



Research to Support Wicked Wildfire Challenges Presented to the Western Forestry Leadership Coalition

Challenges related to wildfire are increasing on landscapes across the United States. Researchers with the USDA Forest Service are working to develop and refine innovative tools and research to support managers who must adapt to extreme and uncertain conditions. The following sections – **Smoke, Fire Modeling, Risk Mitigation, and Fire Effects** – provide an overview of topics and resources presented at the Western Forestry Leadership Coalition fall meeting in November 2024.

Smoke

Smoke management and weather forecasting are critical to safely and successfully execute a prescribed burn. The Forest Service AirFire Team is developing new tools to make it easier for managers to evaluate weather and smoke impacts, from the planning stage to the day of the burn.

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[Prescribed Fire and Smoke Planner](#)



[Crisis Strategy Smoke Scheduler](#)



Fire Modeling

Researchers have developed a new wildland fire behavior model from advanced discoveries of combustion, heat transfer, and ignition processes gained from laboratory and field experiments. Implementing the new model will advance fire and fuels planning, firefighter training, and wildfire predictions.

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[High Resolution Wildfire Modeling](#)



[Convective Ignition Research](#)



Fire Modeling (continued)

[QUIC-Fire](#) is a new fire modeling framework designed to aid in prescribed fire planning by linking planned ignition pattern to fire behavior, smoke dispersion and fire effects.



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Risk Mitigation

A new risk-based analytical framework is helping us to measure outcomes from fuel treatment work on the Wildfire Crisis Strategy landscapes across the West. This framework builds on decades of research in modeling wildfire and evaluating risk, and it is being used to both inform strategic fuel treatment planning and track progress towards risk reduction objectives.

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[RiskMonitor At-a-Glance](#)

[Firescapes](#) are landscape types, defined in terms of the many social and ecological factors that shape how fire and its associated risks and benefits operate as a human-environment system. Firescape maps can provide decision support to forest managers and planners and help inform appropriate strategies to manage fire and associated risks.



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Fire Effects and Fuels

The severity of the 2022 Black ‘megafire’ in southwestern New Mexico was substantially reduced because of previous prescribed fire and wildfire managed for resource benefit. A recent review of over 40 case studies found that thinning coupled with prescribed burning can reduce future wildfire severity by more than 70%.

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[Fuel Treatment Meta Review](#)

The [Eastern Innovation Landscape Network](#) is an interagency team of scientists and prescribed fire practitioners who are innovating in the field of three-dimensional fuels and fire behavior models. An interactive experience with terrestrial LiDAR helps demonstrate how these technologies are moving us forward in fire science. Applications include stronger decision support for fuel treatments, prescribed fire, and habitat assessments.

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[Eastern Innovation Landscape Network](#)



[FastFuels: 3D Fuels](#)

