



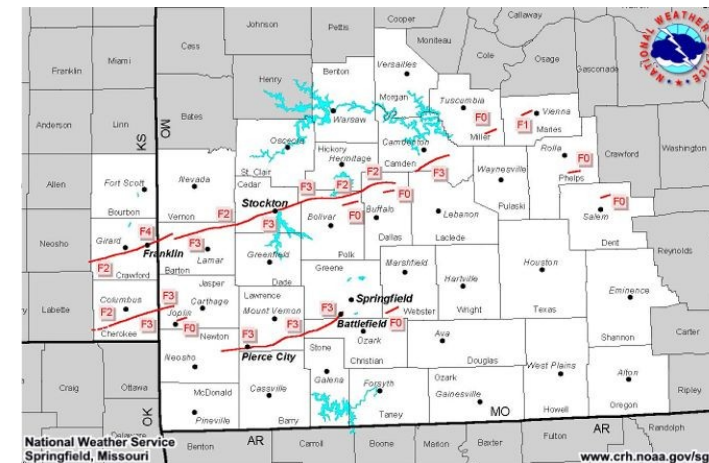
“To provide weather and flood warnings, public forecasts and advisories for all of the United States...and its territories...for the protection of life and property.”

National Weather Service

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National Weather Service

Natural Hazard Risk Assessment Information For: **Crawford County Kansas**



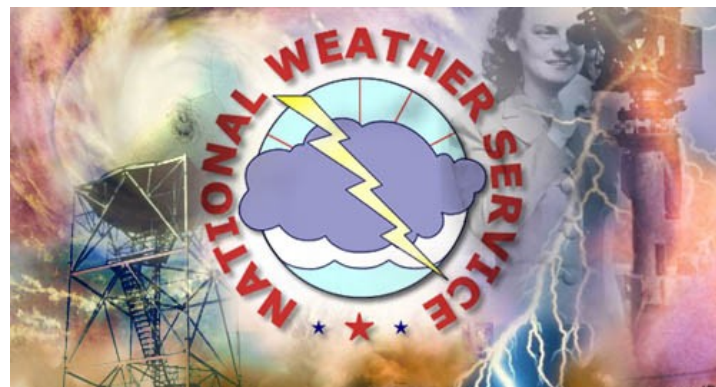
Information Provided By
WFO Springfield, Mo

2009 Update

Includes data and information
through December 2008

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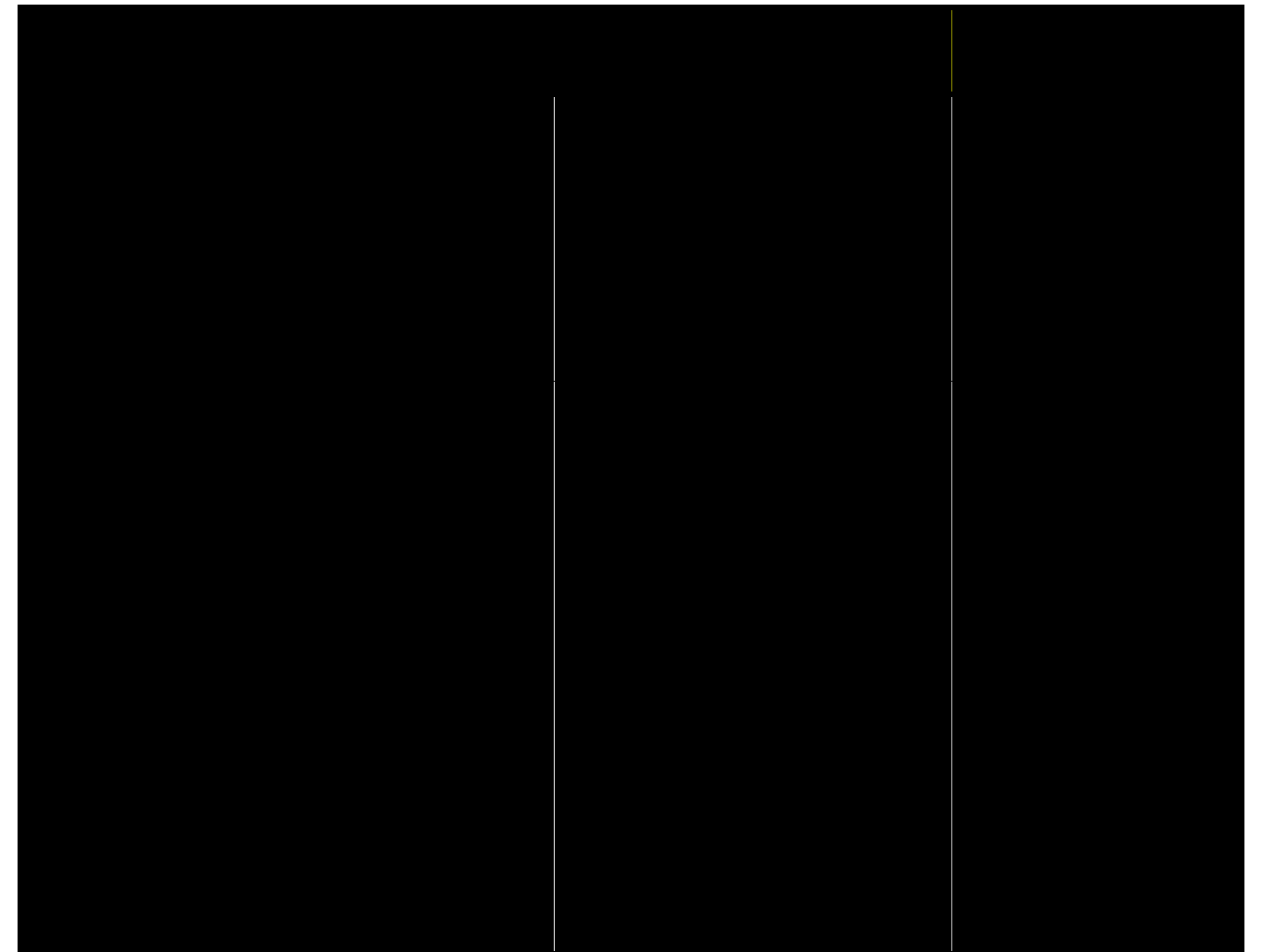
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This document is intended to provide general information on severe weather that has affected Crawford County and the communities with in the county.

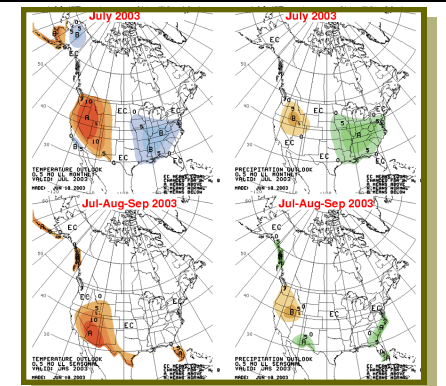
Local Climatology

Averages and records for Girard, Kansas in Crawford County



Links for Climate information

- www.crh.noaa.gov/sgf/
- www.cpc.ncep.noaa.gov/
- www4.ncdc.noaa.gov
- web.missouri.edu/~moclimate/
- mrcc.sws.uiuc.edu/
- agebb.missouri.edu/weather/index.htm



Historic Weather in Southeast Kansas

Jan. 13, 1889...A great blizzard struck the state of Kansas without warning. The storm claimed 50 to 100 lives and nearly 80 percent of the cattle in the state

Feb. 21, 2001... A combination of freezing rain and sleet accompanied by lightning coated extreme southeast Kansas and the Missouri Ozarks with significant ice accumulations. Accumulations of freezing rain and sleet were generally around a quarter to one half inch, while one to two inches occurred from just east of Springfield eastward across Texas and Shannon counties. The thunderstorms accompanied by occasional to frequent lightning produced rapid and sudden accumulations of ice that afternoon. Some of the storms produced small hail. Thunderstorms near the Arkansas border produced large hail up to one inch in diameter.

Mar. 15, 1982...Severe thunderstorms that moved across the Missouri Ozarks spawned an F3 tornado that tracked for 60 miles from Crawford county KS and across Barton County, MO. The tornado, which was 1500 yards wide or over 3/4 of a mile, caused 50 million dollars in damage and 1 fatality.

Apr. 9, 1994... Telephone poles were blown down and buildings were damaged by strong thunderstorm winds in the Girard Kansas area as a line of



severe thunderstorms moved through southeast Kansas.

Apr. 19, 2000...An F2 tornado entered the southwest corner of Crawford County KS west of McCune and traveled northeast over the southwest section of the county. The intermittent damage path was 300 yards wide. Although the tornado stayed over rural areas, it still managed to severely damage or destroy 5 homes and several outbuildings. Four persons were injured by flying debris. The tornado lifted about 6 miles northeast of McCune.

May 4, 2003...From the Neosho and Crawford County line F-2, damage was observed as a tornado moved east northeast until two miles south of Girard were the tornado intensified. The tornado width was about 250 yards wide but increased to one quarter mile wide three miles west southwest of Ringo. At this point scouring was observed and the tornado was rated an F-4 based on the type and scope of structural damage and very heavy objects such as vehicles being tossed several hundred feet away from their original position. The tornado continued its east northeast track as an F-4 as it reached the community of Franklin and caused severe and total devastation to numerous homes and buildings. The tornado width continued over one quarter mile wide across the F-4 track. It remained an F-4 east of Franklin to just south of Mulberry.

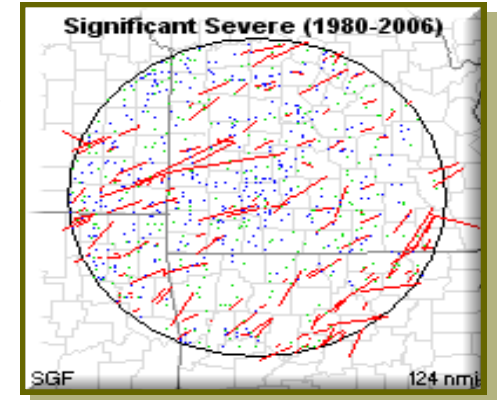


Overview of Weather Hazards in Southwest Missouri & Extreme Southeast Kansas

From 1961 to 2008, 522 tornadoes were reported in the 37 counties that WFO Springfield is responsible for, with an average of 11 occurring each year. There were 71 fatalities from these tornadoes, or near one and a half each year. Tornadoes occurred during every month of the year and at every hour of the day. The majority of these tornadoes are weak, but the occurrence of strong and violent storms is always a possibility and cannot be discounted.

The Ozarks experiences between 50 and 70 thunderstorm days a year. During any given storm, large hail, damaging winds and microbursts are possible. The Ozarks go through three severe thunderstorm seasons during the course of the year. The spring season is the period that supercell thunderstorms are most common, next comes summer as large clusters of storms move across the region, mainly during the overnight hours. Finally fall sees the return of supercells and tornadoes, squall lines and training storms (thunderstorms that form and move over the same area).

The region is affected during the course of any year by flooding, drought, heat and cold extremes and winter storms. Heat extremes and flooding have caused the greatest number of fatalities in the area. Winter storms affect the region in many forms. Ice storms, heavy snow and extreme cold have occurred across the area. Freezing rain is the typical form ice storms in the Ozarks take. Ice storms have deposited 2 to 3 inches of ice during their duration causing power outages, tree damage, and traffic problems.



Weather in the Ozarks

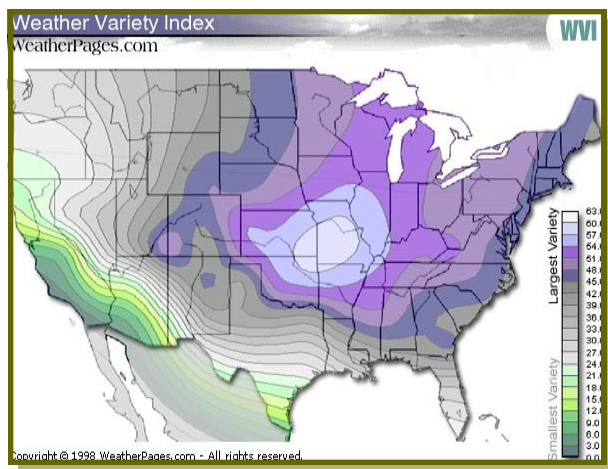
Tornadoes by county for the Springfield County Warning Area from 1950 to 2008

| County | F0/1 | F2 | F3 | F4 | F5 | County | F0/1 | F2 | F3 | F4 | F5 | County | F0/1 | F2 | F3 | F4 | F5 |
|-------------|------|----|----|----|----|----------|------|----|----|----|----|----------|------|----|----|----|----|
| BARRY | 20 | 7 | 1 | 0 | 0 | DOUGLAS | 8 | 6 | 1 | 0 | 0 | OREGON | 9 | 4 | 2 | 1 | 0 |
| BARTON | 23 | 1 | 3 | 1 | 0 | GREENE | 19 | 10 | 3 | 1 | 0 | OZARK | 21 | 2 | 2 | 1 | 0 |
| BENTON | 18 | 2 | 4 | 0 | 0 | HICKORY | 8 | 1 | 1 | 0 | 0 | PHELPS | 15 | 4 | 2 | 0 | 0 |
| BOURBON,KS | 10 | 5 | 0 | 0 | 0 | HOWELL | 20 | 11 | 3 | 1 | 0 | POLK | 16 | 3 | 0 | 0 | 0 |
| CAMDEN | 15 | 6 | 1 | 0 | 0 | JASPER | 30 | 5 | 4 | 1 | 0 | PULASKI | 9 | 4 | 1 | 0 | 0 |
| CEDAR | 10 | 2 | 3 | 0 | 0 | LACLEDE | 9 | 6 | 1 | 0 | 0 | SHANNON | 11 | 1 | 1 | 0 | 0 |
| CHEROKEE,KS | 28 | 5 | 2 | 1 | 0 | LAWRENCE | 11 | 2 | 3 | 0 | 0 | ST.CLAIR | 13 | 2 | 2 | 0 | 0 |
| CHRISTIAN | 19 | 2 | 1 | 1 | 0 | MARIES | 4 | 3 | 0 | 0 | 0 | STONE | 10 | 3 | 0 | 0 | 0 |
| CRAWFORD,KS | 19 | 11 | 3 | 1 | 0 | MCDONALD | 11 | 5 | 0 | 0 | 0 | TANEY | 6 | 1 | 0 | 0 | 0 |
| DADE | 11 | 2 | 2 | 0 | 0 | MILLER | 22 | 3 | 0 | 0 | 0 | TEXAS | 14 | 8 | 1 | 2 | 0 |
| DALLAS | 7 | 1 | 1 | 0 | 0 | MORGAN | 11 | 7 | 0 | 0 | 0 | VERNON | 20 | 1 | 6 | 0 | 0 |
| DENT | 8 | 1 | 1 | 0 | 0 | NEWTON | 30 | 5 | 1 | 2 | 0 | WEBTSEER | 19 | 7 | 2 | 0 | 0 |
| | | | | | | | | | | | | WRIGHT | 10 | 4 | 0 | 1 | 0 |

Historical information for Crawford County, Kansas

Severe Weather in Crawford County

Crawford County Kansas is located in tornado ally in the western most portions of the Ozarks. Because of its location Crawford County is subjected to severe thunderstorms, heavy rainfall, winter storms, flooding, ice storms, droughts, tornadoes and other wind storms.



From www.weatherpages.com

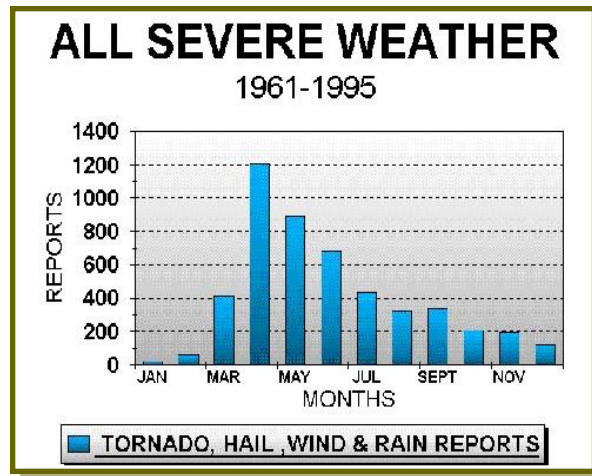
In 2000, a private company looked at regions in the U.S. and determined that the Ozarks region has the most variable weather in the United States.

When does severe weather occur?

Severe weather in tornado ally can occur in any month of the year. While the months of April through June are the peak severe weather season, there is a secondary peak from September to November.

What to expect in Crawford County

Severe thunderstorms in Crawford County have dropped hail up to 4" in diameter, created winds in



excess of 80 miles an hour and rainfall rates greater than 3" in an hour. While southeast Kansas and southwest Missouri receive nearly 11 tornadoes a year, Crawford County averages an event every 1 1/2 years.

Number of Tornadoes in Crawford Co. 1950 to June 2008

| F0/F1 | F2 | F3 | F4 | F5 |
|-------|-----|----|----|----|
| 19 | 11 | 3 | 1 | 0 |
| 56% | 32% | 9% | 3% | 0% |

During the winter season Crawford County averages 5.7 inches of snow. The most snow to fall was 28.7 inches which fell during the 2002 to 2003 winter season. Ice storms also affect the county during the winter season causing significant damage to homes, trees and utilities.

Dam Failure

Dams in Crawford County

Crawford County contains 49 dams. While the majority of these dams are small and used primarily for storm water management, irrigation and recreation, some are a part of local reservoirs. All of the dams in Crawford County are of earthen construction and there have been no recorded failures.

Where are they Located

- Bill Beachner Dam: Murphy Creek, Oswego
- Benage Dam: Brogan Creek, Oswego
- Hammerbach Dam: Walnut Creek, St. Paul
- Davison Dam: Mulberry Creek, Chetopa
- Thomas Dam: Hickory Creek, Oswego
- Painter Dam: Mulberry Creek, Chetopa
- Parsons Dam: Hickory Creek, Oswego
- Stephan Dam: Walnut Creek, St. Paul
- Galichia Dam: First Cow Creek, Frontenac
- Niggeman Dam: Grindstone Creek, Chetopa
- Bell Dam: Hickory Creek, Oswego
- Delange Dam: Lightning Creek, Chetopa
- Price Dam: Thunderbolt Creek, Chetopa
- Sherman Dam: Flat Rock Creek, St. Paul
- Stelles Dam: Elm Creek, Pittsburg
- Sheldon Dam: Lightning Creek, Monmouth
- Egbert Dam: Hickory Creek, Strauss
- Taylor Dam: Second Cow Creek, Pittsburg
- Burkdoll Dam: West Fork Dry Wood Creek, Near Nevada



All of the dams in Crawford County are less than 100 feet high. Many are located on private land and fall under private ownership. In addition to the 19 dams listed 30 others are inside the county limits. These other dams are small enough that they pose little threat to the area they affect.



Heat, Drought and Wildfires



Excessive heat is the leading cause of weather fatalities in the nation. With the variability of the weather in southwest Missouri and southeast Kansas, it is not surprising that excessive heat impacts Crawford county on almost a yearly basis.

Crawford County averages 5 days a year with temperatures at or above 95 degrees. July and August are the two warmest months, which average 3 days at or above 95 degrees.

| Year | Days 95* + | Days 100* + | Days in a row |
|-------------|------------|-------------|---------------|
| ▲ Above 95* | | | |

Drought and wildfires can, and often do accompany excessive heat. Crawford County has gone through dry periods and drought. The latest droughts occurred in 1999 and 2000 when well below normal rainfall and high temperatures combined to produce drought conditions.

Longest periods without rainfall in Crawford County

- 56 days: 6 Oct 1955 ~ 30 Nov 55
- 45 days: 3 Sept 1979 ~ 17 Oct 79
- 45 days: 29 Jul 2000 ~ 11 Sept 00
- 38 days: 14 Jun 1954 ~ 21 Jul 54
- 36 days: 12 Dec 1955 ~ 16 Jan 56
- 34 days: 9 Feb 1956 ~ 13 Mar 56

In a press release issued in 2000 Casey McCoy, rural fire service specialist with the Kansas Forest Service indicated that-
 “California and Kansas are No. 1 and 2 among western U.S. states for producing the greatest number of wildfires every year. California just makes the news a lot more often. Kansas actually surpasses California on amount of land affected. With an average 190,638 acres burned annually, Kansas is second only to Alaska (409,340 acres). Many would guess the leading cause in Kansas is ranchers' pasture burning. That's a widely used and well accepted practice for managing grasslands. Research has shown burning is what many native Plains grass seeds need to germinate - just as they did in buffalo-roaming days, when lightning set the fires.”

Tornado Information

Crawford County lies along the eastern edge of tornado ally and receives on average 2 tornadoes every three years. From 1950 to 2002 Crawford county recorded 28 tornadoes from F0 to F3 in strength. The strongest tornado, an F4, passed across the county on the evening of May 4th, 2003. Along its 35 mile track it caused millions of dollars in damage and killed 4.



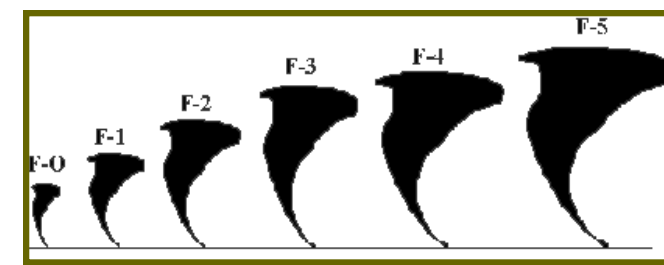
The tornado outbreak of May 4, 2003 was the worst that southeast Kansas has had in recent recorded history. Fourteen tornadoes touched down across the Ozarks during the evening of May 4th one of which was an F4 that struck the towns of Franklin and Ringo. This F4 is the latest killer tornado to strike Crawford county since an F3 that struck in March of 1982.

Historical Tornadoes of Crawford County

- Nov 02, 1961 (F1) 2 inj, 0 dead
- Mar 15, 1982 (F2) 3 inj, 0 dead
- Mar 15, 1982 (F3) 8 inj, 1 dead
- Mar 26, 1982 (F3) 4 inj, 0 dead
- Nov 09, 1988 (F1) 2 inj, 0 dead
- Apr 19, 2000 (F2) 4 inj, 0 dead
- May 04, 2003 (F4) 4 dead

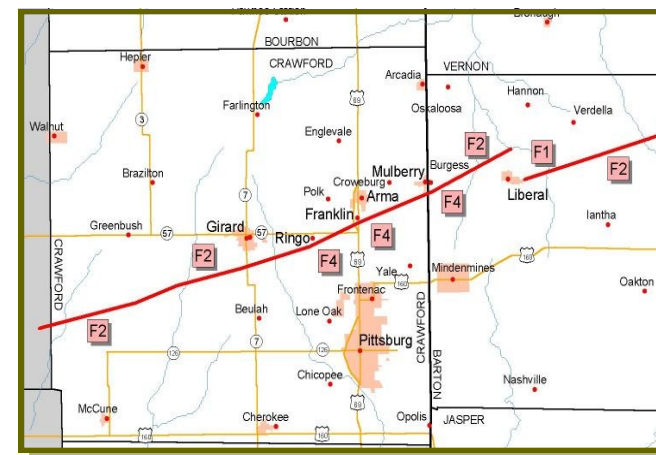
For the Record Crawford County

- Has experienced one F4 tornado.
- No F5 tornadoes
- Most recent Tornado May 3, 2006 (F0)
- 5 deaths and 23 injuries since 1950.

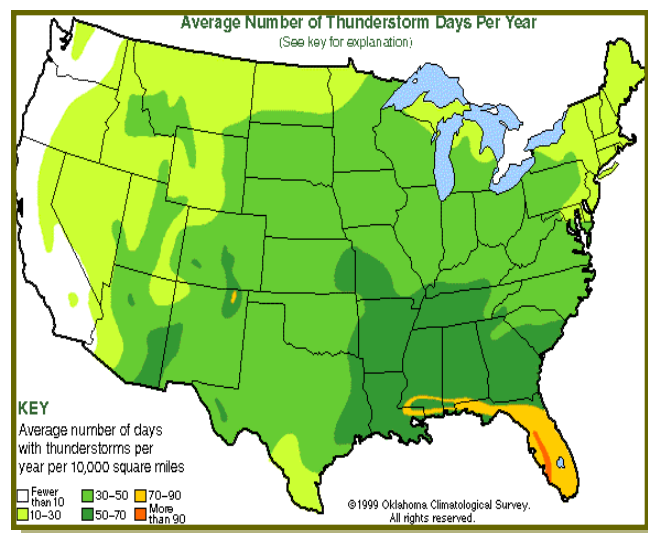


Fujita Scale of tornado intensity

- **F-0:** 40-72 mph, chimney damage, tree branches broken
- **F-1:** 73-112 mph, mobile homes pushed off foundation or overturned
- **F-2:** 113-157 mph, considerable damage, mobile homes demolished, trees uprooted
- **F-3:** 158-205 mph, roofs and walls torn down, trains overturned, cars thrown
- **F-4:** 207-260 mph, well-constructed walls leveled
- **F-5:** 261-318 mph, homes lifted off foundation and carried considerable distances, autos thrown as far as 100 meters



Severe Hail, Lightning, Wind and Winter Weather



Average number of thunderstorm days per year.

Thunderstorms occur in the Ozarks on the average of 50 days per year.

April and May are the two most active hail months in the Ozarks. There is also evidence of a minor secondary peak in September. The greatest number of hail reports over 2 inches happen in the months of April, May and June with the largest report being 4.00 inches in diameter in Crawford county on June 19, 1981. Hail causes considerable damage to homes, vehicles, and crops.

Damaging winds are defined by the NWS as convective wind gusts that reach or exceed 50 knots (58 mph). June is the most active month with April a close second. In general, the most active period for damaging wind events occurs from April to August. This is due in part to the shift from supercell thunderstorms to large clusters of storms and squall lines. The highest wind gust recorded in Crawford county reached 80 mph and occurred in 2003 on the 16th of April. Since 1958 high winds have caused around \$1,494,000.00 in damages.

With any thunderstorm lightning will be present and the safest place to be is indoors. In July of 1994, The historic old Cato General Store caught fire when it was struck by lightning. The landmark was built in 1868 and was a stopping place for pioneers to replenish their supplies as they headed west.



Nationally Kansas ranks 20th in Lightning fatality rate, 15th in injuries and 2nd in property damage related to lightning. During the period from 1960 to 1994 the total number of lightning casualties in Kansas was 213. This averages to more than six casualties per year in the state.

Winter weather across the Ozarks comes in many forms. Freezing rain or drizzle, sleet and snow are common occurrences during the winter season. In the past the Ozarks have had up to 54 inches of snow, Sleet storms that produced inches of sleet and ice storms that laid a covering of one to two inches of ice on most surfaces. While the immediate impact of these storms is to travel, winter storms cause hundreds of thousands of dollars in damages across the region on a near yearly basis.

Flooding

From 1993 to 2002 flooding has occurred in Crawford County in every year. While usually nuisance flooding occurs, such as water on city streets, significant flooding has caused numerous problems in the county. During the previous decade no injuries or deaths have been attributed to flooding in Crawford County. Crawford County contains numerous low water crossings.

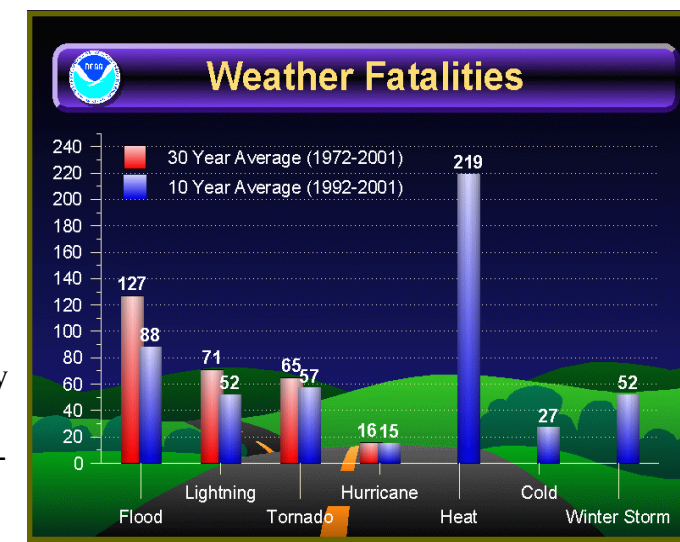
Typically flooding in the county is caused by heavy rainfall associated with high rain producing thunderstorms which move very slowly. In towns, rainfall of one to two inches will cause streets and ditches to flood and make some low water crossings impassable. When rainfall rates reach 3 to 4



inches per hour, major flooding can occur, and amounts over four inches per hour creates significant flooding that affects most of the county.

Floods in Crawford County

24 Sept 1993: Eleven inches of rain fell over Pittsburg which caused Cow Creek to overflow its banks. Floodwaters from Cow Creek inundated Pittsburg and caused \$200,000 damage. As much as 8 feet of water covered the streets in the downtown area and 400 people were evacuated. Some residents called it the worst flooding in history.
26 Sept 1994: County roads were washed out as extremely heavy rain caused streams and creeks to overflow their banks which led to the flooding.



National Weather Fatality Statistics

Rainfall of four inches in four hours was reported near McCune with a 24 hour total through the evening of the 11th of 7.21 inches. Schools were closed that day due to impassable roads.

26 Sept 1996: A large storm system continued to dump heavy rain across the region, with the heaviest in the southeast part of the county from Girard to Pittsburg. Flooding was minor in nature, mostly water over low water crossings. Specifically, water was reported over Highway 57 between Girard and Ringo.

18 May 2001: Numerous county roads were reported flooded throughout the county. The heaviest rainfall totals were concentrated near Pittsburg, Kansas where locally two to four inches fell. Cow Creek, and low water crossings along the creek were especially effected by the flood waters.