

Natural Hazards Assessment

Howard County, IA

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



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Table of Contents:

Overview..... 3

Tornadoes.....4

Severe Thunderstorms / Lightning.....5

Flooding and Hydrologic Concerns.....6

Winter Storms and Extreme Cold.....7

Heat, Drought, and Wildfires.....8

Local Climatology.....9

**National Weather Service &
Weather Monitoring..... 10**

Resources..... 11

Natural Hazards Assessment

Howard County, IA

Prepared by National Weather Service – La Crosse

Overview

Howard County, IA is in the Upper Mississippi River Valley of the Midwest with relatively flat farm land. There is some terrain near the start of the Turkey River basin in east central parts of the county.

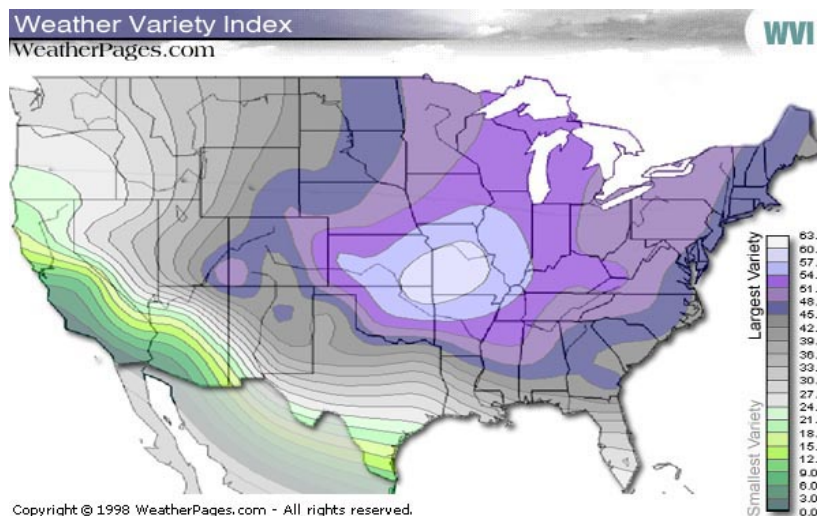
The area experiences a temperate climate with both warm and cold season extremes.

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. Waterloo, IA ranked 10th and Rochester, MN ranked 3rd highest in variability out of 277 cities.

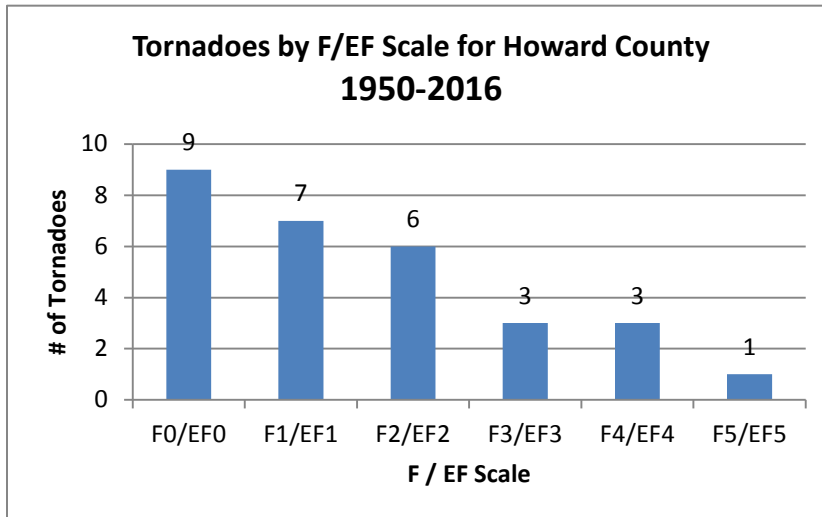


Since 1998, Howard County has been included in a FEMA Federal Disaster Declaration 10 times:

- 1998 – Severe storms / flooding
- 1999 – Severe storms / flooding
- 2004 – Severe storms / flooding
- 2007 – Severe storms / flooding
- 2008 – Severe storms / flooding
- 2010 – Severe storms / flooding
- 2013 – Severe storms / flooding
- 2015 – Severe storms / flooding
- 2016 – Severe storms / flooding

Tornadoes

Howard County has had 28 documented tornadoes since 1950, averaging a tornado every other year. The average in Iowa is about 47 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:

- Sept. 7, 2016 (EF0)
- May 22, 2011 (EF2)
- Aug.19, 2009 (EF0)
- July 5, 2004 (F0)
- June 16, 2004 (F0)
- June 11, 2004 (F3)
- June 27, 1998 (F0)
- July 20, 1997 (F0)
- Aug.19, 1996 (F0)
- July 19, 1994 (F1)
- July 19, 1994 (F3)
- July 19, 1994 (F2)

The strongest documented tornado ever to hit Howard County was the same storm that hit Charles City, IA in May 1968 (F5). This tornado moved into the county from the southwest hitting the community of Elma, IA and causing \$1.5 million in damages. It then moved towards Chester causing 12 injuries in the county total. More recently a tornado (F3) labeled the “State Line Tornado” formed along the western edge of the county in June 2004 and moved north through the Riceville, IA and Le Roy, MN areas. Several homes and farms were destroyed but no one was killed.

Strongest tornadoes: (1850-2013)

- May 15, 1968 (F5) – 12 inj, 0 dead
- Sept.21, 1894 (F4) – 20 inj, 5 dead
- May 10, 1953 (F4) – 8 inj, 1 dead
- May 5, 1965 (F4) – 17 inj, 0 dead
- July 12, 1971 (F4) – 8 inj, 0 dead

Howard County Tornado Facts:

- One F5 tornado in history
- Four F4 and four F3 tornadoes
- 7 deaths and 85 injuries since 1850
- Tornadoes have occurred March – September
- Most have occurred in June (10)

Tornado Watches		Tornado Warnings	
Year	Year	Year	Year
2016	0	2016	0
2015	0	2015	0
2014	1	2014	0
2013	3	2013	4
2012	1	2012	0
2011	3	2011	2
2010	5	2010	0
2009	2	2009	1
2008	8	2008	2
2007	6	2007	0
2006	4	2006	0
2005	8	2005	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

Howard County averages 42 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.

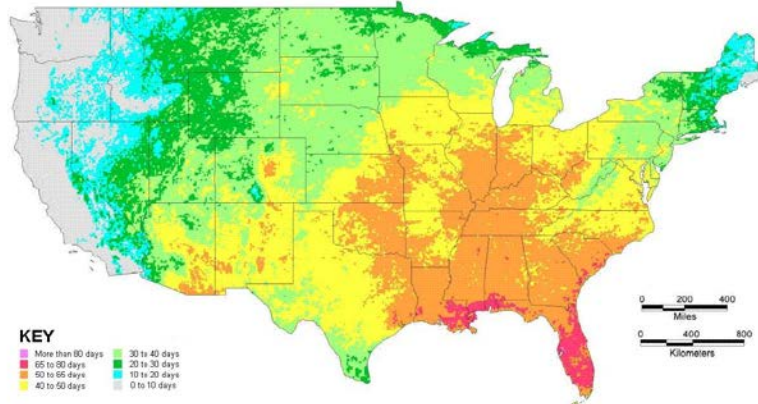
Downdraft winds from a severe thunderstorm can produce local or widespread damage, even tornado-like damage if strong enough. Most severe thunderstorm winds occur in June or July and between the hours of 4 and 8 p.m., but can occur at other times. Most damage involves blown down trees, power lines, and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

occasional related injuries. In May 2002, wind gusts up to 100 mph destroyed a pole barn near Protivin, IA blowing debris about ¾ mile into an open field. Thunderstorm gusts that high were also recorded in July 1994 when a wind gust of 98 mph hit the Schley, IA area. More recently, numerous trailers were tossed by strong winds or a brief tornado touchdown at Featherlite near Davis Corners in May 2008. There have been 70 damaging wind reports since 1982.

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 July 1998, hail the size of tennis balls fell in the Lime Springs, IA area leading to extensive property and crop damage. There have been 73 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 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



(Photo left: Damage near Protivin, IA – May 2002)

(Photo right: Trailers damaged at Featherlite – May 2008)



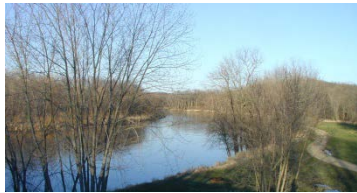
Severe Thunderstorm Watches		Severe Thunderstorm Warnings	
Year		Year	
2016	9	2016	1
2015	3	2015	2
2014	10	2014	10
2013	7	2013	12
2012	7	2012	6
2011	9	2011	7
2010	12	2010	11
2009	8	2009	7
2008	11	2008	9
2007	14	2007	9

Flooding and Hydrologic Concerns

On occasion intense, heavy rain producing thunderstorms or consecutive thunderstorms (“training”) can bring excessive rainfall leading to flash flooding in Howard County. The relatively flat terrain usually leads to ponding of water but road closures and erosion are possible.

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.

Two main rivers can impact Howard County – the Upper Iowa River and the Wapsipinicon River. While flooding can occur from snowmelt or ice jams, it usually stems from heavy rain patterns and rises or falls relatively quickly



compared to other larger rivers in the state. There are numerous other watersheds and creeks as well, including Crane Creek, the Little Wapsipinicon River, branches of the Turkey River, and Bohemian Creek that have a history of flooding.

Flash Flood Warnings	
Year	
2016	9
2015	1
2014	3
2013	8
2012	0
2011	1
2010	1
2009	0
2008	2
2007	2
2006	0
2005	0
2004	4

In July 1999, flooding along the Wapsipinicon and Little Wapsipinicon Rivers was nearly a mile wide in spots. Nearby fields were flooded and highways were closed. Flash flooding was also reported in the county in 1999, 2000, 2004, and 2013.

More recently, heavy rain hit northeast Iowa hard in June 2008 with 4 to 7 inches of rain over a two-day stretch. Several roads and even some bridges were damaged or destroyed from flash flooding, especially along the Minnesota-Iowa state line. In the Lime Springs area, water approached the top of Lidtke Mill Bridge. Parts of Protivin were evacuated and damage to area crops was estimated at \$1 million dollars. Area rivers rose quickly and many crested at all-time highs leading to a federal disaster area declaration.



Winter Storms and Extreme Cold

Hazardous winter weather can bring a variety of conditions to Howard County. Since 1982, an average of 4 to 5 winter storms impacts the area each season. The relatively flat terrain allows for more blizzards to develop than areas to the east, but there have been only 5 true blizzards since 1982. Heavy snow, blowing snow, ice, and sleet all 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 Cresco, IA is 42.3 inches. The highest one-day snowfall is 18.0 inches set on February 28, 1939. 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.

On February 23-25, 2007, a major winter storm impacted northeast Iowa. Heavy snow, including lightning, brought nearly a foot of snow the first night. Winds later increased and created major blowing and drifting. Some sleet and freezing rain fell next, followed by another round of heavy snow and blizzard conditions the next night. When the storm finally moved out, 19" of snow had fallen in the Cresco, IA area. There were hundreds of power poles down in the region as well from thick ice accumulation and wind.

Top 5 Seasonal Snowfalls at Cresco, IA	
Years	Snowfall
1950-51	85.6"
1958-59	73.3"
1951-52	63.5"
2006-07	61.4"
1981-82	60.5"

One of the largest snow storms hit on January 29-30, 1947 when a total of 22.2" fell.

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 during the month of March.

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 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.

Coldest Lows at Cresco, IA	
Low	Date
-36°F	2/3/1996
-36°F	2/2/1996
-35°F	1/15/1963
-34°F	2/4/1996
-33°F	2/10/1899

In late January and early February 1996, Cresco went 6 consecutive days with temperatures at or below zero degrees (F) following a large blizzard. Low temperatures of -19°F, -29°F, -26°F, -36°F, -36°F, -34°F, and -24°F were set on seven straight mornings.

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. On January 30, 2008 wind chill values hit -36°F at Riceville, IA and -35°F at Cresco, 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 Cresco, IA is 106°F set on July 24, 1901.

In Howard County there have 5 heat waves since 1993. During that same time period, there were 6 fatalities directly related to heat waves in Iowa.

A prolonged heat wave hit the region in July 1901 when high temperatures hit 100°F or warmer for 6 of 7 days, including many of the all-time daily records. (Note: Climate data for Cresco, IA was not available for the record setting heat wave of July 1936.) Major heat waves also hit in 1955 and 1988 with several days at or above 100°F. In more recent years, minor heat waves struck in 1995, 1999, 2001, 2011, 2012, and 2012.

Warmest Highs at Cresco, IA	
High	Date
106°F	7/24/1901
105°F	7/21/1901
105°F	7/26/1894
103°F	7/23/1901
102°F	7/31/1955



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 Howard County was 2012 when the USDA gave a drought designation, but droughts have hit parts of Iowa in more recent years, including 1999, 2000, 2001, 2003, 2005, 2006, and 2011.

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 Howard County. Thick, wooded areas also pose a threat for wildfires under extremely dry conditions but occur far less frequently.



Local Climatology

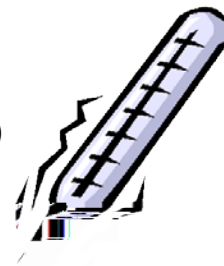
Here are some basic climatology figures for the Howard County area. Data is valid for Cresco, IA based on normals from a 30-year period (1981-2010).

Month	Normal Maximum Temperature	Normal Minimum Temperature	Average Temperature	Precipitation	Snowfall
JAN	23.4	5.1	14.2	0.98"	10.1"
FEB	28.1	9.4	18.8	0.99"	8.1"
MAR	40.9	21.7	31.3	1.93"	6.1"
APR	56.7	33.6	45.2	3.54"	2.1"
MAY	68.6	44.9	56.7	4.01"	0.0"
JUN	77.9	55.2	66.6	5.16"	0.0"
JUL	81.7	59.3	70.5	4.55"	0.0"
AUG	79.6	57.2	68.4	5.25"	0.0"
SEP	72.0	47.7	59.9	3.71"	0.0"
OCT	58.9	35.5	47.2	2.46"	0.4"
NOV	42.2	23.9	33.0	2.17"	4.4"
DEC	27.2	9.8	18.5	1.42"	11.0"
Year	54.8	33.6	44.2	36.15"	42.3"

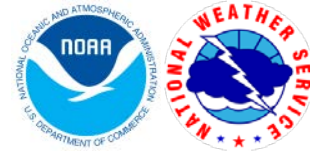
Note: Climate records for Cresco began in 1893 but there is a significant gap in data from 1906 to 1937.

Miscellaneous facts:

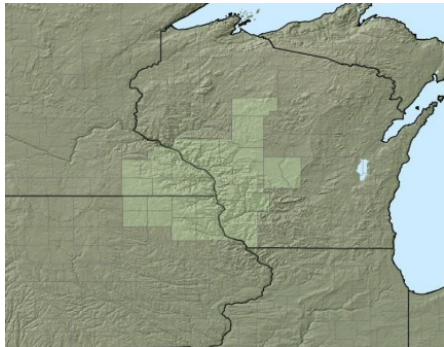
- Warmest year on record – 2012 (49.2°F)
- Warmest month on record – August 1947 (79.0°F)
- Warmest day on record – July 24, 1901 (106°F)
- Year with greatest number of days with 90°F or warmer – 1955 (40 times)
- Coldest year(s) on record – 1979 and 1996 (41.1°F)
- Coldest month on record – January 1977 (-1.3°F)
- Coldest day(s) on record – February 2-3, 1996 (-36°F)
- Year with greatest number of days at 0°F or colder – 1978 (64 times)
- Wettest year on record – 2016 (53.51" as of 11/1/16)
- Wettest month on record – September 1965 (15.09")
- Wettest day on record – August 31, 1962 (6.20")
- Driest year on record – 1958 (21.65")
- Driest month on record – February 1958 (0.00")
- Highest seasonal snowfall on record – 1950/51 (85.6")
- Highest monthly snowfall on record – March 1951 (38.0")
- Highest one-day snowfall on record – February 28, 1939 (18.0")
- Least seasonal snowfall on record – 1967/68 (10.5")



NOAA/National Weather Service Support and Weather Monitoring



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

- KXI60 (Decorah) on 162.525 MHz
- KXI68 (St. Ansgar) on 162.450 MHz

Storm spotters are sparse, but are primarily amateur radio operators and community fire department volunteers, with some additional help from law enforcement and the general public. Spotter training is held about every other year with an average attendance of 63 over the past five years.

There is a limited number of weather monitoring sources in or near Howard County, including:

Automated weather station(s):

- None, but there are stations at Preston, MN, Decorah, IA, and Charles City, IA.

River Gauge(s):

- Upper Iowa River near Lime Springs, IA
- Turkey River near Cresco, IA

Cooperative Observers

- Cresco 1NE
- Elma

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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