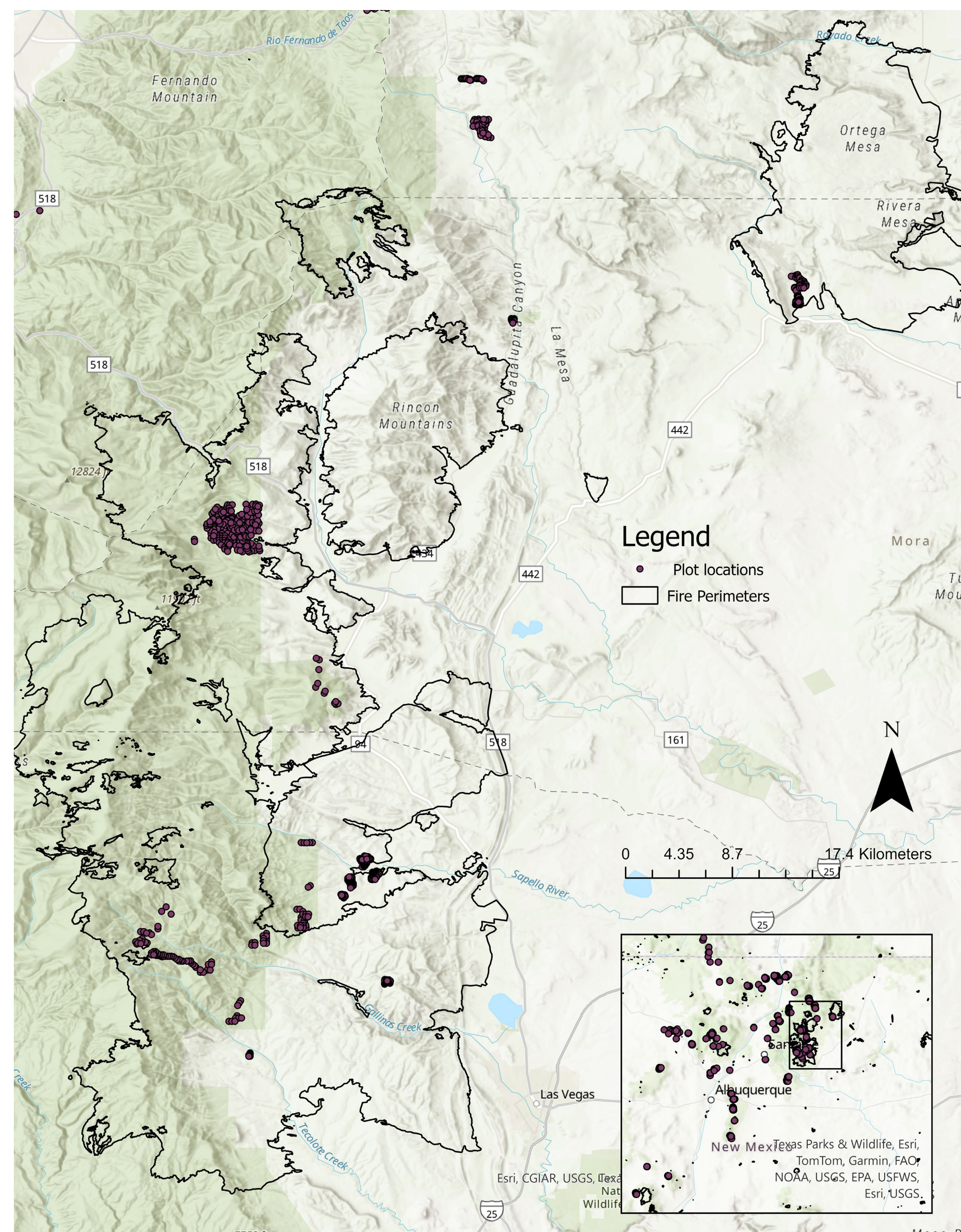


## Background

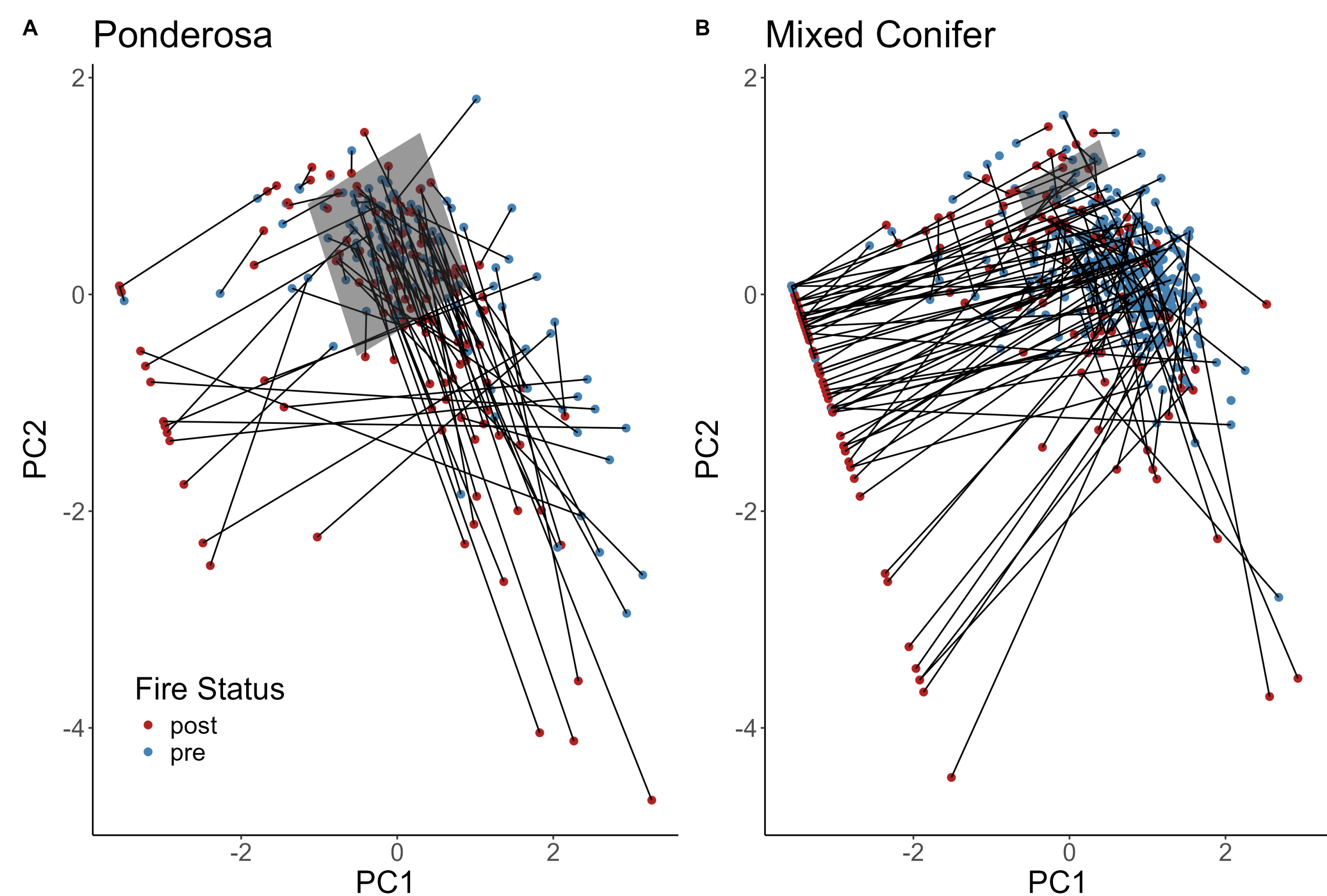
- Fire suppression has led to a buildup of fuels on the landscape, which contributes to an increase in catastrophic wildfires<sup>1</sup>.
- Forest restoration and fuel reduction treatments seek to reduce the load of fuel on the landscape to promote a historical, low-severity fire regime<sup>2</sup>.
- One approach to setting targets for restoration has been to emulate historical conditions that existed when forests burned frequently at low severity, though it is unclear if, in the modern climate, these prescriptions produce desired outcomes<sup>3</sup>.

## Methods

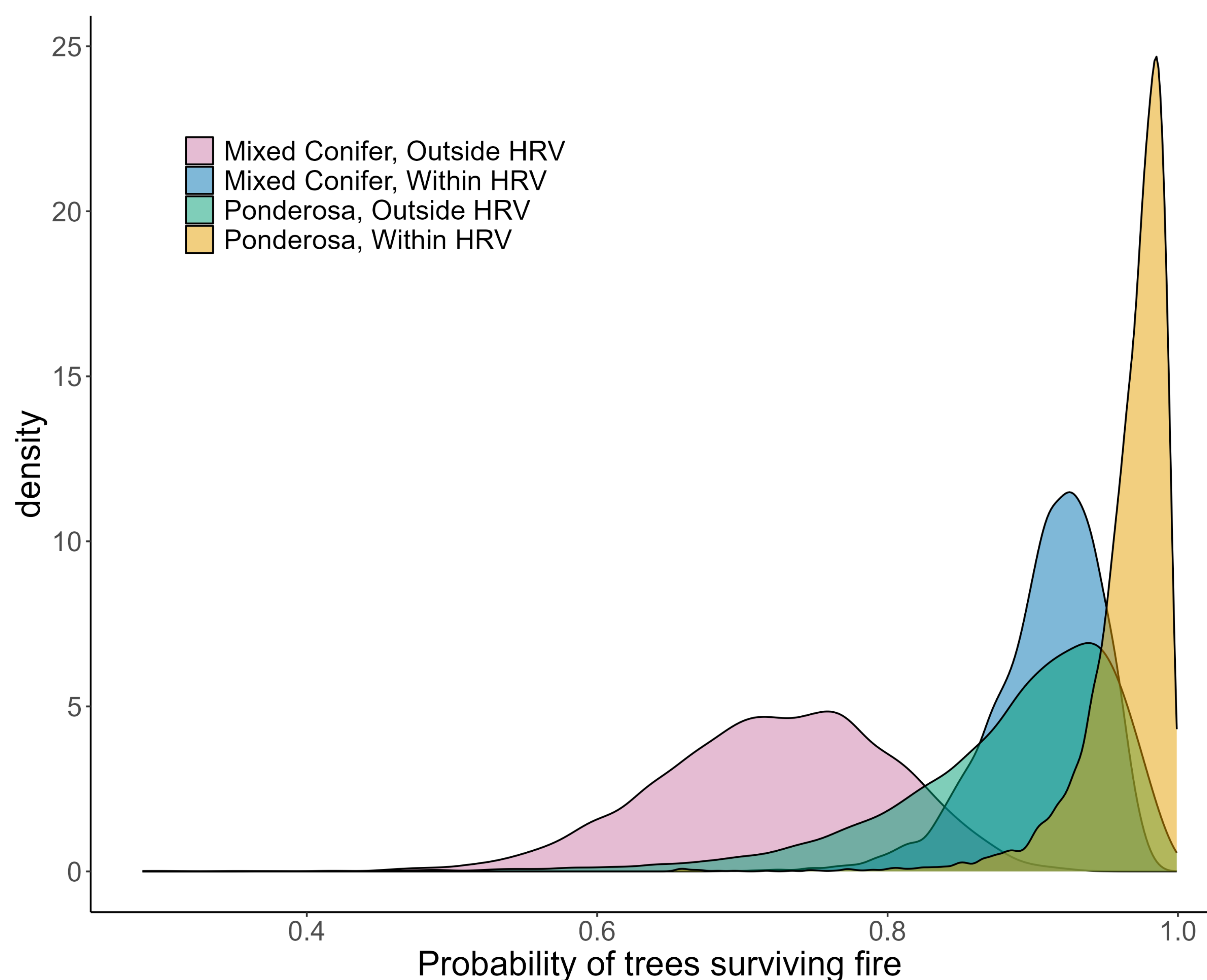
- We used plot-level forest structure data from >350 plots to evaluate whether forest structural conditions fell within the historic range of variability (HRV) before the wildfire (GTR 310<sup>3</sup>) based on trees per acre, basal area, and canopy openness (Figure 1).
- We evaluated whether plots that were within the HRV before the fire were more likely to have surviving trees after the fire, which should promote resilience.



**Figure 1.** Map of study plots. Plots were part of planned or implemented fuel reduction treatments and burned in either the Hermits Peak Calf Canyon, or Cook's Peak wildfires in 2022.



**Figure 2.** Ordination of plot-level data for Ponderosa and Mixed Conifer plots based on trees per acre (TPA), basal area, and canopy openness. Plots from before and after the fire are joined by lines, and fire status is indicated by color. The historic range of variability is represented by the gray shading.



**Figure 3.** Probability of plots having surviving trees after a fire (>20 trees per acre (TPA) and basal area per acre >22), based on whether the pre-fire plot conditions were within the historic range of variability (HRV) based on GTR 310 and plot-level TPA, basal area, and canopy openness.

## Hypothesis

Plots with structural conditions within the historical range of variability will be more likely to have trees survive the wildfire.

## Results

- 50% of the Ponderosa plots and 38% of the mixed conifer plots had conditions that fell within the HRV before the wildfires (Figure 2).
- 11% of the Ponderosa plots and 35% of the Mixed Conifer plots experienced total mortality due to the wildfire.
- Mixed Conifer plots that fell within the HRV before the fire were likely to have surviving trees (95% CI: 0.82-0.97), while Mixed Conifer plots outside of these conditions were less likely to have surviving trees (95% CI: 0.56-0.86, Figure 3).
- The difference between Ponderosa sites within and outside of the HRV was less distinct (within HRV 95% CI: 0.88-0.99 vs. outside HRV 95% CI: 0.67-0.98, Figure 3), with somewhat higher likelihoods in both categories than the mixed conifer plots.

## Conclusions

- Plots with conditions within the historic range of variability were somewhat more likely to have trees survive the wildfires.
- Ponderosa plots were more likely to have surviving trees than the mixed conifer plots.
- Surviving trees on a plot should promote resilience, as dispersal distance can be a significant factor limiting the return of forests<sup>4</sup>.
- Future analysis will explore the broader range of conditions that promote post-fire tree survival, including ladder and surface fuels.

## Acknowledgements

This work has been supported by the long-term data collection of the Ecological Monitoring Program at the New Mexico Forest and Watershed Restoration Institute and their amazing field crews. Additionally, Corey Beinhart was instrumental for organizing and quality controlling this dataset. Funding was provided through the state of New Mexico. Additional funding has come from: both the Southwest Regional Office and the Washington Office Enterprise Program-Integrated Resource Enterprise Unit of the USDA-Forest Services.

### Citations:

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