

Dangerous fire season looms as drought-stricken Western U.S. heads for water crisis

May 14 2021, by Mojtaba Sadegh, Amir Aghakouchak and John Abatzoglou



Dry conditions across the West follow a hot, dry year of record-setting wildfires in 2020. Communities were left with scenes like this, from California's Creek Fire. Credit: Amir Aghakouchak/University of California Irvine

Just about every indicator of drought is flashing red across the western U.S. after a dry winter and warm early spring. The [snowpack is at less than half](#) of normal in much of the region. Reservoirs are being drawn down, river levels are dropping and soils are drying out.

It's only May, and states are already considering water use restrictions to make the supply last longer. California's governor declared a [drought](#) emergency in 41 of 58 counties. In Utah, irrigation water providers are [increasing fines](#) for overuse. Some Idaho ranchers are talking about [selling off livestock](#) because rivers and reservoirs they rely on are dangerously low and irrigation demand for farms is only just beginning.

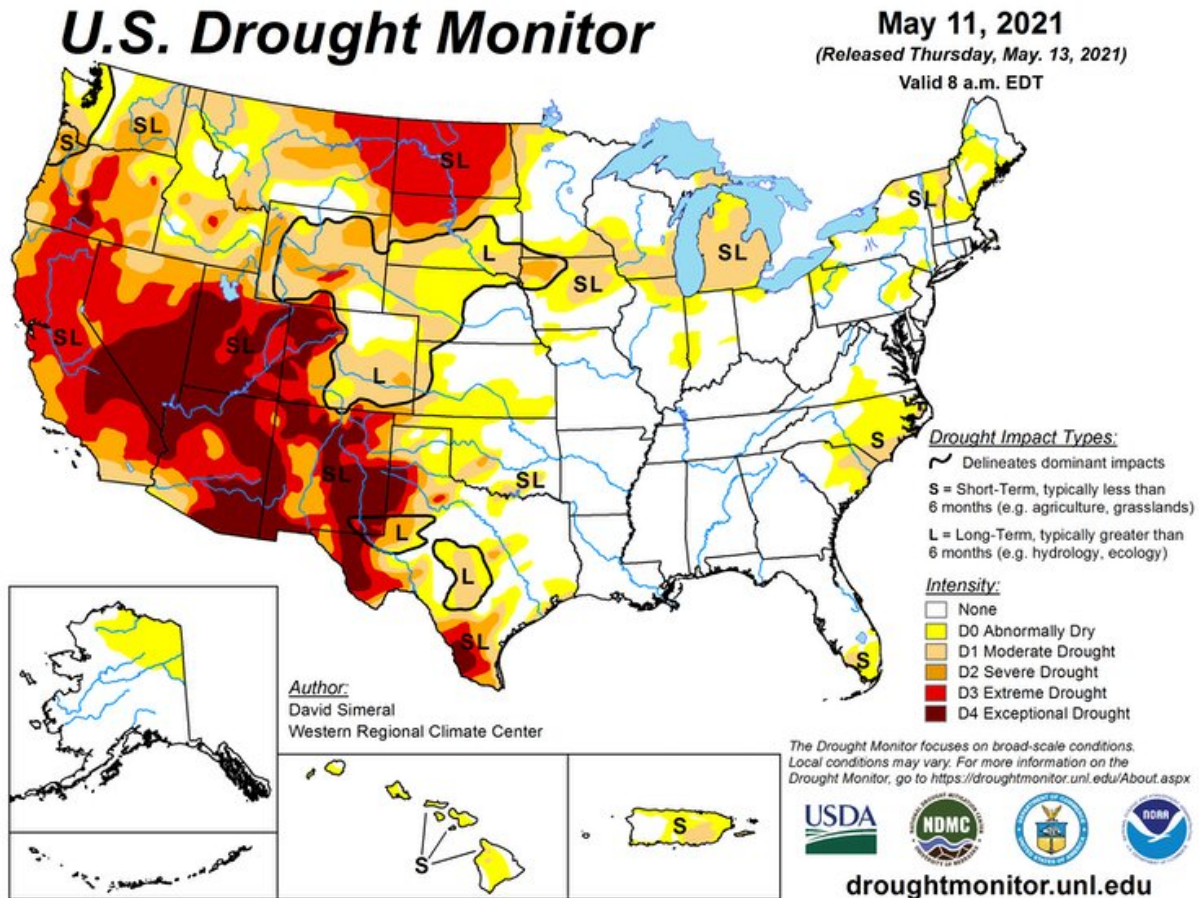
Scientists are also closely watching the impact that the rapid warming and drying is having on trees, worried that water stress could lead to [widespread tree deaths](#). Dead and drying vegetation means more fuel for what is already expected to be [another dangerous fire season](#).

U.S. Interior Secretary Deb Haaland and Agriculture Secretary Tom Vilsack told reporters on May 13, 2021, that federal fire officials had [warned them to prepare for an extremely active fire year](#). "We used to call it fire season, but wildland fires now extend throughout the entire year, burning hotter and growing more catastrophic in drier conditions due to [climate change](#)," [Vilsack said](#).

[As climate scientists](#), we track these changes. Right now, [about 84%](#) of the western U.S. is under some level of drought, and [there is no sign of relief](#).

The many faces of drought

Several types of drought are converging in the West this year, and all are at or near record levels.



The U.S. Drought Monitor for mid-May shows nearly half of the West in severe or extreme drought. Credit: [National Drought Mitigation Center/USDA/NOAA](https://www.nationaldroughtmitigationcenter.org/)

When too little rain and snow falls, it's known as meteorological drought. In April, precipitation across large parts of the West was less than [10% of normal](#), and the lack of rain continued into May.

Rivers, lakes, streams and groundwater can get into what's known as hydrological drought when their water levels fall. Many states are now warning about low streamflow after a winter with less-than-normal snowfall and warm spring temperatures in early 2021 speeding up

melting. The U.S. Bureau of Reclamation said Lake Mead, a giant Colorado River reservoir that provides water for millions of people, is on pace to fall to levels in June that [could trigger the first federal water shortage declaration](#), with water use restrictions across the region.

Dwindling soil moisture leads to another problem, known as agricultural drought. The average soil moisture levels in the western U.S. in April were [at or near their lowest levels in over 120 years of observations](#).

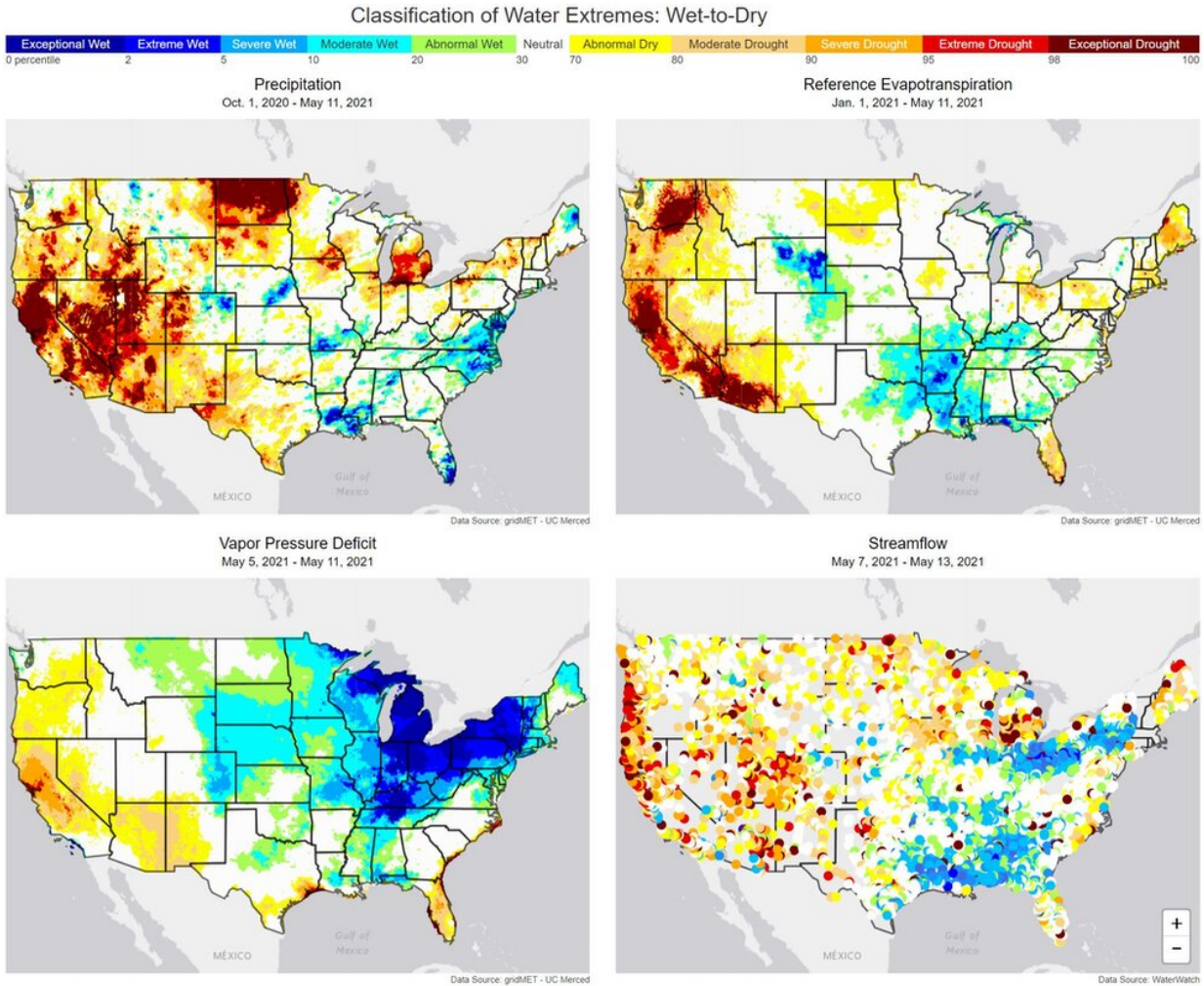
These factors can all drive ecosystems beyond their thresholds—into a condition called ecological drought—and the results can be dangerous and costly. Fish hatcheries in Northern California [have started trucking their salmon to the Pacific Ocean](#), rather than releasing them into rivers, because the river water is expected to be at historic low levels and too warm for young salmon to tolerate.

Snow drought

One of the West's biggest water problems this year is the low snowpack.

The western U.S. is critically dependent on winter snow slowly melting in the mountains and providing a steady supply of water during the dry summer months. But the amount of water in snowpack is on the decline here and across much of the world as global temperatures rise.

Several states are already seeing how that can play out. Federal scientists in Utah warned in early May that more water from the snowpack is sinking into the dry ground where it fell this year, [rather than running off](#) to supply streams and rivers. With the state's snowpack at 52% of normal, streamflows are expected to be well below normal through the summer, with some places at less than 20%.



Four signs of drought. Credit: [Climate Toolbox](#)

Anthropogenic drought

It's important to understand that drought today [isn't only about nature](#).

More people are moving into the U.S. West, increasing demand for water and irrigated farmland. And [global warming](#)—driven by human activities like the burning of fossil fuels—is now [fueling more widespread and intense droughts](#) in the region. These two factors act as

additional straws pulling water from an already scarce resource.

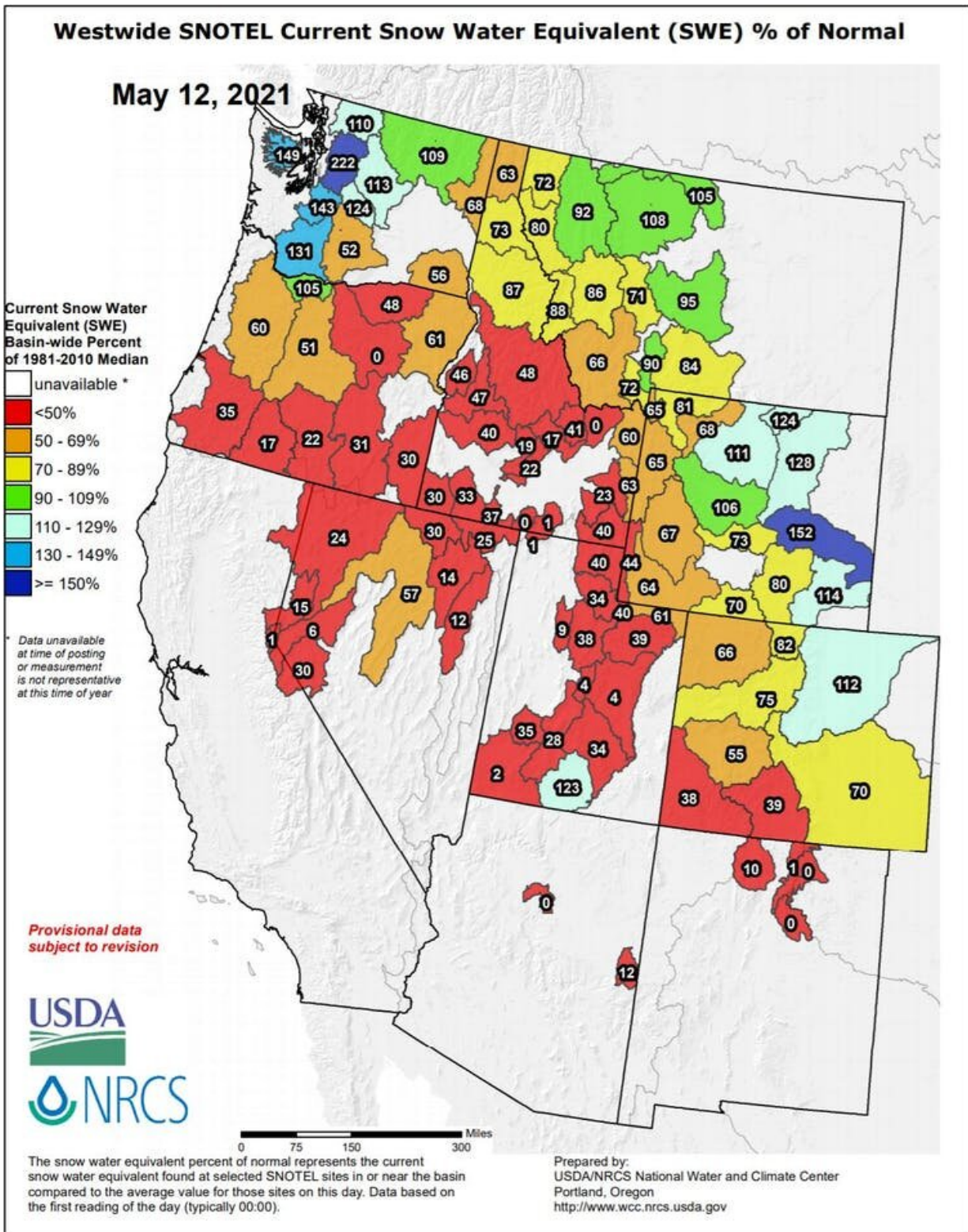
As demand for water has increased, the West is pumping out more groundwater for irrigation and other needs. [Centuries-old groundwater](#) reserves in aquifers can provide resilience against droughts if they are used sustainably. But groundwater reserves [recharge slowly](#), and the West is seeing a decline in those resources, mostly because water use for agriculture outpaces their recharge. Water levels in some wells have dropped at a rate of [6.5 feet \(2 meters\) per year](#).

The result is that these regions are less able to manage droughts when nature does bring hot, dry conditions.

Rising global temperatures also play several roles in drought. They influence whether precipitation falls as snow or rain, how quickly snow melts and, importantly, how quickly the land, trees and vegetation [dry out](#).

Extreme heat and droughts can [intensify one another](#). Solar radiation causes water to evaporate, drying the soil and air. With less moisture, the soil and air then heat up, which dries the soil even more. The result is extremely dry trees and grasses that can quickly burn when fires break out, and also thirstier soils that demand more irrigation.

Alarmingly, the trigger for the drying and warming cycle has been changing. In the 1930s, lack of precipitation used to trigger this cycle, but [excess heat has initiated the process in recent decades](#). As global warming increases temperatures, soil moisture evaporates earlier and at larger rates, drying out soils and triggering the warming and drying cycle.



Snowpack is typically measured by the amount of water it holds, known as snow water equivalent. Credit: [National Resource Conservation Service](https://www.nrcs.usda.gov/)

Fire warnings ahead

Hot, dry conditions in the West last year fueled a [record-breaking wildfire season](#) that burned over 15,900 square miles (41,270 square kilometers), including the largest fires on record in Colorado and California.

As drought persists, the chance of large, disastrous fires increases. The seasonal outlook of [warmer and drier-than-normal conditions for summer](#) and fire season outlooks by federal agencies suggest another [tough, long fire year is ahead](#).

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