



The Right Work in the Right Places: Prioritizing Fuels Reduction to Protect Water Supplies

Introduction

Larger and more severe wildfires in the western U.S. increase the likelihood and magnitude of post-fire runoff, erosion, and debris flow that impact critical municipal water supplies. After the Buffalo Creek and Hayman fires, Denver Water spent \$27.7 million on watershed rehabilitation activities and to dredge 228,000 cubic yards of sediment from Strontia Springs Reservoir. In response to such expenditures, communities have partnered with federal and state agencies to proactively reduce fuels in their municipal watersheds. However, public land management agencies and private ecosystem service programs struggle to quantify treatment benefits and prioritize treatment placement in order to maximize the impact of limited fuels treatment opportunities.

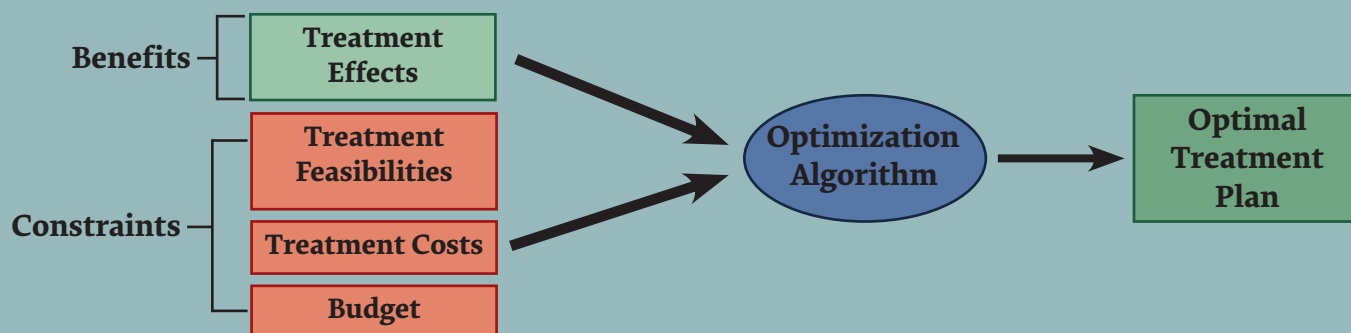
To meet these needs, the Colorado Forest Restoration Institute (CFRI) and partners developed a **Risk Assessment & Decision Support (RADS)** framework that uses **science-based methods to prioritize fuels treatments to maximize return on investment**. Our work with the Peaks to People Water Fund on the Cache la Poudre and Big Thompson River watersheds demonstrates an evidence-based approach for reducing wildfire risk to water supplies by applying the right treatments in the right places at the right scale.

Key Findings from our Case Study

- **Wildfire risk to water supplies can be meaningfully reduced by strategically treating a small portion of large watersheds.** Treatments should focus on forests prone to burning at high severity on erosion prone terrain with high connectivity to water supplies.
- **Thinning followed by prescribed fire is the most effective risk reduction treatment, but prescribed fire alone is the most cost-effective treatment.** Treating fuels on steep slopes achieves more risk reduction per dollar spent than treating fuels on gentle terrain.
- Due primarily to the low probability of a wildfire encountering a fuel treatment, **proactive fuels reduction is not expected to yield a positive return on investment when the only benefit considered is avoided sediment impacts to municipal water supplies, and the only investor is the water utility.** To improve the return on investment, public and private stakeholders concerned with other objectives such as wildlife habitat, ecological restoration, recreation, and safety need to invest where values overlap to prioritize and fund fuel treatments that meet multiple objectives.

Methods

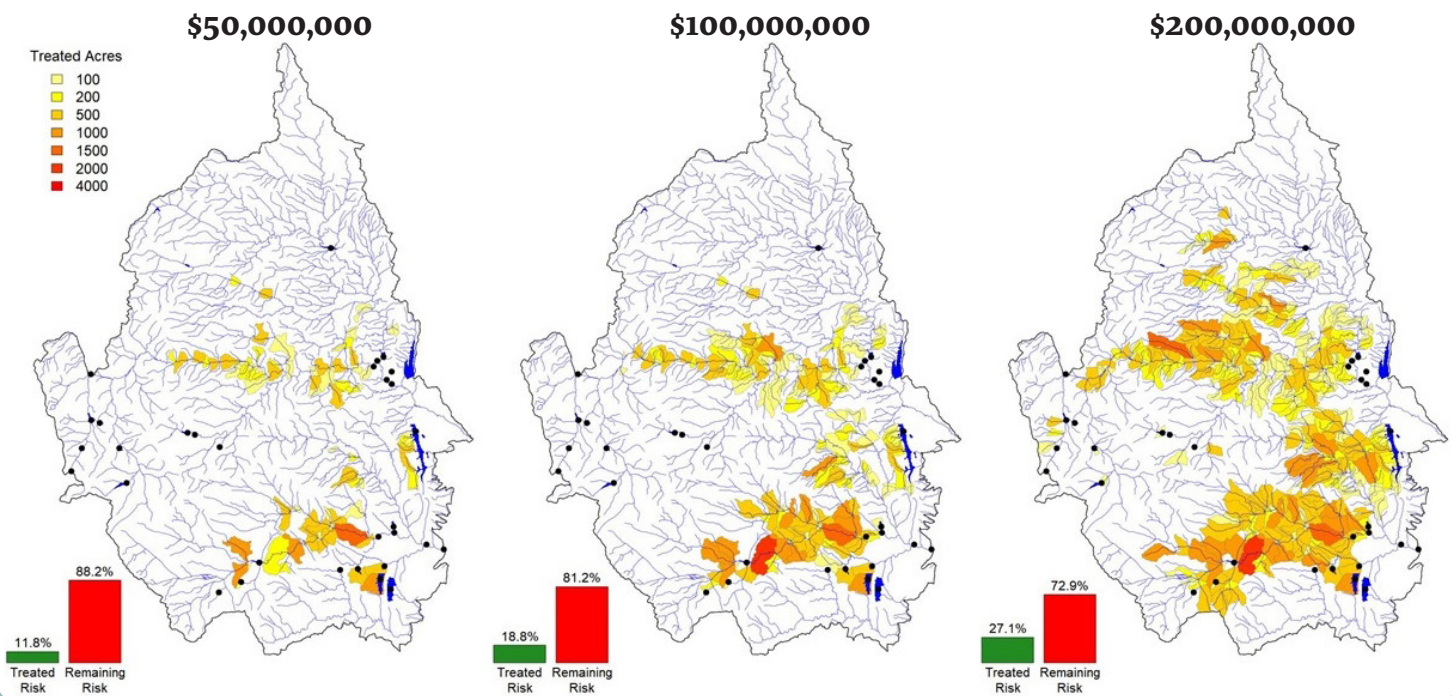
RADS uses quantitative risk assessment to value fuel treatment benefits. It then optimizes the type and location of treatments while accounting for feasibility and budget constraints.



Prioritizing Treatments

Because of the high cost of forest management and immense size of some municipal watersheds, prioritizing the type and location of fuels reduction treatments is critical. RADS uses information on fuel treatment risk reduction, feasibility, and cost to identify the most effective fuel treatment types and locations to reduce wildfire risk to water supplies. In the Cache la Poudre and Big Thompson River watersheds we found that **wildfire risk to water supplies can be meaningfully reduced by treating fuels on less than 10% of the total watershed area.** We also found that treatments should be prioritized on erosion prone slopes near high value reservoirs and stream channels rather than distant uplands.

Optimal Treatment Plans for Various Investment Levels



Future Directions

For this assessment, we narrowly constrained our definition of “watershed risk” as the expected sediment impact costs to water supplies. However, wildfire impacts many more resources beyond water, and fuel treatments can bring additional benefits beyond fire mitigation.

The framework of CFRI’s Risk Assessment and Decision Support tool can be expanded to other valued resources, including recreation, ecological restoration, wildlife habitat, aesthetics, and WUI infrastructure. Expanding the assessment to other resources will help identify where treatments should be placed to benefit multiple resources and improve the overall return on investment from fuel treatment.

Read the Paper:

Gannon BM, Wei Y, MacDonald LH, Kampf SK, Jones KW, Cannon JB, Wolk BH, Cheng AS, Addington RN, Thompson MP (2019) Prioritising fuels reduction for water supply protection. *International Journal of Wildland Fire*. DOI: <https://doi.org/10.1071/WF18182>

