THESIS

EFFECTIVENESS OF BURNED AREA EMERGENCY REHABILITATION TREATMENTS, COLORADO FRONT RANGE

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ABSTRACT OF THESIS

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Wildfires can increase the amount of runoff and erosion by several orders of magnitude compared to unburned areas. Burned area emergency rehabilitation (BAER) treatments are installed to minimize the increase in erosion from burned hillslopes, but there have been few quantitative studies on the effectiveness of these treatments.

This study assessed the effectiveness of seeding, straw mulching, and contour felling in areas burned by the Bobcat Fire in June 2000 near Loveland, Colorado. Sediment yields were measured using thirty-four sediment fences from August 2000 to October 2001 Percent ground cover was measured in fall 2000, spring 2001, and fall 2001 The installation quality and sediment storage capacity of the contour felling treatment were assessed at seven sites in three wildfires along the Colorado Front Range.

In fall 2000, the untreated control plots averaged 67% bare soil. The mulched plots only had 26% bare soil. Percent vegetative cover increased for all treatments over the study period, but only the mulched plots had significantly less percent bare soil than the controls and other treatments throughout the study ($p \leq 0.016$ in all cases).

In summer 2000, the mean sediment yield for the controls was at least 6,200 kg ha^{-1}, and none of the treatments significantly reduced sediment yields relative to the controls. The sediment yields from the control plots averaged 9,500 kg ha^{-1} in summer

2001, while the mean was 520 kg ha^{-1} for the plots that were mulched in 2000, 23 kg ha^{-1} for the plots mulched in 2001, and 2,800 kg ha^{-1} for the newly installed contour-felled plots. In 2001 the sediment yields from these three treatments were significantly less than the sediment yields from the controls ($p \leq 0.0001$ in each case).

The installation quality of the contour felled logs was highly variable between sites. Failure rates ranged from 10 to 70%, with placement or movement off contour the dominant cause of failure. The mean storage capacity for the seven sites was 16 m^3 ha^{-1}, or approximately 18,000 kg ha^{-1}, which is greater than the mean sediment yield for the untreated plots in 2001

Seeding was not effective at increasing cover or reducing sediment yields compared to the controls, even for storms with return periods of less than one year. Mulching was the most effective treatment at reducing sediment yields. This effectiveness extended to slopes of 19 to 69%, and persisted through summer 2001 Contour felling had the capacity to reduce sediment yields from smaller storms. However, the effectiveness of contour felling may not persist, depending on the timing and magnitude of storms as well as proper installation of the logs.

These results should help land managers determine the benefits associated with a given BAER treatment in the Colorado Front Range. The importance of percent cover at reducing sediment yields should be considered in the design of more effective treatments.

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