JFSP Final Report Summary

Project #: 13-1-03-12

Title: Evaluating spatiotemporal tradeoffs under alternative fuel management and suppression policies: measuring returns on investment

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Objectives:
To comprehensively analyze spatiotemporal economic tradeoffs under alternative fuel management and suppression policies on several real-world landscapes.

Workflow objectives:

- Perform a comprehensive analysis of existing literature on approaches to estimating the influence of fuel treatments on suppression costs
- Design spatial fuel treatment strategies to incorporate landscape features that provide control opportunities that are relevant to fire operations
- Demonstrate a proof-of-concept modeling approach for approximating alternative suppression strategies
- Quantify the frequency and magnitude of fire-treatment and fire-fire encounters, and how they vary with alternative fuels management and suppression strategies, respectively
- Explore the extent to which near-term feedbacks from fire-fire encounters might produce self-limitation in burned area under different suppression strategies

Proposed deliverables:
Workshops
Peer-reviewed literature
Conference presentations
Fact sheet

Status of data collection and analysis
Complete

Status of deliverables/findings
Complete

Status of metadata/datasets
N/A

Notes/interesting findings

Findings from synthesis

- To account for the inherent uncertainty of when and where wildfires will occur, evaluations of return on fuel treatment investments must use a spatial, risk-based framework.

- The relative rarity of large wildfire on any given point on the landscape and the commensurate low likelihood of any given area burning in any given year suggest a need for large-scale fuel treatments, if they are to have an impact on wildfire effects. Thus, in order to save large amounts of money on fire suppression, land managers may need to spend large amounts of money on large-scale fuel treatments.

Findings from simulations

- In the Sierra National Forest investments in fuels treatments reduced burn probability in a linear fashion, with about 3% reduction with a $10 million investment and a 12% reduction for a $40 million investment.

- Reductions in burn probability were evident beyond the treated areas, but as distance from treatment increased, the mean percent reduction in burn probability rapidly decreased. Beyond 2 km from treatment boundaries, reductions in burn probability were negligible.

- The probability of wildfire encountering fuel treatments was relatively low. At the highest budget level, 42% of the fire seasons have at least one fire-treatment encounter, but mean treated area burned is only 85.6 ha. However, the magnitude of reductions in annual area burned that resulted from fire-treatment encounters were roughly an order of magnitude larger than annual treated area burned.

- Across all treatment scenarios, suppression cost savings for large fires were of sufficient magnitude to offset treatment costs across all simulated fire seasons. The payback period ranged from 11 to 14 years, which roughly aligns with the effective duration of fuel treatments.

- Leverage metrics for risk reduction were better. One unit of risk reduction within treated areas yielded more than one unit of risk reduction across the landscape. This indicates that reducing burn probabilities and flame lengths both within and outside of treated areas, results in reduced loss or possibly benefits to highly valued resources and assets across the landscape.

Future work:

- Modeling additional treatments and retreatments over time to significantly expand the footprint of treated areas may tell a more complete picture of dynamics between treatment scale and fire-treatment interactions.

- The joint design and creation of optimal potential wildland fire operation delineations to create or enhance possible control locations and prioritizing treatments to create or enhance possible control locations is an avenue ripe for future work.

- The advanced modeling framework can be used to evaluate the possibly synergistic effects of alternative fuel strategies and suppression responses, including not only stopping rules but also

starting rules based on factors like seasonality and location, approximating the “go/no-go” decisions around initial response to ignitions.

- There is a need for empirical information on actual fuels and fire management outside of the modeling domain, including how fuel treatments influence fire management decisions, tactics and outcomes.

Final recommendation

Project is complete