

REPLY TO: 2550 Soil Management

SUBJECT: Soil Monitoring on Dead French Timber Sale

TO: District Ranger, Elk City R.D.

Enclosed is my report on soil conditions of two harvest units in the Dead French Timber Sale area. Unit 7 was clearcut on snow with no site preparation (broadcast burning is anticipated). Unit 1 was clearcut with adverse skidding in summer and dozer piled in late summer or early fall. Soil damage was defined for this report by using standards well accepted in Region 6. Soil damage in Unit 7 does not significantly exceed the 20 percent threshold defined in the Forest Plan. Soil damage in Unit 1 occurred over about 38% of the unit. This significantly exceeds the 20 percent threshold.

Dozer piling appeared to be responsible for this increase in extent of soil damage. A site factor increasing the extent of soil damage was soil wetness near a draw. Inspection of site vegetation and soils could identify areas of wet soils most susceptible to damage by dozer piling.

Another important factor influencing extent of soil damage by dozer piling is how well the operator and administrator understand each other and have a set of well defined objectives. These can address minimizing soil damage while achieving fuel and site prep prescriptions. A series of photos or on the ground demonstrations would be useful to show good and bad conditions for soil conditions, fuels management and site prep.

Special thanks to George Regas and Mike Smith for their interest and cooperation in this project. The Elk City District has consistently invited review of timber operations to evaluate effects on the soil and water resources in order to improve management practices.

Please contact me if you have any questions.

Pat Green  
Soil Scientist

cc:P.Green

T28N R8E Sec 4 SW1/4(SW1/4) - Unit 1

T28N R8E Sec 5 SE1/4 SE1/4 Unit 7

Unit	Elev	Slope	Aspect	LT	HT
Unit 1	4200	10-35%	E	22 A31	Abgr
Unit 7	4800	5-40%	N	22 A31	Abgr

D-8 Dead French T.S. 1988

## SOIL MONITORING PROJECT REPORT

Dead French Timber Sale Area  
Elk City Ranger District  
November, 1987

**Objectives:** To evaluate effects of timber harvest and site preparation practices on the soil resource of representative harvest units within the Dead French Timber Sale area in accordance with the Forest Plan.

To develop soil monitoring methods that yield scientifically credible results in an efficient manner.

**Field Methods:** Two harvest units were selected for sampling to represent typical sites, treatment alternatives and for ease of access. Additional sites including areas with steeper slopes would be useful if time were available.

Sampling methods are adapted from those standard to Region 6 (~~described in Hewes, et al., 1989~~ *each along*). Linear transects were located at random points, with a randomly selected azimuth throughout each harvest unit. Eight transects were placed in each of the two units. Unit 7 is 7 acres in size and Unit 1 is 9 acres.

Percent of each 100 foot transect falling into each of several condition classes was noted. These condition classes are: undisturbed, displaced, deposited, eroded, obviously compacted, puddled, and 'other'.

Compaction was assessed by taking sample cores of soil from 0 to about 4 inch depth at 5 foot increments along each transect. Each core was referenced to the soil condition class it fell in. Twenty to 30 cores of undisturbed soil were taken along 100 foot transects in unharvested areas adjacent to the harvest units to provide a standard bulk density for uncompacted soil.

**Data Summarization:** Soil damage is percent of the unit with surface soil displaced, puddled, obviously compacted (constructed skid trails), eroded, and that part of the 'other' and undisturbed classes that had soils compacted to a bulk density of more than 20 percent above the undisturbed standard. Mean and variance for total soil damage and each damage category were computed for each harvest unit on the basis of transect averages. A t-test was applied to total soil damage value to see if it exceeded the 20 percent standard referenced in the Forest Plan (page II-22). This standard states that a minimum of 80 percent of an activity area shall not be detrimentally compacted, displaced, or puddled upon completion of activities.

**Results:** On Unit 7 total damage averaged 24.5 percent. But a t-test applied to this value indicated that the probability that soil damage does not exceed 20% is more than 15 percent. We cannot say with much confidence that this site sustained soil damage in excess of the Forest Plan standard. Data for Unit 7 are displayed in Table 1.

On Unit 1 total damage averaged 38.2 percent. A t-test of this value indicated that the probability that soil damage does not exceed 20 percent is less than 5 percent. This is a convincing test. Data for Unit 1 are displayed in Table 2.

**Conclusions:** Dozer piling and possibly adverse skidding increased the likelihood that extent of soil damage would be more than 20 percent. Tractor harvest on snow covered ground produced lesser damage, but still close to the 20 percent threshold. In both cases, skidding was not confined to designated skid trails. It would be useful to do the same sampling on harvest units with designated skid trails on similar terrain.

Effects of dozer piling depend on slope, moisture conditions, operator skill and understanding, fuel loading, and the slash prescription. Some of these can be controlled through timing of operation, adjustment of prescription and training of operator and administrator.

I anticipate developing some training tool such as photo guide and/or on the ground workshop, to develop recognition of good ~~to~~ soil damage, and means to achieve man. object. while minimizing eye to soil disturbance

Harvest Unit 7 Data Summary

Transect	Total Damage	Undisturbed	Displaced	Deposited	Obviously Compacted	Puddled	Eroded	Other
1	16.5	85	6	2	0	0	0	7
2	0	70	0	3.5	0	0	0	26.5
3	22	75.5	3	0	0	0	0	21.5
4	24.5	51.5	8.5	2.5	0	0	0	37.5
5	24	45.5	0	.5	0	0	0	53
6	37.5	84	0	8	0	0	0	8
7	33.6	45	14	17	0	0	0	24
8	38.5	62	4	0	0	0	0	34
Average	24.5	64.8	4.4	4.2	0	0	0	26.4
Variance	159.79	266.78	24.53	33.60	-	-	-	233.32
95% C. I.	24.55 <sub>-10.6</sub>	64.3 <sub>-78.9</sub>	4.4 <sub>-7.2</sub>	4.2 <sub>-4.8</sub>	-	-	-	26.4 <sub>-12.8</sub>

### Harvest Unit 1 Data Summary

Transect	Total Damage	Undisturbed	Displaced	Deposited	Obviously Compacted	Puddled	Eroded	Other
1	21	31	6	3	0	0	0	60
2	13	5	3	0	0	0	0	91
3	53	0	15.5	0	0	0	0	84.5
4	49.5	18	27.5	15.5	0	0	0	39
5	38	26	0	0	0	0	0	74
6	49	20	0	4	0	0	0	76
7	25	0	7	16	0	0	0	77
8	57.5	6.5	22.5	7	0	0	0	64
Average	38.2	13.3	10.2	5.7	0	0	0	70.7
Variance	277.29	144.35	109.5	44.5	-	-	-	263.64
95% C. I.	38.25 <sub>-14</sub>	13.3 <sub>-10</sub>	10.2 <sub>-9</sub>	5.7 <sub>-5.6</sub>	-	-	-	70.7 <sub>-13.6</sub>