

Science

BRIEFING

February 26, 2014

REDUCING POST-FIRE RUNOFF AND SEDIMENT YIELDS



Aerial application of post-fire straw mulch treatment

BACKGROUND

Agricultural straw, hydromulch (a matrix of organic fibers mixed with water that binds to soil), and wood shred or wood strand mulches increasingly are being used as post-fire hillslope treatments. However, the differences in effectiveness in reducing measured runoff, sediment yields, and peak flow rates among these mulch treatments are not fully understood.

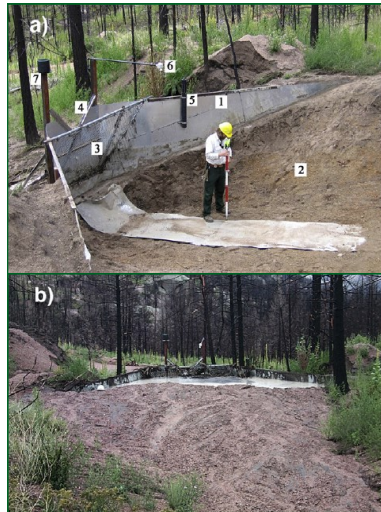
RESEARCH

Research Activity: Following the 2002 Hayman fire in central Colorado and the 2003 Cedar fire in southern California, matched catchments were monitored for five to seven post-fire years to determine the effectiveness of wheat straw mulch (applied at the Hayman fire only) and hydromulch in reducing post-fire runoff, peak flow rates, and sediment yields from natural rainfall.

Immediately after application, the straw mulch at the Hayman Fire increased the total ground cover to 80%. Total ground cover stayed high as the vegetation and litter (including invasive cheatgrass that was inadvertently introduced as seed in the straw mulch) increased and replaced the decreasing straw mulch cover. The wheat straw mulch treatment significantly reduced peak flow rates and sediment yields as compared to the control catchment from the initial and continuous increase in ground cover.

The hydromulch cover at both fires declined rapidly and provided less than 10% of the ground cover within 2.5 months after application in the Cedar catchments, which was similar to the ground cover on the untreated catchment. It was determined that the hydromulch treatment at the Hayman Fire was not effective in reducing post-fire runoff or sediment yields during the treatment period.

Management Implications: Managers need to know treatment purpose and effectiveness to determine the best treatment(s) for a specific location and adapt treatments to improve their effectiveness. These results suggest that post-fire recovery includes not only increased ground cover and reduction of hillslope erosion, but also mitigation of runoff generation and delivery to channels.



A instrumented sediment trap and weir in the Hayman control catchment. a) The empty catchment after sediment removal. b) The catchment filled with sediment after a high intensity thunderstorm.

KEY POINTS

- Major advances in our understanding of post-fire erosion control treatment effectiveness are helping managers make better decisions.
- The Hayman hydromulch treatment did not significantly affect runoff and sediment yields. The wheat straw mulch treatment significantly reduced peak flow rates and sediment yields at the Hayman fire.
- The applied hydromulch had limited residence times on the ground whereas the total ground cover stayed high in the straw mulch catchment – in general, the effects of these mulches on sediment yields corresponds with their longevity.

MORE INFORMATION

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