

Appendix E

Soil Analysis Documentation

Howes Disturbance Classes. (Howes, S.W. 2000. Proposed Soil Resource Condition Assessment. Wallowa-Whitman National Forest. USDA Forest Service, Pacific Northwest Region, Baker City , Oregon.) The visual classifications and their relationship to infiltration rates, percolation, channeling of surface water, productivity, potential restoration work, and Regional and Forest Plan standards are listed below.

Class	Disturbance Category	Visual Classification	Relationship of Disturbance Classes to Regional and Forest Plan Standards
0	Undisturbed	No evidence of past equipment operation. Soils are undisturbed or considered to be in a natural state.	Soil is undisturbed and therefore represents the condition against which the other categories are compared. This category represents maximum potential productivity.
1	Slight	Site is virtually undisturbed. Old litter and duff layers intact. Vegetation present or redeveloping with well established root systems. Some faint impressions of heel tracks or slight depressions evident. Surface soils (A horizons) intact. Surface soil structure unaffected by past equipment operation. No evidence of platiness developing in surface soils.	Subsoils are intact and uncompacted. Infiltration and percolation rates are generally unimpeded except for only small, localized areas. Productivity is unaffected. Restoration activities are not warranted. Soil damage defining criteria not met.
2	Some	Old litter and duff layers intact. Vegetation present or redeveloping with well established root systems. Some visible indications of past equipment operation. Surface soils (A horizons) intact but may show some signs of compaction (i.e. minor amounts or discontinuous platiness at soil surface). No evidence of surface soil removal.	Subsoils are intact and may be slightly compacted. Some localized reduction in infiltration rates may occur. Generally no impact on percolation rates. No measurable reduction in growth rates. Restoration work usually not required. Affected areas recover well naturally. Soil damage defining criteria are not met.
3	Moderate	Old litter and duff layer removed. New litter layer may be redeveloping. Surface soils (A horizons) partially or totally removed or mixed with subsoil material. Evidence of surface soil removal. Some pedestalling at base of trees.	Subsoils are intact but may be compacted. Infiltration and percolation rates are reduced. Productivity reductions are below acceptable levels. Restoration work is warranted and effective in restoring productive potential. Meets Regional and Forest Plan standards for defining soil damage.
4	High	Old litter and duff layer removed. New litter layer may be	Subsoils are exposed and compacted. Drainage characteristics of soils are

Class	Disturbance Category	Visual Classification	Relationship of Disturbance Classes to Regional and Forest Plan Standards
		redeveloping. Surface soils (A horizons) partially or totally removed or mixed with subsoil material. Evidence of surface soil removal. Some pedestalling at base of trees.	affected. Channeling of surface water may occur and cause erosion. Significant productivity reductions are likely. Normal restoration activities are effective in restoring productive potential. Disturbance meets Regional and Forest Plan standards for defining soil damage.
5	Severe	Old litter and duff layer removed. New litter layer redeveloping or absent. Evidence of excessive or extreme surface soil removal. Surface soils (A horizon) absent. Subsoils exposed, compacted, or removed.	Subsoils are exposed or may be removed or compacted. Drainage characteristics of soils affected. Channeling of surface water may occur and cause erosion and gully formation. Significant productivity reductions are highly likely. Restoration measures are difficult yet should be carried out. Meets Regional and Forest Plan standards for defining soil damage.
6	Altered Drainage	Alteration of internal soil drainage characteristics. Results in permanently saturated soils, standing water.	Permanent standing water is the result of altered internal drainage characteristics. Restoration to natural conditions impossible or nearly so.

Summary of existing disturbed soil conditions on field surveyed units

Unit #	SRI Map Unit(s)	Slope			Previous Logging System (Acres)		Compaction Hazard Rating	Field Monitored Existing Disturbed Soil Condition
		<=30%	30-60%	60-90%	Ground	Skyline		
Glacial Terrain								
10	323	x			17.8		Moderate	33%
12	323,324	x	x		19.8	2.4	Moderate	43%
20	323	x			16		Moderate	26%
50	320,325	x	x		33.6	12.8	Moderate	16%
52	324		x			19.9	Moderate	8%
56	324, 200		x	x	19	14	Low, Mod	3%
Earthflow Terrain								
130	100, 101	x	x		11.6	11.3	High	42%
132	100	x			59.4		High	35%
148	100,101	x	x		15.4		High	15%
166	100	x			16.9		High	31%
176	100, 2	x			17.1		High	16%
190	109, 2		x	x	23.2		High	32%
212	100, 101	x	x		9	8.9	High	11%
224	101, 109		x	x	17.3	25.5	High	17%
322	100, 101	x	x		17.9	11.7	High	27%
332	100, 102	x	x		24	11.3	High	19%

Unit Table Selected Alternative

Unit	Acres	Ground Based Acres	Skyline Acres	Helicopter Acres	Existing Temporary Roads Reused (ft.)	Temporary Road Constructed on Skidtrails (ft.)	New Temporary Roads (ft.)
2	24.8	5.1		19.7			
4	12.6	1.5	11.1				
6	8.7	3.6	5.1				
8	46.4	42.3	4.1				
10	17.8	17.8					
12	22.2	22.2			550		
14	97.6	97.6			900		
16	12.3	12.3					
18	1	1					
20	16	16					
22	18.7	18.7					
24	6.6	6.6					
26	76.5			76.5			
28	7.2			7.2			
30	9.8	7.1	2.7				
32	21.2	7.7		13.5			
34	24.7		24.7				
36	46.1			46.1			
38	22.5		22.5				
40	7.4			7.4			
42	80		80				
44	38.1	4.4	33.7		350	330	
46	12.7	12.7					
48	26.6	26.6					
50	46.4	33.6	12.8				
52	19.9	0	19.9		990		240
54	1.9		1.9				
56	33	19	14				
58	28.6	3.3	25.3			450	260
60	23.8		23.8				
62	33.8		33.8		2200		
64	55.1	20.6	34.5				
66	41.6		41.6				
68	34.3		34.3				
70	10		10				
72	2.3		2.3				
74	1.9	1.9					
76	14.4	6.6		7.8			
78	39.7		39.7				

Unit	Acres	Ground Based Acres	Skyline Acres	Helicopter Acres	Existing Temporary Roads Reused (ft.)	Temporary Road Constructed on Skidtrails (ft.)	New Temporary Roads (ft.)
80	20.2	7.2	13				
82	30.3	27.5	2.7				
84	4.7	4.7					
86	19.4		19.4				
88	39.8	39.8			900		
90	26.8	16.5		10.3	580		
92	7.5	7.5					
96	43.7	0	22.5	21.2			
98	65.1	34.1	31				
100	39.5	6.7	32.8		320	200	
102	12.5	12.5	0				
104	63.8	63.8	0				
106	18.3			18.3			
108	37.2	15		22.2	320		
110	12.6			12.6			
112	9.7	9.7					
114	28.1	28.1					
116	28.6	28.6					
118	60.1	16.6	30.8	12.7			
120	27.1	27.1					
121	12.5	12.5					
122	27.7	25.1	2.6		1850		
124	21.9	21.9			950		
126	24	9.6	14.4	0			1000
128	30	17.4	12.6		370		
130	22.8	5.8	17		0	250	590
132	59.4	59.4	0		0		
134	20.6	2.3	2.5	15.8	320		
136	65.7			65.7			
138	33.9	33.9			690		
140	27.7	27.7					
142	22.2	13.5	8.7		685	210	
144	7.4			7.4			
146	13.4	2.4	11				
148	15.4	15.4					
150	21.9	21.9					
152	49.7	39.7	10		1220		
154	17.5			17.5			
156	5.9			5.9			
158	20.3	20.3	0				

Unit	Acres	Ground Based Acres	Skyline Acres	Helicopter Acres	Existing Temporary Roads Reused (ft.)	Temporary Road Constructed on Skidtrails (ft.)	New Temporary Roads (ft.)
160	13.4	9.6	3.8		480		
161	5.4	4.7	0.7				
162	37.8	33.5	0	4.3	1050		
164	32.5	6.5		26			
166	16.9	16.9					
168	34.5	34.5			740		
170	23.8	23.8	0		0		
172	18.6	18.6	0		480		
174	12.3	12.3					
176	17.1	17.1					
177	4.2	4.2					
178	12.5		8.7	3.8		600	
180	32.4	32.4	0		580		
182	29.2	15.5	13.7	0	370		
184	1.4			1.4			
186	14.9		14.9	0			
188	48.4	1.9	39	7.5	0		
190	23.2	21	2.2				
194	28			28			
196	19.8	2	0	17.8			
202	14.1	9.1	5				
204	4.7	4.7					
206	41.1	18.7	14.1	8.3	850		
208	20.5			20.5			
210	2.2			2.2			
212	17.9	17.9	0		200		
214	10.7	10.7					
216	23.9	5.7	18.2		1000		
218	17.8	16.3	0	1.5	210		
220	2.4		0.9	1.5			
222	19.5	11.7	7.8				
224	42.8	17.3	25.5		0	440	
226	16.3		14.5	1.8			
228	8.1	0	8.1				
230	19.7	4.5	15.2		640		
232	2.1	2.1					
234	15.8	12	3.8			210	
236	18.5	13.2	5.3				
238	26.2	3.8	0	22.4	1380		
240	23.7	23.7					

Unit	Acres	Ground Based Acres	Skyline Acres	Helicopter Acres	Existing Temporary Roads Reused (ft.)	Temporary Road Constructed on Skidtrails (ft.)	New Temporary Roads (ft.)
242	30.6	7.6	23				
244	15.3		8.2	7.1			
246	34.5	7.6	16.6	10.3			
248	29.3	3.6	5.4	20.3	270		
250	17.4	4.2	0	13.2			
252	19.2		0	19.2			
254	13.5	3.5	0	10			
256	34.5	14.2	19.7	0.6	1750		
258	37.1	15.9	21.2				
260	35.6	27.5	5.3	2.8	230		
262	25.4	11	14.4				
264	17.7	10.6	7.1		1320		
266	34.4	22.2	6.1	6.1			
268	19.8	9.9		9.9	580		
270	21.1	9.9	6.8	4.4			
272	5.6		5.6				
274	27.8	27.8	0		740		
276	46.7	13.6	27.3	5.8		160	
278	2.2		2.2				
280	51.4	44.7	6.7		420		
282	12.4	12.4					
284	27	19.6	7.4				
286	3.9	3.9					
288	16.6	12.3	4.3				
290	18.1	18.1					
292	6.4	6.4	0				
294	9.7	3.6	6.1				
296	13.5	4.8	3.5	5.2			
298	21.6	21.6			280		
300	30.5	16.9	13.6				
302	8.8	2	6.8				
304	22	10	12				
306	13.9		13.9				
308	56.8	2.6	54.2				
310	36.4	26.1	0	10.3			
312	57	55.1		1.9			
314	34.8	34.8	0				
316	7.3	7.3			950		
318	22.8	22.8	0				
320	18.6			18.6			

Unit	Acres	Ground Based Acres	Skyline Acres	Helicopter Acres	Existing Temporary Roads Reused (ft.)	Temporary Road Constructed on Skidtrails (ft.)	New Temporary Roads (ft.)
322	29.8	17.6	7.4	4.8	500		
324	34.1	24.2		9.9	580		
326	33.1			33.1			
328	36	34.3		1.7	2160		
330	19.1	1.5	17.6				
332	35.2	31.5	0	3.7			
334	1.8	1.2	0.6				
336	16.2	3.3	12.9		270	110	
338	43.1	40.1	0	3	1530		
340	44.8	44.8	0				
342	26.5	14.2	12.3		970		
344	40.9	40.9	0		790		
346	34.9	31.1	0	3.8	850		
348	29.7	18.9	7.4	3.5	420		
350	58.6	2	0	56.6			
	4374.4	2308.0	1265.8	800.6	35,785	2960	2,090
					6.8 miles	0.6 mile	0.4 mile

Approximately 4.3 miles of roads would be decommissioned, 40 miles of roads would be bermed, 10.1 miles would be closed year-round with new gates and one existing gate that is only closed seasonally would be changed to a year-round closure affecting 6.5 miles. This is approximately 6.2 miles fewer closures than Alternative C.

Road #	Miles	Current Status	Proposal	Road #	Miles	Current Status	Proposal
4620-011	0.13	Berm	Decommission	5410-019	0.25	Open	Berm
4620-013	0.28	Berm	Decommission	5410-020	0.25	Open	Berm
4620-016	0.26	Natural	Decommission	5410-120	3.00	Open	Berm
4620-018	0.11	Berm	Decommission	5410-134	0.82	Gate	Berm
4620-025	0.35	Natural	Berm	5410-136	0.36	Natural	Berm
4620-130	0.95	Open	Berm	5411-011	0.18	Natural	Berm
4620-140	0.41	Open	Berm	5411-013	0.54	Open	Berm
4620-160	0.16	Berm	Decommission	5411-162	0.83	Open	Berm
4620-170	0.75	Open	Berm	5411-170	0.77	Open	Berm
4620-174	0.54	Ineffective Berm	Berm	5411-180	1.68	Open	Open
4620-187	0.38	Ineffective Berm	Berm	5411-190	0.92	Open	Berm
4620-190	1.32	Open	Berm	6320	1.99	Open	Berm past junction with 6320180

4620-230	3.29	Natural	Berm	6320-018	0.11	Ineffective Gate	Decommission
4620-260	0.60	Open	Open	6320-022	0.65	Berm	Decommission
4620-260	1.02	Open	Berm	6320-024	0.11	Open	Decommission
4620-270	0.75	Open	Berm	6320-120	3.41	Open	Gate – Close Year-round
4620-280	1.75	Open	Open	6320-170	0.27	Open	Open
4620-290	0.56	Open	Berm	6320	0.93	Open	Open
4620-300	0.58	Open	Berm	6320	0.63	Open	Gate – Close Year-round
4620-310	0.21	Open	Open	6320-150	1.01	Ineffective Gate	Gate – Close Year-round
4621-015	0.17	Gate – Closed Winter	Decommission	6320-160	1.65	Ineffective Gate	Gate – Close Year-round
4621-018	0.15	Berm	Decommission	6320-180	0.81	Open	Open
4621-022	0.27	Berm	Decommission	6320-180	0.73	Open	Berm
4621-027	0.24	Berm	Decommission	6320-190	0.45	Open	Berm
4621-028	0.18	Natural	Decommission	6321	6.52	Gate – Closed Winter	Gate – Close Year-round
4621-029	0.18	Natural	Decommission	6322-014	0.13	Natural	Decommission
4621-125	0.29	Natural	Berm	6322-150	0.47	Natural	Berm
4621-150	2.17	Gate – Closed Winter	Berm	6330-013	0.12	Open	Decommission
4621-180	1.03	Gate – Closed Winter	Berm	6330-019	0.24	Natural & Gate – Closed Winter	Decommission
4621-200	0.79	Gate – Closed Winter	Berm	6330-160	2.01	Gate – Closed Winter	Berm
4622-115	0.57	Ineffective Closure	Berm	6330-195	0.37	Natural & Gate – Closed Winter	Berm
4622-120	0.69	Open	Berm	6330-200	0.77	Gate – Closed Winter	Berm
4622-140	0.35	Ineffective Gate	Berm	6330-240	0.38	Gate – Closed Winter	Berm
4622-150	0.24	Open	Berm	6340-032	0.15		Berm
4630-031	0.5	Ineffective Barrier & Gate – Closed Winter	Berm	6340-120	0.34	Open	Berm
4630-120	0.5	Ineffective Barrier & Gate – Closed Winter	Berm	6340-150	0.93	Open	Berm
4631-013	0.24	Open	Berm	6340-164	0.64	Natural	Berm
4631-016	0.2	Open	Berm	6340-170	2.16	Natural	Berm
4645-120	0.86	Gate – Closed Winter	Berm	7010-019	0.23	Berm	Decommission
4645-135	0.57	Gate – Closed Winter	Berm	7010-120	1.81	Open	Gate – Close Year-round
5410-011	0.81	Open	Berm	7015-120	1.54	Open	Gate – Close Year-round
5410-012	0.56	Open	Decommission first 800 feet				

Open-Road Density Analysis (FW 208)

Approximately 16 miles of roads would need to be closed to meet the road density goals.

Modified Alternative.

Road Density Analysis Areas	Open-Road Density goal from FW-208 (mi./sq. mi.)	Current Open-Road Density (mi./sq. mi.)	Proposed Road Closures and road decommissioning (miles)	Road Density After Implementation (mi./sq. mi.)
WR 19	2.0	1.3	1.33	1.1
WR 21	2.0	0.7	2.81	0.4
WR 23	2.0	1.0	2.80	0.8
WR 24	2.0	1.6	0	1.6
WR 25	2.0	2.1	3.49	1.6
WR 26	2.0	2.9	6.18	2.3
SR 36	2.5	2.9	4.17	2.4
SR 37	2.5	0.9	0.54	0.9
SR 38	2.5	2.1	1.72	1.8
SR 39	2.5	3.3	4.3	2.5
SR 40	2.5	2.5	2.41	2.2
SR 45	2.5	2.2	3.10	1.5

Photos showing examples of proposed actions.

1.

A typical plantation in need of thinning.



2.

This is a 60-year-old plantation that was commercially thinned about 20 years earlier and is now ready for a second commercial thinning. (This plantation is near Unit #122)



3.

Cloak Thinning
Unit 465 - Before
Age 46



4.

Cloak Thinning
Unit 465 - After
Age 47



5.

Cloak Thinning
Unit 467 - Before
Age 46



6.

Cloak Thinning
Unit 467 - After
Age 47



7.

Cloak 467 -This old temporary road was reopened and used for hauling logs. After use, it was obliterated with an excavator. The excavator roughened the surface and placed debris, including slash, rootwads and boulders on the first 200 feet of the road. A berm was built at the road junction (not pictured). Grass seed was planted on bare soils.



8.

This system road was decommissioned. Gravel was removed from the surface and stockpiled elsewhere. A subsoiling machine was used to deeply fracture and decompact the road bed. A berm was placed at the beginning of the road. Grass seed was planted.



9.

This picture shows an old temporary road that will be reused.



10.

Another old temporary road that will be reused.



11.

Berms are installed by selecting an area where it is least likely that someone could drive around. In this case a vandalized guard rail closure is removed first.



12.

One or two deep trenches are dug with the debris piled on either side. Sometimes boulders are placed on the shoulder to further discourage vehicles from going around the berm.



13.

A 90 year-old stand that was never thinned to give the trees room to grow. Trees on this site could have grown to 2 to 3 feet in diameter at this age if they had been thinned at the appropriate time. These trees have stagnated and they may not respond to a thinning.



14.

A plantation that is not thinned such as this one, is so dense and dark that tree growth slows and there is little vegetation on the forest floor. These stands are homogeneous with little diversity.



15.

Another dense stand
that has never been
thinned.



16.

After thinning
Cloak 504
Age 52



17.

2007 Plantation Thin
Unit 56



18.

2007 Plantation Thin
Unit 58



Diagram of Plantation Before Thinning

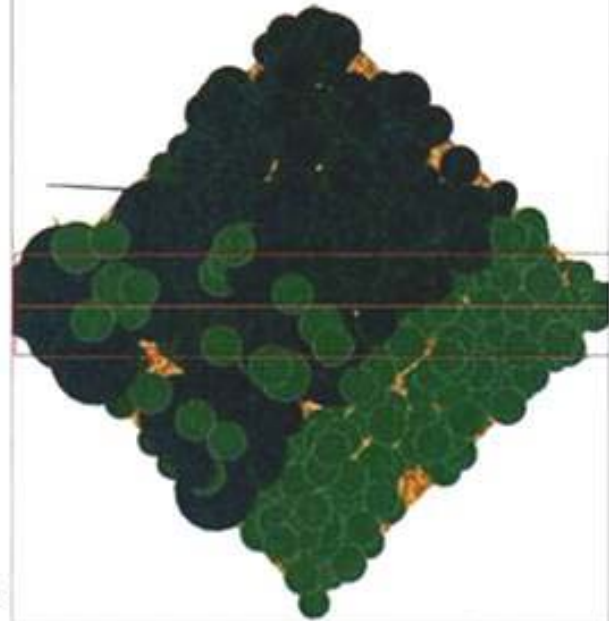
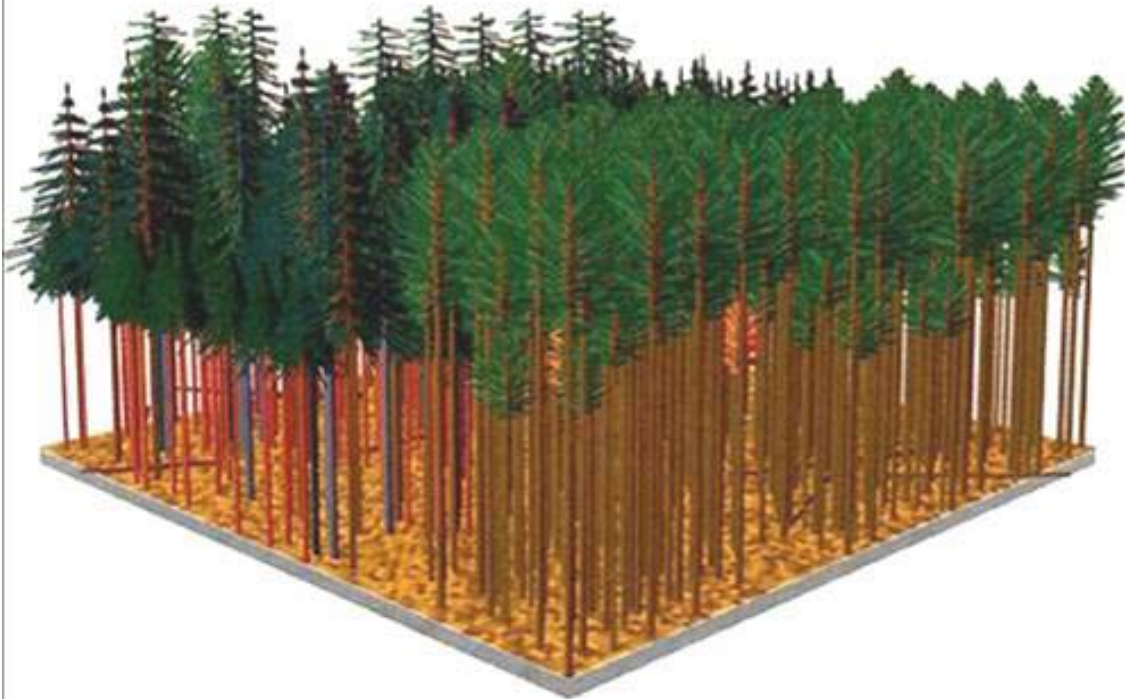


Diagram of Plantation After Variable Density Thinning with Skips and Gaps

