CALIFORNIA FIRE SCIENCE CONSORTIUM

Research Brief for Resource Managers

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California wildland fires burning mostly in non-forests

Calhoun, K. L., M. Chapman, C. Tubbesing. A., McInturf., K. M. Gaynor, A. Van Scoyoc, C. E. Wilkinson, P. Parker-Shames, D. Kurz, J. Brashares. 2021. Spatial overlap of wildfire and biodiversity highlights gap in non-conifer research and management. Diversity and Distributions. DOI: https://doi.org/10.1111/ddi.13394

As California's devastating wildfires continue to break annual records and make global headlines, much of the political and scientific discussion of these fires continues to revolve around forest management. These discussions often overlook one key fact: most of California's recent wildfires burn **outside** of forests and forest management is just one piece of a very large, very nuanced problem. Additionally, these non-forest fires may hold even greater implications for native fauna, native flora, and human livelihoods. To take a closer look at the nuance underneath the distribution of wildfire in California, these authors overlapped wildfire perimeters with broad ecosystem type categories, areas of high biodiversity concern, and the Wildland Urban Interface (WUI) across California.

To begin, the authors collected fire perimeter data via CAL FIRE for all fires larger than 300 acres that burned in California between 2000-2020. These fire perimeter data were then overlapped with 4 broad land cover categories (CAL FIRE FRAP) to take a closer look at wildfire composition in the last 20 years. The authors found that nearly 68% of the total acreage burned in California burned outside of conifer forest, with the most area burned in shrubland ecosystems (38%).

Management Implications

- Over the last 20 years, most wildfires in California have burned in non-conifer ecosystems (64% of the acreage)
- In contrast, only 30% of the academic literature and 43% of news media from the last 20 years focuses on non-forest wildfire in California
- Non-conifer systems that are burning (i.e. shrubland and hardwood) harbor high levels of biodiversity, and we need more research to understand how changes in local fire regimes may impact conservation
- Areas within the Wildland-Urban Interface (WUI) burned most often in shrubland and hardwood systems

In sharp contrast, only 30% of the academic literature and 43% of the news media from the last 20 years focused on non-forest wildfire in California. This mismatch may highlight the need for more research and time given to these non-forest ecosystems that are also burning prevalently.

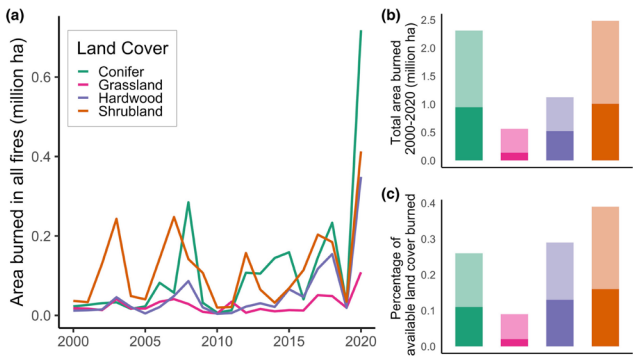
The authors then overlapped these fire perimeters with areas of high biodiversity value (CDFW Areas of Conservation Emphasis) across 5 terrestrial taxonomic groups. This allowed them to examine the potential effects of escalating fires on fauna and flora across ecosystem types. The

authors found that both forested and non-forested regions of high biodiversity value have burned in the last 20 years. In particular, shrublands and hardwoods harbor high levels of biodiversity. Given the value of high biodiversity, we need more research to understand how escalating wildfires may affect the conservation of species in such ecosystems.

Finally, the authors overlapped fire perimeters with WUI areas. WUI areas are anticipated to burn more frequently and have higher costs to human livelihoods. The authors found that of the burned WUI, hardwood and shrubland areas burned a greater amount than forested conifer ecosystems.

Wildfires in California burn across a broad diversity of land cover types with different implications for each unique ecosystem. Therefore, our strategies for dealing with wildfire need to be equally diverse and match this nuance. Most importantly, more funding, research, and time spent learning about non-conifer system fires will benefit our ability to better manage future fire seasons in California.

Figure 1 (*below)* - Breakdown of land cover types burned in California from 2000 to 2020. Panel "a" displays the total yearly area burned by all wildfires in million hectares across each land cover type from 2000 to 2020. Panel "b" displays the total summed burned area (2000–2020) for each land cover category. Light shading displays the total area burned by all wildfires, while dark shading displays the total area burned by megafires in each land cover category (bars are not additive). Panel "c" displays the percentage of each land cover category's total available area that burned during our study period (2000–2020). Light shading displays the percentage of all available land cover that was burned by all fires from 2000 to 2020; dark shading displays what percentage of all available land cover was burned by megafires from 2000–2020.



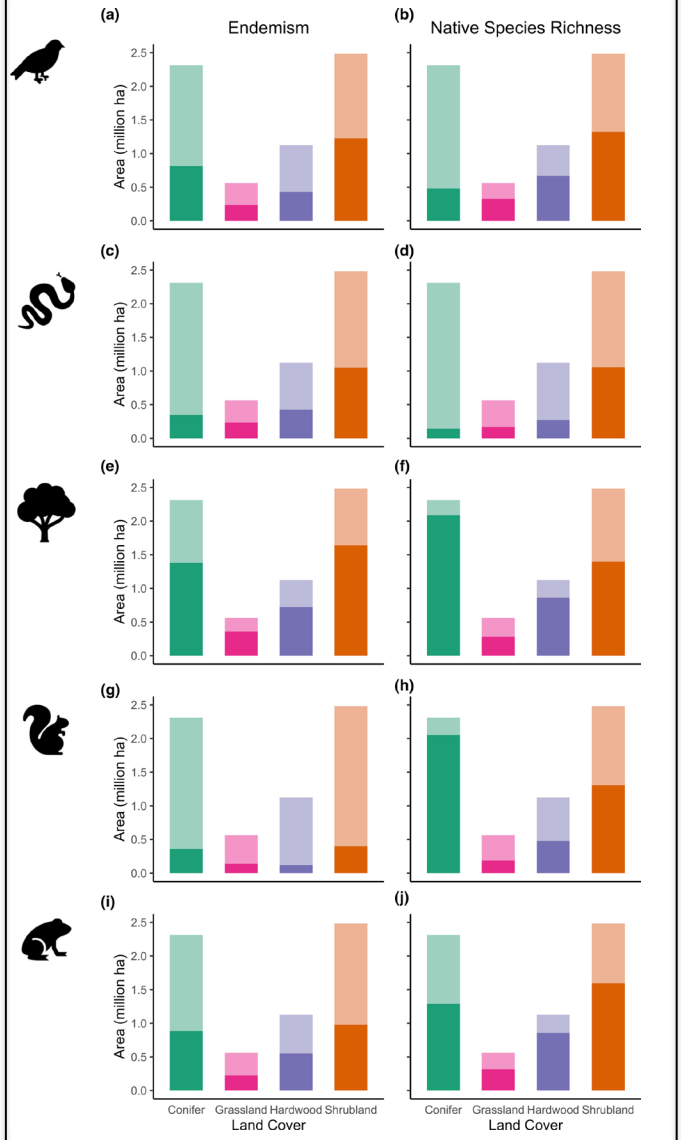


Figure 2 (*above*) - Total area burned by all wildfires (2000–2020) in areas of high biodiversity and endemism across land cover classes in California. Regions that contained at least one endemic species were identified as regions with species endemism. In both richness and endemism plots, light shading displays the total area burned in each land cover type (2000–2020) while dark shading displays the total area burned in areas of high species richness and endemism. The burned area of these identified regions is displayed in Figure 2a,b for birds, Figure 2c,d for reptiles, Figure 2e,f for plants, Figure 2g,h for mammals and Figure 2i,j for amphibians.