



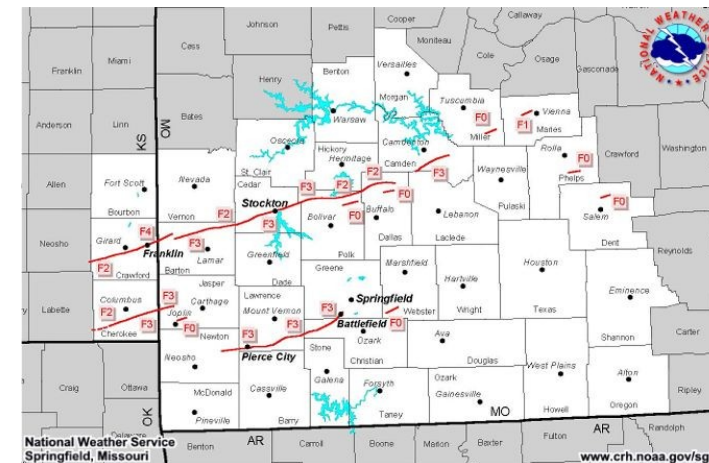
"To provide weather and flood warnings, public forecasts and advisories for all of the United States...and its territories...for the protection of life and property."

National Weather Service

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National Weather Service

Natural Hazard Risk Assessment Information For: Barton 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 Barton County and the communities with in the county.

By Gene Hatch
 Meteorologist Intern WFO Springfield. Mo.

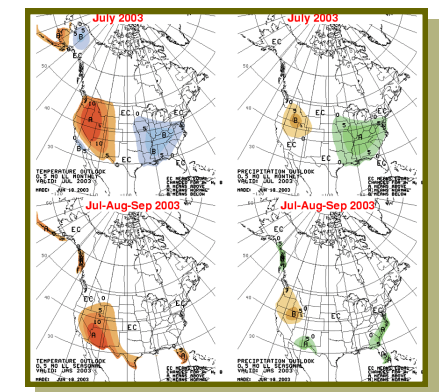
Local Climatology

Averages and records for Lamar, Missouri in Barton County

	Normal High	Normal Low	Normal Precip.	Normal Snow	Record High	Record Low	Record Precip.	Record Snow
Jan	41	21	1.94	3.9	77	-22	7.16	21.5
Feb	47	25	2.20	2.7	86	-28	7.20	16.0
Mar	57	34	3.96	1.3	93	-12	10.17	22.0
Apr	68	44	4.42	0.1	95	15	13.04	2.7
May	75	54	5.42	0	97	29	16.09	0
Jun	84	63	5.49	0	107	41	14.66	0
Jul	89	68	4.62	0	113	49	18.43	0
Aug	89	66	3.69	0	113	43	13.87	0
Sept	81	57	5.39	0	105	25	18.96	0
Oct	71	46	4.27	0	100	16	15.52	0
Nov	56	35	4.37	1.0	88	2	11.22	10.0
Dec	45	25	2.88	2.7	76	-15	8.08	14.5

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.

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. 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.

Sept. 28 - 1998...Thunderstorms developed late in the evening in southeast Kansas and moved into the Missouri Ozarks into the early morning hours of the 29th. The thunderstorms developed into a squall line as it moved across the area. 69 mph gusts were reported in Barton County and numerous other re-



ports of tree damage from high winds was reported.

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. In Barton County, 10 persons were evacuated in southern Lamar as Muddy creek rose rapidly. Miller County - Floods washed temporary repairs made to roads from severe flooding in July.

Nov. 25th-1993...Heavy rain producing thunderstorms moved across southwest Missouri which produced flash flooding in Lamar. Numerous homes were damaged estimated near 500K dollars and 50K dollars of area crops were lost as they lay underwater.

Dec. 20th-1998...Periods of light rain, freezing rain, freezing drizzle, and light snow caused numerous traffic accidents across southern and central Missouri. The most prolonged period of freezing drizzle and light snow occurred in west central and central Missouri from areas around Lamar and Nevada, MO to the Lake of the Ozarks region. Hundreds of traffic accidents were reported across southern Missouri. Three fatalities occurred as a result of this storm.

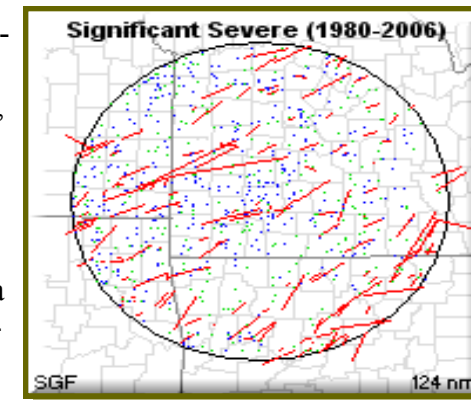


Overview of Weather Hazards in Southwest Missouri & Extreme Southeast Kansas

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

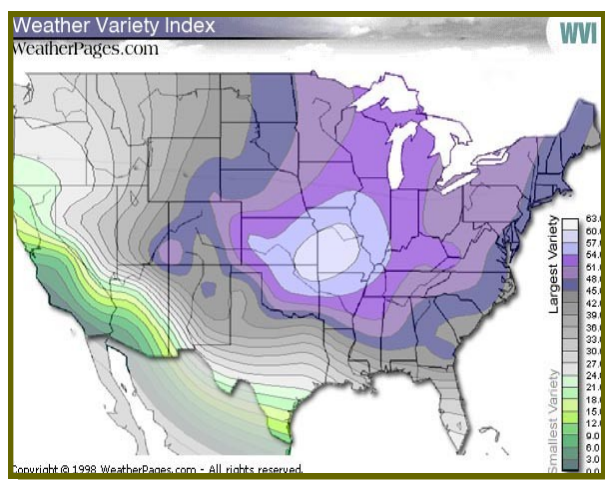
Tornadoes by county for the Springfield County Warning Area from 1950 to 2008

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 Barton County, Missouri

Severe Weather in Barton 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.

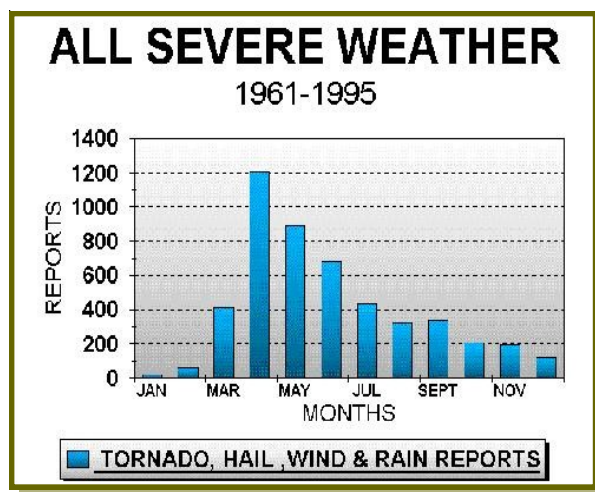


From www.weatherpages.com

Barton County Missouri is located on the Ozark Plateau along the eastern edge of tornado ally. Because of its location Barton 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 thunderstorms in Barton County have dropped hail up to 3" in diameter, created winds in excess of 80 miles an hour and rainfall rates greater than 3" in an hour. While southwest Missouri receives nearly 11 tornadoes a year, Barton County averages an event every 2 years.

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

F1	F2	F3	F4	F5
23	1	3	1	0
82%	4%	10%	4%	0%

During the winter season Barton County averages 11.7 inches of snow. With the most snow in one season at 38 inches, falling during the 1957 to 1958 winter season. Ice storms also affect the county during the winter season causing significant damage to homes, trees and utilities.

Dam Failure

Dams in Barton County

Barton County contains 18 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 Barton County are of earthen construction and there have been no recorded failures.

Where are they Located

- Lamar Lake Dam: North Fork, Lamar
- Gardener Farms Lake Dam: Glendale Fork, Medoc
- Clafin Lake Dam: Clear Creek, Dederick
- Emery Lake Dam: Elm Branch, Lamar
- Moss Lake Dam: Glendale Fork, Medoc
- Prairie Lake Dam: Glendale Fork, Medoc
- Gardener Farms Lake Dam: Bucks run Creek, Medoc
- Sagehorn Lake Dam: Pettis Creek, Lamar
- Marti Lake Dam: Duval Creek, Lamar
- Berryhill Lake Dam: North Fork, Lamar
- Diggs Lake Dam: West Fork, Lamar
- Garfield Lake Dam: West Fork, Lamar
- Curless Lake Dam: Little Dry Wood, Lamar
- Wood Lake Dam: McCarty Creek, Dederick
- Richards Lake Dam: North Fork, Boston
- Ed Onstott Lake Dam: North Fork, Galena, Ks.
- Louge Lake Dam: East Fork Dry Wood, Iantha



- Rose Lake Dam: First Nicholson Tributary: Iantha

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

Barton County averages 20 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.

Years with above average summer heat

Year	Days 95* +	Days 100* +	Days in a row
1901	62	29	36
1913	66	28	19
1934	64	38	19
1936	79	61	22
1939	58	17	19
1980	59	30	26
Normal # of Days	20	6	▲ Above 95*

pany excessive heat. Barton County has gone through dry periods and drought. The latest droughts occurred in 1999, 2000 and 2003 when well below normal rainfall and high temperatures combined to produce drought conditions.

Longest periods without rainfall in Barton County

- 59 days: 11 Oct 1904 ~ 8 Dec 04
- 46 days: 3 Sept 1979 ~ 18 Oct 79
- 46 days: 19 Dec 1985 ~ 2 Feb 86
- 45 days: 6 Oct 1893 ~ 19 Nov 93
- 43 days: 8 Oct 1950 ~ 19 Nov 50
- 42 days: 22 Dec 1960 ~ 11 Jan 61

While no major wildfires have affected Barton 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 5600 fires occurred during that time in the Neosho fire district which includes Barton, Jasper, Newton, McDonald, Lawrence and Barry counties. This represented nearly 10% of the wildfires in the state with over 88,000 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 Neosho fire district were the result of lightning.

Drought and wildfires can, and often do accom-

Tornado Information

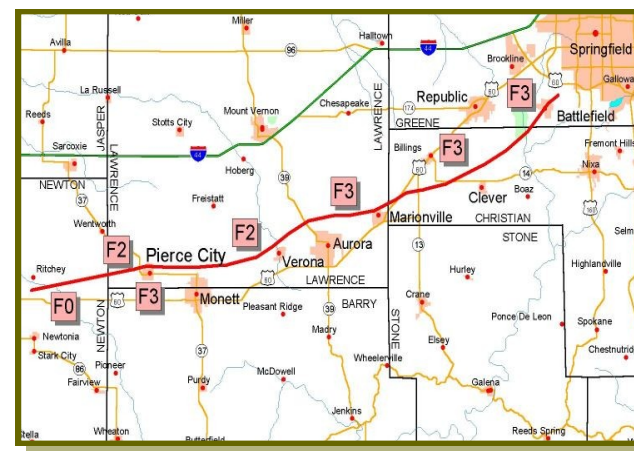
Barton County lies at the eastern edge of tornado ally and receives on average a tornado every three years. From 1950 to 2002 Barton county recorded 16 tornadoes from F0 to F3 in strength. The strongest tornado, an F3, passed across the county on the evening of March 15th, 1982. Along its 14 mile track it caused 25 million dollars in damage.

Historical Tornadoes of Barton County

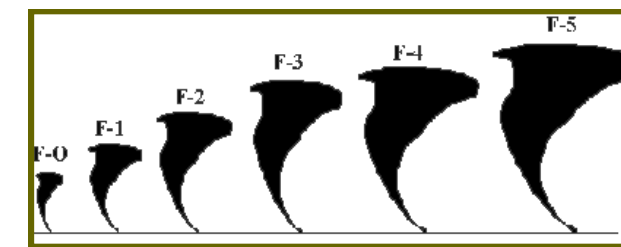
- Apr 20, 1929 (F3) 6 inj, 0 dead
- Sept 21, 1931 (F2) 5 inj, 0 dead
- Mar 14, 1938 (F2) 1 inj, 0 dead
- Mar 24, 1954 (F2) 0 inj, 0 dead
- Nov 17, 1958 (F2) 1 inj, 0 dead
- Mar 15, 1982 (F3) 0 inj, 0 dead
- May 5, 2003 (F4) 10 inj, 1 dead

For the Record Barton County

- Has experienced one F4 tornado.
- No F5 tornadoes
- Most recent Tornado May 13, 2008 (F0)
- 1 death and 21 injuries since 1880.

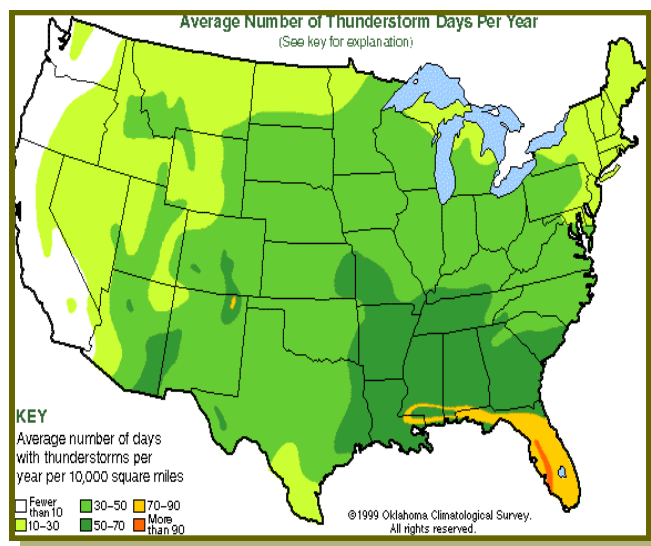


An F0 tornado initially touched down 2 miles west of Jasper, Mo. The tornado continued into Barton county where it was rated F1. The tornado struck 5 miles north northwest of Jasper, Mo and destroyed a trailer and uprooted trees with 2 injured. The tornado then destroyed three houses near Boston, Mo. At Kenoma, Mo. the tornado destroyed a trailer , barn and two homes resultig in 1 fatality and 2 injuries.



- **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 3.00 inches in diameter in Barton county on April 4, 1969. 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 Barton county reached 86 mph and occurred in 1998 on the 30th of September. Since 1957 high winds have caused around \$373,000.00 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 Barton 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 Barton 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, no injuries and three deaths have been attributed to flooding in Barton County. Barton 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

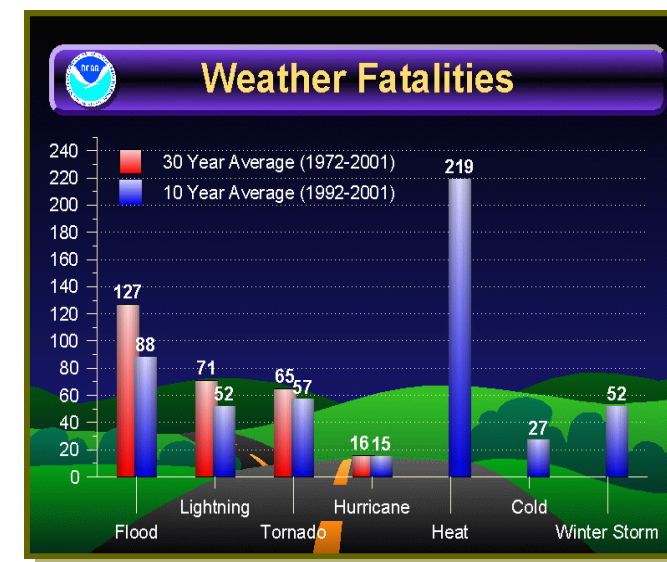


inches, major flooding can occur, and amounts over four inches creates significant flooding that affects most of the county.

Floods in Barton County

24 Sept 1993: Flash flooding was reported along Highway 71 south of Lamar. A 70-year old man was killed when his 4-wheel drive vehicle was washed off the highway.

22 July 2000: Thunderstorms dropped 2 to 4 inches of rain over portions of southwest Missouri. Some areas received 2 inches of rain in one hour. The heavy rain resulted in brief flooding of streets and low water crossings. In Barton County, Highway 126 was flooded 5 miles east of the Kansas state line. In Jasper County, Highway 171 was flooded between Asbury and the Kansas state line.



National Weather Fatality Statistics

In Greene County, widespread street flooding occurred in Springfield.

20 Jun 2000: Thunderstorms developed over eastern Kansas and west central Missouri during the late afternoon hours of June 20th. The storms moved south into southwest Missouri during the evening and overnight hours. Rainfall of 2 to 5 inches occurred over a large area, with the heaviest rain affecting central and southwestern Newton County. Most of the flooding across the area consisted of brief road closures due to low water crossing flooding. The hardest hit area was the city of Neosho in Newton County where 6 homes and an apartment complex were evacuated. No serious structural damage to these dwellings was reported. A Newton County low water bridge on Coyote Drive collapsed from the flooding on Five Mile Creek.