

Restoring pattern to frequent fire forests with variable-density thinning: implementation and initial outcomes

A lecture by

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Historical forests shaped by fire were highly heterogeneous at the within-stand scale, with dense groups of trees and individual trees interspersed with numerous small gaps. Stem maps from research plots on the Stanislaus National Forest dating to 1929 show that prior to any logging, canopy cover was 45% and over 20% of the area within stands was in canopy gaps where shrubs were abundant. As a result of past logging and fire exclusion, the contemporary stands were denser and more homogeneous, with no gaps and very low shrub cover. To improve resilience to disturbances such as wildfire or drought, while better balancing the needs of associated plant and animal species, we utilized the historical structure as a guide to a 'variable density' thinning prescription, comparing this with a standard thinning to an even tree crown spacing, and an unthinned control. Half of the units were then treated with prescribed fire. Mechanical thinning removed 40% of the basal area, and by favoring pines over fir and cedar, produced a species composition similar to the historical reference condition. Variable thinning enhanced within-stand structural heterogeneity and did so at spatial scales similar to heterogeneity found in historical stands. Both thinning treatments experienced significantly less tree mortality during the recent drought than unthinned controls. In addition, understory shrubs and grasses are already much more abundant, especially where thinning was followed by prescribed fire. While still early, it is our hope that the variable density thinning with prescribed fire treatment will not only be more resilient to future wildfires and droughts, but also produce conditions suitable for a greater diversity of species.

Bio: Eric Knapp is a research ecologist with the U.S. Forest Service, Pacific Southwest Research Station, and based in Redding, CA. After completing M.S. and Ph.D. degrees at the University of California at Davis, he got his start in fire by managing a large multidisciplinary prescribed fire study in Sequoia National Park. Since moving over to U.S. Forest Service in 2004, he has been studying the effects of forest and fuel management treatments, including prescribed fire, on ecosystems, and uncovering mechanisms behind variation in wildfire severity. He also specializes in exploiting long-term vegetation datasets to better understand how removing fire from formerly frequent fire ecosystems altered forest structure and fuels, influencing how wildfires now burn.