

## **Soil Report for the Silverado Fire Cleveland National Forest**

### *Amendment 1 to Soil Report Dated September 2014*

#### Observation and Findings

In addition to providing a distribution of post-fire runoff event sediment delivery rates, ERMiT also provides post-fire runoff event sediment delivery rates for hillslopes that have been treated with seeding, straw mulch, straw wattles, and contour-felled log erosion barriers. ERMiT's "event sediment delivery exceedance probability" output can help managers decide where, when, and how to apply treatments to mitigate the impacts of post-wildfire runoff and erosion on life, property, and natural resources (Robichaud et al, 2007).

As stated in the original soil report, erosion rate estimates based upon a 50 percent chance of exceedance, i.e., 2 year precipitation event, for the 1<sup>st</sup> year following the fire are approximately 31 tons per acre as compared to normal background erosion rates of 2 to 3 tons per acre. Since the release of the original soil report, additional information and site visits have been conducted that warrant an updated ERMiT model run considering expanded input parameters, e.g., slope, soil burn severity, exceedance probability, and land treatment options for the 183 acre "Subwatershed C" as delineated in the Hydrology Assessment prepared by E. Fudge (September 12-22, 2014).

#### **Treatments to Mitigate the Emergency**

Land treatments stabilize burned areas by preventing or reducing fire's adverse effects. They foster recovery by providing soil cover and reducing erosion, trapping sediment and reducing sedimentation, and/or reducing water repellency and improving infiltration (Napper 2006). When considering the steep slopes, soil burn severity, local weather conditions, and existing surface roughness, wood shred mulch is recommended as a possible land treatment that best responds to the potential threats or hazards resulting from the Silverado Fire. Wood shred mulch provides immediate ground cover and can effectively mitigate or lessen potential post-wildfire increases in runoff, flooding, and erosion under certain conditions.

Within the 183 acre Subwatershed C, a 62 acre area along the western edge of the subwatershed has been identified as a possible candidate area for treatment with wood shred mulch (1.5 tons ac<sup>-1</sup>). The updated ERMiT model inputs as compared to the original ERMiT inputs reflect changes in hillslope gradient (50% to 60%) and soil burn severity (moderate to low). The remaining ERMiT inputs remain unchanged, e.g., climate, soil texture (sandy loam), rock content (40%), vegetation type (range, 94% shrub, 6% grass), and hillslope length (1000'). The results are shown in Table 1 and Figure 1.

Table 1. Amended ERMiT results with expanded model inputs and mulching treatment option.

ERMiT (2007) Probability that sediment yield will be exceeded (%)	Sediment Delivery year following fire, (tons ac <sup>-1</sup> ) (amended-untreated / amended-treated)				
	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year	4 <sup>th</sup> Year	5 <sup>th</sup> Year
2 (50 year event)	216.14 / 95.69	172.99 / 83.17	83.17 / 83.17	83.17 / 83.17	83.17 / 83.17
4 (25 year event)	173.23 / 14.68	119.99 / 35.07	47.95 / 47.95	35.62 / 35.62	17.19 / 17.19
10 (10 year event)	110.29 / 8.35	70.95 / 10.97	22.90 / 22.90	14.11 / 14.11	8.75 / 8.75
20 (5 year event)	70.06 / 6.50	35.98 / 7.07	11.19 / 11.19	8.43 / 8.43	6.85 / 6.85
50 (2 year event)	22.28 / 3.44	7.15 / 3.35	4.16 / 4.16	3.60 / 3.60	3.40 / 3.40

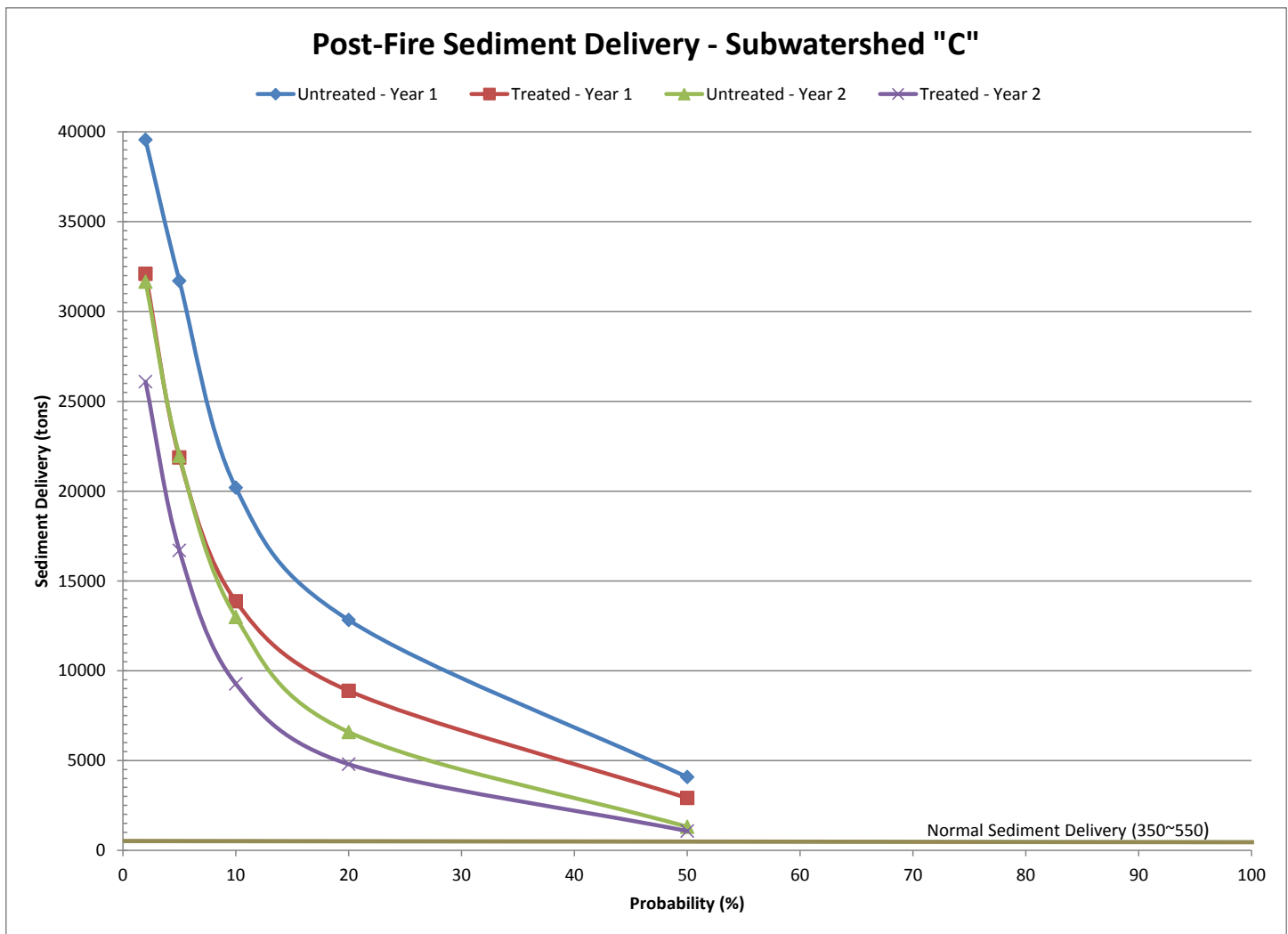


Figure 1. Post-fire sediment delivery for Subwatershed "C" based upon no land treatment versus mulch treatment option.

## Summary

The use of wood shred mulch as a land treatment will reduce the volume of sediment delivered off of Subwatershed "C" between 18 to 31 percent for each of the first 2 years post-fire and 34 to 74 percent for the first 2 years combined. Using wood shred mulch land treatment, the modeled sediment delivery is approximately 8 times higher than natural background levels following a 2 year precipitation event in year 1 and 39 times higher following a 10 year precipitation event in year 1. As expected, year 2 is lower but a 2 year precipitation event still results in sediment delivery approximately 3 times higher than background levels and approximately 26 times higher following a 10 year precipitation event.

Wood shred mulch will reduce the amount of sediment delivered off of Subwatershed "C", but is not likely to be enough of a reduction within the first 2 years post-fire to lessen the risk level to human life and property of the homes nearby the outlet of Subwatershed "C". All previous treatment recommendations should remain in effect including working closely with the community of Silverado, Orange County including the "AlertOC" early emergency warning program, and other necessary public and private stakeholders.