The Nature Conservancy Oregon

The Nature Conservancy in Oregon and University of Washington Forest Resilience Lab

TNC Sycan Marsh Preserve and the 2021 Bootleg Wildfire

As the Bootleg Fire burned through this area from the bottom of the image to the top, the area seen on the left, which had been previously treated with mechanical thinning and controlled burning, faired significantly better than the untreated area on the right. Photo © Brady Holden

Early Analysis: Controlled burning was key to lowering fire severity during the 2021 Bootleg wildfire.

Ecological forest restoration treatments = Ecologically-based thinning of smaller trees and controlled burning during safe conditions.

In July 2021, the Bootleg wildfire burned across approximately 412,000 acres in south-central Oregon, including 12,000 acres of The Nature Conservancy's Sycan Marsh Preserve. For the past two decades the Conservancy's Sycan Marsh Preserve has been a center for investigation and learning. At Sycan, the Conservancy and numerous tribal, academic and public agency scientists have studied the ability to safely restore the natural role of fire in these dry forests through ecological thinning of the smaller trees, which have grown in the absence of natural wildfire and cultural burning, and by reintroducing fire via controlled burning during safe conditions. These ecological forest restoration treatments were conducted to improve the health of the ecosystem, promote biodiversity conservation, increase resilience to warmer and drier weather and to moderate the intensity and severity of wildfires.

During the Bootleg wildfire, frontline fire personnel saw fire behavior change in forested areas in and around Sycan which had previously received a full suite of ecological restoration treatments (including ecological thinning of small trees and controlled burning). They recounted that in these areas, the fire burned with lower intensity and suffered less tree mortality. While these initial observations from Sycan were promising, the Conservancy committed to conducting a rigorous and thorough scientific evaluation of the effectiveness of forest restoration treatments, and whether they moderated the severity of the Bootleg wildfire. To conduct this assessment, the Conservancy partnered with the University of Washington Forest Resilience Laboratory, headed by Dr. Van R. Kane and Dr. C. Alina Cansler.

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Preliminary Results

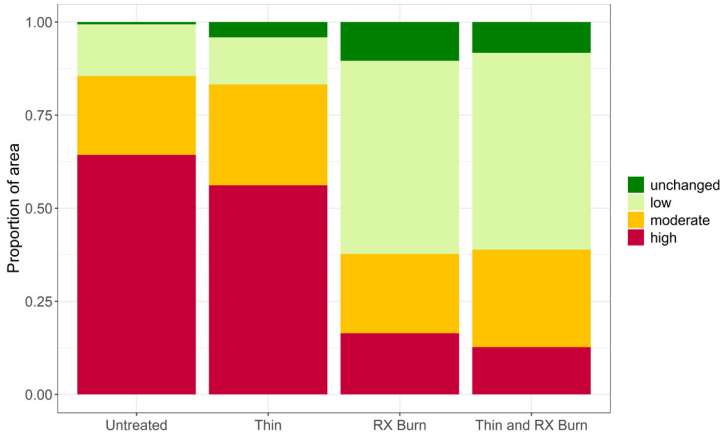
Preliminary results from this analysis at both the plot and landscape scales support the initial observations made by frontline fire personnel during the Bootleg wildfire; ***areas previously treated with controlled burning, either alone or in combination with thinning, burned with lower severity during the 2021 Bootleg wildfire.***

In particular, the initial analyses indicate:

- Controlled burning was key to lowering fire severity: In forests previously treated with controlled burning, either alone or in combination with ecological thinning, the majority was either unchanged or burned with low severity (0-25% of trees killed), while in untreated areas the majority burned with high severity (>75% tree mortality).
- Thinning alone was less effective than thinning + controlled burning: Areas that had been ecologically thinned without controlled burning after the thinning burned during Bootleg with moderate to high severity. However, wildfire severity in these areas was lower than untreated areas.
- Results were consistent when accounting for daily fire weather and biophysical site differences.

Key Results:

Even under extreme fire weather conditions, wildfire severity was moderated in areas that had received controlled burning, either in combination with ecological thinning or alone, prior to the Bootleg Fire. Treatments to reduce fuels also allowed firefighters more and safer options to conduct effective fire suppression efforts.



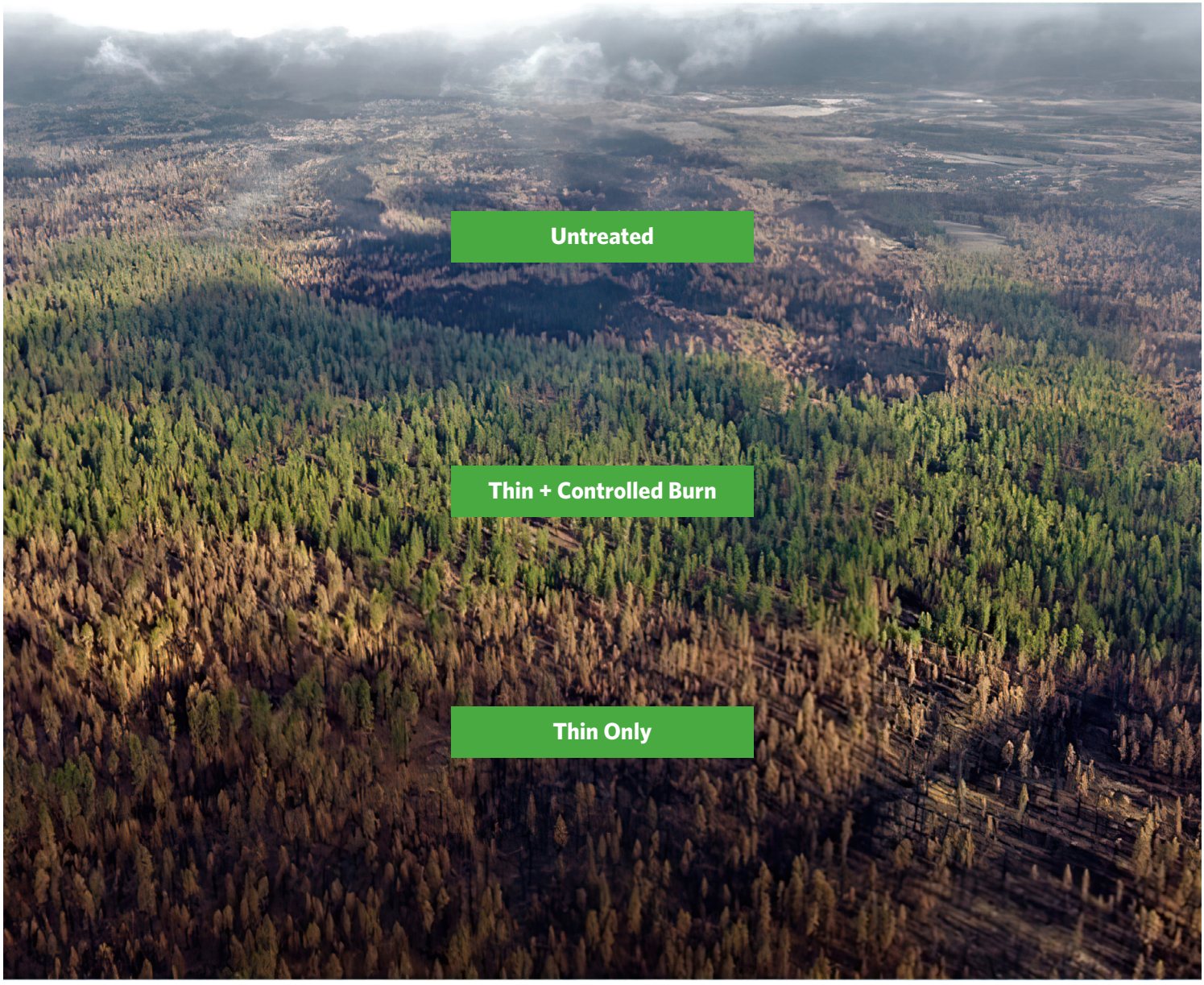
The proportion of area burned by burn severity class, for Sycan forests that were (from left to right): untreated, had previous thinning only, had controlled (rx) burn only, and had thinning + controlled burn prior to the Bootleg wildfire. Burn severity was mapped using pre-fire and immediate post-fire Landsat satellite data by the Rapid Assessment of Vegetation Condition after Wildfire (RAVG) program.

Post-Bootleg photos from Sycan Marsh Preserve of areas that had previously received ecological restoration treatments including ecological thinning and controlled burning, ecological thinning only, controlled burning only, or were untreated.

Next Steps

The preliminary results from our evaluation at Sycan are well aligned with a robust and growing body of research across Western North America demonstrating the effectiveness of ecological forest restoration treatments that include the reintroduction of fire (Prichard et al. 2021). Our evaluation at Sycan is ongoing and intended for submission to a peer-reviewed scientific journal in 2023. The Conservancy and our partners including The Klamath Tribe and the US Forest Service will continue to integrate the lessons from the Bootleg wildfire into our ongoing forest restoration efforts.

Methods: Our overarching research question is whether different types or combinations of ecological forest restoration treatments, including mechanical thinning only, controlled burning only, and thinning and controlled burning in combination, were effective at moderating the severity of the Bootleg wildfire. To address this question, we integrated data from 126 composite burn index (CBI) plots measured during the fall of 2021 with satellite-based mapping of fire severity from the Rapid Assessment of Vegetation Condition after Wildfire (RAVG) program. We evaluated both treated and untreated forests on the Sycan preserve as well as adjacent treated and untreated US Forest Service lands within the "Coyote" project area. Our evaluation of treatment effectiveness used random forests modeling to account for the influence of other factors such as fire weather and biophysical site conditions on wildfire severity. Day of burning weather conditions for each sample location were interpolated from MODIS satellite data while biophysical differences were mapped using climatic water balance and potential vegetation groups datasets. Subsequent analysis will evaluate these questions across the entire 412k acre Bootleg Fire footprint.



Post-Bootleg photos from the Black Hills Project Area on the Fremont-Winema National Forest, south of the Sycan Marsh Preserve. Photo © Steve Rondeau, The Klamath Tribes

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