



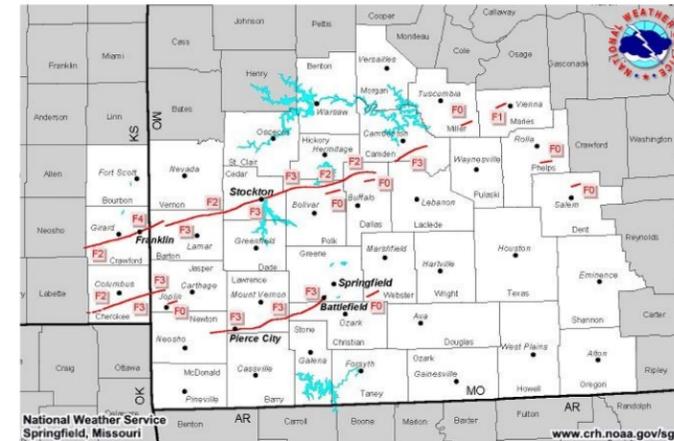
“To provide weather and flood warnings, public forecasts and advisories for all of the United States...and its territories...for the protection of life and property.”

National Weather Service

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National Weather Service

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

By Gene Hatch
 Meteorologist Intern WFO Springfield. Mo.

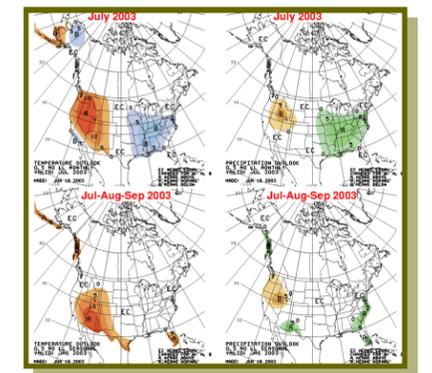
Local Climatology

Averages and records for Licking, Missouri in Texas County

40	19	5.7	76	-24	21.5
46	24	3.6	83	-19	13.7
56	33	2.7	87	-17	18.0
67	42	0.1	90	16	3.0
75	52	0	96	25	0
83	61	0	104	36	0
88	65	0	114	42	0
87	64	0	106	38	0
79	55	0	104	29	0
69	43	0	93	11	1.0
55	34	1.0	84	-1	17.5
43	23	2.8	76	-19	18.2

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

Feb. 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.



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.

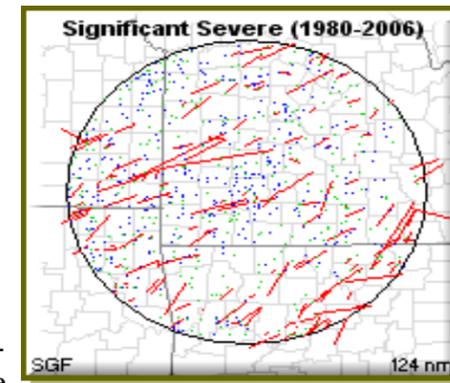


This event surpassed the December 17-18, 2002 tornado event in both loss of lives and property damage, and exceeded tornado events that occurred over the past 100 Years for this part of Missouri. The hardest hit locations included Battlefield, Stockton and Pierce City. 14 tornadoes resulted in extensive damage and 24 deaths. Several of the tornadoes tracked long distances ranging from 15 to 80 miles.

Nov. 18th-1999...From the 18th through the 21st, fires burned 1500 acres in the western sections of the Mark Twain National Forest. Eleven suspected arson fires also burned 1100 acres near Salem in Dent County. Other large fires of over 1000 acres occurred near Roby in northern Texas County and near Fort Leonard Wood in southern Pulaski County. Numerous other smaller fires started over the area on the 18th and continued for two to three days until they were considered under control. The intensity and magnitude of these fires were unusual for the area. Although most of the fires were confined to grassland and near surface material, the high winds and dry conditions caused by several months of below normal rainfall caused some larger scale fires with the burning of larger trees.

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.



Weather in the Ozarks

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.

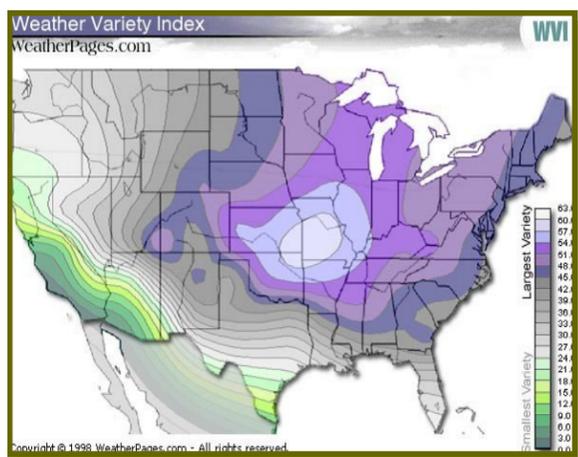
Tornadoes by county for the Springfield County Warning Area from 1950 to 2008

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 Texas County, Missouri

Severe Weather in Texas 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.

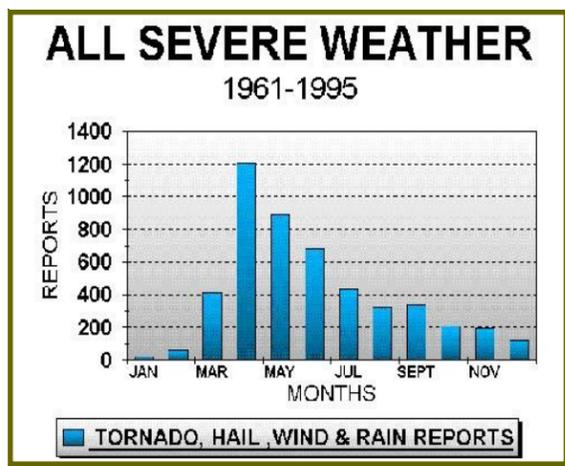


From www.weatherpages.com

Texas County Missouri is located on the Ozark Plateau along the eastern edge of tornado ally. Because of its location Texas 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 Texas County have dropped hail up to 4 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, Texas County averages an event every 2 years.

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

<u>F0/F1</u>	<u>F2</u>	<u>F3</u>	<u>F4</u>	<u>F5</u>
14	8	1	2	0
56%	32%	4%	8%	0%

During the winter season Texas County averages 15.9 inches of snow. With the most snow in one season at 30.5 inches, falling 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 Texas County

Texas County contains 5 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 Texas County are of earthen construction and there have been no recorded failures.

Where are they Located

- Austin Community Dam: Beaver Creek, Manes
- Lake Gemay Dam: North Prong Jacks Fork River, Alley Springs
- Roby Lake Embankment # 2: Little Paddy Creek, Roby
- Roby Lake Embankment # 1: Little Paddy Creek, Roby
- Hutcheson Lake Dam: Indian Creek, Houston

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



Spillway gates open to relieve water after heavy rainfall.



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 Texas county on almost a yearly basis.

Texas County averages 10 days a year with temperatures at or above 95 degrees. July and August are the two warmest months, which average 4 days at or above 95 degrees.

Year	Days 95* +	Days 100* +	Days in a row
1952	28	2	8
1953	38	5	8
1954	41	17	6
1980	52	27	17
1983	32	8	9
2000	20	8	9
Normal # of Days	10	2	▲ Above 95*

Years with above average summer heat

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

- 40 days: 11 Dec 1980 ~ 19 Jan 81
- 34 days: 12 Sept 1963 ~ 15 Oct 63
- 30 days: 26 Jun 1985 ~ 25 Jul 85
- 30 days: 14 Aug 1999 ~ 12 Sept 99
- 29 days: 2 Sept 1948 ~ 6 Oct 48
- 29 days: 15 Aug 1998 ~ 12 Sept 98

While no major wildfires have affected Texas County, small grass fires do pose a hazard. of Conservation, from 1970 to 1989 determined that over 8700 fires occurred during that time in the West Plains Fire district which includes Wright, Texas, Douglas, Ozark and Howell counties. This represented nearly 15% of the wildfires in the state with over 114,000 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 West Plains fire district were the result of lightning.

Tornado Information

Texas County lies at the eastern edge of tornado ally and receives on average a tornado every two years. From 1950 to 2008 Texas county recorded 25 tornadoes from F0 to F4 in strength. The strongest tornado, an F4, passed across the county on the night of March 25th, 1954. Along its 5 mile track it caused 25 thousand dollars in damage and killed 2.

Historical Tornadoes of Texas County

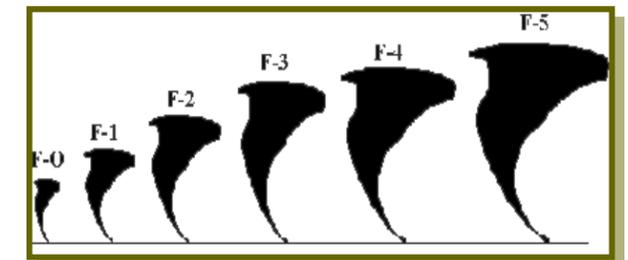
- Apr 18, 1880 (F2) 17 inj, 1 dead
- Apr 29, 1909 (F3) 5 inj, 2 dead
- May 30, 1917 (F4) 10 inj, 6 dead
- May 30, 1917 (F4) 8 inj, 2 dead
- Apr 29, 1937 (F3) 2 inj, 0 dead
- May 10, 1954 (F2) 0 inj, 0 dead
- Dec 8, 1966 (F2) 0 inj, 0 dead
- Mar 24, 1988 (F2) 5 inj, 0 dead

For the Record Texas County

- Has experienced four F4 tornadoes.
- No F5 tornadoes
- Most recent Tornado September 11, 2008 (F0)
- 13 deaths and 46 injuries since 1880.

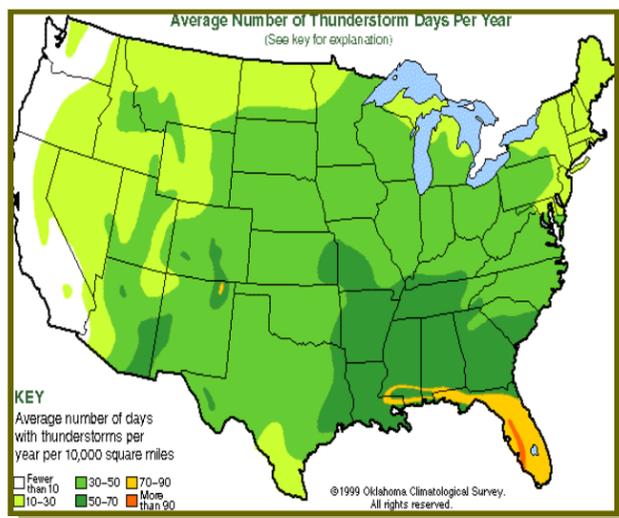


The tornado outbreak of May 4, 2003 was the one of the worst that southwest Missouri has had since the late 1800's. Fourteen tornadoes touched down across the Ozarks during the evening of May 4th one of which was an F3 that struck the town of Battlefield. This F3 is the latest killer tornado to strike Texas county since an F4 that struck Springfield in November of 1991.



- **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



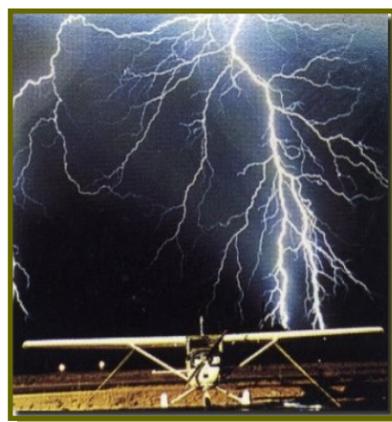
Average number of thunderstorm days per year.

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 4.50 inches in diameter in Texas county on May 21, 1998. 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 Texas county reached 81 mph and occurred in 1996 on the 4th of May. Since 1957 high winds have caused around \$359,000.00 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 Texas 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 Texas County. Texas 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

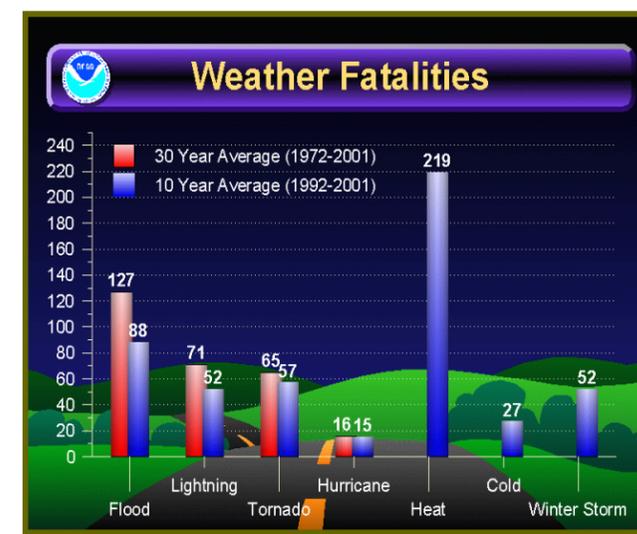


inches, major flooding can occur, and amounts over four inches creates significant flooding that affects most of the county.

Floods in Texas County

20 Jun 1998: Heavy rain of 2 to 5 inches caused flash flooding across the county. Numerous businesses in Houston sustained flood damage including a bowling alley and an apartment complex. The apartment complex had to be evacuated for a short time. Numerous low water bridges and crossings were flooded.

6 Feb 2000: An area of 2.5 to 6 inches of rain fell over a portion of southwest and south central Missouri. The heaviest rain fell in eastern Douglas and Texas Counties. Numerous roads were closed due to high water. Three cars were swept off of low wa



National Weather Fatality Statistics

ter crossings in Texas County. In one incident, three people were treated for hypothermia after their car was swept off of the road along the Big Piney River about 3 miles north of Houston in Texas County. They waited in cold water for about an hour before being rescued. Several roads and bridges in Texas and Douglas Counties were damaged or destroyed.

7 Aug 2000: An intense thunderstorm hit the City of Cabool around 9:30 am, as over five inches of rain caused flash flooding and strong winds downed trees and disrupted power service to a large portion of the town. Rain amounts ranging from four to over five inches were reported in less than an hour during the storm. The lower portion of Roberts Park resembled a raging river and a number of streets were closed due to water.

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.