RESEARCH BRIEF

Exploring Interacting Effects of Forest Restoration on Wildfire Risk, Hydropower, and Environmental Flows

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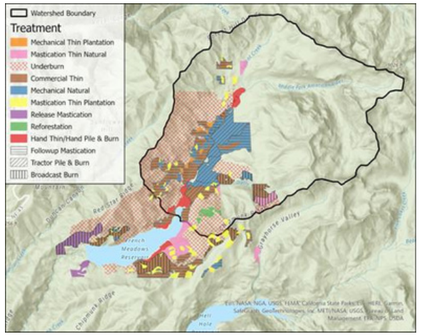
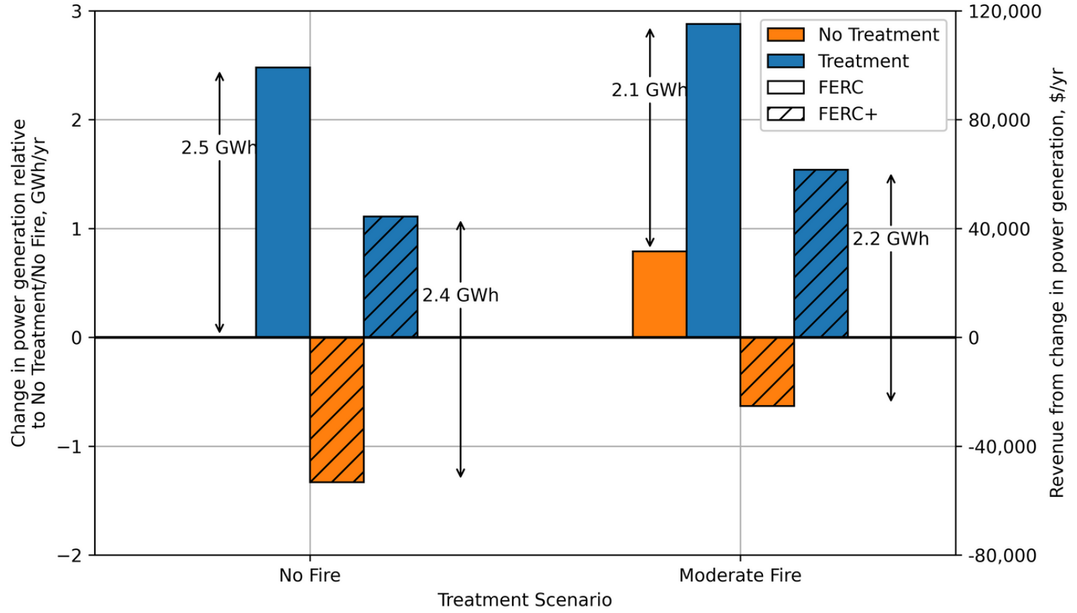
Research Summary

- Enhanced water supply from forest treatments could generate enough hydropower revenue to cover between 8.2 and 15.8% of restoration costs
- Forest treatment enhances water supply when coupled with moderate fire, but mitigates the damage to vegetation from severe fire
- Treatment also has the potential to more than offset reductions in hydropower from enhanced environmental flow requirements
- Including localized operational and regulatory constraints can be critical when valuing forest management co-benefits



The Challenge

In some places, fuels reduction and wildfires can positively impact water supply by increasing the volume of water available for hydropower production. However, the value of that water is uncertain, because local watershed characteristics, reservoir and turbine size, and environmental flow requirements may all change when and to what extent the additional water is available for energy generation. Better understanding the true value of this co-benefit can help increase the confidence of hydropower utilities to invest in forest management.



Co-benefit of Restoration:

Water for Hydropower Production

This study focused on the French Meadows Restoration Project in the headwaters of the American River in the California Sierra Nevada. The study found that the value of hydropower generation from enhanced water supply could cover between 8.2 and 15.8% of forest treatment costs, depending on the presence and severity of wildfire on the landscape, the discount rate, and how fast vegetation regrows after treatment. (GWh is gigawatt-hours, a measure of energy generation).

In addition, the study found that treatment is sufficient to more than offset a loss in energy production if more stringent environmental flow requirements (FERC+) were enacted by the Federal Energy Regulatory Commission, mitigating the trade-off between hydropower production, a relatively low-carbon energy source, and habitat protection.

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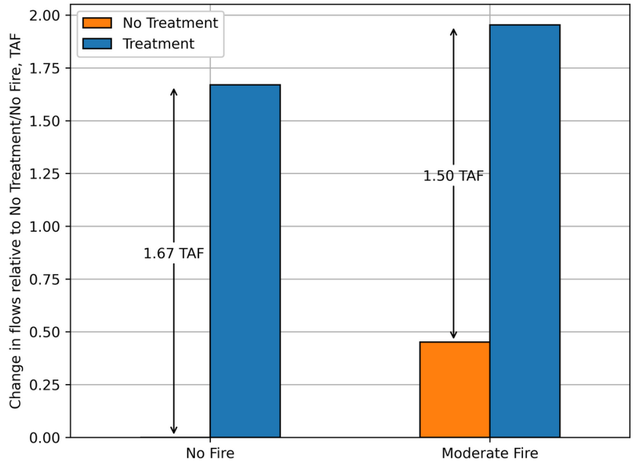
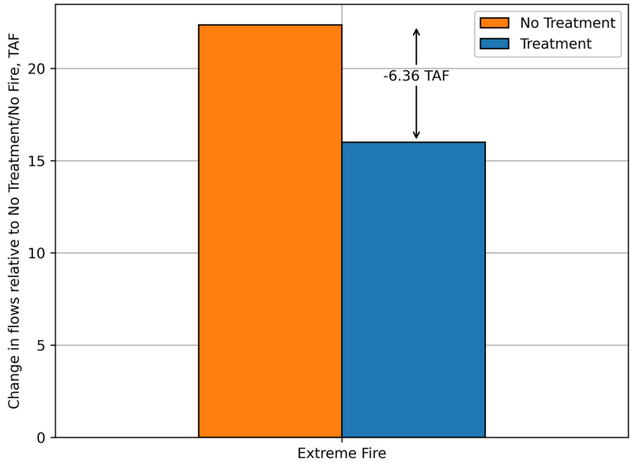
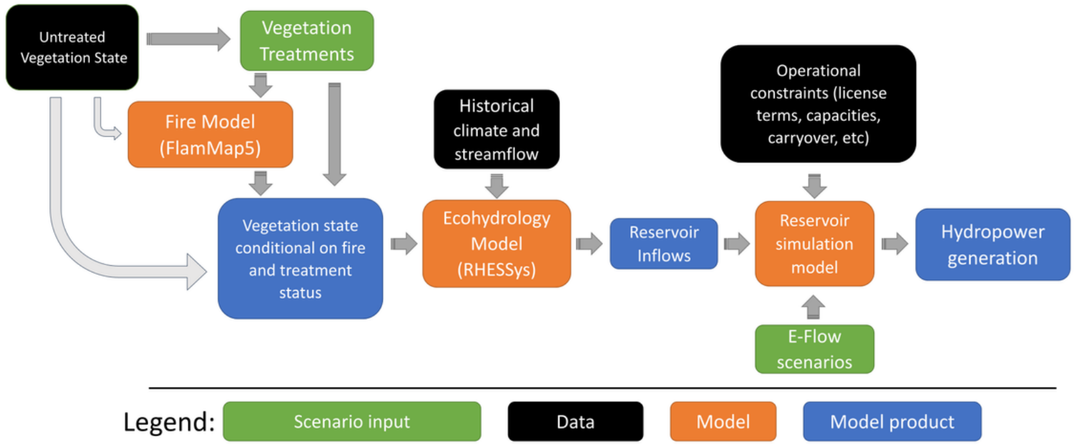
Supporting Ecosystem Resilience

The models in this study showed that forest management treatment enhanced water supply benefits when coupled with moderate wildfire, but mitigated vegetation loss and water runoff when coupled with extreme wildfire. This demonstrates the benefits of treatment even in cases of severe fire, which can have devastating impacts on water utilities by damaging water quality, increasing sedimentation, and changing runoff timing. (TAF is thousand acre-feet, a measure of water volume).







An Integrated Modeling Approach

A unique feature of this research was the integration of several different models to track the combined impacts of fuels reduction and wildfire on water supply and hydropower generation. The authors found that less explicit approaches to reservoir modeling can overestimate the value of additional water supply by between 11% and 74% depending on the scenario. These findings reinforce how critical Blue Forest's collaborative valuation process is: by co-creating value estimates with beneficiaries, Blue Forest can reduce the likelihood that these estimates diverge significantly from reality, even when detailed modeling is not available.

This research brief is based on the study Exploring Interacting Effects of Forest Restoration on Wildfire Risk, Hydropower, and Environmental Flows (https://doi.org/ 10.3390/su151511549) published in *Sustainability*.

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