

RESEARCH BRIEF

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Climate Change Increases California Wildfire Risk

Driven by climate change, hotter and drier weather has noticeably increased across California leading to the conditions conducive to more extreme wildfire seasons that extend into autumn.

Background

California has recently endured a multi-year period of unprecedented wildfire activity. The state's single deadliest wildfire and its two most destructive wildfires occurred during 2017 and 2018. The devastation caused by these and other recent wildfires have garnered widespread attention, with an especially high level of interest from policymakers and emergency responders seeking to understand the multiple factors that have contributed to the increase in wildfire disasters.

POINTS FOR POLICY MAKERS

- ▶ **Conditions during autumn months are increasingly conducive to greater wildfire risk across most of California as a result of historical climate trends.** Increased co-occurrence of extreme fire danger in northern and southern California has the potential to hamper fire suppression and risk-reduction efforts. The risk of extreme wildfire weather during the autumn season has increased during the past four decades across California, raising the likelihood that extreme conditions occur simultaneously in northern and southern California (as happened during the devastating autumn season of 2018).
- ▶ **Continued global warming will intensify extreme autumn fire weather conditions in the future.** Even without changes in precipitation or the strength of offshore winds, continued warming is very likely to result in further increases in extreme autumn fire weather conditions throughout California. Implementation of commitments made in the UN Paris Agreement is likely to substantially reduce this intensification.
- ▶ **California faces increasing greater potential for future wildfire disasters, but a broad portfolio of mitigation options already exists.** The research shows that reducing the trajectory of greenhouse gas emissions can contribute substantially to curbing future increases in extreme wildfire conditions, although even the UN Paris Agreement ensures further warming. Additional options include the use of prescribed burning to reduce fuel loads and improve ecosystem health, upgrades to emergency communications and response systems, community-level development of protective fire breaks and defensible space, and the adoption of new zoning rules and building codes to promote fire-resilient construction.



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One key area of concern is the occurrence of autumn wildfires. Recent autumns have been characterized by multiple large and fast-spreading wildfires burning simultaneously across California. This simultaneous occurrence is particularly concerning as it can compromise the efficacy of local, regional, and even national and international suppression efforts. If the likelihood of autumn wildfires increases, a mismatch can emerge between firefighting resource availability—personnel, vehicles, and aircraft—and actual needs.

Changing demographics, such as the expansion of housing developments into the “wildland-urban interface,” as well as a century-long legacy of fire suppression leading to the accumulation of fuels, have likely also played a substantial role in community exposure and vulnerability to wildfire. In addition, California’s climate has also changed considerably over the past several decades. The state’s five warmest years on record occurred in 2014-2018. Over the past century, state-wide warming has occurred during all calendar months, with the most pronounced warming in late summer and early autumn. Spring snowpack has also been decreasing, leading to drier conditions during the warm season.

To better understand if and how global warming has contributed to changes in extreme autumn wildfire potential, Stanford researchers analyzed extreme fire weather conditions in climate observations and climate model simulations for the state of California, including the conditions surrounding the November 2018 Camp Fire in the Sierra Nevada foothill town of Paradise and the Woolsey Fire near Los Angeles, CA. Both regions were particularly susceptible to extreme fire danger that year following very dry and hot weather.

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This brief is based on the paper “**Climate change is increasing the risk of extreme autumn wildfire conditions across California**” published in *Environmental Research Letters* (2020).



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FOR MORE INFORMATION

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