

Measuring Hillslope Erosion with Silt Fences



Cleaning out sediment first year, 2002 Hayman fire, Pike-San Isabel National Forest.

Measuring hillslope erosion has historically been a costly, time-consuming practice. An easy to install low-cost technique using silt fences (geotextile fabric) and tipping bucket rain gauges to measure onsite hillslope erosion was developed and tested. Equipment requirements, installation procedures, statistical design, and analysis methods for measuring hillslope erosion are discussed. The use of silt fences is versatile; various plot sizes can be used to measure hillslope erosion in different settings and to determine effectiveness of various treatments or practices. Silt fences are installed by making a sediment trap facing upslope such that runoff cannot go around the ends of the silt fence. The silt fence is folded to form a pocket for the sediment to settle on and reduce the possibility of sediment undermining the silt fence. Cleaning out and weighing the accumulated sediment in the field can be accomplished with a portable hanging or platform scale at various time intervals depending on the necessary degree of detail in the measurement of erosion (that is, after every storm, quarterly, or seasonally). Silt fences combined with a tipping bucket rain gauge provide an easy, low-cost method to quantify precipitation/hillslope erosion relationships. Trap efficiency of the silt fences are greater than 90 percent efficient, thus making them suitable to estimate hillslope erosion.



Installing silt fences to monitor the effectiveness of hydromulch after the 2003 Myrtle Creek fire, Idaho Panhandle National Forest.



Full fence after the 2000 Bitterroot Valley fires.

Key reference for silt fence installation and analysis:

- [Silt Fences: An Economical Technique for Measuring Hillslope Soil Erosion](#) (PDF) by P.R. Robichaud and R.E. Brown

Interactive spreadsheet files for silt fence statistical analysis in Microsoft Excel format:

- [Silt fence stat analysis](#)
- [Silt fence appendix examples, E, F & G](#)

Other publications regarding silt fence usage and data collection:

- "The efficiency of silt fences used in hillslope erosion studies" [[ASAE PDF](#) or [ASAE HTML](#)] (subscription)
- "What happened after the smoke cleared: onsite erosion rates after a wildfire in eastern Oregon" [[PDF](#) or [HTML](#)]
- [Upper South Platte Watershed Monitoring Study](#)



Cleaning sediment after the 1998 North-25 fire in the Wenatchee National forest.



Comparing the effectiveness of a straw waffle after the 2000 Bitterroot Valley fires.

Requester/Organization/Location	Questions Being Studied	Date
Hot Creek fire, Boise NF	Postfire treatment effectiveness--flow check	2003
Myrtle Fire, Idaho Panhandle NF	Postfire treatment effectiveness--hydromulch	2003
Roberts Fire, Flathead NF	Postfire treatment effectiveness--surfactants	2003
Hayman Fire, Pike-San Isabel NF	Postfire treatment effectiveness--wood straw	2002
Rodeo-Chediski Fire		
F. Sandberg, Sho Lo High School	Postfire treatment effectiveness	2002
S. Moore, BLM-Oregon	Postfire treatment effectiveness	2002
Dr. S. Wondzell, OSU	Hillslope erosion from Rx fire--JFSP funded	2002
L. Wasniewski, Deschutes NF	Monitoring BAER treatment effectiveness and salvaging logging effects	2002
E. Grote, USGS-BRD, Moab, UT	Measure canyon road traffic effects	2001
C. Hermandorfer, Uinta NF W. Christian	Hillslope erosion from various burn severities	2001
Dr. F. Smith, Watershed Science, CSU	Hillslope erosion from various burn severities	2000
G. Orton, Umpqua NF	Hillslope erosion from various burn severities	2000
Dr. J. McIvers, PNW	Salvage logging effects	2000



Silt fence installation and completion, after the 2003 Hot Creek fire, James Creek, Atlanta -- comparing to the effectiveness of straw mulch.