



Wildfire effects in silviculturally treated vs. untreated forests of Southwestern United States

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Ninety years of aggressive fire suppression and fire exclusion coupled with heavy grazing and prolific conifer regeneration around the turn of the century have combined to change forest structure, understory and overstory composition, and fuel biomass conditions in southwestern forests of the United States. Stand-replacement fires, particularly in ponderosa pine forests (*Pinus ponderosa*), have displaced high frequency low intensity historical fire regimes. We hypothesized forest stands treated recently (<10 years) using silvicultural practices were less likely to experience stand-replacing crown fires compared to untreated stands. Historical reports detailing fire behavior in treated stands are largely anecdotal. We compared fire severity indices, fireline intensity (kcal/m/s), and stand characteristics including canopy bulk density (kg/m³) in silviculturally treated vs. untreated forest stands in New Mexico and Arizona, USA. Results indicated fire severity in pine-grassland forests is reduced when ground and canopy fuel loads are reduced. Specifically, as density (stems/ha) and basal area (m²/ha) decrease and tree diameters (cm) increase, fire severity and fireline intensity decrease. An upper threshold in canopy bulk density of 0.090 kg/m³ on stands with 0–10 % slope was observed beyond which initiation and propagation of crown fire was possible and below which it did not occur. Generally, the more aggressive the treatment (i.e., canopy bulk density is reduced), the less susceptible forest stands will be to crown fire. However, mechanical thinning without appropriate slash treatment may render a stand susceptible to near stand-replacement type damage. In particular, we observed prescribed fire in combination with mechanical thinning had the greatest impact toward mitigating fire severity. Spatial location and arrangement of fuel reduction treatments in relation to other treatments must also be considered if landscape fire hazard reduction is an objective (Finney 2001).