

MODELING VARIABLE FUELS, FIRE BEHAVIOR, AND FIRE EFFECTS IN
UNEVEN-AGED PONDEROSA PINE STANDS

A Thesis

Presented in Partial Fulfillment of the Requirements for the

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With a

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By

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Abstract

Ponderosa pine stands are often managed as uneven-aged groups of trees. Prescribed burning may be beneficial in managing uneven-aged ponderosa pine stands, but variability in fuels within these stands often makes fire behavior and fire effects difficult to predict. I sampled three uneven-aged ponderosa stands in northern Idaho, and constructed site-specific custom fuel models to describe litter, herbaceous, shrub, and downed woody fuels at 72 sample points, and predicted fire behavior at each sample point. Of the 72 samples, 19 produced high rates of spread, heat per unit area, and greater than 20% predicted mortality in trees with a 5-in diameter at breast height (DBH). Using cluster analysis, I classified these 19 fuel models into four “fuel groups”, A, B, C, and D. The four fuel groups differed significantly in the amount of shrub ($p=.0001$), herbaceous plant ($p=.0001$), and litter biomass ($p=.0007$) found in each group. Predicted fire behavior varied between the four groups, with group B, the medium shrub group, producing the highest rate of spread ($p=.313$), and group C, the tall shrub group, producing the highest heat per unit area ($p=.0055$). The fuel and predicted fire behavior characteristics of the four fuel groups also differed from the standard models 2, 5, and 9. Custom fuel groups are useful when predicting fire behavior and effects in uneven-aged ponderosa pine stands vary so much that no standard fuel model describes them accurately.

Study Site

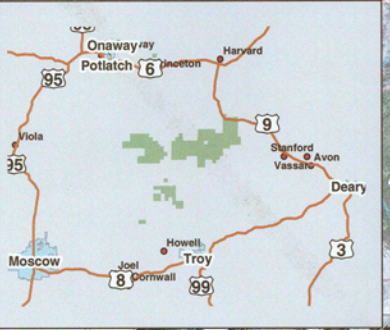
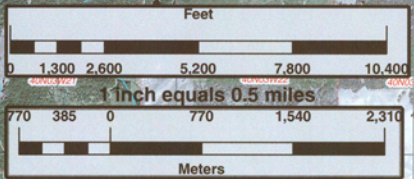
Three stands were chosen as study sites. All three stands belonged to the Douglas-fir/ninebark habitat type (Cooper and others 1987), and were dominated by uneven-aged ponderosa pine. Two of the research areas were located on the University of Idaho Experimental Forest and on adjacent lands owned by the Bennett Lumber Company, five miles south of Princeton, Idaho (Sec 36 T41N R4W), at an elevation of 3200 ft. The third sampled stand is administered by the Idaho Department of Lands. It was located three miles south of Potlatch, Idaho (Sec 13 T41N R4W), at 2800 ft. At least three distinct age/size classes were present in each stand. The slopes of the three stands were no greater than 10%. All three stands were grazed by cattle, and sampling was done in the spring of 1988, prior to grazing.

University of Idaho Experimental Forest

The var aged
Ponderosa Pine
Stand on UI
Exp Forest

UI Experimental Forest Administrative Map 2004

Running Surface Water	Forest Gates
Fencelines	CB Mile Markers
Railroad Grade	Cattleguards
Forest Gravel Road	University of Idaho Experimental Forest
County Paved Road	Bennett Lumber Products
County Gravel Road	Potlatch Corporation
County Dirt Road	City of Troy Forest
State Road	
Public Land Survey System	



University of Idaho Experimental Forest Map 2004



Location of Complete Research:

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University of Idaho Library:

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College of Natural Resources:

Department- Forest Resources

Other Sources: