



FIRE IN THE HEART OF THE OREGON CASCADES:

Exceptional Variability in Fire Across the Western Cascades



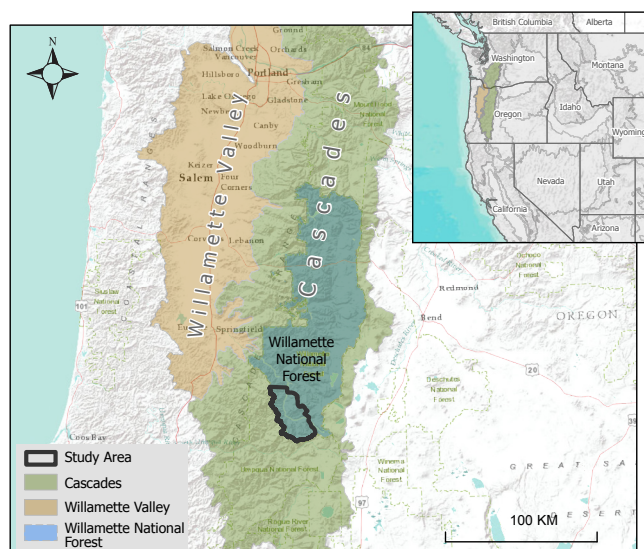
Fact Sheet 30 - August 2024

Wildland fire is a fundamental forest ecosystem process. However, resilience to wildfires is declining in forests of the western US, in part because of the loss of complex and varied forest structures that can reduce wildfire spread and severity. In the past, Indigenous traditions served the ecological and spiritual needs of human communities and landscapes through land stewardship practices such as cultural burning and selective harvesting of natural resources. We hypothesize that these practices played a critical role in the maintenance of fire regimes and resilience of the forest to catastrophic wildfire and climate change broadly. Displacement and genocide of Indigenous peoples and prohibition of their cultural practices led to the diminishment of cultural burning. This, coupled with fire exclusion and suppression policies by federal and state agencies, has contributed to a decline in forest health and a shift toward less resilient landscapes.

In the western Oregon Cascades

Relatively little is known about historical fire frequency and cultural burning practices in the Douglas-fir dominated forests of the western Oregon Cascades. Our research in the Willamette National Forest integrates tree-ring and archaeological evidence into a chronological record of historical Indigenous land use and fire patterns. We seek to provide fundamental insights about the influence of historical Indigenous fire stewardship on the patterns and processes of wildfire and forest succession.

Indigenous fire stewardship for open woodland and savanna grasslands. This study area is within the ancestral homelands of people who today are part of the Confederated Tribes of the Grand Ronde Community of Oregon, the Confederated Tribes of Siletz, the Klamath Tribes, and the Confederated Tribes of Warm Springs. It served as an important travel corridor and trade route between western Oregon and the dry eastern interior and was used for hunting and harvesting of plants seasonally from early spring through mid- to late fall each year.



In the Study Area

On the upper Middle Fork watershed at the southern end of the Willamette National Forest, much of the forest is dominated by Douglas-fir with areas of scattered dry forest species including ponderosa pine and Oregon white oak. Evidence suggests the distribution and extent of dry forest species in this landscape is the result of

Cultural burning in the Pacific Northwest is associated with camas cultivation, acorn collection, rejuvenation of berry crops, and the management of various grasses and shrubs used in basketry. It was also used for driving game in communal hunts, to clear the forest understory for better visibility, and to manage the grazing patterns of animals to improve the success of hunters.

In 1856, most members of Willamette Valley and western Oregon Cascades Indigenous communities (Kalapuya, Molala, Cascades, Wasco, Deschutes, Tenino, and Upper Umpqua) were forcibly removed to reservations. This removal coincides with a decline in fire frequency within our study area as evidenced by tree ring fire scars. Additional removals of the Klamath and Northern Paiute peoples in 1864 to the Klamath Reservation further impacted cultural fire practices in the Cascades.

Fire scars recorded in a tree's annual growth rings are an important source of long-term information about the frequency and seasonality of forest fire. The measurement and sequencing of tree rings and the fire scars they record, followed by the comparison of tree ring and fire event sequences across many different trees, allows us to identify the precise year and sometimes the season in which the fires occurred. Based on this information, we can characterize fire histories in terms of the distribution and variable frequency of fire across the landscape and over time.



Scarred tree rings provide evidence of fire. Photo by James D. Johnston.

Key Findings:

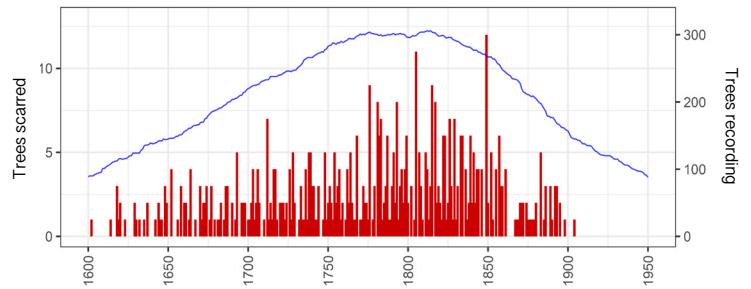
- » Tree ring study sites within the Middle Fork Landscape reveal an extraordinarily complex historical fire regime with fire frequencies ranging from 3 to more than 200 years across study sites. Most fires occurred in late summer to early fall with the remaining fire events happening in early spring. This observed fire seasonality aligns well with the seasonal timing of cultural resource use.
- » Indigenous fire stewardship practices likely resulted in a mosaic of smaller burned areas that reduced overall wildland fire severity compared to today's landscape.



Culturally-important plants in the study area. Left, huckleberry (*vaccinium* spp.); right, beargrass (*Xerophyllum tenax*). Photo by Michael R. Coughlan.



Obsidian (volcanic glass) tools provide evidence of historical hunting within the project area. Photo by Alex J. Nyers.



Red bars (left Y-axis) show the number of trees scarred in a given year. Blue line (right Y-axis) shows the number of trees in the sample that could potentially record a fire in a given year.

- » When Indigenous peoples were forcibly removed from their homelands in the mid-to-late 1800s, their cultural traditions were suppressed and fire regimes changed in the upper Middle Fork watershed.
- » In the absence of such low-severity fire, infill of Douglas-fir in the last 150+ years has resulted in significant mortality of old-growth pines and oaks. Many forest stands will require silvicultural interventions to maintain critical ecological functions.

Management Implications:

- » Without intervention, many western Cascades forests that formerly had diverse structure and composition will become homogeneous, closed canopy Douglas-fir forest that is more vulnerable to high-severity fire. **Prescribed fire or thinning modeled on Indigenous stewardship can increase ecological complexity and resilience to fire.**
- » Tree plantations may not develop complex forest structure in the absence of disturbances such as thinning and low-severity fire and should be a high priority for restoration. Diversity in forest structure contributes to the health and resilience of the western Cascades landscape. **Active management, inclusive of Indigenous knowledge and perspectives, should be considered in young tree plantations of all forest types.**
- » Our research shows the western Cascades forests were historically characterized by a complex, culturally influenced fire regime. **We urge land managers to make restoration decisions based on a broad set of considerations that includes site-specific knowledge, considers forest-wide resilience, and crucially, includes collaboration with Tribes.**

This briefing paper is based on the following articles:

MR Coughlan, JD Johnston, KM Derr, DG Lewis, BR Johnson. 2024. Pre-contact Indigenous fire stewardship: a research framework and application to a Pacific Northwest temperate rainforest. *Frontiers in Environmental Archaeology*, 3. <https://doi.org/10.3389/fearc.2024.1347571>.

JD Johnston, MR Schmidt, AG Merschel, WM Downing, MR Coughlan, DG Lewis. 2023. Exceptional variability in historical fire regimes across a western Cascades landscape, Oregon, USA. *Ecosphere* 14(12). <https://doi.org/10.1002/ecs2.4735>.

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