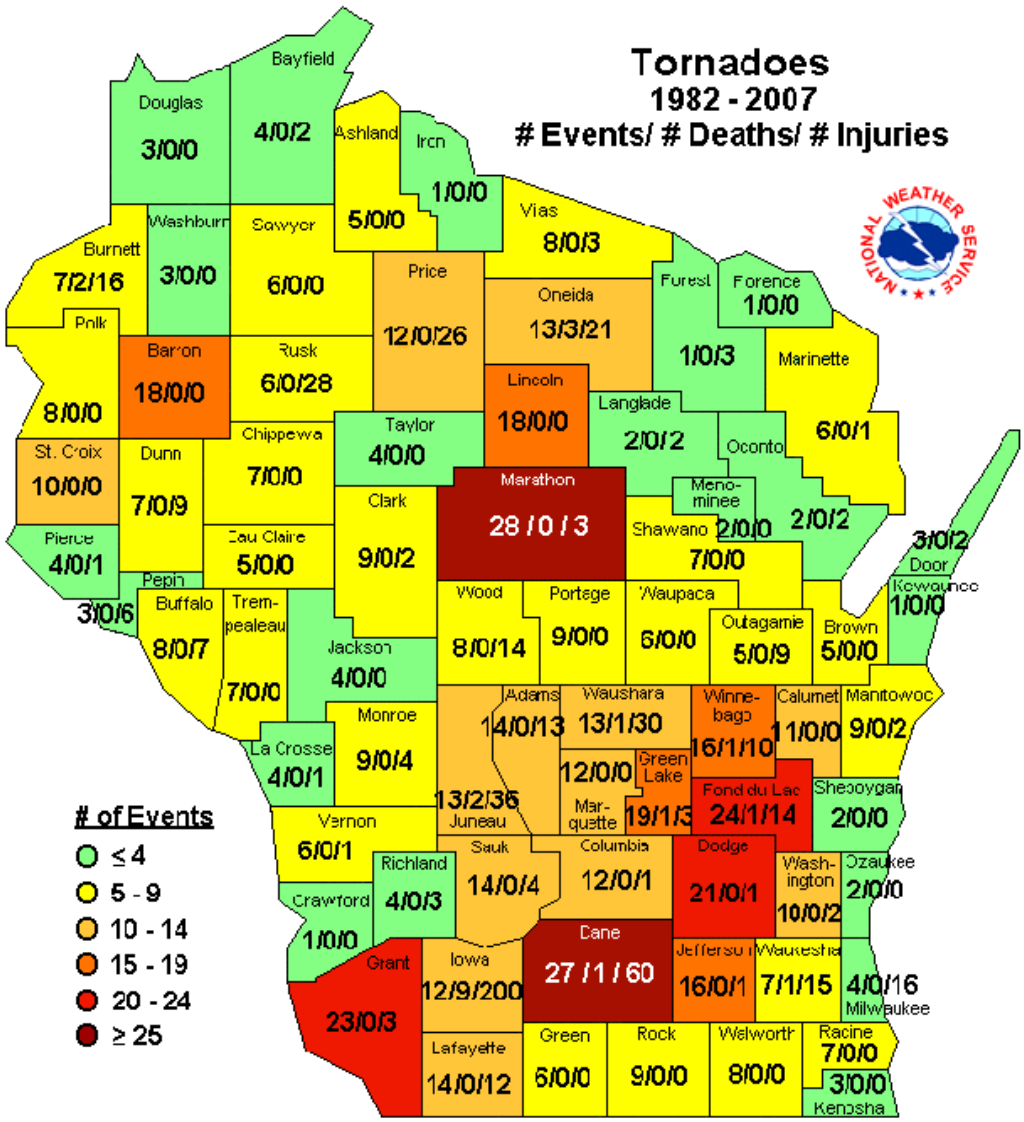
Wisconsin Emergency Management, http://emergencymanagement.wi.gov/docview.asp?docid=13593&locid=18

Wisconsin Severe Thunderstorm Winds



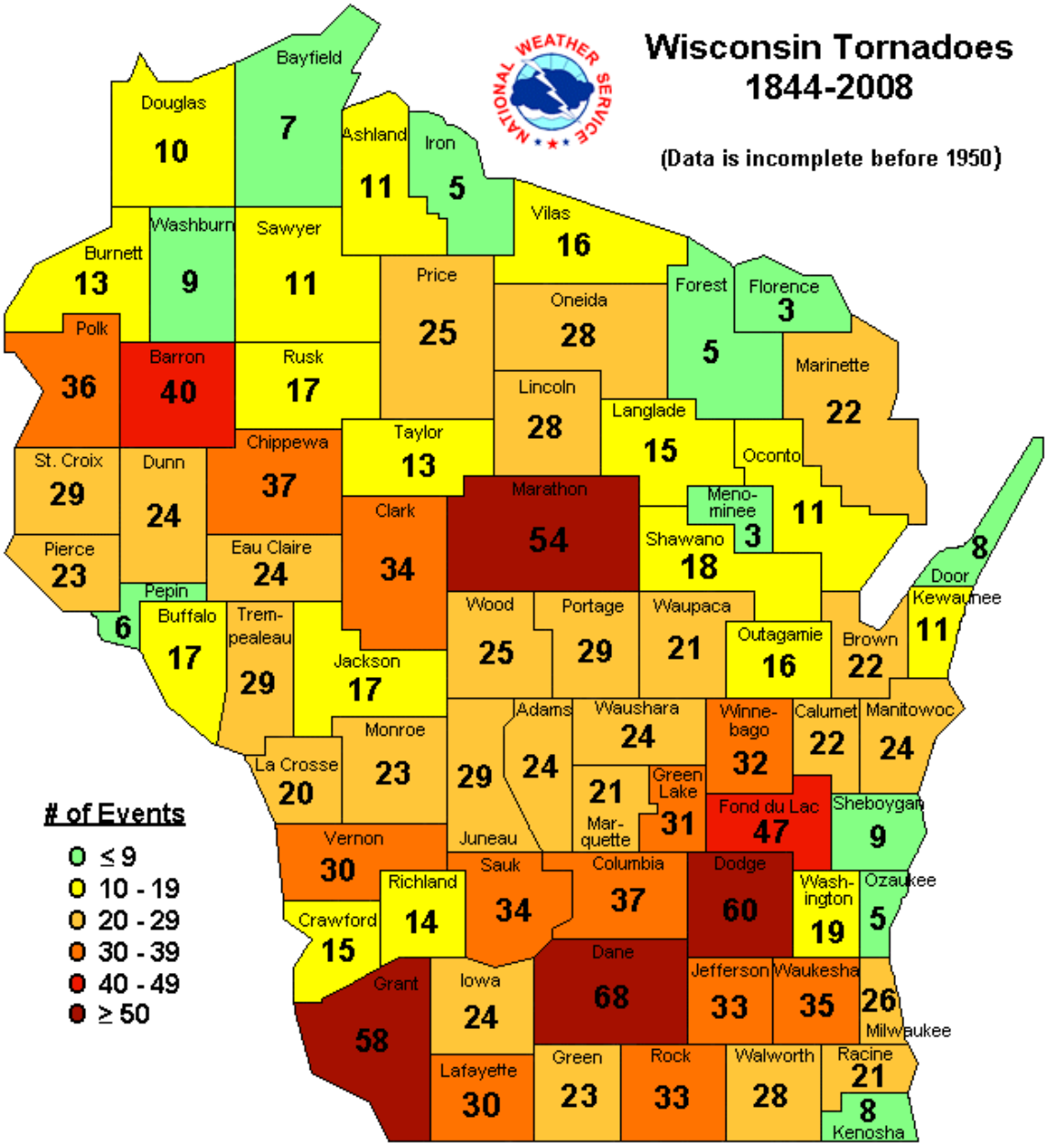
Wisconsin Emergency Management, http://emergencymanagement.wi.gov/docview.asp?docid=13596&locid=18

Wisconsin Tornadoes (1982-2007)



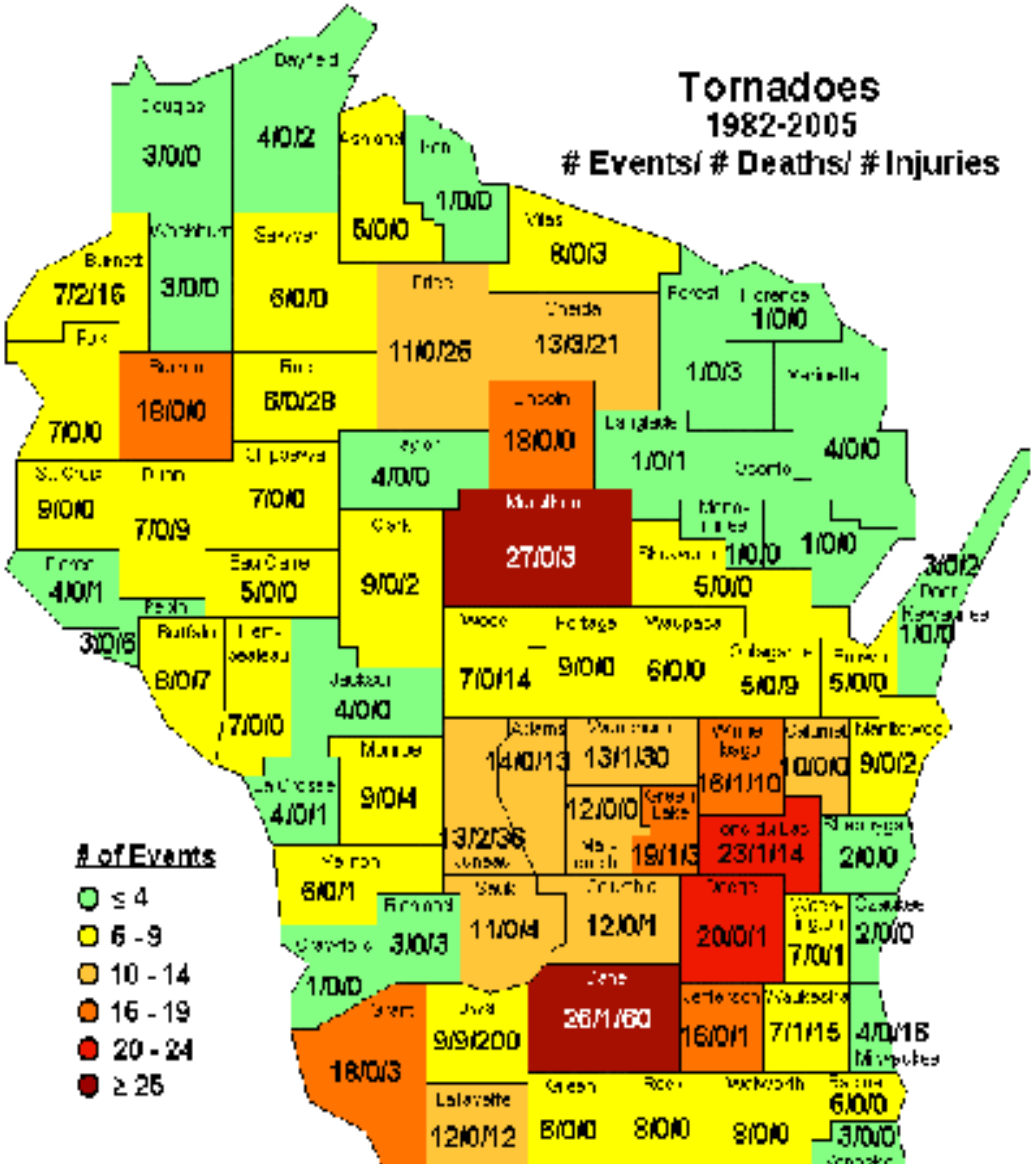
Wisconsin Emergency Management, http://emergencymanagement.wi.gov/docview.asp?docid=13594&locid=18

Wisconsin Tornadoes (1844-2008)



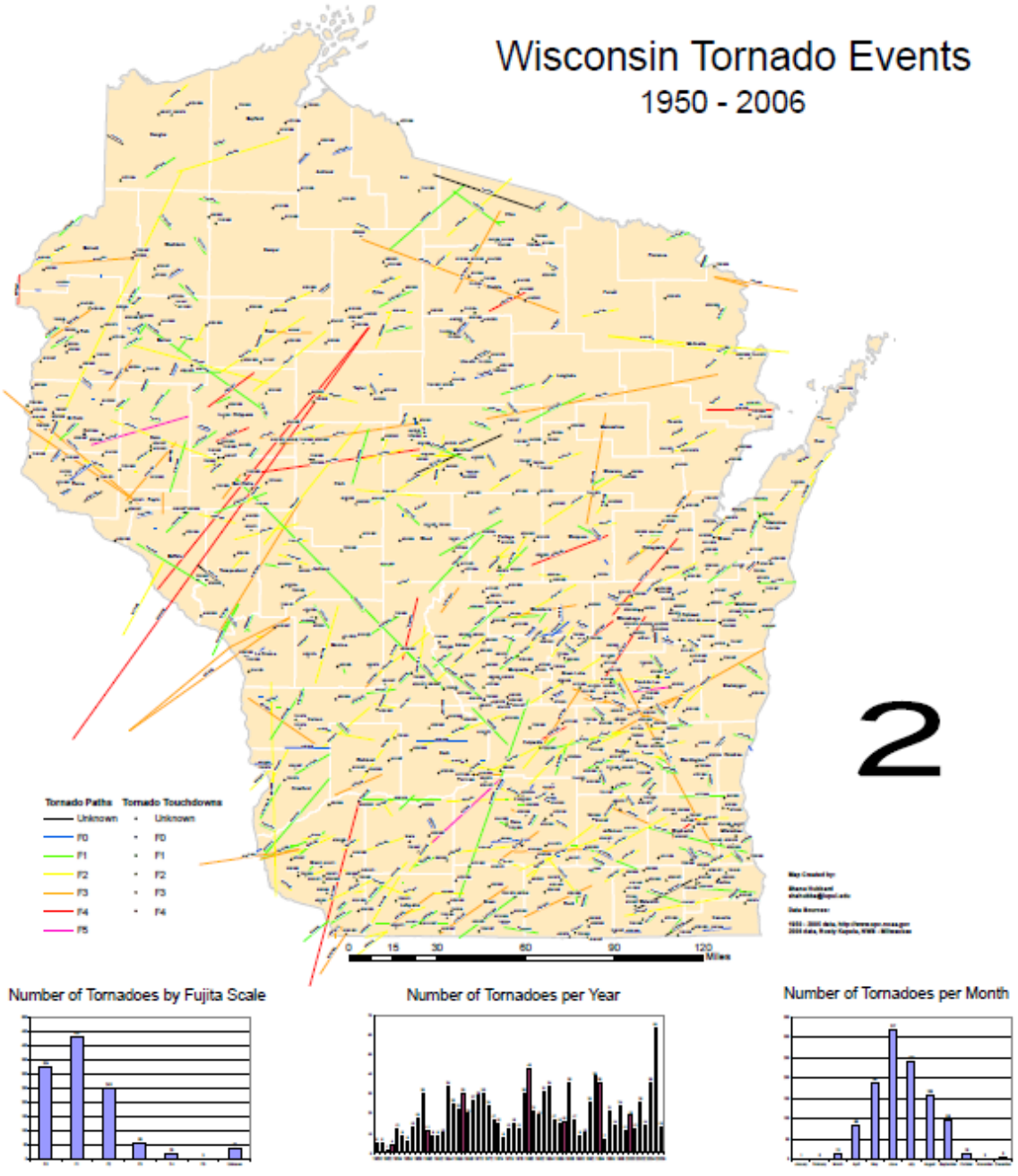
Wisconsin Emergency Management, http://emergencymanagement.wi.gov/docview.asp?docid=6707&locid=18

Wisconsin Tornado Events

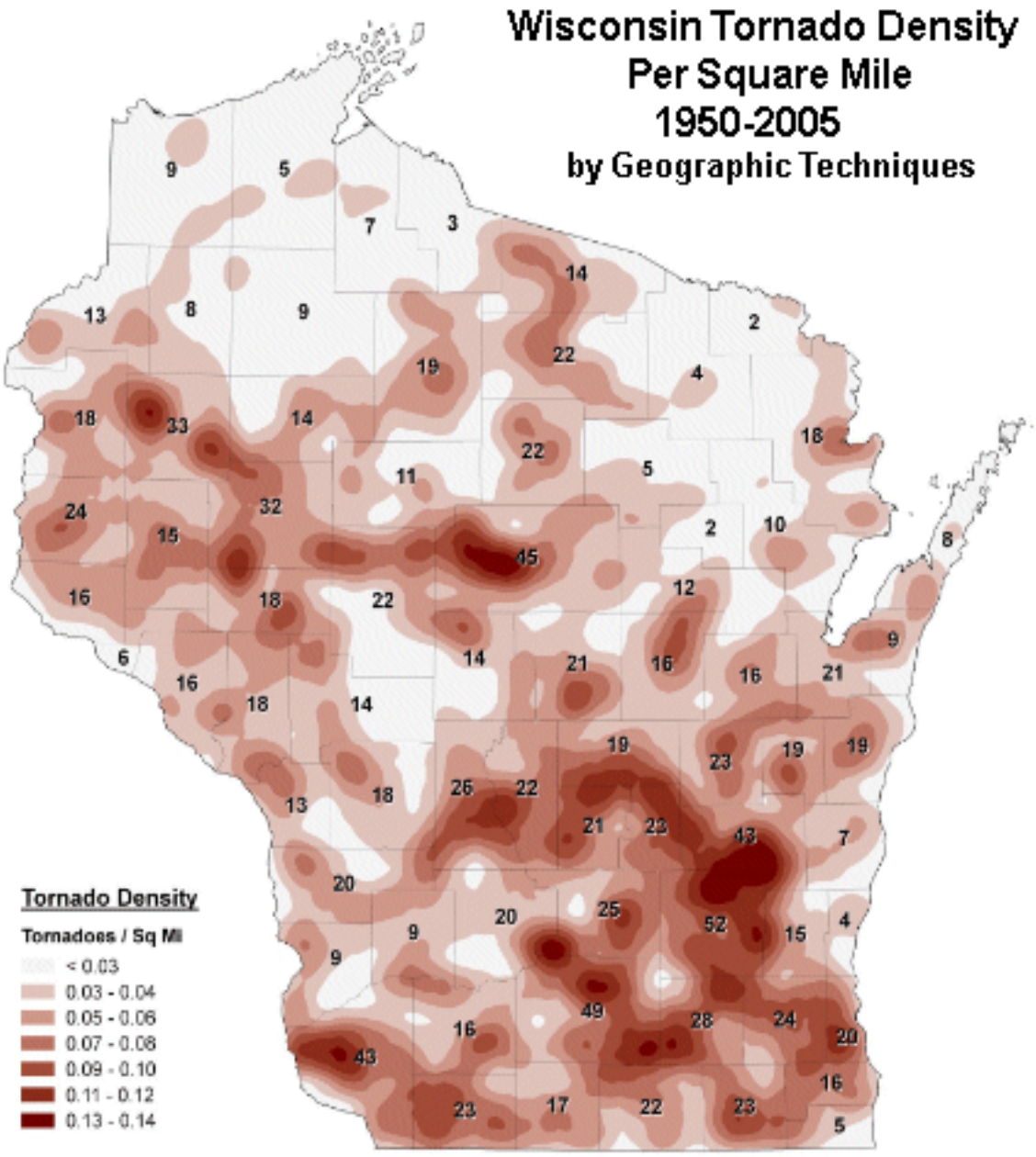


Wisconsin Emergency Management, http://emergencymanagement.wi.gov/docview.asp?docid=6710&locid=18

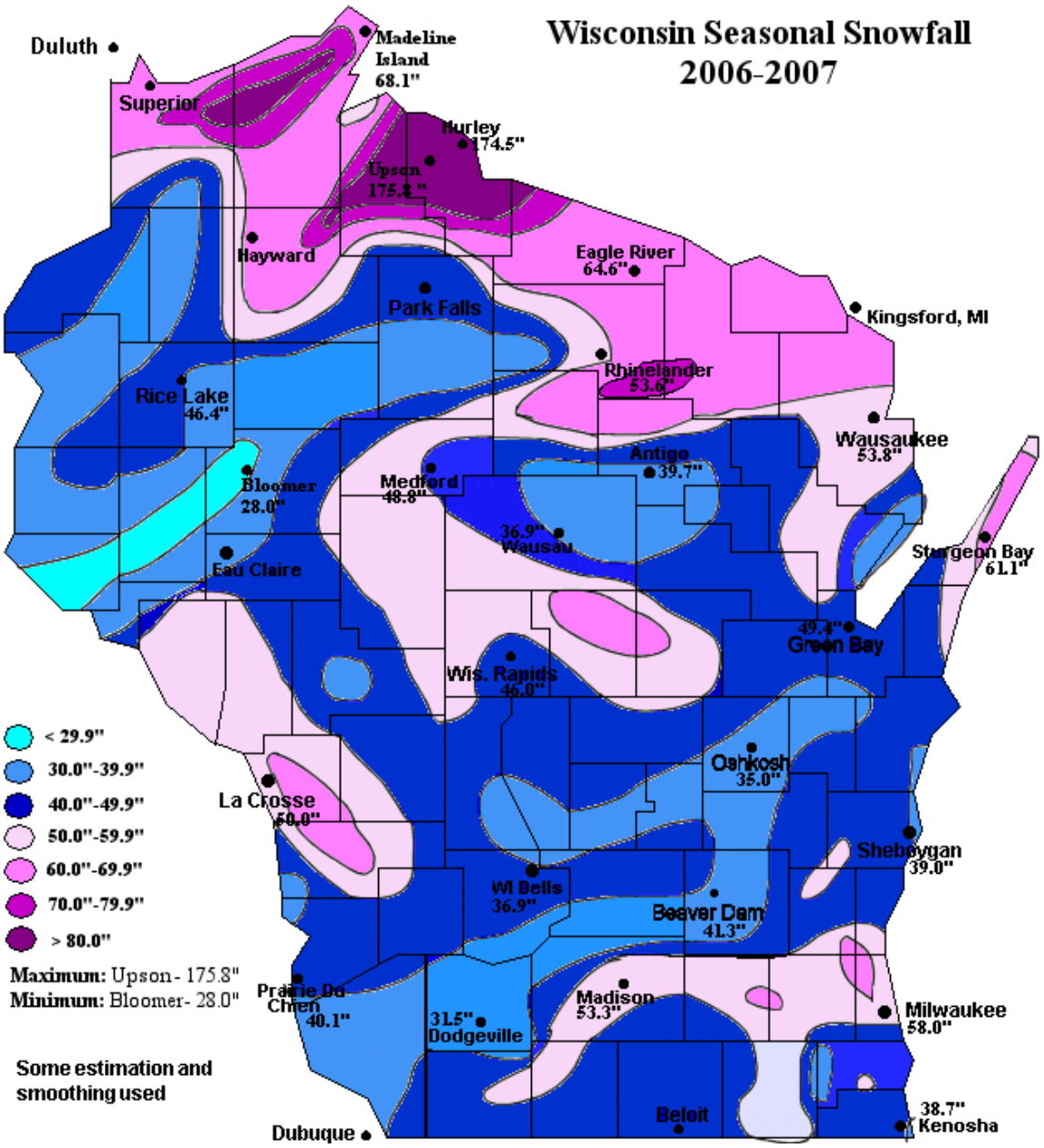
Wisconsin Tornado Events Paths 1950 - 2006



Wisconsin Tornado Density

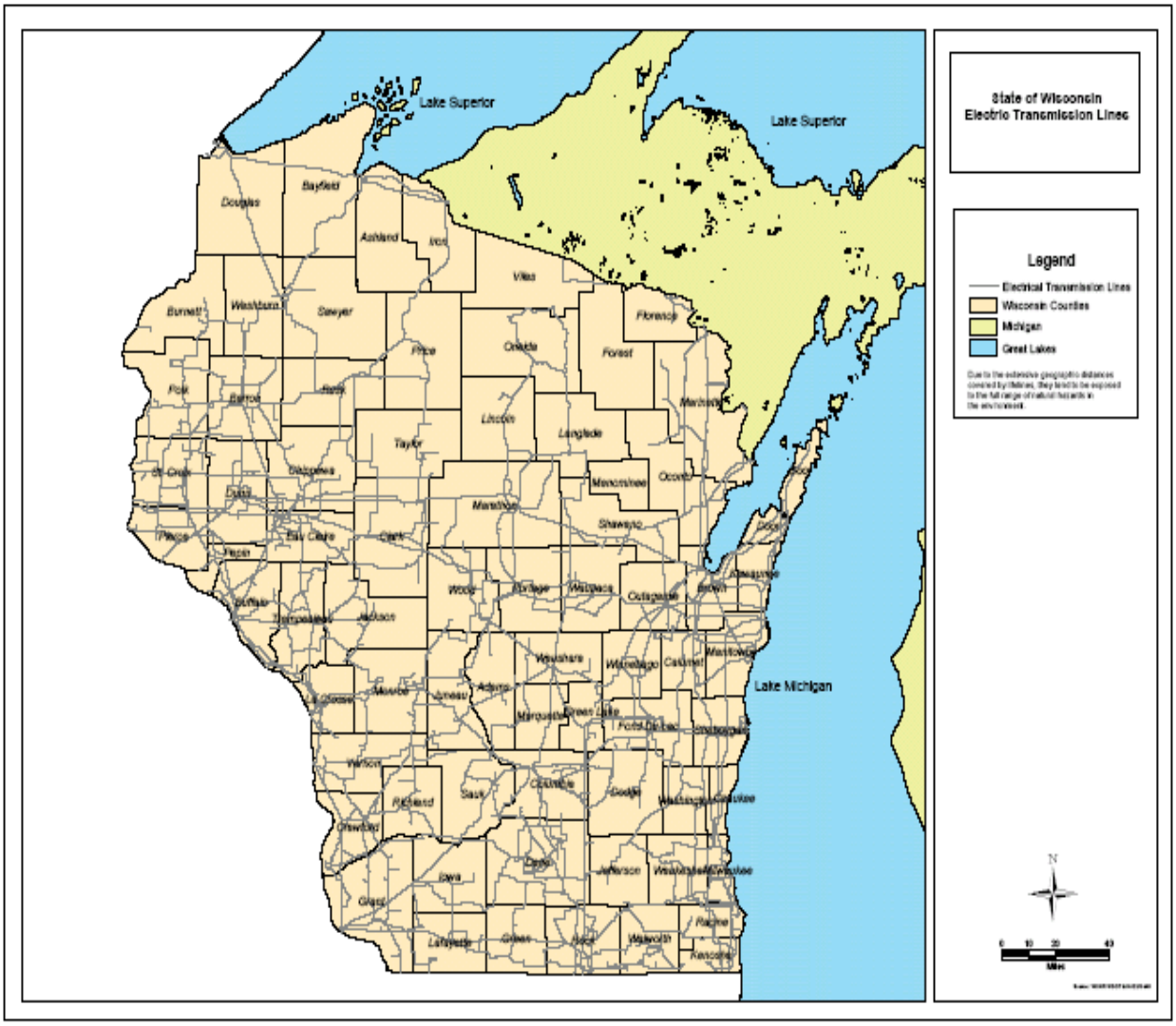


Wisconsin Seasonal Snowfall (2006-2007)



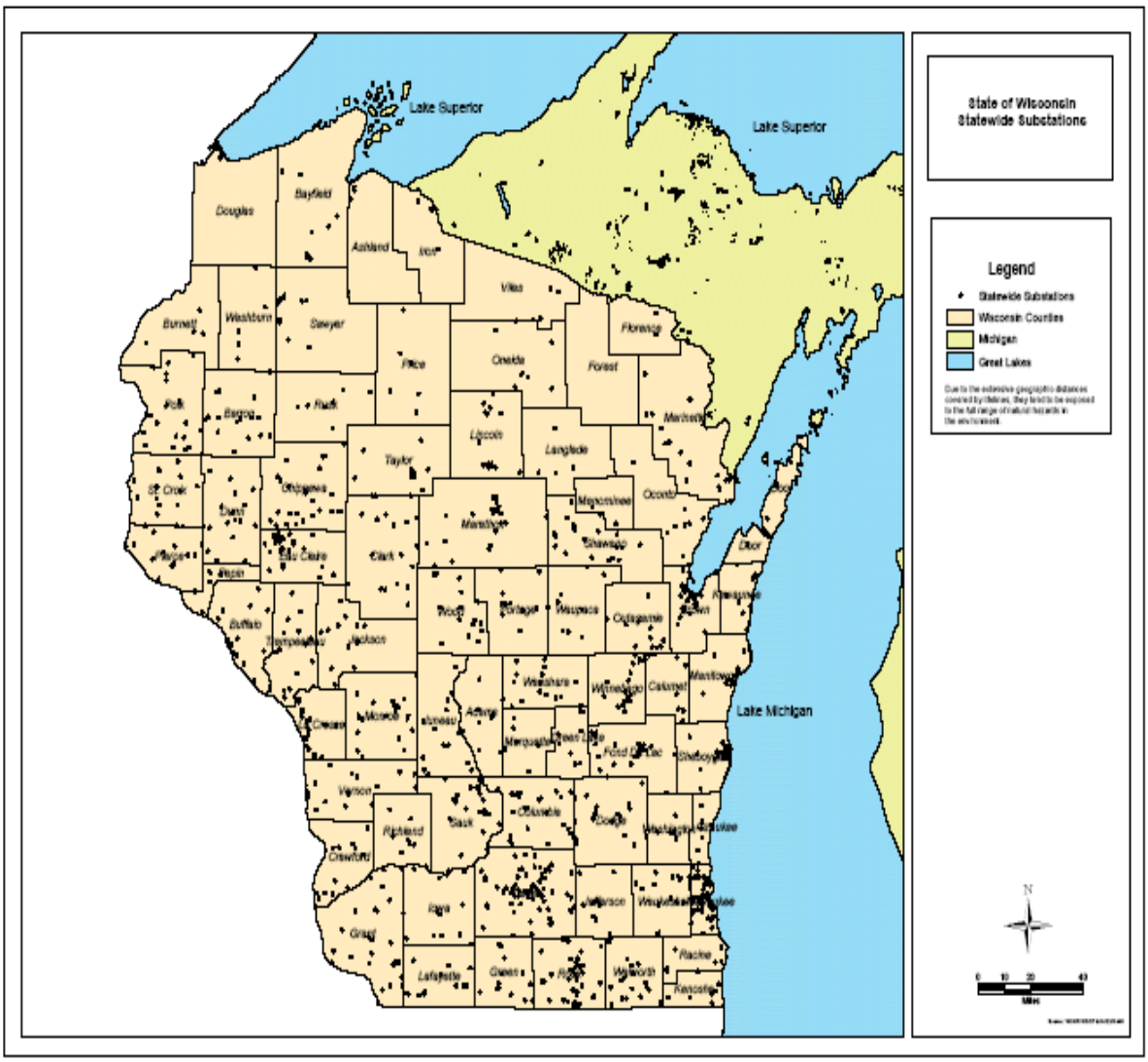
Wisconsin Emergency Management, http://emergencymanagement.wi.gov/docview.asp?docid=12366&locid=18

Electric Transmission Lines



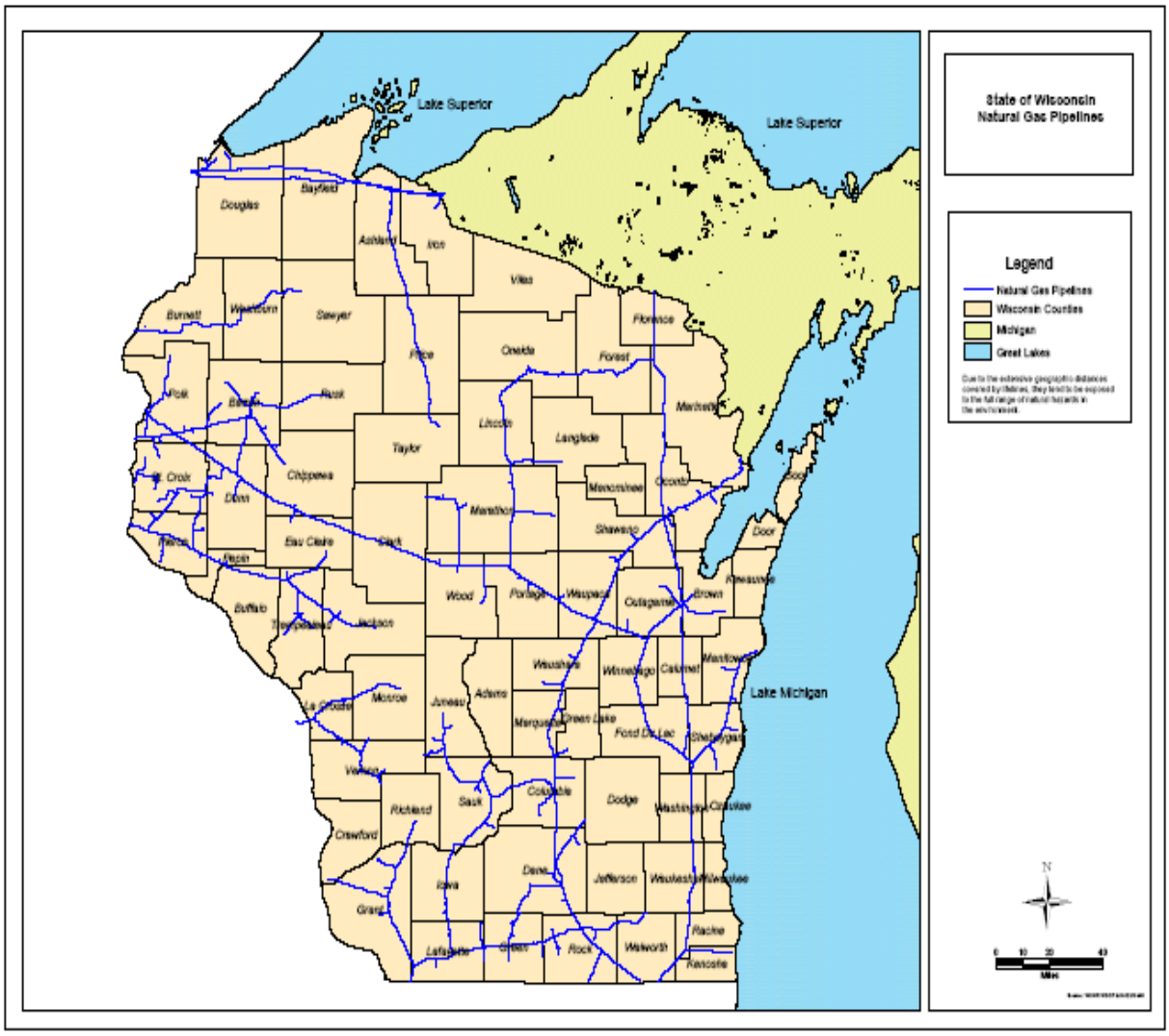
Wisconsin State Hazard Mitigation Plan, 2004, page 4-193

Electrical Substations



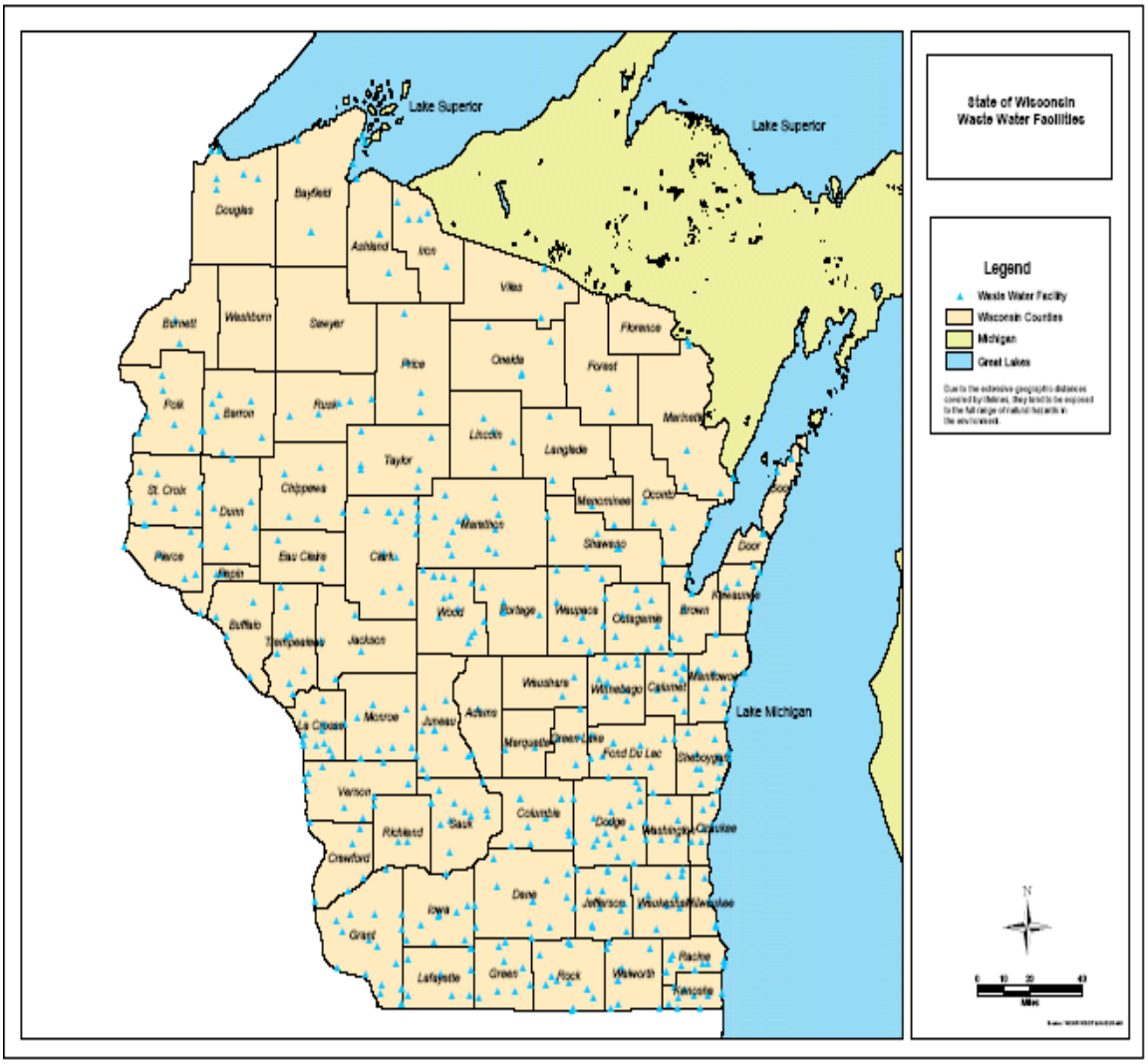
Wisconsin State Hazard Mitigation Plan, 2004, page 4-194

Natural Gas Pipelines



Wisconsin State Hazard Mitigation Plan, 2004, page 4-196

Wastewater Facilities



Wisconsin State Hazard Mitigation Plan, 2004, page 4-189

Appendix B: Plan Adoption

This plan has been adopted by Richland County and its major municipal bodies including the. Scanned copies of those municipalities that adopted this plan follow.

Appendix C: Summary of Mitigation Strategies

Summary of Mitigation Strategies							
Hazard Type	**Mitigation Measures**	**Costs of Project**	**Responsible Management**	**Project Timetable**	**Project Priority**	**Community(ies) Benefitting**	**Comments**
All Hazards	Continue to promote the increased use of National Oceanic and Atmospheric Administration (NOAA) weather radios	Covered by Dept annual budget	EM Dept, ARES-RACES, Sheriff's Office, Fire Depts	Aug 08 – Dec 09	High	All*	Received a disabled/hearing impaired external antenna at cost. They do radio and public relations shows to sell weather radios through the fire stations.
	Upgrade area early warning sirens: • Richland Center has 4 and they need two more. • Viola has 2 and needs 1 more. • Sextonville, Gotham, Rock Bridge and Hub City would all like sirens. • Lone Rock and Cazenovia each have a siren that has to be activated by a person pushing an on-site button for 15 seconds. They would like to tie the activation of these sirens into dispatch. • The county would like to explore audible warning/talking" sirens at campgrounds.	As funding available $30K $15K $7K each siren upgrade $20K per siren	EM Dept. & Richland Center Viola Sextonville, Gotham, Rock Bridge, Hub City Lone Rock, Cazenovia, Sheriff's Office EM Dept	2014	Medium – High Low	Richland Center Viola Sextonville, Gotham, Rock Bridge, Hub City Lone Rock, Cazenovia All*	
	Purchase and install three more weather data collected stations	As grants available. $500/unit plus $750 - $1k/unit for installation	EM Dept	On-going	Low	All*	The goals would be to purchase web-enabled devices that could share information with the National Weather Service as well as provide current information to citizens. One would be placed on the

							ARES tower in the northwest corner/highest point in the county.
	Continue working with and supporting the county volunteer teams	Covered by Dept annual budget	EM Dept	On-going	Low	All*	Work with Alert Cadet (a father/sons group) that takes SFA, CPR, ICS and chainsaw safety training. They volunteered to do firewood and snow removal for mobile homes in Winter 2007.
	Conduct a cost benefit analysis for installing a Reverse 9-1-1 communications system in the county	As grants available	EM Dept. Sheriff's Office	On-going	Low	All*	The project was reviewed and determined to be cost-prohibitive at this point in time. Staff will continue to monitor to see if it becomes feasible.
	Continue to add/update Emergency Management Department links on the existing county web site (e.g., ARC, Homeland Security/FEMA, WEM) especially focusing on preparedness bulletins. Publicize the website to show the community what is there.	Covered by Dept annual budget	EM Dept	On-going	Medium	All*	The county currently puts warnings online but would like to expand to include preparedness materials.
	Provide the capability for the 9-1-1 Center to locate emergency calls coming in from cellular telephones	PSC grant received for $347K	Sheriff's Office & LIO (GIS)	2009	High	All*	Project was completed in January, tested and went live in April, 2009 ahead of its 2010 scheduled date.
	Bring county school bus companies from UHF to VHF band.	As funding allows	EM Dept, School Dists, Bus Companies	2012	Low	All*	• Ithaca, Weston and Kickapoo Districts own buses. Others are private. • Ithaca and Weston have no radios, Kickapoo is on UHF. • For interoperability during school uses and during disaster, when resource may be used by communities.
	Find an alternate location for WRCO (FM & AM) radio station. This privately-owned station is the main	$480,000	EM Dept, City of Richland Center	2012	High	All*	• Radio station can be operated from the EOC due to an equipment upgrade in

	emergency communications mode with the public in Richland Co during a disaster.						2008. • Station personnel were removed from the station in a boat during a flood. • An application went in for this project under the 2008 flood mitigation project money. The city's 12.5% share is $60K.
	Improve interoperable communications capability in the county dispatch center.	Grant received	Sheriff's Office	2008	High	All*	• ROIP (Radio over Internet Protocol) and Spillman were installed in dispatch in March 2009. • Consoles were upgraded in dispatch with a 2005 grant.
	Improve field (IC) interoperable communications capability during a disaster.	Covered by Dept annual budget	EM Dept	2010	Medium	All*	The county would like to create a communications plan that could be used to parse channels in an emergency.
	Improve communications capabilities in the County Emergency Operations Center (EOC).	As funding allows	EM Dept	2008	High	All*	County has an annual project: ▪ '05 – amateur radio and generator back-up ▪ '06 – satellite phone ▪ '07 – IT upgrade ▪ '08 – projector and wireless internet; Davis weather station and amateur radio upgrades ▪ '09 – paging base station
	The county is installing a new server between Zoning and the Sheriff's Office Dispatch Center to provide better data access.	$117,000	Zoning Dept. and the Sheriff's Office	2009	High	All*	
	The radio communication system owned and used by the Village of Viola is not reliable primarily due to terrain issues. The county and the Village would like to upgrade or relocate the tower to provide more	~$30,000 – as grant funding is received	EM Dept., Village of Viola	2014	Medium	Richland County Village of Viola Towns of Bloom, Forest, Marshall, Sylvan	The Viola Fire Department covers the Village of Viola, and the Towns of Bloom, Forest, Marshall, Sylvan

	reliable access.						
Drought and Dust Storms	Provide a link on the county disaster preparedness website to the National Weather Service – LaCrosse drought index.	Covered by Dept annual budget	EM Dept	2009	Medium	All*	DNR gives assistance and permits for stream pumping for farms
	County should be prepared to provide information to farmers during times of drought	Covered by Dept annual budget	UW-Ext./USDA	As needed	Low	All*	DNR gives assistance and permits for stream pumping for farms
	Inform farmers on purchasing crop insurance	Covered by Dept annual budget	UW-Ext./USDA	Ongoing	Low	All*	
Flooding and Dam Failure	Place a link on the EM Dept website for flood preparedness material and one that will show the monitoring of the ground water level at the Koch well. This well is a fairly reliable predictor of local flooding.	Covered by Dept annual budget	EM Dept	2009	Medium	All*	http://groundwaterwatch.usgs.gov/AWLSites.asp?S=431840090203201&ncd=
	Upgrade roadways to prevent future flooding damage: • Highway 80 – flooding caused the K-rails to float into the road requiring replacement. Road needs improved drainage. This is a main N/S trunk road (along w/ Hwy 14) • Hwy 131 & Chadwick Hollow Rd – This road needs to be widened, needs its banks stabilized and needs a bigger culvert at the lower end. Chadwick Hollow Rd is the only road that will provide access to Viola during flooding (30-45 days in 2008 floods). The road starts in Vernon Co but that part has no problems. • County Y is prone to flood damage but it does not provide the only access to any areas. • The Town of Aiken roads are built in bad terrain. Rains cause about	As funding allows	EM Dept, Highway Dept, Sheriff's Office and Village of Viola Town of Aiken	Ongoing	Medium Very High Low Medium	All* All* - especially the Village of Viola and the Town of Forest All* All* - especially the Town of Aiken	

	40 miles of roads to be covered in mud, which requires scraping by the Town. • CTH AA between STH 80 and CTH SR – pave shoulders of overflow areas to prevent damage to the rest of the road during flooding • CTH SR east of STH 80 – Raise a 300' section of SR and add 1 or 2 drainage pipes to keep water off of the road • CTH D west of STH 80 – pave shoulders or overflow areas to prevent damage to the road • CTH JJ from STH 14 to the Sauk County line – improve drainage to keep water off of the road • CTH F south of CTH U – the overflow is in very bad shape and needs to be repaved					Town of Rockbridge Town of Richland Town of Rockbridge Town of Buena Vista Town of Richwood	
	Continue increasing the county's GIS mapping capabilities. Digital orthophotography is used throughout Wisconsin for vital purposes such as emergency planning and response, government decision-making and sound land use policy development.	Cost to be determined	Land Information	As funding available	Medium	All*	Current county floodplain maps are on the website as of 2008. The county has aerial photos that were completed in '05 as part of a multi-county consortium. The Wisconsin Regional Orthopotography Consortium (WROC) is forming to build a multi-participant program to acquire digital orthoimagery (2' intervals) and elevation data throughout Wisconsin in 2010.
	Explore the feasibility of purchasing and installing flood gauges: • Pine River – buy 1 and upgrade 2 • Mill Creek – buy 2	Purchase = $12,000 Upgrade = $4,000	EM Dept and Zoning	As funding available	Very High	All*	Potential of partnering with the NWS and USGS to install gauges.
	Adopt updated flooding ordinances	Covered by Dept	Zoning	2008	High	All*	State mandate to re-adopt and

	required by the WI DNR.	annual budget					the paperwork is at the DNR awaiting approval. City of Richland Center updated in 2008.
	Buyouts/Elevations: ▪ Work with 2 RLP property owners on buy-outs with CDBG grant funding. ▪ Secure funding, relocate and demo WRCO, the Community Center and a 5 private properties in Richland Center ▪ Secure funding and assist with the elevation of 5 properties in Richland Center ▪ Monitor 3-4 properties in Richland Center that are on the periphery of major flooding hazard areas ▪ Assist, as requested and able, with the Richland Center business doing flood mitigation improvements ▪ Explore elevating 10-15 homes along Wisconsin Street in the Village of Viola	Covered by Dept annual budget	Zoning and EM Dept	Closed on 12/30/08 2014 2014	High High High	Richland County City of Richland Center Village of Viola	FEMA's PDM & FMA grants are potential funding sources for buyout.
	Provide information to citizens about the purchase of flood insurance	Covered by Dept annual budget	EM Dept	Ongoing	Medium	All*	Link will be made available on the website
	Review and update preparedness measures (plans, training, exercising, public information) regarding county dams.	Cost to be determined based on project needs	EM Dept and Zoning	Ongoing	Medium	All*	The county completed a dam shadow plan on 5 dams and all but one ordinance was updated. The EOP was also updated to reflect the new information.
	Install shut-offs in sewer lines (laterals) in the Village of Viola to keep water from flooding 20-30 properties.	~$1,000 per unit (1 valve/bldg)	EM Dept and Village of Viola	As funding available	Very High	Village of Viola	Installing these valves would affect ~100 structures, many of which house senior citizens and small, local businesses
	Complete floodplain zoning on all dams listed below. Also complete	**6 & 22** DNR Criteria =	WI DNR and EM Dept	As funding available	Medium	All*	

	dam upgrade projects, as listed, on: ▪ **Mill Creek #1B- "Huth Dam" -** No dwellings within dam failure shadow. ▪ **Mill Creek #13A- "Luttig Dam"** 1 dwelling within dam failure shadow. Dam needs upgrading to principle and emergency spillways for significant or high hazard dam. Principle spillway is not capable of passing the flow required as defined by NR 333, for a significant or high hazard dam. Dam is not capable of passing the total flow required for a significant or high hazard dam through a combination of the principle and emergency spillways. ▪ **Mill Creek #13B- "Durst Dam" "Brown Dam"** - 1 dwelling within dam failure shadow ▪ **Mill Creek #3- "Ewers Dam"** - Not capable of passing flow through principle and auxiliary spillway for a high hazard dam. Capable of passing flows of low hazards. No dwellings with dam failure shadow ▪ **Mill Creek #9A- "Brindley Dam"** - Principle spillway is not capable of passing flow required for a high or significant hazard dam. Emergency and principle spillway together may not be capable of passing high hazard flows. Dam is capable of passing a significant hazard flow through a combination of auxiliary and principle spillways	$677,000.00 + cost of engineer NRCS Low Hazard + Flood Proofing = $821,000.00 NRCS High Hazard = $1,450,000.00 **13A & 13B** DNR Criteria = $721,000.00 + cost of engineer NRCS Low Hazard + Flood Proofing = $393,000.00 NRCS High Hazard = $2,003,000.00					

	▪ **Mill Creek #10- "Dosch Dam"** ▪ **Mill Creek #6- "Robbins Dam"** - 6 dwellings in dam failure shadow. The dam is not capable of safely passing the flow for a high hazard dam. Needs upgrading. ▪ **Mill Creek #22- "Popp Dam" -** 5 dwellings with dam failure shadow. Dam is not capable of safely passing the flow required for a high hazard dam. The principle spillway is not capable of passing the entire 100 year flood without water flowing over the auxiliary spillway. 1000 year flood would overtop the dam. Dam needs upgrading.						
	Raise the interceptor so that flood waters will not inundate the new 6" wastewater pump.	~$2,500 - $3K to raise the manhole	Village of Viola	As funding available	Very High	Village of Viola	History of problems have caused the village to discharge into the Kickapoo River. ~50 residences (12 major and the rest minor) would have had no problems if this was done.
	Continue to work with and support the DNR as they provide education to the municipalities regarding restrictions on development/road work in flood plains.	Covered by Dept annual budget	EM Dept, Zoning Dept. Municipalities	Ongoing	High	All*	• Jan '09 – Towns Association met and distributed floodplain maps for each town • DNR is holding regional meetings with FEMA, Richland Co., WI DOT, WI Counties Association and the WI Towns Association regarding road construction in floodplains.
Fog	Provide public information via website links or brochures regarding safe driving procedures in the fog	Covered by Dept annual budget	EM Dept	Ongoing	Low	All*	The Sheriff's Office does PSAs on radio (WRCO 100.9 FM and 1450 AM) when needed.
Forest Fires and Wildfires	Continue to provide outreach efforts to homeowners on protecting homes	Costs vary	Local Fire Departments	Ongoing	Low	All*	Done annually during Fire Safety Week in Sept. or Oct.

	and structures from wildfires						
	Provide ample training for volunteer fire fighters for larger fires	Costs vary	Local Fire Departments, EM Dept.	Ongoing	Medium	All*	The WI DNR provides annual training (March) on prairie fires where they do a controlled burn (on rotation). There is a DNR satellite office in Richland Center and the main office (w/heavy equip) is in Spring Green. Orion is the most wooded area in the county and it plus the other 3 listed towns have a cover of pine, locusts, oak in a sandy soil.
Landslide	Examine areas where landslides occur and determine if any mitigation measures (signs, retaining walls, lighting, etc.) may be necessary for public safety.	Covered by budget	Towns of Akan, Buena Vista, Eagle, Forest and Orion; Highway Dept, Sheriff's Office and EM Dept.	Initial exam by 2010. Ongoing awareness after that.	Medium	Towns of Akan, Buena Vista, Eagle, Forest and Orion	Due to cutting roadways into the hills, water rushes through and erodes debris onto the roads.
Severe Temperatures	Continue public informational campaigns about severe weather on the website and during Winter and Heat Awareness Weeks.	Covered by budget	EM Dept	Ongoing	Medium	All*	Done in annual campaigns in Fall and Spring. The EM and Public Health Depts. also do PSAs on radio (WRCO 100.9 FM and 1450 AM) when needed.
Storms: Hail	Place hail storm safety materials in county display rack, on the website and during severe weather week.	Covered by Dept annual budget	EM Dept	Ongoing	Medium	All*	
	Provide information regarding the purchase of crop insurance	Covered by Dept annual budget	UW Ext	Ongoing	Low	All*	County farmers lost 85% of the apple crop in a hailstorm in June 2008.
Storms: Lightning	Place lightning safety materials in county display rack, on the website and during severe weather week.	Covered by Dept annual budget	EM Dept	Ongoing	Medium	All*	
	Provide information regarding the use of fire-resistant materials and surge protectors via a website link.	Covered by Dept annual budget	EM Dept	Ongoing	Low	All*	

Storms: Thunderstorm	Place thunderstorm safety materials in county display rack, on the website and during severe weather week.	Covered by Dept annual budget	EM Dept	Ongoing	Medium	All*	
	Provide advice to event boards, the UW campus and residences for senior citizens seeking assistance regarding safety issues.	Covered by Dept annual budget	EM Dept	Ongoing	Low	All*	Star-Spangled Celebration, Fair, State High School Rodeo – can have 15,000-20,000 people. Co received a letter of commendation for weather monitoring during Star-Spangled Celebration. Provide radio PSAs to whole community on WRCO 100.9 FM and 1450 AM.
Storms: Tornadoes and High Winds	Provide information (via website link) to mobile home park owners and park/campground operators about providing permanent storm shelters in the parks. Each shelter holds approximately 10 people and costs $3,000. Provide information of tornado risk based on NWS-provided risk bands.	Costs vary	EM Dept	Ongoing	Medium	All*	• Mobile home parks in City of Richland Center and Villages of Lone Rock, Sextonville and Viola and the Town of Rockbridge. • Campgrounds are Alma Springs, the Flying J and Eagle Cave. (Eagle Cave is in the County's NWS-identified "tornado alley." • Utilize Department of Commerce's CDBG for funding assistance
	Provide information (via website link) to builders and owners of manufactured and mobile homes about the use of tie-downs with ground anchors	Covered by Dept annual budget	EM Dept	Ongoing	Medium	All*	
	Explore the feasibility of increasing the wind resistance of the roofs of community storm shelters.	Covered by Dept annual budget	EM Dept	As grants available	Medium	All*	
	Promote tornado awareness, including safety measures.	Covered by Dept annual budget	EM Dept	Ongoing	Medium	All*	• Done during Tornado Awareness Week in April and by sponsoring spotter classes. Information will be

							included on the website for homes, schools and business safety measures. • NWS LaCrosse provides a tornado packet that included a county map with a vulnerability analysis
Storms: Winter	Promote winter hazards awareness, including home and travel safety measures (including website.)	Covered by Dept annual budget	EM Dept	Ongoing	Medium	All*	Done during Winter Weather Awareness Week in November. The Sheriff's Office also does PSAs on radio (WRCO 100.9 FM and 1450 AM) when needed.
Utility Failure	Complete a feasibility study (with cost-benefit analysis) to selectively upgrade shelter facilities for electricity needs.	Covered by budget	EM Dept	Ongoing	Medium	All*	The middle school in Richland Center is a shelter but it has no generator. The high school might be upgraded. Need to also evaluate the status of the electricity in the shelters in Lone Rock and Viola.
	Three electrical improvement projects: • Provide a loop electric feed for a circuit on the east end of the City of Richland Center. • Install a loop feed system into the North Industrial park. • Build several small pieces of line as back-ups.	As funding allows. $400K for whole project	City Utilities of Richland Center - Electric	2014	High	City of Richland Center	
	There are six lift-station locations, none of which have generator back-up. The city would like to install two permanent generators and to have four, trailer-mounted portable generators to address this need.	As grant funding allows. $35-40K/unit for permanent generators and $90K for portable generators	City of Richland Center - Wastewater Treatment	2014	High	City of Richland Center	
	Purchase and install permanent, 2500KW back-up generators to raise the bay doors so that the heavy	~$50,000/each	Richland County Highway Dept.	2014	Medium	All*	

	equipment can get out in a disaster. Needed at the Highway Shop and at the Richland Electric Co-op Service Center		and Richland Electric Co-op				
	Replace overhead primary electrical lines with underground lines • Project 2751.52.53 – 5.22 miles of SW Richland Co (Upper Byrds Creek from junction of CTH X). • Proj. 2756.57 – 1.88 mi in SW Richland Co (Middle Byrds Creek beginning at 2753) • Proj. 2761.62.3.4 – 4.23 mi in SW Richland Co (Eagle Cave region) • Proj. 4626.31 – 3.63 miles in central Richland Co (Dog Hollow and Upper Willow Watershed) • Proj. 1718.19 – 3.2 mi in NW Richland Co (Gault Hollow)	 $208,800 $75,200 $169,200 $145,200 $128,000	Richland Electric Co-op	 10/1/2010 10/1/2010 4/1/2011 8/1/2011 4/1/2012	High	 Akan, Richwood, Eagle Akan, Richwood, Eagle Eagle, Orion, Richwood Willow Bloom	

EM Dept = Richland County Emergency Management Department
UW Ext = University of Wisconsin – Richland County Extension Office
All Communities in Richland County include: Richland County; the City of Richland Center; the Villages of Boaz, Cazenovia, Lone Rock, Viola and Yuba and the Towns of Akan, Bloom, Buena Vista, Dayton, Eagle, Forest, Henrietta, Ithaca, Marshall, Orion, Richland, Richwood, Rockbridge, Sylvan, Westford and Willow.

Appendix D: Community Input

Richland County believes in the importance of gathering public input from interested parties in the community. To achieve this goal, the Emergency Management Office took every opportunity available to utilize various methods to publicize the opportunity for people to participate in the planning process and to gather input from interested parties. The table that follows outlines the major opportunities that were created to discuss the plan. The table includes dates of workgroup meetings, meetings with public officials and media opportunities for the all-hazards pre-disaster mitigation plan.

DATE	SUMMARY OF OPPORTUNITY

On of the main ways people were made aware of the plan was the publication of a brochure (following) that was widely distributed in the public buildings around the community including the Courthouse and the library. The purpose of this brochure was to provide a general overview of the mitigation planning process, the impetus for planning and the scope of the final result.

9 June 2008

For More Information, Contact Darin Gudgeon (608-647-8187)
For Immediate Release

Richland County, like the rest of the State of Wisconsin, is vulnerable to a variety of disasters. Wisconsin has incurred disaster-related damages totaling nearly $3 billion in the last three decades, with almost half of that occurring in the 1990's alone. These losses can be reduced through mitigation activities. It is estimated that for every dollar spent on mitigation, $2 to $3 in future damages can be avoided. Hazard mitigation breaks the cycle of damage and repair.

Mitigation actions reduce or eliminate the long-term risk to human life and property from hazards. These preventative actions can be simple such as elevating a furnace in a basement that sometimes has water on the floor. Mitigation can also have a comprehensive approach such as relocating buildings out of the floodplain or strengthening critical facilities to prevent wind damage and provide stronger shelter.

In an effort to better prepare Richland County to manage its vulnerability to disaster, Darin Gudgeon, Richland County Emergency Management Director, applied for and received a Pre-Disaster Mitigation (PDM) planning grant. This goal of this grant is to complete an approvable plan, which will serve as a roadmap that outlines potential cost-effective hazard mitigation activities, some of which might be available for future grant funding.

The plan is designed to look at the risks and vulnerabilities that the county faces from natural disaster and to highlight mitigation strategies that might reduce future losses. As part of this planning process, Gudgeon is assembling a workgroup to review and guide the planning activities. The workgroup is reviewing initial background information about Richland County and has begun identifying strategies that might help.

Gudgeon stated, “I am very excited about this part of the planning process. The input from the workgroup can have long-lasting impacts, making Richland County safer and more disaster resistant.”

FEMA has recognized the importance of having members of the community involved in the process and Gudgeon would like to ensure that all interested members of the community have an opportunity to provide input into the plan. If you are interested in more information about the plan or would like to provide input into the plan, please contact Darin Gudgeon at 608-647-8187.

Richland County Unit
Wis. Towns Association Meeting August 27th 2008

Time 7:30 PM at Richland County Court House , 181 West Seminary St., Richland Center, Wisconsin.
(County Board Room)

1. Call WTA meeting to order with pledge to the flag.
2. Reading of agenda.
3. Welcome guests to the meeting.
4. Roll call of Towns in attendance.
5. Minutes of last WTA meeting.
6. Treasurer's report and payment of bills.
7. Senators and Assemblymen & reports. (5 to 7) min
8. District Director Report.
9. Program Part 1: Darin Gudgeon will do a power point on the key parts of the Richland County Emergency plan, our responsibilities and give us a sample resolution which can be used for official adoption of the county plan. Part 2 of the program will be Mitigation planning given by Lenora Borchardt. The training is needed for towns and villages to be eligible to receive funds. Each town needs to adopt the final plan. I encourage each town or village to have someone attend this meeting.
10. Note: If you have not turned in your Mitigation Questionnaire to the DEM please bring it to this meeting.

The program for the Oct 27th meeting will be presented by Rural Insurance. The topic will be safety and risk management .

Is there a topic you would like to have discussed at the meetings? I am planning the next two meetings in 2009 so now is the time to give me your ideas for possible topics to be presented. I need your input and ideas for programs that would be informational.

11. Adjourn meeting

WTA Unit Chairman
Richard Wastlick

Richland County WTA meeting August 27, 2008

Dorie Studnicka Eagle
33552 Newburn Lane
Muscoda, WI 53573

Richard Wastlick Dayton
18024 Lingel Lane
Richland Center Wi 53581

Theresa Osborne Bloom
14178 County Hwy H
Hillsboro, WI, 54634

Charles Davis Bloom

18560 CTH I
Hillsboro Wi 54634

Duane Olson Ithaca
26230 Huffman Lane
Richland Center Wi 53581

Kurt Monson Dayton
24230 CTH ZZ
Richland Center Wi 53581

Howard Oates Akon
No address see below

Merna Queen Akon
27311 Dieter Hollow
Blue River, WI 53518

Edward Keller Richwood
28823 CTH F
Blue River, 53518

Willard Jindrick Bloom
10650 Jindrick Lane
Hillsboro, WI 54634

Kelly Kepler Rockbridge
19886 CTH BR
Richland Center WI 53581

James Lingel Dayton
17525 Lingel Lane
Richland Center Wi 53581

Charles Parduhn Orion
29546 CTH TB
Lone Rock Wi 53556

Jean Nicks Boaz
16920 STH 171
Richland Center Wi 53581

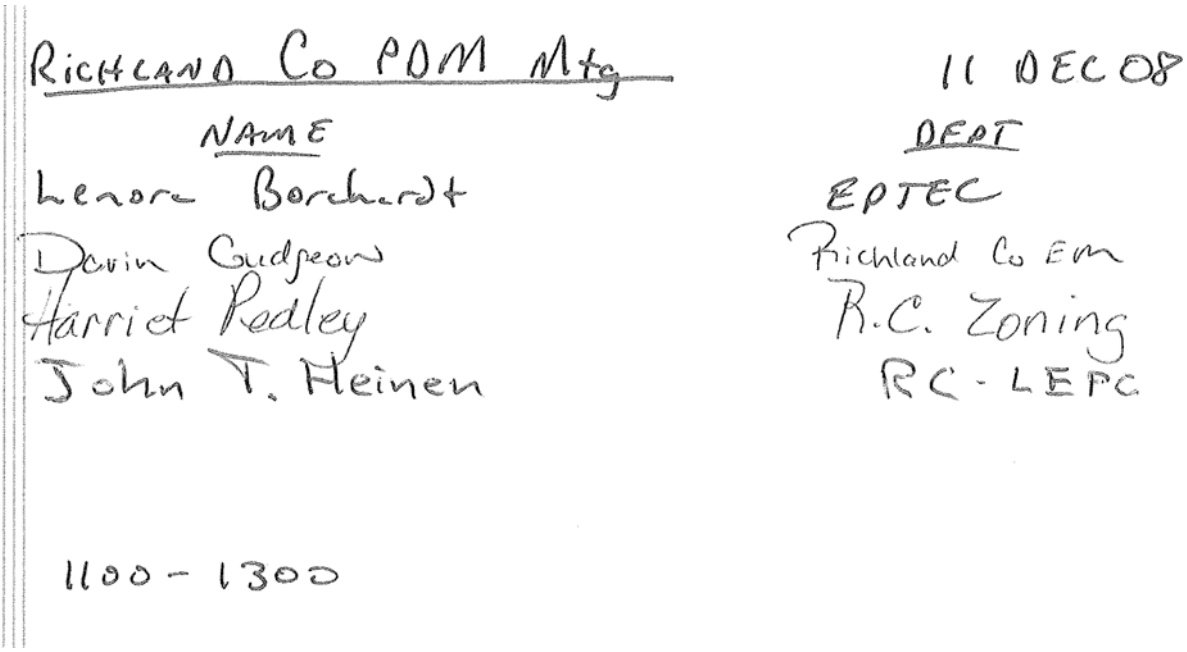
Francis Wiedenfeld Ithaca
30393 CTH N
Richland Center Wi 53581

Allen Unbehauan Orion
29081 Cty HWY TB
Richland Center Wi 53581

Jerome Durst Marshall
17938 CTH A
Richland Center Wi 53581

Don Hubbs Marshall
17857 Old CTY Farm
Richland Center Wi 53581

David Wanless Ithaca
28749 Nebraska Rd
Richland Center Wi 53581



1000-1200

RICHLAND CO. PDM PLAN MTG. 13MAR09

NAME	AGENCY	EMAIL
LENORA BORCHARDT	EPTEC	LENORAB@EPTECINC.COM
Larry D. Fowler, Mayor	City of Richland Center	rcmayor@mwt.net
Jeff LISKA	Village of Viola	jliska@mwt.net
Don Baker	Viola water/wastewater	dbaker@mwt.net
Todd Shea	National Weather Service	todd.shea@noaa.gov
John T Heinen	RCLEPC	heinenj@co.richland.wi.us
Darin Gudgeon	Richland Co	
DALE BENDER	City Utilities Electric	dbender@WPPIENERGY.org
LARRY G. HALLETT	RICHLAND ELECTRIC COOPERATIVE	larry@rec.coop
Harriet Pedley	RC Zoning	pedleyh co.richland.wi.us

OFFICE OF CITY CLERK

CITY OF RICHLAND CENTER
450 S. MAIN STREET – PHONE 608-647-3466
RICHLAND CENTER, WI 53581

OFFICIAL PUBLIC NOTICE
REGULAR MEETING
OF THE COMMON COUNCIL

AGENDA

Tuesday, April 21st, 2009 at 7:30 P.M. in the Council Room of the municipal building at 450 S. Main Street.

1. Roll Call, determine whether a quorum is present, determine whether this meeting has been properly noticed.
2. Entertain a motion to waive the reading of the minutes of the last meeting in lieu of printed copies and to approve said minutes or correct and approve said minutes.
3. Nominate and Elect Council President.
4. Appoint City Attorney - Confirm.
5. Appoint City Assessor - Confirm.
6. Designate Official Newspaper - Confirm.
7. Elect Council Representatives to Utility Commission.
8. Appoint Standing Committees - Confirm.
9. Appointments to Boards and Commissions - Confirm.
   a. Council Representatives.
   b. Citizens Representatives.
10. Confirmation of City Forester.
11. Update Hazard Mitigation Plan.
12. Planning Commission Recommendations:
    a. Introduction of amended Sign Ordinance.
13. Building / Sign / Demo Permits.
14. Public Works Committee Recommendations:
    a. Approve Expenditure for Overlay of Parking Lot next to Fire Station.
    b. Consider purchase of used truck from County.
15. Finance Committee Recommendations:
    a. Consider 2009 Resolution for Carry – Over Funds.
    b. Consider use of unbudgeted funds for overlay of Haseltine St. between Church St. and Main St.
16. Introduction of ordinance relating to extension of deadline for filing appeals with the Board of Review and presentation of evidence at the Board of Review hearing.
17. Reimbursement Resolution Update – Water Utility.
18. Authorize easement and signatures for the purposes of allowing construction and operation and maintenance of utility facilities.
19. Introduction of Emerald Ash Borer Action Plan.
20. Payment of monthly bills.
21. Mayor's Correspondence and Comments.

RICHLAND COUNTY NATURAL HAZARDS PREPAREDNESS AND MITIGATION QUESTIONNAIRE

1. In the past five years, has your community experienced a natural disaster such as a severe windstorm, flood, wildfire, earthquake, etc.?

Event	When event last occurred:				
	Within past year	1-5 years ago	5-15 years ago	More than 15 years ago	Never
Drought	T. of Sylvan	T. of Sylvan	V. of Viola T. of Sylvan T. of Richwood	T. of Forest T. of Richland T. of Eagle T. of Sylvan	V. of Lone Rock
Dust Storm					V. of Lone Rock V. of Viola T. of Forest T. of Richland T. of Eagle T. of Richwood
Earthquake					V. of Lone Rock V. of Viola T. of Forest T. of Richland T. of Eagle T. of Richwood
Flood	C. of Richland Ctr V. of Boaz V. of Cazenovia V. of Lone Rock V. of Viola T. of Marshall T. of Forest T. of Willow T. of Richland T. of Eagle T. of Akan T. of Sylvan T. of Dayton T. of Richwood T. of Ithaca T. of Rockbridge T. of Henrietta T. of Buena Vista T. o f Westford	C. of Richland Ctr V. of Cazenovia V. of Viola T. of Marshall T. of Richland T. of Eagle T. of Akan T. of Sylvan T. of Richwood T. of Rockbridge T. of Henrietta T. of Bloom T. o f Westford	T. of Marshall T. of Eagle T. of Sylvan T. of Richwood T. o f Westford	C. of Richland Ctr V. of Viola T. of Marshall T. of Eagle T. of Akan T. of Sylvan T. of Richwood	
Lakeshore Erosion	V. of Viola	V. of Viola			V. of Lone Rock T. of Forest T. of Richland T. of Eagle T. of Richwood
Landslide/Debris Flow	C. of Richland Ctr V. of Viola T. of Marshall T. of Forest T. of Willow T. of Richland T. of Eagle T. of Akan T. of Sylvan T. of Dayton	C. of Richland Ctr V. of Viola T. of Marshall T. of Akan T. of Sylvan T. of Richwood T. of Rockbridge T. of Bloom	T. of Marshall T. of Sylvan T. of Richwood	C. of Richland Ctr T. of Marshall T. of Sylvan T. of Richwood	V. of Lone Rock

	T. of Richwood T. of Rockbridge				
Wildfire	T. of Richland	T. of Richland			V. of Lone Rock T. of Richwood
Windstorm	V. of Viola T. of Sylvan T. of Buena Vista	C. of Richland Ctr V. of Viola T. of Marshall T. of Forest T. of Richland T. of Eagle T. of Sylvan T. of Richwood	V. of Lone Rock T. of Marshall T. of Sylvan	T. of Marshall T. of Sylvan	
Severe Winter Storm	C. of Richland Ctr V. of Viola T. of Marshall T. of Forest T. of Willow T. of Richland T. of Eagle T. of Sylvan T. of Dayton T. of Richwood T. of Buena Vista	C. of Richland Ctr V. of Viola T. of Marshall T. of Akan T. of Sylvan T. of Richwood	V. of Lone Rock T. of Marshall T. of Sylvan T. of Richwood	C. of Richland Ctr T. of Marshall T. of Sylvan T. of Richwood	
Other (Specify):					

2. For which of the following natural disasters do you think your community is at risk? (Check the appropriate box for each hazard.)

Event	Extremely Concerned	Very Concerned	Concerned	Somewhat Concerned	Not Concerned
Drought			C. of Richland Ctr T. of Forest T. of Eagle T. of Sylvan T. of Ithaca	V. of Viola T. of Richland T. of Akan T. of Richwood	V. of Lone Rock T. of Marshall T. of Dayton T. of Bloom
Dust Storm				T. of Bloom T. of Sylvan	C. of Richland Ctr V. of Lone Rock V. of Viola T. of Marshall T. of Forest T. of Richland T. of Eagle T. of Akan T. of Richwood T. of Ithaca
Earthquake			T. of Sylvan		C. of Richland Ctr V. of Lone Rock V. of Viola T. of Marshall T. of Forest T. of Richland T. of Eagle T. of Akan T. of Richwood T. of Ithaca T. of Bloom
Flood	V. of Viola T. of Marshall T. of Richland T. of Akan T. of Sylvan T. of Richwood T. of Buena Vista	C. of Richland Ctr T. of Forest T. of Eagle T. of Ithaca T. of Rockbridge T. of Henrietta	V. of Lone Rock T. of Willow T. of Dayton T. of Bloom T. o f Westford	V. of Boaz	
Lakeshore Erosion	T. of Sylvan		V. of Viola		C. of Richland Ctr V. of Lone Rock T. of Marshall T. of Forest T. of Richland T. of Eagle T. of Akan T. of Richwood T. of Ithaca T. of Bloom
Landslide/ Debris Flow	T. of Marshall T. of Richland T. of Akan T. of Sylvan	C. of Richland Ctr T. of Richwood T. of Rockbridge	V. of Viola T. of Willow T. of Eagle T. of Bloom	T. of Forest T. of Ithaca	V. of Lone Rock
Wildfire	T. of Buena Vista	T. of Sylvan	V. of Viola T. of Marshall T. of Richland	T. of Forest T. of Akan T. of Richwood T. of Ithaca T. of Bloom	V. of Lone Rock T. of Eagle

Windstorm	V. of Viola T. of Marshall T. of Buena Vista	T. of Akan T. of Sylvan T. of Richwood	C. of Richland Ctr V. of Lone Rock T. of Forest T. of Richland T. of Eagle	T. of Bloom T. of Ithaca	
Severe Winter Storm	T. of Marshall T. of Richland T. of Akan T. of Sylvan T. of Buena Vista	C. of Richland Ctr T. of Eagle T. of Richwood	V. of Lone Rock V. of Viola T. of Forest T. of Willow T. of Dayton T. of Ithaca	T. of Bloom	
Other (Specify):					

3. Has your community had damage to any facilities or infrastructure (e.g., roads, public buildings, utilities?)
    - Wastewater treatment facility, roads, municipal building, parks, tennis courts, bike trail, basketball courts, several homes and businesses as well as the community center – City of Richland Center
    - Trees down across roads also culvert washed out. Sewer utility pumps were flooded under water. Water in buildings in Boaz Park. Mudslide down on Jackson Road. - V. of Boaz
    - No - V. of Cazenovia
    - Flood damage to public buildings and sewer system – V. of Lone Rock
    - Yes to all – V. of Viola
    - Roads, utilities – T. of Marshall
    - We have had significant road damage from the last couple of floods as well as damage to our public buildings due to a tornado two summers ago. – T. of Forest
    - Yes, roads. Debris and shoulders washed away. – T. of Willow
    - Roads – T. of Richland
    - Roads, culverts, bridge approach. – T. of Eagle
    - Yes – T. of Akan
    - Yes – T. of Sylvan
    - Roads and tubes. – T. of Dayton
    - Yes – T. of Richwood
    - Public buildings and town roads. – T. of Ithaca
    - Roads – T. of Rockbridge
    - Roads, recycling building – T. of Henrietta
    - Yes, last year's floods (2008) caused damage to our boat landing and several roads in our township – T. of Buena Vista
    - Debris and washout of roads – T. of Bloom
    - Yes – T. of Westford

4. What facilities or infrastructure in your community do you think are especially vulnerable to damage during a natural disaster?
    - Wastewater treatment facility, roads, municipal building, parks, tennis courts, bike trail, basketball courts, several homes and businesses as well as the community center – City of Richland Center
    - Residents along mill creek, village park and community building. – V. of Boaz
    - Firehouse – well - V. of Cazenovia
    - Utilities – V. of Viola
    - Roads – T. of Marshall
    - I think our roads are at the greatest risk due to our terrain. – T. of Forest
    - Roads – T. of Willow
    - Roads and right-of-way. – T. of Richland
    - Roads, streams, culverts, bridges and private dwellings/property. – T. of Eagle
    - Flooding – Tower Road and West Ridge Road. – T. of Akan
    - Roads and buildings. – T. of Sylvan
    - Power outages, bad water and communications. – T. of Dayton
    - Roads and bridges. – T. of Richwood
    - School, private household, roads and local businesses. – T. of Ithaca
    - Roads – T. of Rockbridge
    - Roads – T. of Henrietta
    - Roads, bridges, boat landing – T. of Buena Vista
    - Roads – T. of Bloom
    - Roads and utilities – T. of Westford

5. How important do you think each of the following projects are in mitigating (i.e., lessening the impacts of) a natural disaster in your community?

Project	Very Important	Somewhat Important	Neutral	Not Very Important	Not Important
Protecting private property	C. of Richland Ctr V. of Boaz V. of Cazenovia V. of Lone Rock V. of Viola T. of Richland T. of Sylvan T. of Dayton T. of Richwood T. of Ithaca T. of Henrietta T. of Buena Vista T. of Bloom T. o f Westford	T. of Marshall T. of Eagle T. of Akan T. of Rockbridge	T. of Forest		

Protecting critical facilities (hospitals, fire stations, etc.)	C. of Richland Ctr V. of Boaz V. of Cazenovia V. of Lone Rock V. of Viola T. of Forest T. of Willow T. of Richland T. of Dayton T. of Ithaca T. of Henrietta T. o f Westford	T. of Sylvan T. of Rockbridge	T. of Buena Vista	T. of Richwood	T. of Eagle T. of Akan
Preventing development in hazard areas	C. of Richland Ctr V. of Boaz V. of Cazenovia T. of Forest T. of Richland T. of Eagle T. of Dayton T. of Rockbridge T. of Buena Vista T. o f Westford	V. of Viola T. of Marshall T. of Richwood	V. of Lone Rock T. of Willow T. of Sylvan T. of Henrietta	T. of Bloom	T. of Akan
Enhancing the function of natural features (streams, wetlands)	V. of Cazenovia T. of Forest T. of Sylvan T. of Rockbridge T. of Henrietta T. of Buena Vista	C. of Richland Ctr V. of Boaz V. of Viola T. of Willow T. of Richland T. of Eagle T. of Akan T. of Dayton T. of Bloom T. o f Westford	T. of Marshall T. of Richwood T. of Ithaca		V. of Lone Rock
Protecting historical and cultural landmarks	V. of Cazenovia V. of Lone Rock T. of Sylvan T. of Ithaca T. of Buena Vista	C. of Richland Ctr V. of Boaz T. of Forest T. of Richland T. of Dayton T. of Rockbridge	V. of Viola T. of Willow T. of Akan T. of Richwood T. of Henrietta T. of Bloom T. o f Westford	T. of Eagle	T. of Marshall
Promoting cooperation among public agencies, citizens, non-profit organizations and businesses	C. of Richland Ctr V. of Boaz V. of Cazenovia V. of Lone Rock T. of Forest T. of Richland T. of Dayton T. of Ithaca T. of Rockbridge T. of Henrietta T. of Buena Vista T. of Bloom	V. of Viola T. of Marshall T. of Willow T. of Akan T. of Sylvan T. of Richwood T. o f Westford	T. of Eagle		
Protecting and reducing damage	C. of Richland Ctr V. of Boaz	T. of Forest T. of Buena Vista			

to utilities	V. of Cazenovia V. of Lone Rock V. of Viola T. of Marshall T. of Willow T. of Richland T. of Eagle T. of Akan T. of Sylvan T. of Dayton T. of Richwood T. of Ithaca T. of Rockbridge T. of Henrietta T. of Bloom T. o f Westford				
Strengthening emergency services	C. of Richland Ctr V. of Boaz V. of Cazenovia V. of Lone Rock T. of Richland T. of Akan T. of Dayton T. of Richwood T. of Ithaca T. of Rockbridge T. of Henrietta T. of Buena Vista T. of Bloom	V. of Viola T. of Marshall T. of Forest T. of Willow T. of Eagle T. of Sylvan T. o f Westford			

6. What ideas do you have for your community to mitigate natural disasters?

- Retention ponds or dams in township areas to slow down the water flowing into the City of Richland Center– City of Richland Center
- Village is in planning stage and is open to any suggestions that would help benefit our community. – V. of Boaz
- Check all areas and do more public awareness on protecting themselves – V. of Cazenovia
- Updating our lift stations and sewer shut-offs. Protecting the river bank from erosion. Having a good emergency response team. – V. of Viola
- Road improvements to lessen flood damage. – T. of Marshall
- I think taking a good, hard look at how our roads are laid out is important. I'm not sure what might come of it but after the amount of damage we have sustained to our road system in the last couple of years it begs for some examination; something as simple as taking a look at our culverts. – T. of Forest
- Be better prepared. – T. of Richland
- Education of public as to private property protection; pre-staged disaster response assets and emergency kits. – T. of Eagle

- Providing additional drainage materials and monies for road improvements. – T. of Akan
- Eliminate all housing in floodplain; do water control in valleys and ravines; protect property; control public garbage and waste (plastic barrels) – cars, trucks and abandoned houses. – T. of Ithaca
- Improved zoning laws to prevent development in areas vulnerable to flooding – T. of Rockbridge
- After the last couple of years with flooding and above average snowfall, our response was excellent along with help from FEMA – T. of Buena Vista

GOVERNMENTAL & PUBLIC INPUT

Successful community mitigation begins with a commitment from government officials throughout the county. Community groups then provide vital information to insure that the plan is workable within the framework of the community's priorities.

REQUIRED INFORMATION

- Flood maps
- Identification of potential hazards
- History of occurrences
- Hazard impact projections
- Location of critical facilities
- Identification of high-risk facilities (schools, fire station, nursing homes, etc.)
- Location of repetitive loss structures
- Development & prioritization of mitigation projects
- Other materials as identified

ADOPTION OF THE PLAN

Local units of government participating in a multi-jurisdictional planning process must adopt the final plan for the municipality to be eligible for future mitigation funds including grants available through FEMA. **Local units (i.e., towns, villages, cities) that do not participate would be ineligible to receive such funds** until such time that they meet these requirements and adopt a plan.

MITIGATION PLANNING PAYS OFF

FEMA has long recognized the critical importance of hazard mitigation and considers reducing vulnerability to natural disasters through mitigation planning a cornerstone of a national emergency management plan.

In the same way, **mitigation should be the cornerstone of local community planning** – a necessary means of making our community a safer place in which to live, work and play and to leave a more viable and sustainable environment for generations to come.

Keep in mind – experience shows that for every dollar spent on mitigation; two to three dollars is saved in potential future damages.

NOTES:_____

_____

_____

_____

For further information please contact:

Richland County
Emergency Management
181 W. Seminary Street
PO Box 251
Richland Center, WI 53581
(608) 647-8187

Creating Safe, Sustainable Communities

MITIGATION PLANNING

Prepared by:
Richland County Emergency Management
181 W. Seminary Street, PO Box 251
Richland Center, WI 53581

HISTORY

1. Since 1993 more than 400 disasters have occurred in the United States, affecting communities in all 50 states, costing the country over **$500 million dollars per WEEK and killing over 24,000 people**.
2. Floods, ice storms, tornadoes and forest/wild fires – these are all functions of the natural environment and only become hazardous when they threaten our "built" environment with destruction. These hazards will occur one day. When this happens, the results can be appreciably different from past outcomes if our community takes action today.

WHAT IS HAZARD MITIGATION PLANNING?

Hazard mitigation planning is the process of developing a set of actions designed to reduce or eliminate long-term risk to people and property from hazards and their effects.

WHY DO IT?

- To preserve the life, health and safety of residents in your community
- To protect your community's economic health
- To preserve the unique character of your community
- To reduce your community's vulnerability to disaster
- To speed your community's recovery after a disaster
- To save valuable tax dollars in your community and beyond

THE DISASTER MITIGATION ACT OF 2000 (DMA2K)

The impetus for states and local governments to undertake natural hazard mitigation planning occurred on October 30, 2000 when the President signed the Disaster Mitigation Act of 2000 (Public Law 106-390, DMA2K). The law encourages and rewards local and state pre-disaster planning, promotes sustainability as a strategy for disaster resistance and is intended to integrate state and local planning with the aim of strengthening statewide mitigation planning. This new approach facilitates cooperation between state and local authorities, prompting them to work together. The resulting enhanced planning network enables local and state governments to articulate accurate and specific needs for mitigation, resulting in faster allocation of funding and more effective risk-reduction projects.

HAZARD MITIGATION PLANNING PROCESS

1. Organize Resources- From the start, communities should focus the resources needed for a successful mitigation planning process. Essential steps include identifying and organizing interested members of the community, particularly those with the technical expertise required during the planning process.
3.
2. Assess Risks- Next, communities need to identify the characteristics and potential consequences of natural hazards. It is important to understand how much of the community can be affected by specific hazards and what the likely impacts would be for important community assets.

3. Develop a Mitigation Plan- Armed with an understanding of the risks posed by natural hazards, communities need to determine what their priorities should be and then look at possible ways to avoid or minimize the undesired effects. The result is a natural hazard mitigation plan and strategy for implementation.

4. Implement the Plan & Monitor Progress- Communities can bring the plan to life in a variety of ways ranging from implementing specific mitigation projects to changes in the day-to-day operation of the local government. To ensure the success of an on-going program, it is critical that the plan remains effective. Thus, it is important to conduct periodic evaluations and make revisions as needed.

Appendix E: Inter-Revision Updates

This plan will undergo major revisions every five years per the FEMA requirements. Richland County has recognized that there may be information that should be added to the plan between the five year updates but that the costs of continuous updates, printing and distribution can be excessive. This section is designed to hold that information that is gathered between the five year updates. It is felt that only having to reproduce and distribute one section between updates will lessen the costs to the county.

Potential Areas of Concern Identified:

- No additional concerns have been identified to date