



Department of
Military

TEMA

Tennessee Mesonet Overview

Duck River Watershed Planning Partnership Meeting
Spring Hill Police Department



What is a “Mesonet”?

What is a Mesonet?

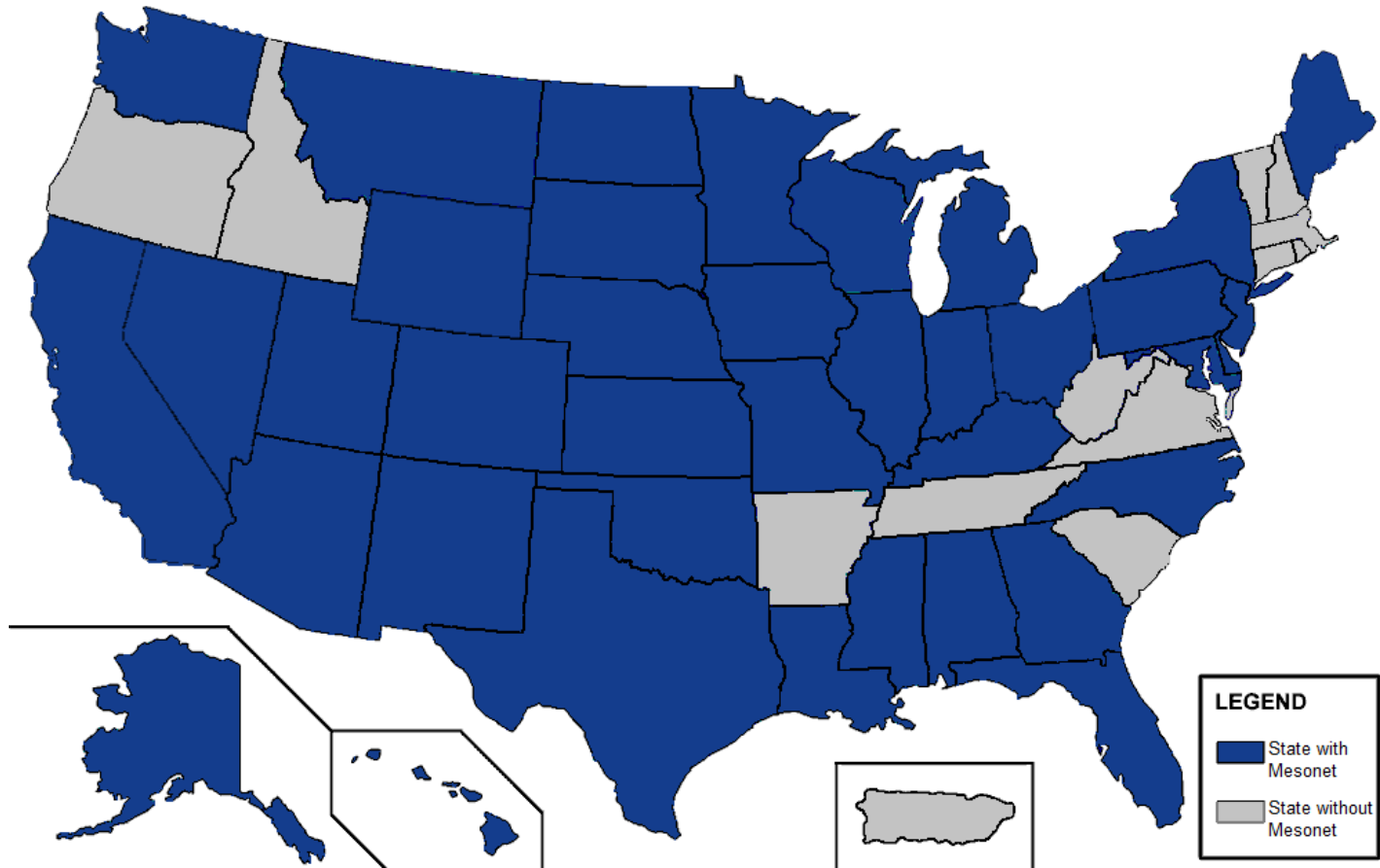
“A network of real-time, automated weather stations for monitoring mesoscale meteorology – a finer and more dynamic scale of weather than is reported on by typical weather station networks.”

- Statement by the American Association of State Climatologists



Existing Networks

- As of July 2026, 38 states host Mesonets



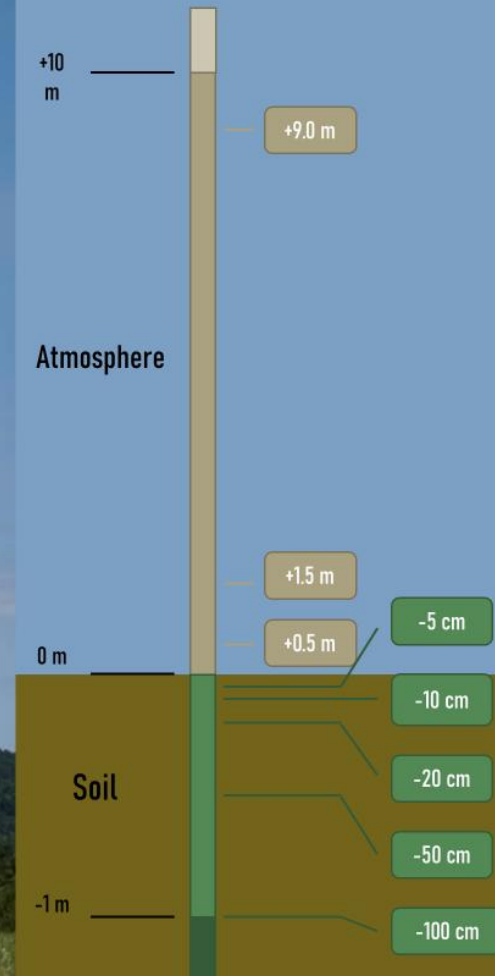
What is measured?

Mesonet Instrumentation Suite

- Air temperature
- Precipitation
- Solar radiation
- Relative humidity
- Wind speed & direction
- Barometric pressure
- Soil moisture & temperature
- Multi-level temperature
- Landscape/weather camera imagery

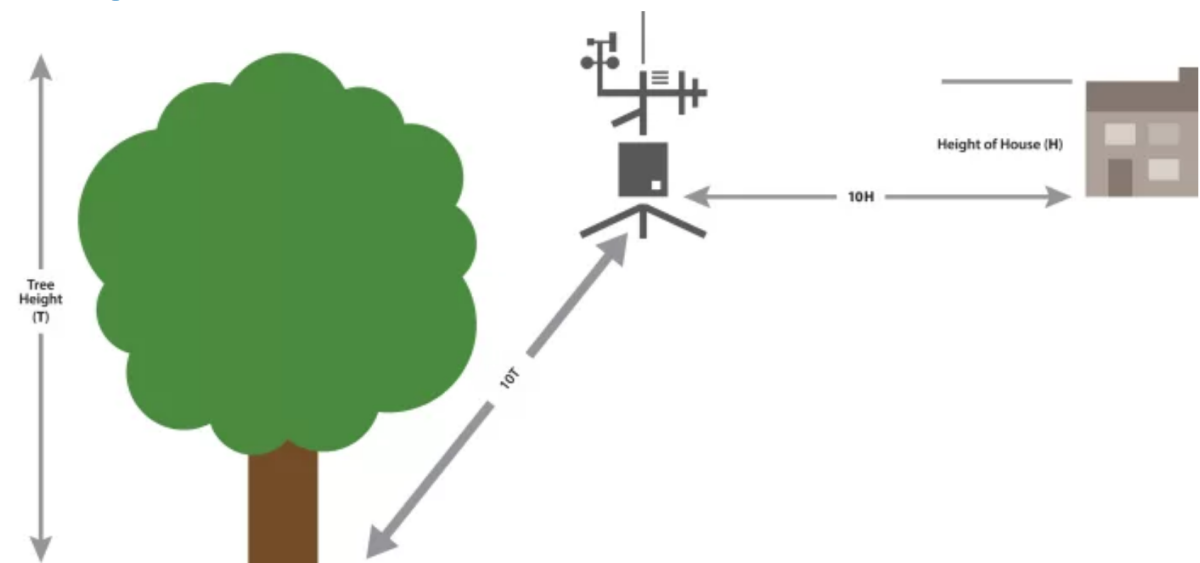
Base Infrastructure

- Datalogger
- Cellular Modem
- Power System



Where can the stations be installed?

Level ground



Each site should be on level ground (as much as possible) and away from obstacles and obstructions that could affect the measurements.





Tennessee Mesonet Plan

Funding

- FY26 State Appropriation to TEMA:
 - \$3M for network build-out
 - \$1.3M recurring for operations and maintenance
- 1 station per county (95 stations)
 - Identical sensors/hardware/etc. for initial installation
 - Potential in the future for expanded sensor options

Implementation Phases



Phase 1: Network Planning and Design



Phase 2: Procurement and Contracting



Phase 3: Station Deployment



Phase 4: Ongoing Operations and Maintenance



Phase 1: Network Planning and Design

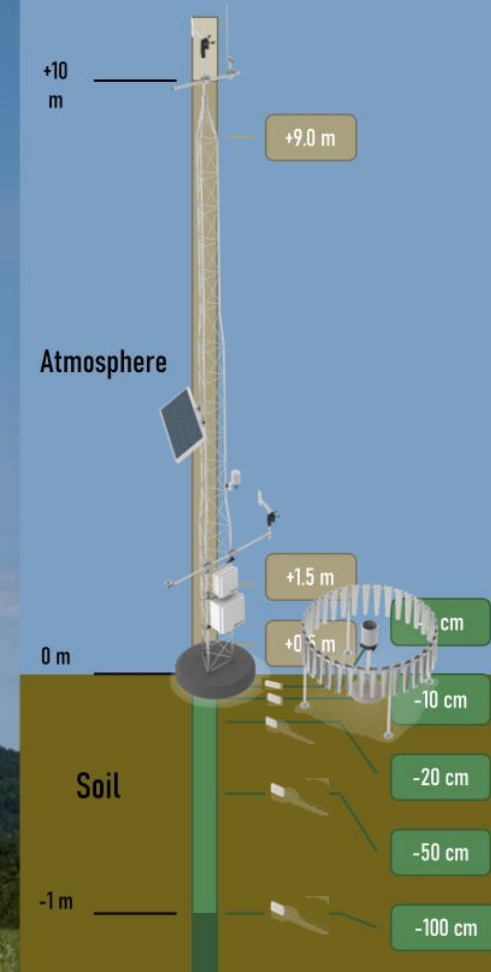
Station Layout and Features

Mesonet Instrumentation Suite

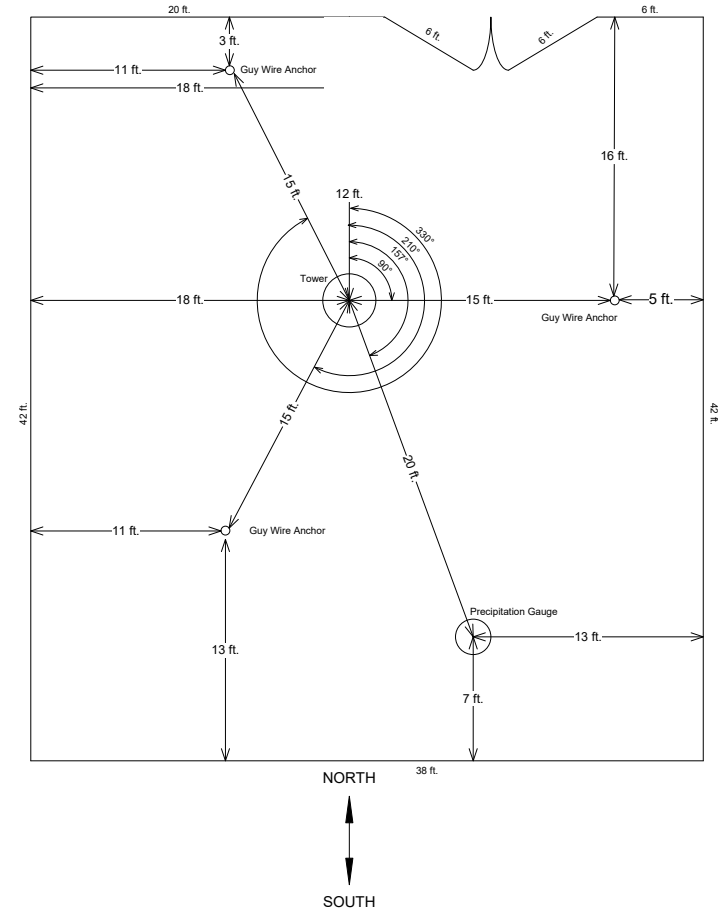
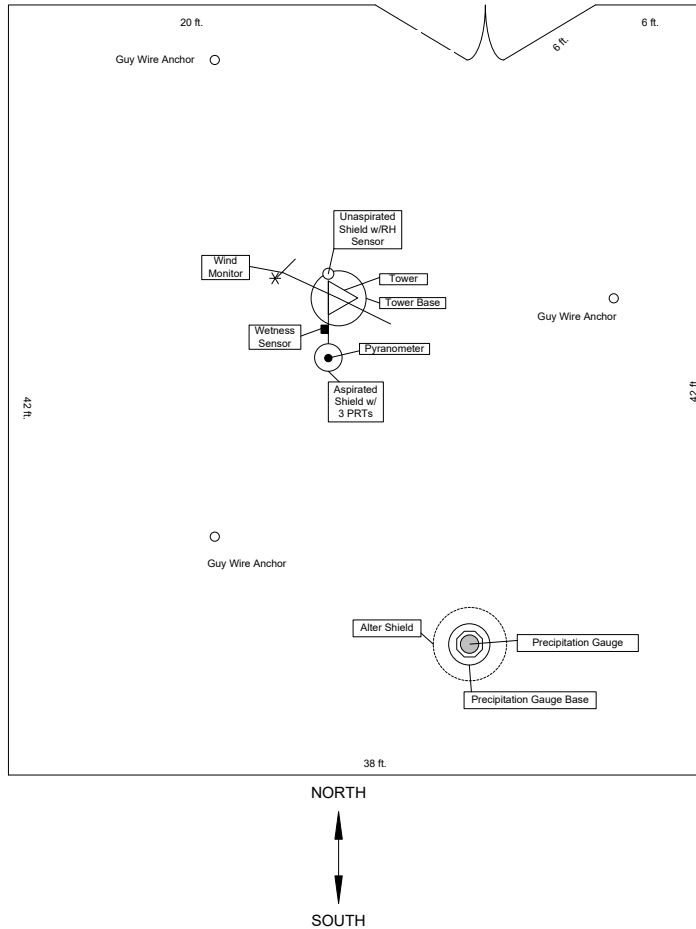
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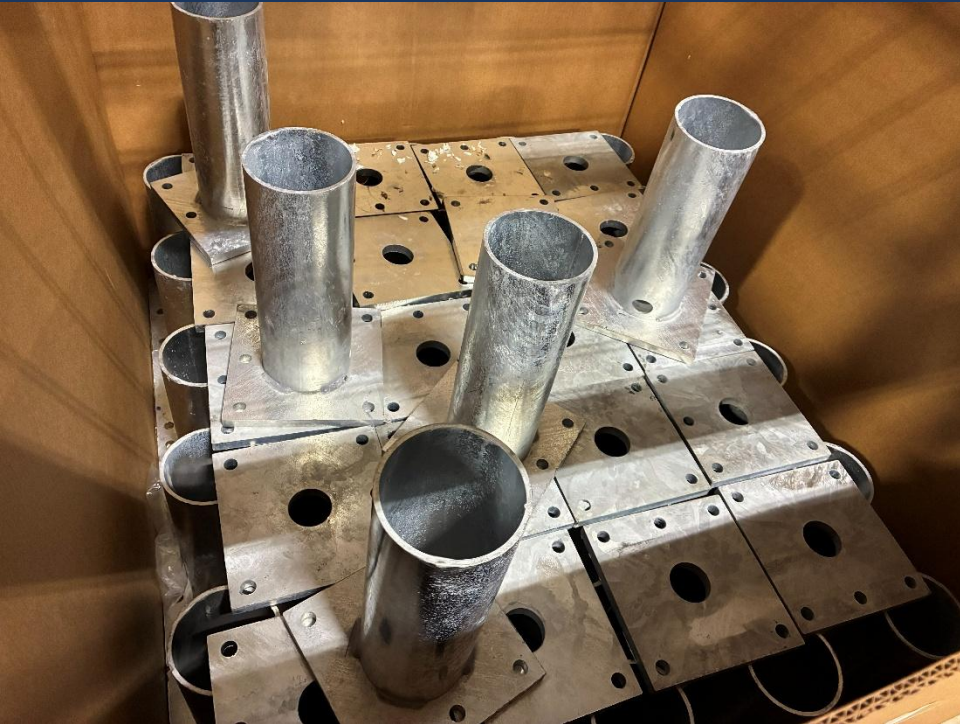
Station Plot





Phase 2: Procurement and Contracting

Shipments Arriving!





Phase 3: Station Deployment

Potential Tennessee Site Locations

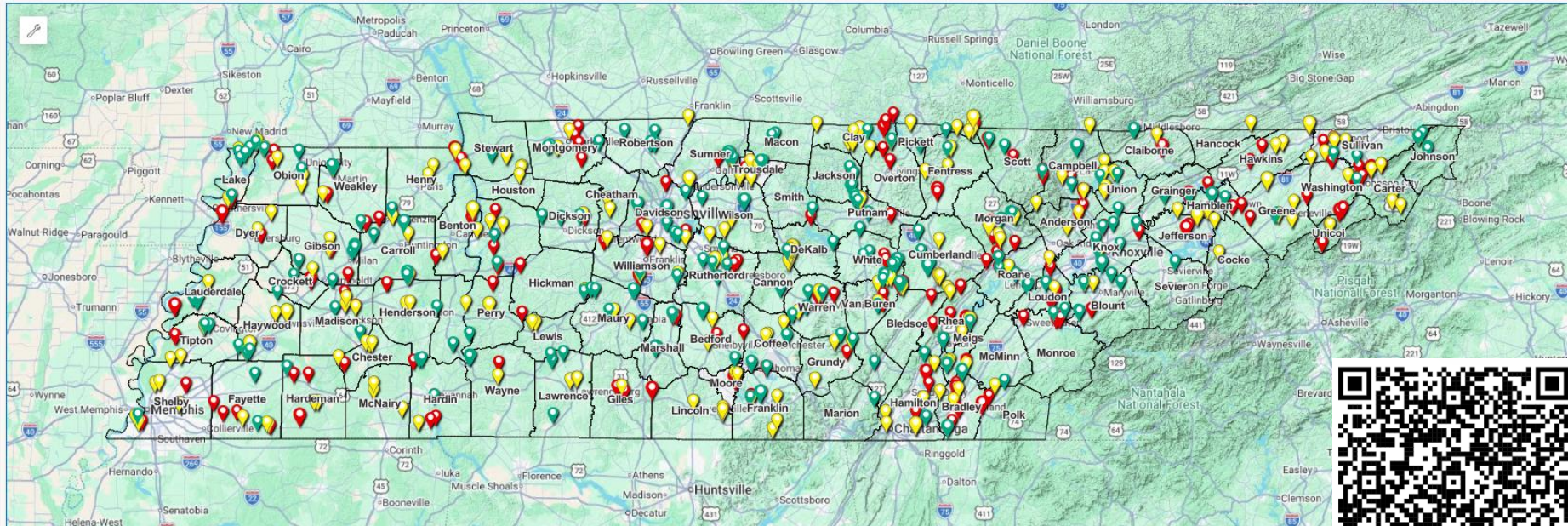
Mesonet Preferred Sites

Potential Site?
Show All

Maybe

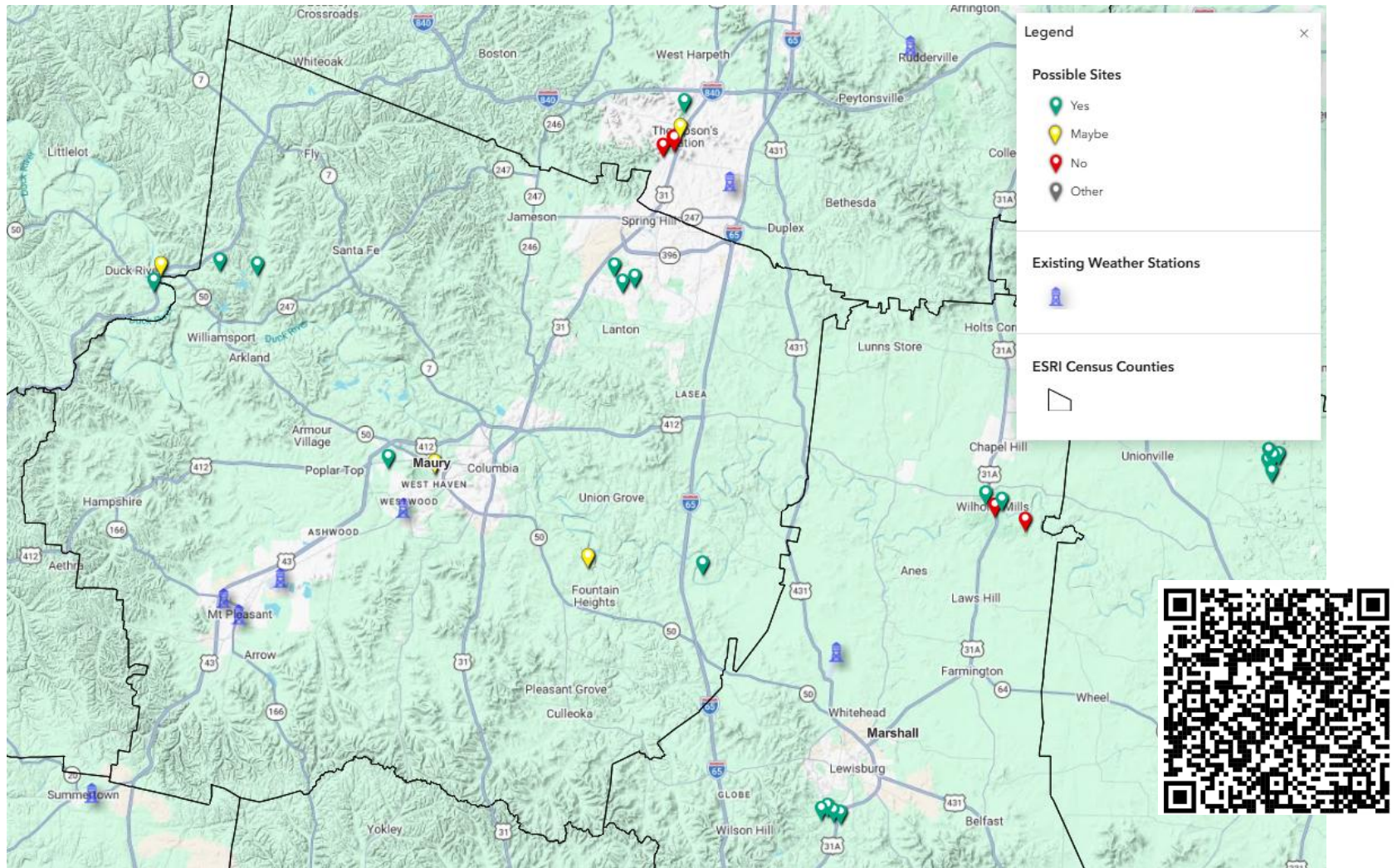
No

Yes



<https://survey123.arcgis.com/share/2ee022a4fd124cbeb9b6276e77c27c88>

Potential Tennessee Site Locations



<https://survey123.arcgis.com/share/2ee022a4fd124cb9b6276e77c27c88>



Phase 4: Ongoing Operations and Maintenance

Site Maintenance

- Complete scheduled spring, summer, and fall site maintenance
 - Check and clean instrumentation
 - Periodically swap out instruments and replace batteries
 - Cut vegetation
 - Take site photographs for metadata documentation
- Respond to “trouble tickets” when QA processes require unscheduled site maintenance visits

Phase 4 and Beyond

- Increase monitoring with additional sensors
 - Ready to go sensor packages for:
 - Flood warning
 - Water level gauges
 - Built out at the County-level
 - Fire Weather
 - Additional relative humidity and wind measurements
 - Fuel Sticks
 - Air Quality/dispersion modeling
 - Transportation
 - Road weather sensors
- Partner with the National Mesonet Program



How can a Mesonet
help Tennesseans?

How can the data be used?

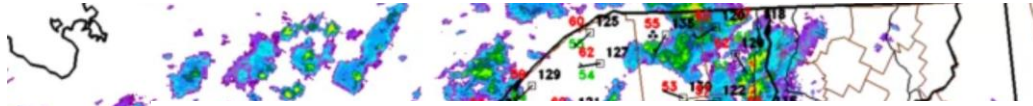


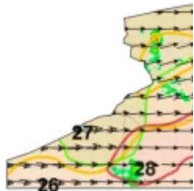
Figure Created On Tue, 2017-06-27, at 17:30 UTC
Image Created By Nick Bassill
Data Provided By The NYS Mesonet

3 Hour

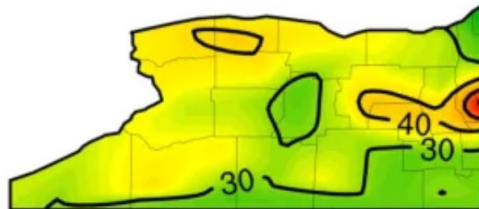
3 H Str
With C
Wind

Figure Created On Tue, 2017-06-27, at 17:30 UTC
Image Created By Nick Bassill
Data Provided By The NYS Mesonet

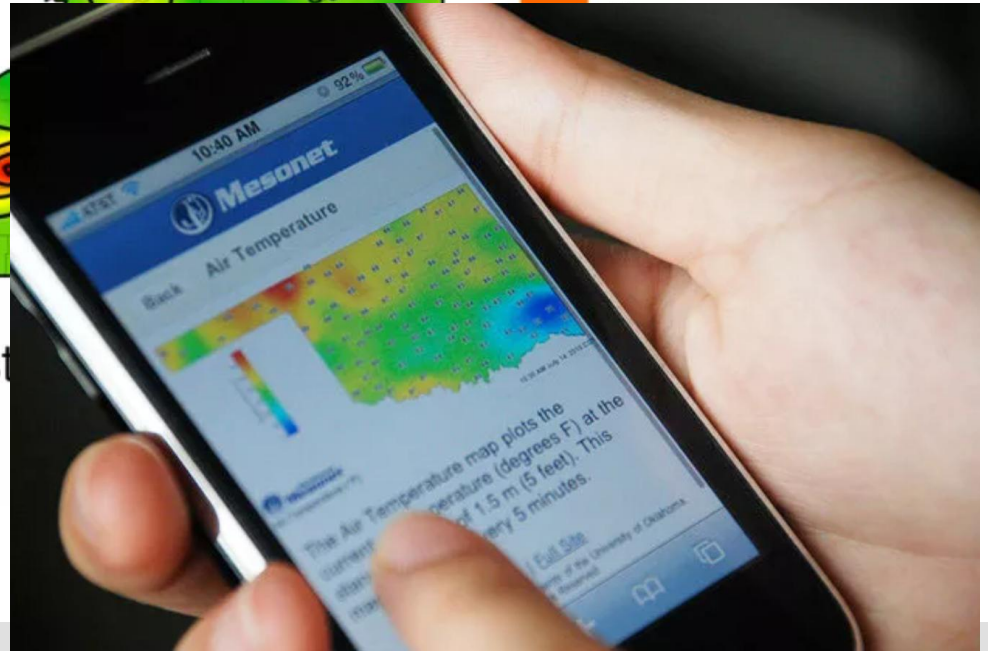
Severe Storms – 05/18/17



(Image courtesy of the NYS Mesonet)



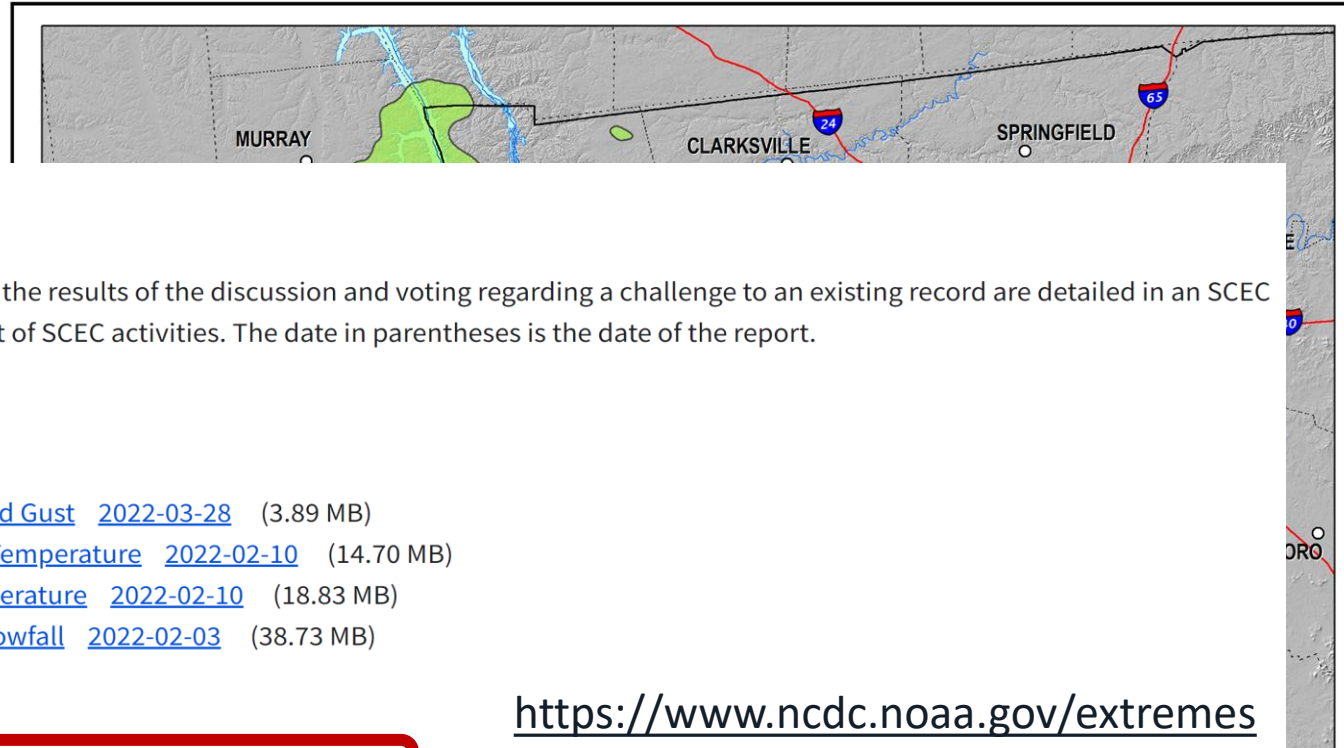
Maximum Gust



Capturing Extremes

New Record 24-hr Rainfall for Tennessee

Extreme Rainfall Estimate August 21



Reports

When an SCEC is convened, the results of the discussion and voting regarding a challenge to an existing record are detailed in an SCEC report. The following is a list of SCEC activities. The date in parentheses is the date of the report.

2022

- [Kentucky Strongest Wind Gust](#) [2022-03-28](#) (3.89 MB)
- [Washington Maximum Temperature](#) [2022-02-10](#) (14.70 MB)
- [Oregon Maximum Temperature](#) [2022-02-10](#) (18.83 MB)
- [New Jersey 24-Hour Snowfall](#) [2022-02-03](#) (38.73 MB)

2021

- [Tennessee 24-Hour Precipitation](#) [2021-12-20](#) (6.48 MB)
- [Kansas Annual Precipitation](#) [2021-11-30](#) (1.49 MB)
- [Kentucky Strongest Wind Gust](#) [2021-08-18](#) (662.24 KB)
- [Texas Hailstone](#) [2021-06-24](#) (8.02 MB)
- [Pennsylvania 24-Hour Snowfall](#) [2021-06-03](#) (5.34 MB)
- [Vermont 24-Hour Snowfall Rejected](#) [2021-03-15](#) (2.45 MB)
- [Delaware Maximum Snow Depth](#) [2021-02-24](#) (1.44 MB)

<https://www.ncdc.noaa.gov/extremes/scec/>

AHPS 48h
Inches

Since the
22nd (en-
2-day tot
that repor
The AHP
estimator
of the thn

TN



Drought Monitoring

US Drought Monitor:
www.drought.gov/states/tennessee

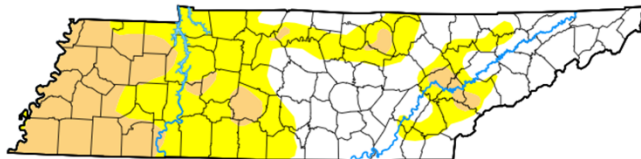
Tennessee Climate Office
Drought Summaries:
<https://www.etsu.edu/cas/geosciences/tn-climate/drought-summaries.php>

Tennessee Drought Update

For the assessment period ending August 12, 2025

This Week's Drought Monitor of Tennessee Map

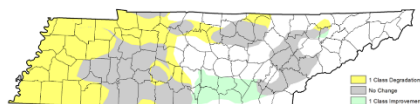
From the US Drought Monitor, authored by Lindsay Johnson, National Drought Mitigation Center, with input from the Tennessee Climate Office



West TN and parts of Middle received below average rainfall and continued their drying pattern

Heavy rains resulted in improvements in southeast TN, while modest rains resulted in few changes elsewhere in East TN

Change Since Last Week



A product of the Tennessee Climate Office
www.etsu.edu/tn-climate



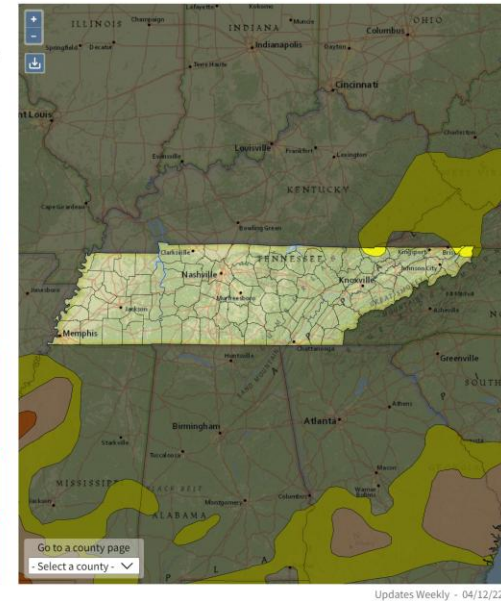
Current U.S. Drought Monitor Conditions for Tennessee

Current Last Week Last Month

The U.S. Drought Monitor (USDM) is updated each Thursday to show the location and intensity of drought across the country. This map shows drought conditions across Tennessee using a five-category system, from Abnormally Dry (D0) conditions to Exceptional Drought (D4). The USDM is a joint effort of the National Drought Mitigation Center, USDA, and NOAA. [Learn more.](#)

The following state-specific drought impacts were compiled by the National Drought Mitigation Center. While these impacts are not exhaustive, they can help provide a clearer picture of drought in Tennessee.

	D0 - Abnormally Dry - Honey production is down; fewer plants are available to pollinate - Lake and pond levels begin to lower	1.1% of TN (D0-D4)
	D1 - Moderate Drought - Agriculture ponds dry up; farmers are hauling water; hay yield is low - More insects and voles are observed, although mosquito numbers are down; disease spreads in trout, fish hatchery closes - Leaves fall early	0.0% of TN (D1-D4)
	D2 - Severe Drought - Corn is severely stressed; producers are importing hay and selling livestock - Air quality is poor; burn bans are implemented; active wildfires are reported - Aquatic species die off	0% of TN (D2-D4)
	D3 - Extreme Drought	0% of TN (D3-D4)
	D4 - Exceptional Drought	0% of TN (D4)



Updates Weekly - 04/12/22

Statewide Condition Summary

What's Changed? Most of the eastern half of TN received average to well above average rainfall during the last drought monitoring period (8/12-8/19), while most of West TN and parts of western Middle TN were drier and hotter than average. Low streamflow continued at a few locations. Multiple impacts (primarily agriculture) were reported again this past week through CMOR.

What's New? Abnormally Dry (D0) conditions were connected across other D0 areas of northern TN and expanded in areas south of Nashville. Moderate Drought (D1) was added across almost all of West TN as that area may be moving into flash drought, exacerbated by higher than average temperatures. D0 was removed in southeast TN after very heavy rains, while a small area of D0 was expanded into Claiborne County.

What's Next? Less than 0.25" of rain is forecasted for the western half of TN over the next 5 days, though parts of northwestern TN have received ~0.75" over the past 2 days. Areas west of the Cumberland Plateau will likely continue their dry pattern with widespread D1 and possible D2 (Severe Drought) introduction likely by the next Drought Monitor release.

Statewide Coverage By Category

Category	Coverage This Week	Change Since Last Week
D0: Abnormally Dry	36.84%	-14.19%
D1: Moderate Drought	23.27%	+19.98%
D2: Severe Drought	0.00%	0.00%
D3: Extreme Drought	0.00%	0.00%
D4: Exceptional Drought	0.00%	0.00%

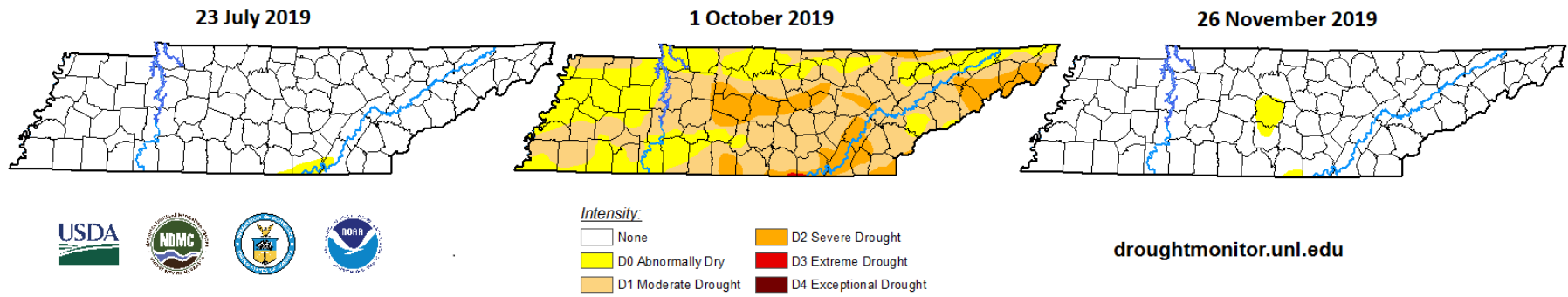
0 with USDA disaster designations

48th driest March was in 2022, over the past 128 years

18th wettest year to date was in 2022, over the past 128 years

Flash Drought 2019

- Started in the Chattanooga area in July
- Most areas of the state recorded less than 20% normal precipitation for September, and average temperatures for the month were 6-8 degrees above normal
- Conditions deteriorated until early October when 100% of the state was impacted by D0 or worse conditions
- All areas of drought were cleared from the state by the first Drought Monitor release in December

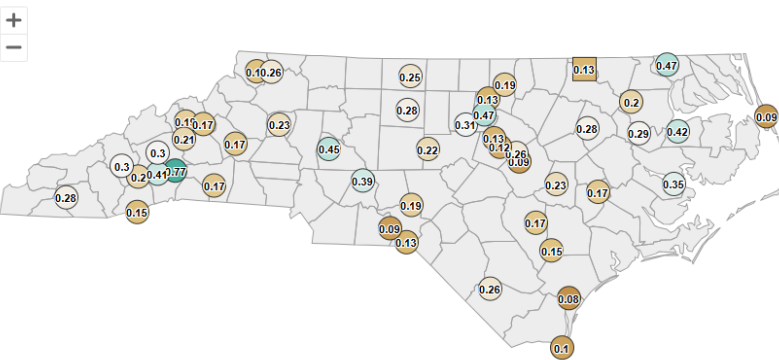


Ground Observations

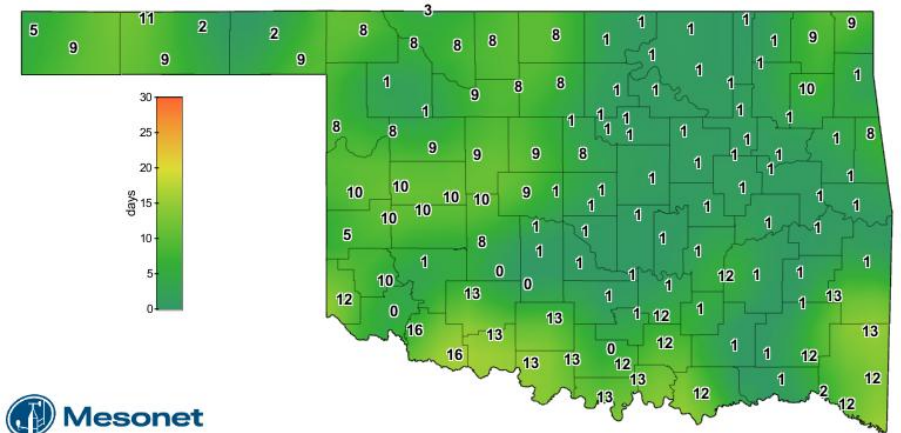
Map Showing: Soil Moisture

NC ECONet Current Conditions

46 out of 46 stations shown as of 12:27pm Jul 6, 2026



Soil Moisture (m3/m3)



Consecutive Days With Less Than 0.25" Rainfall

July 5, 2026

Created 8:15:02 AM July 6, 2026 CDT. © Copyright 2026



Highcharts.com © USA Census Bureau

KANSAS STATE
UNIVERSITY

Soil Moisture

Manhattan

Station Metadata

5 cm Wet, getting drier

Percent of Saturation 87%

Vol. Water Content 0.33 m³/m³

10 cm Wet, getting drier

Percent of Saturation 92%

Vol. Water Content 0.34 m³/m³

20 cm Wet, getting drier

Percent of Saturation 91%

Vol. Water Content 0.32 m³/m³

50 cm Wet

Percent of Saturation 91%

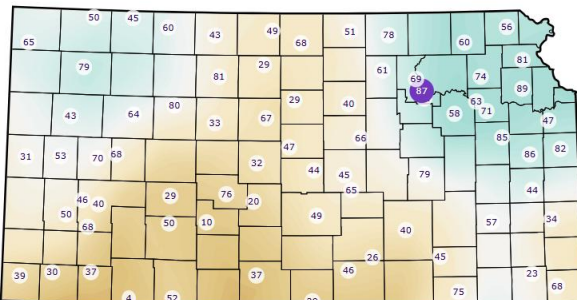
Vol. Water Content 0.42 m³/m³

Change Station

Change Map

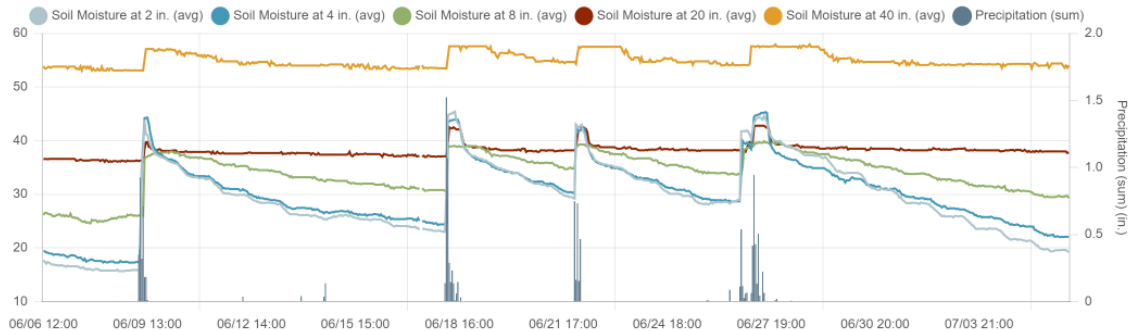
Page Tour

Percent of Saturation at 5 cm



This map is representative of grassland vegetation Mesonet Data - 5 cm % Saturation at Jul 06 2026 11:15 (CDT)

KENTUCKY MESONET WKU
Soil Moisture & Precipitation (agg: mixed)

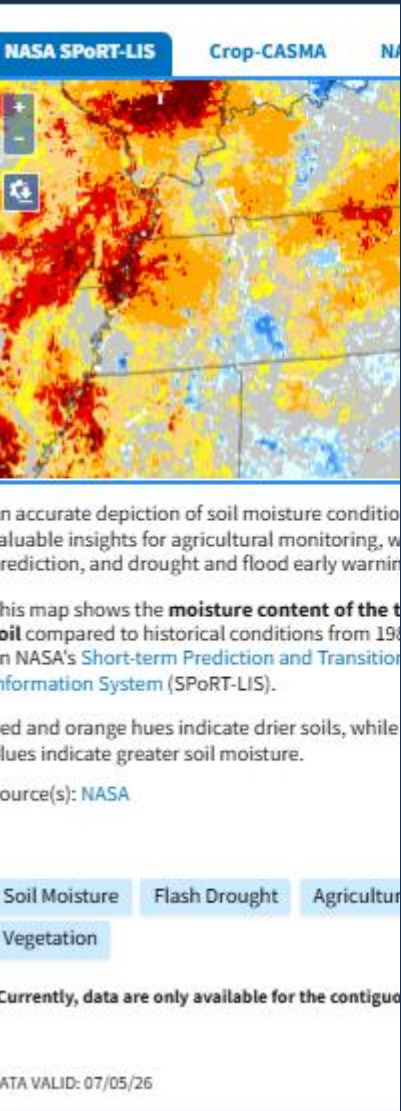


Military

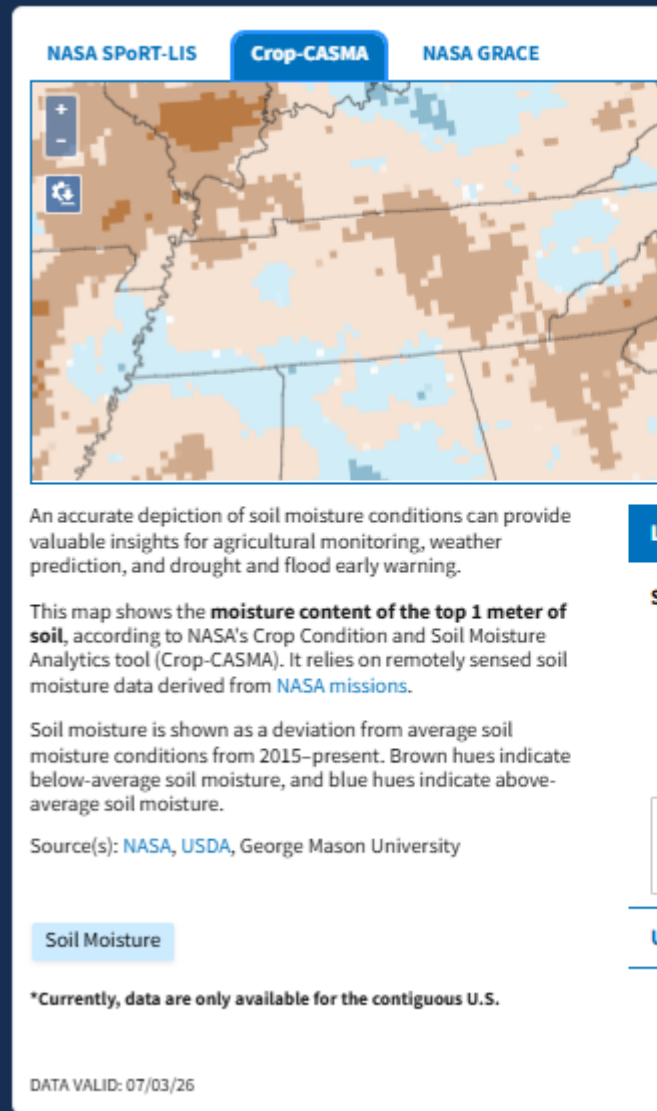
EMA

Satellite-Derived Data

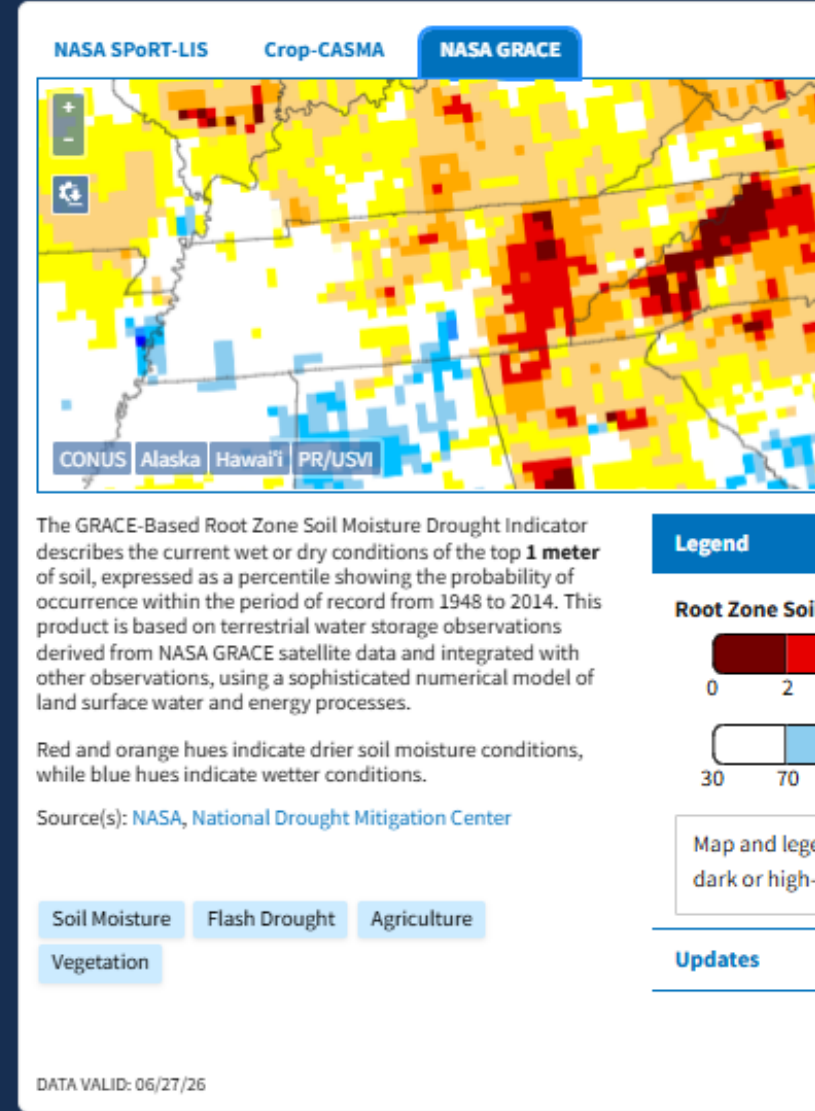
Current Soil Moisture Conditions:



Current Soil Moisture Conditions: Top 1 Meter of Soil



Current Soil Moisture Conditions: Top 1 Meter of Soil



North Carolina Tools

NC Water Supply Dashboard

[Utility Status](#)

[Demand Data](#)

[Drought](#)

[Rainfall](#)

[Surface Water](#)

[Groundwater](#)

[About](#)

Note: Gridded data layers are not currently functional. We are working on updates to resolve this issue. (Oct 2025)

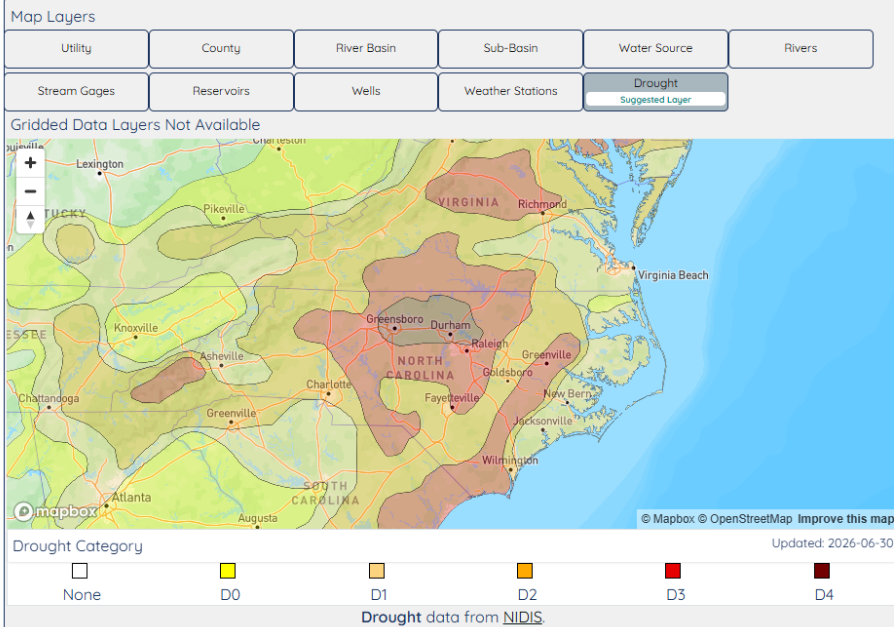
DATA LAST UPDATED: JUL 5, 2026

HIDE MAP

Select Watershed Sub-basin:

Nolichucky

HIDE INFO



Drought

Help

Current Drought Status

Percent of Nolichucky basin by drought status
(As of Jul 9, 2024)



Historical Drought Status

Historical Percent Area in Drought for Nolichucky Sub-basin



To learn more about current drought conditions, visit the [US Drought Monitor of North Carolina](#)

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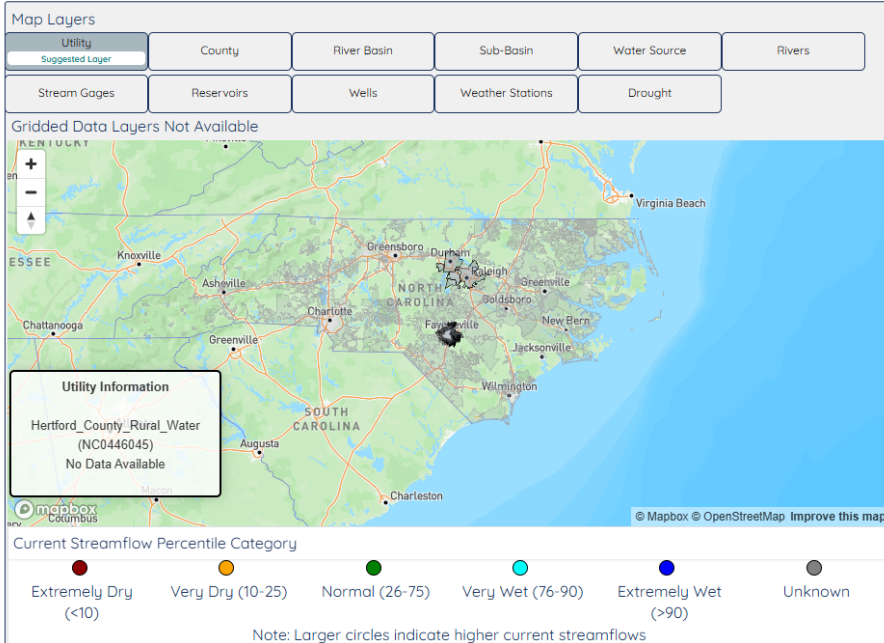
DATA LAST UPDATED: JUL 5, 2026

HIDE MAP

Select a Utility: Fayetteville Public Works

Enter address to find your utility

HIDE INFO



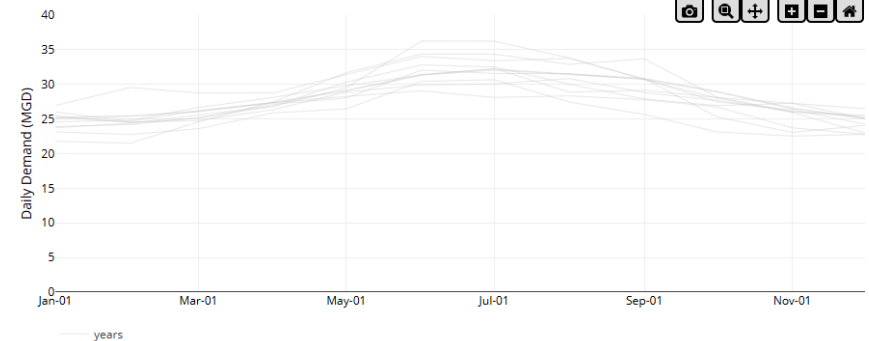
Demand Data

Help

Fayetteville Public Works has higher demand than last week
(Last Updated Oct 01, 2020)

Select Past Year to Highlight

☐ 2002 ☐ 2007 ☐ 2010 ☐ 2011 ☐ 2012 ☐ 2013 ☐ 2014 ☐ 2015 ☐ 2016 ☐ 2017 ☐ 2018 ☐ 2019 ☐ 2020 ☐ 2021 ☐ 2022



TN

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Military

TEMA

North Carolina Tools

NC Water Supply Dashboard [Utility Status](#) [Demand Data](#) [Drought](#) [Rainfall](#) [Surface Water](#) [Groundwater](#) [About](#)

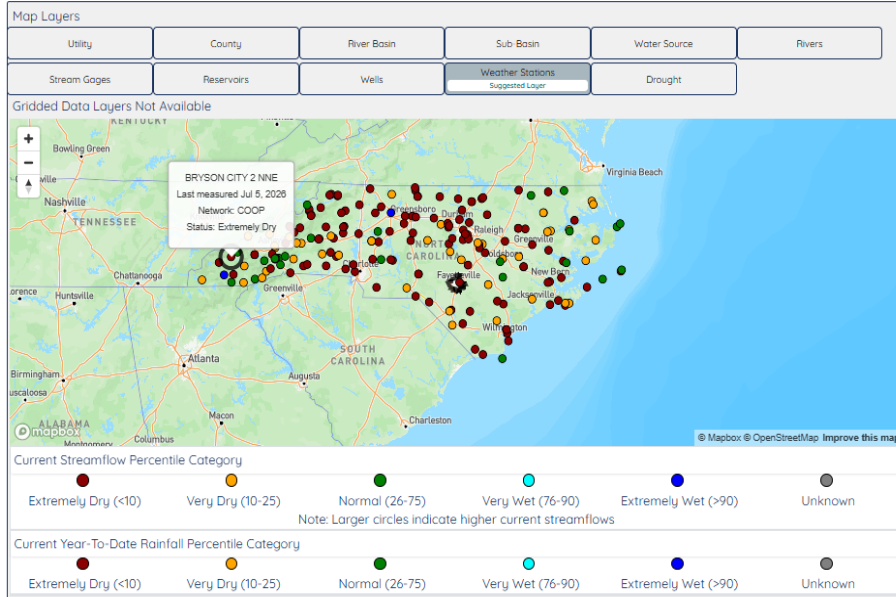
Note: Gridded data layers are not currently functional. We are working on updates to resolve this issue. (Oct 2025)

DATA LAST UPDATED: JUL 5, 2026

HIDE MAP

Select a Weather Station: **BRYSON CITY 2 NNE (311157)**

HIDE INFO



Rainfall

Help

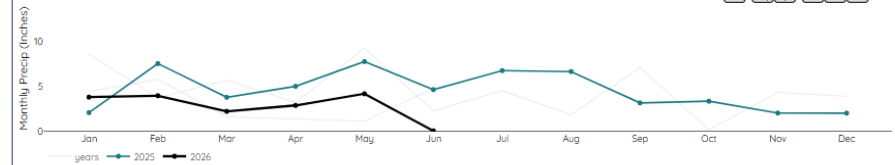
BRYSON CITY 2 NNE (311157)

Last Observation: Jun 09, 2026 | Data Source: [NCSCD](#) | [Get More Data for 311157](#)

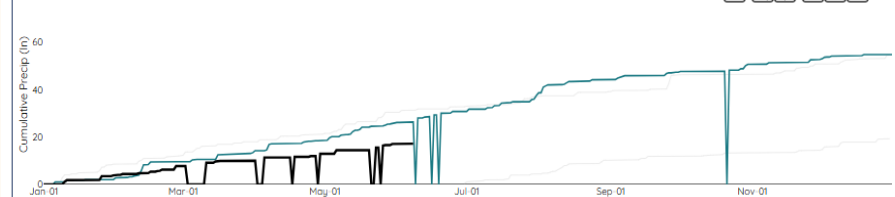
Select Past Year to Highlight

☐ 2002 ☐ 2003 ☐ 2007 ☐ 2008 ☐ 2011 ☐ 2012 ☐ 2013 ☐ 2014 ☐ 2015 ☐ 2016 ☐ 2017 ☐ 2018 ☐ 2019 ☐ 2020 ☐ 2021 ☐ 2022

Monthly Precip (in) for 311157 BRYSON CITY 2 NNE



Cumulative Precip (in) for 311157: BRYSON CITY 2 NNE



North Carolina Tools

NC Water Supply Dashboard

[Utility Status](#)

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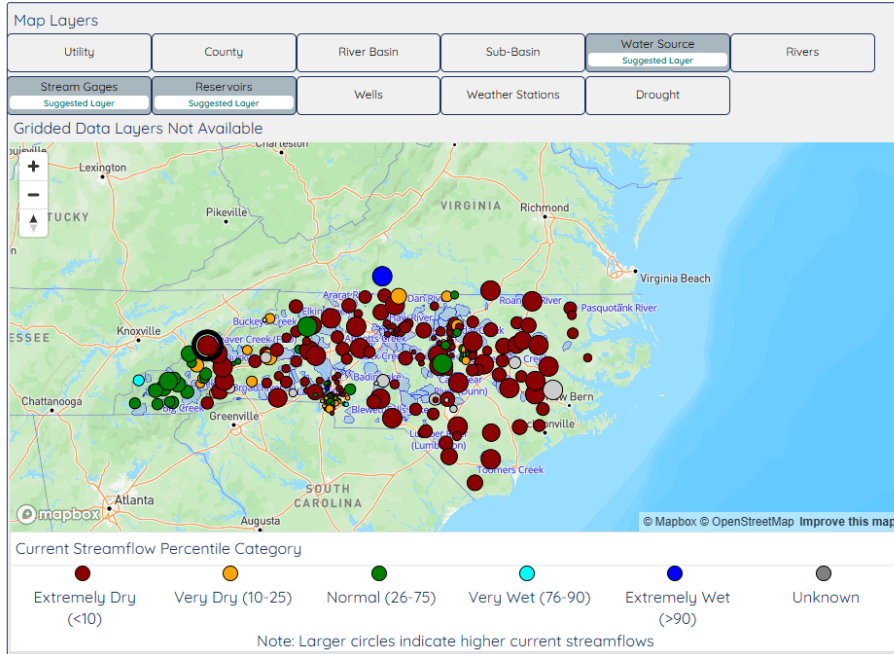
DATA LAST UPDATED: JUL 5, 2026

HIDE MAP

Select a Stream Gauge:

Select a Reservoir:

HIDE INFO



Surface Water Supply

Help

03454500: FRENCH BROAD RIVER AT HOT SPRINGS, NC

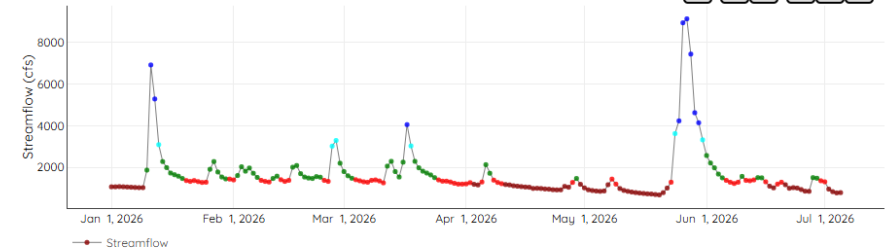
Data from: 1934-2025 (31 years of data) | Last observation: Jul 05, 2026

Data Source: [USGS](#) | Get More Data for [03454500](#)

This site is Extremely Dry, spending 33.3% of the year to date in this status.

☒ Water flow only ☐ Water flow + Stats

Streamflow (cfs) and Categories (color dots) for 03454500





Department of
Military

TEMA

Questions?



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615-946-5507