

Science You Can Use *in 5 minutes*

A Big Fire With Low Fire Severity: Lessons from the Black Fire

When the Black Fire ignited in southwestern New Mexico in 2022, it had all the ingredients for disaster: record-high winds, extremely low humidity, and over 131,000 hectares (323,708 acres) of forest fuels to feed on. But something unexpected happened. Instead of becoming another catastrophic megafire, it burned mostly at low to moderate severity. The secret? The landscape had already experienced dozens of previous fires, both planned and natural, that helped tame the beast.

A study published in *Forest Ecology and Management* reveals that areas previously treated with prescribed fire and

managed wildfire experienced significantly lower burn severity, even under extreme weather conditions.

“There’s a perception that fuels reduction preceding a fire won’t matter much if the fire is burning under such extreme conditions,” says Gavin Jones, Rocky Mountain Research Station Research Ecologist. “But our research shows that the fire treatment history on the Gila National Forest produced a landscape that could accept fire in a healthy way.”

Jones partnered with fire scientists at the Forest Service’s Southwestern Region

and the University of New Mexico to examine two main questions: What factors were most important in explaining landscape-scale patterns of burn severity, and what happens when fire burning along the ground actually encounters a treated area? Their analysis using GIS shows that fire treatments work at both landscape and local scales.

“The most important factor, no matter how we sliced it, was the previously fire-treated area,” Jones explains. At finer scales, the results showed when fire encountered previously burned areas, burn severity diminished. Large-scale results showed that



The Black Fire began in May 2022 and grew into New Mexico’s second-biggest fire. Only 4% of the 131,000-hectare Black Fire burned at high severity owing largely to previously burned areas. Inciweb photo.

more treated area leads to the less high-severity fire, but the relationship isn't linear. The benefits of previous fires occur after reaching a certain threshold, or critical mass. Treating 25 percent or less of the landscape appears ineffective, but treating 38 to 57 percent begins to change fire behavior and show significant benefits. On average, a fully treated area experienced 51 percent less high-severity fire than an untreated area.

That fact that the two largest fires in New Mexico's history burned during the same year, with similar fuels, weather, and topography conditions provides additional insights. The Black Fire area had a rich fire history, with at least 48 large fires within its perimeter between 1984 and 2021. Consequently, only 4 percent of its 131,577 hectares (325,134 acres) burned at high severity. In contrast, the Hermits Peak-Calf Canyon Fire, with only nine small previous fires, saw 23 percent of its 138,188 hectares (341,470 acres) burn at high severity.

When it comes to preventing catastrophic fires, sometimes the best defense is a good offense—in the form of multiple smaller, controlled burns over time. “The way the Black Fire burned is the dream of fire managers,” Jones says. “Can we get more fires to burn, like that? Yes, I think we can.”

Further Reading

Jones, G.M.; Spannuth, A.; Chongpinitchai, A.; Hurteau, M.D. 2025. [Prescribed fire, managed burning, and previous wildfires reduce the severity of a southwestern US gigafire](#). *Forest Ecology and Management*. 580: 122540.

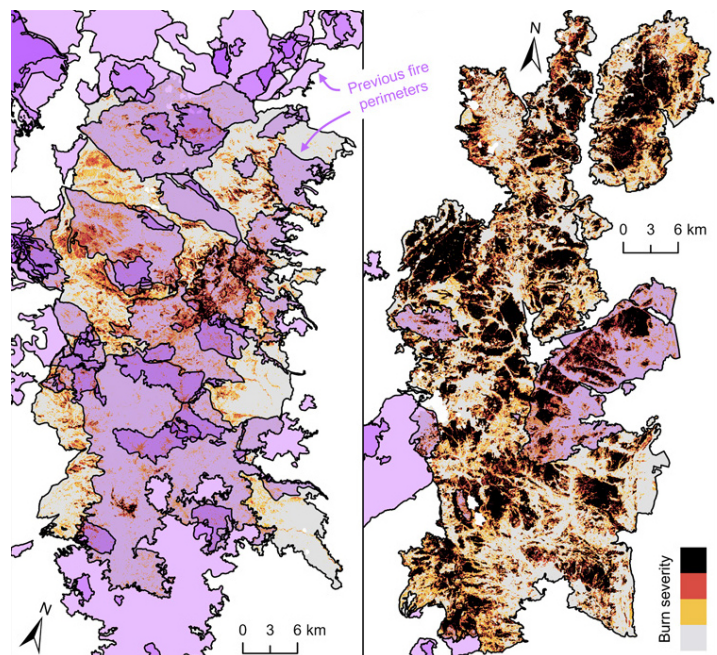
Featured Scientist

[Gavin Jones](#) is a research ecologist who focuses on understanding how sensitive wildlife species respond to forest management.

[Sylvia Kantor](#) is the author of this Science You Can Use.

Management Considerations

- Previous fire history plays a crucial role in moderating fire behavior during major fire events. Both prescribed fire and managed wildfire effectively reduce severe fire effects, even under extreme weather conditions.
- Previous fire treatments reduced high-severity fire by 51% compared to untreated areas.
- Only 4% of the 131,000-hectare Black Fire burned at high severity, despite extreme weather conditions. Areas with previous treatments were the strongest predictor of reduced burn severity, outweighing both weather and other factors.
- When fire encountered treated areas, burn severity decreased by 21-55% within 250 meters.



Comparison of burn severity of the 2022 Black Fire (left) and the 2022 Hermits Peak-Calf Canyon Fire (right). Lower burn severity in the Black Fire depicted in purple is attributed to a history of 48 previous fires (managed and unmanaged for resource benefit) since 1984 that resulted in lower fuel accumulation. In contrast, the area that burned in the Hermits Peak-Calf Canyon Fire had experienced only nine previous small fires over the same time period.



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