

Natural Hazards Assessment

Fayette County, IA

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



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Natural Hazards Assessment

Fayette County, IA

Prepared by National Weather Service – La Crosse

Overview

Fayette County, IA is in the Upper Mississippi River Valley of the Midwest with terrain ranging from relatively flat farm land to rolling hills to steep valleys.

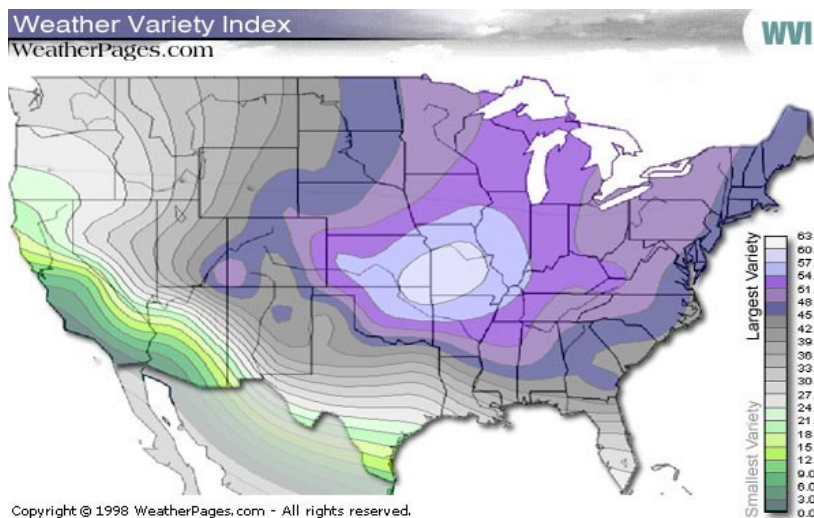
The area experiences a temperate climate with both warm and cold season extremes.

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, enhanced by the hilly terrain. 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. Waterloo, IA ranked 10th and Dubuque, IA ranked 29th highest in variability out of 277 cities.

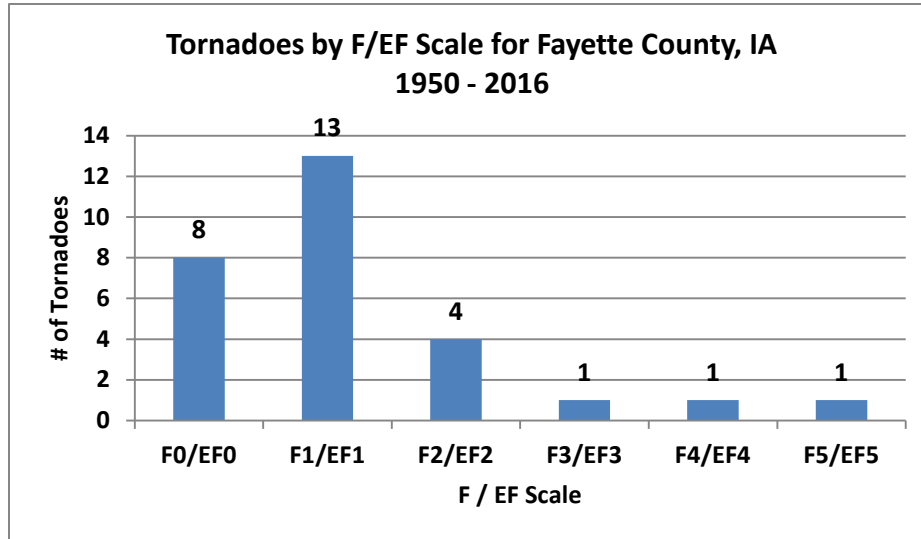


Since 1998, Fayette County has been included in a FEMA Federal Disaster Declaration 11 times:

- 1998 – Severe storms / flooding
- 1999 – Severe storms / flooding
- 1999 – Severe storms / flooding
- 2002 – Severe storms / flooding
- 2004 – Severe storms / flooding
- 2007 – Winter Storms
- 2008 – Severe storms / flooding
- 2010 – Severe storms / flooding
- 2013 – Severe storms / flooding
- 2014 – Severe storms / flooding
- 2016 – Severe storms / flooding

Tornadoes

Even though Iowa averages about 47 tornadoes per year, Fayette County has had 27 documented tornadoes since 1950, averaging about one tornado every other 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 22, 2015 (EF1)
- May 24, 2012 (EF1)
- May 22, 2011 (EF1)
- May 22, 2011 (EF0)
- Aug.19, 2009 (EF0)
- Mar.31,2007(EF0)
- July 5, 2004 (F0)
- Sept.6, 2001 (F1)
- Apr.11, 2001 (F1)
- June 16, 1996 (F0)
- July 7, 1994 (F0)
- July 6, 1994 (F0)

The strongest known tornado to hit Fayette County was in 1968 when a large tornado outbreak impacted northeast Iowa. An F5 tornado struck the communities of Oelwein and Maynard, IA damaging or destroying nearly 1000 homes. Five people were killed and damage costs were estimated at \$21 million. An F4 tornado also hit northwest parts of Fayette County in 1971 causing extensive damage to several homes and farms. More recently, a small tornado hit a farm west of West Union, IA in April 2001 causing the barn to collapse on a 69-year old woman trapping her inside. Two other small tornadoes hit in May 2011.

Strongest tornadoes: (1850-2016)

- May 15, 1968 (F5) – 156 inj, 5 dead
- July 12, 1971 (F4) – 8 inj, 0 dead
- June 12, 1915 (F4) – 1 inj, 0 dead
- June 24, 1971 (F3) – 0 inj, 1 dead
- July 14, 1935 (F3) – 0 inj, 0 dead

Fayette County Tornado Facts:

- One F5 and two F4 tornadoes
- 31 known tornadoes documented
- 6 deaths and 174 injuries since 1850
- Tornadoes have occurred March – October
- Most have occurred in June and July (8)

Tornado Watches		Tornado Warnings	
Year		Year	
2016	0	2016	0
2015	1	2015	0
2014	2	2014	1
2013	4	2013	0
2012	0	2012	1
2011	3	2011	1
2010	6	2010	0
2009	7	2009	4
2008	10	2008	1
2007	6	2007	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

Severe Thunderstorms / Lightning

Fayette County averages 44 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.

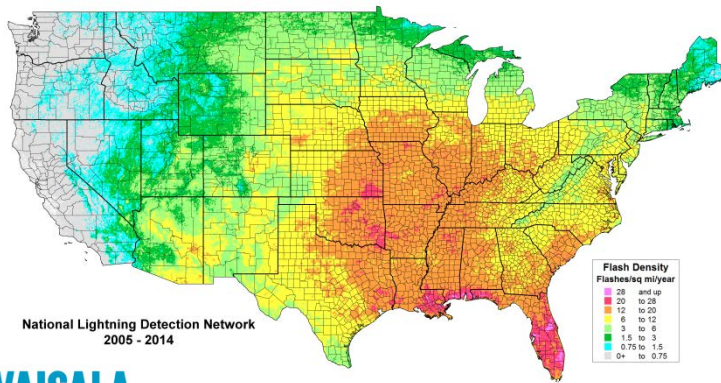
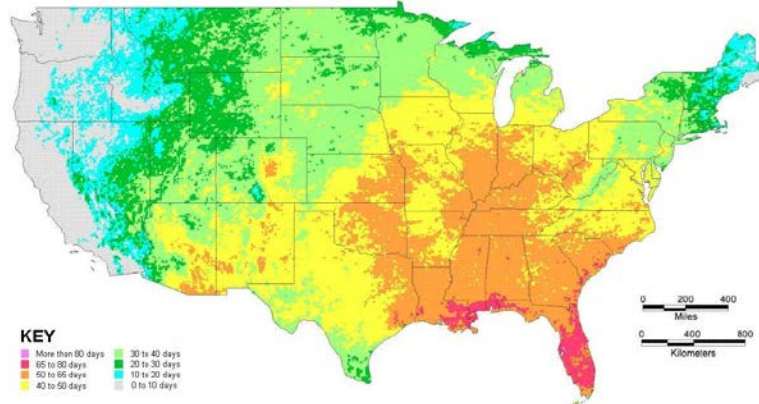
Downdraft winds from a severe thunderstorm can produce local or widespread damage, even tornado-like damage if strong enough. Most severe thunderstorm winds occur in June or July and between the hours of 4 and 8 p.m., but can occur at other times. Most damage involves blown down trees, power lines, and damage to weaker structures (i.e. barns, outbuildings, garages) with

occasional related injuries. During the early morning hours of July 17, 2007, a line of severe thunderstorms produced a wind gust of 59 mph that knocked down hundreds of trees in Oelwein and damaged nearby crops. Damaging wind also hit the southern end of the county in June 2010 with winds of 80-90 mph estimated. There have been 119 damaging wind reports since 1982 in the county.

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. Hail as large as baseballs fell in the Stanley, IA area on May 25, 2008 and in the county on May 15, 1968 when a large tornado struck. There was also extensive large hail reported in August 1994 around Randalia. There have been 108 large hail ($\geq 3/4$ ") reports in the county since 1982.

Non-severe thunderstorms still pose a lightning risk. According to the Vaisala Group, an average of 674,486 cloud-to-ground strikes hit Iowa each year based on data from 2006 to 2015. Nationally, Iowa ranks 29th in lightning related fatalities with 3 deaths reported between 2006 and 2015. Two people were killed in Iowa in 2015 from lightning.

Average Number of Thunderstorm Days per Year



VAISALA

Severe Thunderstorm Watches		Severe Thunderstorm Warnings	
Year		Year	
2016	6	2016	5
2015	3	2015	1
2014	9	2014	12
2013	7	2013	7
2012	7	2012	8
2011	8	2011	6
2010	14	2010	12
2009	8	2009	13
2008	12	2008	11
2007	12	2007	10

Flooding and Hydrologic Concerns

On occasion intense, heavy rain producing thunderstorms or consecutive thunderstorms (“training”) can bring excessive rainfall leading to flash flooding in Fayette County. The rolling hills can promote rapid run-off and enhance the threat.

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 1995, there have been 9 deaths from flooding in Iowa.

In June 2008, widespread 3-6” rainfall totals over a two-day period led to significant flash flooding and eventual river flooding. Numerous roads were damaged and closed from high water and a camp ground near Clermont was destroyed when flood waters swept through. Damage estimates were close to \$7 million in addition to millions in crop damage. There was also significant flash flooding in 1999 and 2004. (Photo below left: Turkey River erosion near Clermont in 2008)



The Turkey River is the main river that flows through north and northeast parts of the county, although the head waters of the Volga River also begin west of Fayette, IA. Flooding often stems from heavy rain patterns, but spring snowmelt can also create problems.

In June 2008, the Turkey River set an all-time record crest of 22.11 feet (flood stage is 12 feet) at Eldorado. Although damage in Eldorado was limited to a few homes near the river, numerous bridges and roads were destroyed between Eldorado and Clermont, including a bridge on County Road W42 that was completely demolished by strong current and debris in the water. A new record crest was also set at Clermont close to 26 feet. (Photos below: Infrastructure damaged in June 2008 along the Turkey River)

Flash Flood Warnings	
Year	
2016	7
2015	1
2014	6
2013	2
2012	1
2011	3
2010	8
2009	3
2008	2
2007	0
2006	0

Turkey River @ Eldorado Crest History (Flood Stage: 12 feet)

Stage	Date
21.46'	6/9/2008
20.65'	9/23/2016
19.61'	5/23/2004
18.78'	6/15/1991
18.07'	4/25/2008



Winter Storms and Extreme Cold

Hazardous winter weather can bring a variety of conditions to Fayette County. Since 1982, an average of 3-4 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 13 documented deaths and 25 injuries as a direct result from winter storms in Iowa since 1993.

The 30-year average seasonal snowfall at Fayette is 39.7 inches. The highest one-day snowfall is 21.0 inches set on March 6, 1959 and there have been 12 months on record where total snowfall reached 30 inches or more. 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.

A large winter storm and blizzard hit northeast Iowa on February 23-25, 2007. Freezing rain and sleet led to ice accumulations of 1 to 2 inches, in addition to heavy snow and blizzard conditions. Wadena, IA reported 17 inches of snow but travel was nearly impossible across the county. Thousands of power poles were knocked down and power outages were widespread.

Top 5 Seasonal Snowfalls at Fayette, IA	
Years	Snowfall
1961-62	89.2"
1950-51	84.5"
1958-59	68.8"
2010-11	65.2"
1977-78	65.0"

March can often be a snowy month. Even though snowfall may be less frequent, heavy wet snow can form from large spring storms. Several of the largest one-day snowfalls have occurred in March, although in April 1910 over 35 inches of snow was reported at Fayette.

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 28 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 -40°F set in 1996.

In late January and early February 1996, Fayette, IA went 6 consecutive days with temperatures at or below zero degrees (F) following a blizzard a few days earlier. Low temperatures of -33°F, -34°F, -32°F, -40°F, -39°F, and -32°F were set on six straight mornings. A low temperature of -32°F was set in Oelwein, IA during this same time period, an all-time record.

Coldest Lows at Fayette, IA	
Low	Date
-40°F	2/3/1996
-39°F	2/4/1996
-38°F	1/30/1951
-36°F	2/8/1971
-35°F	2/1/1918

Since 1993 there have been 5 fatalities in Iowa from cold weather.

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 January 2008, a wind chill of -33°F was reported at Oelwein, IA. In January 2009 wind chills hit -51°F in parts of the county during a 3-day cold spell.

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 Fayette, IA is 110°F set on July 14, 1936 and July 24, 1901. The record high temperature at Oelwein, IA is 109°F set in July and August 1936.

In Fayette County there have 8 heat waves since 1993. During that same time period, there were 5 fatalities directly related to heat waves in Iowa.

A prolonged heat wave hit Fayette County from June 24 - July 27, 1901 when the temperature hit 90°F or higher every day except for 5. Readings hit 100°F or warmer 17 times during that stretch. In July 1936, the high temperature at Fayette, IA hit 100°F or higher for 13 consecutive days. In more recent years, heat waves struck in 1995, 1999, 2001, and 2012. In mid-July 2011, heat indices topped 110 for three straight days (July 17-19).

Warmest Highs at Fayette, IA	
High	Date
110°F	7/14/1936
110°F	7/24/1901
109°F	5/31/1934
108°F	7/13/1936
108°F	6/28/1934



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 Fayette County was 2012 when the USDA declared a drought designation for the region. Droughts have hit parts of Iowa in 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 cropland field fires in Fayette County. Thick, wooded areas also pose a threat for wildfires under extremely dry conditions but occur far less frequently.



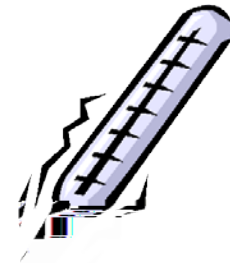
Local Climatology

Here are some basic climatology figures for the Fayette County area. Data is valid for Fayette, IA based on normals from a 30-year period (1981-2010).

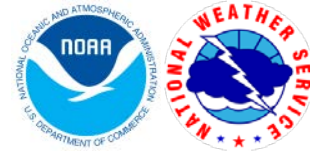
Month	Normal Maximum Temperature	Normal Minimum Temperature	Average Temperature	Precipitation	Snowfall
JAN	25.5	7.4	16.5	1.13"	10.4"
FEB	30.4	11.4	20.9	1.10"	7.7"
MAR	43.3	23.3	33.3	2.02"	5.0"
APR	58.6	34.8	46.7	3.92"	2.0"
MAY	69.9	45.8	57.8	4.84"	0.0"
JUN	79.0	55.7	67.4	5.08"	0.0"
JUL	82.4	60.0	71.2	4.96"	0.0"
AUG	80.6	58.0	69.3	4.68"	0.0"
SEP	73.4	48.6	61.0	3.62"	0.0"
OCT	60.6	37.0	48.8	2.57"	0.3"
NOV	43.8	25.7	34.7	2.37"	3.1"
DEC	29.0	12.1	20.5	1.56"	11.1"
Year	56.4	35.0	45.7	37.86"	39.7"

Miscellaneous facts:

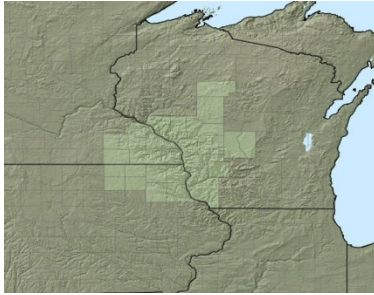
- Warmest year on record – 1931 (51.4°F)
- Warmest month on record – July 1901 (82.4°F)
- Warmest day(s) on record – July 14, 1936 and July 24, 1901 (110°F)
- Greatest number of days with 90°F or warmer – 1894 (55 times)
- Coldest year on record – 1996 (41.6°F)
- Coldest month on record – January 1912 (-1.7°F)
- Coldest day on record – February 3, 1996 (-40°F)
- Greatest number of days at 0°F or colder – 1978, 1963, 1929, 1893 (49 times)
- Wettest year on record – 1902 (54.31")
- Wettest month on record – May 1902 (15.59")
- Wettest day on record – May 17, 1999 (6.20")
- Driest year on record – 1964 (20.86")
- Driest month on record – Oct.1952 and Nov.1904 (Trace)
- Highest seasonal snowfall on record – 1961/62 (89.2")
- Highest monthly snowfall on record – March 1951 (39.5")
- Highest one-day snowfall on record – March 6, 1959 (21.0")
- Least seasonal snowfall on record – 1965/66 (14.4")



NOAA/National Weather Service Support and Weather Monitoring



NOAA's National Weather Service (NWS) forecast office at La Crosse, WI serves Fayette 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 Fayette County includes two stations:

- KXI60 (Decorah) on 162.525 MHz
- WXL94 (Waterloo) on 162.550 MHz

Storm spotter groups consist of almost entirely fire department personnel, with some amateur radio operators, law enforcement, and general public. Spotter training is held nearly every year with an average attendance in the past 5 years of 60.

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

Automated weather station(s):

- Oelwein, IA (KOLZ)

River Gauge(s):

- Turkey River @ Eldorado, IA
- Turkey River @ Clermont (manual gage)
- Little Turkey @ Douglas (manual gage)
- Volga River @ Fayette, IA

Cooperative Observers

- Clermont
- Fayette
- Oelwein 1E
- Waucoma 3SE



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/arx/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/arx/drought
NWS La Crosse Storm Summaries	www.weather.gov/arx/events
NWS La Crosse NOAA Weather Radio page	www.weather.gov/arx/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

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