CHANGING CLIMATE, CHANGING FIRE IN ARIZONA & NEW MEXICO

Fire activity is increasing across the desert Southwest, placing communities, infrastructure, and natural resources at risk.

Why Climate Matters for Wildfire in the Southwest

Effective wildfire mitigation and response strategies must be tailored to local conditions because **different ecosystem types are more vulnerable to wildfire in different climate and weather conditions**. Understanding the relationship between climate and wildfire in the Southwest is key to developing effective management strategies. **Fire management will need to respond to short-term and long-term climate conditions as well as consider ecosystem-specific differences to minimize risks** to communities in fire-prone landscapes.

Wildfire and increasing aridity

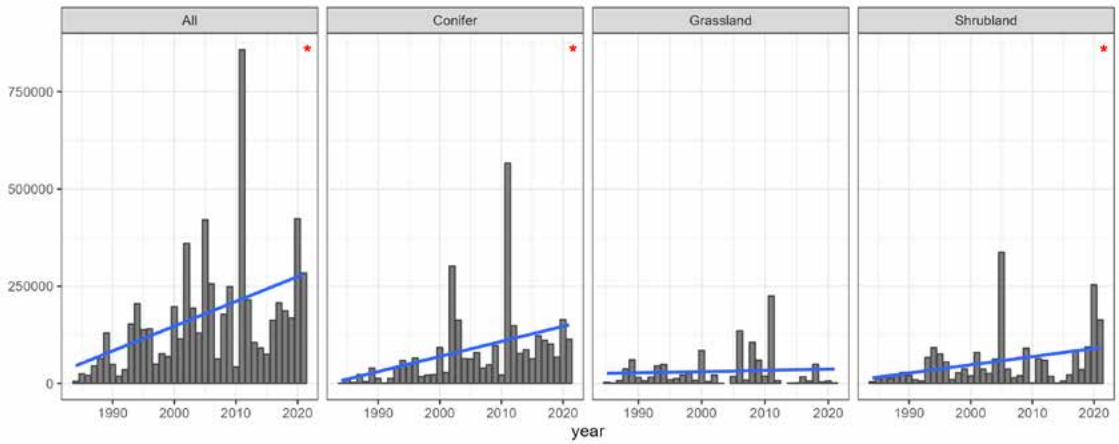
The atmosphere in the Southwest has become increasingly dry due to warming temperatures, which intensifies how strongly the air pulls moisture from vegetation, a measure referred to as vapor pressure deficit or VPD. As aridity has increased, vegetation dries more quickly during warm seasons. This heightened atmospheric moisture demand now tracks closely with increases in the regional area burned.

Recent Climate and Wildfire Patterns in the Southwest

Fire activity is rising overall.

Total area burned and average fire size across Arizona and New Mexico have increased significantly in recent decades. Between 1984 and 2021, a period that coincides with long-term warming and declining precipitation, over 6 million hectares (15 million acres) burned.

At the regional scale, annual vapor pressure deficit (VPD), a measure of aridity, correlates strongly with total area burned—more so than annual precipitation. VPD can be an effective tool for region-wide assessment. However, it does not tell the whole story, especially in grasslands and shrublands.



These figures show annual area burned in Arizona and New Mexico from 1984–2021 by different vegetation types. The blue line highlights the long-term trend; a red asterisk (*) indicates where fire activity is significantly on the rise—in conifer and shrubland ecosystem types.

CLIMAS
Climate Assessment for the Southwest
A NOAA CAP TEAM

Conifer forests drive most of the long-term increase in fire activity.

Conifer-dominated ecosystems account for about half of the total area burned and show clear upward trends in fire number, size, and total area burned.

Conifer forests tend to see large fires during periods of **prolonged drought combined with high warm-season aridity**.

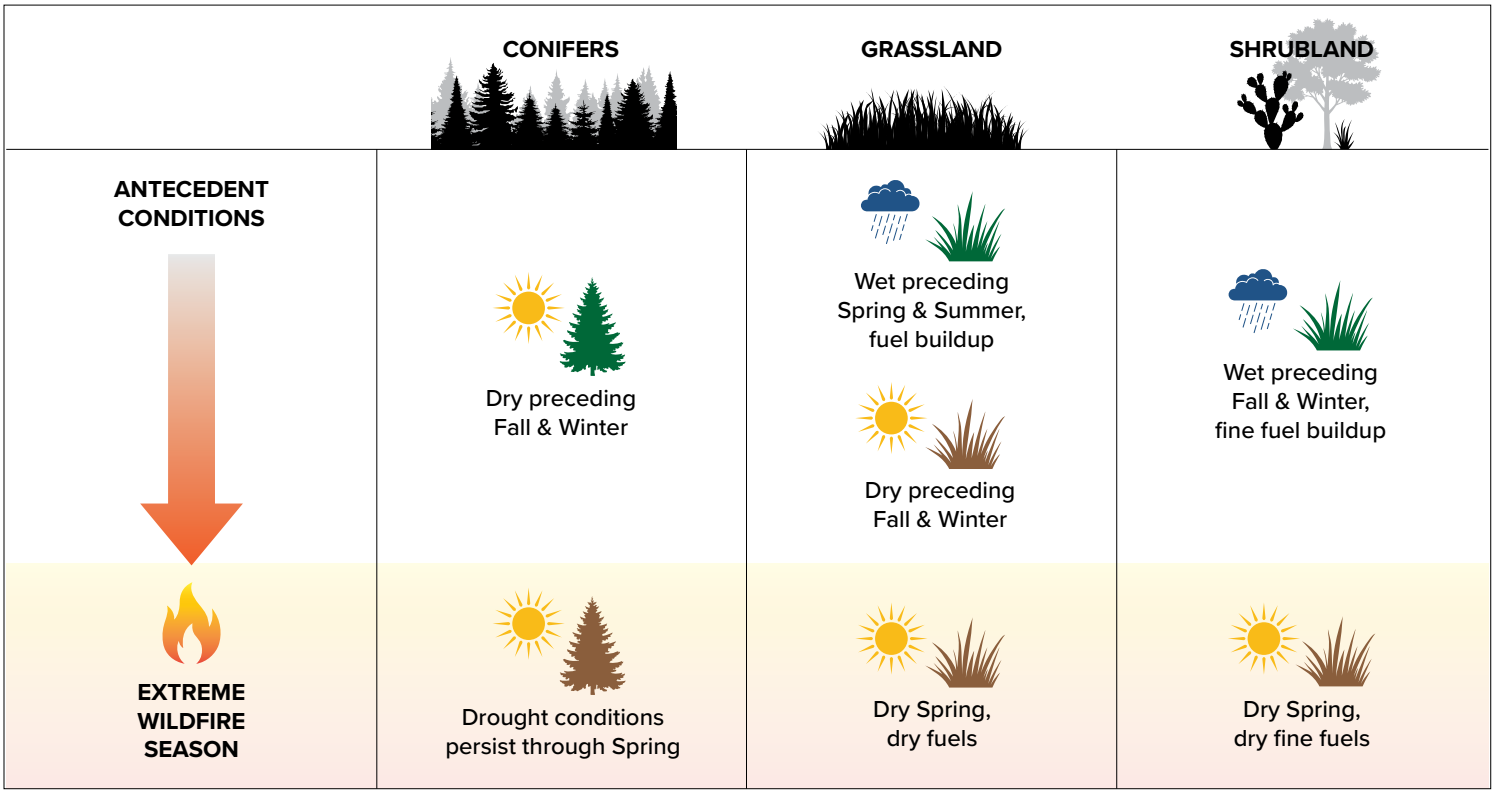
Grassland and shrubland fires vary widely year to year, following wet–dry cycles.

These two ecosystems, which account for slightly more than half of total area burned, respond strongly to **wet seasons** that build up fine fuels, followed by **dry, warm springs** that promote fire spread.

In shrublands, this pattern has intensified: **invasive grasses now create continuous fine fuels in desert areas that once rarely burned**, increasing the potential for large fires under the right conditions.

Seasonal fire-climate relationships across fire-vegetation groups in the Southwest U.S.

The relationship between climate and wildfire in the Southwest is becoming more complex. Drought and high temperatures can provide conditions for increased wildfires in conifer forests, while rain and wet conditions can promote fuel growth for wildfires in shrubland and grasslands. Understanding the nuances of the relationship between climate and wildfire in the Southwest is crucial for planning fire mitigation strategies that are tailored to local conditions.



Study available at: Crimmins, M. A., H. M. E. Geli, C. Greene, M. Meko, and L. Prihodko, 2025: Changing Climate, Changing Fire: Understanding Ecosystem-Specific Fire–Climate Dynamics in Arizona and New Mexico. Earth Interactions, 29, 250001, https://doi.org/10.1175/EI-D-25-0001.1.