

COMPARISON OF THE EFFECTS OF STAND-REPLACEMENT FIRES VERSUS FELL AND BURN SITE PREPARATION FIRES ON ABOVEGROUND BIOMASS IN DEGRADED PINE-HARDWOOD STANDS IN THE SOUTHERN APPALACHIANS

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ABSTRACT

Pine-hardwood ecosystems in the southern Appalachians have changed dramatically in the last 80 years. The combined effects of fire exclusion, abusive land practices, and drought have left many of these stands in poor condition. In particular, fire exclusion, in combination with drought-related pine beetle outbreaks, has resulted in significant reductions in overstory pine. Presuppression wildfires are thought to have played a major role in maintaining a pine component in this ecosystem by providing mineral soil for seed germination and reducing competition. The poor condition of this ecosystem prompted the use of cutting, burning, and planting eastern white pine (*Pinus strobus*) (referred to as fell and burn) to restore productivity. High costs and changes in management philosophy (i.e., ecosystem management) have led to an alternative approach of using stand-replacement fires in intact, but degraded stands.

Our objective was to compare the effects of these two prescribed burning techniques on aboveground biomass (i.e., forest floor, downed woody debris, and vegetation). The results presented here are a component of two large-scale studies assessing the effects of prescribed burning on a variety of ecosystem processes. Forest floor consumption was comparable between the two techniques, where 50–90% of the litter layer was consumed using fell and burn and 40% was consumed using the stand-replacement fire technique. In contrast, there were major differences in downed woody debris consumption. In the fell and burn treatment, differences were large as a result of felling (i.e., 150 metric tonnes per hectare) and consumption average 60%. In contrast, in the stand-replacement techniques, differences were smaller (i.e., 15 metric tonnes per hectare) and consumption averaged 6% for material ≥ 7.5 centimeters and 56% for material < 7.5 centimeters. Consumption of standing vegetation in the stand-replacement fire was minimal.

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