

# A Path Forward: Understanding How Forest Management Mitigates Wildfires

## The Issue

The increasing prevalence of wildfires impacting forest lands and adjacent communities has resulted in historic investment in fuels reduction and forest vegetation treatments, especially in the western US. These treatments primarily include tree and brush removal and thinning, and prescribed fire. Treatments vary in objectives, size, tree spatial location/arrangement, and intensity. With so much variation, there is both need and opportunity to refine how fuel reduction treatments are assessed and evaluated. The state of knowledge about fuel reduction effects is rapidly evolving. Current limitations to our knowledge include:

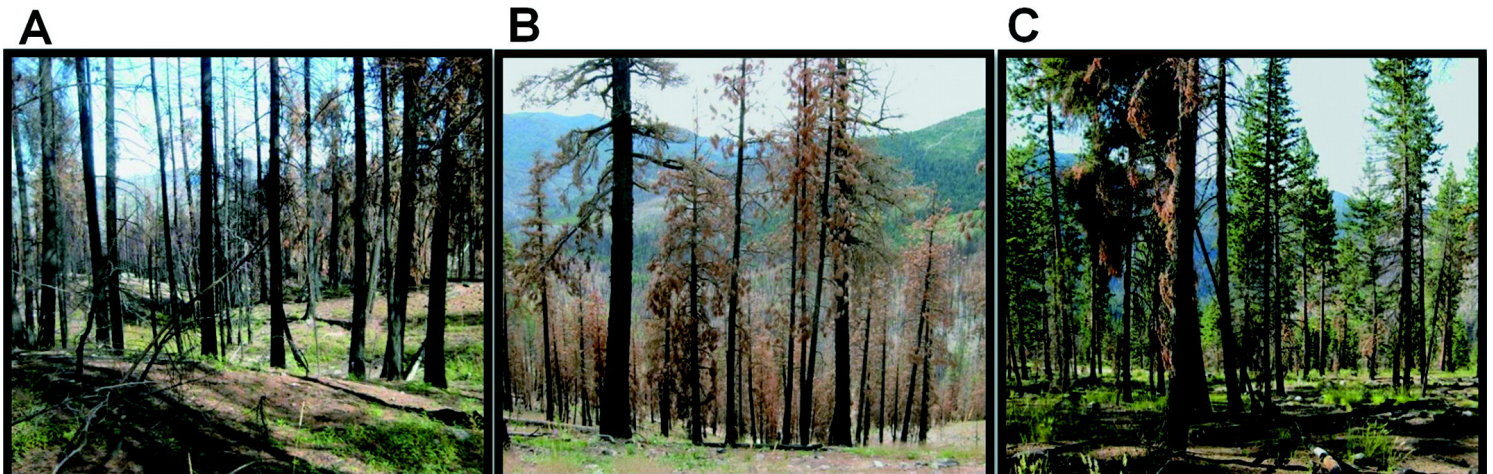
- **Scientific research on fuel treatment effectiveness has generally focused on a narrow set of metrics**, such as rate of spread, fire size, fireline intensity, and burn severity, with less known about impacts to wildlife and water quality and quantity. These metrics are not always clearly linked to treatment objectives.
- **Forest restoration and fuels treatment objectives are often stated in broad, vague terms (e.g., "watershed health"). However, there are many possible definitions of effectiveness.** We identified and defined human interaction, fire behavior, and ecological metrics of treatment effects on fire (See tables in full paper)
- **Many unknowns exist about how wildfires and fuel treatments interact across different conditions.** Research tends to focus on investigating fuel treatments intersected by large wildfires that burned under extreme conditions, thereby

missing fuel treatment interactions that may have burned in more moderate weather conditions.

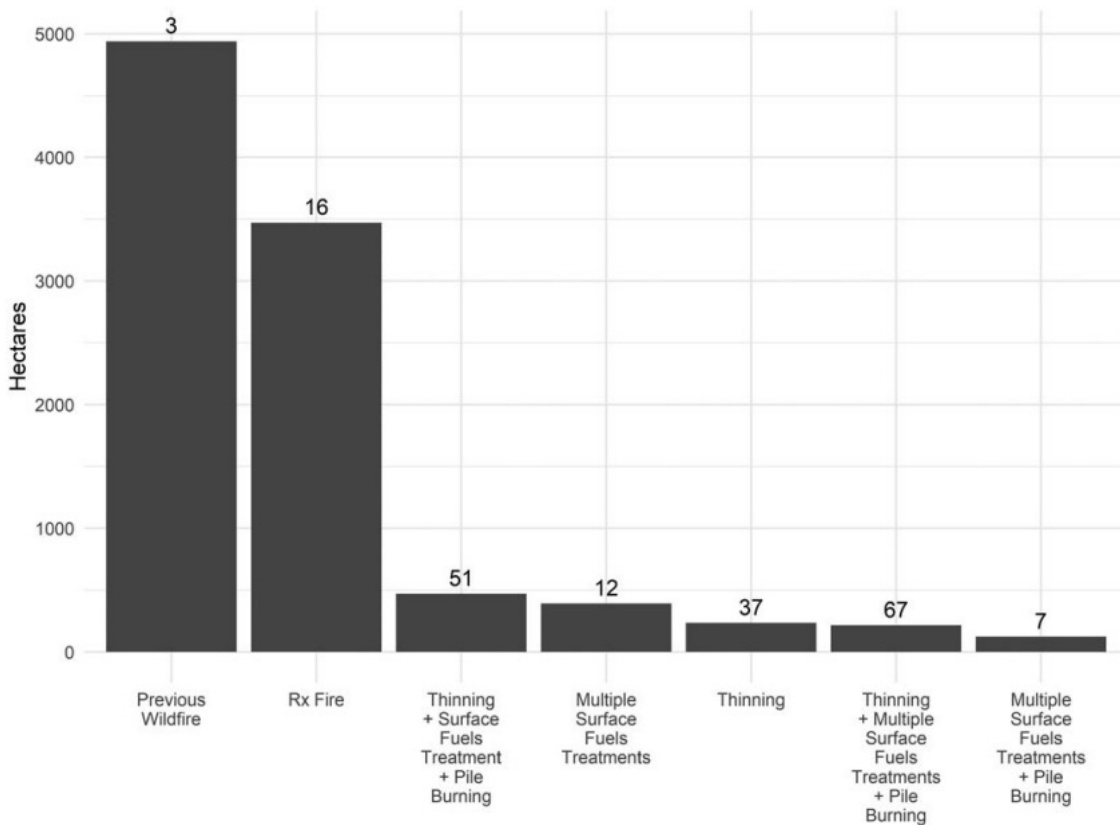
- **Data issues hinder treatment effectiveness assessments.** There is often a lack of data regarding treatment design and implementation specifications, the conditions under which wildfires interact with treatments, and if/how these treatments were utilized by incident responders during wildfires.

## Policy Implications

- **Treatments are often funded, designed, and implemented with many objectives in mind, not just fire-related objectives.** Guidance, training, and key performance indicators are needed for local area managers to clearly distinguish and describe fire-related objectives, and the conditions under which those objectives are expected to be achieved, so that treatment effectiveness can be evaluated directly against those objectives.
- **Cultivating social awareness, understanding, and consent for fuels treatments across local communities is essential when designing, implementing, and evaluating treatments.** Local community-connected partners and collaborative, cross-boundary organizations are critical to this endeavor. Trust can be maintained through clear communication of the intent, limitations, and range of outcomes of fuels treatments.



Burned areas that were previously untreated (A), thinned only (B), and thinned and prescribed fire (C) in Washington State (Prichard et al. 2010)



Wildfires and treatments that were within the largest fire in CO history—the Cameron Peak Fire. The number at the top of each bar indicates the number of fires/treatments while the size of the bars indicate the amount of area treated. Wildfires are altering/“treating” more of the landscape than all other treatments combined, and this trend is likely to continue.

- **Guidance, resources, and training are needed to improve treatment databases.** Detailed attribution of pre-treatment conditions, treatment objectives, and prescriptions can help managers conduct regular updates and standardize data input across agencies. Such data can be more readily used during wildfires by firefighters, and effects can be more accurately measured and evaluated.
- **Total acres treated is an insufficient metric of treatment effectiveness relative to wildfires.** Small, strategically designed and located fuel reduction projects may be very effective at achieving certain wildfire objectives. Conversely, even in areas with many treatments, large wind-driven wildfires can dwarf treatments.
- **The most effective treatments across many metrics include the application of fire.** Either prescribed fire or use of natural ignitions under less extreme conditions are most likely to be successful in mitigating severe wildfire effects.
- **Treatments designed and implemented to be effective against yesterday’s wildfire may not be so for tomorrow’s wildfire.** Climatic changes are impacting the conditions under which fuel treatments can be expected to be effective, and altering the longevity and recovery trajectories of burned landscapes. Guidance, resources, and training is needed for managers to plan and implement fuel treatments with climate adaptation and post-fire recovery objectives in mind. This represents a change in how fuel treatments have traditionally been planned and implemented.

Read the full paper: AG Vorster, C Stevens-Rumann, N Young, B Woodward, C Tsz Hin Choi, ME Chambers, AS Cheng, M Caggiano, C Schultz, M Thompson, M Greiner, G Aplet, RN Addington, MA Battaglia, D Bowker, E Bucholz, B Buma, P Evangelista, D Huffman, S Mueller, C Rhoades, WH Romme, AJ Sánchez Meador, WT Tinkham, M Tuten, A West Fordham. (2024). Metrics and Considerations for Evaluating How Forest Treatments Alter Wildfire Behavior and Effects. *Journal of Forestry*, 122(1), 13-30. <https://doi.org/10.1093/jofore/fvado36>



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Colorado State University | New Mexico Highlands University | Northern Arizona University



Authors: Camille Stevens-Rumann<sup>1</sup>, Anthony G. Vorster<sup>2</sup>, Antony S. Cheng<sup>1</sup>, and Marin E. Chambers<sup>1</sup>

1. Colorado Forest Restoration Institute, Department of Forest Rangeland Stewardship, Colorado State University, Fort Collins, CO  
2. Natural Resource Ecology Laboratory, Ecosystem Science and Sustainability, Colorado State University, Fort Collins, CO

Contact: [c.stevens-rumann@colostate.edu](mailto:c.stevens-rumann@colostate.edu)

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