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2023 October - Tennessee Monthly Climate Report

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October 2023 Tennessee State Climate Summary

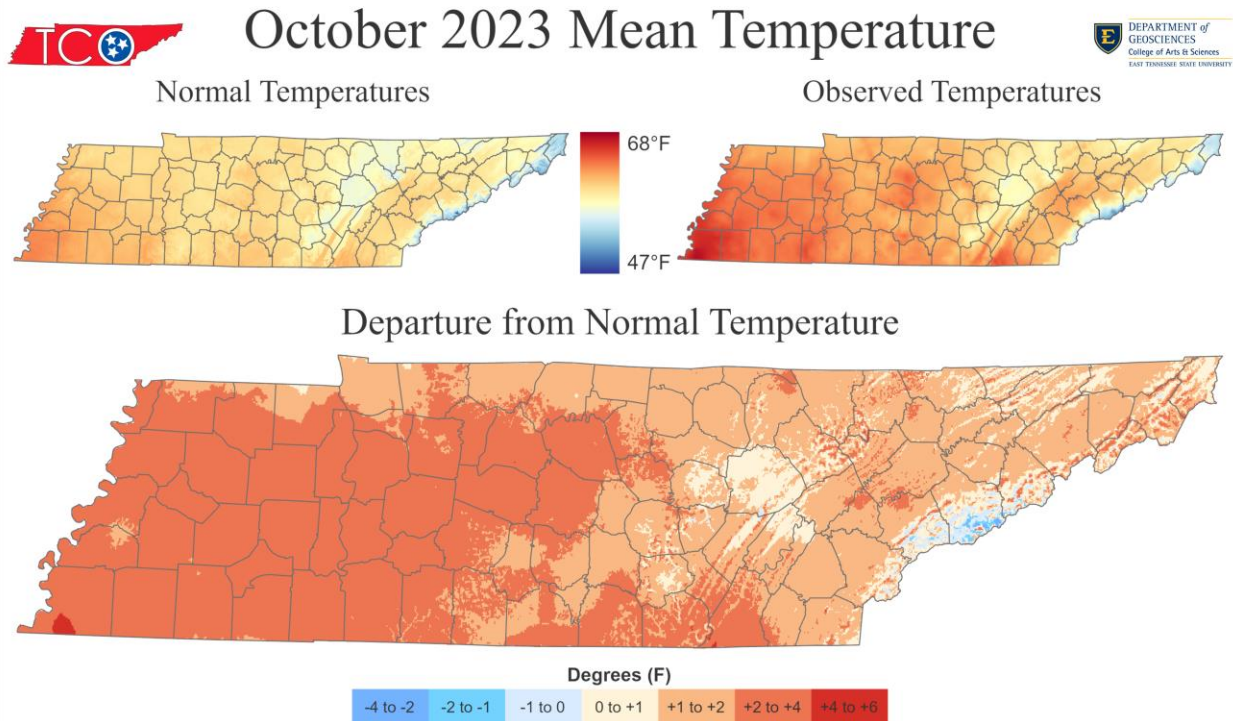
Tennessee Climate Office * East Tennessee State University

Prepared by William Tollefson and Dr. Andrew Joyner

With contributions by [Climate Data Representatives](#) across the state

Monthly Temperature Summary:

Mean temperatures for the month of October 2023 were warmer than normal for most of the state, with most areas of West and Middle Tennessee averaging 2-4°F warmer than normal, and most of East Tennessee averaging 1-2°F warmer than normal. This was largely driven by heat in the first and last weeks of the month. For the week of October 22-28 temperatures in West Tennessee averaged 9-15°F warmer than normal before a strong cold front brought the first freeze of the season to many areas of the state from October 30-31. Temperatures in the middle of the month were cooler than normal, especially in the eastern half of the state. There were 12 broken and 12 tied daily high temperature records set this month. All of these records were set from October 23-29, including the Nashville airport with a high of 87°F on October 28, which broke the previous record by 4 degrees! There were also 5 daily records set for warmest low temperature this month. On the cool side of the record books, there were 11 broken and 2 tied daily records for low temperatures set this month. Monteagle set a monthly record for the lowest temperature recorded in October on the 8th, with a low of 21°F; this new record was tied on the 20th. There were 22 broken and 7 tied daily records for coolest high temperature set this month. Mt LeConte smashed its previous record set in 2002 for October 17 by 9°F, with a high of only 29°F.



Stations with the highest mean temperature

Station Name	Station Type	Mean Temperature (F)
MEMPHIS INTERNATIONAL AP	WBAN	67
SHILOH NMP TENNESSEE	RAWS	66.3
SAVANNAH 6 SW	COOP	66.1
MEMPHIS WFO	WBAN	65.3
AMES PLANTATION	COOP	65.1

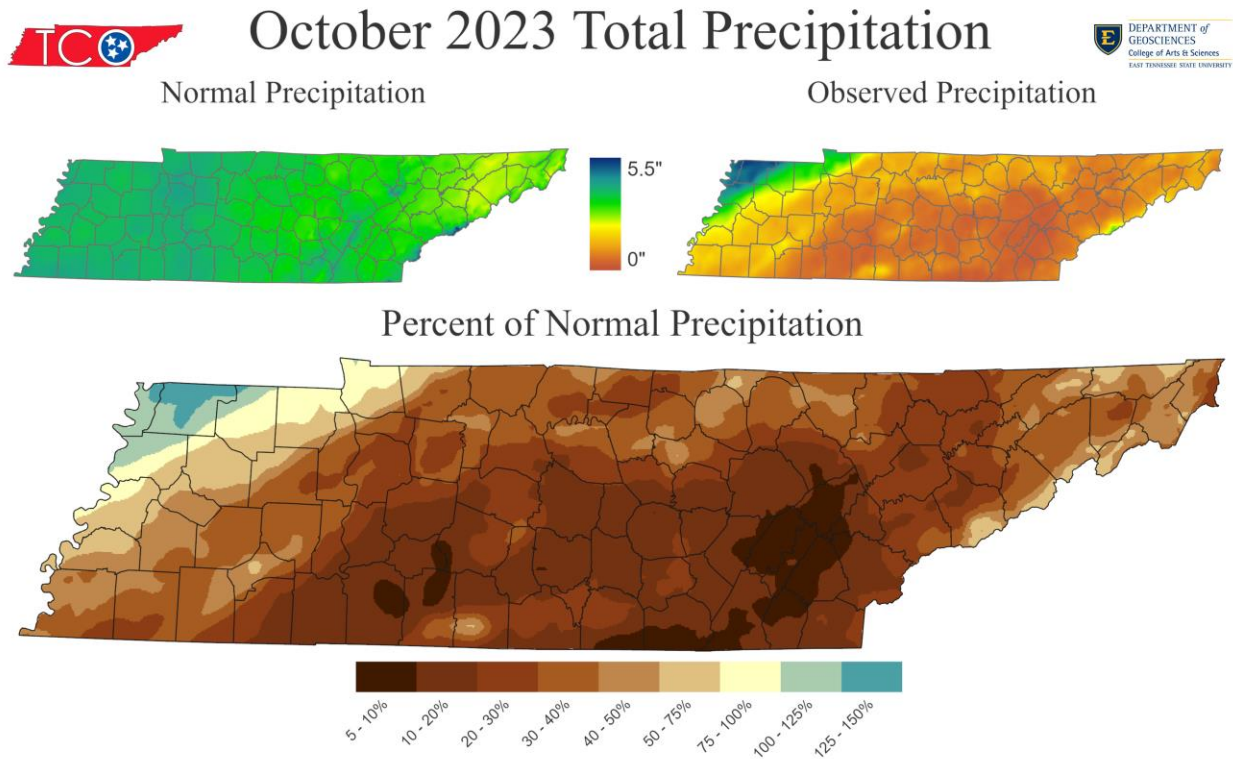
Map Data from PRISM Climate Group, Oregon State University, 1991-2020 Climate Normals Used. Station Data Retrieved From xmACIS2.

Stations with the lowest mean temperature

Station Name	Station Type	Mean Temperature (F)
MT LECONTE	COOP	44.2
NEWFOUND GAP	COOP	51.2
ROAN MOUNTAIN 3SW	COOP	52.8
MOUNTAIN CITY 2	COOP	55.2
CHEROKEE TENNESSEE	RAWS	55.4

Monthly Precipitation Summary:

October 2023 was drier than normal for all areas of the state, except the northwestern corner, where parts of Lake, Obion, Dyer, and Weakley recorded above normal precipitation, tied mainly to one rainfall event near the end of the month. October is usually the driest month of the year for most areas of Tennessee, but over half of the state recorded less than 50% of their normal October precipitation this year. The hardest hit areas were in southeast Tennessee and portions of southern Middle Tennessee where less than 10% of the normal October precipitation was recorded this month! These dry conditions led to the rapid expansion and intensification of drought across the state in October, you can read more about this in the Drought Monitor and Story of the Month sections of this report. Throughout the month, most counties of Tennessee saw little to no rainfall (less than 0.1" per week). Some exceptions included northeast Tennessee and the higher elevations of the Smoky Mountains in the third week of the month, with the highest elevations of the smokies reporting the first snowfall of the season on October 16-17. In the fourth week of the month a band of heavy rainfall set up along northwest Tennessee counties, with some areas of Dyer, Lake, Obion and Stewart counties recording over 2" of rainfall for the week. Despite overall dry conditions this month, there were 5 daily precipitation records set, and Mt LeConte set a daily snowfall record on October 17 with 2.52" of snowfall reported.



Stations with the most precipitation

Station Name	Station Type	Total Precipitation (in)
DYERSBURG MUNICIPAL AIRPORT	WBAN	3.29
DRESDEN	COOP	3.23
NEWFOUND GAP	COOP	3.08
MT LECONTE	COOP	3.07
DOVER 1 W	COOP	2.86

Map Data from PRISM Climate Group,
Oregon State University.
1991-2020 Climate Normals Used.
Station Data Retrieved From xmACIS2

Stations with the least precipitation

Station Name	Station Type	Total Precipitation (in)
CHEATHAM LOCK & DAM	COOP	0
LAWRENCEBURG 8.8 SE	CoCoRaHS	0.06
MURFREESBORO 8.7 E	CoCoRaHS	0.06
HARRIMAN 4.3 SSE	CoCoRaHS	0.13
ROCKWOOD 11.3 S	CoCoRaHS	0.14

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 30-year climate normals for departure from mean temperature and total precipitation:

Station Name	Temperatures (°F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	%Norm
Memphis	77.4	56.7	67.0	+2.4	92	10/1	33	10/31	1.57	-2.41	39%
Jackson	74.9	50.0	62.5	+1.8	90	10/2	28	10/31	1.33	-2.30	37%
Clarksville	73.0	50.6	61.8	+2.5	88	10/2	30	10/31	2.23	-1.90	54%
Nashville	75.1	52.7	63.9	+2.2	89	10/2	33	10/31	0.73	-2.63	22%
Chattanooga	76.3	51.8	64.1	+1.4	89	10/3	40	10/18	0.29	-3.30	8%
Crossville	68.2	46.2	57.2	+0.8	81	10/3	29	10/31	0.31	-2.83	10%
Knoxville	73.8	52.7	61.9	+1.6	86	10/4	40	10/18	0.63	-2.18	22%
Bristol	72.0	45.8	58.9	+1.6	86	10/4	34	10/23	0.98	-1.54	39%

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
SAVANNAH 6 SW	COOP	93	3
LEWISBURG EXP STA	COOP	92	2
JACKSON EXP STA	COOP	92	2
MEMPHIS INTERNATIONAL AP	WBAN	92	1
MEMPHIS WFO	WBAN	92	3
UT MARTIN BRANCH EXP STATION	COOP	91	3
SHILOH NMP TENNESSEE	RAWS	91	2
DYERSBURG MUNICIPAL AIRPORT	WBAN	91	2
BROWNSVILLE	COOP	90	4
CLARKSVILLE WWTP	COOP	90	2
DECATURVILLE	COOP	90	2
MOUSETAIL LANDING STATE PARK	COOP	90	6
JACKSON MCKELLAR- SIPES AP	WBAN	90	2

Five stations tied for the 9th hottest temperature (90°F)

Coldest Stations (lowest minimum temperature)

Station Name	Station Type	Lowest Temperature (F)	Date
MONTEAGLE	WBAN	21	20
UT MARTIN BRANCH EXP STATION	COOP	23	9
CARTHAGE	COOP	24	10
MT LECONTE	COOP	24	9
KINGSTON SPRINGS	COOP	26	31
LYNCHBURG	COOP	26	31
JACKSON 4 NE	COOP	27	31
HOHENWALD	COOP	28	31
MILAN EXP STN	COOP	28	31
WAYNESBORO	COOP	28	31
DECATURVILLE	COOP	28	31
DRESDEN	COOP	28	31
SPRINGFIELD EXPERIMENT STATION	COOP	28	31
JACKSON MCKELLAR- SIPES AP	WBAN	28	31

Seven stations tied for the 8th coldest temperature (28°F)

Warmest Stations (highest mean temperatures)

Station Name	Station Type	Mean Temperature (F)
MEMPHIS INTERNATIONAL AP	WBAN	67
SHILOH NMP TENNESSEE	RAWS	66.3
SAVANNAH 6 SW	COOP	66.1
MEMPHIS WFO	WBAN	65.3
AMES PLANTATION	COOP	65.1
LEWISBURG TOWER TENNESSEE	RAWS	64.5
NASHVILLE BERRY FIELD	COOP	64.4
DYERSBURG MUNICIPAL AIRPORT	WBAN	64.2
CHATTANOOGA AP	WBAN	64.1
JACKSON EXP STA	COOP	63.9
NASHVILLE INTL AP	WBAN	63.9

Two stations tied for the 10th warmest mean temperature (63.9°F)

Cooltest Stations (lowest mean temperatures)

Station Name	Station Type	Mean Temperature (F)
MT LECONTE	COOP	44.2
NEWFOUND GAP	COOP	51.2
ROAN MOUNTAIN 3SW	COOP	52.8
MOUNTAIN CITY 2	COOP	55.2
CHEROKEE TENNESSEE	RAWS	55.4
MONTEAGLE	WBAN	56.1
CROSSVILLE 7 NW	WBAN	56.4
CROSSVILLE EXP STN	COOP	56.5
GATLINBURG 2 SW	COOP	56.5
COALMONT	COOP	56.6

Wettest Stations (highest precipitation totals):

Station Name	Station Type	Total Precipitation (in)
DYERSBURG MUNICIPAL AIRPORT	WBAN	3.29
DRESDEN	COOP	3.23
NEWFOUND GAP	COOP	3.08
MT LECONTE	COOP	3.07
DOVER 1 W	COOP	2.86
UT MARTIN BRANCH EXP STATION	COOP	2.47
SEWANEE	COOP	2.31
CLARKSVILLE OUTLAW AP	WBAN	2.23
DOVER 7.8 NNE	CoCoRaHS	2.05
WESTMORELAND 5.4 NNE	CoCoRaHS	1.91

Only 70 rain gauges reported 1-in or more of rainfall this month.

Driest Stations (lowest precipitation totals):

Station Name	Station Type	Total Precipitation (in)
CHEATHAM LOCK & DAM	COOP	0
LAWRENCEBURG 8.8 SE	CoCoRaHS	0.06
MURFREESBORO 8.7 E	CoCoRaHS	0.06
HARRIMAN 4.3 SSE	CoCoRaHS	0.13
ROCKWOOD 11.3 S	CoCoRaHS	0.14
EAST RIDGE 0.9 NW	CoCoRaHS	0.17
CLEVELAND 1.2 W	CoCoRaHS	0.17
CHRISTIANA 3.4 ENE	CoCoRaHS	0.17
CLEVELAND FILTER PLANT	COOP	0.17
SHELBYVILLE 8.7 W	CoCoRaHS	0.18
OAK RIDGE 3.1 NNW	CoCoRaHS	0.18

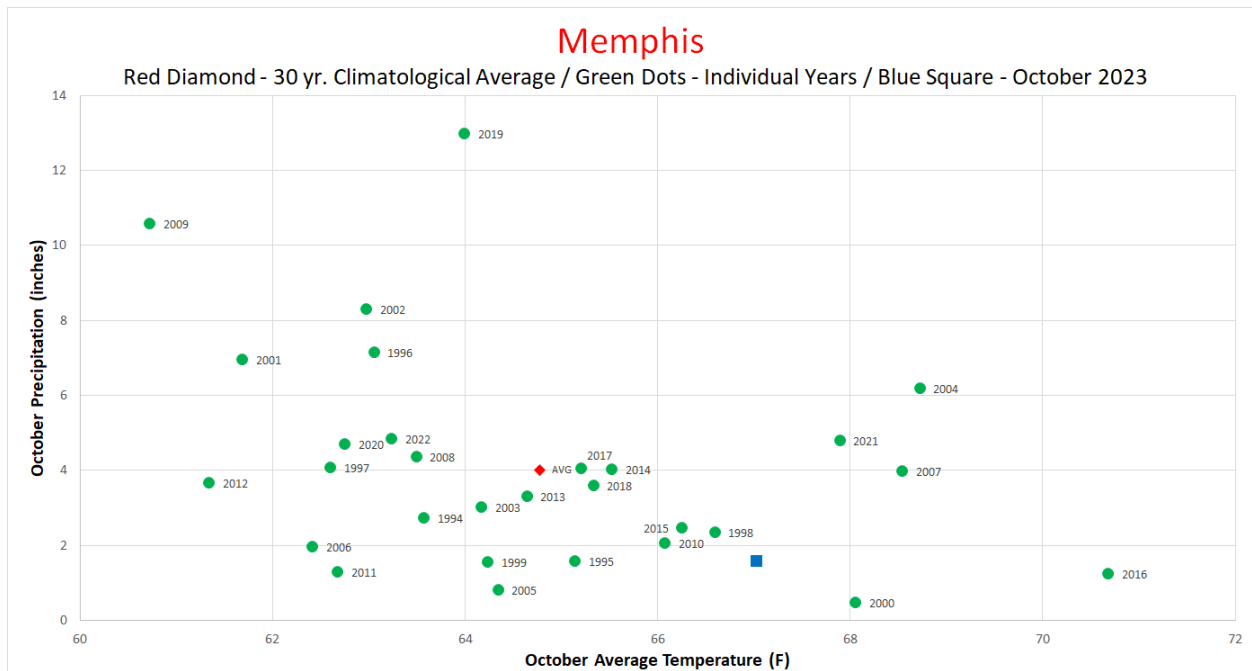
*Two stations tied for the 10th lowest precipitation total (0.18-in)
A total of 252 rain gauges in TN reported less than 1-in of rain this month.*

Snowiest Stations (highest snowfall totals):

Station Name	Station Type	Total Snowfall (in)
MT LECONTE	COOP	3.5
NEWFOUND GAP	COOP	Trace (<0.1-in)

The Month in Comparison:

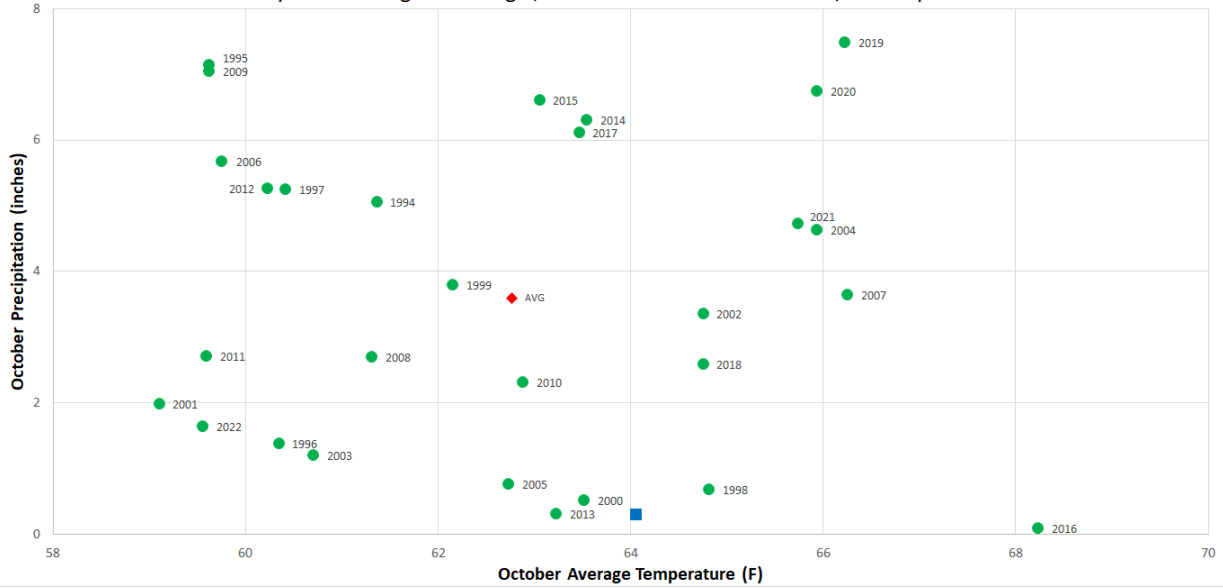
Comparing the average temperature and total precipitation for October 2023 to the conditions of October over the past 30 years at selected automated weather stations located at airports across the state, it was warmer and drier than average. Only Nashville recorded a top-5 warmest October for the past 30 years, but it was tied for 26th warmest October based on the long-term weather history of the city (150-years). Of the past 30 years this was the 2nd driest October for Chattanooga, 3rd driest for Knoxville, and 4th driest for Nashville. Looking at the longer-term weather records, it was tied for the 8th driest October in Chattanooga’s 145-year weather history, tied for 11th driest October in Knoxville’s 153-year weather history, and 18th driest October for Nashville’s 150-year weather history.





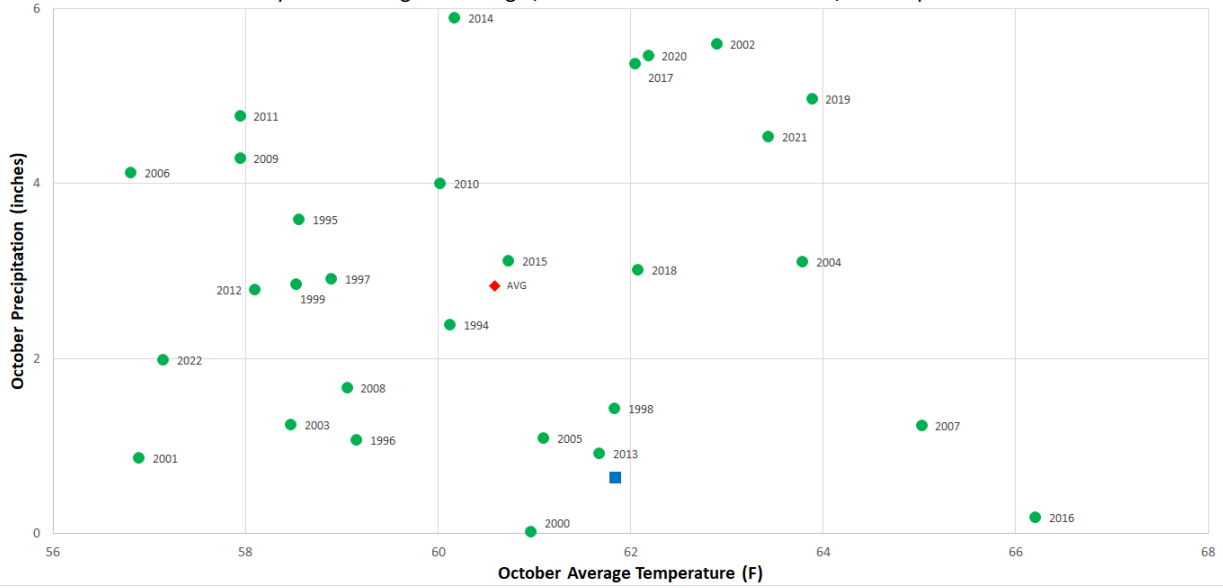
Chattanooga

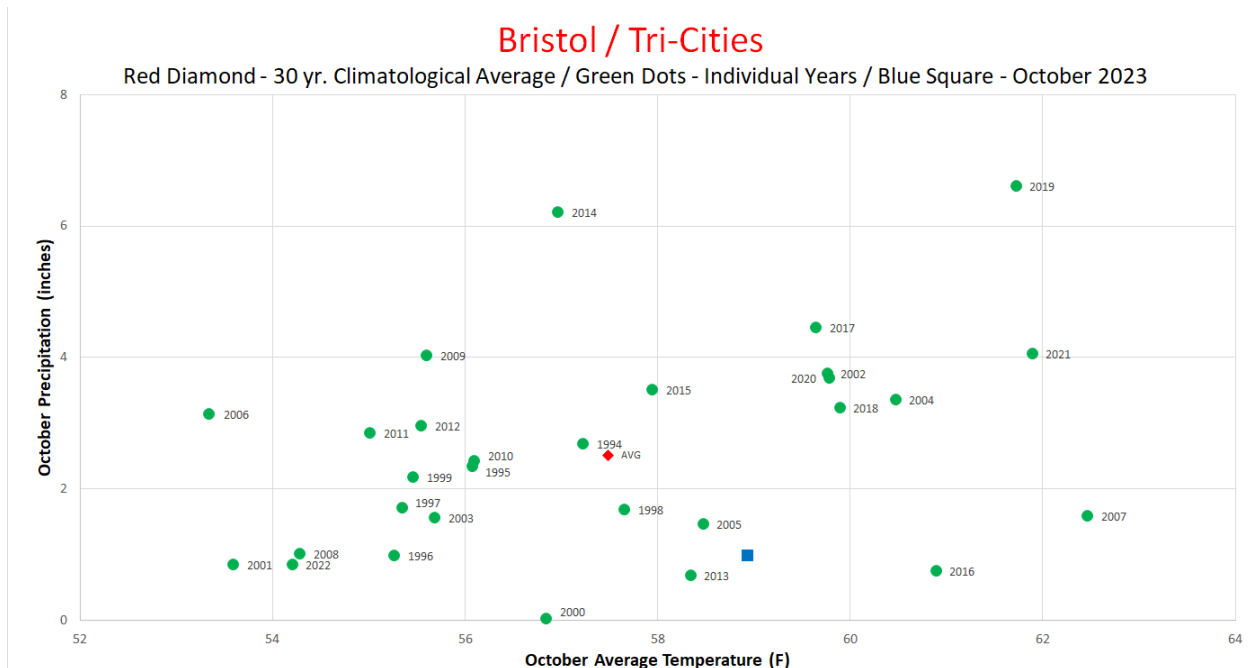
Red Diamond - 30 yr. Climatological Average / Green Dots - Individual Years / Blue Square - October 2023



Knoxville

Red Diamond - 30 yr. Climatological Average / Green Dots - Individual Years / Blue Square - October 2023



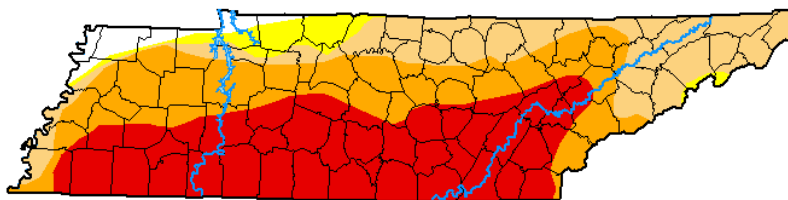


Drought Monitor:

Building off of dry conditions in September with very low rainfall and warmer than normal temperatures this month there were major expansions in drought conditions across Tennessee during October. The first Drought Monitor in October (from Oct. 3) showed 15.8% of the state in Moderate Drought (D1), with an additional 63.3% of the state in Abnormally Dry (D0) conditions. By the last Drought Monitor of the month (from Oct. 31), 40.91% of the state was in Extreme Drought (D3), another 28.92% was in Severe Drought (D2), and 22.17% was in Moderate Drought (D1) for a total of 92% shown with some level of drought conditions and an additional 4.62% in Abnormally Dry (D0) conditions. This represents a 2-3 category degradation in drought conditions across most areas of the state the state during the month. There were a few small areas of improvement in northeast Tennessee where 2-3" of rain fell in the 4th week of the month. Impacts from the drought included dulled fall leaf color, lower than normal water levels in streams across most areas of the state, and dried out ponds and pastures which impacted the agriculture sector, with 32% of the state's pastures reported in poor or very poor condition.

U.S. Drought Monitor Tennessee

October 31, 2023
(Released Thursday, Nov. 2, 2023)
Valid 8 a.m. EDT



Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

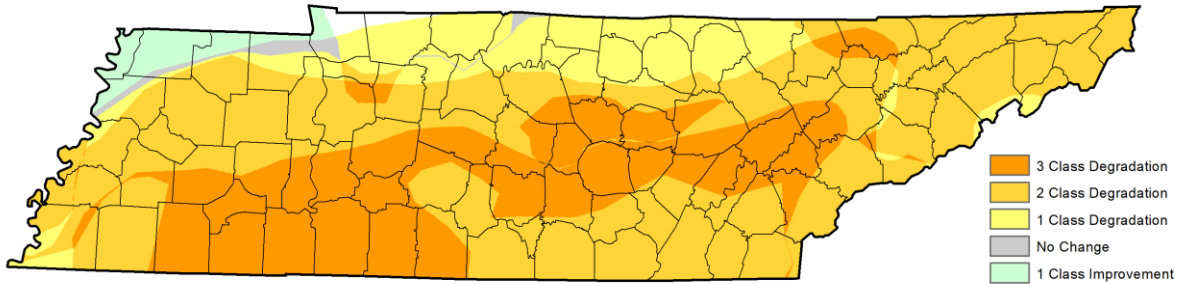
Author:
Brian Fuchs
National Drought Mitigation Center


droughtmonitor.unl.edu

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <http://droughtmonitor.unl.edu/About.aspx>

October 31, 2023
 compared to
 October 3, 2023

U.S. Drought Monitor Class Change - Tennessee
 4 Week

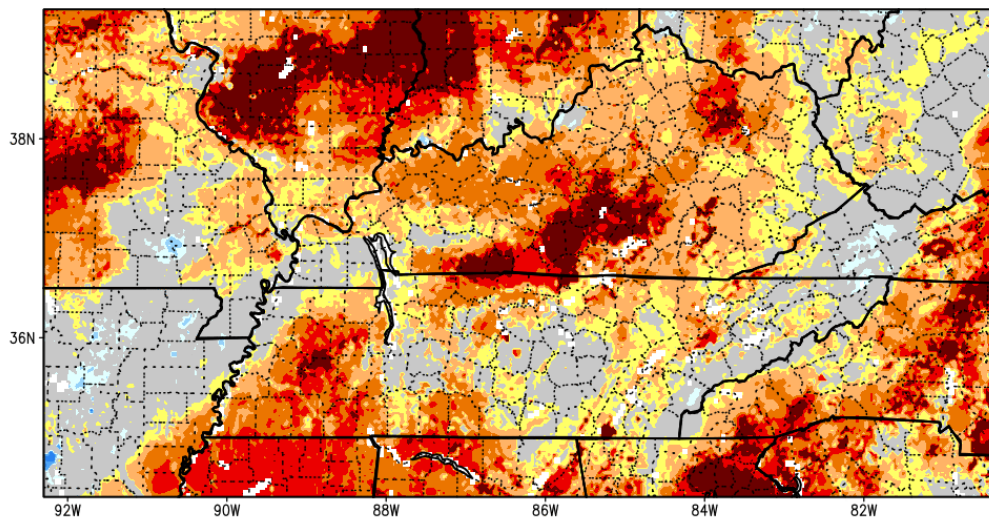


droughtmonitor.unl.edu

Soil Moisture:

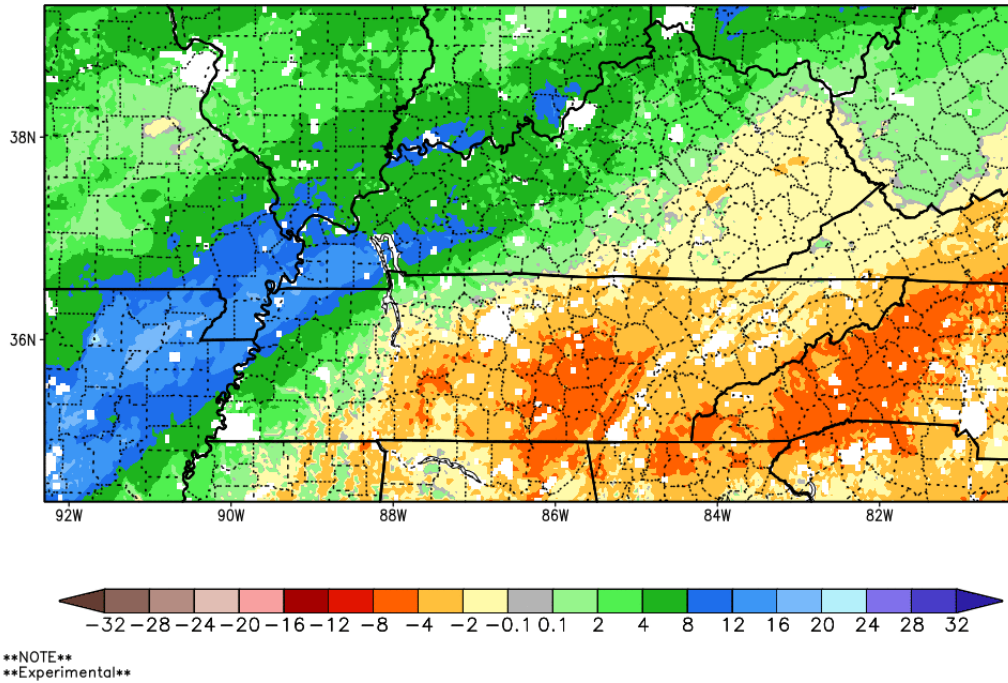
As drought conditions expanded across Tennessee, soil moisture levels dropped across Middle and East Tennessee during October. Most areas of West Tennessee saw minor improvements (0.1-8% increase) during October, and extreme northwest Tennessee saw increases of 8-16% in soil moisture levels during the month, due to heavy rains at the end of October. In the USDA Crop Weather and Progress report for the week ending October 29, topsoil moisture was rated as 18% very short, 37% short, 41% adequate, and 4% surplus. Subsoil moisture was rated as 13% very short, 41% short, 44% adequate, and 2% surplus.

SPoRT-LIS 0-200 cm Soil Moisture percentile valid 31 Oct 2023



****NOTE****
****Experimental****

1-Month Difference in Column Relative Soil Moisture (%) valid 12z 31 Oct 2023

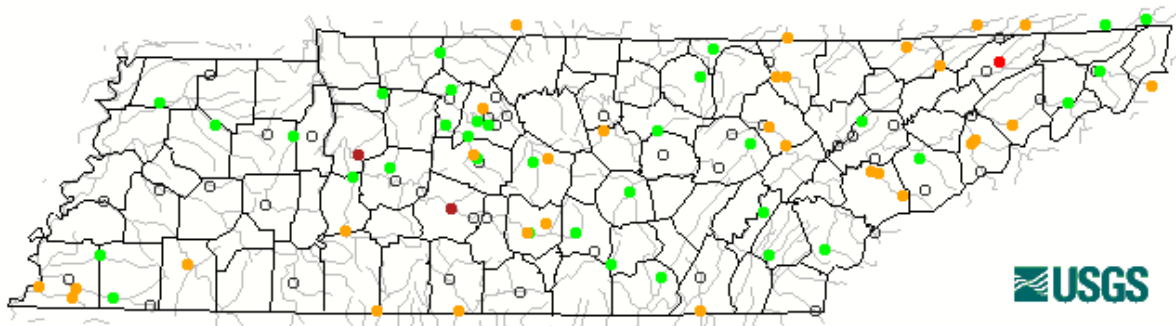


Streamflow:

Average streamflow ratings across Tennessee ranged from normal to much below normal with most below or much below normal flow gauges located in the southern portion of the state and in East Tennessee.

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

October 2023



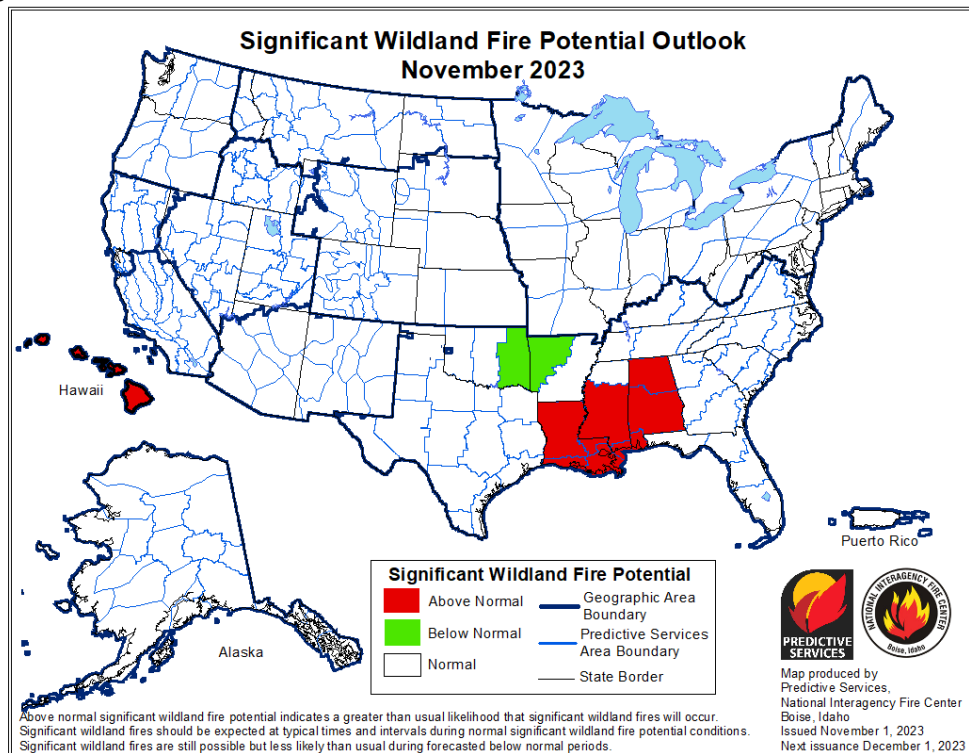
Explanation - Percentile classes							
Low	<10 Much below normal	10-24 Below normal	25-75 Normal	76-90 Above normal	>90 Much above normal	High	Not-ranked

Miscellaneous:

Crop Conditions from USDA: Drought conditions have slowed the progress of winter wheat and negatively impacted pastures across Tennessee over the past two months. 32% of pastures in the state were described as being in poor or very poor condition, and many cattle producers have had to start feeding hay or sell down their herds. Winter wheat has also been negatively impacted by the drought conditions, as planting and emergence are both lagging behind the 5-year average due to a lack of rain. The corn harvest was largely completed during October, with most producers reporting good yields and 78% of the crop reported in Good or Excellent condition as of mid-October. Cotton harvest got underway with 62% of the crop harvested by the end of October and 83% of the crop was reported in Good or Excellent condition. Early planted soybeans also fared well this year, with most producers reporting good yields, but late planted soy beans were suffering due to the drought.

CROP PROGRESS					CONDITION					
Item	This Week	Last Week	2022	5 Year Avg.	Item	Very Poor	Poor	Fair	Good	Excellent
Percent					Percent					
Corn – Harvested	92	88	97	94	Cotton	1	2	14	59	24
Cotton – Bolls Opening	98	96	99	98	Soybeans	0	4	18	60	18
Cotton – Harvested	62	43	63	56	Pasture	9	23	44	22	2
Soybeans – Harvested	73	60	71	62	Winter Wheat	2	4	32	50	12
Winter Wheat – Planted	49	35	61	56						
Winter Wheat – Emerged	25	13	34	34						

Fire Danger: The National Interagency Fire Center significant wildland fire outlook for November shows all of Tennessee with a normal potential for large wildland fires, however due to drought conditions and continued dry weather, and lower than normal relative humidity the state will be at an elevated risk for fires through at least the first half of the month.



Fall Foliage: Signs of an early fall leaf season showed up in September, but above normal temperatures in the beginning of October put a pause on most leaf color, with peak occurring in late October for most areas of East TN, and the Cumberland Plateau. The emerging drought led to a dulled color season for most areas of the state, especially the southern half, as most leaves just fell off or turned brown. Areas that had near normal or above normal rainfall in September still put on a good show, but a strong cold front and hard freeze put an early end to peak foliage conditions from Halloween into the first few days of November.

Snowfall: High elevations in the Appalachians of East Tennessee saw snow for the first time in the middle of October, after a strong cold front swept the state. While snow showers were spotted in several locations, and Newfound Gap reported a trace of snow, only the COOP station at the Mt. LeConte Lodge reported measurable snowfall, with a maximum depth of about 4-inches on October 17-18. This snowfall event set daily snowfall records for the Mt. LeConte station on October 16 and 17.



Snow covered Mt. LeConte Lodge in the Great Smoky Mountains National Park on the morning of October 18 [image via Facebook].

Story of the Month:

The main story of October was the continued and expanding flash drought that started in September. With a majority of the state recording less than 50% of their normal October precipitation and several weeks of above normal temperatures, drought conditions and impacts rapidly expanded through the month. There were a few small brush fires reported during the month, and burn restrictions/bans went into effect in many counties across the state as conditions continued to deteriorate. In addition to drought in Tennessee, drought further upstream in the Mississippi River watershed led to further record low levels on USGS stream gauges on the Mississippi River surpassing record low water levels set last month.

Historical Low Water Events

Current and forecast stage as of 10/16/2023

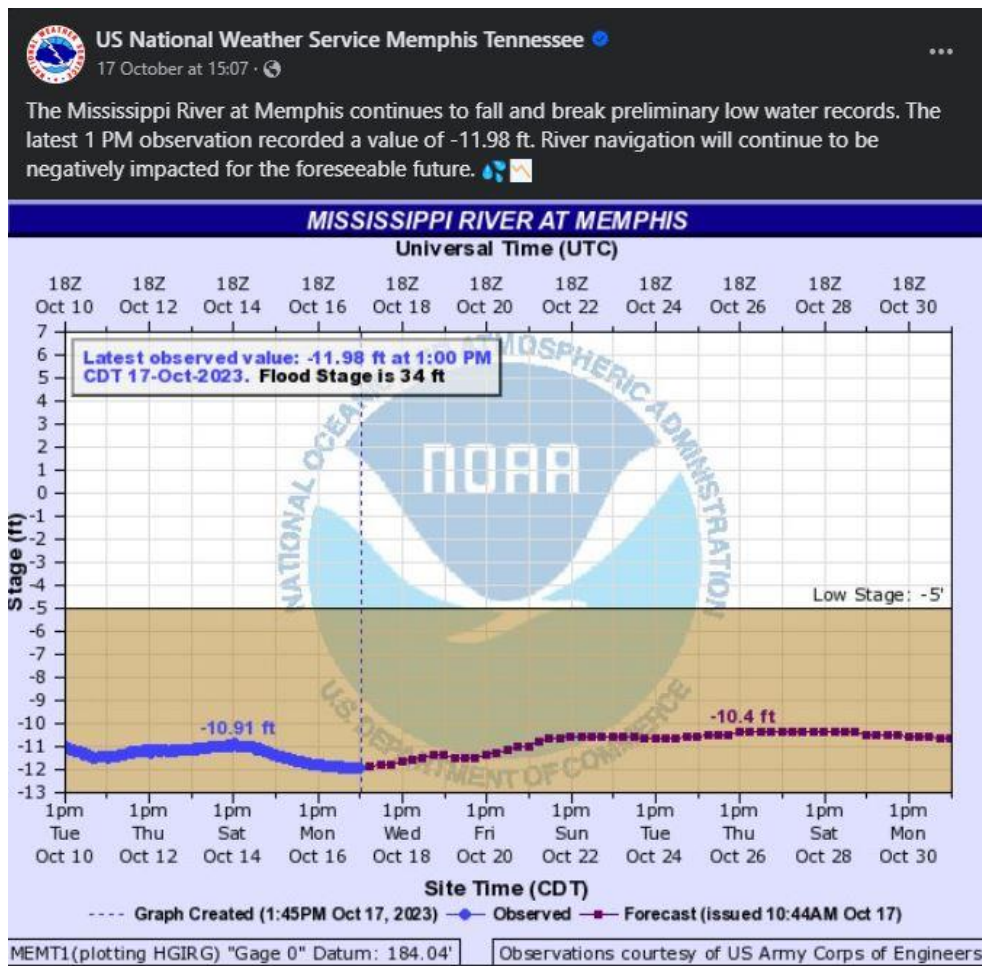
Data provided by U.S. Army Corps of Engineers

Forecast Location	Low Water Mark	Date	2022	2012	2000	1988
Tiptonville*	-2.58 ft	10/16	-1.6 ft	n/a	n/a	n/a
Caruthersville	-2.98 ft	10/16	-1.8 ft	-0.08 ft	-0.4 ft	-0.10 ft
Osceola	-11.80 ft	10/16	-11.6 ft	-9.8 ft	-8.5 ft	-10.3 ft
Memphis	-11.85 ft	10/16	-10.8 ft	-9.8 ft	-9.2 ft	-10.7 ft
Mhoon Landing*	-13.11 ft	10/16	-12.6 ft	n/a	n/a	n/a
Helena	-4.59 ft	10/16	-4.1 ft	-4.0 ft	-3.4 ft	-4.2 ft

Numbers in red are preliminary records

*Gauges have moved and cannot be compared to previous years

Preliminary Low Water Records at Stream gauges on the Mississippi River from the NWS Memphis Area.



Mississippi River at Memphis Stream Gauge observed a new preliminary record low of -11.98ft on October 17. Image from NWS Memphis Facebook.

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](https://www.spc.noaa.gov) for any updates.

There were no days with severe storm reports in Tennessee during October 2023. This was the first time since 2018 that there were no severe storm reports during the month of October.

CPC Outlooks for the Next Month:

The NOAA Climate Prediction Center outlooks for November show that Tennessee will have equal chances of warmer than normal, cooler than normal, or normal temperatures for the next month. Precipitation is leaning towards below normal for November, with slightly higher confidence in the western half of the state, with 40-50% likelihood for below normal precipitation compared to 33-40% likelihood in the eastern half of the state.

