



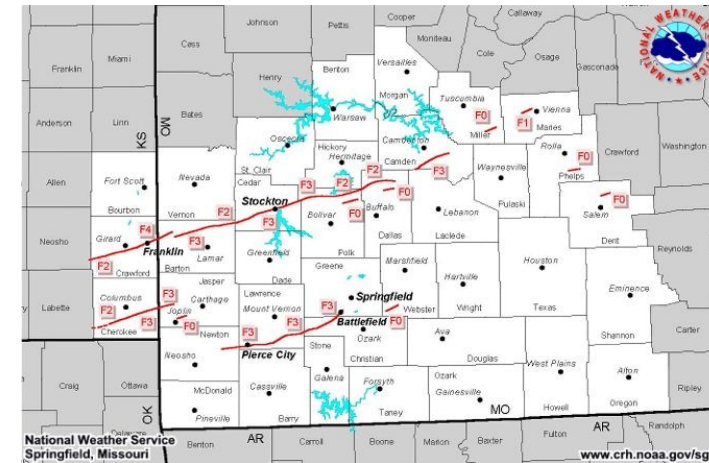
“To provide weather and flood warnings, public forecasts and advisories for all of the United States...and its territories...for the protection of life and property.”

National Weather Service

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National Weather Service

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

By Gene Hatch
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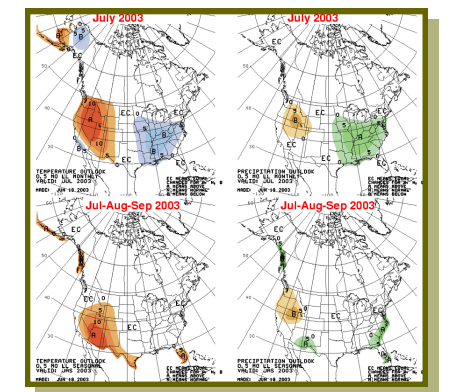
Local Climatology

Averages and records for Marshfield, Missouri in Webster County

41	22	3.8	75	-15	22.5
47	26	3.1	82	-12	15.0
57	35	1.1	88	-3	15.0
67	45	0.1	91	19	4.5
75	54	0	95	29	0
83	63	0	102	43	0
88	68	0	110	47	0
88	66	0	104	45	0
79	58	0	102	31	0
69	47	0	93	18	0
55	36	0.6	81	4	20.0
45	26	1.0	75	-18	20.0

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.

Apr. 18th-1880...More than two dozen tornadoes were reported from Kansas and Arkansas to Wisconsin and Michigan. More than 100 people were killed, including 87 persons at Marshfield MO.

Apr. 24th-2001...Thunderstorms that moved across the Ozarks produced an F1 tornado that tracked from southeast Webster County, southeast of Seymour, to approximately one mile north of Cedar Gap in extreme southwest Wright County.

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.

May 3rd-1956...Storage began in Webster Reservoir behind a 10,720 feet long earthen dam on the South Fork of the Solomon River near Stockton, Kansas. The lake is used for flood control, water supply, public recreation, fish and wildlife habitat, water conservation, and sedimentation. The lake is operated by the Bureau of Reclamation to regulate flows in the Smoky Hill River Basin. A portion of the lake storage supplies area Kansas farmers with irrigation

Nov. 11th-1911...A high of 80 and low of 13 were recorded on the same day in Springfield. A cold front, ahead of a very cold airmass, moved through the Ozarks making temperatures fall rapidly.

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.

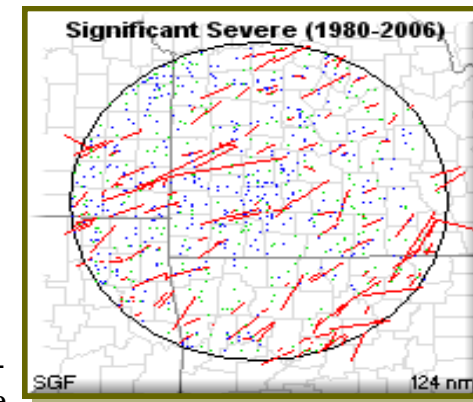


Overview of Weather Hazards in Southwest Missouri & Extreme Southeast Kansas

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. 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

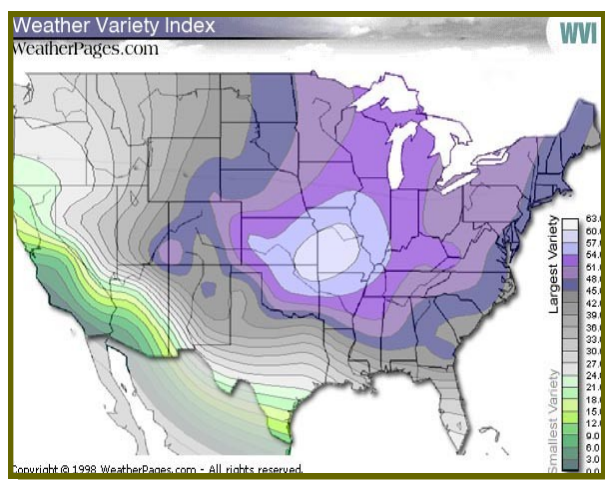
Tornadoes by county for the Springfield County Warning Area from 1950 to 2008

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 Webster County, Missouri

Severe Weather in Webster 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.

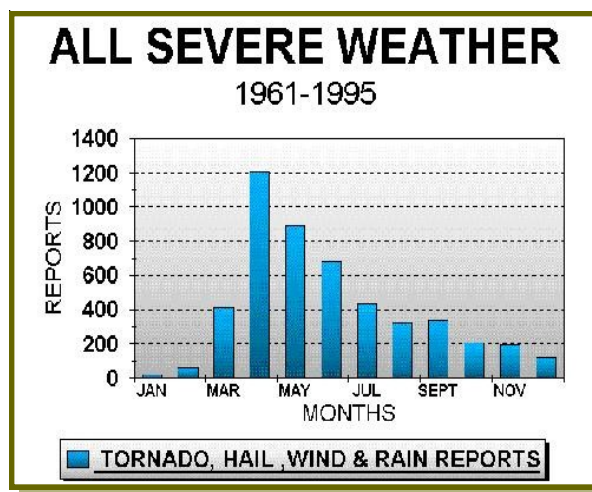


From www.weatherpages.com

Webster County Missouri is located on the Ozark Plateau along the eastern edge of tornado ally. Because of its location Webster 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 Webster County have dropped hail up to 3 1/2" in diameter, created winds in excess of 90 miles an hour and rainfall rates greater than 2" in an hour. While southwest Missouri receives nearly 11 tornadoes a year, Webster County averages an event every 2 years.

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

<u>F0/F1</u>	<u>F2</u>	<u>F3</u>	<u>F4</u>	<u>F5</u>
19	7	2	0	0
68%	25%	7%	0%	0%

During the winter season Webster County averages 9.7 inches of snow. With the most snow in one season at 30.6 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 Webster County

Webster County contains 11 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 Webster County are of earthen construction and there have been no recorded failures.

Where are they Located

- Totten F. A. Lake Dam: North Carolina Creek, Turner
- Biggs Lower Lake Dam: West Fork Niangua River, Marshfield
- Lost Lake Dam: James River, Turners
- Elk Lake Dam: James River, Turners
- Lake Ralph Foster Dam: James River, Turners
- Camp Arrowhead Dam: Osage Fork Gasconade River, Rader
- Great Bear Lake Dam: James River, Turner
- Burk Bridge Co. East Lake Dam: Osage Fork Gasconade River, High Prairie
- Burk Bridge Co. West Lake Dam: Osage Fork Gasconade River, High Prairie
- Farthing East Dam: Finley Creek, Seymour
- Farthing West Dam: Finley Creek, Seymour



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

Webster 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	44	8	23
1953	44	8	7
1954	56	20	12
1980	55	21	17
1983	31	0	6
1995	16	1	5
Normal # of Days	10	2	▲ Above 95*

Years with above average summer heat

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

- 44 days: 21 Dec 1985 ~ 2 Feb 86
- 41 days: 11 Dec 1980 ~ 20 Jan 81
- 30 days: 8 Oct 1950 ~ 6 Nov 50
- 29 days: 17 Jun 1966 ~ 15 Jul 66
- 27 days: 29 Dec 1961 ~ 24 Jan 62
- 26 days: 24 Sept 1956 ~ 19 Oct 56

While no major wildfires have affected Webster 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

Webster County lies at the eastern edge of tornado ally and receives on average a tornadoes every two years. From 1950 to 2008 Webster county recorded 28 tornadoes from F0 to F3 in strength. The strongest tornado, an F3, passed across the county on the evening of January 7th, 2008. Along its 21 mile track it killed 2 and injured 6 people and did near 10 million dollars in damage.



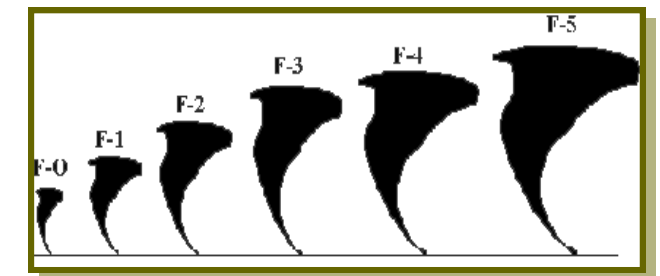
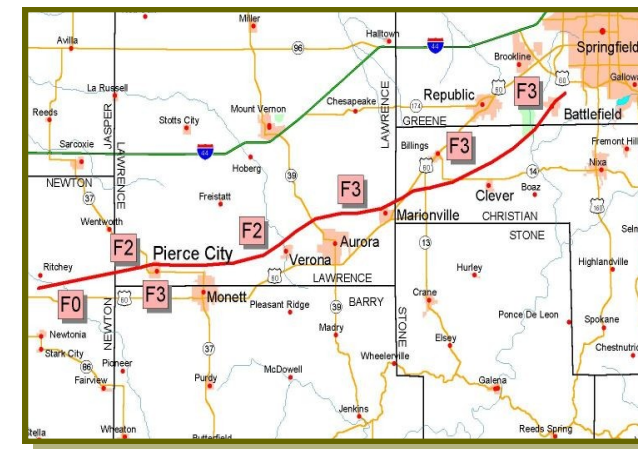
The tornado outbreak of May 4, 2003 was the one of the worst that southwest Missouri has had since the late 1800's. Fourteen tornadoes touched down across the Ozarks during the evening of May 4th one of which was an F0 that struck near the town of Rogersville. This F0 is the latest tornado to strike Webster county since an F0 that struck Duncan in December of 2002.

Historical Tornadoes of Webster County

- Apr 18, 1880 (F4) 5 inj, 7 dead
- Apr 18, 1880 (F4) 110 inj, 92 dead
- May 29, 1903 (F2) 0 inj, 0 dead
- May 27, 1917 (F1) 1 inj, 1 dead
- Mar 23, 1926 (F4) 10 inj, 3 dead
- Feb 20, 1937 (F3) 9 inj, 0 dead
- Apr 30, 1942 (F3) 1 inj, 1 dead
- Apr 14, 1944 ((F2) 4 inj, 2 dead

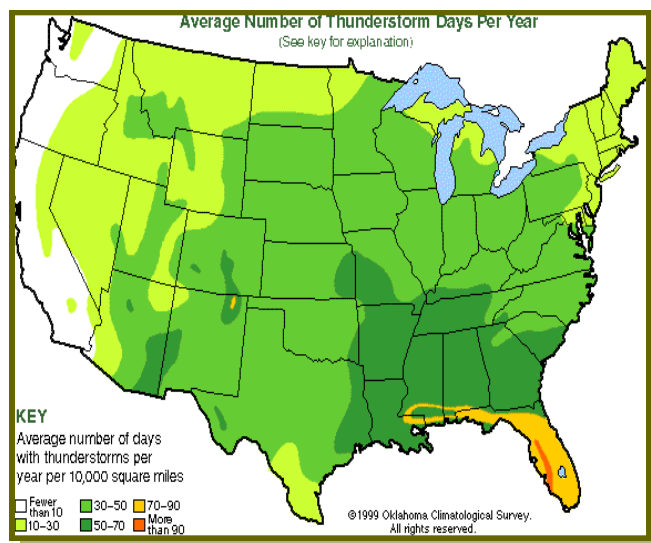
For the Record Webster County

- Has experienced three F4 tornadoes.
- No F5 tornadoes
- Most recent Tornado January 8, 2008 (F0)
- 106 deaths and 155 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 3.50 inches in diameter in Webster county on April 19, 1959. 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 Webster county reached 92 mph and occurred in 1996 on the 28th of April. Since 1956 high winds have caused around \$1,697,000.00 in damages and one fatality.

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 Webster 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 Webster County. Webster 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

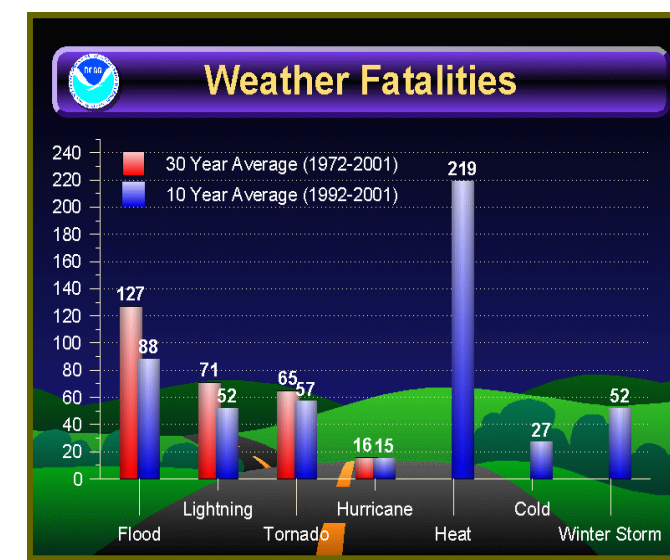


inches, major flooding can occur, and amounts over four inches creates significant flooding that affects most of the county.

Floods in Webster County

14 Nov 1993: The local agriculture office recorded over five inches of rain which led to widespread flash flooding across the county. Several farm roads were damaged. Reynolds County, Flash Flood |Several roads near Redford and Lesterville were closed and damaged due to flash flooding. Some evacuations were needed as well after six to nine inches of rain fell. Every home and business on the east side of Ellington suffered flood damage including a new car lot. Fences were damaged with debris scattered across fields and cattle lost.

17 May 2002: This was the third major flood event to occur within a 10 day period. Some communities



National Weather Fatality Statistics

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.

12 Aug. 2002: Three to four inches of rain fell over portions of southern Webster County where over two feet of water was flowing over Highway YY, along the James River. Over four inches of rain fell in northern Ozark County where Highway Z and tributaries of the North Fork of the White River flooded. Also, law enforcement officers reported street flooding in Gainesville where a local laundry mat had water damage. The flood water also approached a local mobile home park but no evacuations occurred.