Thinning and Underburning Effects on Ground Fuels in Jeffrey Pine[1]

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Abstract

Thinning with cut-to-length and whole-tree harvesting systems followed by underburning were evaluated for their impacts on downed and dead fuel loading by timelag category in eastern Sierra Nevada Jeffrey pine (*Pinus jeffreyi* Grev. & Balf.). Cut-to-length harvesting resulted in an approximate doubling of total fuel loading to 113829 kg ha^{-1} in comparison with the unthinned control treatment, which totaled 55865 kg ha^{-1}. The greatest increases occurred in the 100-hr and 1000-hr categories, amounting to 466% and 354%, respectively, while 1+10-hr fuels increased by only 61%. Ground fuel changes associated with whole-tree harvesting were marginal and ultimately the loading in this treatment did not differ significantly from that in the unthinned treatment regardless of timelag category. The 1+10-hr and total fuel accumulations in the cut-to-length treatment and that of 1000-hr fuels in the whole-tree treatment were positively correlated with harvested basal area and harvested foliage, branch, bole, and total tree biomass. Subsequent consumption during underburning eliminated 1+10-hr and 100-hr fuel additions from cut-to-length harvesting, along with a portion of the natural loading in these categories, but fire was much less effective in reducing the 1000-hr fuels generated by this thinning approach as only 14% of the latter was consumed. Consumption of 1+10-hr, 100-hr, and total fuels in both the cut-to-length and whole-tree treatments was positively correlated with the amounts present within each category before underburning, relationships that extended to the unthinned treatment as well. These results, based on a study conducted on the Tahoe National Forest, provide insight into fuel load modifications resulting from field practices that are being increasingly integrated into comprehensive management efforts to improve forest health in the Sierra Nevada.

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