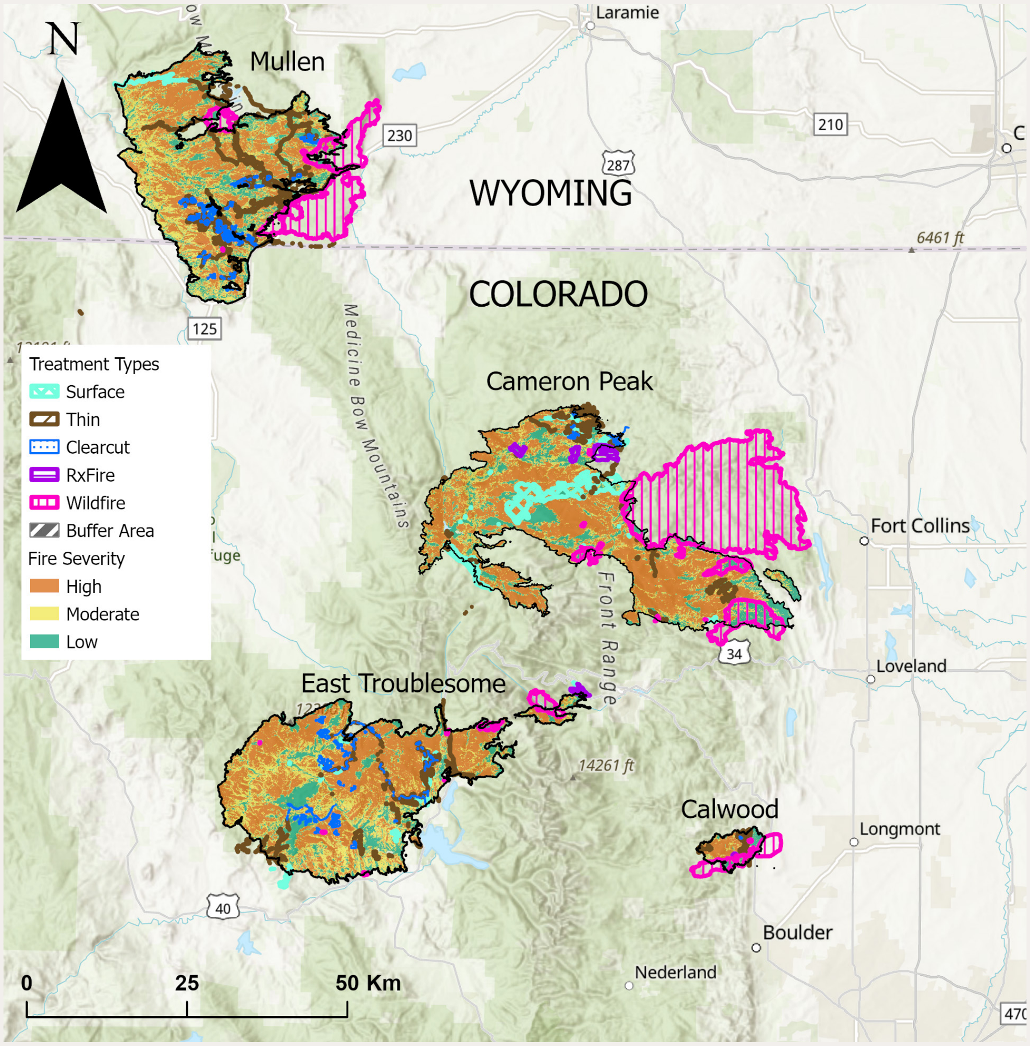
Extreme Colorado 2020 Fires:

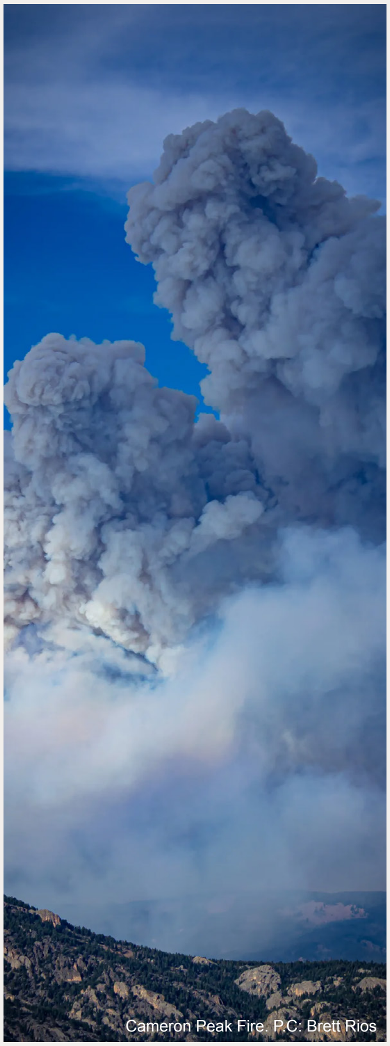
Treatments Altered Remotely Sensed Fire Severity Across Forest Types and Days of Burning

Background

The 2020 fire season in the western United States was among the most extreme on record. In Colorado, four large fires, the Cameron Peak, East Troublesome, Mullen, and Calwood, collectively burned over 588,000 acres, destroyed 1,141 structures, incurred more than $191 million in damages, and degraded air quality for millions of residents. Within these fire perimeters, approximately 10,000 hectares had previously been treated through thinning, prescribed fire, or clearcuts, or had previously burned in wildfires. Driven by severe drought and high winds, the 2020 fires burned under sometimes extreme conditions, providing an opportunity to study how past forest management actions may have influenced fire behavior.

This study looked at how past forest treatments and previous wildfires were related to how severely the 2020 fires burned across different forest types and weather conditions. We focused on whether treatments made a difference in fire severity, and how factors like terrain, climate, weather, and forest type influenced those relationships.

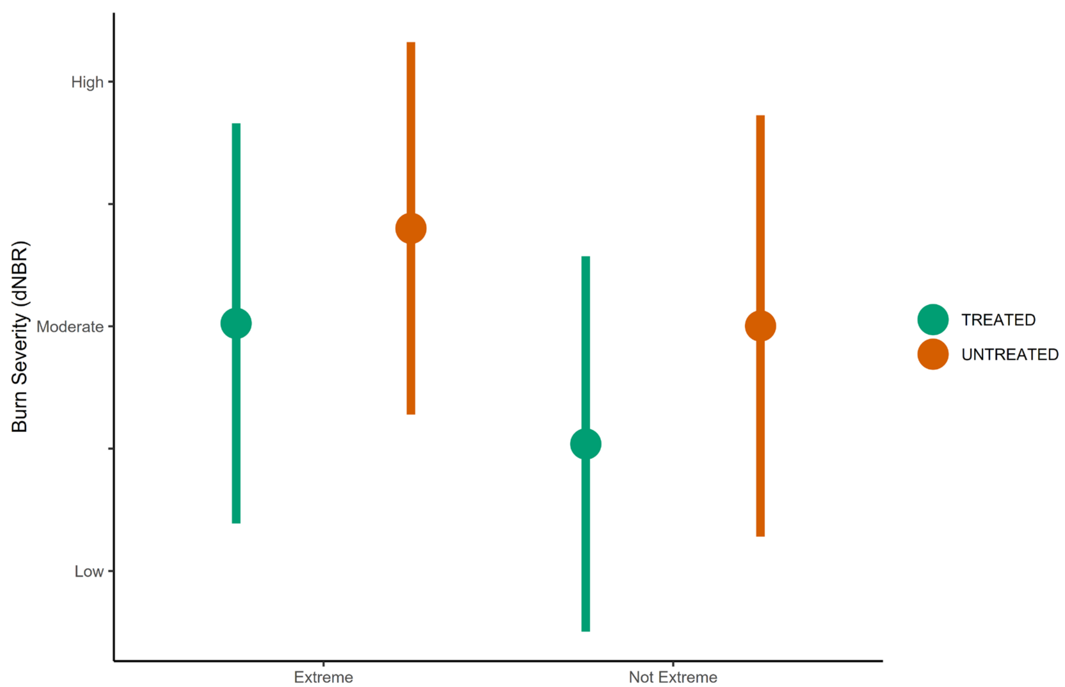




Key Findings

- Fuel treatments, including mechanical thinning, prescribed fire, and clearcuts, along with prior wildfires, were associated with reductions in burn severity across all forest types
- Prescribed fire was associated with the greatest reduction in burn severity
- Treatments in ponderosa pine showed the largest reductions in burn severity
- Mixed conifer and lodgepole pine forests, which are less fire-resistant and naturally prone to high-severity fires, experienced smaller but still meaningful reductions in burn severity

Fire weather also played a role in how treatments influenced burn severity. On days with extreme fire weather, both treated and untreated areas experienced more severe burning. However, treated areas consistently burned less severely than untreated areas.



Fuel treatments reduced burn severity compared to untreated areas, but under the most extreme fire weather treated areas burned similar to untreated areas on less extreme weather days.

To read the paper:

Stevens-Rumann, C.S., Mueller, S.E., Newton, K., and Van Dusen, H. Extreme Colorado 2020 fires: remotely sensed burn severity influenced by treatments, forest types and days of burning. (2025). Canadian Journal of Forest Research. https://doi.org/10.1139/cjfr-2024-0329.

Management Implications

Fuel treatments are moderating wildfire severity and supporting forest resilience, even under extreme fire conditions. Treatment influence depends on forest type, weather, and prior fire history. However, treatments currently cover only a small fraction of the landscape, ranging from 3 to 13 percent of these 2020 fires, highlighting the importance of increasing the pace and scaling up treatments. Across these fires, prescribed fire showed the greatest reductions in burn severity, and ponderosa pine forests benefited the most. However, high-elevation forests, such as lodgepole pine and spruce-fir, present unique management challenges because conventional treatments may not be ecologically appropriate. Overall, treatments need to be strategic and ecologically based to maintain the natural disturbance dynamics of these systems while protecting life, safety, and other human values from extreme fire behavior.

Authors: Camille Stevens-Rumann, Stephanie Mueller, Kelsey Newton, Hannah Van Dusen
Colorado Forest Restoration Institute

Contact: C.Stevens-Rumann@colostate.edu

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