

Effectiveness of BAER treatments in reducing post-fire erosion after the Hayman Fire, Colorado Front Range

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Abstract. Post-fire runoff and erosion are critical environmental concerns following high-severity wildfires. To reduce runoff and erosion events, burned area emergency rehabilitation (BAER) treatments are often applied, yet few studies have quantified their efficacy. The primary objective of this study was to evaluate whether scarification with seeding, dry mulch with seeding, aerially-applied hydromulch, and ground-applied hydromulch significantly reduced erosion after the 2002 Hayman Fire.

The basic design was to compare sediment production from replicated pairs of treated and control swales. Both the dry mulch and the aerially-applied hydromulch reduced annual sediment yields by more than 90% in the first and second years after the fire ($p < 0.05$). Relative to the controls, these treatments also had significantly less bare soil in both 2002 and 2003, and significantly lower rill densities in 2003. By the third year after burning, the aerial hydromulch treatment was no longer statistically different from the controls for sediment yields, percent bare soil, or rill density. In contrast, the dry mulch treatment reduced sediment yields by 77% ($p = 0.002$) and had 15% less bare soil than the controls ($p = 0.04$). Neither the ground-applied hydromulch nor the seeding and scarifying treatments significantly reduced sediment yields in any of the three years.

The data indicate that treatment effectiveness depends on time since burning, storm intensity, and ground cover. Sediment yields were most closely correlated with percent bare soil ($p = 0.006$) and rill density ($p = 0.004$). These relationships explain why the mulch treatments were the most effective, while the treatments that do not immediately increase ground cover, such as seeding and scarifying, were not effective.