Natural Hazards Assessment

Mitchell County, IA

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

Natural Hazards Assessment
for
Mitchell County, IA

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

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Natural Hazards Assessment
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Prepared by National Weather Service – La Crosse

Overview

Mitchell County, IA is in the Upper Mississippi River Valley of the Midwest with relatively flat farm land and rolling hills.

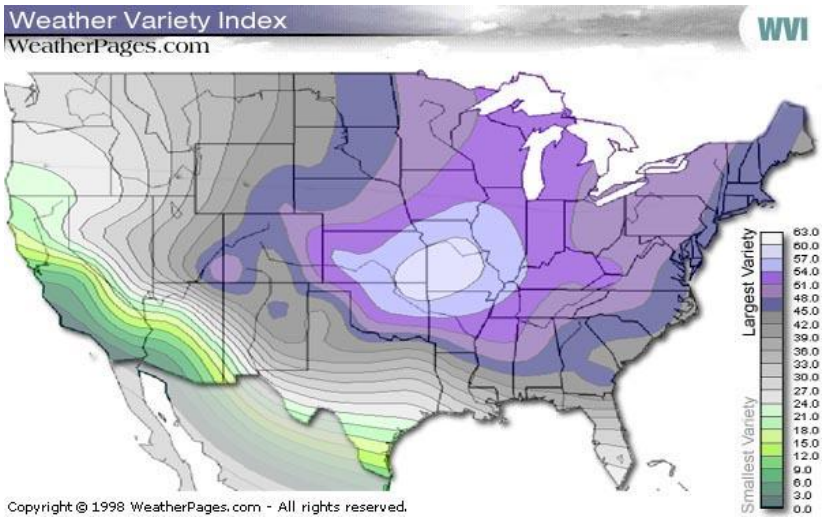
The area experiences a temperate climate with both warm and cold season extremes.

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 4-5 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. 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. The Waterloo, IA area ranked 10th and Rochester, MN ranked 3rd highest in variability out of 277 cities.

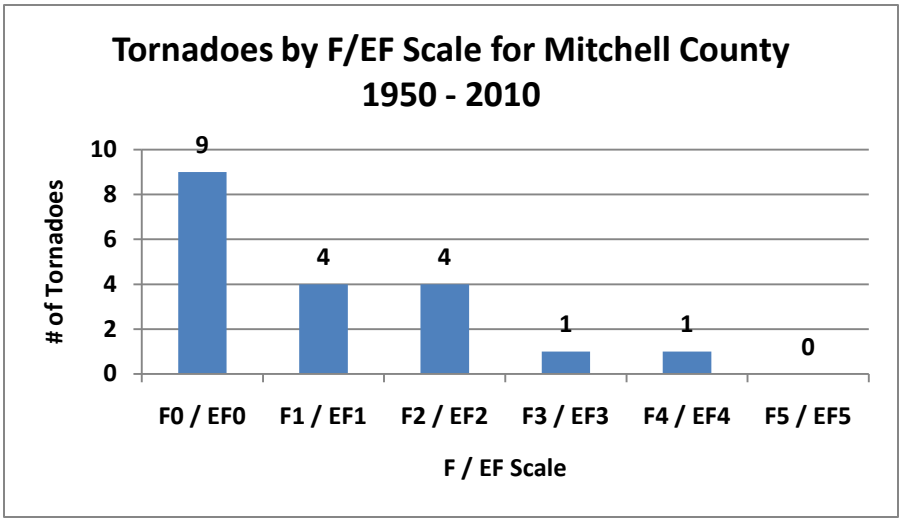


Since 1998, Mitchell County has been included in a FEMA Federal Disaster Declaration 4 times:

1999 – Severe storms / flooding
2004 – Severe storms / flooding
2007 – Winter Storms
2008 – Severe storms / flooding

Tornadoes

Even though Iowa averages about 47 tornadoes per year, Mitchell County has only had 18 documented tornadoes since 1950, averaging about one tornado every 3-4 years. Most tornadoes are short-lived and small. May through July 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)*
- Mar.30, 2005 (F0)
- June 16, 2004 (F0)
- June 11, 2004 (F1)
- Aug.17, 1994 (F0)
- July 31, 1994 (F1)
- June 8, 1993 (F2)
- Mar.24, 1988 (F0)
- May 23, 1981 (F2)
- June 3, 1974 (F1)
- July 12, 1971 (F3)

One of the strongest tornadoes to hit Mitchell county was known as the "St.Ansgar Tornado" in 1971 when an F3 moved in from Worth County, passed near St.Ansgar, and went south of Stacyville. It severely damaged 15 farms and 5000 acres of crops were destroyed. Another historic day was on Sept.21, 1894 when two violent tornadoes moved through the county killing several people and causing damage around Osage and Riceville. There were close to 100 people injured alone.

Strongest tornadoes: (1850-2010)

- Sept.21, 1894 (F4) –70 inj, 4 dead
- Sept.21, 1894 (F4) – 20 inj, 5 dead
- May 5, 1965 (F4) – 17 inj, 0 dead
- July 12, 1971 (F3) – 0 inj, 0 dead
- June 8, 1993 (F2) – 0 inj, 0 dead

Mitchell County Tornado Facts:

- No F5 and three F4 tornadoes
- Last violent tornado - 1965
- 9 deaths and 105 injuries since 1850
- Tornadoes have occurred March – September
- Most have occurred in June (8)

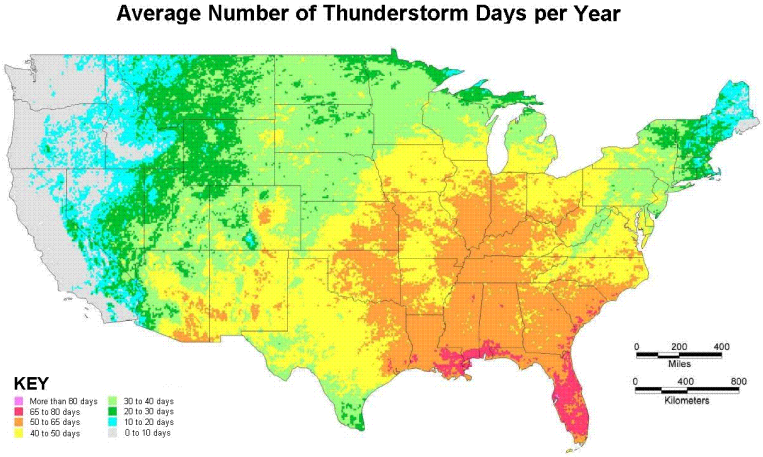
Tornado Watches		Tornado Warnings	
Year		Year	
2010	4	2010	0
2009	3	2009	1
2008	7	2008	3
2007	7	2007	0
2006	4	2006	0
2005	7	2005	2
2004	16	2004	2
2003	7	2003	0
2002	4	2002	1
2001	6	2001	0

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

Mitchell County averages 41 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, 3/4 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. On June 6, 1999, thunderstorms produced wind gusts of 70 mph at both St.Ansgar and Osage, IA which knocked down numerous trees and power lines. There have been 57 damaging wind reports since 1955 in the county, 25 reports since 1995.

Large hail can also occur in a severe thunderstorm. May and June are the peak months 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. During the early morning hours of October 4, 2006, a 12-mile swath of large hail hit the county, combined with strong winds, damaging many windows and roofs. There were at least 7 reports of hail golf ball size or larger, and a peak size of tennis ball size. Hail drifts reached 2 feet deep. On June 10, 2008, two supercell storms dropped large hail in the Osage and Orchard, IA areas (see photo below). There have been 47 large hail (≥ 3/4”) reports in the county since 1995.

Non-severe thunderstorms still pose a lightning risk. According to the Vaisala Group, an average of 546,989 cloud-to-ground strikes hit Iowa each year based on data from 1996 to 2005. Nationally, Iowa ranks 30th in lightning related fatalities with 4 deaths reported since 1998. There was a lightning fatality in Iowa in 2008 when a 20 year old male was struck in his yard at home.

Severe Thunderstorm Watches		Severe Thunderstorm Warnings	
Year		Year	
2010	10	2010	7
2009	9	2009	3
2008	11	2008	12
2007	15	2007	4
2006	9	2006	10
2005	19	2005	2
2004	20	2004	6
2003	12	2003	5
2002	20	2002	3
2001	15	2001	9

Flooding and Hydrologic Concerns

On occasion intense, heavy rain producing thunderstorms or consecutive thunderstorms ("training") can bring excessive rainfall leading to flash flooding in Mitchell County. "Ponding" or overland flooding is usually what occurs when heavy rainfall occurs given the relatively flat terrain.

Flash Flood Warnings	
Year	
2010	1
2009	0
2008	2
2007	2
2006	0
2005	0
2004	5
2003	1
2002	0
2001	1

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. Since 1993, there have been 8 deaths from flooding in Iowa.

In July 1999, consecutive rounds of thunderstorms brought 10.75" of rain in a three day period. This led to widespread flash flooding. Many roads and highways were closed due to high water. Damage was closed to $2 million.

The Cedar River is the main basin that impacts the county. The headwaters for the Wapsipincon River also begin in the county. There are various other creeks, streams, and watersheds though. Flooding often stems from heavy rain patterns, but spring snowmelt can also create problems.

Cedar River @ Charles City, IA Crest History (Flood Stage: 12 feet)	
Stage	Date
25.33'	6/9/2008
22.81'	7/21/1999
21.64'	3/2/1965
21.60'	3/27/1961
21.44'	8/16/1993

The heavy rains in July 1999 brought the Cedar River to record levels. Numerous homes and highways in Mitchell County were impacted.

This was topped by rainfall across the region in June 2008 which led to even a higher crest on area rivers. Highway 218 and sections of Highway 9 east of Osage were closed when water topped bridges. Widespread overland flooding was so bad, much of the county was described as a "lake" for a few days. In Stacyville the flooding was the worst in years and left water standing in fields for more than a week. Besides crop damage, many basements were flooded. Damage topped $2 million and led to a federal disaster area declaration. (Photos below: June 2008 flooding)

On Sept.25, 2010, a crest of 25.08' was observed on the Cedar River in Osage during the morning hours.

Winter Storms and Extreme Cold

Hazardous winter weather can bring a variety of conditions to Mitchell County. Since 1982, an average of 4-5 winter storms impact the area each season. The relatively flat terrain in parts of the county does lead to blizzard conditions every few years. Heavy snow, blowing snow, ice, and sleet also occur. There have been a total of 12 documented deaths and 23 injuries as a direct result from winter storms in Iowa since 1993.

The 30-year average seasonal snowfall at Osage, IA is 35.9 inches. The highest one-day snowfall is 15.0 inches set on December 27, 1904. The bulk of snow falls between December and March. The largest winter storms tend to form over the central or southern Plains, and then move northeast towards the western Great Lakes.

Top 5 Seasonal Snowfalls at Osage, IA

Years	Snowfall
1950-51	77.0”
1908-09	64.5”
1928-29	64.0”
1961-62	61.8”
1951-52	61.5”

A large winter storm and blizzard hit northeast Iowa on February 23-25, 2007. Freezing rain, sleet, and heavy snow fell the first night. Ice accumulations of 1 to 2 inches were reported, which knocked down hundreds of power poles and lines countywide. Blizzard conditions developed the next night with additional snow. Travel was nearly impossible across the region.

March can often be a snowy month. Even though snowfall may be less frequent, heavy wet snow can form from large spring storms. Osage, IA has only had a monthly snowfall over 30” once when 42.0” was recorded in March 1951. Several of the largest one-day snowfalls have also occurred in March, with 13” snow falling on March 12, 1951 and March 19, 1933.

Ice storms (1/4” of ice or more) can occur but are relatively rare with only 7 occurrences since 1993.

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 24 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 -35°F set in 1912.

Coldest Lows at Osage, IA

Low	Date
-35°F	1/12/1912
-32°F	2/2/1996
-32°F	1/18/1967
-32°F	1/7/1912
-32°F	2/9/1899

In late January and early February 1996, Osage, IA went 6 consecutive days with temperatures at or below zero degrees (F) following a blizzard a few days earlier. Low temperatures during that stretch hit -22°F, -20°F, -32°F, -28°F, and -22°F. In January and February 1899, the area went 16 straight days with low temperatures below -13°F.

Since 1993 there have been 6 fatalities in Iowa from cold weather, including 1 in 2009.

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. In late December 2008, a wind chill of -34°F was reported at Osage, IA.

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 Osage, IA is 107°F set on July 14, 1936.

Warmest Highs at Osage, IA	
High	Date
107°F	7/14/1936
105°F	7/13/1936
105°F	7/12/1936
105°F	6/27/1934
105°F	5/31/1934

In Mitchell County there have 4 heat waves since 1993. During that same time period, there were 4 fatalities directly related to heat waves in Iowa.

One of the worst heat waves ever to hit the Midwest occurred in July 1936. Many daily all-time record high temperatures were set during this period. In the Osage area, high temperatures hit 100°F or warmer 12 of 14 days. Another warm year was 1934 when the temperature hit 100°F or warmer 10 times, followed by 1911 when it happened 4 times. In more recent years, heat waves struck in 1995, 1999, and 2001.

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.

The last drought in Mitchell County was 1995, but droughts have hit parts of Iowa in more recent years, including 1999, 2000, 2001, 2003, 2005, and 2006.

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 or field fires in Mitchell County.

Local Climatology

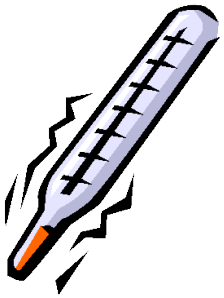
Here are some basic climatology figures for the Mitchell County area. Data is valid for Osage, IA based on normals from a 30-year period (1971-2000).

Month	Normal Maximum Temperature	Normal Minimum Temperature	Average Temperature	Precipitation	Snowfall
JAN	23.5	6.3	14.9	0.96”	10.1”
FEB	30.0	13.1	21.5	0.76”	5.9”
MAR	42.4	25.0	33.7	1.91”	5.6”
APR	57.7	36.6	47.2	3.47”	2.2”
MAY	70.6	48.7	59.6	4.12”	0.0”
JUN	79.7	58.2	69.0	4.80”	0.0”
JUL	82.8	62.5	72.7	4.26”	0.0”
AUG	80.5	60.2	70.3	4.71”	0.0”
SEP	72.9	51.0	62.0	3.59”	0.0”
OCT	60.8	39.5	50.2	2.39”	0.2”
NOV	42.1	25.7	33.9	2.06”	3.8”
DEC	27.7	12.1	19.9	1.19”	8.1”
Year	55.9	36.6	46.2	34.21”	35.9”

NOTE: Data is valid for Osage, IA with records starting in 1893, although there is a large data gap from 1916 to 1924.

Miscellaneous facts:

- Warmest year on record – 1931 (50.7°F)
- Warmest month on record – July 1936 (79.6°F)
- Warmest day(s) on record – July 14, 1936 (107°F)
- Greatest number of days with 90°F or warmer – 1931 (46 times)



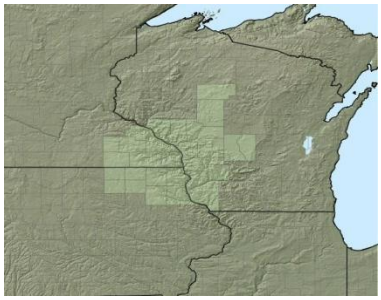
- Coldest year on record – 1951 (41.7°F)
- Coldest month on record – January 1912 (-1.8°F)
- Coldest day(s) on record – January 12, 1912 (-35°F)
- Greatest number of days at 0°F or colder – 1978 (54 times)

- Wettest year on record – 2008 (45.42”)
- Wettest month on record – August 1980 (17.45”)
- Wettest day on record – August 10, 1980 (6.37”)
- Driest year on record – 1910 (17.14”)
- Driest month(s) on record – Numerous (0.00”)

- Highest seasonal snowfall on record – 1950/51 (77.0”)
- Highest monthly snowfall on record – March 1951 (42.0”)
- Highest one-day snowfall on record – December 27, 1904 (15.0”)
- Least seasonal snowfall on record – 1967/68 (9.2”)

NOAA/National Weather Service Support and Weather Monitoring

NOAA's National Weather Service (NWS) forecast office at La Crosse, WI serves Mitchell 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.

NOAA Weather Radio coverage in Mitchell County includes one station:

- KXI68 (St.Ansgar) on 162.450 MHz

Storm spotter groups consist of almost entirely volunteer fire department personnel, with some involvement with law enforcement and the general public. Spotter training is held every other year with an average attendance in the past 5 years of 74.

There are a variety of weather monitoring sources in or near Mitchell County, including:

Automated weather station(s):

- None (Nearby locations include Charles City, IA, Mason City, IA, and Austin, MN)

River Gauge(s):

- Cedar River at Osage, IA

Cooperative Observers

- Osage
- St. Ansgar

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 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

Contact information: Todd Shea
Warning Coordination Meteorologist
NWS La Crosse
todd.shea@noaa.gov

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