



**Displacement** – Removal of 1 inch or more of surface soil in a 100 ft. sq. area. Observe and measure. Visual or transect.

**Rutting** – Wheel ruts at least 2 inches deep in **WET/SATURATED** soils. Observe and measure. Visual or transect.

**Compaction** – 15% increase in natural bulk density. Observation of management induced platy structure, “j” roots, and hard, dense soils void of vegetation. Measured bulk densities (sandy soils BD >1.85, Coarse-loamy soils BD >1.80, Fine-loamy soils BD >1.70, Coarse-fine-silty BD .1.60, Fine soils BD > 1.50 and Very fine soils BD >1.35). Transect. See Jammer road mitigation level for possible inclusion in the area for compaction.

**Severely Burned** – ash depth and color (white or orange and 2 inches or > in depth high intensity, dark ash of less than 2 inches moderate to low intensity). Litter/duff/consumption (litter singed or not = low intensity, charred but not ashed (can still recognize the material) = moderate intensity, no litter visible, small amounts of ash are on soil surface. Plant root crowns are consumed or heavily damaged = high intensity. Soil crusting or baking (the soil looks and feels like orange clay flower pots) can be observed = high intensity. Observed and measured. Visual or transect.

**Above Ground Organic Matter** - The fine portion (3 in or < such as needles, plant litter, duff) must be in contact with the ground. The coarse portion (3 in or > such as plant stems, branches, logs) must be on the surface of the soil. Ground cover will be the fine and coarse added together **PLUSS** rock fragments larger than .75 inches (1.95 cm) in diameter in contact with the soils surface. Observed and measured. Transect.

**Surface Erosion Hazard** – Use what is in the LSI.

**Mass Movement Potential** – Use what is in the LSI.

**Coarse Woody Debris** – Average CWD should be 5 to 35 t/a depending on the habitat type. Because of the fire concern, (large woody debris of 25 to 30 t/a in conjunction with small woody debris of 5 t/a is considered heavy fuel loading), Douglas-fir/ninebark should be 4.5 to 9 t/a after thinning. All others range from 7 to 24.

For an estimate of recruitment of CWD from standing dead trees for Ponderosa pine and Douglas-fir, multiply the number of trees per acre by the information in the following table:

DBH	Ponderosa Pine	Douglas-fir	DBH	Ponderosa Pine	Douglas-fir
4	.015	.024	18	1.009	.870
6	.048	.055	20	1.334	1.131
8	.107	.114	22	1.714	1.435
10	.196	.200	24	2.151	1.782
12	.332	.316	26	2.648	2.174
14	.511	.465	28	3.208	2.614
16	.736	.649	30	3.832	3.104

## References

National Soil Survey Handbook 11.1993, 618 – 1 to 77.

Forest Service Handbook 2509.13, Burned Area Emergency Rehabilitation Handbook 1.12.1995, pg. 7-12.

Forest Service Manual 2500, Watershed and Air Management, R-1 Supplement No. 2500-99-01.

Brown, James K. and Reinhardt, Elizabeth D, "Coarse Woody Debris and Succession in the Recovering Forest". 2001.

BEAR Soil report by Sirucek for the Alpine, Upper Nine Mile, Flat Creek and Landowner fires of 2000 on the Lolo NF, Superior Ranger District.

USDA Natural Resource Conservation Service Soil Quality Information Sheet, "Soil Quality Resource Concerns: Hydrophobicity, pg. 1-2, June 2000. Web site <http://www.statlab.iastate.edu/survey/SQI/>.

USDA Forest Service Pacific Northwest Station, PNW-GTR-463, Sept. 1999, "The Effects of Thinning and Similar Stand Treatments on Fire Behavior in Western Forests", Graham, Russell T., Harvey, Alan E., Jain, Threasa B. and Tonn, Jonalea R. pg. 21-22

The Woody Debris Resource on the Lolo NF, Aug. 9, 1996.

USDA FS, Intermountain Research Station, Research Paper INT-RP-477, Sept. 1994, "Managing Coarse Woody Debris in Forests of the Rocky Mountains". Graham, Russell T., Harvey, Alan E., Jurgensen, Martin F., Jain, Threasa B. and Tonn, Jonalea R., Page-Dumroese, Deborah S.

Lolo NF Dead and Down Habitat Components Guidelines, June 1997.

Personal contact with Laurie S Porth and Rudy M. King, Statistics Unit USDA Forest Service Rocky Mountain Research Station. Fort Collins, CO 80526-2098

**Soil productivity** – Focus on those areas of concern. These include, but are not limited to areas of high surface erosion hazard, high mass movement hazard, large areas (> or = 100 sq ft) of Hydrophobicity, and severely burned areas. But keep in mind that long term soil productivity has a time frame of 20 to 70 years on the short end of things.

Soil Transect Summary Sheet 3.4.02							
Fire	Transect	Road Number	Soil Burn Severity	LSI	LSI Acres	Cutting Unit	Equipment Type
Landowner	Lo1	250	High	61MD	329	*	*
	Lo2	37189	High	30MC	303	2715	Chopper
	Lo3	7789	Unburned	32QA	1804	*	*
Fire	Transect	Road Number	Soil Burn Severity	LSI	LSI Acres	Cutting Unit	Equipment Type
Alpine	AI1	37261	Mod	30QE	776	•	*
	AI2	536	Mod	64MC	780	905	Sky line
	AI3	5475	Mosaic	43QA	181	153	Sky line
	AI4	536	Sever	30QE	776	*	•
Fire	Transect	Road Number	Soil Burn Severity	LSI	LSI Acres	Cutting Unit	Equipment Type
Nimemile	9M1	18008	Mosaic*	30MC	1014	*	*
	9M2	5498	High	15JB	4212	*	*
	9M3	34048	High	30MC	1014	*	*
	9M4	34048	High	64MC	81	*	*
	9M5	18008	High	30QE	458	*	*
	9M6	18102	Mod	30QE	458	*	*
	9M7	5498	Mod	15JB	4212	*	*
	9M8	18139	Mod	33UA	2209	*	*
	9M9	18102	Mod	32QA	1014	*	*
	9M10	5572	Low	33UA	2209	*	*
	9M11	17281	Mosaic	30QE	2792	*	*
	9M12	5498	Low	15JB	4212	*	*
Fire	Transect	Road Number	Soil Burn Severity	LSI	LSI Acres	Cutting Unit	Equipment Type
Flat Creek	FC1	7757	High	64MD	232	*	*
	FC2	7757	High	64MB	176	*	*
	FC3	7873	Mod	64MC	812	1203	Sky line
	FC4	18546	High	60MD	338	2209	Sky line
	FC5	7873	High	30ME	162	2209	Sky line
	FC6	37122	High	30MB	256	*	*
	FC7	540	Mosaic	60MA	513	*	*
	FC8	47039	Mosaic	64MC	118	*	*
	FC9	18546	Unburned	64ME	110	*	*
	FC10	16975	Mod	30MC	140	*	*
	FC11	7873	Mosaic	24JA	703	*	*
	FC12	7873	low	32QA	4404	*	*
	FC13	540	Mosaic	64MB	251	*	*
	FC14	16976	Unburned	24JA	703	*	*
	FC15	18739	Mosaic	64MD	232	*	•

Soil Transect Summary Sheet 3.4.02

Fire	Transect	Road Number	Soil Burn Severity	LSI	Cutting Unit	Equipment Type
Landowner	328 Lo1	250	High	61MD	*	*
July 28 <sup>th</sup> 1804	303 Lo2	37189	High	30MC	2715	Chopper
	Lo3	7789	Unburned	32QA	*	*
Fire	Transect	Road Number	Soil Burn Severity	LSI	Cutting Unit	Equipment Type
Alpine	776 A11	37261	Mod	30QE	*	*
Aug 12	780 A12	536	Mod	64MC	905	Sky line
	181 AL3	5475	Mosaic	43QA	153	Sky line
	776 A14	536	Sever	30QE	*	*
Fire	Transect	Road Number	Soil Burn Severity	LSI	Cutting Unit	Equipment Type
Nimemile	1019M1	18008	Mosaic*	30MC	*	*
4212	9M2	5498	High	15JB	*	*
Aug 30 <sup>th</sup> 1	1019M3	34048	High	30MC	*	*
508	819M4	34048	High	64MC	*	*
	459M5	18008	High	30QE	*	*
458	9M6	18102	Mod	30QE	*	*
4212	9M7	5498	Mod	15JB	*	*
2209	9M8	18139	Mod	33UA	*	*
1014	9M9	18102	Mod	32QA	*	*
2209	9M10	5572	Low	33UA	*	*
2792	9M11	17281	Mosaic	30QE	*	*
4212	9M12	5498	Low	15JB	*	*
Fire	Transect	Road Number	Soil Burn Severity	LSI	Cutting Unit	Equipment Type
Flat Creek	232 FC1	7757	High	64MD	*	*
Aug 4 <sup>th</sup> 11	76 FC2	7757	High	64MB	*	*
	612 FC3	7873	Mod	64MC	1203	Sky line
338	FC4	18546	High	60MD	2209	Sky line
762	FC5	7873	High	30ME	2209	Sky line
256	FC6	37122	High	30MB	*	*
513	FC7	540	Mosaic	60MA	*	*
118	FC8	47039	Mosaic	64MC	*	*
110	FC9	18546	Unburned	64ME	*	*
140	FC10	16975	Mod	30MC	*	*
703	FC11	7873	Mosaic	24JA	*	*
4404	FC12	7873	low	32QA	*	*
251	FC13	540	Mosaic	64MB	*	*
703	FC14	16976	Unburned	24JA	*	*
232	FC15	18739	Mosaic	64MD	*	*

just off rd. not on prw.  
 just end of rd. not on prw.  
 draped could not find sec. off prw.