



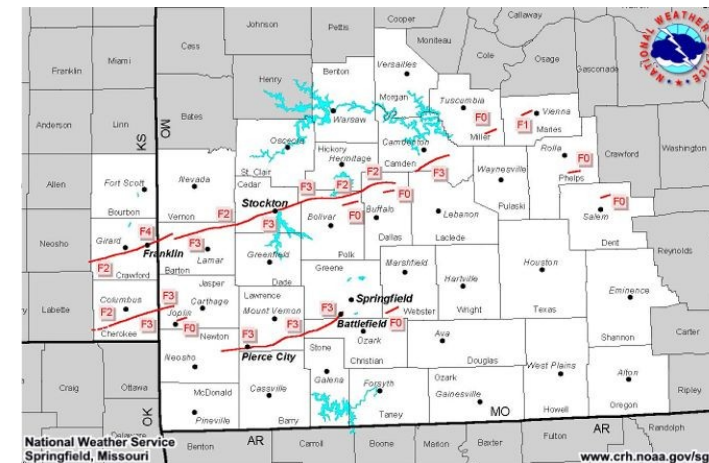
"To provide weather and flood warnings, public forecasts and advisories for all of the United States...and its territories...for the protection of life and property."

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National Weather Service

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



Information Provided By
WFO Springfield, Mo

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NOTE: The climatological data in this document is for West Plains , Missouri. No continuous climate information was available for locations within Shannon County. Climate data is normally obtained by a cooperative observer in each county. Due to the inconsistent nature of the observations in Shannon County a climatological mean could not be established.



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

By Gene Hatch
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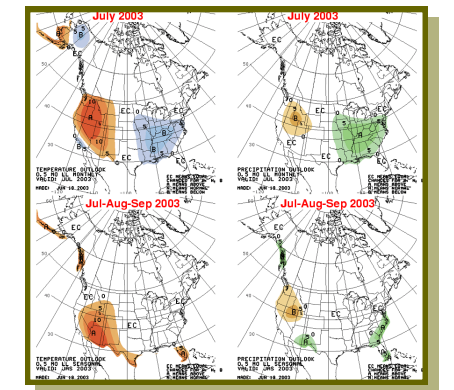
Local Climatology

Averages and records for West Plains, Missouri in Howell County

43	22	3.6	77	-18	18.2
50	26	3.4	87	-21	23.8
59	34	2.1	89	-3	16.4
69	43	0.2	91	19	5.0
76	53	0	95	28	0
84	61	0	105	39	0
90	66	0	107	46	0
89	64	0	106	40	0
81	57	0	103	31	0
71	44	0.1	94	19	2.5
57	34	0.7	84	5	9.3
46	25	2.0	78	-13	14.0

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.

Mar. 12th-1961...A tornado touched down at 745 am in southern Greene County and moved northeast from near Plainview road towards the KWTO towers. The tornado blew down 2 of KWTO's towers, damaged the roof on the Disney school and damage 3 other homes.

Apr. 21st-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.



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.

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.

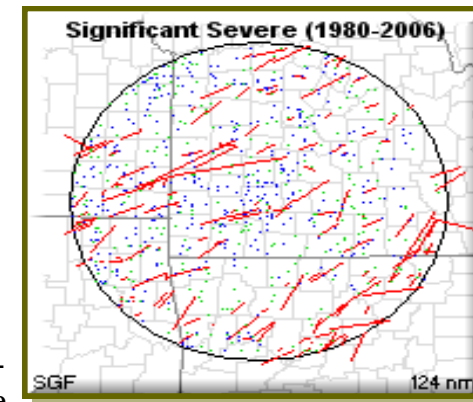


Overview of Weather Hazards in Southwest Missouri & Extreme Southeast Kansas

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

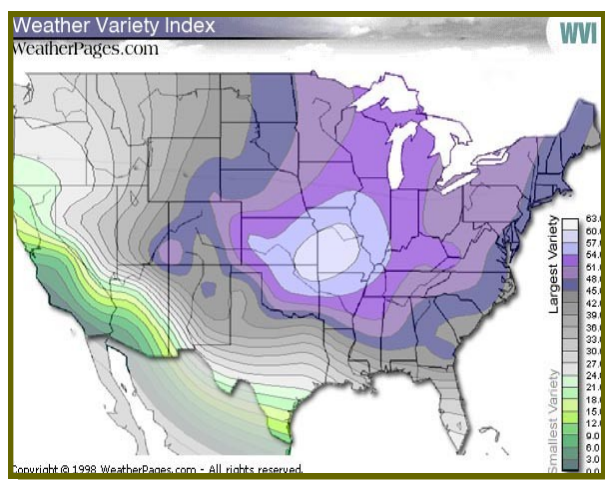
Tornadoes by county for the Springfield County Warning Area from 1950 to 2008

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	WEBTSE	19	7	2	0	0
												WRIGHT	10	4	0	1	0

Historical information for Shannon County, Missouri

Severe Weather in Shannon 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.

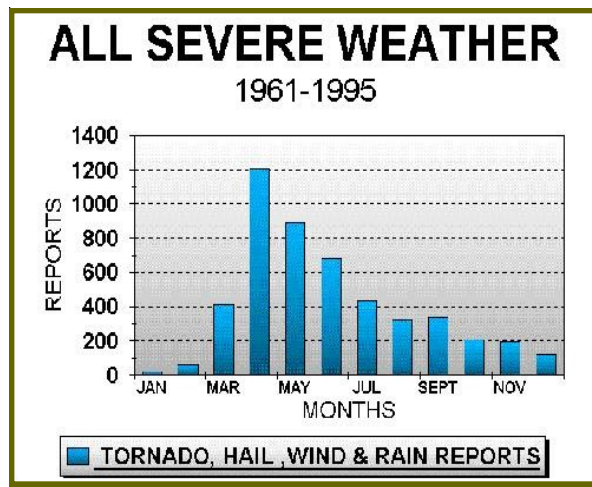


From www.weatherpages.com

Shannon County Missouri is located on the Ozark Plateau along the eastern edge of tornado ally. Because of its location Shannon 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 Shannon County have dropped hail up to 2 1/2" in diameter, created winds in excess of 80 miles an hour and rainfall rates greater than 2" in an hour. While southwest Missouri receives nearly 11 tornadoes a year, Shannon County averages an event every 4 1/2 years.

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

<u>F0/F1</u>	<u>F2</u>	<u>F3</u>	<u>F4</u>	<u>F5</u>
11	1	1	0	0
85%	12.5%	12.5%	0%	0%

During the winter season Howell County averages 12.1 inches of snow. With the most snow in one season at 39.3 inches, falling during the 1980 to 1981 winter season. Ice storms also affect the county during the winter season causing significant damage to homes, trees and utilities.

Dam Failure

Dams in Shannon County

Shannon County contains 7 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 Shannon County are of earthen construction and there have been no recorded failures.

Where are they Located

- Loggers Lake Dam: Mill Creek, Round Springs
- Hellmuth Lower Dam: Sinking Creek, Round Springs
- Hellmuth Upper Dam: Sinking Creek, Round Springs
- Colwil Dam: Matthews Branch, Van Buren
- Deel Lake Dam: Hillman Hollow Shawnee Creek, Owls Bend
- Hunt Lake Dam: Pine Creek, Winona
- Alton Club Lake Dam: Current River, Round Springs



Most of the dams in Shannon 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 Shannon county on almost a yearly basis.

Howell County averages 14 days a year with temperatures at or above 95 degrees. July and August are the two warmest months, which average 5 days at or above 95 degrees.

Year	Days 95* +	Days 100* +	Days in a row
1952	39	12	15
1953	48	17	9
1954	54	22	9
1980	53	19	16
1983	32	7	15
1990	31	5	7
Normal # of Days	14	3	▲ Above 95*

Years with above average summer heat

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

- 40 days: 16 Aug 1976 ~ 24 Sept 76
- 33 days: 13 Sept 1963 ~ 15 Oct 63
- 32 days: 12 Aug 1998 ~ 12 Sept 98
- 29 days: 28 Sept 1964 ~ 26 Oct 64
- 28 days: 21 Dec 1985 ~ 17 Jan 85
- 26 days: 7 Dec 1950 ~ 1 Jan 51

While no major wildfires have affected Shannon 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 4000 fires occurred during that time in the Eminence fire district which includes Shannon, Oregon, Carter, and Ripley counties. This represented nearly 7% of the wildfires in the state with over 43,000 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 Eminence fire district were the result of lightning.

Tornado Information

Shannon County lies at the eastern edge of tornado ally and receives on average a tornado every seven years. From 1950 to 2008 Shannon county recorded 13 tornadoes from F0 to F3 in strength. The strongest tornado, an F3, passed across the county on the evening of October 18th, 1984. Along its 16 mile track it caused 2.5 million dollars in damage and killed 1.

Historical Tornadoes of Shannon County

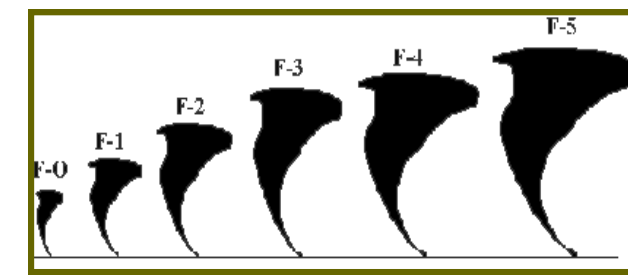
- Apr 13, 1911 (F3) 0 inj, 0 dead
- May 30, 1917 (F2) 0 inj, 0 dead
- Nov 11, 1924 (F2) 2 inj, 0 dead
- Jan 29, 1947 (F3) 5 inj, 5 dead
- May 21, 1957 (F4) 2 inj, 0 dead
- Nov 24, 1973 (F3) 1 inj, 3 dead
- Oct 18, 1974 (F2) 0 inj, 1 dead

For the Record Shannon County

- Has experienced one F4 tornado.
- No F5 tornadoes
- Most recent Tornado January 8, 2008 (F1)
- 9 deaths and 10 injuries since 1880.

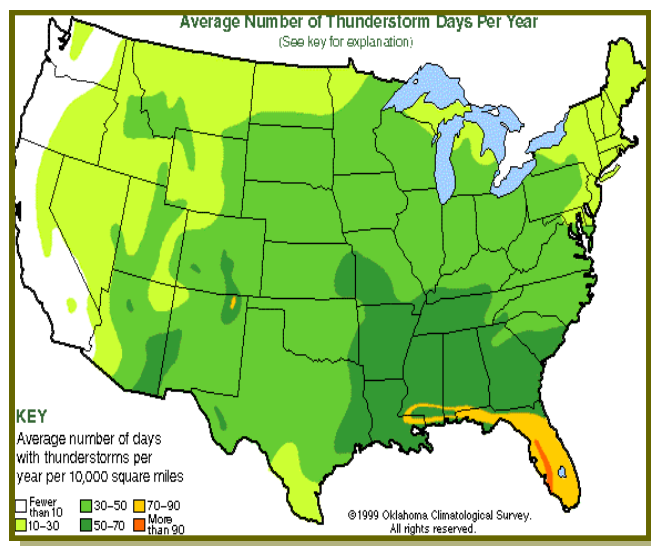


The tornado outbreak of May 4, 2003 was the one of the worst that southwest Missouri has had since the late 1800's. Fourteen tornadoes touched down across the Ozarks during the evening of May 4th one of which was an F3 that struck the town of Battlefield. The latest tornado to strike Shannon county since was an F0 that struck Midridge in June of 1995.



- **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



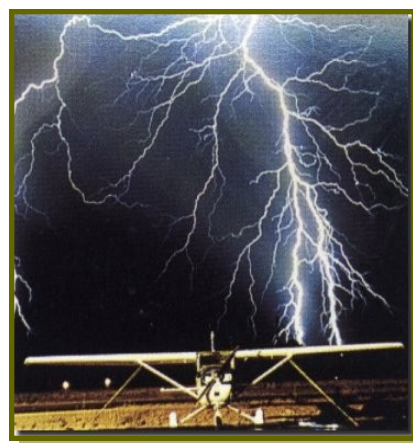
Average number of thunderstorm days per year.

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 Shannon county on March 20, 1976. 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 Shannon county reached 81 mph and occurred in 1998 on the 18th of June. Since 1967 high winds have caused around \$158,000.00 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.

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 Shannon 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 Shannon County. Shannon 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

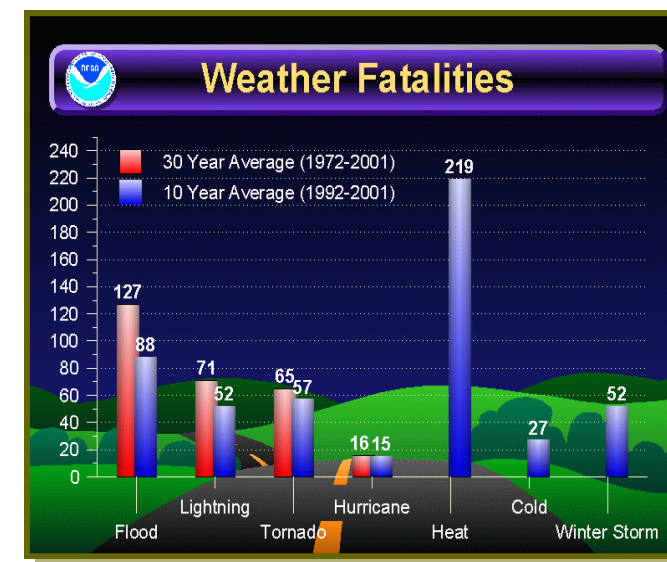
inches, major flooding can occur, and amounts over four inches creates significant flooding that affects most of the county.



Floods in Shannon County

14 Nov 1993: Very heavy rain caused widespread flash flooding across Shannon County. In Winona, numerous people were evacuated when six feet of water quickly flooded homes from very heavy rain. Around 1700 CST, approximately one mile east of Eminence, an elderly man was killed when his truck was washed off Route 106 by flood water from the Jacks Fork River.

20 Jun 1998: Rainfall from a complex of thunderstorms dropped 3 to 4 inches of rain in a short time in some areas. Numerous low water crossings were flooded. Camp grounds in Round Springs in Shannon County were flooded.



National Weather Fatality Statistics

17 May 2002: This was the third major flood event to occur within a 10 day period. Some communities reported over a foot of rain since the beginning of May. This area of excessive rainfall fell over mostly southern Missouri, south of Interstate 44 from the night of May 16, through the morning May 17th. Over an inch of rain fell over a broad area of southern Missouri, with bands of three to six inches from Joplin to Carthage, Powell to Cassville, Ozark to Mansfield, and from Licking to Akers in northern Shannon County. Even though there were three days of dry weather, runoff was not complete from the previous flooding event, therefore, flash flooding developed quickly.

19 Jul 2002: Two to four inches of rain fell over southern Shannon, southern Texas, and northern Howell County during the morning of July 19th. Numerous low water crossings were flooded across southern Shannon County, plus Highway 17 near Mountain View was closed due to the flooding. Major street flooding was also reported in Cabool.