



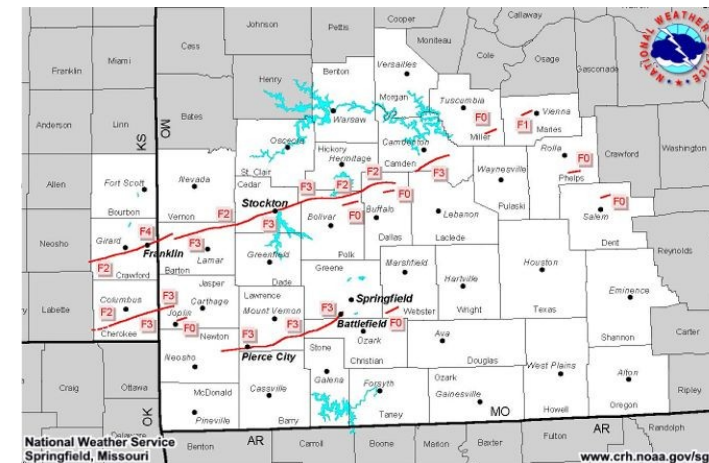
“To provide weather and flood warnings, public forecasts and advisories for all of the United States...and its territories...for the protection of life and property.”

National Weather Service

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National Weather Service

Natural Hazard Risk Assessment Information For: **Miller County Missouri**



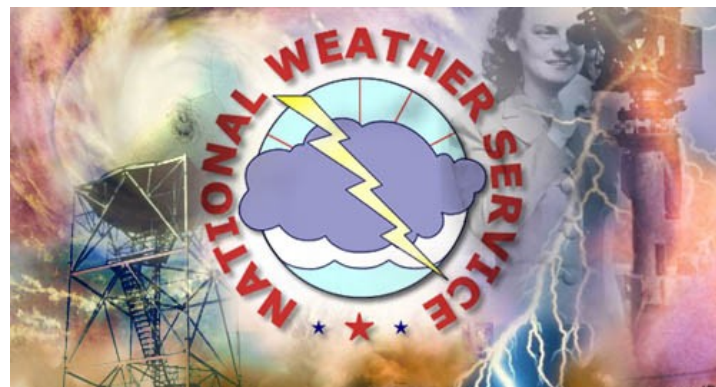
Information Provided By
WFO Springfield, Mo

2009 Update

Includes data and information
through December 2008

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

By Gene Hatch
 Meteorologist Intern WFO Springfield. Mo.

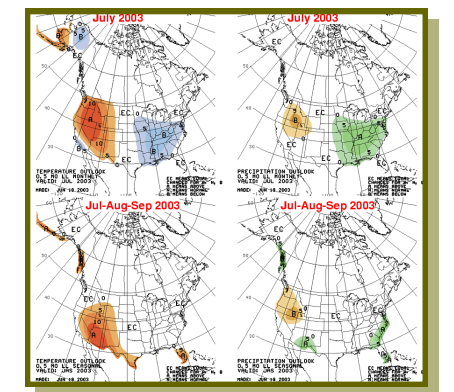
Local Climatology

Averages and records for Eldon, Missouri in Miller County

40	19	4.0	79	-28	23.5
47	25	3.4	85	-28	19.0
58	34	1.7	90	-7	16.2
68	44	0.1	93	10	1.7
76	54	0	102	28	0
85	63	0	106	39	0
90	68	0	115	47	0
89	67	0	112	38	0
81	57	0	108	30	0
70	46	0	96	17	0
55	35	1.2	86	3	13.0
44	24	3.4	77	-25	15.5

Links for Climate information

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



Historic Weather in Southwest Missouri

Jan. 8th-1997...Six inches or more of snow fell over much southwest, south central and central Missouri from noon on the eighth to noon on the ninth. The heaviest snow fell in a band from Cassville to Springfield north to Hermitage where up to ten inches was recorded. Damage estimates at 670K dollars were due to the cost of snow removal.

Apr. 23rd-1967...A severe thunderstorm formed over the northwest portion of the city of Springfield, MO spawning a tornado. The weather service office measured a wind gust of 63 mph as the tornado moved through the center of the city. Nearly 1000 homes and businesses were destroyed with one fatality and 9 injuries reported.

May 4th- 2003...Three tornadic supercell thunderstorms formed over southeast Kansas and moved across the Missouri Ozarks, spawning 13 tornadoes. This was a very rare event for this part of Missouri since many of the tornadoes experienced across this area are short lived small tornadoes.

This event surpassed the December 17-18, 2002 tornado event in both loss of lives and property damage, and exceeded tornado events that occurred over the past 100 Years for this part of Missouri. The hardest hit locations included Battlefield, Stockton and Pierce City. 14 tornadoes resulted in



extensive damage and 24 deaths. Several of the tornadoes tracked long distances ranging from 15 to 80 miles.

May 26th-1997...Thunderstorms over Miller County Missouri a flash flood along the Saline Creek. The water swept away 2 girls while they were camping along the creek. Both girls were killed in the flash flood.

Oct. 5th-1998...Rain and embedded thunderstorms dumped a large area of 4 to 10 inches of rain producing widespread flooding. Most of the flooding was confined to low areas along creeks and highways. The hardest hit areas were in southeast Kansas and west central and central Missouri. Numerous highways were closed due to high water. Some storm highlights: Miller County - Floods washed temporary repairs made to roads from severe flooding in July. West Central and Central Missouri - There were numerous school closings across the area to due to flooded roadways.

Dec. 17-18th-2002...At approximately 1118 pm a tornado struck near Chesapeake Mo. The F2 tornado hit the Lucky Lady trailer park in addition to 1 home northeast and 3 homes southwest of the trailer park. The tornado resulted in 1 fatality and 15 injuries.

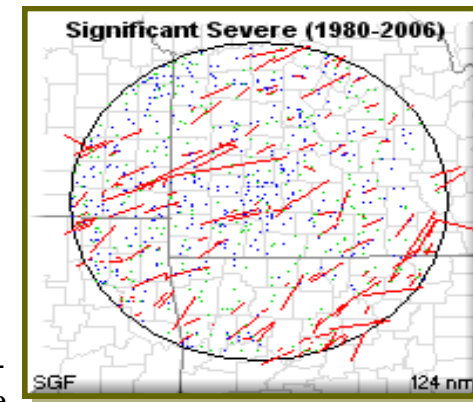


Overview of Weather Hazards in Southwest Missouri & Extreme Southeast Kansas

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

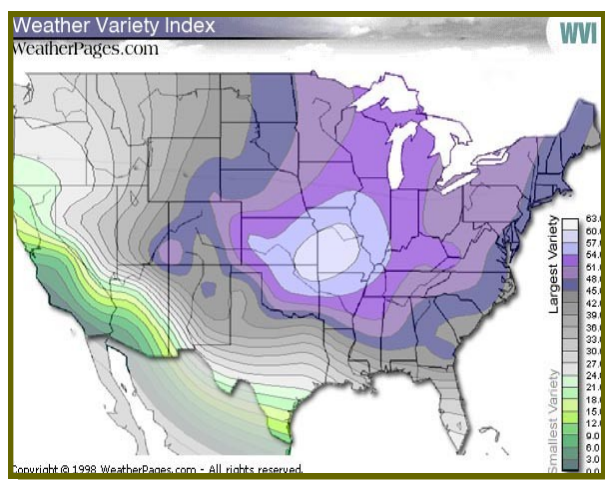
Tornadoes by county for the Springfield County Warning Area from 1950 to 2008

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 Miller County, Missouri

Severe Weather in Miller County

In 2000, a private company looked at 277 cities across the United States. They rated each city on variations in temperature, precipitation and other factors. Of all the cities in their study Springfield, Missouri rated number one as the city with the most variable weather in the U.S.

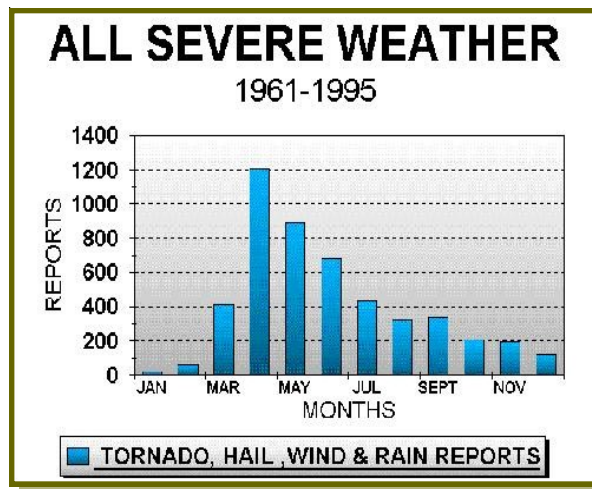


From www.weatherpages.com

Miller County Missouri is located on the Ozark Plateau along the eastern edge of tornado ally. Because of its location Miller County is subjected to severe thunderstorms, heavy rainfall, winter storms, flooding, ice storms, droughts, tornadoes and other wind storms.

When does severe weather occur ?

Severe weather in the Ozarks 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.



Severe thunder storms in Miller County have dropped hail up to 2 1/2" in diameter, created winds in excess of 90 miles an hour and rainfall rates greater than 2" in an hour. While southwest Missouri receives nearly 11 tornadoes a year, Miller County averages an event every 2 years.

Number of Tornadoes in Miller Co. (1950 to 2008)

F0/F1	F2	F3	F4	F5
22	3	0	0	0
88%	12%	0%	0%	0%

During the winter season Miller County averages 13.8 inches of snow. With the most snow in one season at 36.7 inches, falling during the 1978 to 1979 winter season. Ice storms also affect the county during the winter season causing significant damage to homes, trees and utilities.

Dam Failure

Dams in Miller County

Miller County contains 11 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. Most of the dams in Miller County are of earthen construction and there have been no recorded failures. Bagnell dam, as a hydroelectric dam, is the most significant dam in Miller county.

Where are they Located

- Bagnell Dam: Osage River, Bagnell
- Groff Upper Dam: Tavern Creek, Iberia
- Groff Lower Dam: Tavern Creek, Iberia
- Bittle Lake Dam: Jack Buster Creek, Ettersville
- Munson Dam: Jack Buster Creek, Ettersville
- Town & Country Lake Dam: East Fork Little Gravois Creek, Bagnell
- Ortmeyer Lake Dam: Osage River, St. Elizabeth
- Lake Ja-Ha Dam: Blythes Creek, Eldon
- Butzer Lake Dam: Osage River, St. Elizabeth
- Helton Lake Dam: Brockman Branch, St. Anthony
- Prock's Dam: Coon Creek, Ulman



Most of the dams in Miller County are less than 100 feet high. Many are located on private land and fall under private ownership.



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, it is not surprising that excessive heat impacts Miller county on almost a yearly basis.

Miller County averages 18 days a year with temperatures at or above 95 degrees. July and August are the two warmest months, which average 7 days at or above 95 degrees.

Year	Days 95* +	Days 100* +	Days in a row
1901	53	4	9
1913	62	0	5
1921	45	0	0
1953	59	5	10
1980	50	21	15
1983	42	9	9
Normal # of Days	18	2	▲ Above 95*

Years with above average summer heat

Drought and wildfires can, and often do accompany excessive heat. Miller 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 Miller County

- 33 days: 18 Dec 1901 ~ 19 Jan 02
- 32 days: 5 Dec 1912 ~ 5 Jan 13
- 28 days: 3 Nov 1936 ~ 30 Nov 36
- 28 days: 1 Sept 1939 ~ 28 Sept 39
- 28 days: 21 Dec 1985 ~ 17 Jan 85
- 28 days: 16 Aug 1976 ~ 12 Sept 76

While no major wildfires have affected Miller County, small grass fires do pose a hazard.

A twenty year study by the Missouri Department of Conservation, from 1970 to 1989 determined that over 11,000 fires occurred during that time in the Lake Ozark fire district which includes Morgan, Miller, Camden, Dallas and Laclede counties. This represented nearly 20% of the wildfires in the state with over 131,000 acres burned.

There are numerous ways wildfires can be started, but when dealing with weather related phenomenon, namely lightning, only 0.8% of the wildfires in the Lake Ozark fire district were the result of lightning.

Tornado Information

Miller County lies at the eastern edge of tornado ally and receives on average a tornado every three years. From 1950 to 2008 Miller county recorded 25 tornadoes from F0 to F2 in strength. The strongest tornado, an F2, passed across the county on the early morning of October 3rd, 1986. Along its 7 mile track it caused 2.5 million dollars in damage.

Historical Tornadoes of Miller County

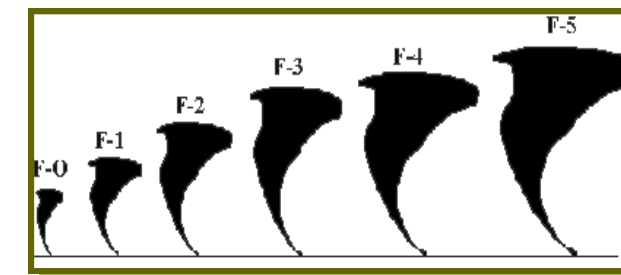
- Apr 18, 1880 (F4) 0 inj, 0 dead
- Mar 5, 1961 (F2) 0 inj, 0 dead
- Oct 14, 1966 (F2) 0 inj, 0 dead
- May 28, 1978 (F1) 5 inj, 0 dead
- Oct 3, 1986 (F2) 0 inj, 0 dead
- Jun 7, 1990 (F1) 0 inj, 0 dead
- Oct 23, 2001 (F1) 1 inj, 0 dead
- May 6, 2003 (F0) 0 inj, 0 dead

For the Record Miller County

- Has experienced one F4 tornadoes.
- No F5 tornadoes
- Most recent Tornado July 5, 2004 (F1)
- 0 deaths and 6 injuries since 1880.

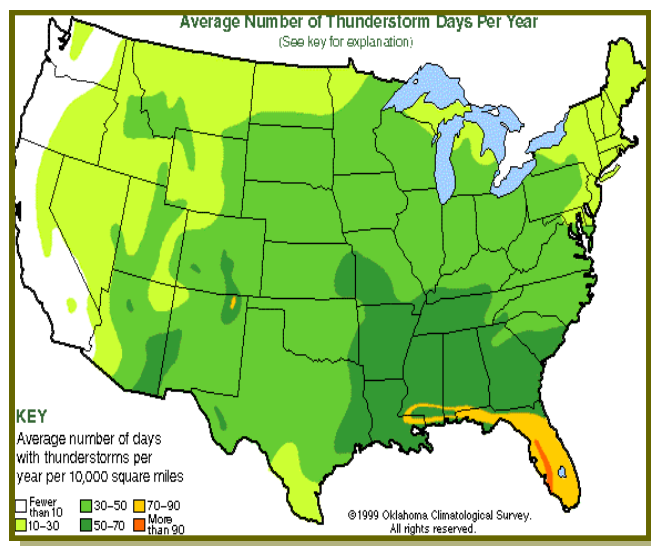


The tornado outbreak of May 4 & 6, 2003 was one of the worst that southwest Missouri has had since the late 1800's. Thirty tornadoes touched down across the Ozarks between May 4th and 6th, one of which was an F0 that struck near the town of Eldon. This F0 touched down on May 6th and is the latest tornado to strike Miller county since an F0 that struck near Iberia on May 4th of 2003.



- **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 occur in the months of April, May and June with the largest report being 2.50 inches in diameter in Miller county on March 15, 1984. Hail can cause considerable damage to homes, vehicles, and crops.

Severe thunderstorm 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 Miller county reached 91 mph and occurred in 1990 on the 15th of June. Since 1957 high winds have caused around \$462,000.00 in damages.

With any thunderstorm, lightning will be present and the safest place to be is indoors. In August of 2002, four people were killed near Willard in Greene County during a funeral. As a thunderstorm moved into the area, the victims sought shelter under a tree.



Nationally, Missouri ranks 27th in Lightning fatality rate, 44th in injuries and 38th in property damage related to lightning. During the period from 1960 to 1994, the total number of lightning casualties in Missouri was 165. This is nearly five 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.

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21 Feb 2001: Sleet, freezing rain and embedded thunderstorms caused ice accumulations from one quarter, up to two inches in places across southwest, central and south central Missouri. The heaviest ice accumulations occurred along and north of Highway 60, and along the I-44 corridor. Howell-Oregon electric cooperative reported numerous power outages due to the ice around the communities of Willow Springs, Birch Tree, Mountain View, Winona, Eminence and Dora.

Flooding

From 1993 to 2002 Flooding has occurred in Miller County in every year. While usually nuisance flooding such as water on city streets, significant flooding has caused numerous problems in the county. During the previous decade, only one injury and no deaths have been attributed to flooding in Miller County. Miller 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, major flooding can occur, and amounts over four inches creates significant flooding that affects most of the county.

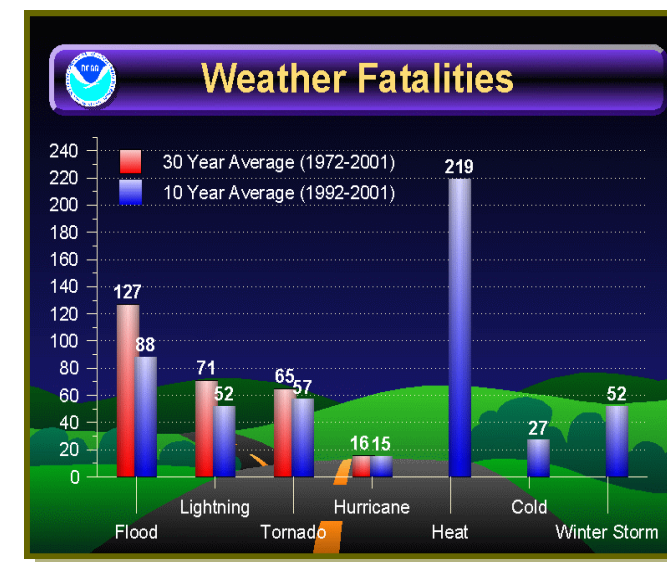


Floods in Miller County

14 Sept 1993: The county sheriff reported flash flooding from the Tavern Creek which covered part of Highway 52 southeast of Saint Elizabeth. Parts of County Road C near Highway 42 were covered with as much as one foot of water.

27 May 1995: Heavy rain caused flooding on Highway 17 between Iberia and Crocker. The water rose as high as two feet over the road. Most other flooding occurred in the usual flood prone locations including the lower bridges in the south half of the county.

26 May 1997: A flash flood along the Saline Creek



National Weather Fatality Statistics

swept away 2 girls while they were camping along the creek.

19 Aug 1997: Highway 17 was briefly flooded near the intersection of Highway K. A large complex of thunderstorms produced 3 to 5 inches of rain in a band from just north of Nevada to near Rolla. The previous three weeks had been very dry across the region, so flooding problems were minor.

17 Mar 1998: Over an inch of rain fell during the afternoon causing flooding of several low water crossings. County roads along Highway 17 and Highway 52 north and east of Tuscumbia were most impacted. Highway 52, 2 miles east of St. Elizabeth, was closed during the evening.

3 Apr 2001: Significant street flooding occurred around the Eldon area. Rainfall totals averaged around two inches countywide, with isolated totals of three to four inches near Iberia, Brays and St. Anthony.