

PRESCRIBED BURNING IN OAK SHELTERWOOD STANDS: WHICH FUEL MODEL APPLIES?

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ABSTRACT

The BEHAVE modeling system and its accompanying 13 standard fuel models are useful in predicting wildfire behavior and planning prescribed fires. Typical hardwood fuel situations are represented by Model 6 (hardwood slash), Model 8 (compacted litter), and Model 9 (loose litter). We compared fire behavior in oak (*Quercus*) shelterwood stands to BEHAVE-generated predictions using the above fuel models and a custom fuel model.

Three mature mixed-oak stands were partially harvested using the shelterwood system. Each stand was divided into three treatments (spring burn, summer burn, and winter burn) and was prescribed burned 2–5 years later. Fuel loadings were measured prior to the prescribed fires to create a custom fuel model. Treatment areas were burned using strip-head fires or ring fires and the head fires and backing fires were measured for flame length and rate-of-spread.

Overall, BEHAVE provided useful predictions of fire behavior in a shelterwood setting. Of the four fuel models, the customized one most accurately predicted flame lengths and rates of spread. Model 6 greatly overestimated fire behavior while Models 8 and 9 consistently underestimated fire behavior. When planning prescribed fires in oak shelterwood settings, land managers need to be mindful that the typical hardwood fuel models do not accurately predict fire behavior for this situation.

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THE HISTORY OF FIRE IN A SOUTHWESTERN VIRGINIA *PINUS PUNGENS* STAND

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ABSTRACT

We investigated the potential for fire history analysis in the Appalachians, and explored the relationships between fire, stand structure, and composition with respect to changing fire regimes. We developed fire histories of two *Pinus pungens* (Table Mountain pine) communities from southwestern Virginia. Tree-ring analysis of fire-scarred *P. pungens* specimens, and a tree inventory along two belt transects, revealed species composition and age distributions. Between 1758–1944, fires burned approximately every 5 years (Weibull median probability interval) during the dormant season. A climate reconstruction of summer temperature revealed an association between warm summers and fire occurrence. Most of the *P. pungens* population derives from two large cohorts (1850's, 1930's), with no establishment after 1950. The 1850's cohort followed a late summer fire, which was a near stand-replacing event. The 1930's cohort followed the present fire exclusion regime. Among all species, the smaller diameter classes are dominated by *Quercus* (oak) species, mostly *Q. prinus* (chestnut oak) and *Q. coccinea* (scarlet oak). Recent regeneration failure of *P. pungens* and growing dominance of *Quercus* spp. appears to coincide with fire exclusion. Without fire, *P. pungens* importance will decline and the communities will be dominated by *Quercus* species.

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