

Natural Hazards Assessment

Allamakee County, IA

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



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Overview

Allamakee County, IA is in the Upper Mississippi River Valley of the Midwest with relatively hilly terrain and bluffs. It is bordered by the Mississippi River to the east.

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

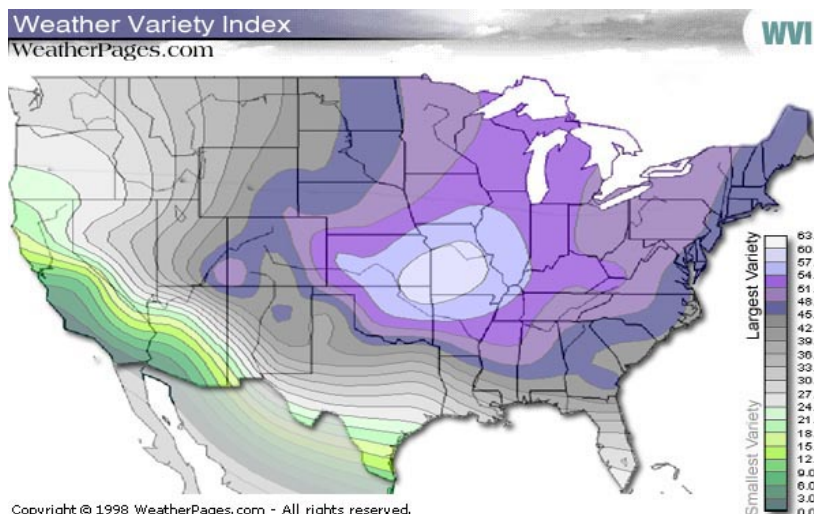
Winter months can bring occasional heavy snows, intermittent freezing precipitation or ice, and prolonged periods of cloudiness. While true blizzards are rare, winter storms impact the area on average about 3 to 4 times per season. Occasional arctic outbreaks bring extreme cold and dangerous wind chills.

Temperatures between river valleys and surrounding ridges can vary greatly. Typically high temperatures on ridges are 3° to 5°F colder than valleys. This can lead to slightly more average snowfall on ridge tops and occasionally a difference in winter precipitation types from ridge to valley.

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, along with urban-related flood problems. The terrain can lead to mud slides and generally increases the flash flood threat. Heat and high humidity is occasionally observed in June, July, or August.

The autumn season usually has the quietest weather. Valley fog is most common in the late summer and early fall months. On calm nights, colder air settles into valleys leading to colder low temperatures compared to ridge top locations. 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.



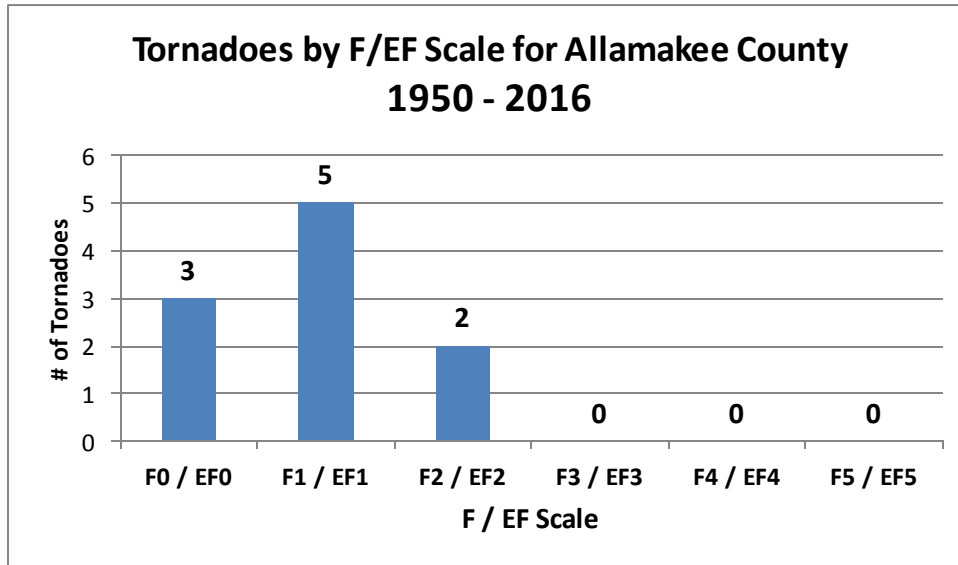
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Since 1998, Allamakee County has been included in a FEMA Federal Disaster Declaration 10 times, including:

- 2002 – Severe storms / flooding
- 2004 – Severe storms / flooding
- 2007 – Severe storms / flooding
- 2008 – Severe storms / flooding
- 2013 – Severe storms / flooding
- 2014 – Severe storms / flooding
- 2015 – Severe storms / flooding
- 2016 – Severe storms / flooding

Tornadoes

Even though Iowa averages about 47 tornadoes per year, Allamakee County has only had 10 documented tornadoes since 1950, averaging about one tornado every 5-6 years. 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:

- May 8, 2002 (F0)
- July 2, 2000 (F0)
- July 19, 1994 (F1)
- July 6, 1994 (F0)
- July 29, 1987 (F2)
- Nov. 9, 1975 (F1)
- Oct. 14, 1966 (F1)
- Apr. 11, 1965 (F1)
- Oct. 14, 1964 (F1)
- May 4, 1964 (F2)

One of the strongest tornadoes to hit

Allamakee County was in June 1915 when a large tornado formed near Waterville, IA and moved northeast towards Ferryville, WI. There were numerous injuries, damaged buildings, and even fatalities on the Wisconsin side. Although terrain in the region does prevent many tornadoes from forming, this tornado illustrates that large tornadoes can cross steep bluffs and valleys. Tornadoes in 1987 and again in 2002 hit near Waukon, IA, hitting the same lumber yard both times but luckily there were no injuries.

Strongest tornadoes: (1850-2016)

- June 12, 1915 (F4) – 50 inj, 9 dead
- Sept. 26, 1881 (F3) – 7 inj, 0 dead
- May 4, 1964 (F2) – 3 inj, 0 dead
- July 29, 1987 (F2) – 0 inj, 0 dead
- July 19, 1994 (F1) – 0 inj, 0 dead

Allamakee County Tornado Facts:

- No F5 or EF5 tornadoes
- Only one F4 and F3 tornado
- 9 deaths and 60 injuries since 1850
- Tornadoes have occurred April – November
- Most have occurred in July (4)

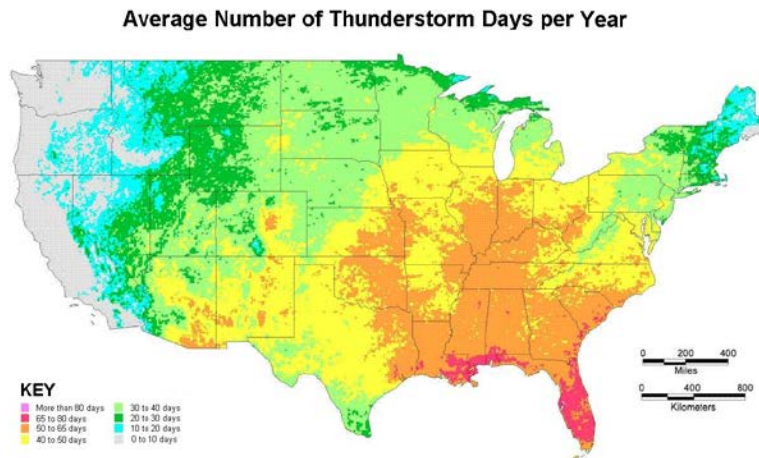
Tornado Watches		Tornado Warnings	
Year		Year	
2016	0	2016	0
2015	1	2015	0
2014	1	2014	0
2013	4	2013	0
2012	0	2012	0
2011	3	2011	0
2010	6	2010	0
2009	5	2009	3
2008	8	2008	1
2007	7	2007	0

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

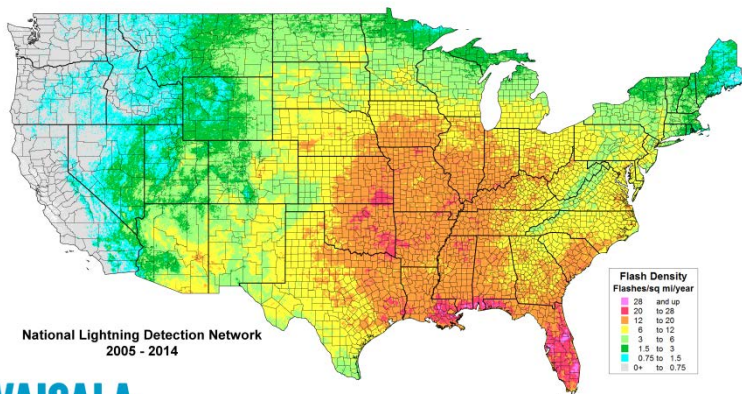
Allamakee County averages 42 thunderstorm days per year. The National Weather Service (NWS) considers a thunderstorm severe when it produces wind gusts of 58 mph (50 knots) or higher, 1 inch diameter hail or larger, or a tornado.

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 June 1998, a large squall line moved through the region with wind gusts in excess of 100 mph knocking down hundreds of trees and damaging buildings. Power was out in many communities. Wind gusts to 65 mph were also reported in June 2006 causing damage. There have been 80 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 May 1996 tennis ball sized hail hit Dorchester, IA damaging many roofs and windows. In May 2000 golf ball to tennis ball sized hail hit much of the county causing thousands of dollars in damage. There have been 85 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.



VAISALA

Severe Thunderstorm Watches		Severe Thunderstorm Warnings	
Year		Year	
2016	8	2016	6
2015	4	2015	3
2014	11	2014	14
2013	7	2013	9
2012	6	2012	16
2011	12	2011	6
2010	12	2010	7
2009	6	2009	9
2008	12	2008	4
2007	11	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 Allamakee County. The hilly terrain promotes rapid run-off and enhances the threat. Mudslides can and do occur in extreme cases.

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.

Extreme northeast Iowa was hit by extreme flash flooding in both 2007 and 2008. In August 2007, five inches of rain led to flooding and mudslides damaging infrastructure and flooding basements. One man was killed in Postville, IA when he entered his flooded basement and was electrocuted.



In June 2008, widespread 5-7” rainfall totals over a two day period led to significant flash flooding and eventual river flooding. Numerous roads were closed from mudslides. Flash flood waters swept whole trailers away in Dorchester, IA (photo left). At least 2500 acres of farm land were flooded with over \$5 million in property damage and \$3 million in crops. There was also significant flash flooding in 2000, 2004, 2010, and 2016.

Flash Flood Warnings	
Year	
2016	11
2015	1
2014	6
2013	10
2012	3
2011	1
2010	2
2009	3
2008	2
2007	2
2006	0

Mississippi River @ Lansing, IA Top 5 Crests (FS: 18 feet)	
Date	Crest
4/24/1965	22.50'
4/21/2001	19.93'
6/20/1880	19.90'
4/22/1969	18.88'
6/30/1993	18.46'

Three main rivers can impact Allamakee County –the Mississippi River, the Upper Iowa River, and the Yellow River, in addition to many other creeks and watersheds. The Mississippi River is often highest in the spring associated with the seasonal snowmelt, but on rare occasions can reach flood stage during the summer or fall from heavy rain patterns. The combination of up-river snowmelt and area rain brought major flooding along the Mississippi River in April 2001, setting the 2nd highest crest levels in many locations. The record crest year remains 1965.



Flooding along the Upper Iowa and Yellow Rivers can be a bit more frequent, usually stemming from heavy rain patterns as opposed to snowmelt. Ice jams can also occur. In June 2008 record crests were observed on the Upper Iowa River. Damage was extensive. (Photo left: Upper Iowa River at Dorchester/Hwy.76)

Upper Iowa River @ Dorchester, IA Top 5 Crests (FS: 14 feet)	
Date	Crest
8/24/2016	24.30'
6/9/2008	22.46'
2/28/1948	22.20'
5/30/1941	21.80'
3/5/1937	20.89'

The US Army Corps of Engineers maintains a Lock and Dam (#9) at Lynxville, WI that is used to manage navigational water levels, not for flood control.

Winter Storms and Extreme Cold

Hazardous winter weather can bring a variety of conditions to Allamakee County. Since 1982, an average of 4 winter storms impacts the area each season. The terrain in the county does limit the number of true blizzards (only 3 since 1982) but 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 Waukon, IA is 41.9 inches. The highest one-day snowfall is 17.0 inches set on November 30, 1934, which began the snowiest 7-day stretch on record (over 25" of snow). 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 far 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, 16.4" of snow had fallen in the Dorchester area with 16" at Lansing, IA. Another major storm hit less than a week later, with a seven day total of 19.5" ending 3/2/1997. A blizzard also hit the area with a foot of snow on Dec. 11-12, 2010.

Top 5 Seasonal Snowfalls at Waukon, IA	
Years	Snowfall
1935-36	84.0"
2007-08	74.9"
2010-11	71.0"
1992-93	68.5"
1942-43	65.6"

March can often be a snowy month. Even though snowfall may be less frequent, heavy wet snow can form from large spring storms.

Ice storms (1/4" of ice or more) can occur but are relatively rare with only 6 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 25 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 1996.

In late January and early February 1996, Waukon went 6 consecutive days with temperatures at or below zero degrees (F) following a large blizzard. Low temperatures of -26°F, -24°F, -34°F, -34°F, -34°F, and -25°F were set on six straight mornings. In mid-January 1994, temperatures dropped to -22°F or colder for 6 of 7 mornings as well.

Coldest Lows at Waukon, IA	
Low	Date
-34°F	2/4/1996
-34°F	2/3/1996
-34°F	2/2/1996
-31°F	1/30/1951
-31°F	1/22/1936

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.

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 Waukon, IA is 106°F set on July 14, 1936.

In Allamakee County there have 7 heat waves since 1993. During that same time period, there were 5 fatalities directly related to heat waves in Iowa.

Prolonged heat waves hit Allamakee County in 1936, 1947, and 1988. In July 1936, the high temperatures hit 90°F or higher 14 days in a row, topping 100°F nine of those days. In August 1947, temperatures hit 90°F or higher 17 days, including several straight days at 98°F or 99°F. In more recent years, heat waves struck in 1995, 1999, 2001, 2011, 2012, and 2013.

Warmest Highs at Waukon, IA	
High	Date
106°F	7/14/1936
105°F	7/13/1936
105°F	7/11/1936
104°F	7/12/1936
104°F	7/6/1936



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 Allamakee County was 2012 when the USDA declared a drought designation, but 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 and cropland field fires in Allamakee 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 Allamakee County area. Data is valid for Waukon, IA based on normals from a 30-year period (1981-2010).

Month	Normal Maximum Temperature	Normal Minimum Temperature	Average Temperature	Precipitation	Snowfall
JAN	24.5	7.9	16.2	0.67"	10.3"
FEB	29.7	12.0	20.8	0.62"	8.6"
MAR	43.0	24.1	33.5	1.49"	5.3"
APR	57.3	35.5	46.4	3.76"	2.1"
MAY	68.0	46.4	57.2	4.20"	0.0"
JUN	77.8	56.7	67.2	4.95"	0.0"
JUL	81.6	61.1	71.3	4.72"	0.0"
AUG	79.3	59.1	69.2	4.80"	0.0"
SEP	71.6	49.8	60.6	3.45"	0.0"
OCT	59.4	38.4	48.9	2.29"	0.1"
NOV	42.8	25.9	34.3	2.20"	3.7"
DEC	28.0	12.5	20.2	1.17"	11.3"
Year	55.1	35.6	45.3	34.47"	41.9"

Note: Climate records for Waukon, IA began in 1934.

Miscellaneous facts:

- Warmest year on record – 1987 (48.7°F)
- Warmest month on record – July 1936 (79.0°F)
- Warmest day on record – July 14, 1936 (106°F)
- Year with greatest number of days with 90°F or warmer – 1936 (43 times)

- Coldest year on record – 1996 (42.1°F)
- Coldest month on record – January 1977 (2.6°F)
- Coldest day(s) on record – February 2-4, 1996 (-34°F)
- Year with greatest number of days at 0°F or colder – 1978 and 1963 (46 times)

- Wettest year on record – 2007 (52.06")
- Wettest month on record – August 2007 (19.11")
- Wettest day on record – May 30, 1941 (5.98")
- Driest year on record – 1958 (18.14")
- Driest month on record – Numerous

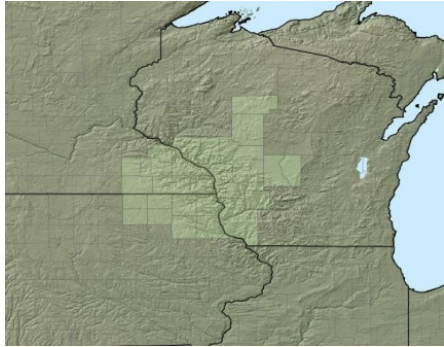
- Highest seasonal snowfall on record – 1935/36 (84.0")
- Highest monthly snowfall on record – December 2010 (36.0")
- Highest one-day snowfall on record – November 30, 1934 (17.0")
- Least seasonal snowfall on record – 1959/60 (7.0")



NOAA/National Weather Service Support and Weather Monitoring



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

- KXI60 (Decorah) on 162.525 MHz
- WXJ86 (La Crosse) on 162.550 MHz
- WWG86 (Prairie du Chien) on 162.500 MHz

Storm spotters are very sparse. There is some involvement by fire department personnel, in addition to law enforcement and the general public. Spotter training is held about every other year with an average attendance of 32.

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

Automated weather station(s):

- None (although observations are available at Decorah, IA and Prairie du Chien, WI)

River Gauge(s):

- Mississippi River Lock & Dam #9 @ Lynxville, WI
- Mississippi River @ Lansing
- Upper Iowa River @ Dorchester
- Yellow River @ Ion

Cooperative Observers

- Dorchester
- Lansing 4SE
- Postville
- Waukon



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 La Crosse Severe Weather Climatology	www.weather.gov/arx/svr_climate
NWS Storm Prediction Center	http://www.spc.noaa.gov/
SPCOnline 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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