



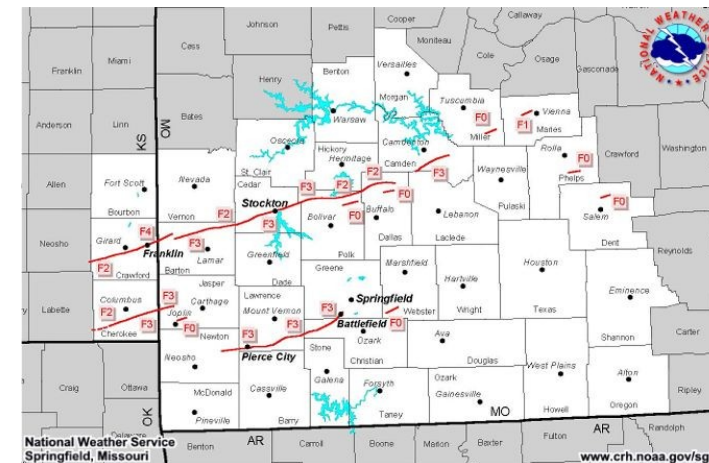
*“To provide weather and flood warnings, public forecasts and advisories for all of the United States...and its territories...for the protection of life and property.”*

## National Weather Service

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## National Weather Service

### Natural Hazard Risk Assessment Information For: **Bourbon County Kansas**



Information Provided By  
WFO Springfield, Mo

2009 Update

Includes data and information  
through December 2008

# Table of Contents

Overview of Weather Hazards in Southwest Missouri	2
Historical information for Bourbon County Kansas	3
Tornado Information	4
Severe Hail, Lightning, Wind and Winter Weather	5
Flooding	6
Heat , Drought and Wildfires	7
Dam Failure	8
Historic Weather in Southwest Missouri	9
Local Climatology	10



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

By Gene Hatch  
 Meteorologist Intern WFO Springfield. Mo.

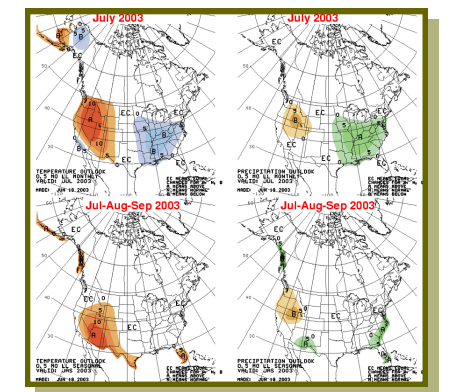
# Local Climatology

Averages and records for Ft. Scott, Kansas in Bourbon County

41	21	5.2	77	-16	20.5
48	27	4.2	83	-14	17.0
59	36	1.6	91	-6	13.0
69	46	0.1	97	17	4.0
78	56	0	98	30	0
86	65	0	106	41	0
92	70	0	120	50	0
91	68	0	113	48	0
82	59	0	110	30	0
72	48	0	99	18	0.2
56	36	1.3	84	0	13.9
44	26	2.9	75	-18	26.1

Links for Climate information

- [www.crh.noaa.gov/sgf/](http://www.crh.noaa.gov/sgf/)
- [www.cpc.ncep.noaa.gov/](http://www.cpc.ncep.noaa.gov/)
- [www4.ncdc.noaa.gov](http://www4.ncdc.noaa.gov)
- [web.missouri.edu/~moclimat/](http://web.missouri.edu/~moclimat/)
- [mrcc.sws.uiuc.edu/](http://mrcc.sws.uiuc.edu/)
- [agebb.missouri.edu/weather/index.htm](http://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. 11th-1994**...Lightning struck a house, causing a fire to engulf and destroy the home in Fort Scott KS. In Bourbon County rainfall of six to seven inches in a 24 hour period caused the Marmaton River to crest 7.5 feet above flood stage at Fort Scott. Numerous roads were closed and some homes were damaged.

**May. 11th-1999**...A severe thunderstorm moved across Crawford and Bourbon counties in extreme southeast Kansas and into part of southwest Missouri producing up to quarter sized hail in numerous locations.

**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.

**Jun. 28th-1998**...Thunderstorm winds produced widespread damage across Bourbon county KS. Especially hard hit was the Ft. Scott area. Winds downed a number of barns, small trailers, trees and power lines.

**Jul. 9th-1860**...A hot blast of air in the middle of a sweltering summer pushed the mercury up to 115 degrees at Ft. Scott, KS and Lawrence, KS.

**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.

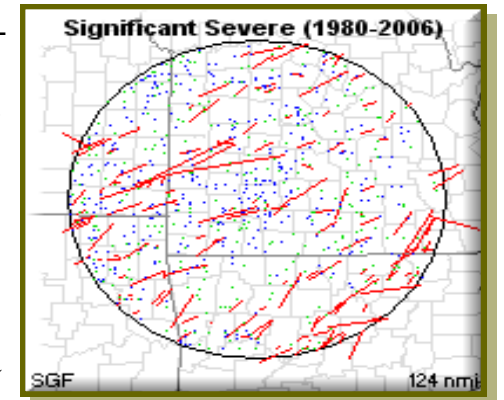


## Overview of Weather Hazards in Southwest Missouri & Extreme Southeast Kansas

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. There were 22 fatalities from these tornadoes, or less than one 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

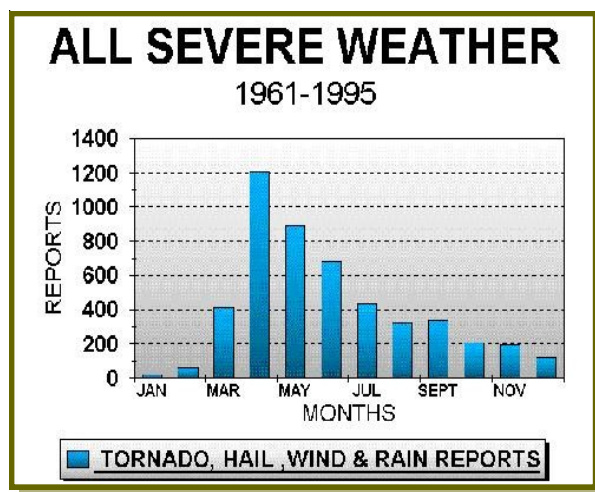
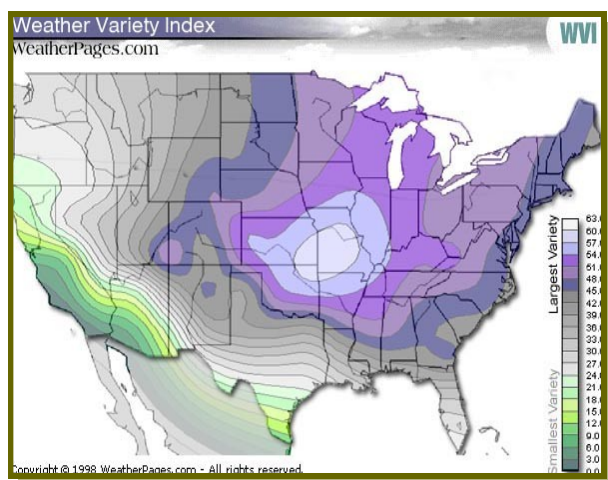
County	F0/1	F2	F3	F4	F5	County	F0/1	F2	F3	F4	F5	County	F0/1	F2	F3	F4	F5
BARRY	20	7	1	0	0	DOUGLAS	8	6	1	0	0	OREGON	9	4	2	1	0
BARTON	23	1	3	1	0	GREENE	19	10	3	1	0	OZARK	21	2	2	1	0
BENTON	18	2	4	0	0	HICKORY	8	1	1	0	0	PHELPS	15	4	2	0	0
BOURBON,KS	10	5	0	0	0	HOWELL	20	11	3	1	0	POLK	16	3	0	0	0
CAMDEN	15	6	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 Bourbon County, Kansas

### Severe Weather in Bourbon 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.



Severe thunderstorms in Bourbon County have dropped hail up to 4" in diameter, created winds in excess of 80 miles an hour and rainfall rates greater than 2" in an hour. While southwest Missouri and southeast Kansas, receive nearly 11 tornadoes a year, Bourbon County averages an event every 4 years.

**Number of Tornadoes in Bourbon Co. (1950 to 2008)**

F0/F1	F2	F3	F4	F5
10	5	0	0	0
66%	34%	0%	0%	0%

During the winter season Bourbon County averages 15.3 inches of snow. With the most snow in one season at 42.2 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.

### From www.weatherpages.com

Bourbon County Missouri is located on the Ozark Plateau along the eastern edge of tornado ally. Because of its location Bourbon 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.

## Dam Failure

### Dams in Bourbon County

Bourbon County contains 53 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 Bourbon County are of earthen construction and there have been no recorded failures.

### Where are they Located

- Milligan Dam: Mill Creek, Ft. Scott
- Kirchner Dam: Tennyson Creek, Uniontown
- Towels Dam: Little Osage River, Fulton
- Zimmerman Dam: Mill Creek, Ft. Scott
- Cole Dam: Wolverine Creek, Deerfield
- Harrington Dam: Mill Creek, Ft. Scott
- Dotson Dam: Mill Creek, Ft. Scott
- Davis Dam: Owl Creek, Ft. Scott
- Killion Dam: Little Mill Creek, Devon
- Lewelling Dam: Rock Creek, Ft. Scott
- Jackson Dam: Paint Creek, Ft. Scott
- Darling Dam: Little Osage River, Stotesbury
- Johnson Dam: Walnut Creek, Redfield
- Seven Springs Farms Dam: Pawnee Creek, Ft. Scott
- Kansas FF and Game Dam: Wolfpen Creek, Uniontown
- City of Bronson Dam: Tennyson Creek, Uniontown
- City of Ft. Scott Dam: Rock Creek and Marmaton River Trib., Ft. Scott
- Bourbon County Lake Dam: Elm Creek, Ft. Scott



- Pool Dam: Marmaton River Trib., Uniontown
- Thogmartin Dam: Wolverine Creek, Deerfield
- Pemberton Dam: Marmaton River Trib., Uniontown
- Felt Dam: Wolverine Creek, Deerfield
- N.C.&W Land Development Dam: Bell Branch, Fulton
- Brown Dam: Pawnee Creek, Ft. Scott
- Beltz Dam: Little Osage River Trib., Fulton

In addition to the 25 dams listed there are 28 others that are either too small or not well enough defined to list.

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

Bourbon County averages 16 days a year with temperatures at or above 95 degrees. July and August are the two warmest months, which average 6 days at or above 95 degrees.

Year	Days 95* +	Days 100* +	Days in a row
1939	55	28	19
1947	51	29	18
1952	68	23	23
1953	74	30	16
1954	89	68	55
1980	77	47	33
Normal # of Days	16	5	▲ Above 95*

Years with above average summer heat

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

- 46 days: 3 Sept 1979 ~ 18 Oct 79
- 45 days: 12 Dec 1955 ~ 25 Jan 56
- 44 days: 30 Jul 2000 ~ 11 Sept 00
- 43 days: 4 Oct 1950 ~ 15 Nov 50
- 42 days: 21 Oct 1965 ~ 1 Dec 65
- 38 days: 31 Oct 1989 ~ 7 Dec 89

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

Bourbon County lies at the eastern edge of tornado ally and receives on average a tornado every four and a half years. From 1950 to 2002 Bourbon county recorded 12 tornadoes from F0 to F2 in strength. The strongest tornado, an F2, passed across the county on the evening of September 27th, 1973. Along its 7 mile track it caused 250 Thousand dollars in damage.

## Historical Tornadoes of Bourbon County

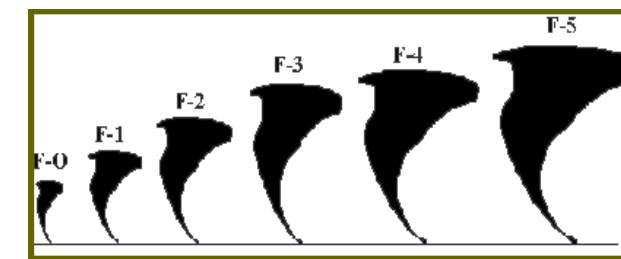
- Jun 17, 1915 (F2) 5 inj, 0 dead
- Apr 19, 1916 (F4) 4 inj, 3 dead
- Jul 13, 1924 (F2) 0 inj, 0 dead
- Jun 8, 1928 (F2) 0 inj, 0 dead
- Apr 20, 1929 (F3) 0 inj, 0 dead
- Apr 24, 1929 (F2) 2 inj, 0 dead
- Sept 25, 1930 (F3) 0 inj, 0 dead
- May 2, 1942 (F4) 5 inj, 0 dead

## For the Record Bourbon County

- Has experienced two F4 tornadoes.
- No F5 tornadoes
- Most recent Tornado May 3, 2006 (F0)
- 7 deaths and 60 injuries since 1880.



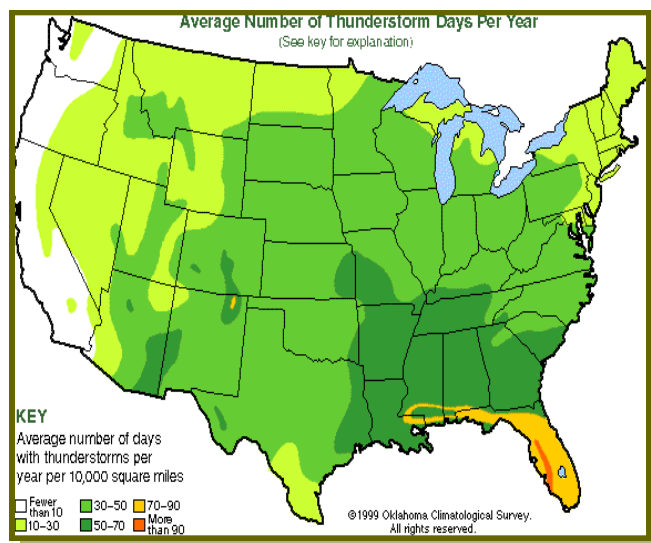
The tornado outbreak of May 4, 2003 was the one of the worst that southwest Missouri and southeast Kansas has had since the late 1800's. Fourteen tornadoes touched down across the Ozarks during the evening of May 4th one of which was an F4 that went just south of Bourbon County. This F4 is the latest killer tornado to strike near Bourbon county since an F4 that struck near Ft. Scott in April of 1916.



- **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 4.00 inches in diameter in Bourbon county on June 19, 1981. 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 Bourbon county reached 80 mph and occurred in 2003 on the 16th of April. Since 1959 high winds have caused around \$399,000.00 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.

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 Bourbon County in almost 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 Bourbon County. Bourbon County contains numerous low water crossings.

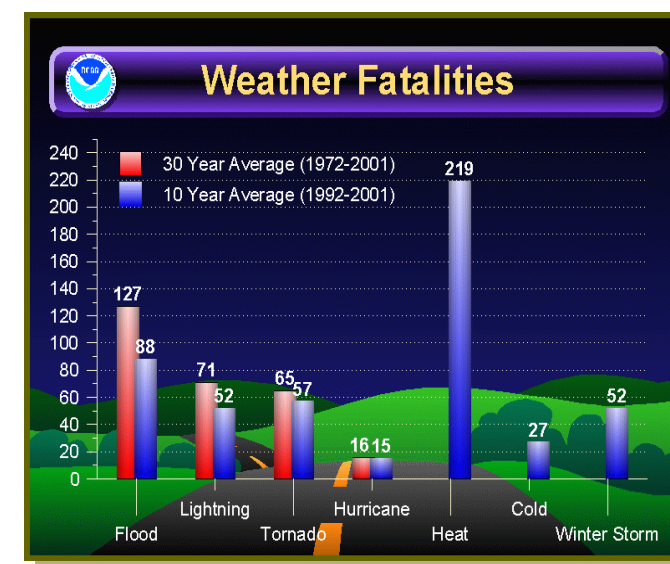
Typically, flooding in the county is caused by heavy rainfall associated with high rain producing thunderstorms which move very slowly. In towns, rainfall of one to two inches will cause streets and ditches to flood and make some low water crossings impassable. When rainfall rates reach 3 to 4



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

### Floods in Bourbon County

**13 Sept 1998:** Heavy rain of 5 to 12 inches fell over portions of extreme southeast Kansas. Unofficial reports of rainfall as high as 14 inches was reported in Bourbon County Kansas. The hardest hit areas were along the Marmaton River in Bourbon County including Ft. Scott. The highest estimated stage of the Marmaton River at Ft. Scott reached 50.05 feet on 9/14/98 which is the second highest stage ever recorded. Widespread river flooding occurred in northern sections of Ft. Scott affecting numerous homes and businesses. Flood water receded fairly quickly and water damage was con



### National Weather Fatality Statistics

fined to lower floors and basements. Many businesses had to close for two or three days due to the flooding and associated clean up. Several highways and bridges were damaged due to the flood waters. Agricultural damage in Bourbon County was mainly confined to the Marmaton River flood plain. Crop losses included 2300 acres of corn (40% yield loss), 7500 acres of soybeans (50% yield loss), and 500 acres of grain sorghum (75% yield loss). In addition, 200 head of cattle were lost. Farms along the Marmaton River also suffered damage to grazing land (topsoil damage) and damage to fencing.

**27 Apr 1994:** The Marmaton River flooded from Uniontown to Fort Scott. Uniontown was hardest hit and was said to be the worst flooding ever seen there. Schools were closed in Uniontown. In Fort Scott the river crested at almost 10 feet above flood stage and did not go back into its banks until the 29th. The entire county was declared a state of local disaster. Road damage was \$120,000 and other damage well exceeded a million dollars.