

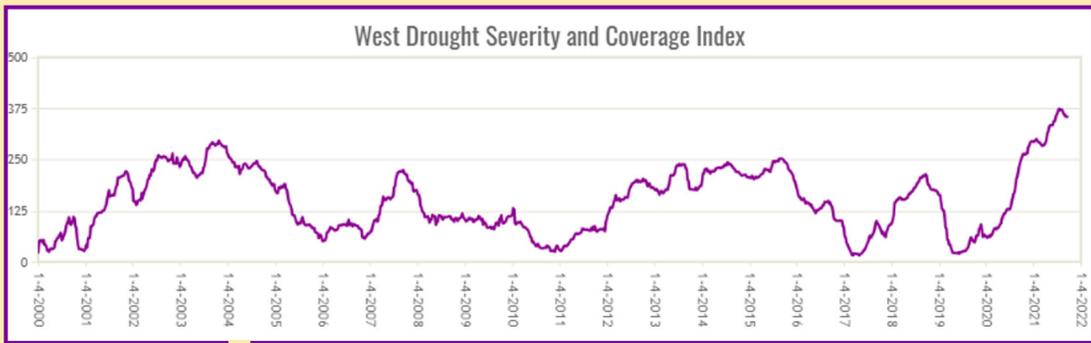
Q

How can I summarize the U.S. Drought Monitor over time, with one number?

A

Use the Drought Severity and Coverage Index

The U.S. Drought Monitor (USDM) is a snapshot of where drought is occurring across the country in a given week. Meaningfully condensing many weekly maps into one map showing drought over time results in interesting, complex maps such as the one below. Likewise, a statistical summary retains as much nuance as possible. We don't just average a single level of drought. Instead, to simplify the USDM for an area like a state or a county to one number, we use a weighted sum to condense five area statistics into one, and then add or average them over time. The Drought Severity and Coverage Index (DSCI) summarizes U.S. Drought Monitor status each week on a scale from zero to 500, and can be computed for any area.

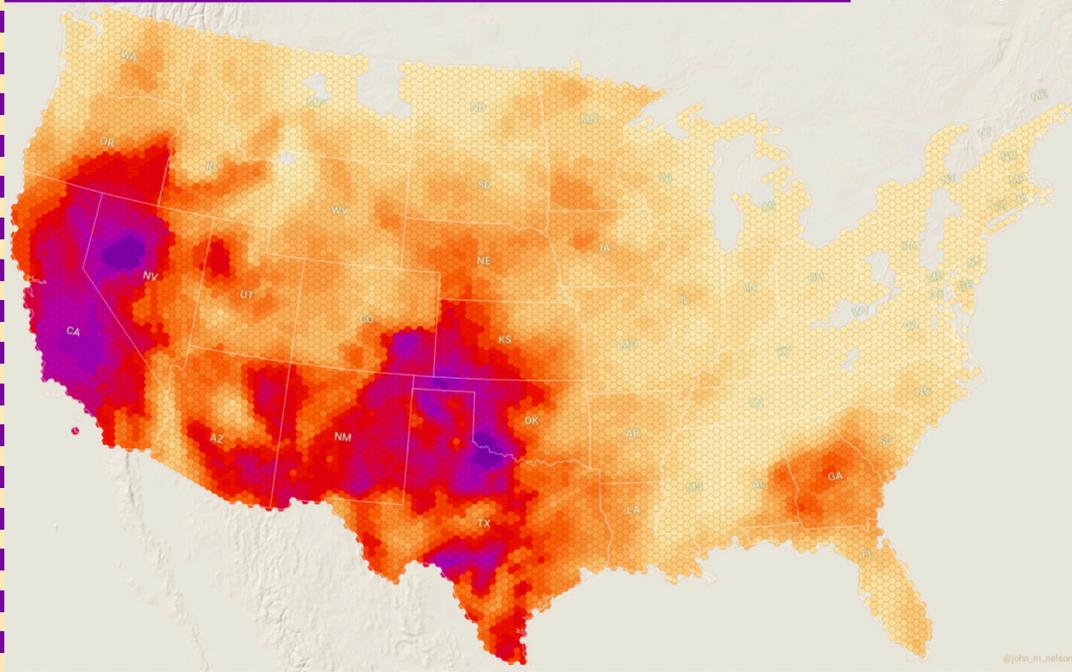


Five+ Years of Drought:

An extended look at drought intensity and duration in the contiguous United States

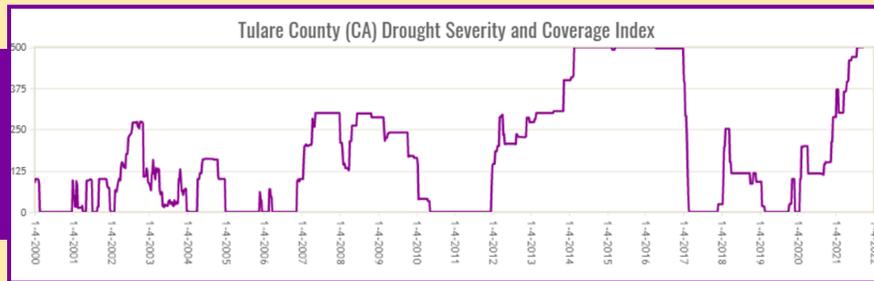
Based on U.S. Drought Monitor data for 2011–2016

Courtesy of John M. Nelson



The U.S. Drought Monitor is jointly produced by the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration.

USDM statistics: The way the USDM works, each week, each part of the country is classified as being in one of six levels of drought: none, abnormally dry (D0), moderate (D1), severe (D2), extreme (D3), and exceptional (D4). Statistics computed each week alongside the map describe what proportion of an area is in what level of dryness or drought, so there are six percentages to describe an area in a single week. We use the five levels from D0 to D4 to compute the DSCI. These stats are computed for the entire area of the United States, with and without non-contiguous states and islands, and for individual states, counties, tribal areas, river basins and other geopolitical and natural boundaries (droughtmonitor.unl.edu/DmData/DataTables.aspx > Area type).



Computing DSCI: The Drought Severity and Coverage Index (DSCI) is a weighted sum of the proportion of each area in each level of drought, summarizing the extent and severity of drought with a single number each week on a scale from 0 (no drought) to 500 (all of the area in the worst category of drought). You can compute it two different ways:

Using cumulative Drought Monitor data, add the percentages for D0 through D4 for a given week to get the Drought Severity and Coverage Index for that week.

$$D0 + D1 + D2 + D3 + D4 = \text{DSCI}$$

Or, use categorical (not cumulative) Drought Monitor data, and compute a weighted sum of the percentages for D0 through D4:

$$1(D0) + 2(D1) + 3(D2) + 4(D3) + 5(D4) = \text{DSCI}$$

Caution: Note that because drought has a large footprint, smaller areas have more all (500) and none (0) DSCI values. It doesn't necessarily mean that drought is more extreme there. It actually means that a more locally specific description is possible when computing statistics for a smaller area. For example, the Western U.S. is a very large region, and as of 2021, the lowest DSCI for the West in more than 20 years of USDM data was 16, in 2017, when just under 3% of the area was in moderate drought or worse. Its highest DSCI was 374, in July 2021, when 95% of the region was in some degree of drought and 28% was in exceptional drought. In contrast, Tulare County, California, which is part of the western region, has had many weeks with DSCI of zero, and many weeks with DSCI of 500.

DSCI over time: Best practices for using DSCI over time are still evolving and depend on the intended use. The most obvious choices are to average or sum it.

Averaging DSCI: The advantage of averaging the DSCI is that the same 0–500 scale applies, so users would not have to learn a new scale, and less qualifying detail is needed for context. For example, a state climatologist might find it useful to compare the average DSCI for their state from month to month as part of a regular report.

Summing DSCI: Summing the DSCI may be more useful for comparing different droughts. If for example two areas experienced droughts of comparable duration, but one had a higher total DSCI than the other, we could conclude that the one with the higher DSCI experienced a more intense or more widespread drought. Summing the DSCI could also be part of a comparison of two droughts from the same area.

For more information on DSCI:

droughtmonitor.unl.edu/About/AbouttheData/DSCI.aspx

Credit

The idea for the Drought Severity and Coverage Index is courtesy of Adnan Akyuz, North Dakota State University. Suggested citation:

Akyuz, F. A. 2017. Drought Severity and Coverage Index. United States Drought Monitor. droughtmonitor.unl.edu/About/AbouttheData/DSCI.aspx