



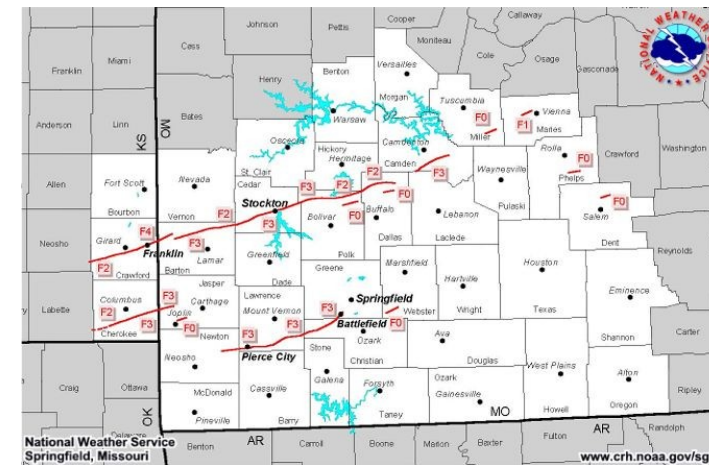
*“To provide weather and flood warnings, public forecasts and advisories for all of the United States...and its territories...for the protection of life and property.”*

## National Weather Service

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## National Weather Service

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



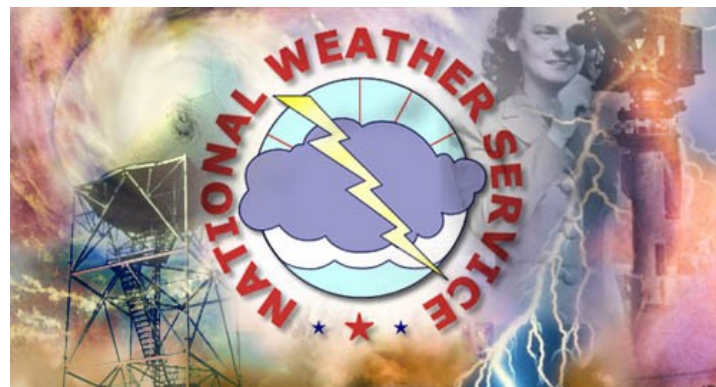
Information Provided By  
WFO Springfield, Mo

2009 Update

Includes data and information  
through December 2008

# Table of Contents

Overview of Weather Hazards in Southwest Missouri	2
Historical information for Dent County Missouri	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 Dent County and the communities with in the county.

By Gene Hatch  
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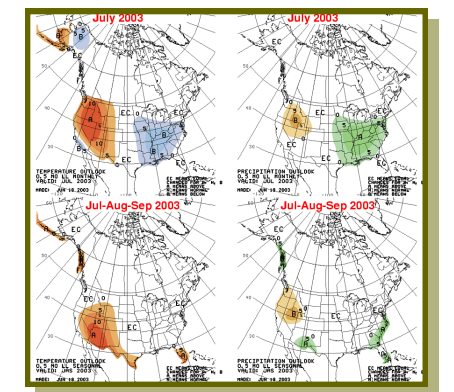
# Local Climatology

Averages and records for , Missouri in Dent County

42	22	3.2	79	-22	22.0
48	27	1.3	85	-23	12.5
59	35	0	91	-8	20.5
69	44	0	93	13	1.5
77	53	0	95	29	0.7
84	61	0	105	38	0
89	66	0	111	44	0
88	65	0	112	39	0
80	56	0	104	27	0
71	46	0	93	16	1.6
57	36	0.2	86	-2	9.4
45	26	0.4	79	-21	11.0

### 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.

**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.

**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, Tunas 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. 9th-1975**...Thunderstorms that developed over the Springfield area dropped 3.62 inches of rainfall in one hour. This was the greatest hourly rainfall rate recorded for Springfield.

**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.

**Nov. 1st-1997**...A severe thunderstorm dropped golf ball sized hail near the town of Salem in Dent county Missouri.

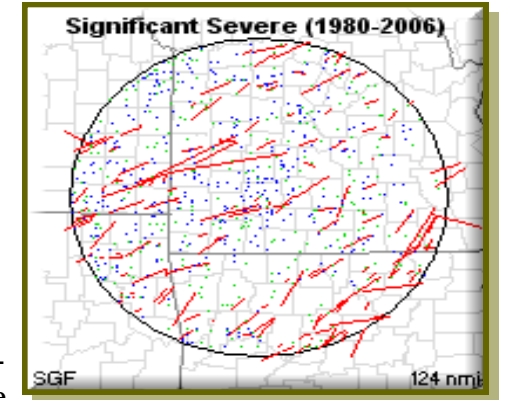


## Overview of Weather Hazards in Southwest Missouri & Extreme Southeast Kansas

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

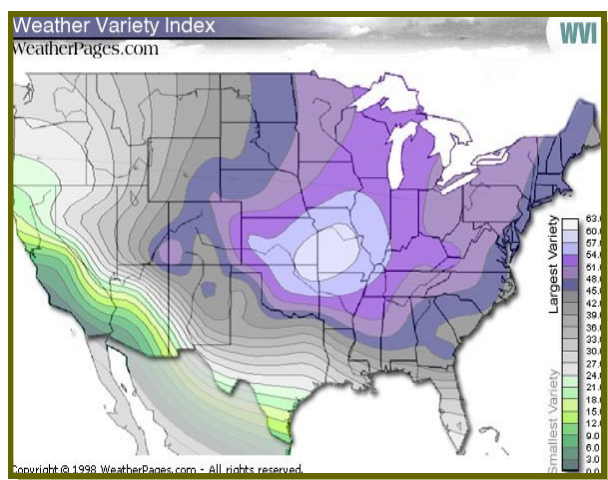
County	F0/1	F2	F3	F4	F5	County	F0/1	F2	F3	F4	F5	County	F0/1	F2	F3	F4	F5
BARRY	20	7	1	0	0	DOUGLAS	8	6	1	0	0	OREGON	9	4	2	1	0
BARTON	23	1	3	1	0	GREENE	19	10	3	1	0	OZARK	21	2	2	1	0
BENTON	18	2	4	0	0	HICKORY	8	1	1	0	0	PHELPS	15	4	2	0	0
BOURBON,KS	10	5	0	0	0	HOWELL	20	11	3	1	0	POLK	16	3	0	0	0
CAMDEN	15	6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

### Severe Weather in Dent 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.

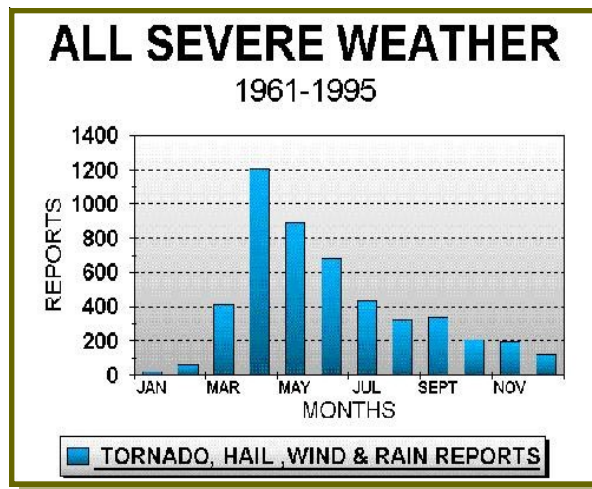


### From www.weatherpages.com

Dent County Missouri is located on the Ozark Plateau along the eastern edge of tornado ally. Because of its location Dent 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 Dent County have dropped hail up to 2.75” in diameter, created winds in excess of 70 miles an hour and rainfall rates greater than 2” in an hour. While southwest Missouri receives nearly 11 tornadoes a year, Dent County averages an event every 6 years.

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

F0/F1	F2	F3	F4	F5
8	1	1	0	0
80%	10%	10%	0%	0%

During the winter season Dent County averages 5.1 inches of snow. With the most snow in one season at 35.8 inches, falling during the 1960 to 1961 winter season. Ice storms also affect the county during the winter season causing significant damage to homes, trees and utilities.

## Dam Failure

### Dams in Dent County

Dent County contains 29 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 Dent County are of earthen construction and there have been no recorded failures.

### Where are they Located

- Bubbling Springs Dam: Peters Branch, Lake Springs
- Indian Trail Fish Hatchery Dam: Crooked Creek, Sligo
- Masters Dam: Lost Creek, Wesco
- Bass Dam: Spring Creek Trib., Salem
- Lake Ziske Dam: Spring Creek Trib., Salem
- Putman Dam: Spring Creek Trib., Salem
- Street Lake Dam: Spring Creek Trib., Salem
- Honey Lake Dam: Merimec River Trib., Cook Station
- Lost Lake Dam: Lost Creek, Cook Station
- Hart Development Lake Dam: Lost Creek, Cook Station
- Lake Turner Dam: Spring Creek, Salem
- Arrowhead Lake Lower Dam: Merimec River, Cook Station
- Arrowhead Lake Upper Dam: Merimec River, Cook Station
- Mitchell Dam: Merimec River, Cook Station
- Clark Lake Dam: Hutchins Creek, Wesco
- Huzzah Hatcheries Dam: Huzzah Creek,



- Howes Mill
- Tealwood Dam: Black Oak Creek, Newburg
- Howes Mill Fish Hatchery Dam: Howes Branch, Boss
- Metzger Dam: Taft Creek, Cook Station
- Bishop Dam: Stone Hill Branch, Wesco
- Warner Lake Dam: Merimec River, Cook Station
- Upper Echo Lake Dam: Hamilton Hollow Creek, Salem
- Green Dam: Hyers Branch, Anutt
- Mund Dam: Dry Fork, Salem
- Scotia Pond Dam: Merimec River, Gladden
- Ryder Lake Dam: Dry Fork, Lake Spring
- Wood Brothers Dam: Firm Branch, Newburg
- Deeken Lake Dam: Persimmon Pond Hollow, Gladden

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

Dent County averages 13 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
1934	47	29	18
1936	53	27	17
1947	35	13	10
1954	42	10	6
1980	47	29	24
1988	27	8	12
Normal # of Days	13	3	▲ Above 95*

Years with above average summer heat

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

- 41 days: 9 Dec 1955 ~ 18 Jan 56
- 33 days: 6 Jan 1919 ~ 7 Feb 19
- 33 days: 14 Sept 1963 ~ 16 Oct 63
- 32 days: 13 Aug 1998 ~ 13 Sept 98
- 30 days: 9 Oct 1950 ~ 7 Nov 50
- 29 days: 21 Dec 1985 ~ 18 Jan 86

While no major wildfires have affected Dent 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 4600 fires occurred during that time in the Gasconade Fire district which includes Osage, Maries, Pulaski, Phelps and Dent counties. This represented nearly 8% of the wildfires in the state with over 38,000 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 Gasconade fire district were the result of lightning.

# Tornado Information

Dent County lies at the eastern edge of tornado ally and receives on average one tornado every seven years. From 1950 to 2002 Dent county recorded 8 tornadoes from F0 to F3 in strength. The strongest tornado, an F3, passed across the county on the evening of May 21st, 1957. Along its 10 mile track it caused 25 Thousand dollars in damage, injured 2.



## Historical Tornadoes of Dent County

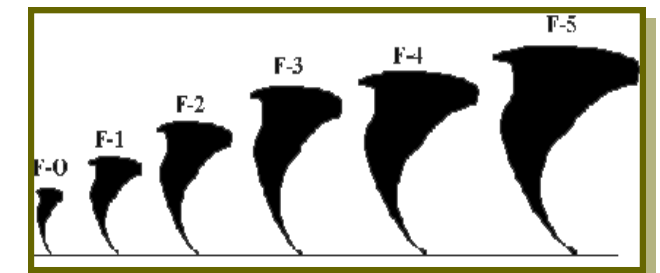
- Apr 18, 1880 (F2) 2 inj, 0 dead
- May 30, 1917 (F4) 10 inj, 3 dead
- May 30, 1917 (F4) 30 inj, 0 dead
- Jan 18, 1933 (F2) 0 inj, 0 dead
- Apr 29, 1947 (F3) 1 inj, 0 dead
- Apr 3, 1958 (F2) 0 inj, 0 dead

## For the Record Dent County

- Has experienced two F4 tornadoes.
- No F5 tornadoes
- Most recent Tornado Aug 24, 2007 (F0)
- 3 deaths and 47 injuries since 1880.



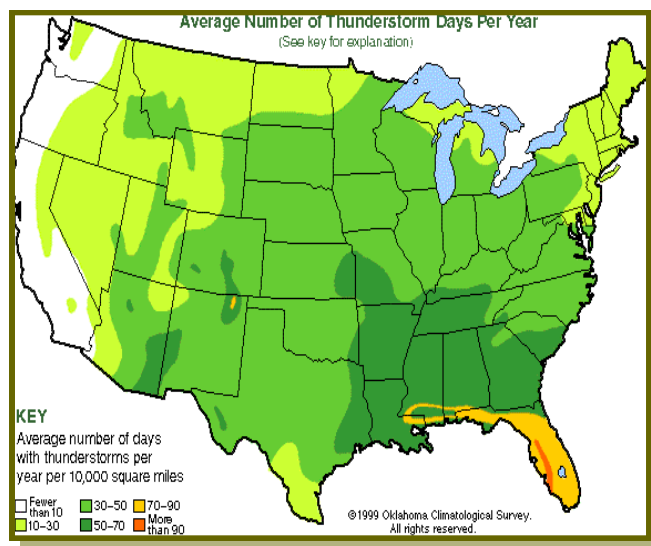
The tornado outbreak of May 4, 2003 was the one of the worst that southwest Missouri has had since the late 1800's. Fourteen tornadoes touched down across the Ozarks during the evening of May 4th one of which was an F0 that struck the north of Salem. This F0 is the latest tornado to strike Dent county since an F0 that struck Lecom in June of 1999.



- **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 Dent county on May 6, 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 Dent county reached 73 mph and occurred in 1968 on the 11th of July. Since 1958 high winds have caused around \$308,000.00 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 Dent 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 Dent County. Dent 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

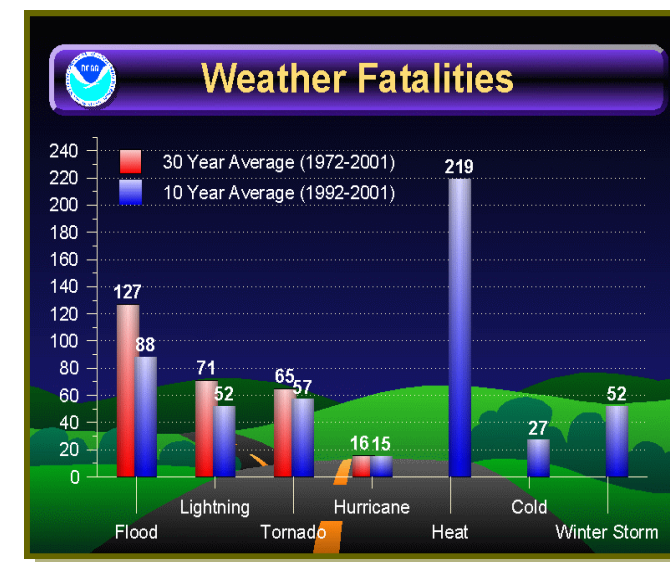


inches, major flooding can occur, and amounts over four inches creates significant flooding that affects most of the county.

### Floods in Dent County

**14 Nov 1993:** Small streams began to flash flood at 0125 CST near Anutt. At one point 2.50 feet of water was flowing over County Road C. Heavy rains through out the county also flash flooded highways, washed out secondary roads, and flooded Montauk State Park. Campers and hunters had to be evacuated from the area as low water bridges washed out and roads were closed.

**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



### National Weather Fatality Statistics

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.

**16 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 Ankers 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.