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Down and Dead Woody Fuel Report

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Introduction

The mechanical fuel reduction & utilization demonstration project was targeted at the small diameter trees between 1 and 10 inches dbh. In the coniferous forests of the west these trees are a component of the fuel ladders that can link a ground fire to the overstory trees and cause a canopy fire. There is concern that the mechanical treatment of only the small trees will increase the surface fuel load especially in the smaller particle size classes (0.25- 1.0 inches) that are most flammable.

The mechanical fuel treatment used during the demonstration project generally consisted of an initial mastication of brush, accumulated down woody debris and small trees that could not be processed for lumber. The mastication was conducted using a ASV4520 with a Davco BC705 Brush Cutter. Following mastication those trees that could be processed for lumber were removed with a mechanized tree cutter sometimes referred to as a "hotsaw". These trees ranged from 5 inches to 10 inches dbh. Following the tree harvest the area was masticated a second time targeting the limbs and tops of the harvested small trees. At two of the demonstration sites the harvested trees were chipped instead of being milled for lumber. At these locations the trees were whole tree skidded leaving no limbs or tops and there was little pre-existing surface fuel so no mastication was performed.

Prior to treatment the dead and down woody fuels were assessed using the planar intercept method (Brown, 1974).

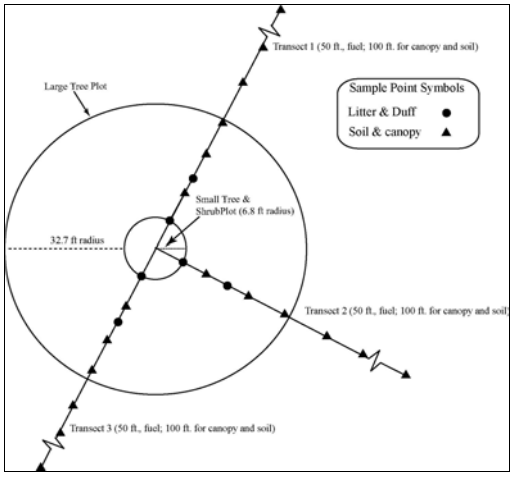

Figure 1. Plot layout illustrating fuel transects.

Methods

The planar intercept method was used to monitor down woody fuels prior to and following the fuel reduction treatment. At each of the demonstration sites one-tenth acre plots were established to sample a number of forest variables. Typically one plot was established for each acre of treatment. Three 50 foot transects were established at each plot for fuel sampling (Figure 1).

The first transect was located randomly by referencing the second hand on a wrist watch upon arrival at the plot and converting the seconds to degrees, i.e. 15 seconds would result in a fuel transect located 90 degrees from north. The second and third transects were located 90 degrees from the previous transect. Techniques described by Brown (1974) were then used to estimate fuel loading in the 1, 10, and 100 hour fuels. Duff and litter was also measured using the methods developed by Brown. Fuel depth was not measured during the sampling.

Transect data was analyzed using Fuel Management Analyst Plus (version 1.2.20).

Results

The pre- and post-treatment fuel assessment results are presented in Table 1 and Figure 1. Table 1 shows the fuel load in tons per acre by particle size as well as the sum all particle size classes.

It should be noted that PLU2 and PLU3 were whole tree chipped with no mastication process. It should be further noted that the PLU3 is raked and burned annually by the landowner to control litter accumulation.

Table 1. Pre- and Post-treatment fuel load.

			Fuel Particle Size Class (inches)								
Site	No. of Transects	PRE/POST	0-0.24	0.25-0.9	1.0-2.9	3.0-6.0	6.0-9.0	9.0-20.0	20.0+	Total Fuel (tons per acre)	Ave. Duff Depth
NEV1	9	PRE	0.05	0.75	1.62	0.17	0.38	0	4.17	7.14	1.78
NEV1	9	POST	0.11	1.39	3.24	0.68	2.08	2.08		9.58	2.4
NEV2	9	PRE	0.34	1.45	1.08	0.24	0.69		12.44	16.24	1.97
NEV2	9	POST	0.14	0.48	0.95	0.57	0	0.96	3.84	6.94	1.61
PLU2	15	PRE	0.07	0.49	1.78	0.25	0.21	4.18	3.6	10.58	2.03
PLU2	15	POST	0.13	0.89	1.13	1.02	1.34	3.63	3.66	11.8	1.47
PLU3	9	PRE	0	0	0	1.69	2.23	6.03	0	9.95	0
PLU3	9	POST	0	0	0	0	0	0	0	0	0.08
PLU4_5	8	PRE	0.2	1.73	5.33	1.93	3.73	2.8	25.12	40.84	2.93
PLU4_5	9	POST	0.26	1.39	7.95	2.26	4.37	1.77	19.7	37.7	2.93
SIE1	9	PRE	0.03	0.47	2.65	3.87	6.22	0	0	13.24	2.4
SIE1	9	POST	0.07	1.22	3.24	4.53	6.15	0	4.14	19.35	2.33
		Pre- Treatment Average	0.12	0.82	2.08	1.36	2.24	2.60	7.56	16.33	1.85
		Post-Treatment Average	0.12	0.90	2.75	1.51	2.32	1.41	6.27	14.23	1.80
		Difference	0.00	0.08	0.68	0.15	0.08	-1.20	-1.29	-2.10	-0.05

The mechanical fuel treatment had variable effect on the surface fuels. In terms of the total fuel load it was increased on three sites and decreased on three sites. When averaged for all sites total fuel load was decreased.

Table 2 summarizes the change in fuel load by fuel particle size class. The fuel load in the 0.0 to 0.24 inch particle class was increased on 67 percent of the sites. However the increase averaged 0.055 tons per acre. In the 1.0 to 2.9 inch and the 3.0 to 6.0 inch size class the load was increased on all but one site by 1.61 and 0.52 tons, respectively.

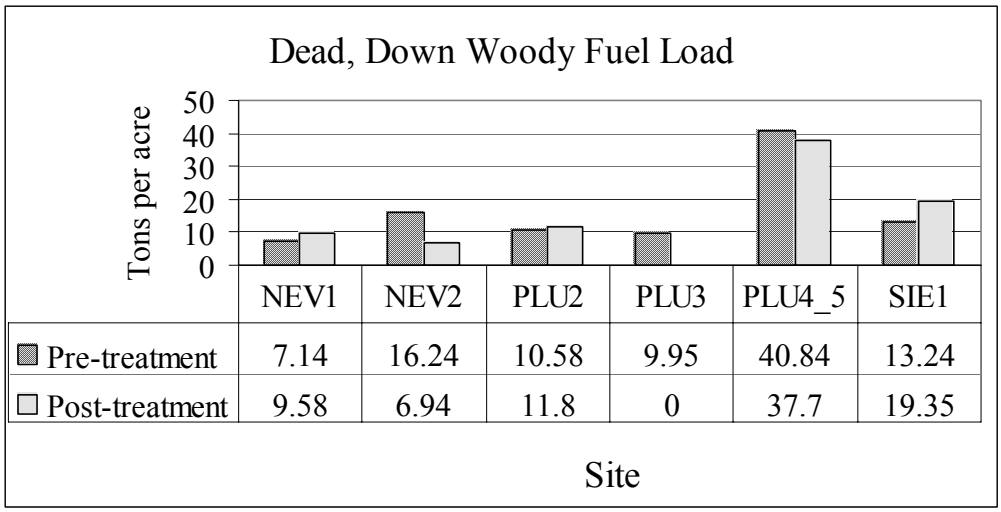

Figure 1 Total down and dead woody fuel in tons per acre pre- and post-treatment.

Table 2 Summary of fuel load change by particle size class.

Particle Size Class (inches)	Average Difference for all Sites	No. of Sites Increased	% of Sites Increased	Average Increase for Sites where Fuel Increased (tons/acre)
0.0-0.24	0.00	4	67%	0.055
0.25-0.9	0.08	3	50%	0.6
1.0-2.9	0.68	5	83%	1.61
3.0-5.9	0.15	5	83%	0.52
6.0-8.9	0.08	3	50%	1.16
9.0-20.0	-1.08	1	17%	-
>20.0	-2.33	2	33%	2.1

Conclusions

Sampling to quantify the down and dead woody fuels both prior to and following the fuel reduction thinning yielded variable results. Overall the fuel load was reduced on half of the sites and increased on the other half of the sites. However, when looking more closely at the individual particle size classes there was an increase in fuel load in the 1.0 to 2.9 inch and the 3.0 to 5.9 inch particle size class on 5 of the 6 sites that averaged 1.61 and 0.52 tons, respectively.

The fuel reduction demonstration focused primarily on decreasing the fuel ladders by thinning small trees between 5 and 10 inches dbh. Brush and trees that were smaller than 5 inches were masticated. The tops and limbs that were masticated would be expected to increase the fuel load in the 0.25 to 1.0 and the 1.0 to 3.0 inch size classes. These fine fuels should be treated with a follow-up treatment that may include prescribed fire. At 3 of the demonstration sites the landowners have performed follow-up treatments that has included raking and burning.

Literature Cited

Brown, J. K., 1974. Handbook for Inventorying Downed Woody Material. USDA Forest Service, Ogden, Utah.