Natural Hazards Assessment

Adams County, WI

Prepared by: NOAA / National Weather Service La Crosse, WI

Natural Hazards Assessment
for
Adams County, WI

Prepared by NOAA / National Weather Service – La Crosse
Last Update: November 2010

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Overview

Adams County is in the Upper Mississippi River Valley of the Midwest with relatively flat terrain. There are several rock bluffs, mounds, or natural monuments. It is bordered by the Wisconsin River to the west.

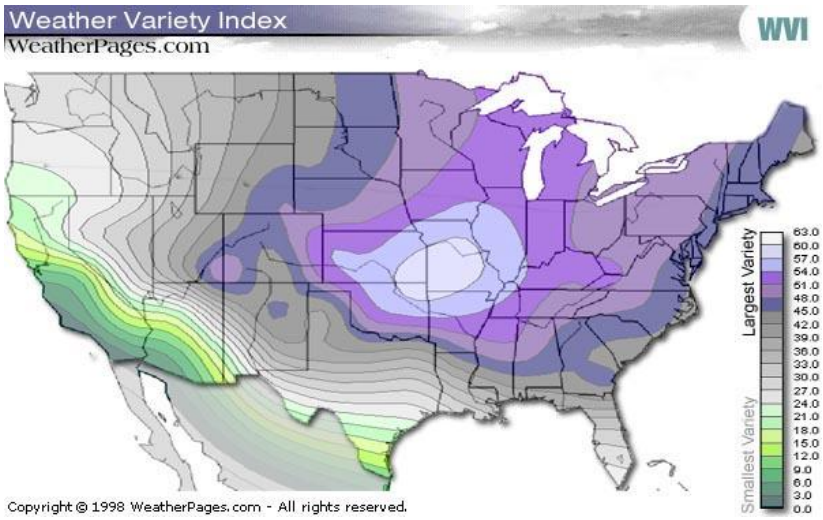
The area experiences a temperate climate with both warm and cold season extremes.

Winter months can bring occasional heavy snows, intermittent freezing precipitation or ice, and prolonged periods of cloudiness. While true blizzards are rare, winter storms impact the area on average about 3 to 4 times per season. Occasional arctic outbreaks bring extreme cold and dangerous wind chills.

Thunderstorms occur on average 30 to 50 times a year, mainly in the spring and summer months. The strongest storms can produce associated severe weather like tornadoes, large hail, or damaging wind. Both river flooding and flash flooding can occur. Heat and high humidity is occasionally observed in June, July, or August.

The autumn season usually has the quietest weather. River valley fog is relatively common. High wind events can also occur occasionally, usually in the spring or fall.

The variability in weather can be seen in the following graphic, created by a private company (weatherpages.com) that rated each city on variations in temperature, precipitation, and other factors. Madison, WI ranked 8th and La Crosse, WI ranked 27th highest in variability out of 277 cities.

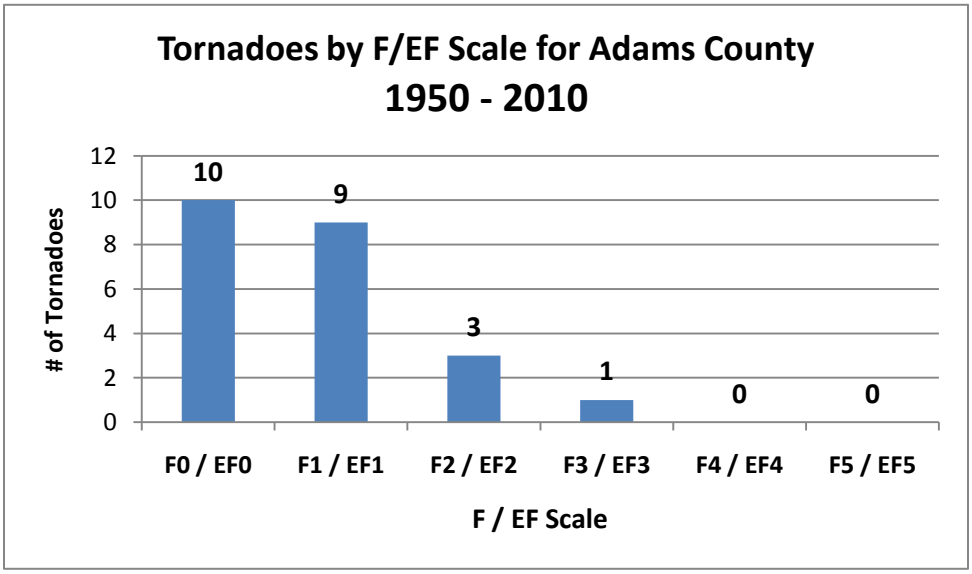


Since 1998, Adams County has been included in a FEMA Federal Disaster Declaration 5 times:

2000 – Severe storms / flooding
2001 – Flooding
2002 – Severe storms / flooding
2004 – Severe storms / flooding
2008 – Severe storms / flooding

Tornadoes

Adams County has had 24 tornadoes since 1950, averaging about one tornado every 2-3 years. Wisconsin averages 21 tornadoes per year. Most tornadoes are short-lived and small. May and June are the peak months and most occur between 3 and 9 p.m., but they can occur nearly any time of year and at all times of the day.



Most recent tornadoes:

- June 7, 2008 (EF0*)
- Aug.8, 2005 (F1)
- June 23, 2004 (F1)
- Aug.27, 1994 (F0)
- Aug.27, 1994 (F3)
- June 8, 1993 (F0)
- Aug.29, 1992 (F1)
- May 24, 1989 (F0)
- July 10, 1984 (F2)
- Apr.27, 1984 (F1)
- July 3, 1983 (F0)

One of the strongest tornadoes to hit Adams County was on August 27, 1994. A large tornado formed and swept through the small community of Big Flats killing 2 and injuring 22 others. Twenty four homes were destroyed with 168 others badly damaged. The Big Flats Fire Department and Town Hall were both destroyed. The year before, a large tornado outbreak hit Wisconsin on June 8th (1993) producing 5 small tornadoes in Adams County as well.

Strongest tornadoes: (1850-2010)

- Oct.3, 1903 (F4) – 40 inj, 5 dead
- Aug.27, 1994 (F3) – 22 inj, 2 dead
- July 10, 1984 (F2) – 0 inj, 0 dead
- July 19, 1980 (F2) – 0 inj, 0 dead
- May 8, 1964 (F2) – 0 inj, 0 dead

Adams County Tornado Facts:

- No F5 or EF5* tornadoes
- Only one F4 and F3 tornado
- 7 deaths and 70 injuries since 1850
- Tornadoes have occurred April – October
- Most have occurred in June (8)

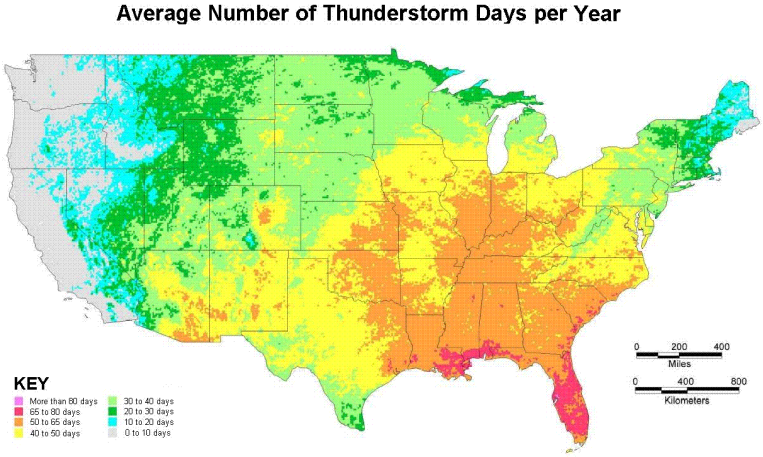
Tornado Watches		Tornado Warnings	
Year		Year	
2010	4	2010	0
2009	2	2009	0
2008	6	2008	1
2007	8	2007	0
2006	2	2006	0
2005	8	2005	1
2004	5	2004	1
2003	2	2003	0
2002	2	2002	0
2001	4	2001	0

Enhanced Fujita (EF*) Scale	
EF0	65-85 mph
EF1	86-110 mph
EF2	111-135 mph
EF3	136-165 mph
EF4	166-200 mph
EF5	>200 mph

* Started February 1, 2007

Severe Thunderstorms / Lightning

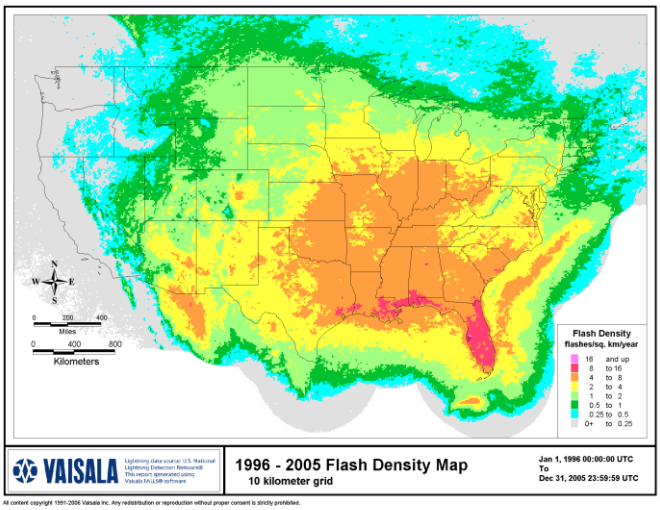
Adams County averages 39 thunderstorm days per year. The National Weather Service (NWS) considers a thunderstorm severe when it produces wind gusts of 58 mph (50 knots) or higher, 1 inch diameter hail or larger, or a tornado.



Downdraft winds from a severe thunderstorm can produce local or widespread damage, even tornado-like damage if strong enough. Most severe thunderstorm winds occur in June or July and between the hours of 4 and 8 p.m., but can occur at other times. Most damage involves blown down trees, power lines, and damage to weaker structures (i.e. barns, outbuildings, garages) with occasional related injuries. In June 2004, a line of thunderstorms produced extensive wind damage across the Township of Easton in the center part of the county. There were 5 reported injuries and hundreds of trees blown down. In July 2002, a mobile home park sustained major damage from thunderstorms winds in the Township of New Rome. There have been 101 damaging wind reports since 1982 in the county.

Large hail can also occur in a severe thunderstorm. June is the peak month with the most common time between 1 and 9 p.m., but it can occur in other warm season months and at any time of day. Hail is typically a crop damaging hazard but can damage roofs, windows, and vehicles if large enough (> 1”). Expenses can be high. Injuries or fatalities are rare for hail. Golf ball size hail hit Arkdale, WI in April 2008 and large hail damaged crops and broke windshields and windows in August 2006. There have been 58 large hail (≥ 3/4”) reports in the county since 1982.

Non-severe thunderstorms still pose a lightning risk. According to the Vaisala Group, an average of nearly 300,000 cloud-to-ground strikes hit Wisconsin each year based on data from 1996 to 2005. Even though there was a lightning fatality in Wisconsin both in 2007 and 2008, there are no known injuries or fatalities in Adams County from lightning going back to 1982.



Severe Thunderstorm Watches		Severe Thunderstorm Warnings	
Year		Year	
2010	10	2010	7
2009	3	2009	2
2008	8	2008	10
2007	14	2007	3
2006	25	2006	11
2005	15	2005	7
2004	12	2004	4
2003	9	2003	3
2002	16	2002	4
2001	14	2001	7

Flooding and Hydrologic Concerns

On occasion intense, heavy rain producing thunderstorms or consecutive thunderstorms ("training") can bring excessive rainfall leading to flash flooding in Adams County. Given the relatively flat terrain, ponding of water is more likely, but true flash flooding and erosion problems can develop if rainfall is excessive enough.

June is the most common month for flash floods, but they can occur from May through September. They are most common in the evening hours, between 8-10 p.m., but can occur at other times and typically last from 3-6 hours. Between 1982-1997, there were 8 deaths from flooding in Wisconsin.

Flash Flood Warnings	
Year	
2010	0
2009	0
2008	1
2007	0
2006	0
2005	0
2004	1
2003	0
2002	1
2001	0

On June 21-22, 2002, rounds of thunderstorms with heavy rain led to extensive flash flooding over central Wisconsin. Northeast parts of Adams County were hit hard with 5 inches of rain at Big Flats and up to a foot reported in the Township of Leola. Numerous roads were closed or badly eroded, with many bridges washed out. Area lakes were full, while levees and dikes were nearly breached. Many basements and septic fields were flooded out.

(Photo left by Debbie Segina, June 2002)

One main river impacts Adams County – the Wisconsin River. There are two hydro-electric dams (Castle Rock and Petenwell) that maintain pool or lake levels and control flow. Water levels are typically high in the spring from snowmelt, but can also develop during the summer or fall from heavy rain patterns. Failure at either dam would lead to flash flooding and inundation near the river, including some campgrounds, resorts, and residences. (Photo below: Petenwell Dam)

Wisconsin River @ Wisconsin Dells, WI Top 5 Crests (FS: 16 feet)	
Date	Crest
9/14/1938	23.8'
3/16/1973	20.7'
4/5/1967	19.2'
4/15/1965	19.0'
6/24/1993	18.2'

Winter Storms and Extreme Cold

Hazardous winter weather can bring a variety of conditions to Adams County. Since 1982, there have been 74 winter storms to hit the county with an average of 2-3 each season. Heavy snow, blowing snow, ice, and sleet all occur, although blizzards are more rare (only 3 since 1982). There have been a total of 4 documented deaths and 49 injuries as a direct result from winter storms in Wisconsin since 1982.

The 30-year average seasonal snowfall at Wisconsin Dells is 39.6 inches. The all-time record one-day snowfall is 15.0 inches that occurred in the Wisconsin Dells on January 3, 1999 and December 1, 1985. The bulk of snow falls between December and March. The largest winter storms tend to form over the central or southern Plains, then move northeast towards the western Great Lakes.

The winter of 2007-2008 was one of the worst on records with six winter storms that dropped at least 6" of more of snow on Adams County. On December 22-23, 2007 about 13" of snow fell in the Friendship area, with 8" on February 14, 2008 and another 11.2" on February 17, 2008. This led to the largest seasonal snowfall on record.

Top 5 Seasonal Snowfalls at the Wisconsin Dells

Years	Snowfall
2007-08	97.4"
1950-51	77.9"
1951-52	71.2"
1942-43	70.1"
1958-59	68.5"

March can often be a snowy month. Even though snowfall may be less frequent, heavy wet snow can form from large spring storms. In 1997, a large winter storm dropped nearly 20 inches of wet snow in Adams County on March 13-14th.

Ice storms (1/4" of ice or more) can occur but are relatively rare with only 5 occurrences since 1982. On January 4-5, 1998 ice up to nearly an inch led to 14 injuries and thousands in property damage.

Arctic cold outbreaks can occur in the upper Midwest as well. Snow depth can modify these cold temperatures leading to sub-zero readings on average 22 times a winter. Occasionally strong northwest winds will combine with arctic outbreaks to create dangerous wind chill conditions as well. The coldest temperatures are usually in January and February with average lows in the single digits and record lows colder than -25°F most days. The all-time record low is -43°F set in 1951.

Coldest Lows at Wisconsin Dells, WI

Low	Date
-43°F	1/30/1951
-38°F	2/20/1929
-37°F	2/3/1996
-36°F	2/4/1996
-36°F	1/19/1994

In late January and early February 1996, the Adams County area went 6 consecutive days with temperatures below zero degrees (F) following a blizzard about a week earlier. Low temperatures to start February at the Wisconsin Dells were -35°F, -34°F, -37°F, -36°F, and -34°F over five straight mornings.

Since 1982 there have been 27 fatalities in Wisconsin from cold weather and 42 direct injuries.

The La Crosse National Weather Service 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 wind chill hit -44°F on January 30, 2008 at Friendship, WI.

Heat, Drought, and Wildfires

On occasion the weather pattern across the upper Midwest favors prolonged heat and humidity, leading to heat waves. June through August are the warmest months with average high temperatures in the 80s and record highs above 100°F most days. The warmest temperature on record at the Wisconsin Dells is also the current state record of 114°F set on July 13, 1936.

Warmest Highs at Wisconsin Dells, WI	
High	Date
114°F	7/13/1936
113°F	7/14/1936
108°F	7/12/1936
107°F	7/11/1936
106°F	7/24/1934

Since 1982, there have been 115 fatalities directly related to heat waves and another 95 indirectly, in Wisconsin. In Adams County, there has been 13 heat waves since 1982 but no heat related fatalities documented.

One of the longest heat waves on record occurred in July 1936 when the Adams County area hit 90°F or higher for 13 consecutive days, including 9 days at or above 100°F and an all-time record high of 114°F as noted above. In more recent years, the high temperature hit 90°F or warmer 9 days from July 31st through August 10th in 2001, and for 7 consecutive days from June 19th through 25th in 1995 at the Wisconsin Dells, WI.

Prolonged dry spells can also lead to drought causing extreme damage to crops. Droughts vary in length and intensity but abnormally dry to moderate drought conditions can occur quite frequently. Severe to extreme droughts occur far less frequently.

Droughts have occurred in Wisconsin as recently as 2005 to 2009.

Dry weather can also lead to a wildfire threat, especially in the spring before foliage has emerged (i.e. before green up) or in the fall after vegetation has started to die off. Warm, dry (i.e. lower relative humidities), and windy conditions all favor higher fire danger and can lead to sporadic grass fires in Adams County. Thick, wooded areas, especially in areas thick with Jack Pines or pine plantations, also pose a threat for wildfires under extremely dry conditions but occur far less frequently.

On May 5th, 2005, a large wildfire began in central and northern parts of Adams County. Known as the "Cottonville Fire", it started early in the afternoon on a warm, windy, and dry day. The dominant vegetation in the area was grass, pine, and scrub oak--all species known for their ability to burn quickly and intensely. Approx. 3400 acres were burned, along with 30 homes, 60 other structures, and several vehicles. There were no fatalities. A considerable amount of timber was lost as well leading to at least a million dollars in damage. (Photos below: Cottonville Wildfire, WDNR)

Local Climatology

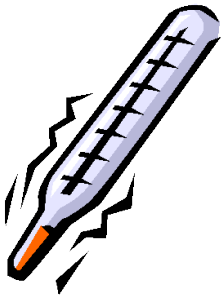
Here are some basic climatology figures for the Adams County area. Data is valid for the Wisconsin Dells, WI based on normals from a 30-year period (1971-2000).

Month	Normal Maximum Temperature	Normal Minimum Temperature	Average Temperature	Precipitation	Snowfall
JAN	24.5	4.0	14.3	0.99”	11.1”
FEB	31.0	9.0	20.0	1.01”	7.0”
MAR	42.2	20.6	31.4	2.09”	5.7”
APR	56.4	32.3	44.4	3.50”	2.5”
MAY	69.5	43.6	56.6	3.50”	0.0”
JUN	78.2	53.3	65.8	4.20”	0.0”
JUL	81.9	58.1	70.0	4.10”	0.0”
AUG	79.4	56.1	67.8	4.57”	0.0”
SEP	70.9	47.1	59.0	3.47”	0.0”
OCT	59.2	35.4	47.3	2.30”	0.4”
NOV	42.6	23.4	33.0	2.11”	3.9”
DEC	29.4	10.5	20.0	1.26”	9.0”
Year	55.4	34.0	44.7	33.10”	39.6”

Miscellaneous facts: (for Wisconsin Dells, WI)

- Warmest year on record – 1998 (47.9°F)
- Warmest month on record – July 1955 (77.6°F)
- Warmest day on record – July 13, 1936 (114°F)
- Greatest number of days with 90°F or warmer – 1931 (53 times)

- Coldest year on record – 1996 (41.9°F)
- Coldest month on record – January 1977 (2.4°F)
- Coldest day on record – January 30, 1951 (-43°F)
- Greatest number of days at 0°F or colder – 1963 (54 times)

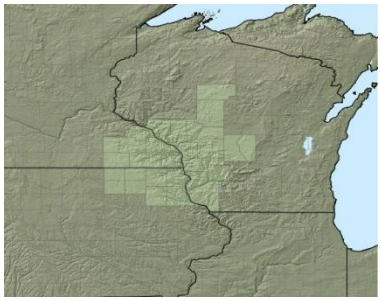


- Wettest year on record – 1938 (47.84”)
- Wettest month on record – August 1980 (14.13”)
- Wettest day on record – August 7, 1980 (7.67”)
- Driest year on record – 1939 (19.61”)
- Driest month on record – Numerous dry months

- Highest seasonal snowfall on record – 2007/08 (97.4”)
- Highest monthly snowfall on record – December 2008 (38.6”)
- Highest one-day snowfall on record – January 3, 1999 (15.0”)
- Least seasonal snowfall on record – 1967/68 (10.3”)

NOAA/National Weather Service Support and Weather Monitoring

NOAA's National Weather Service (NWS) forecast office at La Crosse, WI serves Adams County with weather information and support on a continuous basis. Operating 24 hours a day, a staff of 23 issues routine and non-routine informational products for the area, including all watches, warnings, and advisories related to natural hazards. Doppler radar (WSR-88D) is co-located with the La Crosse NWS office and covers the region.



NWS La Crosse has a web site at: www.weather.gov/lacrosse

Normal communication during hazardous weather scenarios is via telephone, and to a lesser degree amateur radio.

NOAA Weather Radio coverage in Adams County includes WWF40 (Coloma) on 162. 400 MHz.

Storm spotter groups consist of mainly amateur radio operators, the general public, with some involvement from law enforcement and fire departments. Spotter training is held almost every year with an average attendance in the past 5 years around 50.

There are a variety of weather monitoring sources in Adams County, including:

Automated weather station(s):

- None (but available at nearby Wisconsin Dells and Wisconsin Rapids)

River Gauge(s):

- Wisconsin River @ Petenwell Dam
- Wisconsin River @ Castle Rock Dam
- Wisconsin River @ Wisconsin Dells, WI (Sauk Co.)

Cooperative Observer Locations:

- Friendship
- Friendship 3NE

In addition, numerous volunteer reports from around the county are received at the La Crosse NWS office including rainfall, snowfall, and temperatures, on a routine basis.

Resources

National Weather Service – La Crosse	www.weather.gov/lacrosse
NWS La Crosse Tornado Database	www.weather.gov/lacrosse/?n=tornadomain
NWS La Crosse River Monitoring	http://www.crh.noaa.gov/ahps2/index.php?wfo=arx
NWS La Crosse Climate	www.weather.gov/climate/index.php?wfo=arx
NWS La Crosse Drought information	www.weather.gov/lacrosse/?n=drought
NWS La Crosse Storm Summaries	www.weather.gov/lacrosse/?n=events
NWS La Crosse NOAA Weather Radio page	www.weather.gov/lacrosse/?n=nwr
NWS La Crosse Severe Weather Climatology	www.weather.gov/lacrosse/svr_climate.php
NWS Storm Prediction Center	http://www.spc.noaa.gov/
SPC Online Severe Weather Climatology	http://www.spc.nssl.noaa.gov/climo/online/grids/ http://www.spc.noaa.gov/climo/online/rda/ARX.html

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