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Abstract

Modelling Potential Control Locations: Development and Adoption of Data-Driven Analytics to Support Strategic and Tactical Wildfire Containment Decisions †

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Wildfire management has long been driven by a cadre of experienced professionals that rely heavily on their personal experience and judgement to determine the best available holding features to contain actively growing wildfires. In the western United States, the number of large high-severity wildfires has increased dramatically over the past decade, pushing the limits of the fire management system, and highlighting the need for more strategic, data-driven approaches to incident response. Here, we present work that builds from an original methods paper published in 2017 that outlines a gradient boosting approach to predict potential fire control locations.

Over the past four years, a series of significant model improvements, informed by its application on more than 200 large wildfires in the western USA, has led to the widespread adoption of the Potential Control Locations (PCL) model as an important decision support tool for large wildfire management and strategic fire planning across ownerships. With wall-to-wall models developed for most of the western United States, the PCL Atlas can be pre-positioned and easily shared among incident command teams, fuel and fire managers, line officers, and the public to communicate response options and intentions.

Here, we detail improvements to the updated model framework, assess its effectiveness as a decision support tool under a range of real-world applications, and outline future research directions to improve the accuracy of model projections. Specific ongoing research topics address improvements to generalized landscape-scale PCL models and the development of custom short-term PCL forecasts that account for variability in seasonal fuel loading, daily fire weather, and topographically driven fuel moisture gradients. We also address the underlying data infrastructure needed for PCL modeling and potential for international applications.

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Data Availability Statement: PCL, PODs, and fire data are available from the Risk Management Assistance sharepoint site at: https://wfmrda.nwcg.gov/rma.

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