

Soil Quality and Sediment Production

3.2.3.1 Soil Types

The Land System Inventory (LSI) of the Lolo National Forest (USDA Forest Service, 1988) characterizes soil types across the forest based on landform, geology, vegetation, and topography. Within the Seeley Fuels Reduction Project units there are eight different LSI types (Table 3.2.3.1.1). Disturbed Site Revegetation potential, Surface Erodibility, and Landform Sediment Delivery Efficiency for each LSI were evaluated to create an index value of the relative risk of sediment being produced and delivered to streams from each LSI. This index value is called the Sediment Risk Rating. For LSIs within the Seeley Lake Fuels Reduction Project Units, one is a high Sediment Risk, three are moderate, and four are low (Table 3.2.3.1.1).

Table 3.2.3.1.1. LSI in the Seeley Fuels Reduction Project units

LSI	Disturbed Site Revegetation potential	Surface Erodibility	Landform Sediment Delivery Efficiency	Sediment Risk Rating	Units
10UB	good	high	high	high	3, 11, 19, 22, 24, 26, 27, 30, 31, 32
10UC	good	moderate	high	moderate	1
13UB	good	low	high (escarpment) low (surface)	low	14, 15, 18, 19, 22, 25, 26, 27, 28
14JB	fair; cutbank erosion	moderate	low	moderate	13, 20, 22, 23, 24, 25, 26
72BA	good	high	low	moderate	29, 30
72OA	good	moderate	low	low	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 18, 20, 21, 22, 24, 25, 26, 28
73UA	fair; droughty soils	low	low	low	1, 3, 11, 31, 32
73UB	good	moderate	low	low	1, 2, 3, 4, 12, 13, 29, 31, 32

The LSI with High Sediment Rating Risk, 10UB, occurs in action Alternative B along stream corridors in portions of several Units (Table 3.2.3.1.2).

Table 3.2.3.1.2 Occurrence of LSI type in proposed units. (X indicates the occurrence of the LSI in the proposed unit).

Units	10 UB	10UC	13UB	14JB	72BA	72OA	73UA	73UB
1		X					X	X
2								X
3	X					X	X	X
4						X		X
5						X		
6						X		
7						X		
8						X		
9						X		
10						X		
11	X					X	X	
12						X		X
13				X				X
14			X			X		
15			X			X		
18			X			X		
19	X		X					
20				X		X		
21						X		
22	X			X		X		
23				X				
24	X			X		X		
25			X	X		X		
26	X		X	X		X		
27	X		X					
28				X		X		
29					X			X
30	X				X			
31	X						X	X
32	X						X	X

3.2.3.2 Previous Harvest Activities and Residual Soil Impacts

Several stands in the proposed action areas have been previously harvested (Table 3.2.3.2.1). Stand field visits, analysis of historical aerial photos, and TSMRS (Timber Stand Management Recording System) data show that while harvest occurred over 25 years ago, soil in several stands remains highly compacted and/or displaced (Table 3.2.3.2.1 and Table 3.2.3.2.2). These residual detrimental soil conditions include compaction and displacement causing decreased infiltration capacity and reduced productivity. The soils were not easily penetrated with a shovel. Evidence of puddling and surface runoff was present. Low site productivity was evident by the fact that trees in these areas, if any, are growing only in the old road bed center lines or at the edges of the roads, where compaction is lowest. This vegetation consisted of approximately 20-year old trees of very small diameter (Figures 3.2.3.2.1 - 3.2.3.2.4).

Table 3.2.3.2.1: Previous harvest activity in proposed units.

Unit	Stand	Area+ (ac)	Previous					Proposed				Unit Meets R1 Soil Quality Standards
			Activity Code	Activity	Year	Month	Previous Activity Area^ (ac)	Silviculture Treatment	Yarding Method	Fuels Treat-ment	Winter Harvest	
3	12-03-071	64	4211	liberation cut	1950	6	68	IC	tractor	YTSPB	No	Yes
4	12-03-073	52	4211	liberation cut	1973	10	54	IC	tractor	YTSPB	No	Yes
6	12-03-003	121	4132	seed tree seed cut	1969	10	108	IC	tractor	YTSPB	No	Yes
7	12-03-038	26	4132	seed tree seed cut	1969	10	26	IC	tractor	YTSPB	No	Yes
8	12-03-017	18	4230	sanitation/salvage	1977	10	19	IC	tractor	YTSPB	No	No*
8	12-03-037	28	4211	liberation cut	1969	10	26	IC	tractor	YTSPB	No	
9	12-03-016	12	4131	shelterwood seed cut	1977	6	13	PCT	NA	UB	No	No*
9	12-03-019	31	4132	seed tree seed cut	1969	10	31	PCT	NA	UB	No	
9	12-03-045	28	4132	seed tree seed cut	1969	10	29	PCT	NA	UB	No	
10	12-03-015	15	4230	sanitation/salvage	1977	6	17	IC/GSW	tractor	YTSPB	No	No*
10	12-03-020	46	4211	liberation cut	1969	10	41	IC/GSW	tractor	YTSPB	No	
11	12-03-001	15	4211	liberation cut	1973	6	16	IC	tractor	YTSPB	No	Yes
11	12-03-005	53	4211	liberation cut	1973	10	55	IC	tractor	YTSPB	No	
11	12-03-091	20	4211	liberation cut	1973	6	23	IC	tractor	YTSPB	No	
14	23-02-009	12	4114	clearcut with reserves	1996	9	6	CT	tractor	YTSPB	no	Yes
15	23-02-004	21	4113	Stand clear cut	1966	6	22	PCT	NA	HPB	No	Yes
15	23-02-003	82	4132	seed tree seed cut	1966	6	85	PCT	NA	HPB	No	
23	21-03-057	40	4111	patch clearcut	1983	3	5	GRPSEL	tractor	YTSPB	Yes	Yes
24	21-03-037	19	4211	liberation cut	1976	8	16	NA	NA	SPB	No	Yes
28	22-02-019	2	4211	liberation cut	1978	6	18	NA	NA	SPB	No	Yes
28	22-02-041	6	4230	liberation cut	1996	6	3	NA	NA	SPB	No	
30	19-02-007	11	4131	shelterwood seed cut	1992	8	9	CT	tractor	YTSPB	No	Yes

IC = improvement cut, GSW = group shelterwood, CT = commercial thin, GRPSEL = group selection, YT = yard tops, SPB = slash, pile, burn, HPB = hand pile, burn UB = underburn; + = from GIS data; ^ = from TSMRS data; * = See table 3.2.3.2.2



Figure 3.2.3.2.1: Evidence of residual soil compaction. Note horizontal planes of separation.



Figure 3.2.3.2.2: Evidence of residual compaction: ~ 20 year old, trees growing primarily in road center line where there is less compaction.



Figure 3.2.3.2.3: Evidence of residual compaction. Note ~ 20 year-old, trees growing primarily in road centerline where there is less compaction. Arrows indicate wheel tracks.



Figure 3.2.3.2.4: Sampling soil in old skid trail. Skid trail path is discernable, with little new vegetation establishment.

Of specific concern are two stands in Unit 8, two stands in Unit 10, and one stand in Unit 9. Residual compaction, displacement, and resulting low site productivity in these stands do not meet USDA Forest Service Region One Soil Quality Standards (R1SQS) (USDA Forest Service, 1999).

Table 3.2.3.2.2: Existing detrimental soil conditions in proposed units.

Unit	Stand	Total Acres*	Detrimental Soil Conditions		
			Acres	Percent of Stand	Percent of Unit
8	12-03-017	19	3.8	20	6.4
8	12-03-037	28	7	25	11.9
8	12-03-083	12	0	0	0
Total		59	10.8		18.3
9	12-03-016	13	1.3	10	1.8
9	12-03-019	31	12.4	40	16.9
9	12-03-045	29	2.9	10	4
Total		73	16.6		22.7
10	12-03-015	17 (20)	3.4	20	5.4
10	12-03-020	46 (38)	11.5	25	18.3
Total		63 (58)	14.9	45	23.7

* Numbers may vary from Silviculture and Economic analyses, which used proposed activity area (in parentheses). For soils analysis of the existing condition, area values were compared between GIS stand polygons and TSMRS database of previous activity. The larger value was used in order to ensure that impacts from previous activity were not under-accounted.