# Post Wildfire Erosion and Flooding Risk Mitigation and the Effects of Hillslope Soil Treatments


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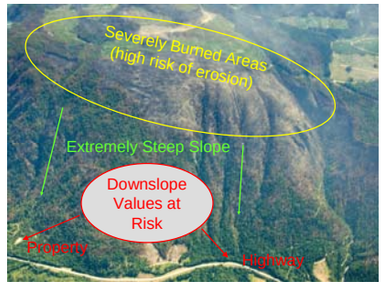
## Introduction

Ecosystem restoration through fuel management, prescribed fire and even some invasive plant programs may reduce fuels and the potential severity of wildfires. The severe 2003 fire season in BC resulted in major erosion and mass movement incidents on several interface fires, a phenomenon that had not previously been as extensively documented in BC.

Severe fires occur when the soils and fuels are very dry, resulting in higher burn severity on the soil and subsequent increased risk of post-wildfire erosion and flooding. A new risk analysis and mitigation program is being implemented by the BC Forest Service with the help of the US Forest Service. Where warranted by risk, treatments to reduce post-wildfire erosion are currently being applied and tested on the severely burned areas of the Springer and Sitkum fires in the West Kootenays.

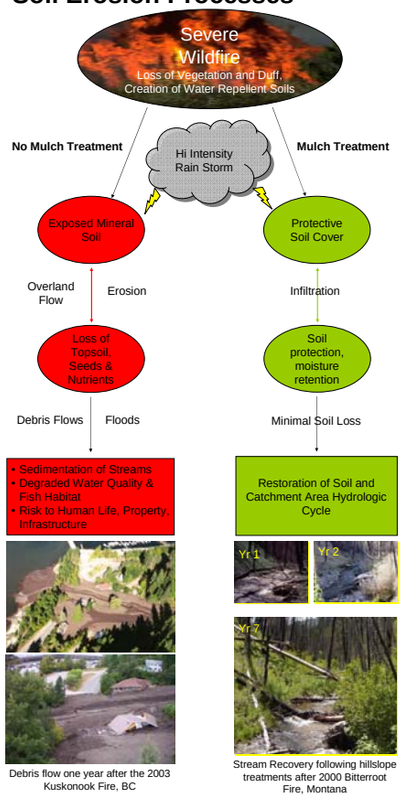
Broadcast straw mulching from helicopters is the main treatment being used to prevent erosion and flooding on these fires. Test plots have also been installed using other products including broadcast seeding, WoodStraw™ and pulp wood chips. The use of reforestation is a consideration where there is high risk of snow avalanche or long-term slope stability hazard as a result of the fire.

Start of Springer Fire July 29, 2007




2007 Springer Burn – Near Slocan, BC

## Soil Erosion Processes




Debris flow one year after the 2003 Kuskonook Fire, BC

Stream Recovery following hillslope treatments after 2000 Bitterroot Fire, Montana

## Mitigation Treatments

**Heli-Mulching** - bales dropped from a cargo net

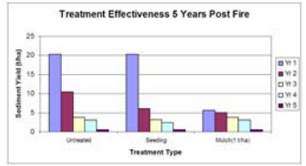
- Immediate ground cover
- Slows down surface flow
- Increases soil infiltration
- Several years of effectiveness

**Straw**
- May contain weed seeds
- Can blow away in wind
- Limited availability until fall
- Large quantities ship from prairie provinces
- Inexpensive

**WoodStraw™**
- No weed seeds
- Available year-round
- Not produced in Canada
- Expensive

**Heli-seeding** or seeds in the straw germinate and produce temporary green cover

| Pros | Cons |
|---|---|
| • Roots hold soil in place after establishment<br>• After first year, dead material acts as mulch<br>• Low weed content<br>• May regenerate in yr 2 | • **May contain weed seeds**<br>• Can wash away<br>• Ineffective in 1st year<br>• Can inhibit native species |




ERMiT Model results for hillslope similar to Springer Creek (Slocan, BC) – Potential results of various mitigation treatments. Notice the effectiveness of mulch treatments in the first year.

## Monitoring

Control plot with no mulch (approx. sediment yield 0.9 t/ha light rain events)

Plot mulched with straw (no erosion event on plot)

Effectiveness monitoring of mulch is required to ensure treatment success and document cost/benefit of these new mitigation efforts. Silt fences are being constructed for initial budgeting and logistics trial and to test effectiveness of the operational treatments.

The introduction of weeds from straw mulch is a concern which will also be monitored in the years following treatments.

In addition, an FIA funded, Forest Science Program research project has been funded and the authors of this poster are studying the soil processes affecting overland flow, erosion, downslope sedimentation, and debris flows and floods.

## Future Considerations

The immediate objective of the treatments is to reduce the risk of potential landslides and debris flows that could damage human life and property. This requires rapid and effective assessment and application of treatments.

Future fuel management and ecosystem restoration activities should be considered in urban interface areas, not just to protect homes from fire, but also to reduce the potential of high severity fire, and the after-effects related to erosion and flooding.

Further research in this field will continue to provide managers with information and tools necessary to address these issues.

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## Acknowledgments


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## Further Information

- This poster was presented at the Columbia Mountain Institute, Restoration Ecology Conference in Cranbrook, B.C. Oct 11-13, 2007
- Reports and Maps and related publications, can be found at http://www.for.gov.bc.ca/ftp/rsi/external/!publish/Wildfire%20Erosion
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