

Changes in Canopy Fuels and Fire Behavior After Ponderosa Pine Restoration Treatments: A Landscape Perspective

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Abstract—We modeled crown fire behavior and assessed changes in canopy fuels before and after the implementation of restoration treatments in a ponderosa pine landscape at Mt. Trumbull, Arizona. We measured 117 permanent plots before (1996/1997) and after (2003) thinning and burning treatments. The plots are evenly distributed across the landscape and represent an area of approximately 1,200 ha (2,964 ac), about half of which is an untreated control. Basal area decreased significantly by 42% from 32.6 m² (142.0 ft²) to 18.9 m² (82.3 ft²) in the treated area between 1996 and 2003, while the control did not change significantly over the same time period. Canopy biomass decreased significantly by 50% from 18.3 Mg/ha (8.2 tons/ac) to 9.1 Mg/ha (4.1 tons/ac) and canopy bulk density decreased by 42% from 0.093 kg/m³ (0.006 lb/ft³) to 0.048 kg/m³ (0.003 lb/ft³) in the treated area, while slight increases occurred in the control. Analysis of crown fire behavior using simulation models under extreme drought and wind conditions suggests that the proportion of the landscape susceptible to active crown fire and the mean patch size of these areas were both reduced in the treated area. In contrast, the models suggest little change in active crown fire susceptibility in the control over the same time period.

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