



## Research Brief for Resource Managers

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# Two Big Fire-drivers (Fuel vs. Wind) Mean Different Management Strategies Across California

Keeley, J.E., and A.D. Syphard. 2019. Twenty-first century California, USA, wildfires: fuel-dominated vs. wind-dominated fires. *Fire Ecology* 15:24  
[doi.org/10.1186/s42408-019-0041-0](https://doi.org/10.1186/s42408-019-0041-0)

Since the start of the 21<sup>st</sup> century, large wildfires have become increasingly more frequent in California. To explain these fire patterns, this paper contrasts the two most important factors driving large fires: fuel-dominated vs. wind-dominated wildfires. These two fire types differ significantly, with lightning-ignited, eastern California forest fires typically being **fuel-driven (i.e., bottom-up control)**, the result of long-term fire suppression, or forest management practices while western California shrubland fires are overwhelmingly **wind-driven (i.e., top-down control)**, the result of foehn wind events that coincide with human ignitions in densely populated areas. Other significant ways that these two types of fire differ include: past fire and management history (effective fire suppression vs. less effective suppression), ignition sources (lightning dominated vs human dominated), seasonal timing, (summer vs. fall), type of resources most at risk (forests vs. human lives and property), and the need for dramatically different management responses (fuel reduction vs. fire prevention).

Although high intensity forest fires are traditionally blamed, the reality is that frequent, wind-dominated fires are the most catastrophic in terms of total lives lost and structures burned.

### Management Implications

- It is widely recognized that management of fuel-dominated fires requires pre-fire fuel manipulations, including prescription burning, managed fire for resource benefit in wildlands, and mechanical treatments of understory fuels.
- Less well appreciated is the conclusion that wind-dominated fires, which cause the largest loss of lives and property, require a very different approach, labeled the **Five P's**: People, Prevention, Planning, Protection, and Prediction.

This paper demonstrates that because anomalous fuel loads are not associated with these wind-driven events, future management should focus on what is called “**the Five P's**”: 1) **People**, rather than fuels, should be the primary focus. 2) **Prevention** will be far more effective than fuel treatments. This includes controlling both direct human ignitions, as well as those from human infrastructure, such as powerline failures. 3) **Planning** communities should incorporate smart regional planning along with local fire safety needs. 4) **Protection** of structures through hardening of homes will help avoid ember-ignited fires. 5) **Prediction** of wind-driven fire trajectories combined with rapid communication of those predictions to agencies and the public to reduce fatalities.