



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2004MT33B

Title: Quantitative assessment of the effectiveness of post-fire erosion control techniques

Project Type: Research

Focus Categories: Quantitative assessment of the effectiveness of post-fire erosion control techniques

Keywords: soil erosion, forest fire, burn-area emergency rehabilitation

Start Date: 03/01/2004

End Date: 02/28/2005

Federal Funds: \$6,680

Non-Federal Matching Funds: \$13,369

Congressional District: At large

Principal Investigators:

Scott Woods
University of Montana

Tom Deluca
The University of Montana

Abstract

Soil erosion rates in undisturbed forested watersheds are typically very low. However, substantial increases in erosion rates have been observed after forest fires due to the loss of the protective duff layer, and changes in the soil physical characteristics that increase the rate of surface runoff. Increased erosion rates are a concern due to the loss of soil productivity, and the ecological impacts of increased sedimentation in downstream water bodies. Various approaches have been used to reduce the adverse impacts of post-fire erosion, including: 1) hillslope treatments such as seeding, mulching and straw wattles, 2) in-stream treatments such as straw bale and log check dams, and 3) road rehabilitation treatments such as upgrading of culverts and ditches. Hillslope treatments are regarded as the most beneficial because they control erosion near the point of origin, thus reducing the probability that eroded soil will reach downstream water bodies. The costs associated with implementing post-fire erosion control projects are extremely high, so it is essential that these projects employ only the most effective treatments. However, few studies have

assessed the effectiveness of individual treatments, and even fewer have included quantitative measures of treatment effectiveness.

The purpose of our research is to quantitatively evaluate the effectiveness of two commonly used hillslope erosion control treatments, aerial seeding and straw mulching, for reducing post-fire erosion. The specific objectives are to: 1) compare the effectiveness of aerial seeding and mulching for reducing plot-scale erosion rates, and 2) determine the effect of site factors (slope, soil texture etc.) on the effectiveness of aerial seeding for reducing hillslope-scale erosion rates. This ongoing study began in May 2002, and we have obtained one year of data from study sites in an area burned by the 2002 Fox Creek fire in northern Montana. We are using a rainfall simulator to compare erosion rates from 0.5 m² plots that have been treated with aerial seeding or straw mulching to untreated control plots. An observational study is assessing the effect of slope, soil type, percent cover, and soil organic content on the effectiveness of aerial seeding in reducing erosion rates from hillslope-scale plots. The project is funded through May 2004 by a 104(b) grant from the Montana Water Center. This proposal requests support to collect a second year of data in order to assess the longer-term effectiveness of the treatments. The results of our research will provide much needed quantitative data on the effectiveness of two commonly used post fire erosion control techniques, and will thus help land managers to select more efficient erosion control treatments.