SCIENCE FOR DECISION MAKING

Western Fire & Forest Resilience Collaborative

The **Western Fire & Forest Resilience Collaborative** (WFFRC) is a multi-institution collaborative of researchers advancing breakthrough science on fire and forest resilience across Montana and the western U.S. Our scientists conduct field observations and experiments, develop models, and analyze remotely-sensed data to understand changing patterns in fire behavior, fire regimes, and ecosystem structure and function. We use these findings to explore the impacts of wildfire on people, water resources, and ecosystems. Our Collaborative strives to make our science actionable by engaging land managers, supporting research applications, and delivering practical, ready-to-use products that can address management challenges. Two examples are highlighted below, and our resources are constantly growing – including forthcoming modeling of live fuel moisture content and projections of future forest area burned.

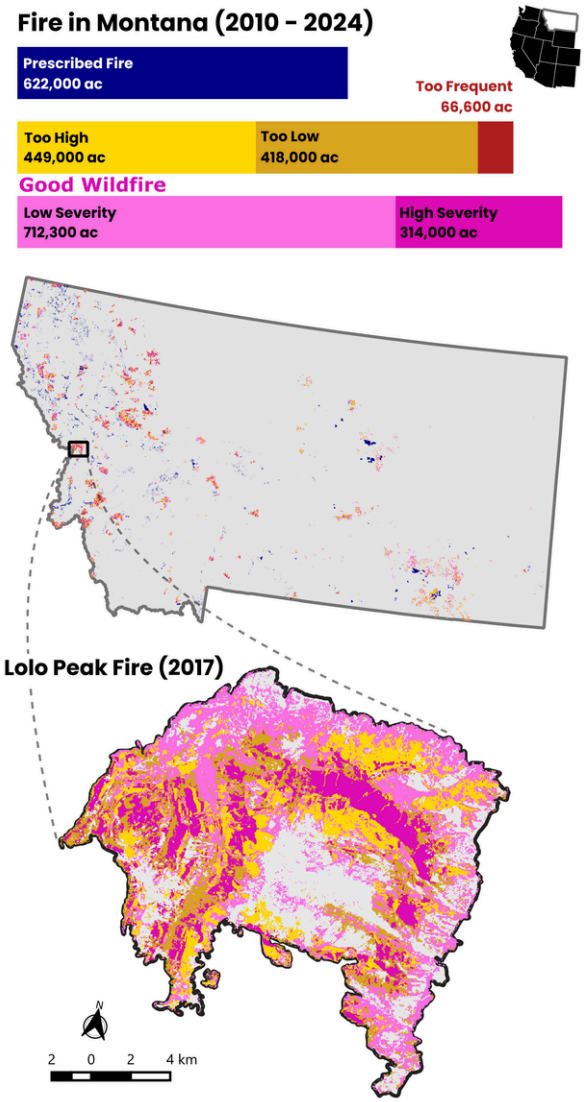
MONTANA

GOOD WILDFIRE

WFFRC's analysis of Good Wildfire[1] indicates whether forest fires burned in a beneficial way – that is consistent with the severity and frequency of the historical fire regime. Fire that burns within the historical range of frequency and severity is more likely to produce positive ecological benefits such as reduced fuels and fire hazard, vegetation recovery, and sufficient regeneration – outcomes that lead to healthier and more resilient forests.

The Good Wildfire dataset covers all fires in forests across the western U.S. from 1986 to 2024 and will be updated each year (with a year lag) adding fires for the latest fire season.

Between 2010 and 2024, forest fires burned about 2 million acres in Montana. Of this total, 712,250 acres burned as low-severity good wildfire and another 313,798 acres burned as high-severity good wildfire. The extent of good wildfire varies in any year and any one fire event. For example, the 2017 Lolo Peak Fire that burned 53,902 acres in Missoula and Ravalli Counties had substantial areas of good wildfire, both low- and high-severity good wildfire.



POTENTIAL APPLICATIONS

- **Determine how much of an individual forest fire or region burned in an ecologically beneficial way.**
- **Compare the area of good wildfire from unplanned ignitions with the area of prescribed fire to track progress toward treatment targets.**

[1] *Balch, J.K., McIntosh, T.L., Illangakoon, N.T., Cummins, K., Varner, J.M., Hansen, W.D., Dargan Marquis, K., Raymond, C.L., Harvey, B.J., Bitters, M.E. and Platt, R.V. In Review. Good wildfire in western U.S. forests (2010-2020).*

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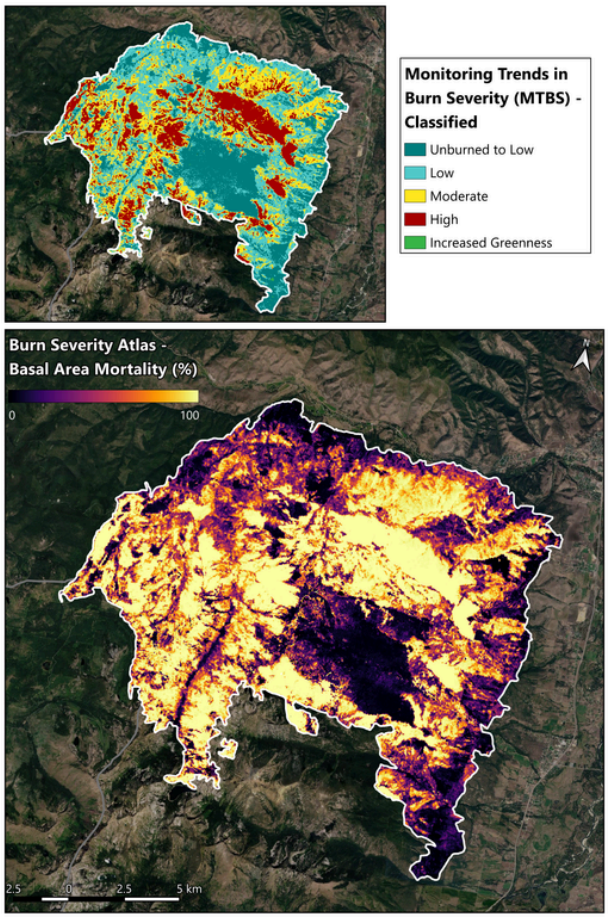
ECOLOGICAL BURN SEVERITY ATLAS

The Ecological Burn Severity Atlas[2] is a set of maps of the ecological effects of wildfires in western U.S. forests between 1987 and 2024. The Atlas translates satellite-detected changes in vegetation reflectance into interpretable maps of burn severity that are calibrated to local forest structure and other ecological conditions.

The Atlas extends commonly used burn severity products, such as BARC and MTBS categorical severity maps, by mapping multiple on-the-ground ecological effects of wildfire. For all fires larger than 247 acres, the Atlas includes one-year post-fire layers for basal area mortality, stem mortality, live canopy cover loss, tree needle/leaf retention, tree bole char, and ground surface char.

The Atlas provides a more nuanced picture of fire effects one year post-fire as seen in the Lolo Peak fire. For example, the areas with the highest proportions of basal area mortality across the fire show overlapping areas of moderate and high severity in MTBS burn severity maps.



A comparison of MTBS categorical severity (top figure) and the percent basal area mortality from the Ecological Burn Severity Atlas(bottom figure) for the 2017 Lolo Peak Fire in Montana.

POTENTIAL APPLICATIONS

- **Examine the ecological effects of a forest fire, including the potential range of effects based on remotely-sensed observations.**
- **Inform management decisions with a more complete assessment of the post-fire effects on vegetation than is provided by existing burn severity layers.**

[2] *Buonanduci, M.S., K.H. Braziunas, M.M. Laughlin, G.W. Meigs, A.L. Reiner, S.J. Saberi, and B.J. Harvey. Ecological burn severity atlas for forests of the western United States. Submitted to Ecological Applications*

Questions? Contact:

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