Perspectives: The pace and scale challenge: Leveraging wildfire footprints to increase forest resilience to future high-severity fire

SOUTHERN ROCKIES FIRE SCIENCE NETWORK

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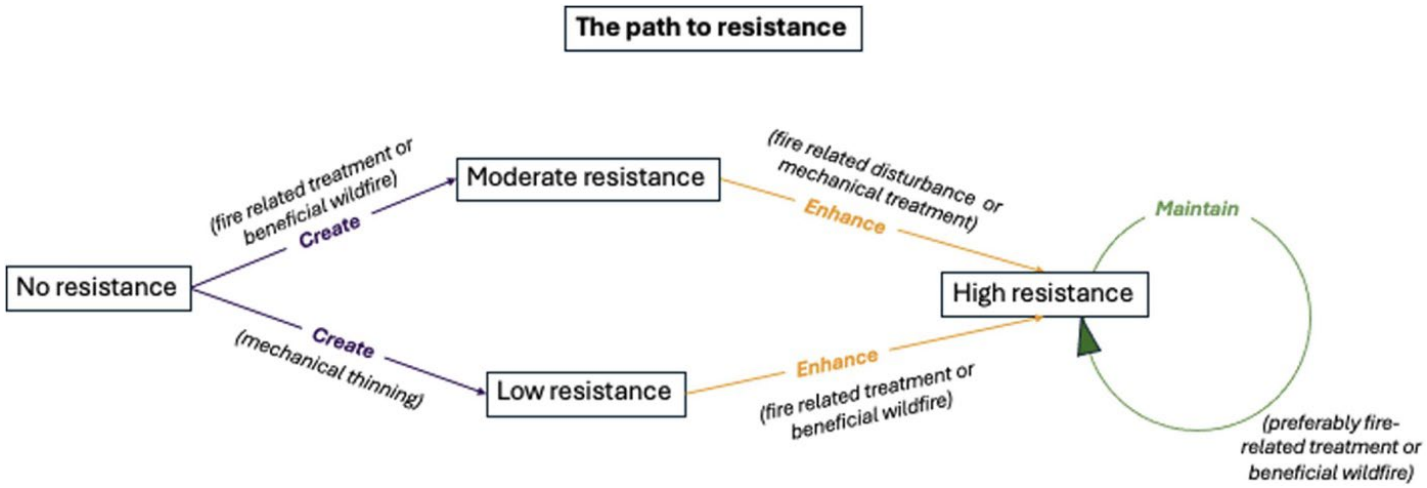
Background

Fire suppression and climate change have led to increases in the extent and severity of wildfires in historically frequent-fire forests in the western U.S. While these fires can have undesirable outcomes, they may also offer opportunities. Managers may be able to leverage recent wildfire footprints to treat adjacent forests or build on the work done by wildfire, which has the potential to reduce preparation costs and operational complexity and increase resistance to future high-severity fire.

This study presents three management pathways (create, enhance, maintain) towards achieving resistance to severe fire in the context of leveraging recent wildfire. These pathways provide a framework to support planning and implementation efforts for prescribed fire and wildfire for resource objectives in forests within western North America.

Research Overview



Note: Conceptual figure of the three pathways (*create*, *enhance*, and *maintain*) to re-establish western North American forests' resistance to high-severity wildfire. The pathway a land manager follows depends on the starting condition of the forest system and management options. Reprinted from *Corrigendum to* "Perspectives: The pace and scale challenge: Leveraging wildfire footprints to increase forest resilience to future high-severity fire" by Wilson et al., 2026, *Forest Ecology and Management*, 603, 123443. Copyright 2025 The Authors. Reprinted with permission.

Leveraging Wildfire Footprints Review:

Wilson et al. (2026) used treatment and wildfire histories from 2013-2022 in California's Sierra Nevada yellow pine-mixed conifer forests across 1,673 Potential Operational Delineations (POD) to achieve the following objectives, and then examined regulatory pathways and hurdles for timely implementation.

- **Objective 1:** Introduce three management pathways (create, enhance, maintain) that can be used to foster resistance to high-severity fire in and adjacent to wildfire footprints.
- **Objective 2:** Identify opportunities to apply these pathways via a case study in the Sierra Nevada yellow pine-mixed conifer forest at the POD scale.
- **Objective 3:** Outline policy options for acting within limited post-fire windows and consider how modifications to environmental compliance could support timely management of burned areas.

Key Findings

Finding 1: Three Pathways to Resistance

Land managers can ***create*** resistance to future high-severity fire in long-unburned or untreated forest by using recent burned edges as containment lines to treat adjacent forest or unburned islands with prescribed fire, cultural burning, wildfire managed for resource objectives, and mechanical treatment where needed. Managers can ***enhance*** resistance in forests that have received one prior beneficial disturbance, either one beneficial fire or one mechanical treatment, by implementing a follow-up fire treatment. After ≥2 beneficial disturbances, one of which was fire, managers can ***maintain*** resistance as fuels reaccumulate by implementing recurring beneficial fire.

Finding 2: Case Study Opportunities

Using recent burned edges as containment lines may allow managers to expand treatment areas while reducing line-construction needs and operational exposure. In this case study, there is an opportunity to create resistance on >230,000 ha across 197 PODs. Prioritizing enhance or maintain pathways in recently burned areas could help safeguard investments in environmental review because their reduced fuel conditions may lower the likelihood of reburning before planning and treatment are completed. Additionally, burning in low- to moderate-severity areas may produce less smoke, potentially reduce escape risk, and broaden the conditions under which prescribed fire or wildfire managed for resource benefits can be considered. The largest opportunity was to enhance resistance, with almost 300,000 ha across 301 PODs with at least one low- to moderate-severity fire. More than 102,000 ha across 164 PODs have experienced ≥2 beneficial disturbances and will require future treatments to maintain resistance. Over time, expanding the area in the enhance and maintain pathways could increase landscape-level resistance to high-severity fire.

Finding 3: Regulatory Hurdles and Challenges

Reintroducing fire to western North American forests can involve many regulatory hurdles. Programmatic environmental review can support broader implementation by analyzing prescribed fire or wildfire management for resource objectives across a park, forest, or other management unit. This allows agencies to implement fire where most beneficial at a given time. The authors argue that additional policy and legal reforms should be considered, including exemptions from some environmental compliance review for prescribed fire, cultural burns, and resource objective fire in recognition of fire's longstanding ecological and cultural role.

Management Implications

- Land managers can prioritize management areas within and adjacent to recent wildfire footprints to potentially reduce costs and improve firefighter safety.
- This approach may allow land managers to work within a broader range of burn conditions and burn windows.
- Leveraging wildfire footprints provides an opportunity to scale up treatment area in forested systems, creating larger areas with increased resistance to high-severity fire.
- The case study presented shows that recent fire seasons have created extensive opportunities to leverage wildfire.

Additional Information

This brief is based on the following article:

Wilson, K. N., Shive, K. L., Williams, J. N., North, M. P., Coppoletta, M., Hendershot, J. N., & Stanley, C. K. (2026). Perspectives: The pace and scale challenge: Leveraging wildfire footprints to increase forest resilience to future high-severity fire. *Forest Ecology and Management*, *603*, 123443.

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