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FUTURE FORESTS

EVALUATION OF ALTERNATIVE FIRE HAZARD REDUCTION TECHNIQUES IN HIGH-HAZARD, HIGH-VALUE, AND HIGH-USE FORESTS

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Forested areas heavily used by recreationists have severely restricted options for management treatments to reduce fire hazard and capture the productivity potential of the site. A high proportion of these sites occur in the ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga mensiesii*) forests of Montana—an environment having a long fire season. Therefore, treatments are needed to minimize fire hazards while optimizing the multiple benefits of recreation, wildlife, timber, and water production.

The objective of this study was to determine the relative cost and effectiveness of alternative slash disposal treatments aimed at reducing fire incidence (ignition), rate of spread (control), intensity (damage), and resistance to control (difficulty of fireline construction). Six treatments were tested:

1. Bulldozer pile and burn
2. Lop and scatter
3. Removal of pieces over 3 inches (7.6 cm) in diameter by farm tractor
4. Firewood removal and leave material less than 3 inches diameter
5. Firewood removal and lop material less than 3 inches diameter

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6. Firewood removal and hand pile and burn material less than 3 inches diameter.

The treatments were applied to a 48-acre study area along Highway 200 on Montana Division of Forestry land adjacent to the University of Montana's Lubrecht Experimental Forest. The stand was second-growth ponderosa pine, Douglas-fir, western larch (*Larix occidentalis*), and lodgepole pine (*Pinus contorta*), that had been logged by individual tree selection a year before the application of the treatments. An intensive fuel inventory, using the planar intersect technique for inventorying downed woody material, was conducted at the site before the application of the treatments. Detailed cost records were kept during the application of the treatments and a second fuel inventory was conducted after the treatments were completed.

Small diameter fuel (0-3 inches) reduction was statistically significant at the 5 percent level for all treatments, except for "lop and scatter" and "firewood removal." However, fuel bed depth reduction was significant for all treatments.

Using the fire behavior prediction computer system BEHAVE, the fire behavior potential of the fuels before and after each treatment was calculated. Two sets of typical environmental conditions (spring and mid-summer) were used for the comparisons. The results are shown in figure 1 where the solid lines represent mid-summer conditions and the dotted lines represent spring conditions.

All six treatments showed significantly reduced fire potential and predicted fire behavior within the limit of manual attack methods. "Lop and scatter" produced acceptable fire behavior, but effectiveness is perhaps limited to low fuel loads (less than 10 tons/acre [22.4 metric tons/ha] of total woody fuel).

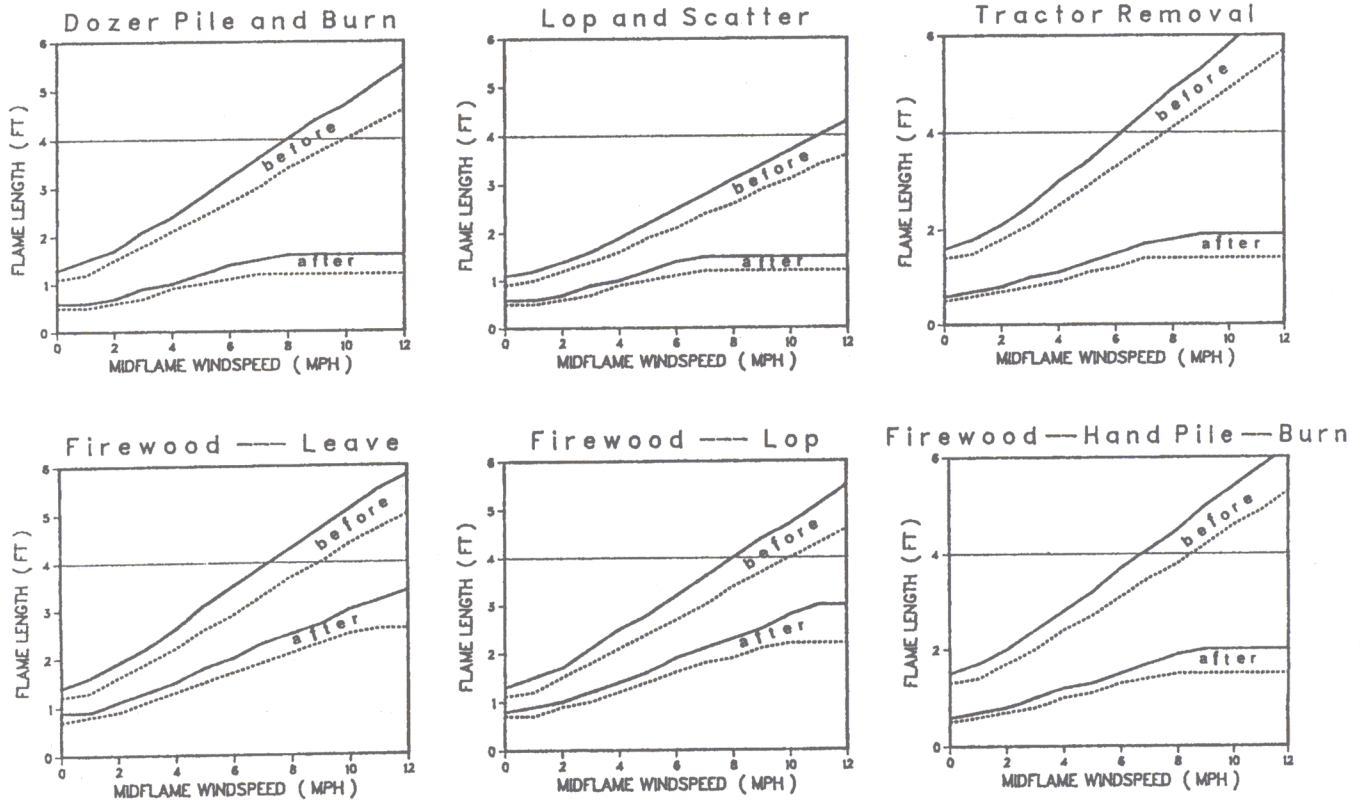


Figure 1—Relationship of flame length to midflame windspeed for six different fire hazard reduction treatments.