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Undergraduate



# BLAZING A NEW TRAIL: WILDFIRE SUPPRESSION IN CALIFORNIA

BY LUYANG ZHANG

## CALIFORNIA IN FLAMES

Glowing orange skies hang above smothering smoke as air quality alerts flare red, warning against outdoor activity. California's 2020 summer is an apocalyptic scene as an outbreak of dry lightning prompted a record-breaking 10,000 wildfires that burned through nearly 4.2 million acres of land in one of the most severe fire seasons in state history.<sup>1</sup>

Unfortunately, 2020's record-breaking wildfire season was not an isolated incident — in fact, it is the most recent addition to the state's trend of increasingly severe fire events. Eighteen of the twenty largest fires in California's history have occurred in the last two decades. In 2020 and 2021 alone, the state will have respectively poured a projected total of 1.3 and 1.13 billion dollars into the thousands of planes, helicopters, bulldozers, fire engines, water trucks, and firefighters needed to quell wildfires

throughout the year — the first fiscal years the state has ventured into billion dollar wildfire suppression budgets.<sup>1,2</sup>

Whether the metric is by dollars invested in suppression or proportion of acres burned at high severity, the pattern is obvious: the increasing rate of larger, more severe fires requires increasing amounts of suppression resources, and threatens to outstrip California's capacity to effectively manage wildfires.

This pattern may be most obvious to Thom Porter, UC Berkeley forestry alumnus and Director of the California Department of Forestry and Fire Protection (Cal Fire). With over two decades of forestry and firefighting experience, Porter has seen more than his fair share of wildfires, giving him the unique ability to see an evolution in California's wildfire seasons.

In 2018, the Camp Fire, resulted in a total of 18,804 burnt structures and 85 deaths; it was the most deadly and destructive fire

in California's history. After the Camp Fire Porter explained, "In the first two-thirds of my career, the old-timers would talk about career fires," or unusually large, destructive fires. "We do not talk about that anymore. It is almost gone from our vocabulary. We are finding times where we are having multiple career fires every single season, sometimes at the same time."<sup>1,3</sup>

## SPARKING ECOLOGICAL CHANGE

The acceleration of large fires cannot be attributed to a single cause. Climate change, increasing urbanization, and implications of historic forest management, to name just a few, are all influencing the rising frequency and extent of fires.<sup>4</sup> One thing these factors have in common are that they are amplified by a faltering wildfire management system based around fire suppression. Recent increases in suppression budgets are often the result of public pressure to take di-



Figure 1. An airplane drops fire retardant on a wildfire.

“The pattern is obvious: the increasing rate of larger, more severe fires requires increasing amounts of suppression resources, and threatens to outstrip California’s capacity to effectively manage wildfires.”

rect, decisive action against wildfires in the interest of safeguarding developed structures, valued natural resources, and human safety.<sup>2</sup>

Fire suppression involves dousing flames with water and chemical fire retardants and using bulldozers to clear large swatches of brush and trees before they are consumed by fire.<sup>2</sup> However, historic policies of fire suppression have contributed to a buildup of woody, flammable material in

California ecosystems. This excess of readily available fuel has resulted in an increased likelihood for more frequent and severe wildfires similar to those that have occurred in the last few decades.<sup>5</sup>

Additionally, assuming that suppression alone will effectively mitigate wildfires forever oversimplifies California’s ecosystem ecology, which is deeply intertwined with the presence of fire. For some wildlife, fires mean rebirth, not destruction. Fires can create patches of variation and diversity between burned and unburned areas, creating a wealth of ecological niches that support California’s rich species diversity.<sup>6</sup> Fire exclusion eliminates many of these essential processes from the ecosystem, causing long-term issues for humans as well as for a wide array of California organisms.

Take *Ceanothus*, for example, a genus of nitrogen-fixing shrubs and small trees native to California. The leaves on *Ceanothus* are coated with flammable resin, which provides the heat required for seed germination when set alight. In addition, the roots of *Ceanothus* trees are resistant to fire — thus, the plant can regrow in burned areas.<sup>7</sup> These “pyrophiles” use fires as a key aspect of their life cycles and as a strategy to edge out competing, non-fire resistant

plants.

Conversely, the way that suppression has fueled a turbulent cycle of fires has also caused increasingly severe burns in certain areas that experience the greatest buildup of organic material. These wildfires benefit hardy, non-native species that thrive under the pressure of regular wildfires, such as perennial pepperweed and poison hemlock, which have already started to replace more vulnerable, native species such as sycamores, cottonwoods, and willows.<sup>8</sup> Even native species like

“Assuming that suppression alone will effectively mitigate wildfires forever oversimplifies California’s ecosystem ecology, which is deeply intertwined with the presence of fire.”





Figure 2. Firefighters apply a prescribed burn to fallen branches in Grand Canyon National Park, Arizona, for the South Rim Piles Project.



Figure 3. A species of *Ceanothus*.

those in *Ceanothus*, which appear as large shrub fields following high severity fires, are growing at rates that are not necessarily natural and can have dire ecological consequences. With more erratic fires and poor fire management, growing fires will cause significant shifts in these species and, as a result, in California's landscapes.

### FIGHTING FIRE WITH FIRE

Luckily, ecological and human health are not mutually exclusive. Prescribed burning, a stewardship strategy originally used

by Indigenous peoples, combines the ecological benefits of fire with mitigating the risks fire poses to human safety. Prescribed burning involves intentionally setting controlled fires to reduce hazardous fuels. These fuels include dead grass, fallen tree branches, dead trees, smaller-diameter trees, and brush — all major contributors to

the current fuel loads driving California's unprecedented wildfires. Prescribed burns can also cycle nutrients from the burned material back into the soil as well as slow the spread of insect infestations and some invasive species. They can also assist with the growth and proliferation of pyrophiles and other plants that incorporate wildfire into their life cycle.<sup>9</sup> But for now, California will continue to combat fires mainly with suppression. This is in part due to the extensive preparation required for safe prescribed burns. Fire managers must have a clear idea of burn objectives, which can in-

fluence types of vegetation burned and size and intensity of burn operations. They must also navigate planning, permitting, and implementing prescribed fires within "burn windows" that have ideal weather and air quality conditions. Additionally, labor and resources needed to implement prescribed fires at the necessary scales are often diverted to engage in suppression activities, thus hindering the application of proactive fuels treatments.<sup>2,9</sup> Other concerns include potential adverse respiratory health effects of adding particulate matter from prescribed fires into the atmosphere.<sup>10</sup>

Despite these institutional challenges, there is hope that fire management may look different in the future. Recently, California has passed bills SB-332 and AB-642, which establish legal protection for prescribed burn practitioners, establish cultural burning liaisons, and propose the development of a prescribed fire burning center.<sup>11,12</sup>

Hopefully, this return to historical land management strategies, in a time when the future bodes of unprecedented ecological turmoil and the smoke-filled summers to come, will plant the first seeds of change in California's charred landscapes.



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