Wildfire, Vegetation, and Climate

Interplay and Considerations for California

California Native Plant Society

FOR DISCUSSION

What is the relationship between California wildfire, native vegetation, and climate change, and how can those relationships inform the way we manage wildfire going forward?

Nick Jensen, PhD
Lead Conservation Scientist
CNPS

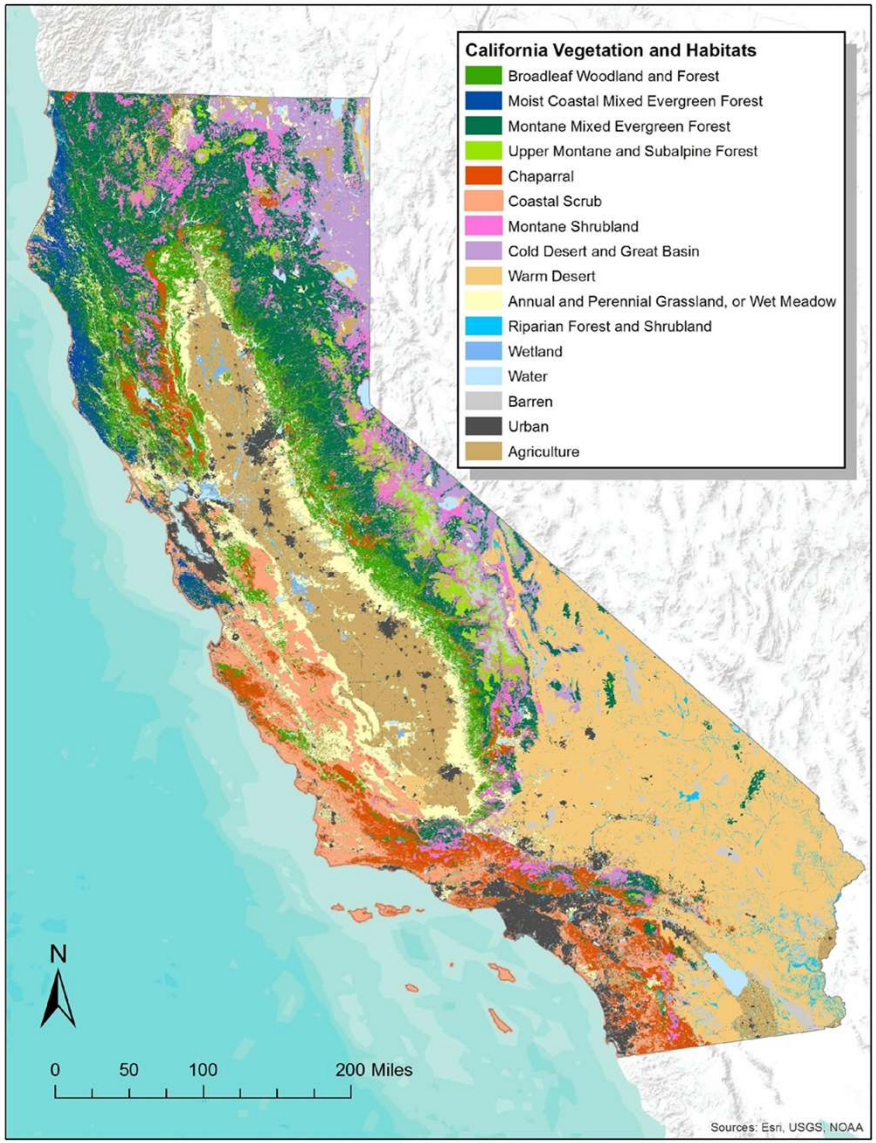
Butte County, 2018

Calsbad Fire, 2014

Burned chamise

CALIFORNIA IS COMPLEX

California's habitats are remarkably diverse. Our approaches to wildfire will need to be the same.



CALIFORNIA HABITAT DIVERSITY

The story of wildfire in California is inextricably linked to the native flora of our state. Native plants have evolved with fire, and vegetation is an aggregate of those same plants. How fire behaves on the landscape is the combination of the responses of those plants, land management, weather, climate, topography, the presence of people, and more . . .



Forest

- 100+ yrs of fire suppression = fire scarcity
- Accumulation of fuels/dense undergrowth
- Ladder fuels contribute to severe canopy fires
- Unsustainable logging practices
- Prescribed fire and ecological thinning are needed
- Rare plants and species diversity must be protected when “clearing” forest floors

Grassland & Woodlands

- Home of super blooms, vernal pools, often intermixed with woodlands
- Often targeted for development because they look weedy and bare a lot of the year
- Prone to fast-moving fires
- Fires have gotten more severe with invasive species and human presence (witness Santa Rosa)
- Especially vulnerable to type conversion (other plants taking over) that increase fire risk and fire return intervals
- Community and home hardening / building restrictions are key

Chaparral & Shrublands

- Found statewide but esp. along the coast and So Cal
- Also found in lower elevations of the Sierra Nevada, adding complexity to forest regimes
- Chaparral habitats require fire for health, but the fire is happening too frequently
- Today, they’re at risk of type conversion, which increases fire risk
- Controlled burns and mastication are extremely harmful
- Hardening and building restrictions are key

Impacts of Climate Change

Many California plants and animals are currently being affected by climate change

The link between climate change on wildfire and fire regimes is complicated (e.g. different factors are at play in forest habitats versus chaparral)

A primary link is Vapor Pressure Deficit, which explains how increased temperatures lead to atmospheric conditions drying vegetation and driving recent catastrophic fires

Other Ecological Impacts

Prescribed fire is very beneficial in many forested habitats but could be harmful in others

Treatment activities have the potential to do harm to habitats (e.g. could spread invasive plants) and should be informed by biological surveys

Solutions should be planned to maximize ecological benefits while minimizing risks

RECOMMENDATIONS

California needs tailored wildfire solutions by region and habitat.

- ✔ Address the dramatic funding imbalance between firefighting and wildfire prevention.
- ✔ Bring greater balance to the mix of tools used in wildfire prevention.
- ✔ Know the full toolkit available to us and when and where to use what tools.
- ✔ Fund biodiversity protection. Better science, better surveys leave more species diversity and healthier ecosystems for everyone to enjoy.

protecting

CALIFORNIA'S NATIVE FLORA SINCE 1965

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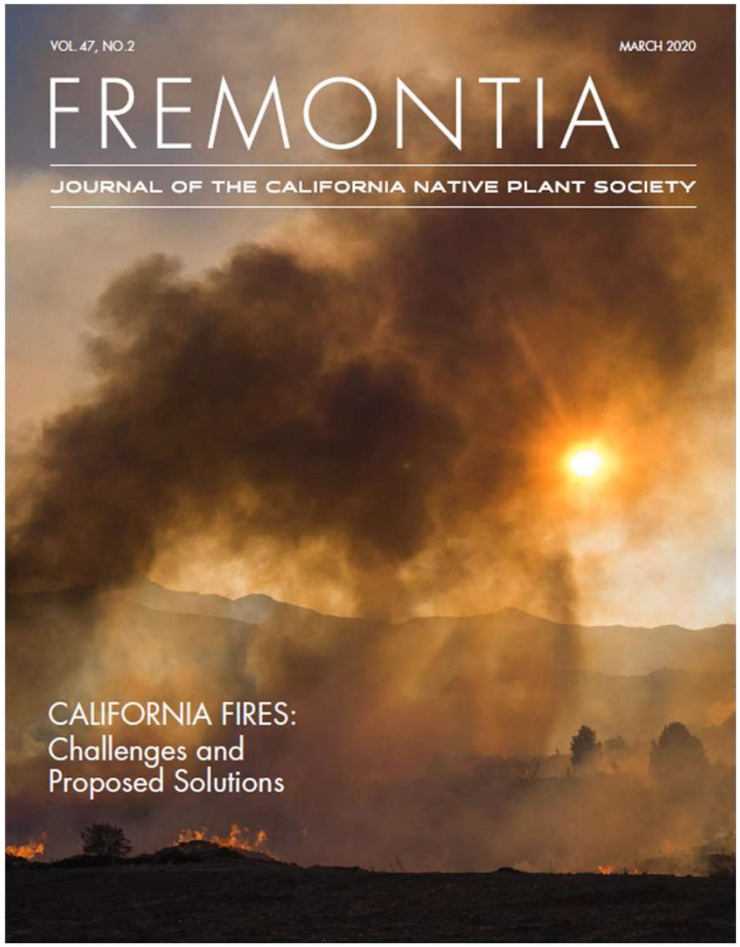
APPENDIX

Highlights from *Fremontia* Fire Issues – Spring 2020



NEXUS BETWEEN WILDFIRE, CLIMATE CHANGE, AND POPULATION GROWTH IN CALIFORNIA

Jon E. Keeley and Alexandra D. Syphard

> Sorting out the factors driving this rise in fire activity requires an appreciation for the diversity of landscapes and fire regimes in the state. After all, California has the largest latitudinal range of any western state, comparable to that from southern New Mexico to Wyoming, and the largest altitudinal range (containing both the lowest and highest points in the lower 48 states). California also is the most populous state in the union: One out of eight Americans live here. And most live within dense metropolitan areas juxtaposed with fire-prone wildlands, while a great many more live widely dispersed in rural settings.

> We can summarize our findings by contrasting U.S. Forest Service lands in the Sierra Nevada (Fig. 8a) with the lower elevation California Department of Forestry and Fire Protection (Cal Fire) responsibility lands in Southern California (Fig. 8b). In Sierra Nevada forests there is a significant relationship between higher spring and summer temperatures and area burned; indeed, in the last 50 years, the combination of these two climate variables (spring and summer temperature) could explain over 50 percent of the year-to-year variation in area burned (Keeley and Syphard 2017). This is consistent with claims that global warming has played a role in increased burning in western forests in recent decades (Abatzoglou and Williams 2016).

> In contrast, on non-forested landscapes in Southern California we found little correlation between seasonal temperatures and area burned (Fig. 8b), a pattern consistent with other recent studies (Williams et al. 2019). We surmise that this is likely due to the fact that in Southern California it is hot and dry enough every year to support large fires. (Note that maximum summer temperatures in the Sierra Nevada, when fires are most extensive, are similar to the lowest temperatures observed in Southern California in the summer, Fig. 8a&b). The lack of a strong annual climate relationship with fires in Southern California is due to climate being overridden by other factors, such as extreme wind events, increasing human ignitions during severe wind events, and long-term drought. Interestingly, while there has been an effect in the last 50 years of prior year precipitation on fires in Southern California, this effect is well known in grasslands and savannas throughout the southwest and is tied to elevated grass fuel loads following high rainfall years (Keeley and Syphard 2017). We believe this relationship showed up for Southern California in the last half of the long-term record (Fig. 8b) because of the the well-documented increase in type conversion from shrublands to grasslands in the region (Syphard et al. 2018a).

DOWNLOAD THE FULL ISSUE AT: https://www.cnps.org/wp-content/uploads/2020/04/Fremontia-V47-N2-LR.pdf

Highlights from *Fremontia* Fire Issues – Spring 2020

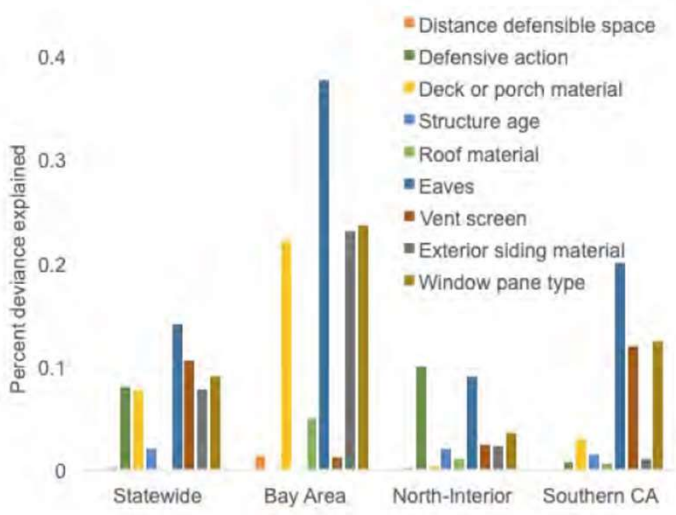


Figure 4. Relative importance (percent deviance explained) of defensible space distance and structural characteristics explaining structure loss to California wildfires from 2013–2018 for the entire state and broken into three broad regions. *[Figure modified from Syphard and Keeley 2019]*

WHY ARE SO MANY STRUCTURES BURNING IN CALIFORNIA?

Alexandra D. Syphard and Jon E. Keeley

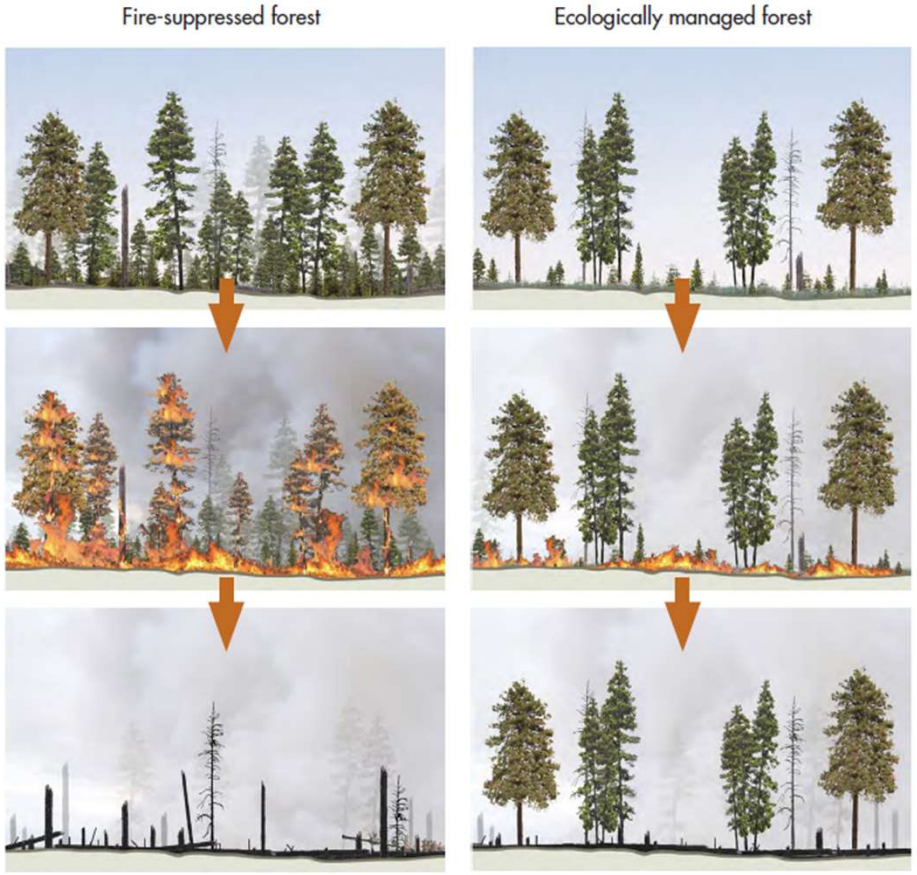
> These results suggest that, in an ideal world, the most effective strategy at reducing future structure loss would focus on reducing the extent of low-density housing via careful land planning decisions. This conclusion is rather obvious given that reducing exposure reduces the chance that a wildfire could reach a structure in the first place. In the real world, regardless of land use planning decisions for future development, there is extensive existing development that may be exposed to future wildfires. Therefore, strategies like ignition prevention and strategic vegetation management could potentially reduce the exposure of these houses by focusing on the initiation or spread of the wildfire.

Highlights from *Fremontia* Fire Issues – Spring 2020

WILDFIRES AND FOREST RESILIENCE: THE CASE FOR ECOLOGICAL FORESTRY IN THE SIERRA NEVADA

Rodd Kelsey

> California's fire-prone forests are unhealthy and at serious risk of uncharacteristic, high-severity wildfire, drought, and insect outbreaks. There is compelling evidence that ecological forestry—ecological thinning, prescribed burning, and managed wildfire—can reduce these risks and promote healthier, more resilient forests. We urge policymakers to maintain and increase funding for ecological thinning and prescribed fire and to take steps to address the policy and practical barriers to implementing ecological forestry at a scale and pace appropriate to the challenge at hand.



Fire-starved forests that have not experienced fire in many decades are prone to high-severity fires that burn very hot and kill 75% or more of trees, including large, fire-resistant trees.

By carefully thinning the understory of some forests to reduce fuel load, we can safely reintroduce fire as a restorative process.

[Graphics courtesy of The Nature Conservancy]