

West Fork Fire Complex Experimental Soil Stabilization Plots - Summary Report

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Background:

In the summer of 2013, the West Fork Fire Complex burned over 100,000 acres of forest in the upper Rio Grande watershed. The complex of three fires were ignited naturally by lightning strikes and spread easily due to dry and windy conditions. The West Fork Fire Complex denuded hill slopes of vegetation and changed soil properties that affect watershed hydrology and sediment-transport processes, thus increasing the probability and magnitude of flood and debris flows. In order to investigate different methods to provide ground cover and increase soil water holding capacity in order to improve vegetative cover and reduce hill slope erosion, the Rio Grande Headwaters Restoration Project (RGHRP) and the Rio Grande Watershed Emergency Action Coordination Team (RWEACT) partnered to install and monitor 10 experimental soil stabilization test plots in the West Fork Fire Complex burn area.

Methods:

Test plots were installed at two sites in the West Fork Fire Complex burn area. Site 1 has a slope of 42%, is located on private land and is not grazed by livestock. Site 2 has a moderate slope, is on US Forest Service Land, and is grazed by cattle. Each site contains 5 test plots with each plot receiving a different soil stabilization treatment. These treatments are summarized in the table below.

SUMMARY OF TREATMENTS FOR THE WEST FORK FIRE COMPLEX SOIL STABILIZATION PLOTS					
Site 1 - 42% Slope, no livestock grazing					
	Hydro Mulching	Mulch Pellets	Wood Straw Mulch	Seeding	Control
Dimensions	200'x50'	200'x50'	200'x50'	200'x50'	200'x50'
Seed Rate	20 lbs/acre	20 lbs/acre	20 lbs/acre	20 lbs/acre	No Seed
Mulch Type	Terra Novo EarthGuard Fiber Matrix,	Terra Novo EarthGuard Edge	Mountain Pine Manufacturing, Wood Straw	No Mulch	No Mulch
Mulch Rate	2000 lb./acre	5000 lb./acre	applied at a rate of 216 bales per acre with a goal of 60% ground cover.	No Mulch	No Mulch
Site 2 - Moderate Slope, livestock grazing					
	Hydro Ax	Hydro Mulching	Wood Straw Mulch	Mulch Pellets	Control
Dimensions	200'x50'	200'x50'	200'x50'	200'x50'	200'x50'
Seed Rate	20 lbs/acre	20 lbs/acre	20 lbs/acre	20 lbs/acre	No Seed
Mulch Type	Rue Logging Hydro Ax	Terra Novo EarthGuard Fiber Matrix, sprayed	Mountain Pine Manufacturing, Wood Straw	Terra Novo EarthGuard Edge	No Mulch
Mulch Rate	N/A	2000 lb./acre	applied at a rate of 80 bales per acre with a goal of 40% ground cover.	4000 lb./acre	No Mulch

Ground cover for each test plot was measured using the line-transect method, which involves stretching a line across the test site and recording what material intersects the line at specified points. For this study, a 100 ft tape measure was stretched lengthwise along the plot and ground material (bare ground, litter, rock, mulch, plant species) was recorded at each foot marker. To avoid error, measurements were read from the same side of the tape each time.

For our initial sampling in October 2013, one line-transect was ran through the middle of each test plot. However, to increase the statistical power and validity of this study, we modified the protocol for the May 2014 sampling and future sampling to include three, evenly distributed line-transects throughout each plot. The data collected from these three transects were averaged to get a more accurate sample of the ground cover in each plot.

Results

Mulch cover in all test plots has decrease over time. This decrease is most significant in the hydromulch plots with mulch cover disappearing almost entirely by the September 2015 sampling. Mulch cover has decreased the least in the wood straw plots and hydro ax plots. Vegetation cover has increased over time in all test pots, except for the Site 1 control plot. Grass cover is significantly higher in plots that received seeding compared to the control plots. The table below shows the results of the most recent sampling.

Results of test plot sampling completed September 15, 2015					
Percent Cover at Site 1 (steep slope, no grazing)					
	Hydromulch	Mulch Pellets	Wood Straw	Seeding	Control
Bare	19.67	15.00	6.67	17.33	35.00
Litter	25.00	12.67	10.67	24.33	26.00
Rock	6.00	6.67	7.33	7.00	11.00
Mulch	2.67	14.00	27.00	0.00	0.00
Forbs	3.00	4.00	0.67	0.67	9.00
Grasses and Grasslikes	30.00	36.00	32.33	26.33	0.67
Trees and Shrubs	8.67	6.33	14.67	23.33	16.33
Moss	5.00	5.33	0.67	1.00	2.00
TOTAL	100.00	100.00	100.00	100.00	100.00
Percent Cover at Site 2 (moderate slope, livestock grazing)					
	Hydromulch	Mulch Pellets	Wood Straw	Hydro Ax	Control
Bare	47.67	36.67	25.67	29.33	42.67
Litter	28.00	24.67	22.00	7.67	18.33
Rock	0.00	0.33	0.00	0.00	0.33
Mulch	0.00	6.67	16.67	34.67	0.00
Forbs	2.00	4.00	8.00	3.33	13.33
Grasses and Grasslikes	16.00	22.67	22.33	24.00	15.67
Trees and Shrubs	4.67	3.33	5.33	1.00	9.67
Moss	1.67	1.67	0.00	0.00	0.00
TOTAL	100.00	100.00	100.00	100.00	100.00

Photo comparison of test plots over time
Site 1 - Wood Straw Plot



October 2013



September 2014



September 2015

Photo comparison of test plots over time
Site 2 - Wood Straw Plot



October 2013



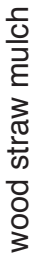
September 2014



September 2015

Change in Ground Cover Over Time in Experimental Plots

Site 1



Site 2



KEY

 vegetation

- mulch

■ bare

 litter

Attachment 1: Species Composition in Experimental Soil Stabilization Plots

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