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Tennessee Climate Office Monthly Report

10-1-2021

## 2021 October - Tennessee Monthly Climate Report

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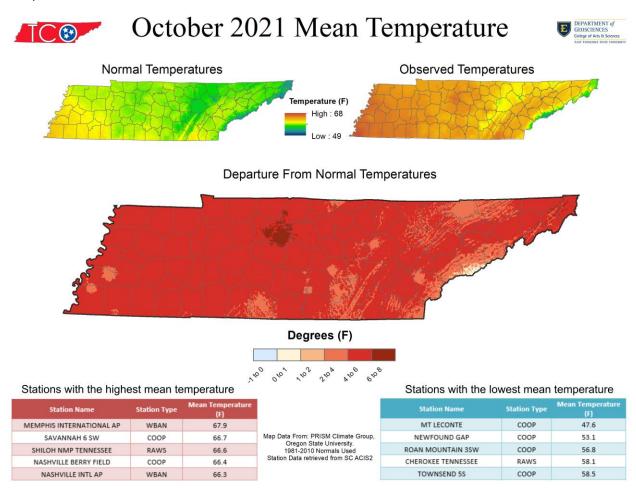
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## October 2021 Tennessee State Climate Summary

Tennessee Climate Office \* East Tennessee State University
Prepared by William Tollefson and Dr. Andrew Joyner
With contributions by <u>Climate Data Representatives</u> across the state

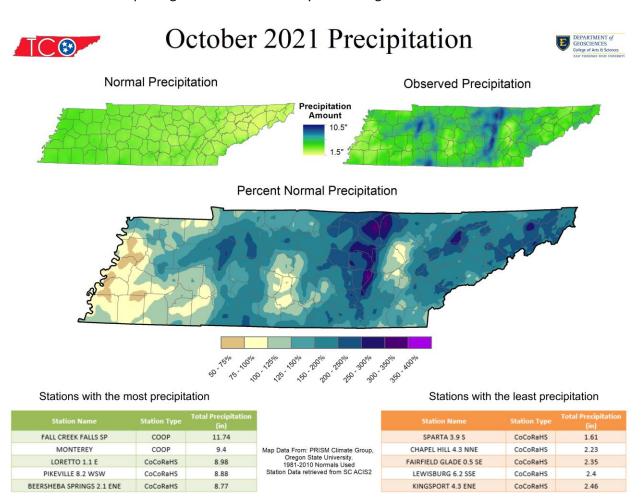
### Monthly Temperature Summary:

It was a warm October across the state, with most areas recording temperatures 4-6°F above normal based on the 1981-2010 30-year climate normals (approximately 3-5°F above the 1991-2020 30-year climate normals). Temperatures were much above normal for the first half of the month, peaking in the second week (8-14 Oct.) when large portions of the state recorded mean temperatures 9-12°F above normal for the week. All the long-term climate reporting weather stations across the state recorded one of their top-10 warmest Octobers in the first half of October, it was the 2<sup>nd</sup> warmest for Tri-Cities and Oak Ridge, 3<sup>rd</sup> warmest for Nashville, 5<sup>th</sup> warmest for Memphis, 6<sup>th</sup> warmest for Chattanooga, and 8<sup>th</sup> warmest for Knoxville. The second half of the month brought a few cold fronts across the state, which brought temperatures closer to normal for this time of the year, and pushing down the monthly temperature rankings out of the top-10 warmest for all climate stations except at Tri-Cities (6<sup>th</sup> warmest October) and Oak Ridge (9<sup>th</sup> warmest). At stations with at least a 30-year reporting history, there were 11 record-high daily maximum temperatures set during the month, and 49 record-high daily minimum temperatures! In the second half of the month two stations on the Cumberland Plateau set record-low daily maximum temperatures.



## Monthly Precipitation Summary:

Most of the state recorded above normal precipitation with portions of the Cumberland Plateau experiencing over 300% normal rainfall during the month! However, western portions of the state recorded below normal precipitation, with several areas along the Mississippi River recording less than 75% of their normal rainfall. The month started with heavy rains, with 2" or more across Middle and East Tennessee, and some counties in the Cumberland Plateau recording over 5" of rain in the first week of the month. Then it was very dry for the second week of the month, except in extreme northeast Tennessee where rains continued at the beginning of the second week of October. More rains came to southern and eastern portions of the state in the third week of the month, and northern portions of the state in the last week of the month. Of stations with at least a 30-year reporting history, 44 stations set record daily precipitation records, and 4 stations in the northeast portion of the state each recorded their rainiest October day in station history: Oneida with 3.14" on the 4th, Monterey with 5.23" on the 7th, Cookeville with 4.34" on the 4th, and Kingsport with 3.70" on the 16th, and the Kingsport, Cookeville, and Monterey stations each have reporting histories of over 100-years in length!



## Station Data and Top Tenn. (warmest/wettest, coldest/driest stations of the month):

Station data for airports across the state using WBAN weather stations, compared to 1991-2020 climate normals:

Temperature					ıres (°F)	res (°F)			Precipitation (inches)		
Station Name	Averages					Extre	emes		Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	%Norm
Memphis	77.5	58.3	67.9	3.3	87	10/13	45	10/31	4.78	0.80	120%
Jackson	75.6	53.7	64.7	4.0	88	10/10	38	10/18	3.08	-0.55	85%
Clarksville	73.8	53.5	63.6	4.3	86	10/1	40	10/18	4.09	-0.04	99%
Nashville	76.0	56.5	66.3	4.6	88	10/1	43	10/18	4.70	1.34	140%
Chattanooga	74.6	56.9	65.7	3.0	85	10/4	44	10/27	4.72	1.13	131%
Crossville	68.4	50.9	59.6	3.2	80	10/1	33	10/27	4.64	1.50	148%
Knoxville	72.7	54.2	63.4	3.1	83	10/14	39	10/27	4.53	1.72	161%
Bristol	72.8	51.0	61.9	4.6	83	10/14	32	10/27	4.05	1.53	161%

Departures and %Norm Key: Warmer than Normal, Cooler than Normal; Wetter than Normal, Drier than Normal

**Hottest Stations (highest maximum temperature)** 

Station Name	Station Type	Highest Temperature (F)	Date
WOODBURY 1 WNW	COOP	92	2
OLD HICKORY DAM	СООР	89	1
CAMDEN	СООР	89	24
SAVANNAH 6 SW	СООР	88	10
LYNCHBURG	СООР	88	2
LEWISBURG EXP STA	СООР	88	2
JACKSON EXP STA	COOP	88	11
CHEATHAM LOCK & DAM	СООР	88	28
NASHVILLE BERRY FIELD	СООР	88	2
CAMDEN TOWER TENNESSEE	RAWS	88	10
SHILOH NMP TENNESSEE	RAWS	88	9
JACKSON MCKELLAR- SIPES AP	WBAN	88	10
DYERSBURG MUNICIPAL AIRPORT	WBAN	88	10
NASHVILLE INTL AP	WBAN	88	1

Eleven stations tied for the 4<sup>th</sup> hottest temperature (88°F)

**Coldest Stations (lowest minimum temperature)** 

Station Name	Station Type	Lowest Temperature (F)	Date
MT LECONTE	COOP	25	18
NEWFOUND GAP	COOP	26	31
WAYNESBORO	COOP	27	27
ROAN MOUNTAIN 3SW	COOP	29	28
MILAN EXP STN	COOP	31	19
ONEIDA	СООР	31	28
CROSSVILLE AREA OFFICE TENNESS	RAWS	31	27
SAVANNAH 6 SW	COOP	32	17
GREENEVILLE EXP STA	COOP	32	28
TAZEWELL	СООР	32	28
FALL CREEK FALLS SP	СООР	32	29
BLEDSOE SF TENNESSEE	RAWS	32	27
BRISTOL AP	WBAN	32	27

Six stations tied for the  $8^{th}$  coldest temperature (32°F)

## **Warmest Stations (highest mean temperatures)**

warmest stations (mgnest mean temperatures)						
Station Name	Station Type	Mean Temperature (F)				
MEMPHIS INTERNATIONAL AP	WBAN	67.9				
SAVANNAH 6 SW	СООР	66.7				
SHILOH NMP TENNESSEE	RAWS	66.6				
NASHVILLE BERRY FIELD	СООР	66.4				
NASHVILLE INTL AP	WBAN	66.3				
MEMPHIS WFO	WBAN	66.2				
MOUNT PLEASANT 1N	СООР	66.1				
BROWNSVILLE	СООР	66.1				
CAMDEN TOWER TENNESSEE	RAWS	66.1				
JACKSON EXP STA	СООР	65.9				
CAMDEN	СООР	65.9				

Two stations tied for the 10<sup>th</sup> warmest mean temperature (65.9°F)

**Coolest Stations (lowest mean temperatures)** 

Station Name	Station Type	Mean Temperature (F)
MT LECONTE	СООР	47.6
NEWFOUND GAP	СООР	53.1
ROAN MOUNTAIN 3SW	СООР	56.8
CHEROKEE TENNESSEE	RAWS	58.1
TOWNSEND 5S	СООР	58.5
GATLINBURG 2 SW	СООР	58.8
FALL CREEK FALLS SP	COOP	58.8
COALMONT	СООР	59.2
CROSSVILLE 7 NW	WBAN	59.3
TAZEWELL	COOP	59.4

## Wettest Stations (highest precipitation totals):

Station Name	Station Type	Total Precipitation (in)
FALL CREEK FALLS SP	СООР	11.74
MONTEREY	СООР	9.4
LORETTO 1.1 E	CoCoRaHS	8.98
PIKEVILLE 8.2 WSW	CoCoRaHS	8.88
BEERSHEBA SPRINGS 2.1 ENE	CoCoRaHS	8.77
COOKEVILLE	СООР	8.72
WINCHESTER 5SE	СООР	8.7
LORETTO 5.2 NE	CoCoRaHS	8.39
COOKEVILLE 3.3 SSW	CoCoRaHS	8.29
DUNLAP 3.1 NW	CoCoRaHS	8.21

## **Driest Stations (lowest precipitation totals):**

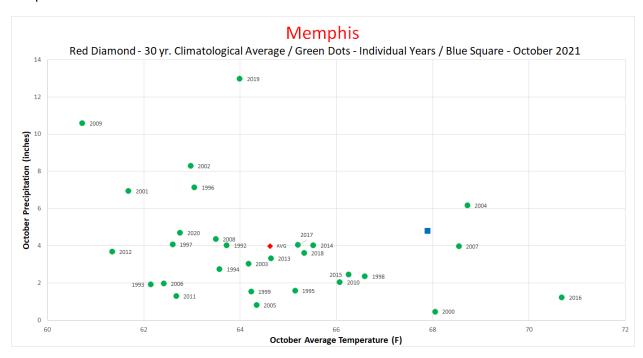
Station Name	Station Type	Total Precipitation (in)
SPARTA 3.9 S	CoCoRaHS	1.61
CHAPEL HILL 4.3 NNE	CoCoRaHS	2.23
FAIRFIELD GLADE 0.5 SE	CoCoRaHS	2.35
LEWISBURG 6.2 SSE	CoCoRaHS	2.4
KINGSPORT 4.3 ENE	CoCoRaHS	2.46
STANTON 8.8 E	CoCoRaHS	2.48
ROCKWOOD 11.3 S	CoCoRaHS	2.64
LEWISBURG 5.1 SW	CoCoRaHS	2.66
BAILEYTON 1.0 NW	CoCoRaHS	2.67
GREENEVILLE 10.1 S	CoCoRaHS	2.73

## **Snowiest Stations (highest snowfall accumulations)**

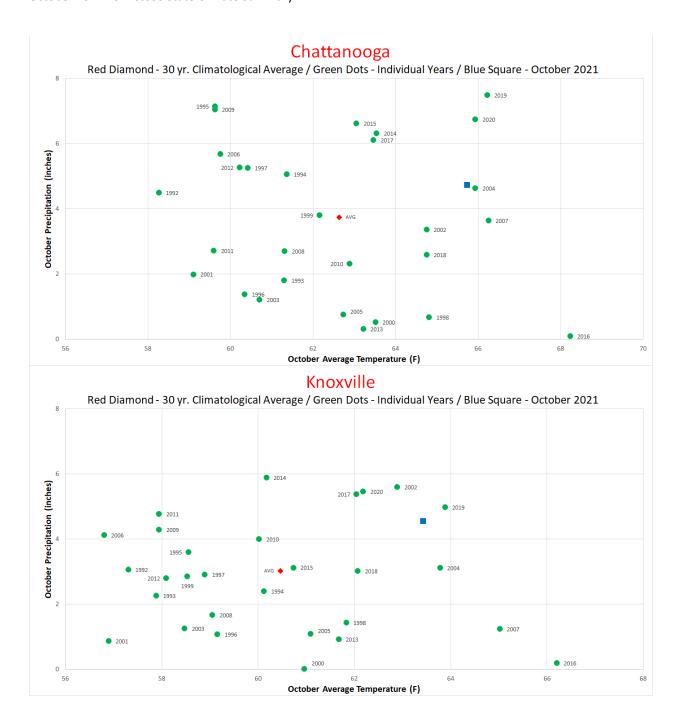
Name	Station Type	Total Snowfall (in)
MT LECONTE	СООР	Trace

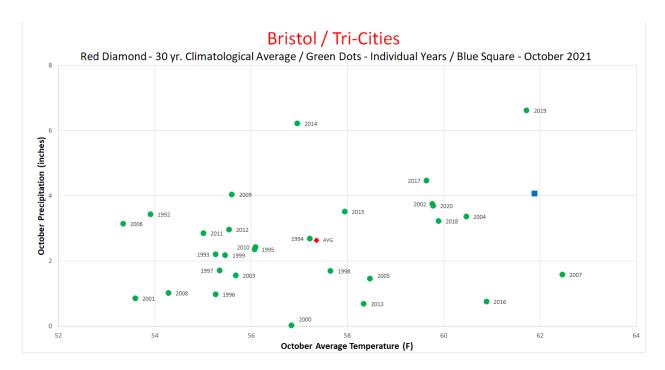
## The Month in Comparison:

Comparing the mean monthly temperature and total precipitation of October 2021 to the October temperature and precipitation patterns of the previous thirty years at major airports across the state, this month was several degrees warmer than the 30-year average. Jackson and Nashville recorded their second warmest October in the past thirty years (behind only October 2016) and the Bristol/Tri-Cities recorded its second warmest October in the past thirty years (behind only 2007). All airport stations except Jackson had total precipitation above the 30-year average, but were not as outlying as the temperature values.



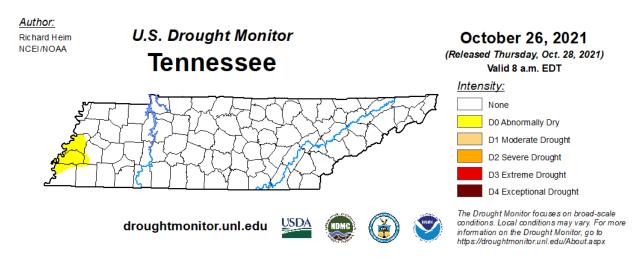


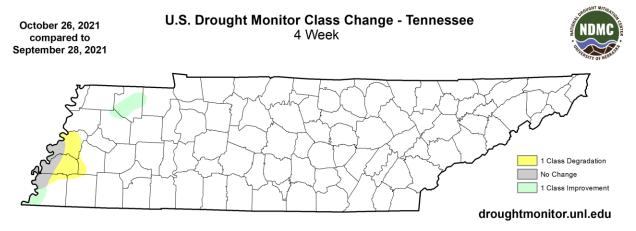




### **Drought Monitor:**

In the U.S. Drought Monitor for October, there was a persistent area of Abnormally Dry (D0) conditions in West Tennessee, which reached its largest size in the October 12 release of the drought monitor when D0 covered 3.3% of the state. During October, a small area of D0 centered in Weakley County was removed, and southwest portions of Shelby County were cleared of D0. However, there was some increasing coverage of D0 in Tipton and Lauderdale Counties, and in the last release of the month D0 coverage was down to 3.05% of the state.

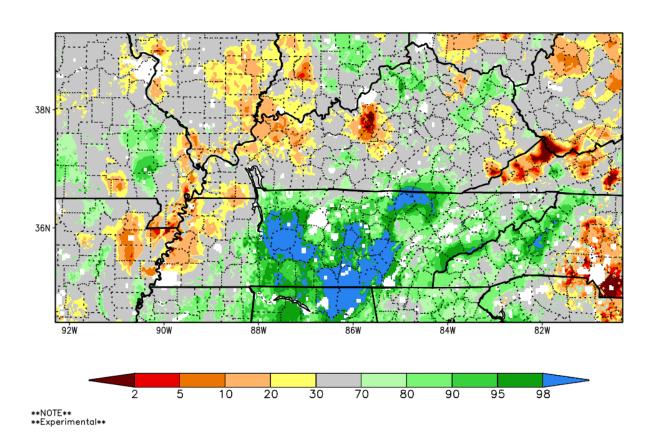




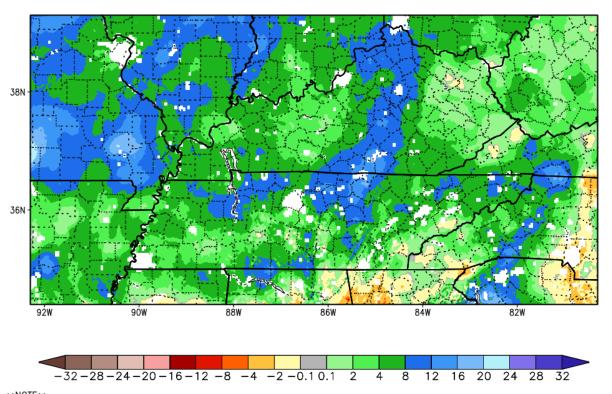
#### Soil Moisture:

The USDA Crop Weather Report for the end of October rated topsoil moisture 3% short, 75% adequate, and 22% surplus across the state, and subsoil moisture was rated 1% very short, 8% short, 75% adequate, and 16% surplus. The NASA SPORT Land Information System shows that most of East and Middle Tennessee had surpluses of soil moisture (integrated from surface to 2 meters down) with portions of Middle Tennessee and the Cumberland Plateau recording 98<sup>th</sup> percentile soil moisture levels. In West Tennessee there were areas with lower percentile soil moisture levels, indicating a shortage of soil moisture levels. However, almost all portions of the state recorded increasing levels of soil moisture.

SPoRT-LIS 0-2 m RSM percentile valid 31 Oct 2021



## 1-Month Difference in Column Relative Soil Moisture (%) valid 12z 31 Oct 2021

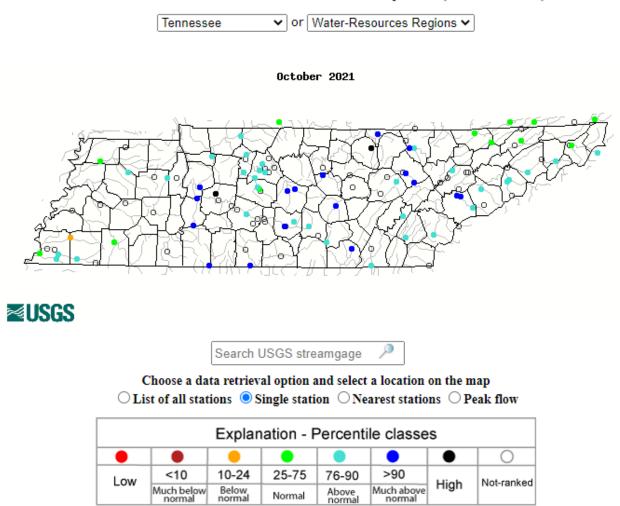


\*\*NOTE\*\* \*\*Experimental\*\*

#### Streamflow:

Matching the precipitation data for the month, most streams in the state recorded normal to much above normal streamflow rates for October. Streams in Northeast Tennessee were mostly in the normal range of percentiles, while most of the Cumberland Plateau and southern sections of Middle Tennessee had streams in the much above normal streamflow percentiles. One stream gauge in northern Shelby County recorded below normal streamflow for the month.

# Map of monthly streamflow compared to historical streamflow for the month of the year (Tennessee)

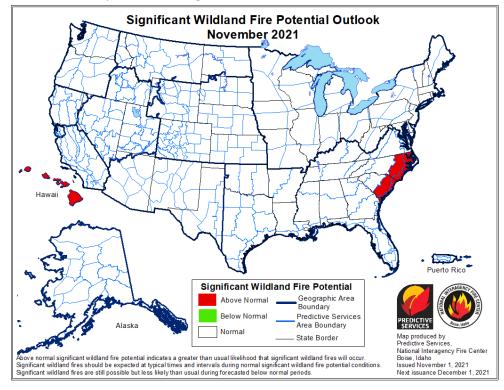


#### Miscellaneous:

Crop Conditions from USDA: Harvesting was underway for row crops across the state, with tobacco harvests finishing up in the middle of the month. Frequent rains in Middle and East Tennessee did slow down harvesting with cotton, soybean, and corn harvests running behind the 5-year average progress. Winter wheat planting is also underway, but is slightly behind 5-year average progress. Warm temperatures and plentiful rainfall were good for pastures and some producers were able to get a final cutting for hay, leaving the state in good shape heading into winter.

CROP	CROP PROGRESS				CONDITION					
Crop	This Week	Last Week	2020	5 Year Avg.	Item	Very Poor	Poor	Fair	Good	Excellent
	Percent						Per	cent		
Corn - Harvested	91	86	94	97	Pasture	1	6	27	56	10
Cotton - Bolls Opening	94	89	100	100	Cotton	3	9	23	54	11
Cotton – Harvested	42	25	51	66	Winter Wheat	0	2	13	64	21
Soybeans – Harvested	55	44	57	69						
Winter Wheat - Planted	59	49	63	61						
Winter Wheat – Emerged	37	28	46	36						

**Fire Danger**: The National Interagency Fire Center significant wildland fire potential outlook shows all of Tennessee with normal fire potential during November.



**Fall Foliage:** A cool spell coinciding with the first days of autumn in late September spurred some leaves to start changing, but much warmer than normal temperatures in the first half of October (many areas recorded temperatures 10°F above normal for the first two weeks of October) put a halt on fall colors across the state. For areas in East Tennessee with elevations above 3000ft, peak color was reached about the third week of the month, while lower elevations did not reach peak color until the very end of October.

## Story of the Month:

The main stories of October 2021 were the much above normal temperatures in the first half of the month, and the severe storms and flash flooding associated with strong storm systems that moved through the state on the 6<sup>th</sup> and 7<sup>th</sup>. A frontal system that passed through the state in the middle of the month finally broke the summer-like pattern that had been in place for the first half of the month and allowed temperatures to return to near normal conditions, although most areas were still slightly warmer than the 1991-2020 normal mean temperature for the latter half of the month.

Temperatures across Tennessee were well above the 1991-2020 30-year climate normals in the first half of the month, with many areas recording mean temperatures  $9-12^{\circ}F$  warmer than normal. Looking at weather station data from the National Centers for Environmental Information (NCEI) Global Historical Climatological Network dataset, which keeps track of records set at weather stations with at least a 30-year reporting history, there were 11 record-high daily maximum temperatures set during the month and 49 record-high daily minimum temperatures set during the month. All record minimum temperatures were set during the first half of the month (Oct 2- Oct 16).

Additionally, the Allardt, TN COOP weather station in Fentress County (Cumberland Plateau) with a 93-year reporting history (January 1928-present) broke its record-high October minimum temperature three times this month! On October 7, 2021 the daily low temperature was recorded as 69°F setting the record for the station's warmest low temperature recorded during the month of October (the previous record was 68°F set on Oct 4, 1954). The next day, October 8, 2021 the daily low temperature was 70°F, breaking the record-high October minimum temperature set the previous day. Then on October 13, 2021 the station recorded a low temperature of 71°F, again breaking the record-high minimum temperature for the month of October!

**Record-high Daily Maximum Temperatures Set During October 2021:** 

Record-ingh bany waximam remperatures set buring october 2021.								
Station Name	Date of Record	Daily High Temperature (°F)	Previous Record Date	Previous Record Temp (°F)	Station History Length (Years)			
NEWFOUND GAP	10/10/2021	69	10/10/1997	68	30			
ALLARDT	10/11/2021	85	10/11/1938	84	93			
NEWFOUND GAP	10/11/2021	72	10/11/2010	68	30			
WOODBURY 1 WNW	10/12/2021	90	10/12/2019	89	63			
OLD HICKORY WEATHER FORECAST OFFICE	10/14/2021	84	10/14/1992	83	30			
NEWFOUND GAP	10/14/2021	69	10/14/2016	67	30			
MEMPHIS WEATHER FORECAST OFFICE	10/14/2021	87	10/14/2000	85	33			
ALLARDT	10/15/2021	86	10/15/1947	84	93			
NEWFOUND GAP	10/15/2021	73	10/15/2020	69	30			
NEWFOUND GAP	10/16/2021	73	10/16/1996	72	30			
MONTEREY	10/25/2021	78	10/25/2012	77	117			

**Record-high Daily Minimum Temperatures Set During October 2021:** 

Record-High Da	ily iviinimum	remperatures s	et During Octob	per 2021:	
Station Name	Date of Record	Daily Low Temperature (°F)	Previous Record Date	Previous Record Temp (°F)	Station History Length (Years)
MEMPHIS WEATHER FORECAST OFFICE	10/2/2021	70	10/2/2019	68	33
FAYETTEVILLE WATER PLANT	10/3/2021	68	10/3/1995	67	64
PIKEVILLE	10/3/2021	66	10/3/2014	65	59
CLEVELAND FILTER PLANT	10/4/2021	67	10/4/1986	66	65
ATHENS	10/4/2021	67	10/4/2019	66	59
KINGSPORT	10/6/2021	65	10/6/1995	64	104
BRISTOL AIRPORT	10/7/2021	65	10/7/2018	64	83
TAZEWELL	10/7/2021	64	10/7/2018	63	55
ALLARDT	10/7/2021	69	10/7/2018	63	93
TAZEWELL	10/8/2021	63	10/8/2018	61	55
ALLARDT	10/8/2021	70	10/8/2017	67	93
ALLARDT	10/10/2021	67	10/10/2017	65	93
AMES PLANTATION	10/11/2021	67	10/11/2020	66	45
HUNTINGDON WATER PLA	10/11/2021	67	10/11/2020	65	59
ALLARDT	10/11/2021	67	10/11/2020	63	93
TULLAHOMA	10/12/2021	67	10/12/2020	65	125
MOUNT PLEASANT 1 N	10/12/2021	67	10/12/1969	65	68
ALLARDT	10/12/2021	69	10/12/2020	65	93
ONEIDA	10/13/2021	64	10/13/2001	63	61
MEMPHIS INTERNATIONAL AIRPORT	10/13/2021	73	10/13/2008	71	81
ALLARDT	10/13/2021	71	10/13/2001	63	93
AMES PLANTATION	10/14/2021	67	10/14/1985	66	45
MEMPHIS INTERNATIONAL AIRPORT	10/14/2021	71	10/14/2008	70	81
MEMPHIS WEATHER FORECAST OFFICE	10/14/2021	68	10/14/2008	67	33
OLD HICKORY WEATHER FORECAST OFFICE	10/14/2021	63	10/14/2014	60	30
JACKSON MCKELLAR SIPES AIRPORT	10/14/2021	70	10/14/1985	67	72
TAZEWELL	10/14/2021	62	10/14/2014	59	55
ALLARDT	10/14/2021	66	10/14/2014	61	93
FRANKLIN SEWAGE PLANT	10/15/2021	65	10/15/1925	64	128
BRISTOL AIRPORT	10/15/2021	62	10/15/1985	61	83
NORRIS	10/15/2021	59	10/15/1970	58	86
MOUNT PLEASANT 1 N	10/15/2021	66	10/15/1962	65	68
KINGSPORT	10/15/2021	64	10/15/1949	63	104
BROWNSVILLE	10/15/2021	69	10/15/1935	68	118

Station Name	Date of Record	Daily Low Temperature (°F)	Previous Record Date	Previous Record Temp (°F)	Station History Length (Years)
DOVER 1 W	10/15/2021	67	10/15/2017	65	123
MORRISTOWN RADIO WCRK	10/15/2021	64	10/15/1985	62	39
CHEATHAM LOCK AND DAM	10/15/2021	63	10/15/2008	60	50
NASHVILLE INTERNATIONAL AIRPORT	10/15/2021	68	10/15/1984	64	73
ALLARDT	10/15/2021	68	10/15/1985	64	93
MEMPHIS WEATHER FORECAST OFFICE	10/15/2021	69	10/15/2008	65	33
MURRAY, KY US	10/15/2021	69	10/15/1962	64	95
NEWFOUND GAP	10/15/2021	54	10/15/2016	49	30
OLD HICKORY WEATHER FORECAST OFFICE	10/15/2021	66	10/15/2008	61	30
NEWFOUND GAP	10/16/2021	54	10/16/2018	53	30
MOUNT LECONTE	10/16/2021	49	10/16/2018	48	33
ONEIDA	10/16/2021	57	10/16/2016	56	61
ELIZABETHTON	10/16/2021	60	10/16/1985	59	126
MORRISTOWN RADIO WCRK	10/16/2021	63	10/16/1993	61	39
TAZEWELL	10/16/2021	60	10/16/2013	56	55

In addition to the warmth, the first week of the month also brought more extreme rainfall to portions of the state, with the Cumberland Plateau seeing the most wide-spread impacts, many counties in the region had weekly rainfall totals in the 5-8-inch range from October 1-7. Sequatchie County was impacted by flash flooding that surrounded homes with water and washed out some roads. There were also severe storms associated with this frontal system, and an EF1 tornado occurred in Cumberland County Oct 6.



## **Storm Reports:**

\*Storm Reports are based on filtered NOAA Storm Prediction Center data or local NWS storm reports. Future quality control checks may change the official record of severe events, please see spc.noaa.gov for any updates.

There were two days with severe storm reports in Tennessee during October 2021, with a total of 3 tornadoes, 3 severe wind damage reports, and 1 severe hail report (1" diameter or larger).

#### October 3



#### Tornadoes:

Time (UTC)	Strength	Location	County	Lat	Lon	Comments
21:36	EFO	4 SW MOUNT JULIET	WILSON	36.16	-86.56	A SMALL WEAK EF-0 TORNADO TOUCHED DOWN ALONG JOHN HAGER ROAD IN SOUTHWEST MOUNT JULIET THEN MOVED NORTHEAST ACROSS I-40. SEVERAL VIDEOS OF THE TORNADO WERE TAKEN IN THI (OHX)
21:42		MOUNT JULIET	WILSON	36.21	-86.52	VIDEO EVIDENCE OF WHAT APPEARS TO BE A BRIEF SPIN-UP NEAR I-40 JUST INSIDE THE WILSON/DAVIDSON COUNTY LINE. NO REPORTS OF DAMAGE. (OHX)

#### October 6:



## Tornadoes:

Time (UTC)	Strength	Location	County	Lat	Lon	Comments
22:59	EF1	4 N CROSSVILLE	CUMBERLAND	36.01	-85.03	AN EF1 TORNADO TOUCHED DOWN ON THE NORTH SIDE OF CROSSVILLE NEAR THE OBED RIVER AND MOVED NORTHWARD ACROSS RYE WOODY RDLAWSON RD AND TABOR LOOP BEFORE LIFTING. AT LE (OHX)

## Wind:

Time (UTC)	Speed (mph)	Location	County	Lat	Lon	Comments
		1 NW				TREES DOWN NEAR THE CUMBERLAND
22:45	22:45 UNK	CROSSVILLE	CUMBERLAND	35.96	-85.05	COUNTY COMMUNITY COMPLEX ON
						LIVINGSTON ROAD IN CROSSVILLE (OHX)
22.20	23:20 UNK	RINNIE	CUMBERLAND	36.15	-85.03	A FEW TREES REPORTED DOWN IN THE
23:20						RINNIE AREA (OHX)
		10 ENE CENTERVILLE	HICKMAN	35.85	-87.28	TREES AND POWERLINES DOWN NEAR
23:53	UNK					HASSEL CREEK IN THE PRIMM SPRINGS AREA
						OF HICKMAN COUNTY (OHX)

## Hail:

Time (UTC)	Size (in)	Location	County	Lat	Lon	Comments
0:25	1.00	5 NW BON AQUA	DICKSON	36	-87.41	PHOTOS SHOWED QUARTER SIZE HAIL IN THE EAST PINEY ROAD AND WILL BEND ROAD AREA (OHX)

## CPC Outlooks for the Next Month:

The NOAA Climate Prediction Center outlooks for November show all of Tennessee with equal chances of above normal, normal, or below normal temperatures and precipitation for the next month.

