



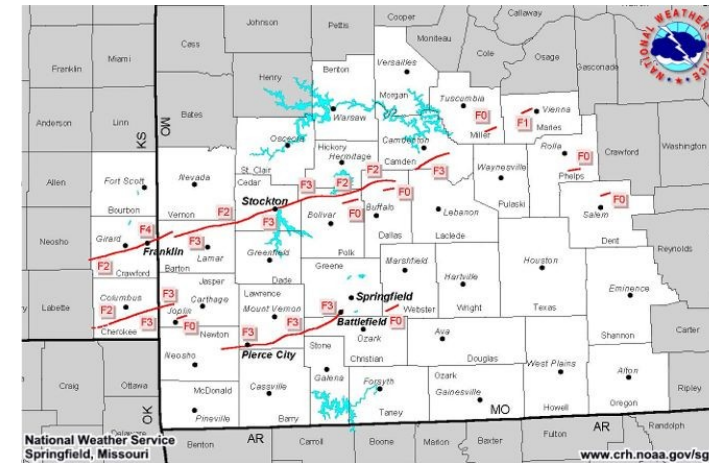
*"To provide weather and flood warnings, public forecasts and advisories for all of the United States...and its territories...for the protection of life and property."*

## National Weather Service

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## National Weather Service

### Natural Hazard Risk Assessment Information For: **Polk County Missouri**



Information Provided By  
WFO Springfield, Mo

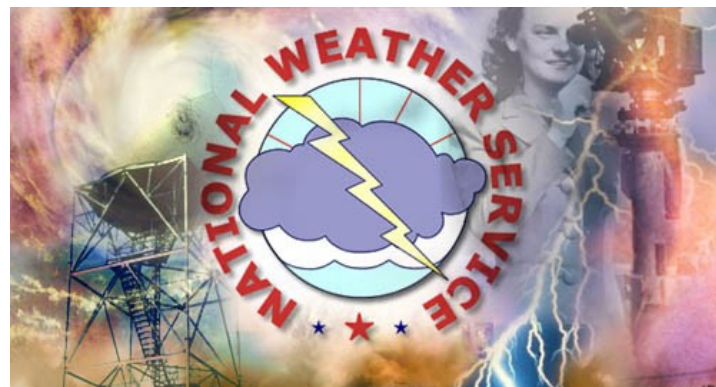
2009 Update

Includes data and information  
through December 2008

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**NOTE: No Consistent snowfall data was available for Polk county to provide an accurate 30 year snowfall average.**



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

By Gene Hatch  
 Meteorologist Intern WFO Springfield. Mo.

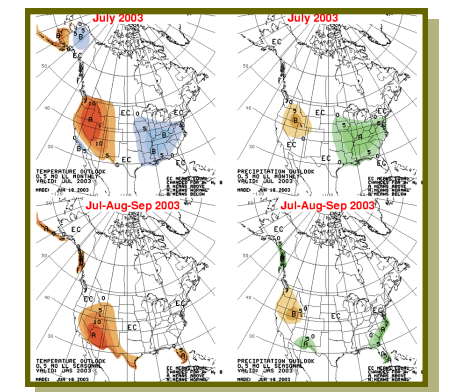
# Local Climatology

Averages and records for Bolivar, Missouri in Polk County

|    |    |     |     |     |      |
|----|----|-----|-----|-----|------|
| 41 | 19 | N/A | 77  | -30 | 14.8 |
| 47 | 24 | N/A | 86  | -19 | 8.9  |
| 57 | 33 | N/A | 91  | -7  | 12.0 |
| 68 | 43 | N/A | 91  | 16  | 2.8  |
| 76 | 52 | N/A | 100 | 28  | 0    |
| 84 | 61 | N/A | 104 | 39  | 0    |
| 90 | 66 | N/A | 115 | 44  | 0    |
| 89 | 64 | N/A | 108 | 36  | 0    |
| 81 | 55 | N/A | 108 | 19  | 0    |
| 70 | 43 | N/A | 95  | 17  | 0.3  |
| 56 | 33 | N/A | 87  | -1  | 16.3 |
| 46 | 24 | N/A | 77  | -19 | 8.0  |

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.

**May 6th-1998**...Golf ball hail damaged cars and roofs in Bolivar MO. Thunderstorms winds also downed trees and power lines.

**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.

**Jun. 6th-1995**...Thunderstorm winds destroyed a barn and downed trees in Humansville MO. Over 200 hundred trees were uprooted and two barn roofs were removed to the east of Rondo. Trees were also uprooted in Bolivar.

**Sept. 11th-2000**...Severe thunderstorms moved across Polk county MO during the late morning hours. Numerous trees were blown down countywide and dime sized hail was reported in Halfway. House pillars were blown down, and a local school roof was also blown off near Halfway.

**Nov. 25th-1996**...Freezing rain fell causing ice accumulations of around one-quarter of an inch across the northern parts of Polk county MO to more than an inch in the southern part. Numerous power outages resulted due to downed power lines and trees.

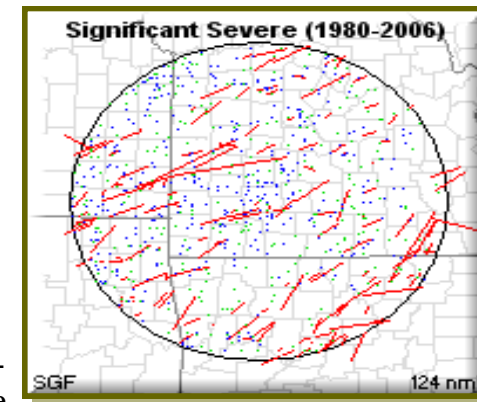


## Overview of Weather Hazards in Southwest Missouri & Extreme Southeast Kansas

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.

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

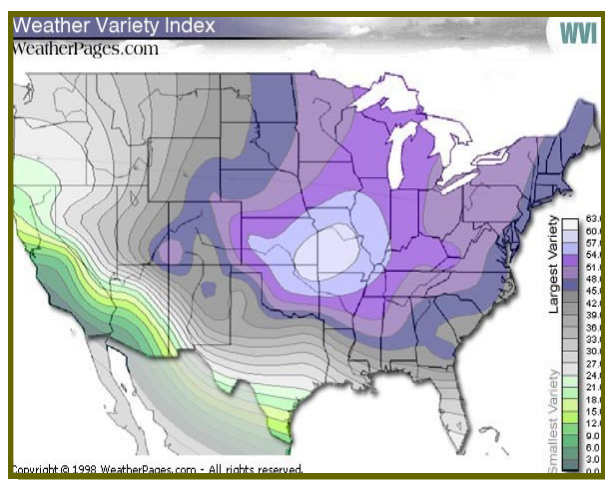
| County      | F0/1 | F2 | F3 | F4 | F5 | County   | F0/1 | F2 | F3 | F4 | F5 | County   | F0/1 | F2 | F3 | F4 | F5 |
|-------------|------|----|----|----|----|----------|------|----|----|----|----|----------|------|----|----|----|----|
| BARRY       | 20   | 7  | 1  | 0  | 0  | DOUGLAS  | 8    | 6  | 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 Polk County, Missouri

### Severe Weather in Polk 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.

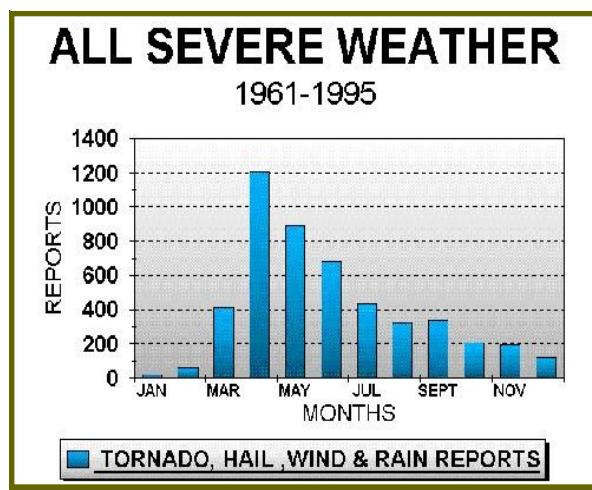


### From www.weatherpages.com

Polk County Missouri is located on the Ozark Plateau along the eastern edge of tornado ally. Because of its location Polk 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 Polk County have dropped hail up to 2 3/4" 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, Polk County averages an event every 3 1/2 years.

### Number of Tornadoes in Greene Co. (1950 to 2008)

| <u>F0/F1</u> | <u>F2</u> | <u>F3</u> | <u>F4</u> | <u>F5</u> |
|--------------|-----------|-----------|-----------|-----------|
| 16           | 3         | 0         | 0         | 0         |
| 84%          | 16%       | 0%        | 0%        | 0%        |

During the winter season Polk County averages 12 inches of snow. With the most snow in one season at 29.6 inches, falling during the 1958 to 1959 winter season. Ice storms also affect the county during the winter season causing significant damage to homes, trees and utilities.

## Dam Failure

### Dams in Polk County

Polk County contains 9 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 Polk County are of earthen construction and there have been no recorded failures.

### Where are they Located

- Owens Lake Dam Sect 8: Slagle Creek, Slagle
- Sprowels Dam: Brush Creek, Humansville
- Gordon Lake Dam: Panther Creek, Goodson
- McNerney Lake Dam: Pomme De Terre River, Pleasant Hope
- Hawk Lake Dam: Piper Creek, Bolivar
- Woods Lake Dam: Lindley Creek, Sentinel
- Sergent Lake Dam: Brush Creek, Sentinel
- Jensen Lake Dam: Lindley Creek, Sentinel
- Owens Lake Dam Sect 4: Panther Creek, Osceola



April 9, 2002 / KY3 NEWS

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

Polk 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*<br>+ | Days 100*<br>+ | Days in<br>a row  |
|---------------------|---------------|----------------|-------------------|
| 1901                | 46            | 22             | 14                |
| 1913                | 77            | 49             | 25                |
| 1938                | 45            | 17             | 13                |
| 1953                | 52            | 14             | 13                |
| 1954                | 70            | 38             | 14                |
| 1980                | 58            | 30             | 16                |
| Normal #<br>of Days | 16            | 4              | ▲<br>Above<br>95* |

Years with above average summer heat

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

- 47 days: 4 Oct 1906 ~ 19 Nov 06
- 42 days: 29 Jul 1913 ~ 8 Sept 13
- 39 days: 8 Oct 1950 ~ 15 Nov 50
- 39 days: 9 Dec 1955 ~ 16 Jan 56
- 38 days: 1 Jan 1919 ~ 7 Feb 19
- 37 days: 3 Sept 1979 ~ 9 Oct 79

While no major wildfires have affected Polk 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 5500 fires occurred during that time in the Springfield Fire district which includes Cedar, Dade, Polk, Greene, Webster, Christian, Stone and Taney counties. This represented nearly 10% of the wildfires in the state with over 59,000 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 Springfield fire district were the result of lightning.

# Tornado Information

Polk County lies at the eastern edge of tornado ally and receives on average a tornadoes every 3 1/2 years. From 1950 to 2008 Polk county recorded 9 tornadoes from F0 to F2 in strength. The strongest tornado, an F2, passed across the county on the evening of May 4th, 2003. Along its 23 mile track it caused 4.7 million dollars in damage.



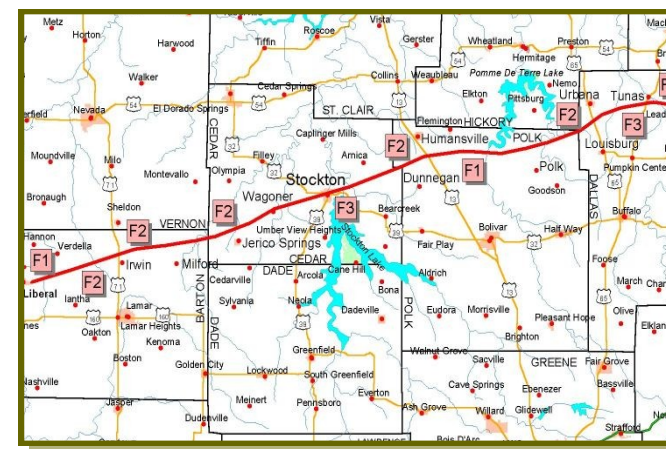
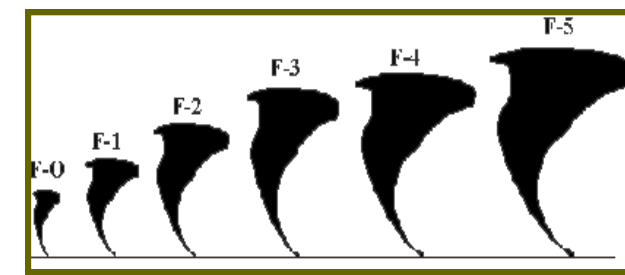
The tornado outbreak of May 4, 2003 was the one of the worst that southwest Missouri has had since the late 1800's. Fourteen tornadoes touched down across the Ozarks during the evening of May 4th one of which was an F2 that struck near the town of Humansville. This F2 is one of the latest tornado to strike Polk county since an F1 that struck Humansville in December of 2002.

## Historical Tornadoes of Polk County

- Mar 26, 1882 (F2) 1 inj, 0 dead
- Apr 20, 1929 (F2) 10 inj, 0 dead
- Apr 20, 1929 (F3) 20 inj, 0 dead
- Feb 26, 1936 (F2) 0 inj, 0 dead
- Apr 12, 1924 (F4) 4 inj, 16 dead
- Dec 17, 2002 (F2) 1 inj, 0 dead
- May 4, 2003 (F2) 0 inj, 0 dead
- May 6, 2003 (F3) 0 inj, 0 dead

## For the Record Polk County

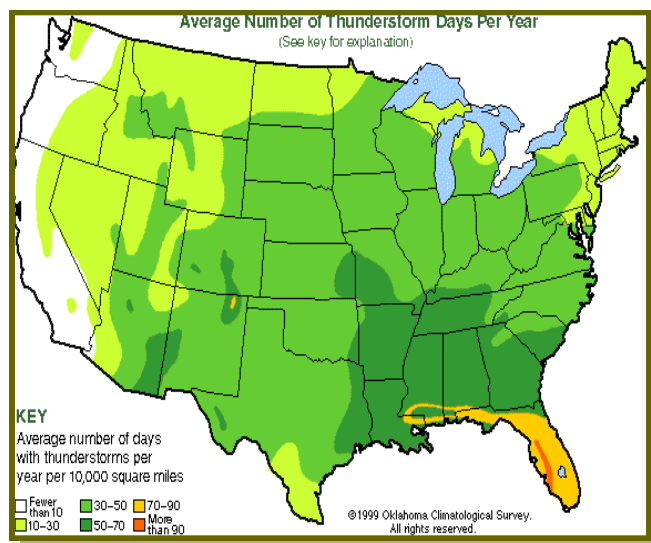
- Has experienced one F4 tornadoes.
- No F5 tornadoes
- Most recent Tornado March 31, 2008 (F0)
- 4 deaths and 50 injuries since 1880.



- **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 2.75 inches in diameter in Polk county on April 30, 2002. 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 Polk county reached 81 mph and occurred in 2002 on the 17th of December. Since 1970 high winds have caused around \$881,000.00 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 Polk 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 Polk County. Polk County contains numerous low water crossings.

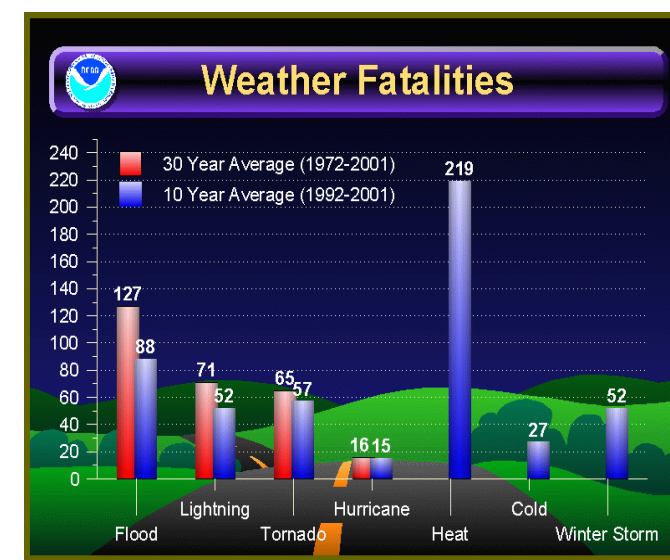
Typically, flooding in the county is caused by heavy rainfall associated with high rain producing thunderstorms which move very slowly. In towns, rainfall of one to two inches will cause streets and ditches to flood and make some low water crossings impassable. When rainfall rates reach 3 to 4



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

### Floods in Polk County

**12 May 2002:** Another in a series of thunderstorm complexes moved across the area producing excessive rainfall on the already saturated soils. Most of the heavy rainfall began across central Missouri Sunday morning May 12th, and then produced another round of torrential rainfall Sunday evening. By Monday morning May 13th, a large area of two inches fell north of Interstate 44, with the heaviest bands of three to six inches from Joplin northeast to Greenfield, Bolivar and Urbana. Another area of excessive rain fell over eastern Texas, northern Shannon, and southern Dent counties where locally three to six inches fell.



### National Weather Fatality Statistics

**10 Oct 001:** During the morning of October 10, a band of very heavy rainfall fell over portions of southwest Missouri. It produced a swath of four to eight inches of rainfall in a narrow band from Northwestern Newton County, northeast across Southern Jasper, Northern Lawrence, Southeast Dade, Northwest Greene, and Southern Polk County. It caused several roads to close around Neosho, Red Oak, Reeds, Pennsboro, Everton, Walnut Grove, Stotts City, and Morrisville. Numerous creeks and rivers also rose significantly, especially the Sac and Little Sac River, as well as the Spring River. The Spring River actually rose above flood stage for a few hours during the height of the storm. A bridge was damaged along Highway 51 and 28 near Walnut Grove. The torrential downpours caused nearly 4,000 dollars in damage to a local greenhouse near Sarcoxie, and water damage to a barn near Pierce City. Additional heavy rainfall during the morning kept numerous roads and low water bridges flooded through the early afternoon.