Natural Hazards Assessment

Floyd County, IA

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

Natural Hazards Assessment
for
Floyd County, IA

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

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Natural Hazards Assessment
Floyd County, IA

Prepared by National Weather Service – La Crosse

Overview

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

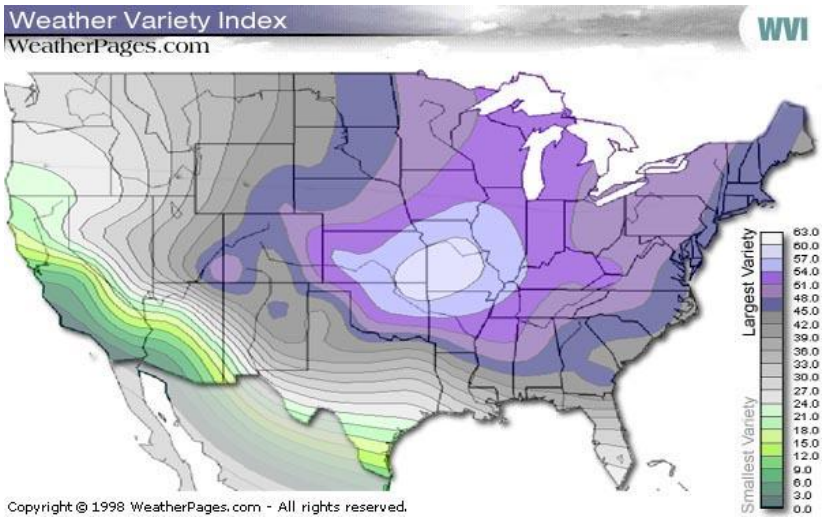
The area experiences a temperate climate with both warm and cold season extremes.

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 highest in variability out of 277 cities.

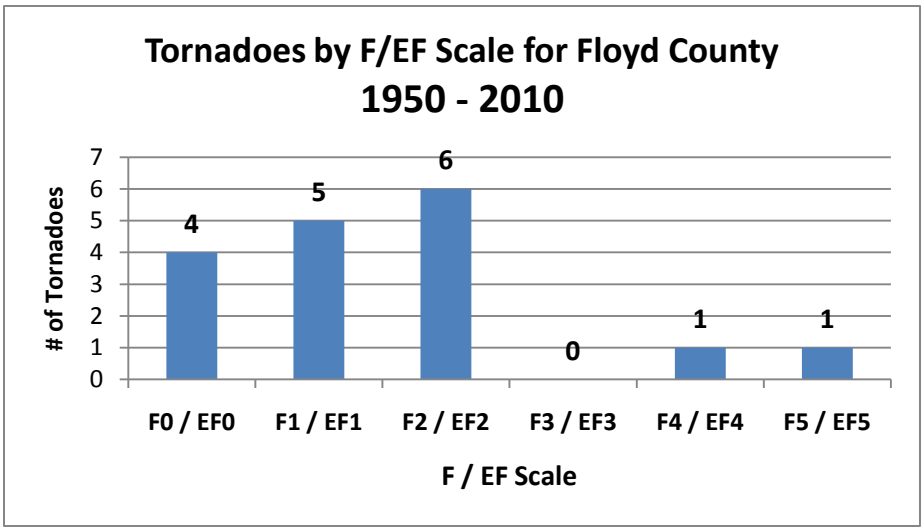


Since 1998, Floyd County has been included in a FEMA Federal Disaster Declaration 5 times:

1998 – Severe storms / flooding
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, Floyd County has only had 17 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 16, 2004 (F0)
- July 20, 1999 (F1)
- Aug.23, 1997 (F1)
- July 6, 1994 (F1)
- July 10, 1993 (F2)
- June 16, 1990 (F1)
- Mar.24, 1988 (F1)
- Sept.28, 1986 (F2)
- June 22, 1984 (F0)
- June 16, 1984 (F0)

One of the most historic tornadoes ever to hit Iowa occurred in Floyd County on May 15, 1968 when a violent tornado (F5) struck Charles City, IA. It passed directly through town destroying 337 homes and caused about $30 million in damage. There were 13 fatalities and 450 injuries in the county. The tornado continued northeast and also struck Elma, IA. A sizeable tornado also struck Charles City, IA in June 1908. More recently a tornado tracked about 5 miles southwest of Charles City in August 1997 but there were no injuries and limited damage.

Strongest tornadoes: (1850-2010)

- May 15, 1968 (F5) – 450 inj, 13 dead
- May 9, 1918 (F4) – 15 inj, 7 dead
- May 5, 1965 (F4) – 17 inj, 0 dead
- June 7, 1908 (F3) – 10 inj, 1 dead
- Sept.28, 1986 (F2) – 2 inj, 0 dead

Floyd County Tornado Facts:

- One F5 and two F4 tornadoes
- Last violent tornado - 1968
- 21 deaths and 502 injuries since 1850
- Tornadoes have occurred March – September
- Most have occurred in June (7)

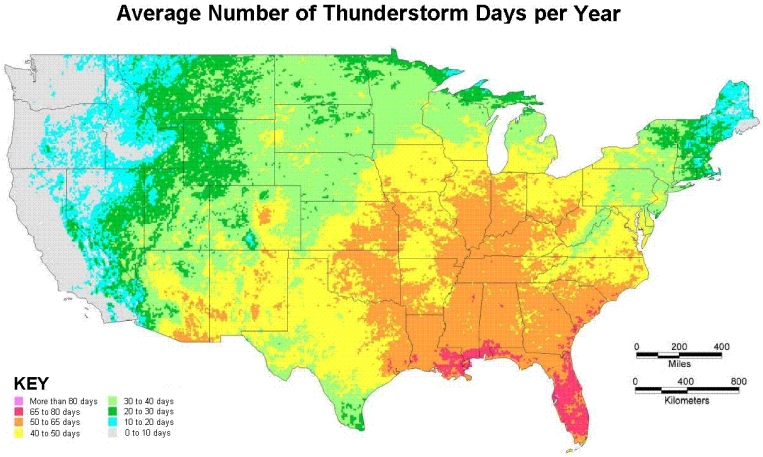
Tornado Watches		Tornado Warnings	
Year		Year	
2010	5	2010	0
2009	3	2009	2
2008	7	2008	3
2007	6	2007	0
2006	3	2006	0
2005	7	2005	0
2004	13	2004	3
2003	6	2003	0
2002	3	2002	1
2001	5	2001	0

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

Floyd County averages 43 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. Wind gusts as high as 75 mph hit Floyd County both in July and August 1994 knocking down numerous trees and power lines. More recently damage occurred from strong thunderstorm wind gusts in June 2007. There have been 65 damaging wind reports since 1955 in the county, 27 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. In May 1996, softball size hail fell on Charles City, IA injuring one woman and damaging numerous roofs in town. Hail up to 3” in diameter also hit the county hard in May 2004 with numerous windshields and roofs damaged in and around Charles City. In April 2009 two inch diameter size hail fell in Charles City and Rockford, IA. There have been 72 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	8	2009	3
2008	10	2008	14
2007	13	2007	7
2006	9	2006	5
2005	14	2005	2
2004	20	2004	9
2003	12	2003	4
2002	14	2002	6
2001	15	2001	4

Flooding and Hydrologic Concerns

On occasion intense, heavy rain producing thunderstorms or consecutive thunderstorms ("training") can bring excessive rainfall leading to flash flooding in Floyd County.

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.

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

In July 1999, consecutive rounds of thunderstorms brought nearly a foot of rain (11.85" at Charles City) in a three day period. On the 19th of that month, 8" fell leading to widespread flash flooding, especially in the Rockford and Nora Springs, IA areas. An earthen dike washed away and a dam breached leading to severe flooding. This included one fatality when a car was swept away while the man was attempting to cross the flooded bridge near Rudd, IA. Flash flooding was also reported in the Charles City area in August 2007.

River basins that impact the county mainly include the Cedar and Shell Rock Rivers. 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
25.55'	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. Approximately 100 homes in the Charles City area were impacted.

This was topped by rainfall across the region in June 2008 which led to even a higher crest on area rivers. Flooding along the Shell Rock river breeched a levee in Nora Springs leading to extensive flooding in Rockford, with 40 homes damaged. As many as 60 secondary roads were washed out or closed. Water levels rose high enough in Charles City that both main traffic bridges were closed and a walking suspension bridge was washed away. At least 500 homes were impacted in Charles City. Water levels on the Cedar River also exceeded the ability of the river gauges. Damage was in the millions and the county was declared a federal disaster area. (Photos below: June 2008 flooding)

Winter Storms and Extreme Cold

Hazardous winter weather can bring a variety of conditions to Floyd 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 25 injuries as a direct result from winter storms in Iowa since 1993.

The 30-year average seasonal snowfall at Charles City is 37.8 inches. The highest one-day snowfall is 13.0 inches set on January 4, 1971. 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, sleet, and heavy snow fell the first night. Ice accumulations of 1 to 2 inches were reported, which knocked down many power poles and lines. Blizzard conditions developed the next night with additional snow. Travel was nearly impossible across the region.

Charles City has reached 30" or more of snow during a month only twice.

Top 5 Seasonal Snowfalls at Charles City, IA

Years	Snowfall
1961-62	77.1"
1950-51	75.9"
1951-52	59.0"
1964-65	58.6"
1958-59	55.0"

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, with 12" snow falling on March 8, 1961 and a total of 32.6" of snow in March of 1951.

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 26 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 -34°F set in 1912 and 2009. January 14-17, 2009 was a very cold period with wind chills of -30 to -40 and record temperatures for days.

Coldest Lows at Charles City, IA

Low	Date
-34°F	1/16/2009
-34°F	1/12/1912
-32°F	2/2/1996
-32°F	3/1/1962
-32°F	1/6/1910

In late January and early February 1996, Charles City, IA went 6 consecutive days with temperatures at or below zero degrees (F) following a blizzard a few days earlier. In January and February 1936, the area went 16 straight days and 34 of 36 days with low temperatures below 0°F.

Since 1993 there have been 6 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 -35°F was reported at Charles City, 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 Charles City, IA is 108°F set on July 21, 1901.

Warmest Highs at Charles City, IA	
High	Date
108°F	7/21/1901
107°F	7/24/1901
106°F	7/14/1936
106°F	7/23/1901
105°F	7/13/1936

In Floyd 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 Charles City area, high temperatures hit 100°F or warmer 11 of 13 days. In July 1901, high temperatures hit 100°F or higher a total of 12 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 Floyd 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 Floyd 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 Floyd County area. Data is valid for Charles City, IA based on normals from a 30-year period (1971-2000).

Month	Normal Maximum Temperature	Normal Minimum Temperature	Average Temperature	Precipitation	Snowfall
JAN	24.5	6.3	15.4	0.92”	9.8”
FEB	30.8	13.0	21.9	0.87”	6.5”
MAR	43.5	24.7	34.1	2.01”	5.6”
APR	59.2	36.3	47.8	3.41”	2.9”
MAY	71.8	48.1	59.9	4.08”	0.0”
JUN	80.9	57.4	69.1	5.19”	0.0”
JUL	83.9	61.2	72.6	4.61”	0.0”
AUG	81.8	58.9	70.4	4.57”	0.0”
SEP	74.4	50.1	62.3	3.35”	0.0”
OCT	62.0	38.7	50.4	2.45”	0.1”
NOV	42.7	25.5	34.1	2.13”	4.5”
DEC	28.5	12.1	20.3	1.08”	8.3”
Year	57.0	36.0	46.5	34.68”	37.8”

NOTE: Data is valid for Charles City, IA with records starting in 1893. Snowfall records are only from 1948 to present.

Miscellaneous facts:

- Warmest year on record – 1931 (51.5°F)
- Warmest month on record – July 1901 (81.3°F)
- Warmest day(s) on record – July 21, 1901 (108°F)
- Greatest number of days with 90°F or warmer – 1988 (47 times)

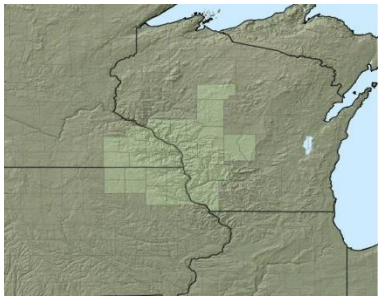
- Coldest year on record – 1917 (41.7°F)
- Coldest month on record – January 1912 (-2.3°F)
- Coldest day(s) on record – January 16, 2009 (-34°F)
- Greatest number of days at 0°F or colder – 1978 (52 times)

- Wettest year on record – 1999 (51.40”)
- Wettest month on record – July 1999 (18.48”)
- Wettest day on record – July 26, 1940 (6.66”)
- Driest year on record – 1910 (15.89”)
- Driest month(s) on record – October 1952 (0.00”)

- Highest seasonal snowfall on record – 1961/62 (77.1”)
- Highest monthly snowfall on record – March 1951 (32.6”)
- Highest one-day snowfall on record – January 4, 1971 (13.0”)
- Least seasonal snowfall on record – 1967/68 (11.5”)

NOAA/National Weather Service Support and Weather Monitoring

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

- KXI68 (St.Ansgar) on 162.450 MHz
- WXL94 (Waterloo) on 162. 550 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 Mitchell County combining an average attendance in the past 5 years of 91.

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

Automated weather station(s):

- Charles City, IA (KCCY)

River Gauge(s):

- Cedar River @ Charles City

Cooperative Observers

- Charles City

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

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