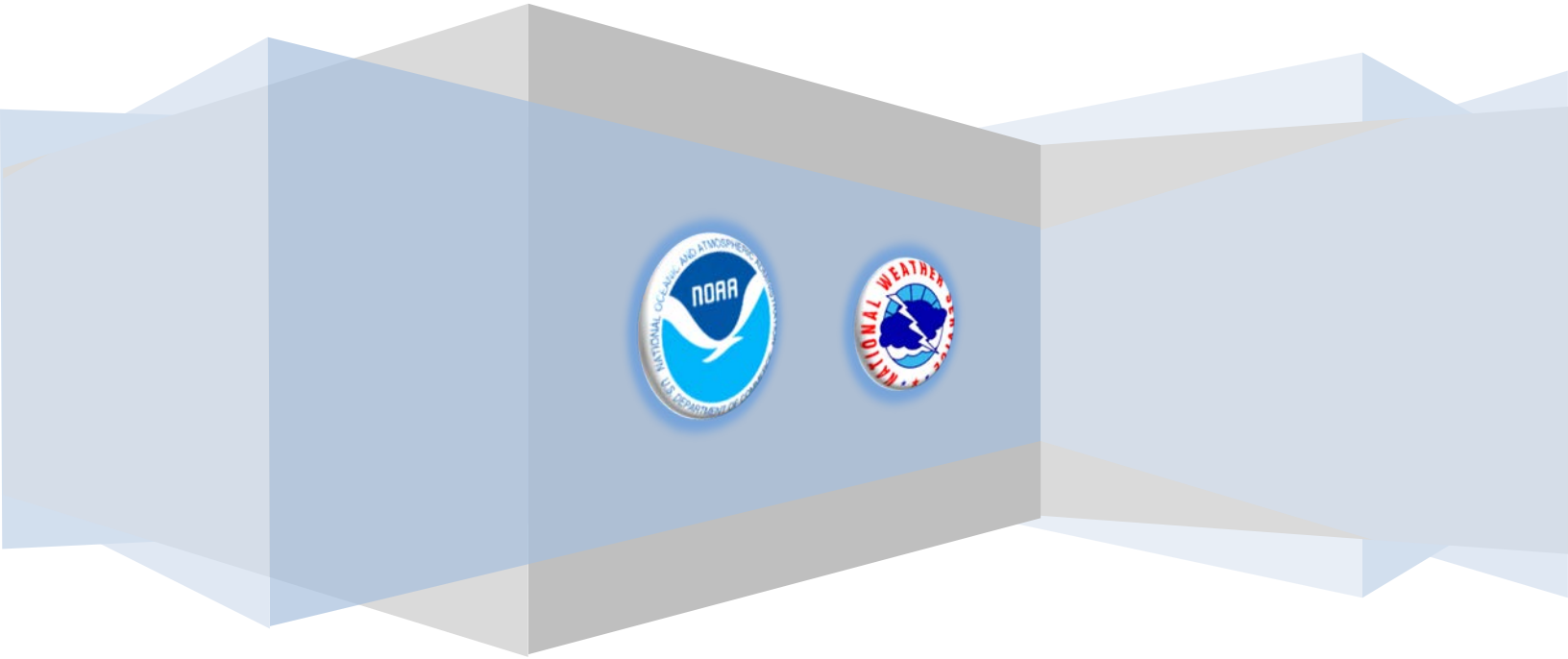
Natural Hazards Assessment

Clark County, WI

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



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for
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Prepared by NOAA / National Weather Service – La Crosse
Last Update: October 2016

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Overview

Clark County is a large county in the western Great Lakes section of the Midwest (central Wisconsin) with hilly to relatively flat terrain. There are some mounds or bluffs that rise several feet above the average terrain. The county is mainly rural and agricultural based.

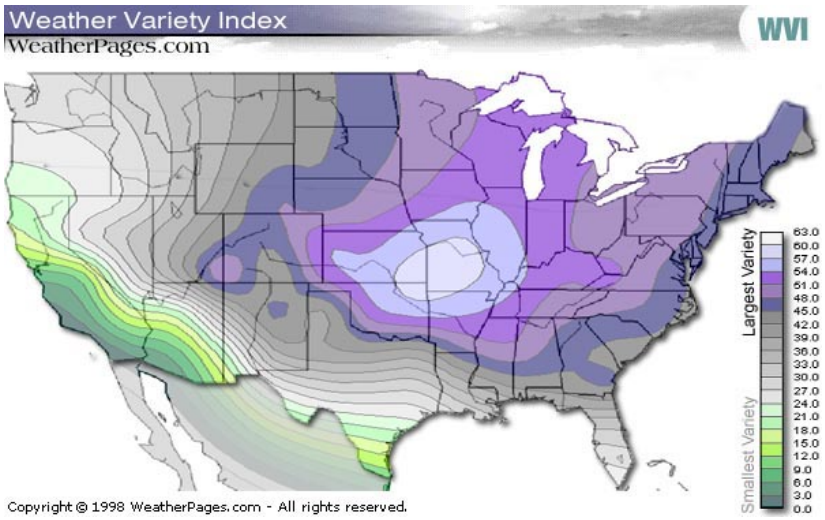
The area experiences a temperate climate with both warm and cold season extremes.

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 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. Green Bay, WI ranked 80th and La Crosse, WI ranked 27th highest in variability out of 277 cities.

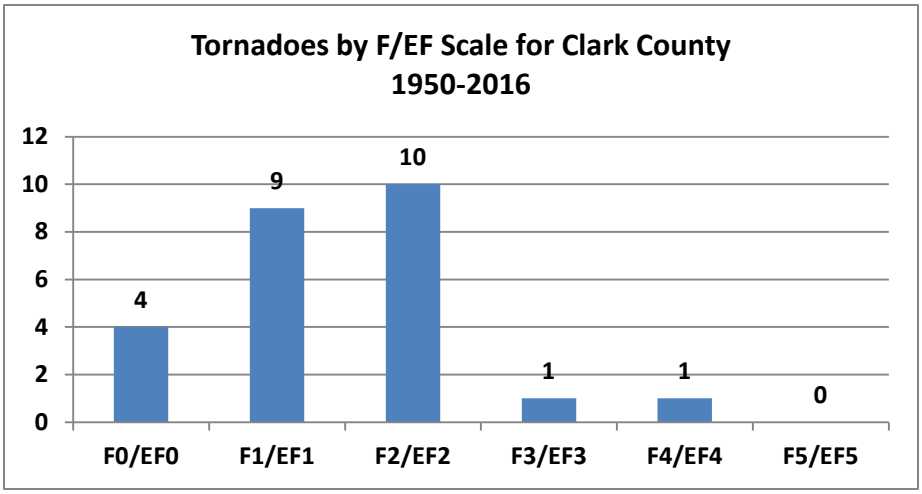


Since 1998, Clark County has been included in a FEMA Federal Disaster Declaration 7 times:

1998 – Severe storms
2001 – Flooding
2002 – Severe storms / flooding
2002 – Severe storms / flooding
2004 – Severe storms / flooding
2010 – Severe storms / flooding
2016 – Severe storms / flooding

Tornadoes

Clark County has an extensive tornado history. There have been 25 documented tornadoes since 1950, averaging about one tornado every 3-4 years. Wisconsin averages 23 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:

- August 23, 2011 (EF2)
- July 14, 2010 (EF1)
- June 4, 2005 (F1)
- Sept.30, 2002(F0)
- June 25, 2002 (F1)
- Sept.26, 1986 (F1)
- Aug.12, 1985 (F1)
- June 7, 1984 (F2)
- Aug.16, 1983 (F0)
- July 19, 1983 (F1)

Perhaps given the size and relative flat terrain of the county, Clark County has had a share of violent tornadoes in the past. In 1924 a large tornado (F4) moved through northwest parts of the county (near Thorp) and killed 14 people, while another large tornado killed 4 more in the Owen-Withee, WI area. More recently, a small tornado hit in downtown Abbotsford, WI on June 25, 2002 shearing off trees and demolishing a large feed mill. Debris was thrown into a car dealership and several nearby cars and buildings. A small but strong tornado heavily damaged homes near Chili on August 23, 2011.

Strongest tornadoes: (1850-2016)

- Sept.21, 1924 (F4) – 50 inj, 18 dead
- July 3, 1907 (F4) – 40 inj, 11 dead
- June 4, 1958 (F4) – 3 inj, 4 dead
- July 3, 1907 (F4) – 30 inj, 1 dead
- Sept.28, 1971 (F3) – 5 inj, 0 dead

Clark County Tornado Facts:

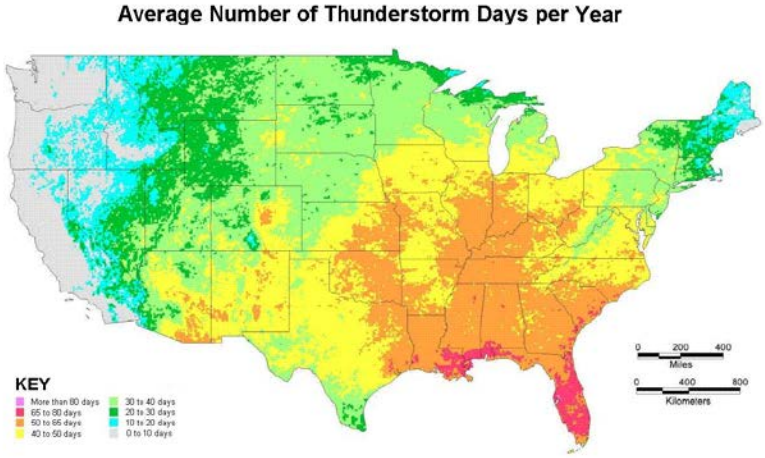
- Four (4) F4 tornadoes
- Last violent tornado - 1958
- 36 deaths and 141 injuries since 1850
- Tornadoes have occurred April – November
- Most have occurred in June (11)

Tornado Watches		Tornado Warnings	
Year		Year	
2016	1	2016	0
2015	0	2015	0
2014	0	2014	0
2013	5	2013	3
2012	2	2012	0
2011	3	2011	6
2010	2	2010	2
2009	2	2009	0
2008	6	2008	0
2007	6	2007	2
2006	2	2006	1
2005	6	2005	4
2004	4	2004	0
2003	2	2003	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

Clark County averages 39 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. On July 16, 2008 a squall line produced at least 6 reports of damaging wind across northern parts of the county. July 2002 saw a similar storm, and back in July 1997 a line of storms produced wind gusts of 90 mph causing widespread damage in Clark County. There have been 94 reports of damaging wind since 2000 with one injury (on 7/23/2005).

Large hail can also occur in a severe thunderstorm. June is the peak month 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. 2001 was quite a year for large hail with 2” size hail hitting the Owen area in May and then hail as large as 3.5” falling around Thorp, WI in June. There have been 91 large hail (≥ 3/4”) reports in the county since 2000.

Non-severe thunderstorms still pose a lightning risk. According to the Vaisala Group, an average of just under 300,000 cloud-to-ground strikes hit Wisconsin each year based on data from 2006 to 2015. There were lightning fatalities in Wisconsin in 2007, 2008, 2011, and 2016. In August 2002, two people were injured sleeping in a tent around Willard after a lightning strike.

Severe Thunderstorm Watches		Severe Thunderstorm Warnings	
Year		Year	
2016	1	2016	10
2015	5	2015	1
2014	1	2014	11
2013	8	2013	9
2012	10	2012	7
2011	13	2011	15
2010	10	2010	11
2009	3	2009	5
2008	10	2008	11
2007	14	2007	5
2006	19	2006	14

Flooding and Hydrologic Concerns

On occasion intense, heavy rain producing thunderstorms or consecutive thunderstorms ("training") can bring excessive rainfall leading to flash flooding in Clark County. Given the relatively flat terrain, "ponding" or collecting of water is more likely, but true flash flooding and erosion problems can develop if rainfall is excessive enough.

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 1982, there were 9 deaths from flooding in Wisconsin. On average, one flash flood warning is issued every other year but that depends on the extent and threat for flooding.

Flash Flood Warnings	
Year	
2016	5
2015	1
2014	1
2013	1
2012	0
2011	2
2010	0
2009	2
2008	0
2007	0
2006	0
2005	1

On June 21-22, 2002, rounds of thunderstorms with heavy rain led to extensive flash flooding over central Wisconsin. Parts of Clark County were hit with 4 to 7 inches of rain which led to the flooding of numerous county roads and highways. Road erosion also occurred. A washed out culvert also led to the death of 3 people in June 2012 from 1-2" of rain.

Major river flooding in Clark County is rare but the Black River (see picture below) does run the length of the county from north to south. Flooding can occur from spring snow melt or ice jams, but is more common from patterns of excessive rainfall. In fact, all the record crests along the Black River are during the warmer months.

Black River @ Neillsville, WI Top 5 Crests (FS: 18 feet)	
Date	Crest
9/10/1938	23.8'
6/28/1943	22.5'
6/6/1905	22.4'
9/22/2016	21.1'
6/5/1914	19.8'

In addition to other several smaller creeks and drainage areas, the headwaters to the Eau Claire River begin in the western end of the county. Lake Arbutus resides along the Black River along the Clark-Jackson County line.

(Flooding in Owen, WI – 1938. Courtesy of Wisconsin Valley Library Service.)

Winter Storms and Extreme Cold

Hazardous winter weather can bring a variety of conditions to Clark County. Since 1982, there have been 84 winter weather events with an average of 3-4 each season. Heavy snow, blowing snow, ice, and sleet all occur, although blizzards are more rare (only 4 since 1982). There have been a total of 6 documented deaths and 51 injuries as a direct result from winter storms in Wisconsin since 1982.

The 30-year average seasonal snowfall at Neillsville is 41.7 inches. The all-time record one-day snowfall is 20.0 inches that occurred at Neillsville on December 28, 1904. 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.

There have been numerous notable winter storms and heavy snows in the record books. One of the snowiest periods was late December 1904 when 26" fell over a several day period. More recently 10" of snow fell just before Christmas in December 2007 while in December 2008, a total of 28.4" of snow fell making it the 4th snowiest December on record. The most snow ever to fall in a month was 33.1" in December 1904.

Top 5 Seasonal Snowfalls at the Neillsville, WI

Years	Snowfall
1935-36	78.1"
1951-52	71.5"
1905-06	71.5"
2012-13	70.0"
1996-97	70.0"

March can often be a snowy month. Even though snowfall may be less frequent, heavy wet snow can form from large spring storms. On March 10, 1909, 18" of snow fell at Neillsville, and 29" of snow was recorded in March 1951.

Ice storms (1/4" of ice or more) can occur but are relatively rare with only 7 occurrences since 1982. In January 2005, freezing rain led to ice accumulation up to a ½ inch thick in spots. Ice an 1/8 – ¼ inch thick fell as recently as January 3, 2009.

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 35 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 -30°F most days. The all-time record low is -48°F set back in January 1951.

In late January and early February 1996, Neillsville, WI went 5 consecutive days with temperatures at or below zero degrees (F) following a blizzard about a week earlier. Low temperatures during this stretch were -22°F, -34°F, -22°F, -34°F, -34°F, and -37°F over six straight mornings. In late January and early February 1899, there were 18 straight days with lows at -8°F or colder – the longest such streak. Four times during that stretch the temperature hit -40°F or lower.

Coldest Lows at Neillsville, WI

Low	Date
-48°F	1/30/1951
-46°F	1/18/1967
-46°F	2/10/1899
-44°F	1/15/1963
-42°F	2/11/1899

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 95°F most days. The warmest temperature on record at Neillsville, WI is 106°F set on July 13 and July 14, 1936.

Warmest Highs at Neillsville, WI	
High	Date
106°F	7/14/1936
106°F	7/13/1936
106°F	7/24/1901
105°F	5/31/1934
104°F	7/12/1936

Since 1982, there have been 121 fatalities directly related to heat waves and another 95 indirectly, in Wisconsin. In Clark County, there have been 13 heat waves since 1982 with two documented fatalities that occurred in 2001.

One of the longest heat waves on record occurred in July 1936 when the Clark County area hit 95°F or higher for 12 consecutive days, including 6 days at or above 100°F and all-time record highs of 106°F as noted above. Back in July 1901, high temperatures hit 90°F or warmer for 13 days. More recently, heat waves have occurred in 1995, 1999, 2001, 2011, 2012, and 2013.

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.

Droughts have occurred in Wisconsin as recently as 2005 to 2009, and again in 2012. A drought designation was given to Clark County in 2012 by the USDA.

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 fires in Clark County. Thick, wooded areas, especially in areas thick with Jack Pines or pine plantations, also pose a threat for wildfires under extremely dry conditions but occur far less frequently.

In 2007 there were five (5) wild fires that totaled less than an acre, but in 2008 there were 13 fires that totaled near 12 acres.

Local Climatology

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

Month	Normal Maximum Temperature	Normal Minimum Temperature	Average Temperature	Precipitation	Snowfall
JAN	24.6	4.7	14.7	0.96”	9.6”
FEB	30.0	8.9	19.4	0.88”	7.5”
MAR	41.7	19.6	30.6	1.61”	7.9”
APR	57.3	32.1	44.7	2.86”	2.1”
MAY	68.7	42.5	55.6	3.79”	0.0”
JUN	77.0	51.7	64.3	4.68”	0.0”
JUL	80.9	56.0	68.5	4.23”	0.0”
AUG	78.8	54.6	66.7	4.38”	0.0”
SEP	70.4	45.8	58.1	4.10”	0.0”
OCT	58.0	34.9	46.5	2.58”	0.5”
NOV	41.8	23.4	32.6	1.98”	4.0”
DEC	27.7	9.4	18.5	1.24”	9.8”
Year	**54.6**	**31.9**	**43.2**	**33.45”**	**41.7”**

Note: Cooperative weather data for Neillsville, WI began in 1893.

Miscellaneous facts:

- Warmest year on record – 1921 (47.0°F)
- Warmest month on record – July 1916 (78.2°F)
- Warmest day on record – July 13/14, 1936 (106°F)
- Greatest number of days with 90°F or warmer – 1988 (39 times)

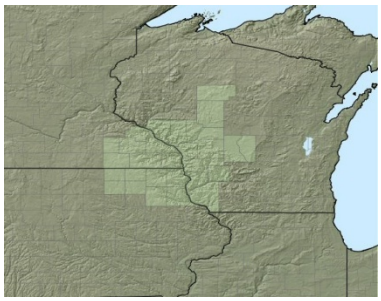
- Coldest year on record – 1950 (39.5°F)
- Coldest month on record – January 1912 (-2.7°F)
- Coldest day on record – January 30, 1951 (-48°F)
- Greatest number of days at 0°F or colder – 1951 (64 times)

- Wettest year on record – 1911 (47.17”)
- Wettest month on record – August 1980 (12.62”)
- Wettest day on record – August 8, 1980 (5.00”)
- Driest year on record – 1948 (18.19”)
- Driest month(s) on record – January 1981 and November 1976 (0.00”)

- Highest seasonal snowfall on record – 1935/36 (78.1”)
- Highest monthly snowfall on record – December 1935 (48.0”)
- Highest one-day snowfall on record – December 28, 1904 (20.0”)
- Least seasonal snowfall on record – 1967/68 (14.0”)

NOAA/National Weather Service Support and Weather Monitoring

NOAA's National Weather Service (NWS) forecast office at La Crosse, WI serves Clark 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 and amateur radio.

NOAA Weather Radio coverage in Clark County includes three (3) transmitters:

- KZZ77 (Withee) – 162.425 MHz
- WXJ89 (Wausau) – 162.475 MHz
- WNG564 (Black River Falls) – 162.500 MHz

Storm spotter groups consist of a nice mixture of volunteer fire department personnel, law enforcement, amateur radio operators, and the general public. Spotter training is held nearly every year with an average attendance in the past 5 years of 65.

There are a variety of weather monitoring sources in Clark County, including:

Automated weather station(s):

- None, but there are nearby stations at Eau Claire (EAU), Medford (MDZ), Marshfield (MFI), and Wisconsin Rapids (ISW)

River Gauge(s):

- Black River @ Neillsville, WI

Cooperative Observer Locations:

- Neillsville 3SW
- Owen 2N
- Willard

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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