CALIFORNIA FIRE SCIENCE CONSORTIUM

JOINT FIRE SCIENCE PROGRAM

Research Brief for Resource Managers

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Linking California Wildfire Drivers to the Appropriate Management Tools

Keeley Jon E. and Alexandra D. Syphard. 2020. Nexus between wildfire, climate change and population growth in California. Fremontia 47(2):18-27.

Management Implications

- To prevent fuel-driven forest fires, use traditional fuel management tools.
- To prevent wind-driven fires, implement "the Five P's": 1) People 2) Prevention 3) Planning. 4) Protection 5) Prediction.
- Because the wind-driven, non-forested fires are the most destructive, the "five P's" may be a better long-term management focus in those ecosystems.

Since 2000, the increase in large wildfires across California has been remarkable, with a shocking five million hectares burned in the last 20 years, roughly twice the area burned in the preceding 20 years. Although these numbers are valuable for grasping the scale of the problem, they fail to show that two kinds of wildfire are to blame. In fact, in the state with the most landscape diversity housing the largest, fastest growing human population in the lower 48 states, there are several anthropogenic fire-drivers causing two fire types, and each requires a different set of management tools.

The first kind of fire is the one most people think of. **Fuel-driven conifer forest fires** (e.g., Table 1 top 6 rows) occur where lightening ignites drought-impacted fuels that have accumulated with human-induced fire suppression. In these forested ecosystems, both climate change and fire suppression are the drivers that need to be managed. To prevent such fuel-driven fires, fuel management is required, including prescription fire and mechanical thinning.

Although the second kind of fire is less familiar to people, it is the most destructive, causing more loss of lives and more structure loss than fuel-driven fires. **Wind-driven shrubland and grassland fires** (e.g., Table 1 bottom 9 rows) occur where high density human populations and infrastructure introduce unnatural ignitions during annual extreme winds (i.e., foehn winds). In this case, increased human development into the wildland urban interface (WUI) and the associated increase in human ignitions during the windy season are the drivers that need to be managed.

To prevent the destruction from these wind-driven fires, the "5 P's" are required: 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 will potentially reduce losses.

Although the lightning-ignited, fuel-driven forest fires get more attention, the reality is that the human-ignited, wind-driven fires are the most catastrophic. Distinguishing the two fire types by their causes is essential for reducing future fire losses.

TABLE 1. Selected fires representing fuel-dominated and wind-dominated fires.

Year	Fire	County	Mon. (days)*	Hectares	Cause	Lives	Structures
Fuel-Dominated Fires:							
1977	Marble C	Monterey	July -	71,980	Lightning	0	0
2012	Barry Point	Modoc	Aug -	37,630	Lightning	0	3
2012	Rush	Lassen	Aug -	110,080	Lightning	0	1
2013	Rim	Stanislaus	Aug -	104,220	Campfire	0	112
2014	King	El Dorado	Sept -	39,260	Arson	0	80
2015	Rough	Fresno	July -	61,360	Lightning	0	4
Wind-Dominated Fires:							
1889	Santiago	Orange	Sept (3)	125,000	Campfire	0	0
1970	Laguna	San Diego	Sept (3)	70,500	Powerline	5	382
2003	Cedar	San Diego	Oct (3)	109,500	Flares	15	2,820
2007	Witch	San Diego	Oct (2)	80,200	Powerline	2	1,265
2017	Tubbs	Sonoma	Oct (2)	14,900	Powerline	22	5,643
2017	Thomas	Ventura	Dec (10)	114,080	Powerline	2	1,063
2018	Camp	Butte	Nov (2)	62,060	Powerline	88	18,804
2018	Woolsey	Ventura	Nov (3)	39,335	Powerline	3	1,643
2019	Kincade	Sonoma	Nov (5)	31,470	Powerline	0	374

*indicates days of Santa Ana or North winds *[data from the State of California Fire and Resource Assessment Program, FRAP Fire History Database, https://frap.fire.ca.gov/mapping/gis-data/; accessed Jan 2020].*