

Extreme California wildfires may increase 57% even with low emissions

Wildfires that grow more than 4000 hectares in a single day could become much more frequent in California even with low greenhouse gas emissions

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A firetruck on California Highway 96 as the McKinney Fire burned in Klamath National Forest in 2022

Noah Berger/AP/Shutterstock

By 2050, days with extreme wildfires in California could become 57 per cent more frequent even in a warming scenario with low greenhouse gas emissions. With very high emissions, days with extreme fire could nearly triple by the end of the century.

Since 1972, the area burned by wildfires annually in California has **increased fivefold**. A disproportionate amount of that increase has been from extreme fires, those that grow more than 4000 hectares in a single day. “Any fire that burns ten thousand acres is a very

aggressive, dangerous fire to fight,” says Jon Heggie, a battalion chief at the California Department of Forestry and Fire Protection.

Using data on nearly 18,000 days with fire between 2003 and 2020, [Patrick Brown](#) at the Breakthrough Institute, a California think tank, and his colleagues trained machine learning models to isolate the role of temperature from the many other [factors that affect fire risk](#), such as wind speed and precipitation. They then tested the models’ predictions against historical data that wasn’t used to train them. The data was provided by the California utility Pacific Gas & Electric, which also funded the research.

The utility recently agreed to [pay \\$55 million in penalties](#) for the role its equipment played in massive California wildfires in 2019 and 2021.

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The researchers used the best performing models to test how warmer temperatures and drier fuel affected the risk of extreme fires. They assumed all other variables, such as the number of ignitions and weather patterns, remained the same as the period between 2003 to 2020.

Under a scenario with less than 2°C of warming by the end of the century, the frequency of extreme wildfire days increased 57 per cent by 2050 relative to a pre-industrial baseline, and held steady until 2100. Under a high-emissions scenario, extreme wildfire days increased 81 per cent by 2050, and 174 per cent by 2100.

[Michael Flannigan](#) at Thompson Rivers University in Canada says many of the factors the analysis keeps constant – such as the amount of vegetation – [could change](#). But these results “might be conservative”, he says. “Things are progressing much more rapidly than we thought.”

“We are living in a time where we should expect each [fire] to have that potential for large-scale growth,” says Heggie.

Reference: eartharxiv.org/repository/view/3450/

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