1-1-2021

2020 - Tennessee Annual Climate Summary

Tennessee Climate Office, East Tennessee State University

2020 Tennessee State Climate Summary

*Tennessee Climate Office * East Tennessee State University*
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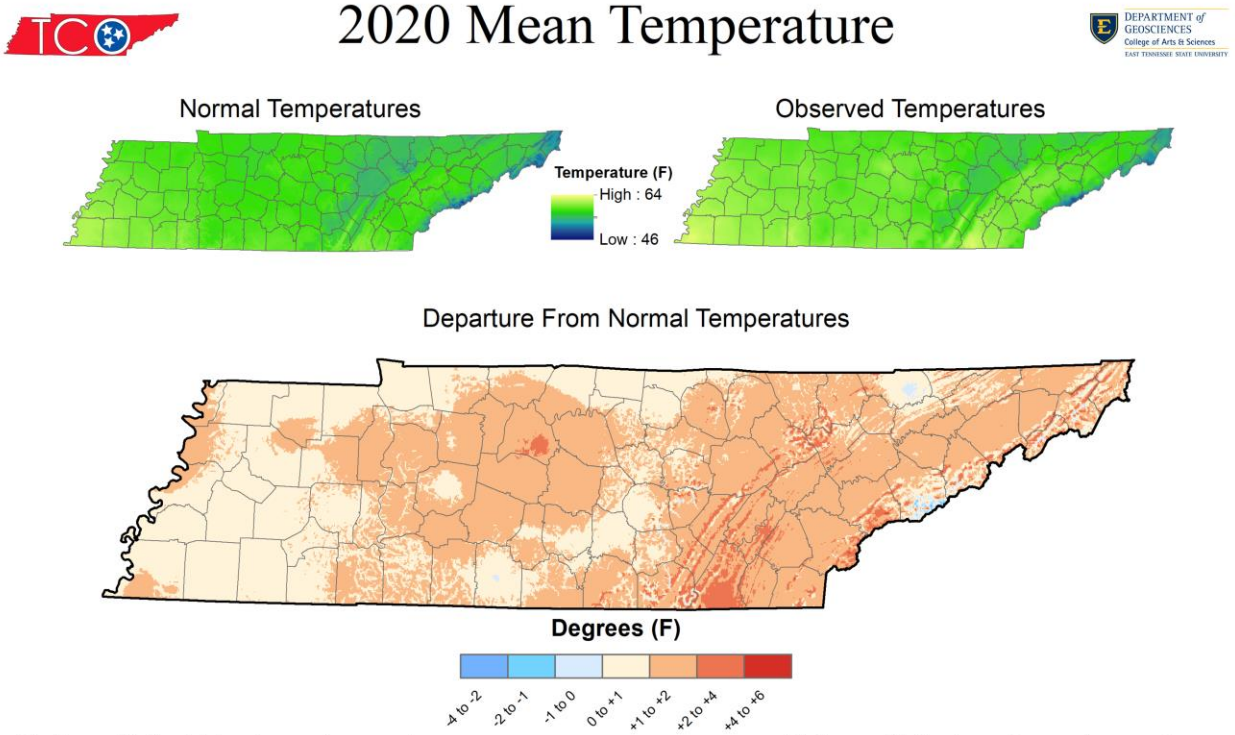
With contributions by Climate Data Representatives at University of Memphis, University of Tennessee-Martin, Vanderbilt University, University of Tennessee-Knoxville, and University of Tennessee-Institute of Agriculture

Annual Temperature Summary:

Most areas of the state reported a mean temperature for 2020 that was warmer than the 30-year climate normal. Most areas in West Tennessee were 0-1°F above normal, while locations were 1-4°F above normal for the year in Middle and East Tennessee. The mean temperature for 2020 was among the top-10 warmest on record for four of the climate reporting weather stations across the state: 3rd warmest in Chattanooga (141-year station record), 8th warmest in Oak Ridge (73-year station record), tied for 8th warmest in the Tri-Cities (73-year station record), and tied for 9th warmest in Nashville (146-year station record). Temperature extremes for the year ranged from -6°F at Mount LeConte (December 26) to 100°F at Woodbury (July 11th) and Tellico Plains (July 17th).

January, February, and March brought above normal temperatures across the state. Then the temperature profile flipped as April and May brought below normal temperatures. June saw temperatures close to normal, then July brought warmer than normal conditions to the state. August, September, and October each saw a west-to-east gradient in average temperatures, with the western end of the state recording below normal temperatures and the eastern end recording above normal temperatures. November was warmer than normal across the state, while December had slightly above normal temperatures in the western half of the state and cooler than normal conditions in East Tennessee.



Stations with the highest mean temperature

Station Name	Station Type	Mean Temperature (F)
SAVANNAH 6 SW	COOP	63.7
CHATTANOOGA AP	WBAN	63.7
MEMPHIS INTERNATIONAL AP	WBAN	63.6
SHILOH NMP TENNESSEE	RAWS	63.1
GERMANTOWN 4SE	COOP	62.9

Map Data From: PRISM Climate Group, Oregon State University.
1981-2010 Normals Used
Station Data retrieved from SC ACIS2

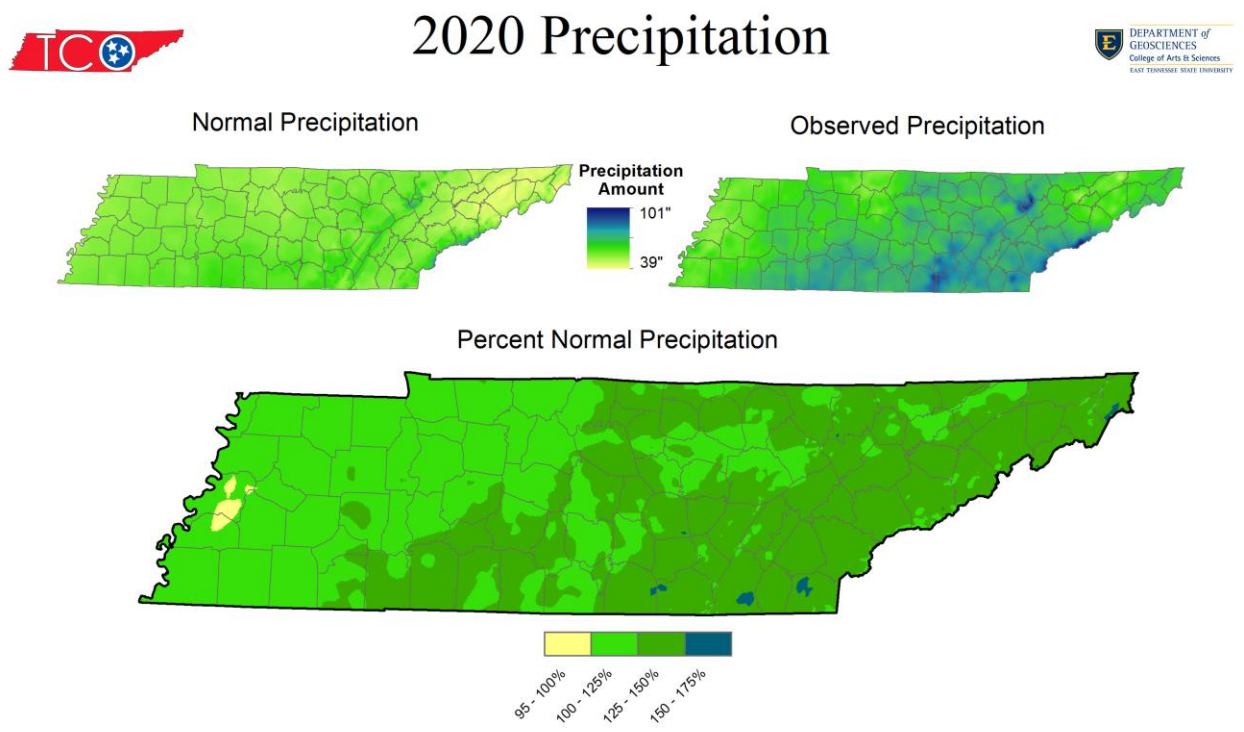
Stations with the lowest mean temperature

Station Name	Station Type	Mean Temperature (F)
MT LECONTE	COOP	43.2
NEWFOUND GAP	COOP	49.9
ROAN MOUNTAIN 3SW	COOP	52.6
CROSSVILLE EXP STN	COOP	54.7
TAZEWELL	COOP	54.9

Annual Precipitation Summary:

Precipitation totals for nearly the entire state were above the 30-year climate normal. East Tennessee saw the largest above normal precipitation totals with almost all areas recording 125-150% of their annual normal. Crossville and Chattanooga both recorded a surplus of precipitation equivalent to over 20 inches of rain for the year! West Tennessee recorded closer to normal conditions, with most areas recording 100-125% of their normal precipitation totals. However, some locations in Tipton and Lauderdale counties were drier than normal. This was the wettest year on record for Crossville (65-year station record), and four other climate reporting stations in East Tennessee had one of their top-five wettest years: 2nd wettest in Chattanooga (143-year station record), 3rd wettest in the Tri-Cities (73-year station record), 4th wettest in Knoxville (149-year station record), and 5th wettest in Oak Ridge (73-year station record). The two weather stations in the Great Smoky Mountains each recorded over 100 inches of rain for the year!

January, February, and March all brought above normal precipitation totals to Tennessee, with many areas in the eastern half of the state recording 200-300% of their normal precipitation for February. April was wetter than normal for most of the state, but drier than normal conditions occurred in the northwest corner of the state. May, June, and July were mixed bags for the state, while most areas recorded normal to below normal conditions, a few locations recorded well above normal rainfall due to slow moving thunderstorms. This was most notable in July, where several counties had weather stations reporting less than 40% of their normal rainfall, while other stations reported more over 200% of their normal rainfall. August, September, and October continued the variable conditions, with parts of the state recording drier than normal conditions, but with a majority of the state recording above normal rainfall. November was very dry across much of the state, large parts of West and Middle Tennessee recorded less than 40% of their normal monthly rain. December continued drier than normal conditions for most of the state, with a few scattered bands of above normal precipitation.



Stations with the most precipitation

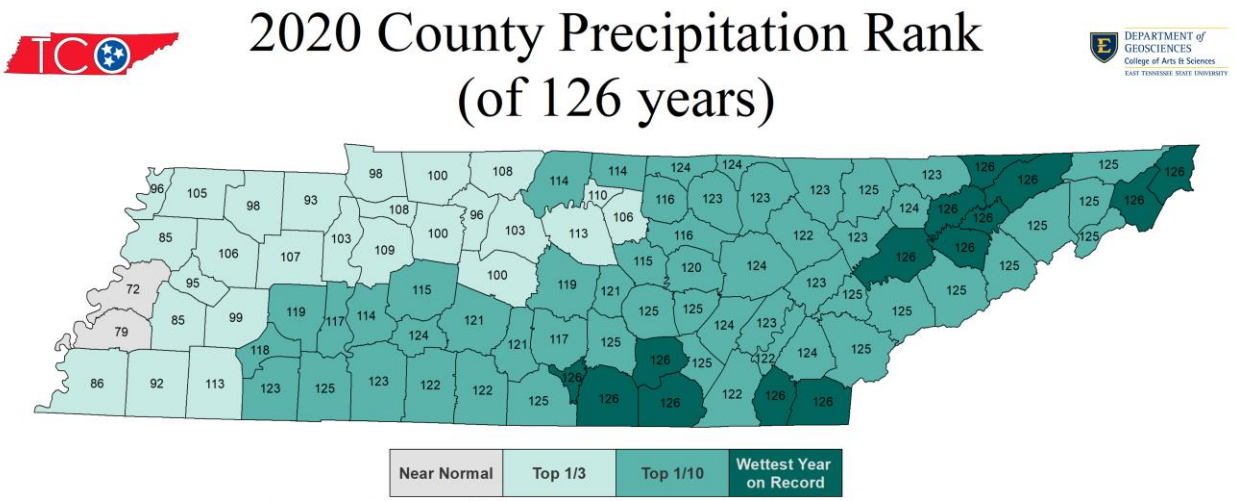
Station Name	Station Type	Total Precipitation (in)
MT LECONTE	COOP	109.46
NEWFOUND GAP	COOP	102.06
SEWANEE	COOP	99.09
BENTON 2.3 ESE	CoCoRaHS	98.06
MONTEAGLE	WBAN	92.72

Map Data From: PRISM Climate Group, Oregon State University.
1981-2010 Normals Used
Station Data retrieved from SC ACIS2

Stations with the least precipitation

Station Name	Station Type	Total Precipitation (in)
NASHVILLE 7.6 WSW	CoCoRaHS	44.84
WAVERLY AIRPORT	COOP	46.67
JACKSON 5.9 NW	CoCoRaHS	47.23
OLD HICKORY DAM	COOP	47.41
CHEATHAM LOCK & DAM	COOP	48.64

In addition to having above normal precipitation for the year, many counties across the state recorded precipitation totals that were in their top 1/3 wettest on record. Fourteen counties (mainly in East Tennessee) recorded their highest precipitation totals, with records from the NOAA National Centers for Environmental Information going back 126 years. An additional 16 counties recorded their second wettest year on record.



Counties with Wettest Year on Record

County	Precipitation Total (in)	Anomaly	County	Precipitation Total (in)	Anomaly
Grundy	83.68	+26.81	Johnson	67.17	+18.23
Franklin	80.38	+25.86	Hamblen	62.5	+17.19
Marion	81.75	+25.02	Hancock	65.53	+17.1
Bradley	74.46	+22.08	Grainger	64.66	+17.03
Polk	76.67	+22.08	Carter	64.4	+16.85
Moore	74.92	+20.41	Hawkins	62.58	+16.7
Knox	67.68	+18.42			

Data Source:
NOAA National Centers for Environmental information,
Climate at a Glance: County Mapping, published January 2021,
Retrieved on January 15, 2021 from https://www.ncdc.noaa.gov/cag/

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

Station data for select airports across the state using WBAN weather stations:

Station Name	Temperatures (˚F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	%Norm
Memphis	72.6	54.5	63.6	+0.6	97	8/11	21	12/25	55.69	+2.01	104%
Jackson	70.9	49.7	60.3	+0.5	96	8/10	17	12/25	54.94	+1.67	103%
Clarksville	69.5	48.8	59.1	+1.3	93	8/10	14	2/15	54.11	+3.93	108%
Nashville	72.2	51.5	61.8	+2.5	98	7/20	17	12/26	51.34	+4.09	109%
Chattanooga	73.6	53.7	63.7	+2.9	98	7/18	19	12/26	72.67	+20.19	138%
Crossville	66.0	47.0	56.5	+0.6	90	7/21	8	12/26	75.32	+20.23	137%
Knoxville	70.7	50.9	60.8	+1.7	97	7/20	11	12/26	66.10	+18.24	138%
Bristol	69.1	46.8	57.9	+2.3	95	7/16	6	12/26	57.46	+16.45	140%

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
TELLICO PLAINS	COOP	100	07-17
WOODBURY 1 WNW	COOP	100	07-11
SEVIERVILLE	COOP	99	07-20
OLD HICKORY DAM	COOP	99	07-22
LEBANON 7 N	COOP	99	07-20
DECATUR 7NE	COOP	99	07-21
GERMANTOWN 4SE	COOP	99	08-12
SELMER	COOP	98	08-11
KINGSTON	COOP	98	07-21
GLADEVILLE	COOP	98	07-21
NASHVILLE BERRY FIELD	COOP	98	07-21
ATHENS	COOP	98	07-19
LINDEN WATER PLANT	COOP	98	07-19
JACKSON EXP STA	COOP	98	08-11
LENOIR CITY	COOP	98	07-19
SHILOH NMP TENNESSEE	RAWS	98	08-10
LENOIR CITY TENNESSEE	RAWS	98	07-20
CHATTANOOGA AP	WBAN	98	07-18
MEMPHIS WFO	WBAN	98	07-16
NASHVILLE INTL AP	WBAN	98	07-20

Thirteen stations tied for the eighth highest maximum temperature (98°F).

Coldest Stations (lowest minimum temperature)

Station Name	Station Type	Lowest Temperature (F)	Date
MT LECONTE	COOP	-6	12-26
PICKETT STATE PARK	COOP	0	12-26
TAZEWELL	COOP	1	12-26
NEWFOUND GAP	COOP	1	12-26
NORRIS	COOP	3	01-22
ROAN MOUNTAIN 3SW	COOP	3	12-27
GREENEVILLE EXP STA	COOP	4	12-26
CENTERVILLE 4NE	COOP	5	01-20
GAINESBORO	COOP	6	12-28
MAYNARDVILLE	COOP	6	12-26
CHEROKEE TENNESSEE	RAWS	6	12-26
COKER CREEK TENNESSEE	RAWS	6	12-26
CROSSVILLE 7 NW	WBAN	6	12-26
BRISTOL AP	WBAN	6	12-26

Six stations tied for the ninth coldest temperature (6°F).

Warmest Stations (highest mean temperatures)

Station Name	Station Type	Mean Temperature (F)
SAVANNAH 6 SW	COOP	63.7
CHATTANOOGA AP	WBAN	63.7
MEMPHIS INTERNATIONAL AP	WBAN	63.6
SHILOH NMP TENNESSEE	RAWS	63.1
GERMANTOWN 4SE	COOP	62.9
MEMPHIS WFO	WBAN	61.9
NASHVILLE INTL AP	WBAN	61.8
NASHVILLE BERRY FIELD	COOP	61.5
AMES PLANTATION	COOP	61.4
MC MINNVILLE	COOP	61.4
WINCHESTER 5SE	COOP	61.4

Three stations tied for the ninth warmest temperature (61.4°F).

Coolest Stations (lowest mean temperatures)

Station Name	Station Type	Mean Temperature (F)
MT LECONTE	COOP	43.2
NEWFOUND GAP	COOP	49.9
ROAN MOUNTAIN 3SW	COOP	52.6
CROSSVILLE EXP STN	COOP	54.7
TAZEWELL	COOP	54.9
CHEROKEE TENNESSEE	RAWS	55.1
COALMONT	COOP	55.4
CROSSVILLE 7 NW	WBAN	55.5
ONEIDA	COOP	55.9
GATLINBURG 2 SW	COOP	56.2

Wettest Stations (highest precipitation totals):

Station Name	Station Type	Total Precipitation (in)
MT LECONTE	COOP	109.46
NEWFOUND GAP	COOP	102.06
SEWANEE	COOP	99.09
BENTON 2.3 ESE	CoCoRaHS	98.06
MONTEAGLE	WBAN	92.72
PETROS 0.2E	CoCoRaHS	87.91
MCMINNVILLE 8.5 ESE	CoCoRaHS	87.17
GRAYSVILLE 11.6 WSW	CoCoRaHS	85.45
BEERSHEBA SPRINGS 2.1 ENE	CoCoRaHS	85.04
COALMONT	COOP	84.21

Driest Stations (lowest precipitation totals):

Station Name	Station Type	Total Precipitation (in)
NASHVILLE 7.6 WSW	CoCoRaHS	44.84
WAVERLY AIRPORT	COOP	46.67
JACKSON 5.9 NW	CoCoRaHS	47.23
OLD HICKORY DAM	COOP	47.41
CHEATHAM LOCK & DAM	COOP	48.64
FRANKLIN SEWAGE PLANT	COOP	49.99
NASHVILLE 4.1 SSW	CoCoRaHS	50.19
ALAMO 1 N	COOP	50.41
DICKSON 6.7 SSW	CoCoRaHS	50.87
NASHVILLE 4.7 SW	CoCoRaHS	50.95

Each of these stations, except Alamo 1 N, had at least 1 day without reporting, so actual precipitation totals might be higher.

Snowiest Stations (highest snowfall accumulations):

Station Name	Station Type	Total Snowfall (in)
MT LECONTE	COOP	80.6
NEWFOUND GAP	COOP	24.3
ROAN MOUNTAIN 3SW	COOP	22.5
JAMESTOWN	COOP	11.5
CLARKRANGE 6.0 NE	CoCoRaHS	11.4
MCMINNVILLE 8.5 ESE	CoCoRaHS	10.7
KYLES FORD 1.0 N	CoCoRaHS	10.6
KNOXVILLE 5.5 W	CoCoRaHS	10.5
JAMESTOWN 3.1 SE	CoCoRaHS	9.8
MORRISTOWN WFO	COOP	9.5

Major Weather and Climate Stories of 2020:

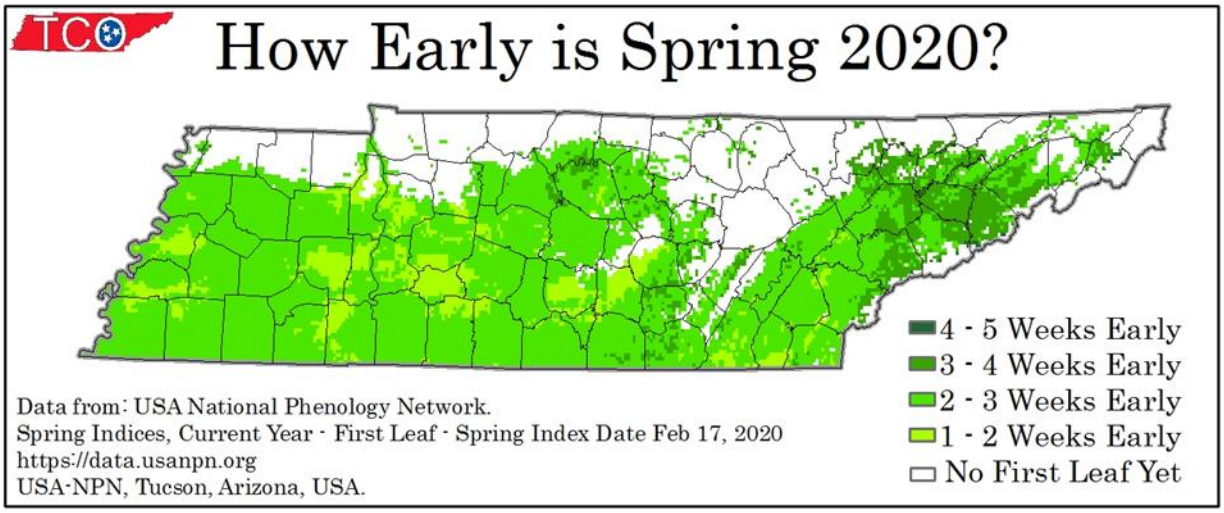
Tennessee was impacted by several weather-related disasters in the first half of 2020, with severe storms and/or tornadoes hitting the state in January, March, April, and May, and flooding in February. Fortunately, the second half the year brought much quieter weather, although several remnant-lows from tropical cyclones did bring rain and high winds to the state from August to October, and thunderstorms generated flash floods in Middle Tennessee in September.

January:

Severe storms swept the state on January 10th and 11th, producing 3 tornadoes and 84 reports of severe wind damage, along with a mountain wave wind event that produced wind gusts of 30-60mph in East Tennessee.

February:

Well above normal temperatures in January and February led to an early spring, with the first leaf index showing the spring green up occurring up to a month ahead of normal in parts of the state during February.

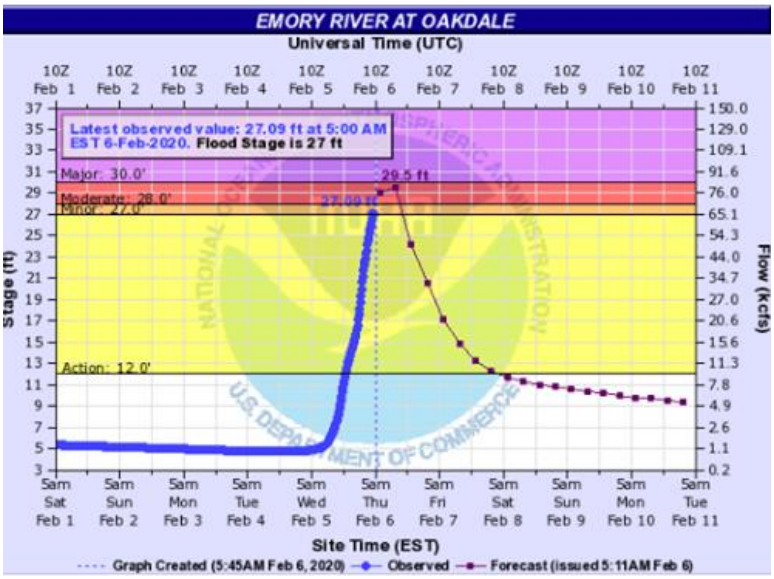


For the third year in a row, February brought heavy rains to the state resulting in flooding and mass wasting events. Heavy rainfall at the end of the first week of February produced flash flooding in many streams in East Tennessee, prompting road closures, like pictured below in the Great Smoky Mountains National Park. The hydrograph of the Emory River shows just how quickly flood waters increased, with over a 25-foot rise in just 12 hours. Later in the month, more rainfall produced flooding on larger rivers, including the Tennessee River. The flooding and rainfall combined to produce a mass wasting event at Chalk Bluff along the Tennessee River in Hardin County. The slope failure started Saturday when one home was evacuated as signs pointed to the hillside falling into the river. Later that day the house did collapse down the slope, a second unoccupied house fell into the river on Sunday, and part of the road in front of the houses followed on Monday. The Tennessee River at Savannah entered into major flood stage on February 14th, and continued to affect residents in the area through the second half of the month.

Floodwaters lap against a road in the Great Smoky Mountains National Park (photo via GSMNP Facebook page).

US National Weather Service Morristown Tennessee
6 February at 06:19 ·

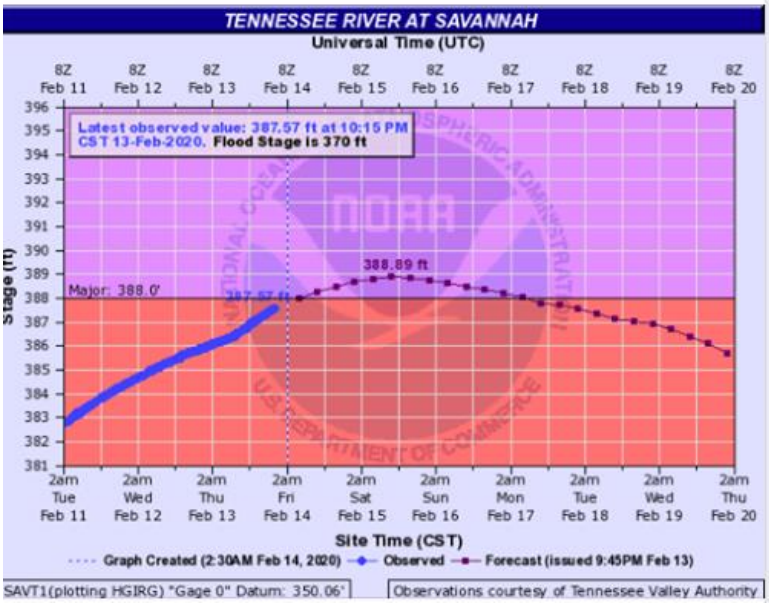
Several of our rivers are in or will be in flood stage soon. The Emory River at Oakdale is forecast to be near major flood stage. The current stage is at 27.09 feet with a forecast crest of 29.5 ft. At 30 ft, homes on Riverview Road are completely inundated, with 5 to 8ft of water.



Mass wasting at Chalk Bluff in Hardin County, destroying two homes and a road (photos via the Hardin County Fire Department).

US National Weather Service Memphis Tennessee
14 February at 03:42 ·

The Tennessee River near Savannah will exceed 388.0 feet (major flood stage) later this morning. Widespread, significant flooding is expected across portions of Hardin and Decatur Counties with the river cresting near 388.9 feet on Saturday.



US National Weather Service Memphis Tennessee
16 February at 17:50 ·

Garner Ray is in Savannah, Tennessee.
15 February at 14:42

Flood 2020

March:

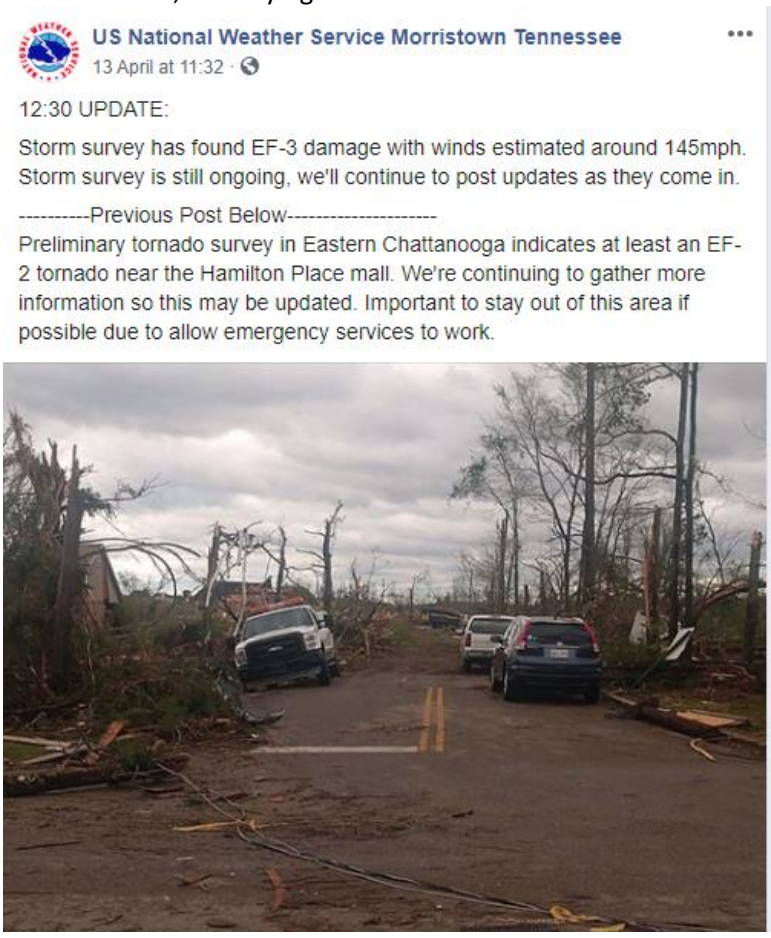
A deadly tornado outbreak struck the state in the overnight hours of March 2-3. This storm system generated an EF4 tornado in Putnam County, which was the first EF4 to occur in Tennessee since the April 2011 tornado outbreak. The March 2-3, 2020 tornado outbreak also produced a long-track EF3 tornado, with a 50-mile path stretching from West Nashville to Gordonsville. These storms were responsible for the deaths of 29 people (21 people in Putnam County alone) and an additional 310 injuries. March 3rd was also the "Super Tuesday" presidential primary election in Tennessee, and tornado damage in parts of Nashville required the closing of some polling locations.

Aerial view of tornado damage in Nashville (Source: Nashville Police Department, twitter)

Tornado damage in Putnam County March 3, 2020. (Source: Senator Paul Bailey/WVLT)

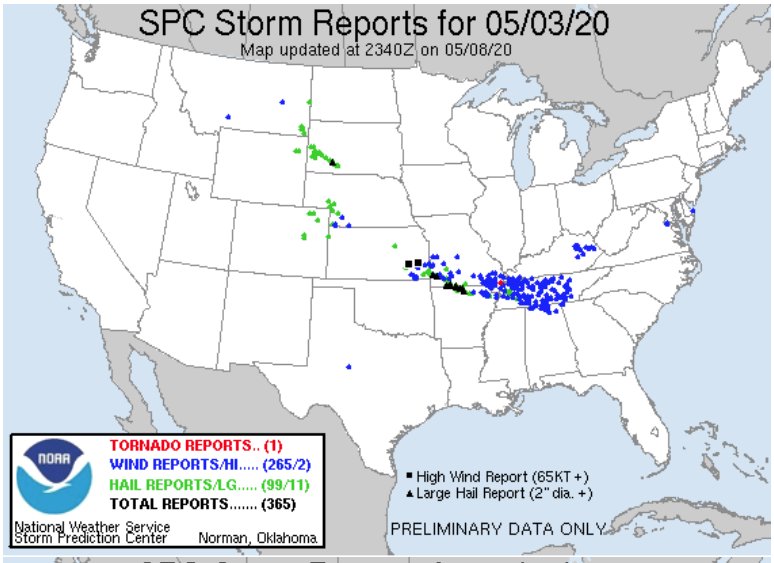
April:

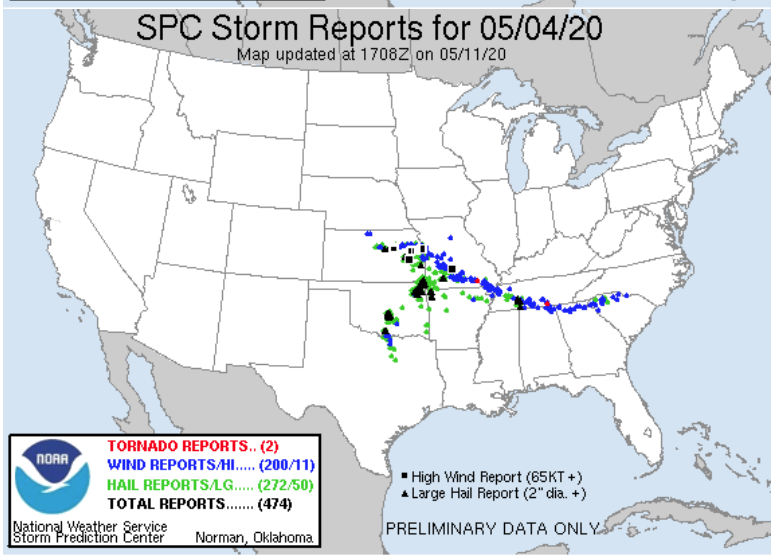
Another deadly tornado outbreak struck Tennessee, this time hitting the southeast corner of the state late on Easter Sunday (April 12th). An EF3 tornado hit Hamilton County killing 3, injuring 18 others, and destroying 344 homes. The storm system then spawned three other tornadoes in Bradley County, including an EF2 that hit Cleveland, destroying 26 homes.



May:

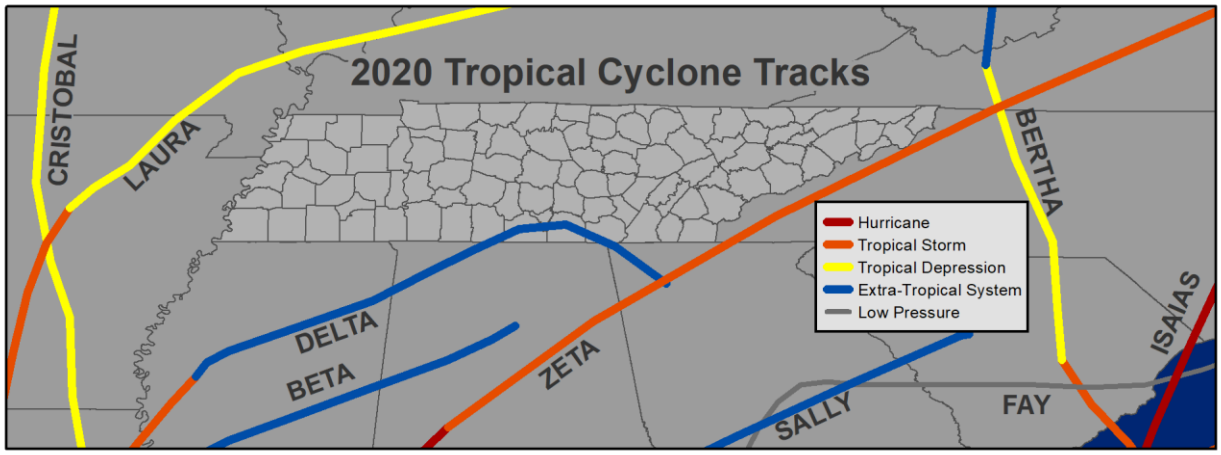
Back-to-back derecho events (long-lived thunderstorms that produce damaging straight-line winds) swept across portions of the state on May 3rd and 4th with both storms originating in Kansas. Combined, these two events led to 141 severe wind reports and 30 reports of severe hail (1" or larger), and produced massive power outages, with over 130,000 customers without power at one point in the day. The Nashville Electric Service (NES) reported over 120,000 customers without power (approximately one third of their customers), saying it was one of the largest power outages on record for the utility company.





Late Summer – Fall:

Many tropical cyclones (hurricanes/tropical storms) had tracks that brought their remnant low pressure systems into or near Tennessee from August through October: Hurricane Laura (late August), Hurricane Sally (mid-September), Tropical Storm Beta (mid-September), Hurricane Delta (early October), and Hurricane Zeta (late October). These systems produced some heavy rains and high wind events in the state. Luckily, there were no major issues with flooding or wind damage, and the rain brought by these tropical systems was beneficial to the state. Most of Tennessee would have been quite dry without the rains brought by the remnants of these tropical cyclones, as only a few frontal rainfall events occurred during these months.



Flash flooding occurred with a line of heavy rain and training storms that set up over Middle Tennessee on September 13th. These storms produced 5-8 inches of rain in the span of about 8 hours, resulting in several instances of flash flooding in the Nashville metro area. One of the highest totals came from Brentwood, with 8.25 inches of rain on the 13th, which accounted for over 90% of their rainfall for the month.

US National Weather Service Nashville Tennessee
14 September at 17:50 ·

Here are some of the higher measured rainfall totals from yesterday's flooding rainfall event. These are 24 hour rainfall totals, but most of this fell in about an 8 hour window Sunday morning. Hopefully Sally stays away!

Location:	Amount:	Source of Report:
1.9 ESE BRENTWOOD	8.25"	COCORAHS
LASCASSAS	7.45"	TWITTER
NOLENSVILLE	7.03"	FACEBOOK
2.4 SW NOLENSVILLE	6.04"	COCORAHS
SARDIS	5.60"	FACEBOOK
2.0 W NOLENSVILLE	5.53"	COCORAHS
2.1 SW LAVERGNE	5.38"	COCORAHS
MT. PLEASANT	5.14"	OHX COOP
COLUMBIA	5.00"	FACEBOOK

Late Fall – Early Winter:

November and December were very quiet months for severe weather, which was a bit out of the norm - we typically have a small secondary severe weather season in Nov/Dec. One of the biggest (and nicest!) weather events was the Christmas snow for East Tennessee. This was the first white Christmas for Knoxville and the Tri-Cities since 2010.