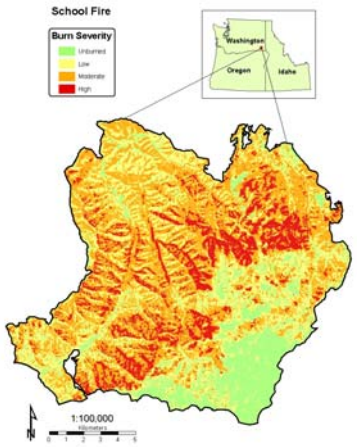
Assessing soil and vegetation recovery following the 2005 School Fire, Umatilla National Forest

SCHOOL FIRE

2008 Progress Report

Introduction



Following the 2005 School Fire which burned ~ 50,000 acres across forest and grasslands, managers were particularly concerned with treating severely burned areas to control soil erosion and to mitigate weed spread. Various mulching treatments were implemented to control erosion on steep slopes above the Tucannon River Canyon. An unprecedented native seed application provided a unique opportunity to monitor the effects of seeding on native plant recovery, weed spread, and erosion control. Our research team is using a combination of field-based and remotely sensed techniques to detect and monitor vegetation response and weed spread. We have been monitoring and sampling field sites since 2005 and will continue through 2010.

Our research projects, funded by the USDA/USDOI Joint Fire Science Program, aim to answer the following questions:

- ✓ How do weeds respond to varying degrees of burn severity?
- ✓ How does vegetation respond to post-fire erosion control treatments? To salvage logging?
- ✓ How do post-fire treatments affect soil biology such as microbial activity?
- ✓ How effective are post-fire treatments at reducing erosion? Are there other factors besides soil erosion that need to be considered when prescribing post-fire mitigation treatments?

Weed response to fire and post-fire treatments

Ground-based monitoring of soil and vegetation response

- Thus far, we have seen some increased weed presence in the burned area
- Areas that historically had heavy human and machine traffic from camping, grazing, logging, etc. are the areas where we have seen the greatest weed response
- Vegetation abundance continued to increase during the third post-fire growing season
- Seeded areas have high native grass cover which may preclude invasion of weeds, but may also be limiting native forb, shrub, and tree seedling growth
- Wheat and wood straw mulch treatments provide the best immediate erosion control; however wood straw decomposes slowly and may inhibit long-term vegetation recovery
- Vegetative species composition appears to be different between the mulched sites – longer term monitoring will attempt to determine the cause and significance of these differences
- Vegetation monitoring will continue for two more growing seasons (through 2010) to monitor weed response to fire, and overall vegetation response to salvage logging and post-fire rehabilitation treatments

Remotely sensed monitoring of post-fire vegetation and mulch treatments

- We found several weedy species on national forest and state land; most are in non-forested openings
- Weeds spreading from known sources are being monitored and will be mapped
- We mapped weed, native vegetation, and mulch treatment patches (4 to 100 m^2) on the ground to test remotely sensed image detection
- Wood and wheat straw were detectable and mappable in the remotely sensed imagery, indicating the likely potential for mapping similar sized patches of vegetation
- Quickbird satellite imagery was found to be a suitable substitute for mapping postfire burn severity and based on our findings may be used immediately postfire if Landsat data are not available on future fires

Effectiveness of post-fire treatments at reducing erosion

- Low-intensity and infrequent rainfall events since the fire have resulted in lower than expected sediment accumulation in silt fences on severely burned steep slopes above the Tucannon River

- 2008 annual total erosion by treatment was: 0.04 tons/acre (control), 0.003 (hydromulch), 0.03 (seeded), 0.003 (wheat straw) and 0.01 (wood straw)
- Erosion decreased from 2007 by 80% (control), 97% (hydromulch), 85% (wheat straw), 50% (wood straw), and 50% (seeded)
- Estimates of total ground cover (vegetation plus litter and remaining mulch) were 62% (control), 87% (hydromulch), 87% (seeded), 91% (wheat straw), and 90% (wood straw).
- Total ground cover is high on all treated sites, independent of mulch type. The minimal amount of exposed mineral soil (~10%) likely contributed to lower rates of erosion.
- Three years after fire, low erosion rates and high ground cover suggest that these treatments may have been effective in reducing the immediate vulnerability of these sites. Further monitoring and evaluation will allow us to address nuances in soil and vegetation response to severe fire and to these treatments.

Work in progress

In 2008 we:

- Relocated plots that had been disturbed by the salvage logging operation and resampled ~200 sites in summer of 2008 (June-July) to assess the second-year vegetation response
- Monitored 35 silt fences for erosion, and collected sediment in the spring and fall
- Led one field trip for UNF managers and scientists to update them on our latest findings and discuss the need for longer term monitoring, especially on the salvaged and mulched sites
- Presented preliminary results on: 1) our success using QuickBird imagery for mapping burn severity at the Forest Service RSAC biennial meeting, and 2) vegetation response to mulch treatments applied for erosion control at the Association for Fire Ecology's Southwest Meeting – also preparing an invited manuscript that includes these preliminary results

As a result of extended funding received from the Umatilla National Forest, in we will:

- Continue field monitoring of treated, untreated, and salvaged sites through the 2010 growing season
- Provide updated reports and have annual meetings with land managers to report our progress and findings

For more information

RMRS Moscow website: http://forest.moscowfsl.wsu.edu/

Who We Are

We are Forest Service Rocky Mountain Research Station and University of Idaho researchers working in cooperation with managers of the Umatilla National Forest and the Washington Department of Natural Resources and Department of Fish and Wildlife

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