



Case Study by CART



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Forest Thinning to Restore Fire Resilience at Lassen
Volcanic National Park

A Case Study on Fire Management

May 22, 2024



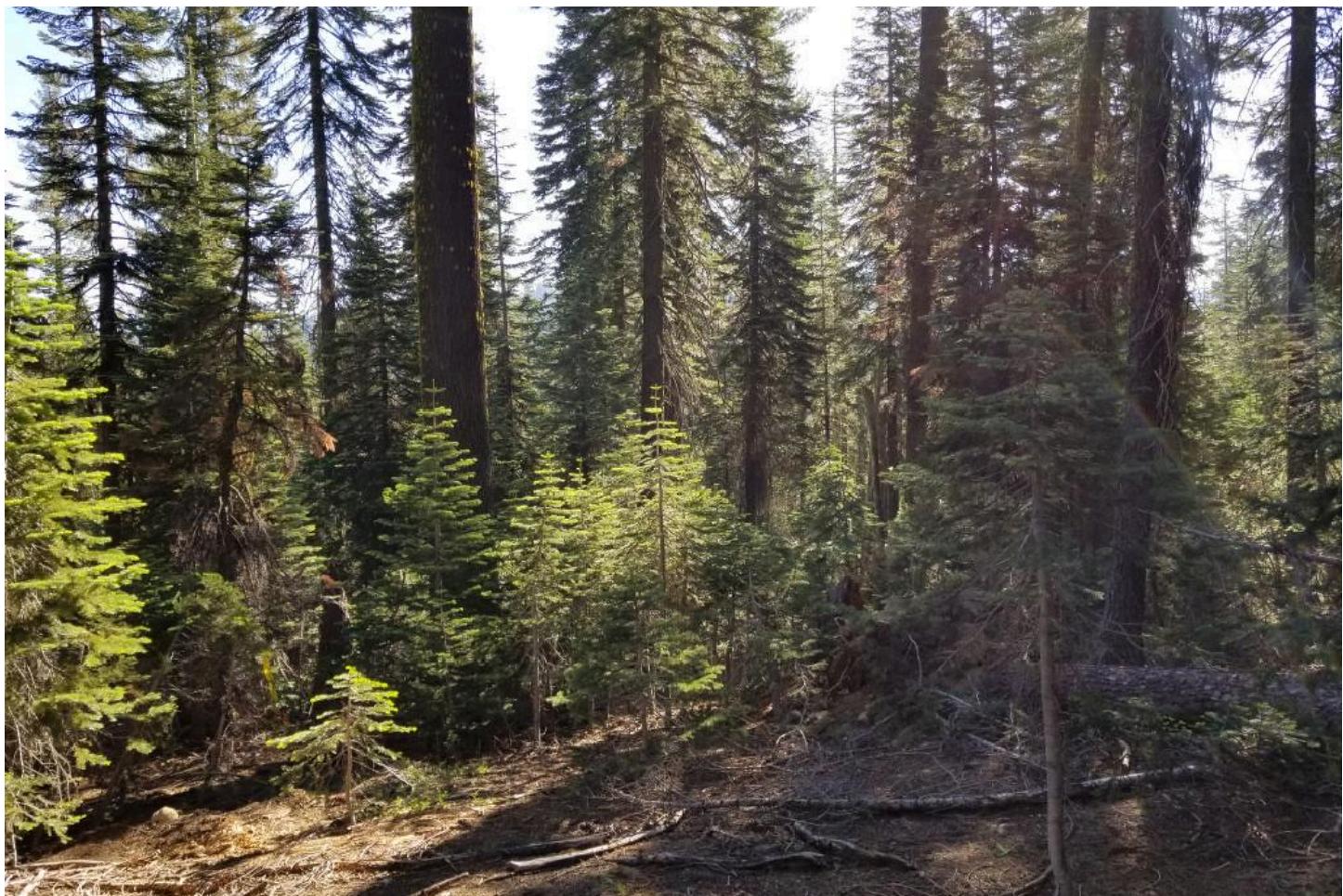
Introduction

[Lassen Volcanic National Park \(LAVO\)](#) in northern California sits at the meeting point of four watersheds and multiple bioregions. The southern North Fork Feather River watershed within LAVO is dominated by mixed conifer and, in the higher elevations, red fir (*Abies magnifica*) forests. Additionally, LAVO protects state-recognized endangered species including the [long-toed salamander](#) (*Ambystoma macrodactylum*), [Northern goshawk](#) (*Accipiter gentilis*), and [American badger](#) (*Taxidea taxus*) as well as the federally listed species, [Whitebark pine](#) (*Pinus albicaulis*) which can be found across the park's high peaks. The historic [fire regimes](#) at LAVO vary from 5 to 15 years in meadows and low-elevation forests to over 200 years in high-alpine forests. Historically, LAVO was the meeting point for at least four [indigenous groups](#), including the Atsugewi, Yana, Yahi, and Maidu, whose forest management and burning practices were important to maintaining the health of the forest. LAVO also protects historic structures and cultural sites, such as [Drakesbad Guest Ranch](#), that date back to the late 19th century.

A long history of state and federal fire suppression policy, as well as the loss of cultural burning practices in the 19th century have reduced the frequency of forest fires at LAVO. Fire exclusion practices increased the density of trees and burnable fuels at LAVO, heightening the risk of catastrophic wildfires that threaten the forest's health and historic structure. The [Reading Fire](#) in 2012, which burned over 12,000 acres, was the first fire LAVO has experienced that burned over 1000 acres in 170 years. Nine years later, the [Dixie Fire](#) burned nearly 70% of the park. Climate change has shortened the burn window between hot, dry

summer conditions and freezing, snow-packed winter conditions. As the burn windows have narrowed, worries about the fire danger associated with heavy vegetation density within LAVO have grown.

To restore forest health and an ecological and climate-adapted fire regime, staff at LAVO partnered with the Sierra Nevada Conservancy and Sierra Institute to implement the North Fork Feather River Headwaters Forest Restoration Project beginning in 2019. This project aimed to reduce forest fuel loads within wilderness areas of the North Fork Feather River watershed. Project participants thinned the density of trees using crosscut saws to create and reinforce fire boundaries with the intention to reintroduce fire to the landscape and direct fire regimes toward a more fire-resilient and climate-adapted landscape.



Key Issues Addressed

Typical thinning treatments in forested areas use chainsaws and other mechanical equipment to cut down trees because mechanized equipment is seen as being more efficient. However, 74% of LAVO forest is protected by [Section 4c of the Wilderness Act](#), which prohibits the use of mechanized equipment, including chainsaws, in forest management activities. This means that LAVO must consider an alternative tool that is both cost-effective and efficient at removing large trees and other heavy fuels for any thinning treatments in protected wilderness areas. However, hand tools such as crosscut saws require substantially more time and staff to thin the forest.

Without the natural thinning of the forest by frequent low-intensity fires, the density of shade-loving tree species has increased, creating denser forests and an excess of heavy fuels. Additionally, extreme drought conditions and higher temperatures lead to a higher [energy release component \(ERC\)](#), a metric related to how likely a fire is to ignite and its severity. In 2021, the ERC rose to 99% indicating a near certainty of ignition along with an increasing risk of catastrophic wildfire.

Increased fire hazards threaten many historic structures within LAVO, including the well-known Drakesbad Guest Ranch. These historic sites are important to preserving the history of LAVO. Increased fire risk also threatens numerous indigenous cultural sites found within park boundaries.

Project Goals

- Reduce the density of trees using crosscut saws that have minimal impact on designated wilderness areas and prepare designated firelines to facilitate the reintroduction of natural fire regimes.
- Reintroduce frequent low-intensity fires through prescribed burning to 4,000 acres of wilderness at LAVO. Use these prescribed burns to create varying levels of severity to develop

a mosaic of fire-resilient patches that prevent large landscape fires by interrupting fuel continuity.

- Create detailed, location-focused prescriptions in areas where the intent is the protection of backcountry structures, including the historic Drakesbad Guest Ranch.

Image Caption: Pre-treatment, dense forest clearing. Trees are heavily crowded and there are many young trees mixed in with the more mature trees. Courtesy of National Park Service (NPS).



Project Highlights

- **Crosscut Saws Increase Safety in Wilderness:** In addition to meeting wilderness area guidelines, crosscut saws are more cost-effective and safer for NPS crosscut saw crews. Crosscut saws saved \$3,311.50 annually over traditional chainsaw sawyer crews. Crosscut saw crews often worked several miles in remote, backcountry areas. This distance makes responding

to potential injuries difficult. Using crosscut saws instead of chainsaws allowed the crosscut saw crews to hear and feel changes in the wood fibers of unstable trees and respond appropriately, reducing risk of injury to themselves or other members of their crew.

- **Accomplishments from Forest Thinning:**

- Crosscut crews removed small trees and fine fuels within 100 feet along the edges of LAVO trails to assist fire personnel and break up fuel continuity.
- Over the 2019 season, a 6-person crew removed 852 trees of a diameter greater than 8 inches and 8,213 trees of a diameter less than 8 inches.
- Over the 2020 season, a 5-person crew removed 459 trees of a diameter greater than 8 inches and 9,271 trees of a diameter less than 8 inches.
- As of 2021: 12 miles of the LAVO trail system were prepared for prescribed fire, 1,400 acres of forest were prepared for planned underburn, and LAVO staff planned continued prep of control lines on 9 miles of LAVO trails

- **Removing Fuels Preserves Historic Buildings:** Crosscut saw crews worked to ensure that federally designated historic structures and important roadways were preserved within park boundaries. This included making sure that fuels were kept away from historical and federally-owned cabins as well as buildings important for park operations. Thanks to this preemptive work, when the Dixie Fire started emergency crews were able to quickly mitigate fuels adjacent to important and historical structures such as Drakesbad Guest Ranch to protect the ranch. However, four outbuildings on the outskirts of the Ranch were damaged in the fire due to their proximity to trees that experienced crown fire.

Image Caption: *A crosscut saw crew member cuts a large tree into smaller pieces for easier removal. Courtesy of NPS.*



Lessons Learned

BIGGER THINKING

Increasing the scale of forest restoration by working on larger landscape units and increasing the size of individual treatments is needed to meet the scale and pace of the wildfire crisis.

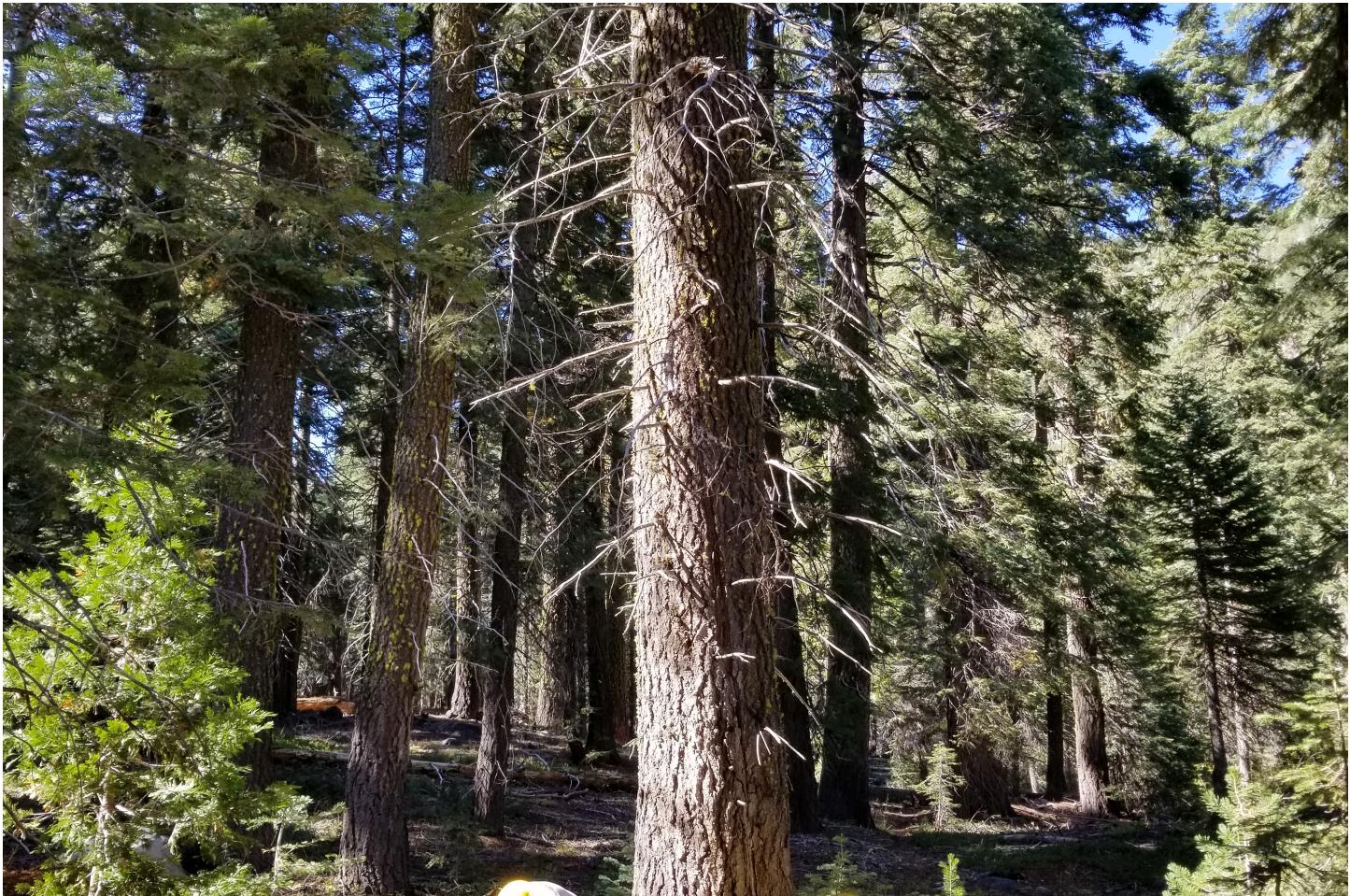
Climate variability patterns with hotter summers and drought conditions not previously seen in LAVO have created problems for reintroducing prescribed fire. Quicker changes between summer and winter temperatures have created shorter burn windows for LAVO to perform prescribed burn treatments as planned. Shortened burn windows have slowed the implementation of prescribed burns and pile burns of the thinned wood at LAVO. Portions of LAVO that had not yet experienced a prescribed burn suffered higher severity fire during the Dixie Fire than areas that had previously been burned

in the park. Prescribed burns that were scheduled for 2020 and 2021 are now rescheduled for 2027 and 2030 because of poor burn conditions and the impacts of the Dixie Fire.

Despite the thinning work to increase fire resilience at LAVO, it was not conducted early enough or at a large enough scale to prevent the damage of the Dixie Fire of 2021. Because of high-severity fire conditions driven by climate change, the Dixie Fire ruined the efforts of crosscut saw crews to preserve the aesthetics of the park by eroding soil around cut stumps and wood from felled trees buried along busy roadways and around structures. **Despite this, areas where crosscut crews worked were less severely impacted than untreated areas within the park.**

To meet compliance for monitoring of endangered species under the [California Environmental Quality Act \(CEQA\)](#), **LAVO chose to include a trained biologist in each crosscut saw crew instead of having biologists work independently from crosscut saw crews.** Biologists performed surveys in areas of prescribed treatments to ensure that continued monitoring of T&E species was done appropriately under state guidelines. Having trained biologists on the crosscut saw crews provided the additional benefit of ensuring crosscut saw crews did not disrupt native birds during mating seasons.

Image Caption: *A crosscut saw crew member observes a large tree falling after being cut. Courtesy of NPS.*



Next Steps

- Restore areas of the park, including historical structures, damaged by the Dixie Fire before continuing with prescribed burns
- Implement rescheduled prescribed fires in 2027 and 2030 to continue with both low and moderate-severity fires in the ecosystem at regular intervals to create a more fire-resilient landscape
- Expand forest thinning work to cover other areas of the park outside of the project area

Image Caption: *Two crosscut saw crew members use a crosscut saw on a large tree. Courtesy of NPS.*



Resources

May 2024 Case Study Handout

Collaborators

- [Lassen Volcanic National Park](#)
- [Sierra Nevada Conservancy](#)
- [Sierra Institute for Community and Environment](#)

Funding Partners

- [Sierra Nevada Conservancy](#)

Resources

- [Lassen Volcanic National Park Webpage](#)

- [USDA Fire Effects Information System Web Database](#)
- [Lassen Volcanic National Park Fire Regimes Webpage](#)
- [Lassen Volcanic Indigenous Information Webpage](#)
- [Drakesbad Guest Ranch History Webpage](#)
- [Lassen Volcanic National Park Reading Fire Webpage](#)
- [Lassen Volcanic National Park Dixie Fire Webpage](#)
- [USFS Wilderness Act Cheat Sheet PDF](#)
- [Northern California Geographic Area Coordination Center Energy Release Component Information Webpage](#)
- [North Fork Feather River Restoration Project 2019 Prescription Progress Report PDF](#)
- [North Fork Feather River Restoration Project 2020 Season Overview PDF](#)
- [North Fork Feather River Restoration Project 2021 Briefing Statement PDF](#)
- [California Environmental Quality Act Guidelines Webpage](#)

Photo Gallery

- [Photo Album and Credits](#)

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Image Caption: *Post-treatment, thinned forest clearing with only mature trees in view. Cut fuels removed from trees litter the forest floor. Courtesy of NPS.*

More Information on CART