

**210 LITHIC XERORTHENTS, MESIC-XEROFLUENTS, MESIC-AQUOLLS ASSOCIATION,
0 to 20 percent slopes**

Map Unit Components	Lithic Xerorthents, mesic (35 percent)	Xerofluents, mesic (20 percent)	Aquolls (20 percent)
Position, Slope, and Elevation	On sideslopes of narrow incised drainages and ridge crests adjacent to drainages; 1 to 20 percent slopes; 4300 to 5500 feet.	On lower sideslopes of alluvial drainages (subject to spring flooding); 1 to 10 percent slopes; 4300 to 5500 feet.	On concave areas of alluvial drainages (subject to flooding); 0 to 2 percent slopes; 4300 to 5500 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, low sagebrush, buckwheat, cheatgrass, other grasses; 14 to 18 inches ppt.	Western juniper, low sagebrush, big sagebrush, rabbitbrush, grasses; 14 to 18 inches ppt.	
Surface Layer	0 to 5 inches; brown and yellowish brown very cobbly loam and gravelly loam; platy and granular structure; slightly hard; pH 6.6 to 6.8.	0 to 37 inches; dark gray, grayish brown and light brownish gray silty clay loam, sandy loam, coarse sandy loam and loam; prismatic, blocky and massive structure; soft, slightly hard and hard; pH 6.8 to 8.0.	0 to 4 inches; dark grayish brown silty clay loam, granular structure, hard, pH 6.6. *SUBSOIL: 4 to 26 inches; dark grayish brown and grayish brown clay with yellowish brown mottles in lower part, prismatic and blocky structure, very hard, pH 6.8 to 7.0.
Substratum		37 to 60 inches; very pale brown sandy loam, platy structure, slightly hard, pH 7.4.	26 to 60 inches; gray and dark gray clay and stratified gravelly clay and very gravelly clay loam, massive, hard and very hard, pH 6.4 to 6.6.
Rooting Depth (in.) to Underlying Material	4 to 10; basalt	20 plus; alluvium, basalt	40 plus; alluvium, basalt
Erosion Factor (K)	Variable	Variable	Variable
Max. Erosion Hazard	Moderate to high	Moderate	Moderate
Soil Permeability	Moderate	Slow	Variable
Drainage Class	Somewhat excessively drained	Well drained	Poorly drained
Soil Manageability Class Group	3EDX III	2e	3eW
Forest Site Class	7 (non-commercial)	7 (non-commercial)	7 (non-commercial)
Range Site	1	18, 13	25
Water Runoff Potential	Rapid	Slow	Very Slow
Watershed Sensitivity	3 (Moderate)	6	7
Hydrologic Soil Group	D	C	D
Available Water Capacity (AWC) Upper 20 inches	Very Low 0.6 to 1.5 inches	Low to High 2.8 inches	Moderate to High 3.0 inches
Susceptibility to Burning Damage	Low	Low	Low
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	1 tons/acre/year	2, 3 tons/acre/year	3 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated	Not Rated
R-Value	Not Rated	Not Rated	Not Rated
Soil horizons in inches, USDA, Unified, AASHTO	0-5; Variable Unified: Not Rated AASHTO: Not Rated 5+; Unweathered bedrock	0-60; Variable Unified: Not Rated AASHTO: Not Rated	0-60; Variable Unified: Not Rated AASHTO: Not Rated

210 LITHIC XERORTHENTS, MESIC-XEROFLUVENTS, MESIC-AQUOLLS ASSOCIATION (continued)

Included Areas:

Included with these soils in mapping and making up about 25 percent of the acreage are the Pass Canyon, Gwin, Roval, Bieber, Deven and Fordice families, unnamed fluvaquents, Rock outcrop, Rubble land and areas with steeper slopes.

211 LOBERG-FRIANA-CHEADLE FAMILIES ASSOCIATION, 30 to 65 percent slopes

Map Unit Components	Loberg famiy (40 percent)	Friana family (25 percent)	Cheadle family (20 percent)
Position, Slope, and Elevation	On sideslopes of mountain uplands; 30 to 60 percent slopes; 7000 to 8000 feet.	On lower sideslopes and toeslopes of mountain uplands; 30 to 60 percent slopes; 7000 to 8000 feet.	On upper sideslopes, ridges and knolls of mountain uplands; 35 to 65 percent slopes; 7000 to 8000 feet.
Typical Vegetation and Precipitation (ppt)	Lodgepole pine, white fir, western white pine, prostrate manzanita, few forbes, few grasses; 25 to 30 inches ppt.	Lodgepole pine, white fir, big sagebrush, lupine, ceonothus, bottlebrush, needlegrass; 25 to 30 inches ppt.	
Surface Layer	2 to 0 inches of lodgepole pine needles and twigs, over 0 to 15 inches; brown and light brown gravelly loam to very gravelly loam, granular and blocky structure, slightly hard, pH 5.8 to 6.0.	1/2 to 0 inches of lodgepole pine and white fir needles, over 0 to 11 inches; dark grayish brown silty clay loam, granular and blocky structure, slightly hard and hard, pH 6.2 to 6.4.	0 to 17 inches; dark grayish brown to brown very cobbly loam; granular and subangular blocky structure, slightly hard to hard; pH 6.6.
Substratum	37 to 60 inches; weathering in place semi-soft light brown tuff conglomerate which rubs to a clay loam.		
Rooting Depth (in.) to Underlying Material	20 to 40; tuff	30 plus; tuff	10 to 20; andesite, tuff
Erosion Factor (K)	.43	.37	.37
Max. Erosion Hazard	High	High	High to very high
Soil Permeability	Slow	Slow	Moderate
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	3S III	3S	3Ed
Forest Site Class	6(5)	6 (4-5)	7 (non-commercial)
Range Site	Not placed in a range site.	Not placed in a range site.	9
Water Runoff Potential	Rapid	Rapid	Very Rapid
Watershed Sensitivity	3 (High)	3	3
Hydrologic Soil Group	C	C	D
Available Water Capacity (AWC) Upper 20 inches	Low to Moderate 2.6 inches	Moderate to High 3.0 inches	Very Low to Low 1.2 to 2.4 inches
Susceptibility to Burning Damage	High	moderate	Moderate
Slope Stability Hazard	Moderate to high	Moderate to High	Low
Allowable Soil Loss	2 tons/acre/year	2, 3 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Moderate	High	Not Rated
Rating for Timber Site	Fair (12)	Fair (12)	Not Rated
R-Value	0-30	0-30	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-15; Gravelly loam, very gravelly loam Unified: SC, CL AASHTO: A-6 15-37; Very gravelly clay loam Unified: SC, CH AASHTO: A-7 37+; Weathered bedrock	0-11; Silty clay loam Unified: CL, CH AASHTO: A-6, A-7 11-38; Silty clay Unified: CH AASHTO: A-7 38-53; Very gravelly silty clay loam Unified: GC, CH AASHTO: A-7 53+; Weathered bedrock	0-12; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4, A_6 12-17; Very cobbly clay loam Unified: SC AASHTO: A-6, A-7 17+; Unweathered bedrock

211 LOBERG-FRIANA-CHEADLE FAMILIES ASSOCIATION (continued)

Included Areas:

Included with these soils in mapping and making up about 15 percent of the acreage are the Supervisor, Behanin, Gralic families, Lithic Cryochrepts, Rock outcrop, and Rubble land.

212 MANILA-MERLIN-MASCAMP FAMILIES ASSOCIATION, 10 to 35 percent slopes

Map Unit Components	Manila family (40 percent)	Merlin family (25 percent)	Mascamp family (20 percent)
Position, Slope, and Elevation	On sideslopes, toeslopes and draws of mountain uplands; 10 to 35 percent slopes; 5500 to 7000 feet.	On middle to upper sideslopes of mountain uplands; 10 to 35 percent slopes; 5500 to 7000 feet.	On upper sideslopes, ridges and knolls of mountain uplands; 15 to 35 percent slopes; 5500 to 7000 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, few white fir and ponderosa pine, big sagebrush, current spp., mulesear, Idaho fescue; 20 to 25 inches ppt.	western juniper, low sagebrush, big sagebrush, western yarrow, Phlox spp., Idaho fescue, other grasses; 20 to 25 inches ppt.	
Surface Layer	0 to 4 inches; dark grayish brown cobbly clay loam, platy and granular structure, slightly hard, pH 6.6.	0 to 2 inches; grayish brown very cobbly clay loam, granular structure, slightly hard, pH 6.4.	0 to 6 inches; dark grayish brown very cobbly loam, granular structure, slightly hard, pH 6.8.
Substratum	27 plus inches; weathering in place light brownish gray semi-soft tuff conglomerate which rubs to a clay loam.		
Rooting Depth (in.) to Underlying Material	20 to 40; conglomerated tuff	10 to 20; conglomerated tuff	8 to 20; andesite, conglomerated tuff, basalt
Erosion Factor (K)	.32	.32	.37
Max. Erosion Hazard	Moderate	Moderate to High	Moderate to high
Soil Permeability	Slow	Slow	Moderate
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	2s II	3Ed	3Ed
Forest Site Class	7 (non-commercial)	7 (non-commercial)	7 (non-commercial)
Range Site	19	9	9, 1
Water Runoff Potential	Moderate	Rapid	Rapid
Watershed Sensitivity	5 (High)	3	4
Hydrologic Soil Group	C	D	D
Available Water Capacity (AWC) Upper 20 inches	Low to Moderate 2.7 inches	Very Low to Low 1.1 to 2.3 inches	Very Low to Low 1.0 to 1.9 inches
Susceptibility to Burning Damage	Moderate	Moderate	Moderate
Slope Stability Hazard	Low to Moderate	Low to Moderate	Low
Allowable Soil Loss	2 tons/acre/year	1 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated	Not Rated
R-Value	0-30	0-30	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-13; Cobbly clay loam, clay loam Unified: CL, CH AASHTO: A-6, A-7 13-27; Silty clay, gravelly silty clay Unified: CH AASHTO: A-7 27+; Weathered bedrock	0-2; Very cobbly clay loam Unified: SC, CL AASHTO: A-6 2-12; Gravelly clay Unified: CH AASHTO: A-7 12+; Unweathered bedrock	0-12; Very cobbly loam, very gravelly loam Unified: SM-SC, SC AASHTO: A-4 12-19; Very gravelly clay loam Unified: SC AASHTO: A-2-6, A-6 19+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up about 15 percent of the acreage are the Bertag, Smarts, DeMasters, Vipont, Los Gatos, Ridd, Bearskin, and Anatone families and Rock outcrop.		

213 MANILA-MERLIN-MASCAMP FAMILIES ASSOCIATION, 35 to 60 percent slopes

Map Unit Components	Manila family (40 percent)	Merlin family (25 percent)	Mascamp family (20 percent)
Position, Slope, and Elevation	On sideslopes, toeslopes and draws of mountain uplands; 35 to 50 percent slopes; 5500 to 7000 feet.	On middle to upper sideslopes of mountain uplands; 35 to 60 percent slopes; 5500 to 7000 feet.	On upper sideslopes, ridges and knolls of mountain uplands; 35 to 60 percent slopes; 5500 to 7000 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, few white fir and ponderosa pine, big sagebrush, current spp., mulesear, Idaho fescue; 20 to 25 inches ppt.	Western juniper, low sagebrush, big sagebrush, western yarrow, Phlox spp., Idaho fescue, other grasses; 20 to 25 inches ppt.	
Surface Layer	0 to 4 inches; dark grayish brown cobbly clay loam, platy and granular structure, slightly hard, pH 6.6.	0 to 2 inches; grayish brown very cobbly clay loam, granular structure, slightly hard, pH 6.4	0 to 6 inches; dark grayish brown very cobbly loam, granular structure, slightly hard, pH 6.8.
Substratum	27 plus inches; weathering in place light brownish gray semi-soft tuff conglomeration which rubs to a clay loam.		
Rooting Depth (in.) to Underlying Material	20 to 40; conglomerated tuff	10 to 20; conglomerated tuff	8 to 20; andesite, conglomerated tuff, basalt
Erosion Factor (K)	.32	.32	.37
Max. Erosion Hazard	High	High to very high	High to very high
Soil Permeability	Slow	Slow	Moderate
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	3S III	3Sd	3Ed
Forest Site Class	7 (non-commercial)	7 (non-commercial)	7 (non-commercial)
Range Site	19	9	9, 1
Water Runoff Potential	Rapid	Very Rapid	Rapid
Watershed Sensitivity	3 (High)	2	4
Hydrologic Soil Group	C	D	D
Available Water Capacity (AWC) Upper 20 inches	Low to Moderate 2.7 inches	Very Low to Low 1.1 to 2.3 inches	Very Low to Low 1.0 to 1.9 inches
Susceptibility to Burning Damage	Moderate	Moderate	Moderate
Slope Stability Hazard	High	High	Low
Allowable Soil Loss	2 tons/acre/year	1 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated	Not Rated
R-Value	0-30	0-30	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-13; Cobbly clay loam, clay loam Unified: CL, CH AASHTO: A-6, A-7 13-27; Silty clay, gravelly silty clay Unified: CH AASHTO: A-7 27+; Weathered bedrock	0-2; Very cobbly clay loam Unified: SC, CL AASHTO: A-6 2-12; Gravelly clay Unified: CH AASHTO: A-7 12+; Unweathered bedrock	0-12; Very cobbly loam, very gravelly loam Unified: SM-SC, SC AASHTO: A-4 12-19; Very gravelly clay loam Unified: SC AASHTO: A-2-6, A-6 19+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up about 15 percent of the acreage are the Bertag, Smarts, DeMasters, Vipont, Bearskin, and Anatone families and Rock outcrop.		

214 MERLIN FAMILY, 1 to 10 percent slopes

Map Unit Components	Merlin family (75 percent)
Position, Slope, and Elevation	On basalt plateaus; 1 to 10 percent slopes; 5800 to 7000 feet.
Typical Vegetation and Precipitation (ppt)	Few western juniper, trace of ponderosa pine, low sagebrush, big sagebrush, buckwheat, Phlox spp., Idaho fescue, Poa spp., other grasses; 20 to 30 inches ppt.
Surface Layer	0 to 2 inches; grayish brown very cobbly clay loam, granular structure, slightly hard, pH 6.4.
Rooting Depth (in.) to Underlying Material	10 to 20; basalt, tuff
Erosion Factor (K)	.32
Max. Erosion Hazard	Moderate
Soil Permeability	Slow
Drainage Class	Well drained
Soil Manageability Class	2ed
Group	II
Forest Site Class	7 (non-commercial)
Range Site	9
Water Runoff Potential	Moderate
Watershed Sensitivity	4 (High)
Hydrologic Soil Group	D
Available Water Capacity (AWC)	Very Low to Low
Upper 20 inches	1.1 to 2.3 inches
Susceptibility to Burning Damage	Low
Slope Stability Hazard	Low
Allowable Soil Loss	1 tons/acre/year
Chance of Seedling Survival	Not Rated
Rating for Timber Site	Not Rated
R-Value	0-30
Soil horizons in inches, USDA, Unified, AASHTO	0-2; Very cobbly clay loam Unified: SC, CL AASHTO: A-6 2-12; Gravelly clay Unified: CH AASHTO: A-7 12+; Unweathered bedrock
Included Areas:	Included with this soil in mapping and making up about 25 percent of the acreage are the Manila, Bearskin, Mascamp, Anatone, Smarts, and Bertag families and Lithic Xerorthents, frigid.

215 GRALIC-LOBERG FAMILIES-RUBBLE LAND ASSOCIATION, 35 to 80 percent slopes

Map Unit Components	Gralic family (35 percent)	Loberg family (30 percent)	Rubble land (20 percent)
Position, Slope, and Elevation	On sideslopes of mountain uplands; 35 to 65 percent slopes; 7000 to 8000 feet.	On sideslopes and toeslopes of mountain uplands; 35 to 60 percent slopes; 7000 to 8000 feet.	On scarp breaks and upper sideslopes of mountain uplands; 50 to 80 percent slopes; 7000 to 8000 feet.
Typical Vegetation and Precipitation (ppt)	Lodgepole pine, white fir, prostrate manzanita, current spp., princess pine, Ross's sedge, few grasses; 25 to 30 inches ppt.	Lodgepole pine, white fir, prostrate manzanita, current spp., princess pine, bottlebrush, needlegrass, Ross's sedge, Poa spp.; 25 to 30 inches ppt.	
Surface Layer	1 to 0 inches; lodgepole pine needles, over 0 to 17 inches; grayish brown to pale brown very gravelly fine sandy loam, granular structure, soft, pH 6.2.	2 to 0 inches of lodgepole pine needles and twigs, over 0 to 15 inches; brown and light brown gravelly loam to very gravelly loam, granular and blocky structure, slightly hard, pH 5.8 to 6.0.	NOT APPLICABLE: Colluvial deposition of angular cobbles, stones and boulders of basalt or andesite rock material.
Substratum	17 to 60 inches; light yellowish brown to very pale brown very gravelly sandy loam to very gravelly loamy sand, single grain and massive, loose and soft, pH 6.2 to 6.4.	37 to 60 inches; weathering in place semi-soft light brown tuff conglomerate which rubs to a clay loam.	
Rooting Depth (in.) to Underlying Material	30 plus; andesite	20 to 40; tuff	
Erosion Factor (K)	.24	.43	
Max. Erosion Hazard	High	High	
Soil Permeability	Moderately rapid	SLow	
Drainage Class	Well drained	Well drained	
Soil Manageability Class Group	3Ep III	3S	
Forest Site Class	6-7 (5 to non-commercial)	6 (5)	
Range Site	Not placed in a range site.	Not placed in a range site.	
Water Runoff Potential	Moderate	Rapid	Very Rapid
Watershed Sensitivity	6 (High)	3	2
Hydrologic Soil Group	B	C	
Available Water Capacity (AWC)	Low to Moderate	Low to Moderate	
Upper 20 inches	1.8 inches	2.6 inches	
Susceptibility to Burning Damage	High	High	
Slope Stability Hazard	Low	High	
Allowable Soil Loss	2-3 tons/acre/year	2 tons/acre/year	
Chance of Seedling Survival	Low to Moderate	Moderate	
Rating for Timber Site	Fair (12)	Fair (12)	
R-Value	60+	0-30	

215 GRALIC-LOBERG FAMILIES-RUBBLE LAND ASSOCIATION (continued)

Soil horizons in
inches, USDA,
Unified, AASHTO

0-17; Very gravelly fine
sandy loam
Unified: SM
AASHTO: A-2-4

17-60; Very gravelly sandy
loam, very gravelly
loamy sand
Unified: SM
AASHTO: A-1-b

0-15; Gravelly loam, very
gravelly loam

Unified: SC, CL
AASHTO: A-6

15-37; Very gravelly clay loam
Unified: SC, CH

AASHTO: A-7

37+; Weathered bedrock

Included Areas:

Included with this unit in mapping and making up about 15 percent of the acreage are the Supervisor, Cheadle, Friana families and Lithic Cryochrepts and Rock outcrop and areas of lesser slopes.

216 GRALIC-SUPERVISOR FAMILIES COMPLEX, 10 to 35 percent slopes

Map Unit Components	Gralic family (60 percent)	Supervisor family (25 percent)
Position, Slope, and Elevation	On sideslopes and convex areas of mountain uplands; 10 to 35 percent slopes; 7000 to 7800 feet.	On sideslopes of mountain uplands; 10 to 35 percent slopes; 7000 to 7800 feet.
Typical Vegetation and Precipitation (ppt)	Lodgepole pine, washoe pine, white fir, western white pine, prostrate manzanita, ceonothus, few forbes, Ross's sedge, few grasses; 25 to 30 inches ppt.	Lodgepole pine, washoe pine, white fir, western white pine, prostrate manzanita, ceonothus, few forbes, Ross's sedge, few grasses; 25 to 30 inches ppt.
Surface Layer	1 to 0 inches; lodgepole pine needles, over 0 to 17 inches, grayish brown to pale brown very gravelly fine sandy loam, granular structure, soft, pH 6.2.	1 to 0 inches; lodgepole pine needles, over 0 to 12 inches; dark grayish brown to brown gravelly fine sandy loam, granular and blocky structure, slightly hard, pH 6.0 to 6.2.
Substratum	17 to 60 inches; light yellowish brown to very pale brown very gravelly sandy loam to very gravelly loamy sand, single grain and massive, loose and soft, pH 6.2 to 6.4.	26 to 37 inches; weathering in place pale brown to reddish brown semi-soft tuff conglomerate.
Rooting Depth (in.) to Underlying Material	30 plus; andesite, obsidian.	20 to 40; andesite tuff, obsidian.
Erosion Factor (K)	.24	.20
Max. Erosion Hazard	Moderate	Moderate
Soil Permeability	Moderately rapid	Moderate
Drainage Class	Well drained	Well drained
Soil Manageability Class	2ep	2ep
Soil Manageability Group	II	
Forest Site Class	6-7 (5 to non-commercial)	6 (4-5)
Range Site	Not placed in a range site.	Not placed in a range site.
Water Runoff Potential	Slow	Slow
Watershed Sensitivity	7 (Moderate)	7
Hydrologic Soil Group	B	B
Available Water Capacity (AWC)	Low to Moderate	Low to Moderate
Upper 20 inches	1.8 inches	2.2 inches
Susceptibility to Burning Damage	Moderate	Moderate
Slope Stability Hazard	Low	Low
Allowable Soil Loss	2,3 tons/acre/year	2 tons/acre/year
Chance of Seedling Survival	Low to Moderate	Low to Moderate
Rating for Timber Site	Fair (12)	Fair (7,12)
R-Value	60+	60+
Soil horizons in inches, USDA, Unified, AASHTO	0-17; Very gravelly fine sandy loam Unified: SM AASHTO: A-2-4 17-60; Very gravelly sandy loam, very gravelly loamy sand Unified: SM AASHTO: A-1-b	0-12; Gravelly fine sandy loam Unified: SM AASHTO: A-2-4, A-4 12-26; Very gravelly sandy loam Unified: SM AASHTO: A-1-b 26+; Weathered bedrock
Included Areas:	Included with these soils in mapping and making up about 15 percent of the acreage are the Wapal, Patio, Cheadle families and soils similar to the Supervisor family but deeper than 40 inches, and Rock outcrop.	

217 GRALIC-SUPERVISOR FAMILIES COMPLEX, 10 to 35 percent slopes

Map Unit Components	Gralic family (60 percent)	Supervisor family (25 percent)
Position, Slope, and Elevation	On sideslopes and convex areas of mountain uplands; 35 to 60 percent slopes; 7000 to 7800 feet.	On sideslopes of mountain uplands; 35 to 60 percent slopes; 7000 to 7800 feet.
Typical Vegetation and Precipitation (ppt)	Lodgepole pine, washoe pine, white fir, western white pine, prostrate manzanita, ceonothus, few forbes, Ross's sedge, few grasses; 25 to 30 inches ppt.	Lodgepole pine, washoe pine, white fir, western white pine, prostrate manzanita, ceonothus, few forbes, Ross's sedge, few grasses; 25 to 30 inches ppt.
Surface Layer	1 to 0 inches; lodgepole pine needles, over 0 to 17 inches, grayish brown to pale brown very gravelly fine sandy loam, granular structure, soft, pH 6.2.	1 to 0 inches; lodgepole pine needles, over 0 to 12 inches; dark grayish brown to brown gravelly fine sandy loam, granular and blocky structure, slightly hard, pH 6.0 to 6.2.
Substratum	17 to 60 inches; light yellowish brown to very pale brown very gravelly sandy loam to very gravelly loamy sand, single grain and massive, loose and soft, pH 6.2 to 6.4.	26 to 37 inches; weathering in place pale brown to reddish brown semi-soft tuff conglomerate.
Rooting Depth (in.) to Underlying Material	30 plus; andesite, obsidian.	20 to 40; andesite tuff, obsidian.
Erosion Factor (K)	.24	.20
Max. Erosion Hazard	High	High
Soil Permeability	Moderately rapid	Moderate
Drainage Class	Well drained	Well drained
Soil Manageability Class Group	3Ep III	3Ep
Forest Site Class	6-7 (5 to non-commercial)	6 (4-5)
Range Site	Not placed in a range site.	Not placed in a range site.
Water Runoff Potential	Moderate	Moderate
Watershed Sensitivity	6 (Moderate)	6
Hydrologic Soil Group	B	B
Available Water Capacity (AWC) Upper 20 inches	Low to Moderate 1.8 inches	Low to Moderate 2.2 inches
Susceptibility to Burning Damage	High	Moderate to High
Slope Stability Hazard	Low	Low
Allowable Soil Loss	2-3 tons/acre/year	2 tons/acre/year
Chance of Seedling Survival	Low to Moderate	Low to Moderate
Rating for Timber Site R-Value	Fair (8,12) 60+	Fair (7,8,12) 60+
Soil horizons in inches, USDA, Unified, AASHTO	0-17; Very gravelly fine sandy loam Unified: SM AASHTO: A-2-4 17-60; Very gravelly sandy loam, very gravelly loamy sand Unified: SM AASHTO: A-1-b	0-12; Gravelly fine sandy loam Unified: SM AASHTO: A-2-4, A-4 12-26; Very gravelly sandy loam Unified: SM AASHTO: A-1-b 26+; Weathered bedrock
Included Areas:	Included with these soils in mapping and making up about 15 percent of the acreage are the Wapal, Patio, Cheadle families and soils similar to the Supervisor family but deeper than 40 inches, Rock outcrop and Rubble land.	

218 PACKWOOD-BIEBER FAMILIES COMPLEX, 1 to 10 percent slopes

Map Unit Components	Packwood family (45 percent)	Bieber family (40 percent)
Position, Slope, and Elevation	On nearly level to undulating basalt plateaus; 1 to 10 percent slopes; 4700 to 5500 feet.	On nearly level to undulating basalt plateaus; 1 to 10 percent slopes; 4700 to 5500 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, low sagebrush, sandburg bluegrass, Idaho fescue, cheatgrass, other grasses; 14 to 16 inches ppt.	Western juniper, low sagebrush, black sagebrush, cheatgrass, sandburg bluegrass, other grasses; 14 to 16 inches ppt.
Surface Layer	0 to 5 inches; light yellowish brown very stony loam and platy and blocky structure, slightly hard to hard, pH 6.2 to 6.5	0 to 4 inches; brown very cobbly loam, blocky and granular structure, hard, pH 6.8.
Substratum	8 to 16 inches; weakly to strongly cemented yellow and brown silica duripan.	18 plus inches; strongly cemented silica duripan.
Rooting Depth (in.) to Underlying Material	7 to 15; silica duripan over basalt	8 to 20; silica duripan over basalt.
Erosion Factor (K)	.43	.37
Max. Erosion Hazard	Moderate	Moderate
Soil Permeability	Slow	Very slow
Drainage Class	Well drained	Well drained
Soil Manageability Class	2edx	2edx
Group	II	
Forest Site Class	7 (non-commercial)	7 (non-commercial)
Range Site	8, 1	8, 1
Water Runoff Potential	Moderate	Moderate
Watershed Sensitivity	6 (Moderate)	5
Hydrologic Soil Group	D	D
Available Water Capacity (AWC)	Very low to low	Very low to low
Upper 20 inches	1.1 to 2.3 inches	1.0 to 2.5 inches
Susceptibility to Burning Damage	Low	Low
Slope Stability Hazard	Low	Low
Allowable Soil Loss	1 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated
R-Value	30-60	0-30
Soil horizons in inches, USDA, Unified, AASHTO	0-5; Very stony loam, loam Unified: CL-ML, CL AASHTO: A-4, A-6 5-8; Clay loam Unified: CL AASHTO: A-6 8-16; Silica duripan 16+; Unweathered bedrock	0-4; Very cobbly loam Unified: SC, CL AASHTO: A-6 4-18; Clay Unified: CH AASHTO: A-7 18+; Silica duripan
Included Areas:	Included with these soils in mapping and making up about 15 percent of the acreage are the Ditchcamp, Roval, Puls, Barnard, Deven and Pass Canyon families, Rock outcrop and Rubble land.	

219 PACKWOOD-DITCHCAMP FAMILIES-ROCK OUTCROP COMPLEX, 1 to 10 percent slopes

Map Unit Components	Packwood family (50 percent)	Ditchcamp family (20 percent)	Rock outcrop (15 percent)
Position, Slope, and Elevation	On intermountain areas between 10 to 30 foot diameter mounds on basalt plateaus; 1 to 5 percent slopes; 4500 to 5200 feet.	On 10 to 30 foot diameter mounds normally spaced within 100 feet of each other on basalt plateaus; 2 to 10 percent slopes; 4500 to 5200 feet.	On upper sideslopes and slightly convex areas on basalt plateaus; 2 to 10 percent slopes; 4500 to 5200 feet.
Typical Vegetation and Precipitation (ppt)	Low sagebrush, black sagebrush, Phlox spp., buckwheat, Idaho fescue, cheatgrass, other grasses; 12 to 14 inches ppt.	Big sagebrush, low sagebrush, western juniper, Idaho fescue, Poa spp., other grasses; 12 to 14 inches ppt.	
Surface Layer	0 to 5 inches; light yellowish brown very stony loam to loam, platy, and blocky structure, slightly hard to hard, pH 6.2 to 6.5.	0 to 15 inches; brown loam, platy and blocky structure, hard, pH 6.5	NOT APPLICABLE: Basalt or andesite bedrock with minor accumulations of aeolian soil deposition in some fractures.
Substratum	8 to 16 inches; weakly to strongly cemented yellow and brown silica duripan.	30 to 34 inches; strongly cemented reddish yellow silica duripan.	
Rooting Depth (in.) to Underlying Material	7 to 20; silica duripan over basalt bedrock	20 to 35; silica duripan over basalt bedrock	
Erosion Factor (K)	.43	.43	
Max. Erosion Hazard	Moderate	Moderate	
Soil Permeability	Slow	Slow	
Drainage Class	Well drained	Well drained	
Soil Manageability Class Group	2edx II	2e	
Forest Site Class	7 (non-commercial)	7 (non-commercial)	
Range Site	7, 1	12	
Water Runoff Potential	Slow	Slow	Rapid
Watershed Sensitivity	6 (Moderate)	7	4
Hydrologic Soil Group	D	C	
Available Water Capacity (AWC) Upper 20 inches	Very low to low 1.1 to 3.1 inches	Low to moderate 3.4 inches	
Susceptibility to Burning Damage	Low	Low	
Slope Stability Hazard	Low	Low	
Allowable Soil Loss	1 tons/acre/year	2 tons/acre/year	
Chance of Seedling Survival	Not Rated	Not Rated	
Rating for Timber Site R-Value	Not Rated 30-60	Not Rated 30-60	
Soil horizons in inches, USDA, Unified, AASHTO	0-5; Very stony loam, loam Unified: ML-CL AASHTO: A-4, A-6 5-8; Clay loam Unified: CL AASHTO: A-6 8-16; Silica duripan 16+; Unweathered bedrock	0-15; Loam Unified: ML-CL, CL AASHTO: A-4, A-6 15-30; Clay loam Unified: CL, CH AASHTO: A-6, A-7 30-34; Silica Duripan 34+; Unweathered bedrock	
Included Areas:	Included with this unit in mapping and making up about 15 percent of the acreage are the Deven, Bieber, Roval, Puls and Aikman families and Lithic Xerorthents, mesic and rubble land.		

220 PACKWOOD-PULS FAMILIES COMPLEX, 1 to 5 percent slopes

Map Unit Components	Packwood family (50 percent)	Puls family (20 percent)
Position, Slope, and Elevation	On upper areas of undulating basalt plateaus; 2 to 5 percent slopes; 4400 to 5300 feet.	On nearly flat to concave areas of gently undulating basalt plateaus; 1 to 3 percent slopes; 4400 to 5300 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, low sagebrush, phlox spp., Idaho fescue, cheatgrass, sandburg bluegrass other grasses; 14 to 16 inches ppt.	Low sagebrush, black sage cheatgrass, few forbs; 14 to 16 inches ppt.
Surface Layer	0 to 5 inches; light yellowish brown very stony loam and platy and blocky structure, slightly hard to hard, pH 6.2 to 6.5	0 to 5 inches; pinkish gray very stony clay loam, granular structure, slightly hard, pH 6.3.
Substratum	8 to 16 inches; weakly to strongly cemented yellow and brown silica duripan.	19 to 28 plus inches; indurated cemented silica duripan.
Rooting Depth (in.) to Underlying Material	7 to 15; silica duripan over basalt	8 to 20; silica duripan over basalt.
Erosion Factor (K)	.43	.37
Max. Erosion Hazard	Moderate	Moderate
Soil Permeability	Slow	Very slow
Drainage Class	Well drained	Well drained
Soil Manageability Class	2edx	3edx
Soil Manageability Group	II	
Forest Site Class	7 (non-commercial)	7 (non-commercial)
Range Site	8, 1	1
Water Runoff Potential	Moderate	Moderate
Watershed Sensitivity	6 (Moderate)	5
Hydrologic Soil Group	D	D
Available Water Capacity (AWC)	Very low to low	Very low to low
Upper 20 inches	1.1 to 2.3 inches	1.0 to 2.5 inches
Susceptibility to Burning Damage	Low	Low
Slope Stability Hazard	Low	Low
Allowable Soil Loss	1 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated
R-Value	30-60	0-30
Soil horizons in inches, USDA, Unified, AASHTO	0-5; Very stony loam, loam Unified: CL-ML, CL AASHTO: A-4, A-6 5-8; Clay loam Unified: CL AASHTO: A-6 8-16; Silica duripan 16+; Unweathered bedrock	0-5; Very stony clay loam Unified: GC, MH AASHTO: A-2-6, A-6 5-9; Clay loam Unified: CL, MH AASHTO: A-6 9-19; Clay Unified: CH AASHTO: A-7-5, A-7-65 19-28; Silica duripan
Included Areas:	Included with these soils in mapping and making up about 30 percent of the acreage are the Bieber, Ditchcamp, Roval, Barnard, Deven and Pass Canyon families, Rock outcrop and Rubble land.	

221 PASS CANYON-DISHNER-DEVEN FAMILIES ASSOCIATION, 1 to 20 percent slopes

Map Unit Components	Pass Canyon family (40 percent)	Dishner family (25 percent)	Deven family (15 percent)
Position, Slope, and Elevation	On upper sideslopes and ridges of basalt plateaus; 2 to 20 percent slopes; 4300 to 4800 feet.	On sideslopes and toeslopes of basalt plateaus; 1 to 15 percent slopes; 4300 to 4800 feet.	On sideslopes of basalt plateaus; 1 to 20 percent slopes; 4300 to 4800 feet.
Typical Vegetation and Precipitation (ppt)	Rabbitbrush, low sagebrush, big sagebrush, few western juniper, Phlox spp., Idaho fescue, sandberg bluegrass, cheatgrass; 10 to 14 inches ppt.	Low sagebrush, rabbitbrush, few western juniper, bottlebrush, cheatgrass; 10 to 14 inches ppt.	
Surface Layer	0 to 4 inches; very dark grayish brown to dark brown very cobbly loam and loam granular and platy structure, slightly hard, pH 6.8 to 6.6.	0 to 5 inches; light brownish gray cobbly sandy clay loam, platy and granular structure, slightly hard, pH 6.8.	0 to 2 inches; brown cobbly loam, granular structure, soft, pH 6.3.
Rooting Depth (in.) to Underlying Material	8 to 15; basalt	10 to 20; basalt	10 to 20; basalt
Erosion Factor (K)	.32	.43	.37
Max. Erosion Hazard	Moderate	Moderate	Moderate
Soil Permeability	Moderately slow	Slow	Slow
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	2ed II	2ed	2ed
Forest Site Class	7 (non-commercial)	7 (non-commercial)	7 (non-commercial)
Range Site	7, 1	7	7
Water Runoff Potential	Slow	Slow	Slow
Watershed Sensitivity	6 (Moderate)	5	5
Hydrologic Soil Group	D	D	D
Available Water Capacity (AWC) Upper 20 inches	Very Low to Low 1.0 to 2.0 inches	Very Low to Low 1.4 to 2.8 inches	Very Low to Low 1.4 to 2.8 inches
Susceptibility to Burning Damage	Low	Low	Low
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	1 tons/acre/year	1 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated	Not Rated
R-Value	30-60	0-30	0-30
Soil horizons in inches, USDA, Unified, AASHTO	0-2; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4 2-4; Loam Unified: ML-CL, CL AASHTO: A-4, A-6 4-12; Clay loam, cobbly clay loam Unified: CL, MH AASHTO: A-6, A-7 12+; Unweathered bedrock	0-9; Cobbly sandy clay loam, silty clay loam Unified: CL AASHTO: A-6 9-16; Clay loam, cobbly clay Unified: CL, CH AASHTO: A-7 16+; Unweathered bedrock	0-2; Cobbly Loam Unified: ML-CL, CL AASHTO: A-4, A-6 2-7; Clay loam Unified: CL, MH, CH AASHTO: A-6, A-7 7-16; Clay Unified: CH AASHTO: A-7 16+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up about 20 percent of the acreage are the Gwin, Bakeoven, Stukel, Castlevale, Cowiche families, Lithic Xerorthents, mesic, and Rock outcrop.		

222 PASS CANYON-ELMORE FAMILIES-LAVA FLOW ASSOCIATION, 1 to 20 percent slopes

Map Unit Components	Pass Canyon family (40 percent)	Elmore family (30 percent)	Lava flow (15 percent)
Position, Slope, and Elevation	On nearly level to convex areas on or immediately adjacent to hummocky lava flow rock on undulating basalt plateaus; 1 to 10 percent slopes; 4300 to 5800 feet.	On isolated concave 0.1 to 2 acre pockets between broken and hummocky lava flow rock on undulating basalt plateaus; 1 to 5 percent slopes; 4300 to 5800 feet.	Hummocky, disaggregated lava flow rock with slope lengths of 5 to 30 feet on undulating basalt plateaus; 5 to 20 percent slopes; 4300 to 5800 feet.
Typical Vegetation and Precipitation (ppt)	Few ponderosa pine, western juniper, low sagebrush, big sagebrush, rabbitbrush, bitterbrush, sandberg bluegrass, Idaho fescue, cheatgrass; 16 to 18 inches ppt.	Ponderosa pine, Jeffrey pine, western juniper, big sagebrush, bitterbrush, bluebunch wheatgrass, bottlebrush, Ross's sedge, needlegrass; 16 to 18 inches ppt.	
Surface Layer	0 to 4 inches; very dark grayish brown to dark brown very cobbly loam and loam, granular and platy structure, slightly hard, pH 6.8 to 6.6.	1 to 0 inches of ponderosa pine needles and twigs, over 0 to 8 inches; brown loam, platy and granular structure slightly hard, pH 6.0.	NOT APPLICABLE: Fractured vesicular basalt flow rock with minor accumulations of aeolian soil deposition in some fractures.
Rooting Depth (in.) to Underlying Material	10 to 20; basalt	20 to 40; basalt	
Erosion Factor (K)	.32	.37	
Max. Erosion Hazard	Moderate	Low	
Soil Permeability	Moderately slow	Moderately slow	
Drainage Class	Well drained	Well drained	
Soil Manageability Class	2ed	2x	
Group	II		
Forest Site Class	7 (non-commercial)	5-6 (3-5)	
Range Site	8	Not placed in a range site.	
Water Runoff Potential	Moderate	Slow	Rapid
Watershed Sensitivity	6 (Moderate)	8	5
Hydrologic Soil Group	D	B	
Available Water Capacity (AWC)	Very Low to Low	Low to Moderate	
Upper 20 inches	1.3 to 2.6 inches	3.2 inches	
Susceptibility to Burning Damage	Low	Moderate	
Slope Stability Hazard	Low	Low	
Allowable Soil Loss	1 tons/acre/year	2 tons/acre/year	
Chance of Seedling Survival	Not Rated	Moderate	
Rating for Timber Site	Not Rated	FAIR (1,7,10)	
R-Value	30-60	30-60	

222 PASS CANYON-ELMORE FAMILIES-LAVA FLOW ASSOCIATION (continued)

Soil horizons in
inches, USDA,
Unified, AASHTO

0-2;	Very cobbly loam Unified: SM, SM-SC AASHTO: A-4	0-8;	Loam Unified: ML-CL, CL AASHTO: A-4, A-6
2-4;	Loam Unified: ML-CL, CL AASHTO: A-4, A-6	8-27;	Clay loam, gravelly clay loam Unified: CL, MH AASHTO: A-6, A-7
4-12;	Clay loam, cobbly clay loam Unified: CL, MH AASHTO: A-6, A-7	27+;	Unweathered bedrock
12+;	Unweathered bedrock		

Included Areas:

Included with these soils in mapping and making up about 15 of the acreage is Lithic Xerorthents, mesic, Los Gatos, Keating, Germany, Gwin, Deven, Bieber, Lawyer, Stukel and Bakeoven families and Lava flow rock with steeper slopes.

223 PASS CANYON-ELMORE-PACKWOOD FAMILIES ASSOCIATION, 1 to 10 percent slopes

Map Unit Components	Pass Canyon family (40 percent)	Elmore family (25 percent)	Packwood family (20 percent)
Position, Slope, and Elevation	On lower sideslopes of undulating basalt plateaus 1 to 10 percent slopes, 4400 to 5800 feet.	On gentle knolls and ridges of undulating basalt plateaus; 1 to 10 percent slopes; 4400 to 5800 feet.	On nearly level to slightly concave areas of undulating basalt plateaus; 1 to 5 percent slopes; 4400 to 5800 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, big sagebrush, low sage- brush, bitterbrush, Idaho fescue, sand- burg bluegrass, other grasses; 16 to 18 inches ppt.	Ponderosa pine, Jeffrey pine, western juniper, big sagebrush, bitterbrush, mountain mahogany, squaw carpet, Ross's sedge, grasses; 16 to 18 inches ppt.	
Surface Layer	0 to 4 inches; very dark grayish brown to dark brown very cobbly loam and loam, granular and platy structure, slightly hard, pH 6.8 to 6.6	1 to 0 inches of ponderosa pine needles and twigs, over 0 to 8 inches; brown loam, platy and granular structure, slightly hard, pH 6.0.	0 to 5 inches; light yellowish brown very stony loam to loam, platy and blocky structure, slightly hard to hard, pH 6.2 to 6.5.
Substratum			8 to 16 inches; weakly to strongly cemented yellow and brown silica duripan.
Rooting Depth (in.) to Underlying Material	10 to 20; basalt	20 to 40; basalt	7 to 20; silica duripan over basalt
Erosion Factor (K)	.32	.37	.43
Max. Erosion Hazard	Moderate	Low	Moderate
Soil Permeability	Moderately slow	Moderately slow	Slow
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	2ed II	1	2edx
Forest Site Class	7 (non-commercial)	5-6 (3-5)	7 (non-commercial)
Range Site	8	Not placed in a range site.	8, 1
Water Runoff Potential	Moderate	Slow	Moderate
Watershed Sensitivity	6 (Moderate)	8	6
Hydrologic Soil Group	D	B	D
Available Water Capacity (AWC) Upper 20 inches	Very Low to Low 1.3 to 2.6 inches	Low to Moderate 3.2 inches	Very Low to Low 1.1 to 3.1 inches
Susceptibility to Burning Damage	Low	Moderate	Low
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	1 tons/acre/year	2 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Moderate	Not Rated
Rating for Timber Site	Not Rated	Fair (1,7,10)	Not Rated
R-Value	30-60	30-60	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-2; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4 2-4; Loam Unified: ML-CL, CL AASHTO: A-4, A-6 4-12; Clay loam, cobbly clay loam Unified: CL, MH AASHTO: A-6, A-7 12+; Unweathered bedrock	0-8; Loam Unified: ML-CL, CL AASHTO: A-4, A-6 8-27; Clay loam, gravelly clay loam Unified: CL, MH AASHTO: A-6, A-7 27+; Unweathered bedrock	0-5; Very stony loam, loam Unified: ML-CL, CL AASHTO: A-4, A-6 5-8; Clay loam Unified: CL AASHTO: A-6 8-16; Silica duripan 16+; Unweathered bedrock

223 PASS CANYON-ELMORE-PACKWOOD FAMILIES ASSOCIATION (continued)

Included Areas:

Included with these soils in mapping and making up about 15 percent of the acreage are the Deven, Gwin, Lawyer, Bieber and Barnard families and Rock outcrop.

224 PASS CANYON-FORDICE-GWIN FAMILIES ASSOCIATION, 1 to 20 percent slopes

Map Unit Components	Pass Canyon family (35 percent)	Fordice family (25 percent)	Gwin family (20 percent)
Position, Slope, and Elevation	Mainly on southeast to westerly aspects of sideslopes, ridges and knolls of undulating basalt plateaus and mountain uplands; 1 to 20 percent slopes; 4400 to 6000 feet.	Mainly on southeast to westerly aspects of concave areas of undulating basalt plateaus and mountain uplands; 1 to 20 percent slopes; 4400 to 6000 feet	Mainly on southeast to westerly aspects of sideslopes, ridges and knolls of undulating basalt plateaus and mountain uplands; 5 to 20 percent slopes; 4400 to 6000 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, few scattered ponderosa pine, low sagebrush, big sagebrush, mulesear, buckwheat, western yarrow, sandberg bluegrass, Idaho fescue, cheatgrass; 16 to 20 inches ppt.	Ponderosa pine, Jeffrey pine, western juniper, big sagebrush, bitterbrush, squaw carpet, lupine, bluebunch wheatgrass, Junegrass, Ross's sedge, other grasses; 16 to 20 inches ppt.	
Surface Layer	0 to 4 inches; very dark grayish brown to dark brown very cobbly loam, and loam, granular and platy structure, slightly hard, pH 6.6 to 6.8.	1 to 0 inches; of ponderosa pine and Jeffrey needles, over 0 to 9 inches; dark grayish brown and grayish brown very stony loam and extremely cobbly loam, granular and subangular blocky structure, friable, pH t.2 to 6.4.	0 to 11 inches; dark grayish brown very cobbly loam, granular and blocky structure, slightly hard, pH 6.8.
Rooting Depth (in.) to Underlying Material	10 to 20; basalt, andesite	20 to 40; basalt, andesite	10 to 20; basalt, andesite
Erosion Factor (K)	.32	.28	.37
Max. Erosion Hazard	Moderate	Low to Moderate	Moderate
Soil Permeability	Moderately slow	Moderately slow	Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	2edx II	2epx	2edx
Forest Site Class	7 (non-commercial)	6 (4-5)	7 (non-commercial)
Range Site	8	Not placed in a range site.	8
Water Runoff Potential	Moderate	Slow	Moderate
Watershed Sensitivity	6 (Moderate)	7	6
Hydrologic Soil Group	D	B	D
Available Water Capacity (AWC) Upper 20 inches	Very Low to Low 1.3 to 2.6 inches	Low to Moderate 2.0 inches	Very Low to Low 1.0 to 2.0 inches
Susceptibility to Burning Damage	Low	Moderate	Low
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	1 tons/acre/year	2 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Very Low	Not Rated
Rating for Timber Site	Not Rated	Poor (1,4,7,11)	Not Rated
R-Value	30-60	30-60	30-60

224 PASS CANYON-FORDICE-GWIN FAMILIES ASSOCIATION (continued)

Soil horizons in
inches, USDA,
Unified, AASHTO

0-2; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4	0-9; Very stony loam, extremely cobbly loam Unified: SM, SM-SC AASHTO: A-4, A-6	0-11; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4
2-4; Loam Unified: ML-CL, CL AASHTO: A-4, A-6	9-28; Extremely cobbly clay loam Unified: GC, CL AASHTO: A-6	11-18; Extremely cobbly clay loam Unified: SC, CL AASHTO: A-6
4-12; Clay loam, cobbly clay loam Unified: CL, MH AASHTO: A-6, A-7	28+; Unweathered bedrock	18+; Unweathered bedrock
12+; Unweathered bedrock		

Included Areas:

Included with these soils in mapping and making up about 20 percent of the acreage are the Deven, Stukel, Elmore and Lawyer families, Lithic Xerorthents, mesic and Rock outcrop.

225 PASS CANYON-FORDICE-GWIN FAMILIES ASSOCIATION, 20 to 40 percent slopes

Map Unit Components	Pass Canyon family (35 percent)	Fordice family (25 percent)	Gwin family (20 percent)
Position, Slope, and Elevation	Mainly on southeast to westerly aspects of sideslopes, ridges and knolls of mountain uplands; 20 to 40 percent slopes; 4400 to 6000 feet.	Mainly on southeast to westerly aspects of smooth sideslopes and concave areas of mountain uplands; 20 to 40 percent slopes; 4400 to 6000 feet.	Mainly on southeast to westerly aspects of upper sideslopes, ridges and knolls of mountain uplands; 20 to 40 percent slopes; 4400 to 6000 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, few scattered ponderosa pine, low sagebrush, big sagebrush, mulesear, buckwheat, western yarrow, sandberg blue- grass, Idaho fescue, cheatgrass; 16 to 20 inches ppt.	Ponderosa pine, Jeffrey pine, western juniper, big sagebrush, bitterbrush, squaw carpet, lupine, bluebunch wheatgrass, June- grass, Ross's sedge, other grasses; 16 to 20 inches ppt.	
Surface Layer	0 to 4 inches; very dark grayish brown to dark brown very cobbly loam and loam, granular and platy structure slightly hard, pH 6.6 yo 6.8.	1 to 0 inches; ponderosa pine and juniper needles, over 0 to 9 inches; dark grayish brown and grayish brown very stony loam and extremely cobbly loam, granular structure, friable, pH 6.2 to 6.4.	0 to 11 inches; dark grayish brown very cobbly loam, granular and blocky structure, slightly hard, pH 6.8.
Rooting Depth (in.) to Underlying Material	10 to 20; basalt andesite	20 to 40; basalt andesite	10 to 20; basalt, andesite
Erosion Factor (K)	.32	.28	.37
Max. Erosion Hazard	Moderate to high	Moderate	Moderately to high
Soil Permeability	Moderately slow	Moderately slow	Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	3Edx III	2Epx	3Edx
Forest Site Class	7 (non-commercial)	6 (4-5)	7 (non-commercial)
Range Site	8	Not placed in a range site.	8
Water Runoff Potential	Rapid	Slow	Rapid
Watershed Sensitivity	5 (Moderate)	7	5
Hydrologic Soil Group	D	B	D
Available Water Capacity (AWC) Upper 20 inches	Very Low to Low 1.3 to 2.6 inches	Low to Moderate 2.0 inches	Very Low to Low 1.0 to 2.0 inches
Susceptibility to Burning Damage	Moderate	Moderate to High	Moderate
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	1 tons/acre/year	2 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Very Low	Not Rated
Rating for Timber Site	Not Rated	Poor (1,4,7,11)	Not Rated
R-Value	30-60	30-60	30-60

225 PASS CANYON-FORDICE-GWIN FAMILIES ASSOCIATION (continued)

Soil horizons in inches, USDA, Unified, AASHTO

0-2; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4	0-9; Very stony loam, extremely cobbly loam Unified: SM, SM-SC AASHTO: A-4, A-6	0-11; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4
2-4; Loam Unified: ML-CL, CL AASHTO: A-4, A-6	9-28; Extremely cobbly clay loam Unified: GC, CL AASHTO: A-6	11-18; Extremely cobbly clay loam Unified: SC, CL AASHTO: A-6
4-12; Clay loam, cobbly clay loam Unified: CL, MH AASHTO: A-6, A-7	28+; Unweathered bedrock	18+; Unweathered bedrock
12+; Unweathered bedrock		

Included Areas:

Included with these soils in mapping and making up about 20 percent of the acreage are the Deven, Stukel, Bakeoven, Ruckles, Elmore and Lawyer families Lithic Xerorthents, mesic and Rock outcrop.

226 PASS CANYON-GWIN-FORDICE FAMILIES ASSOCIATION, 40 to 70 percent slopes

Map Unit Components	Pass Canyon family (35 percent)	Gwin family (30 percent)	Fordice family (15 percent)
Position, Slope, and Elevation	Mainly on southeast to westerly aspects of sideslopes, ridges and knolls of mountain uplands; 40 to 70 percent slopes, 4400 to 6000 feet.	Mainly on southeast to westerly aspects of upper sideslopes, ridges and knolls of mountain uplands; 40 to 70 percent slopes; 4400 to 6000 feet.	Mainly on southeast to westerly aspects of smooth sideslopes and concave areas of mountain uplands; 40 to 60 percent slopes; 4400 to 6000 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, few scattered ponderosa pine, low sagebrush, big sagebrush, mulesear, buckwheat, western yarrow, sandberg blue- grass, Idaho fescue, cheatgrass; 16 to 20 inches ppt.	Western juniper, mountain mahogany, current spp., big sagebrush, low sagebrush, mulesear, Phlox spp., bottlebrush, Idaho fescue, cheat- grass; 16 to 20 inches ppt.	
Surface Layer	0 to 4 inches; very dark grayish brown to dark brown very cobbly loam and loam, granular and platy structure slightly hard, pH 6.6 to 6.8.	0 to 11 inches; dark grayish brown very cobbly loam, granular and blocky structure, slightly hard, pH 6.8.	1 to 0 inches; of ponderosa pine and juniper needles, over 0 to 9 inches; inches; dark grayish brown and grayish brown very stony loam and extremely cobbly loam, granular and subgranular blocky structure, friable, pH 6.2 to 6.4.
Rooting Depth (in.) to Underlying Material	10 to 20; basalt andesite	10 to 20; basalt andesite	20 to 40; basalt, andesite
Erosion Factor (K)	.32	.37	.28
Max. Erosion Hazard	High to very high	High to very high	High
Soil Permeability	Moderately slow	Moderately slow	Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	3Edx III	3Epx	3Edx
Forest Site Class	7 (non-commercial)	7 (non-commercial)	6 (4-5)
Range Site	8	8	Not placed in a range site.
Water Runoff Potential	Rapid	Very Rapid	Moderate
Watershed Sensitivity	4 (High)	3	6
Hydrologic Soil Group	D	D	B
Available Water Capacity (AWC)	Very low to Low	Very Low to Low	Low to Moderate
Upper 20 inches	1.3 to 2.6 inches	1.0 to 2.0 inches	2.0 inches
Susceptibility to Burning Damage	Moderate	Moderate	High
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	1 tons/acre/year	1 tons/acre/year	2 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated	Very Low
Rating for Timber Site	Not Rated	Not Rated	Poor (1,4,7,8,11)
R-Value	30-60	30-60	30-60

226 PASS CANYON-GWIN-FORDICE FAMILIES ASSOCIATION (continued)

Soil horizons in inches, USDA, Unified, AASHTO

0-2;	Very cobbly loam Unified: SM, SM-SC AASHTO: A-4	0-11;	Very cobbly loam Unified: SM, SM-SC AASHTO: A-4	0-9;	Very stony loam, extremely cobbly loam Unified: SM, SM-SC AASHTO: A-4, A-6
2-4;	Loam Unified: ML-CL, CL AASHTO: A-4, A-6	11-18;	Extremely cobbly clay loam Unified: SC, CL AASHTO: A-6	9-28;	Extremely cobbly clay loam Unified: GC, CL AASHTO: A-6
4-12;	Clay loam, cobbly clay loam Unified: CL, MH AASHTO: A-6, A-7	18+;	Unweathered bedrock	28+;	Unweathered bedrock
12+;	Unweathered bedrock				

Included Areas:

Included with these soils in mapping and making up about 20 percent of the acreage are the Deven, Bakeoven, Ruckles, Elmore and Lawyer families Lithic Xerorthents, mesic and Rock outcrop.

227 PASS CANYON FAMILY-LITHIC XERORTHENTS, MESIC COMPLEX, 1 to 15 percent slopes

Map Unit Components	Pass Canyon family (45 percent)	Lithic Xerorthents, mesic (35 percent)
Position, Slope, and Elevation	On undulating basalt plateaus; 1 to 15 percent slopes; 4500 to 5700 feet.	On nearly level cobble pavement flats, knolls and ridges of undulating basalt plateaus; 1 to 15 percent slopes; 4500 to 5700 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, low sagebrush, few big sagebrush, Idaho fescue, sandberg blue- grass, cheatgrass; 14 to 18 inches ppt.	Low sagebrush, buckwheat, cheatgrass; 14 to 18 inches ppt.
Surface Layer	0 to 4 inches; very dark grayish brown to dark brown very cobbly loam and loam, granular and platy structure, slightly hard, pH 6.8 to 6.6.	0 to 5 inches; brown and yellowish brown very cobbly loam and gravelly loam; platy and granular structure; slightly hard; pH 6.6 to 6.8.
Rooting Depth (in.) to Underlying Material	8 to 15; basalt	4 to 10; basalt andesite
Erosion Factor (K)	.32	Variable
Max. Erosion Hazard	Moderate	Moderate
Soil Permeability	Moderately slow	Moderate
Drainage Class	Well drained	Somewhat excessively drained
Soil Manageability Class	2ed	3eDx
Soil Manageability Group	II	
Forest Site Class	7 (non-commercial)	7 (non-commercial)
Range Site	8,1	1
Water Runoff Potential	Moderate	Moderate
Watershed Sensitivity	6 (Moderate)	5
Hydrologic Soil Group	D	D
Available Water Capacity (AWC)	Very Low to Low	Very Low
Upper 20 inches	1.0 to 2.0 inches	0.6 to 1.5 inches
Susceptibility to Burning Damage	Low	Low
Slope Stability Hazard	Low	Low
Allowable Soil Loss	1 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated
R-Value	30-60	Not Rated
Soil horizons in inches, USDA, Unified, AASHTO	0-2; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4 2-4; Loam Unified: ML-CL, CL AASHTO: A-4, A-6 4-12; Clay loam, cobbly clay loam Unified: CL, MH AASHTO: A-6, A-7 12+; Unweathered bedrock	0-5; Variable Unified: Not Rated AASHTO: Not Rated 5+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up about 20 percent of the acreage are the Deven, Indian Creek, Packwood, Keating families and Rock outcrop.	

228 PASS CANYON-LOS GATOS FAMILIES COMPLEX, 1 to 20 percent slopes

Map Unit Components	Pass Canyon family (45 percent)	Los Gatos family (35 percent)
Position, Slope, and Elevation	On undulating basalt plateaus and sideslopes of mountain uplands; 1 to 20 percent slopes; 4400 to 5500 feet.	On undulating basalt plateaus and lower sideslopes of mountain uplands; 1 to 15 percent slopes; 4400 to 5500 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, low sagebrush, big sagebrush, rabbitbrush, Idaho fescue, Poa spp., cheatgrass; 14 to 18 inches ppt.	Western juniper, few scattered ponderosa pine, big sagebrush, bitterbrush, rabbitbrush, Idaho fescue, Poa spp., other grasses; 14 to 18 inches ppt.
Surface Layer	0 to 4 inches; very dark grayish brown to dark brown very cobbly loam and loam, granular and platy structure, slightly hard, pH 6.8 to 6.6.	0 to 19 inches; brown gravelly loam, granular and blocky structure, soft, pH 6.8 to 7.0
Rooting Depth (in.) to Underlying Material	10 to 20; hard fractured basalt, tuff	20 to 40; hard fractured basalt, tuff
Erosion Factor (K)	.32	.32
Max. Erosion Hazard	Moderate	Low
Soil Permeability	Moderately slow	Moderate
Drainage Class	Well drained	Well drained
Soil Manageability Class	2ed	1
Soil Manageability Group	II	
Forest Site Class	7 (non-commercial)	7 (non-commercial)
Range Site	8,4	13
Water Runoff Potential	Moderate	Slow
Watershed Sensitivity	6 (Moderate)	8
Hydrologic Soil Group	D	B
Available Water Capacity (AWC) Upper 20 inches	Very Low to Low 1.3 to 2.6 inches	Low to Moderate 2.8 inches
Susceptibility to Burning Damage	Low	Moderate
Slope Stability Hazard	Low	Low
Allowable Soil Loss	1 tons/acre/year	2 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated
R-Value	30-60	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-2; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4 2-4; Loam Unified: ML-CL, CL AASHTO: A-4, A-6 4-12; Clay loam, cobbly clay loam Unified: CL, MH AASHTO: A-6, A-7 12+; Unweathered bedrock	0-19; Gravelly loam Unified: ML, ML-CL AASHTO: A-4 19-38; Clay loam, gravelly clay loam Unified: CL, MH AASHTO: A-6, A-7 38+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up about 20 percent of the acreage are the Ridd, Stukel, Supan, Keating, Alicel, Cowiche, Elmore, Deven and Roval families and Rock outcrop, and unnamed soils similar to the Gwin family but over soft tuff.	

229 PASS CANYON-ROVAL FAMILIES COMPLEX, 1 to 15 percent slopes

Map Unit Components	Pass Canyon family (60 percent)	Roval family (25 percent)
Position, Slope, and Elevation	On undulating basalt plateaus and lower sideslopes of mountain uplands; 1 to 15 percent slopes; 4700 to 6000 feet.	On undulating basalt plateaus and lower sideslopes of mountain uplands; 1 to 15 percent slopes; 4700 to 6000 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, low sagebrush, rabbit- brush, Phlox spp., Idaho fescue, sandberg bluegrass, cheatgrass; 14 to 16 inches ppt.	Western juniper, low sagebrush, rabbit- brush, Phlox spp., Idaho fescue, sandberg bluegrass, cheatgrass; 14 to 16 inches ppt.
Surface Layer	0 to 4 inches; very dark grayish brown to dark brown very cobbly loam and loam, granular and platy structure, slightly hard, pH 6.8 to 6.6.	0 to 2 inches; brown very cobbly loam, platy and granular structure, slightly hard, pH 6.6.
Substratum		12 to 14 inches; strongly cemented silica duripan
Rooting Depth (in.) to Underlying Material	10 to 20; basalt	10 to 20; silica duripan over basalt.
Erosion Factor (K)	.32	.37
Max. Erosion Hazard	Moderate	Moderate
Soil Permeability	Moderately slow	Slow
Drainage Class	Well drained	Well drained
Soil Manageability Class	2ed	2ed
Group	II	
Forest Site Class	7 (non-commercial)	7 (non-commercial)
Range Site	8	8
Water Runoff Potential	Moderate	Moderate
Watershed Sensitivity	6 (Moderate)	6
Hydrologic Soil Group	D	D
Available Water Capacity (AWC)	Very Low to Low	Low
Upper 20 inches	1.3 to 2.6 inches	1.5 to 3.0 inches
Susceptibility to Burning Damage	Low	Low
Slope Stability Hazard	Low	Low
Allowable Soil Loss	1 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated
R-Value	30-60	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-2; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4 2-4; Loam Unified: ML-CL, CL AASHTO: A-4, A-6 4-12; Clay loam, cobbly clay loam Unified: CL, MH AASHTO: A-6, A-7 12+; Unweathered bedrock	0-2; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4 2-10; Clay loam Unified: CL, MH AASHTO: A-6, A-7 10-13; Clay Unified: CH AASHTO: A-7 13-14; Silica duripan 14+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up about 15 percent of the acreage are the Bieber, Deven, Stukel, Los Gatos and Fordice families, Lithic Xerothents, mesic, and Rock outcrop.	

230 PATIO deep-GLEASON-MERKEL FAMILIES COMPLEX, 10 to 40 percent slopes

Map Unit Components	Patio family, deep (35 percent)	Gleason family (30 percent)	Merkel family (25 percent)
Position, Slope, and Elevation	On sideslopes of mountain uplands; 15 to 40 percent slopes; 4800 to 6200 feet.	On sideslopes of mountain uplands; 10 to 40 percent slopes; 4800 to 6200 feet.	On toeslopes and sideslopes of mountain uplands; 10 to 35 percent slopes; 4800 to 6200 feet.
Typical Vegetation and Precipitation (ppt)	Ponderosa pine, few incense-cedar and white fir, rabbitbrush, ceonothus, snowberry, squaw carpet, Ross's sedge, few grasses; 16 to 25 inches ppt.	Ponderosa pine, few incense-cedar and white fir, rabbitbrush, ceonothus, snowberry, squaw carpet, Ross's sedge, few grasses; 16 to 25 inches ppt.	
Surface Layer	1 to 0 inches of white fir needles, over 0 to 18 inches; yellowish brown very gravelly loam, granular structure, slightly hard, pH 6.2 to 6.8.	1 to 0 inches; undecomposed ponderosa pine needles and twigs, over 0 to 22 inches; grayish brown gravelly sandy loam and sandy loam, granular and massive structure, soft, pH 6.0 to 6.5.	1 to 0 inches of white fir needles, over 0 to 11 inches pale brown very gravelly loam, granular and blocky structure, soft, pH 6.8.
Substratum		22 to 50 inches; light gray and very pale brown gravelly sandy loam to very gravelly coarse sand, massive, slightly hard to hard, pH 6.2.	
Rooting Depth (in.) to Underlying Material	40 plus; andesite, obsidian	40 plus; andesite obsidian or tuff	30 plus; tuff, andesite
Erosion Factor (K)	.28	.17	.32
Max. Erosion Hazard	Moderate	Low to Moderate	Moderate
Soil Permeability	Moderate	Moderately rapid	Moderate
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class	2ep	2e	2e
Group	II		
Forest Site Class	5 (3-4)	5 (3-4)	5 (3-4)
Range Site	Not placed in a range site.	Not placed in a range site.	Not placed in a range site.
Water Runoff Potential	Slow	Slow	Slow
Watershed Sensitivity	7 (Moderate)	8	7
Hydrologic Soil Group	B	B	B
Available Water Capacity (AWC)	Moderate	Moderate	Moderate
Upper 20 inches	2.3 inches	2.5 inches	2.4 inches
Susceptibility to Burning Damage	Moderate	Moderate	Moderate
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	3 tons/acre/year	3 tons/acre/year	2,3 tons/acre/year
Chance of Seedling Survival	Low to Moderate	Moderate	Low to Moderate
Rating for Timber Site	Good (10)	Good (10)	Good (10)
R-Value	30-60	60+	30-60

230 PATIO deep-GLEASON-MERKEL FAMILIES COMPLEX (continued)

Soil horizons in
inches, USDA,
Unified, AASHTO

0-60; Very gravelly loam,
extremely gravelly
loam, extremely
cobble loam
Unified: SM, SM-SC
AASHTO: A-2-4, A-2-6

0-35; Gravelly sandy loam,
sandy loam
Unified: SM
AASHTO: A-2-4
35-50; Very gravelly coarse
sand
Unified: SW-SM, SM
AASHTO: A-1-b
50+; Weathered bedrock

0-32; Very gravelly loam,
extremely cobbly loam
Unified: SM, SC
AASHTO: A-2-4,
A-2-6, A-4, A-6
32+; Unweathered bedrock

Included Areas:

Included with these soils in mapping and making up about 10 percent of the acreage are the Lamondi, Wapal, Smarts, DeMasters, Inville, Mascamp, Alicel, and Anatone families and areas with less slope.

231 PATIO deep-MERKEL FAMILIES COMPLEX, 15 to 35 percent slopes

Map Unit Components	Patio family, deep (60 percent)	Merkel family (20 percent)
Position, Slope, and Elevation	On sideslopes of mountain uplands; 15 to 35 percent slopes; 5500 to 7000 feet.	On sideslopes of mountain uplands; 15 to 35 percent slopes; 5500 to 7000 feet.
Typical Vegetation and Precipitation (ppt)	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, few lodgepole pine at higher elevations, plus snowberry, current spp., squaw carpet, Ross's sedge, few grasses; 20 to 30 inches, ppt.	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, few lodgepole pine at higher elevations, plus snowberry, current spp., squaw carpet, Ross's sedge, grasses; 20 to 30 inches ppt.
Surface Layer	1 to 0 inches of white fir needles, over 0 to 18 inches; yellowish brown very gravelly loam, granular structure, slightly hard, pH 6.2 to 6.8	1 to 0 inches of white fir needles, over 0 to 11 inches pale brown very gravelly loam, granular and blocky structure, soft, pH 6.8.
Rooting Depth (in.) to Underlying Material	40 plus; basalt, andesite	30 plus; tuff, andesite
Erosion Factor (K)	.28	.32
Max. Erosion Hazard	Moderate	Moderate
Soil Permeability	Moderate	Moderate
Drainage Class	Well drained	Well drained
Soil Manageability Class	2ep	2e
Soil Manageability Group	II	
Forest Site Class	5 (3-4)	5 (3-4)
Range Site	Not placed in a range site.	Not placed in a range site.
Water Runoff Potential	Slow	Slow
Watershed Sensitivity	7 (Moderate)	7
Hydrologic Soil Group	B	B
Available Water Capacity (AWC)	Moderate	Moderate
Upper 20 inches	2.3 inches	2.4 inches
Susceptibility to Burning Damage	Moderate	Moderate
Slope Stability Hazard	Low	Low
Allowable Soil Loss	3 tons/acre/year	2,3 tons/acre/year
Chance of Seedling Survival	Low to Moderate	Low to Moderate
Rating for Timber Site	Good	Good
R-Value	30-60	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-60; Very gravelly loam, extremely gravelly loam, extremely cobbly loam Unified: SM, SM-SC AASHTO: A-2-4, A-2-6	0-32; Very gravelly loam, extremely cobbly loam Unified: SM, SC AASHTO: A-2-4, A-2-6, A-4, A-6 32+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up 20 percent of the acreage are the Smarts, Lamondi, Wapal, Gleason, Anatone families, Lithic Xerorthents, frigid, and Rock outcrop.	

232 PATIO deep-MERKEL FAMILIES COMPLEX, 35 to 60 percent slopes

Map Unit Components	Patio family, deep (55 percent)	Merkel family (25 percent)
Position, Slope, and Elevation	On sideslopes of mountain uplands; 35 to 60 percent slopes; 5500 to 7000 feet.	On sideslopes of mountain uplands; 35 to 60 percent slopes; 5500 to 7000 feet.
Typical Vegetation and Precipitation (ppt)	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, few lodgepole pine at higher elevations, plus snowberry, current spp., squaw carpet, Ross's sedge, few grasses; 20 to 30 inches, ppt.	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, few lodgepole pine at higher elevations, plus snowberry, current spp., squaw carpet, Ross's sedge, grasses; 20 to 30 inches ppt.
Surface Layer	1 to 0 inches of white fir needles, over 0 to 18 inches; yellowish brown very gravelly loam, granular structure, slightly hard, pH 6.2 to 6.8	1 to 0 inches of white fir needles, over 0 to 11 inches pale brown very gravelly loam, granular and blocky structure, soft, pH 6.8.
Rooting Depth (in.) to Underlying Material	40 plus; basalt, andesite	30 plus; tuff, andesite
Erosion Factor (K)	.28	.32
Max. Erosion Hazard	High	High
Soil Permeability	Moderate	Moderate
Drainage Class	Well drained	Well drained
Soil Manageability Class Group	3Ep III	3E
Forest Site Class	5 (3-4)	5 (3-4)
Range Site	Not placed in a range site.	Not placed in a range site.
Water Runoff Potential	Moderate	Moderate
Watershed Sensitivity	6 (Moderate)	5
Hydrologic Soil Group	B	B
Available Water Capacity (AWC) Upper 20 inches	Moderate 2.3 inches	Moderate 2.4 inches
Susceptibility to Burning Damage	Moderate to High	Moderate to High
Slope Stability Hazard	Low	Low
Allowable Soil Loss	3 tons/acre/year	2,3 tons/acre/year
Chance of Seedling Survival	Low to Moderate	Low to Moderate
Rating for Timber Site	Fair (8)	Fair (8)
R-Value	30-60	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-60; Very gravelly loam, extremely gravelly loam, extremely cobbly loam Unified: SM, SM-SC AASHTO: A-2-4, A-2-6	0-32; Very gravelly loam, extremely cobbly loam Unified: SM, SC AASHTO: A-2-4, A-2-6, A-4, A-6 32+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up 20 percent of the acreage are the Smarts, Lamondi, Wapal, Gleason, Anatone families, Rubble land, Rock outcrop and unnamed soils similar to the Inville family.	

233 PATIO-SMARTS-ANATONE FAMILIES ASSOCIATION, 15 to 35 percent slopes

Map Unit Components	Patio family (35 percent)	Smarts family (30 percent)	Anatone family (20 percent)
Position, Slope, and Elevation	On sideslopes and ridges of mountain uplands; 15 to 35 percent slopes; 5800 to 6700 feet.	On lower sideslopes and toeslopes of mountain uplands; 15 to 30 percent slopes; 5800 to 6700 feet.	On upper sideslopes, ridges and knolls of mountain uplands; 20 to 35 percent slopes; 5800 to 6700 feet.
Typical Vegetation and Precipitation (ppt)	Few ponderosa pine, white fir, western juniper, dense rabbitbrush, big sagebrush, some bitterbrush, paintbrush, mulesear, bottlebrush, Ross's sedge, other grasses; 20 to 30 inches ppt.	Few ponderosa pine, white fir, western juniper, dense rabbitbrush, big sagebrush, some bitterbrush, paintbrush, mulesear, bottlebrush, Ross's sedge, other grasses; 20 to 30 inches ppt.	
Surface Layer	0 to 19 inches; dark grayish brown to brown very gravelly loam, granular and blocky structure, soft, pH 6.8.	1/2 to 0 inches; ponderosa pine and white fir needles and twigs, over 0 to 20 inches; reddish brown stony loam and very cobbly loam, granular and blocky structure, slightly hard and hard, pH 6.6 to 6.8.	0 to 17 inches; brown cobbly loam to very cobbly loam, granular and subangular blocky structure, slightly hard, pH 7.0 to 6.8.
Rooting Depth (in.) to Underlying Material	20 to 40; andesite	20 to 40; basalt, andesite	10 to 20; andesite, basalt
Erosion Factor (K)	.28	.32	.37
Max. Erosion Hazard	Moderate	Moderate	Moderate to high
Soil Permeability	Moderate	Moderately slow	Moderate
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	3epX III	3epX	3EdX
Forest Site Class	6 (4-5)	5-6 (3-5)	7 (non-commercial)
Range Site	Not placed in a range site.	Not placed in a range site.	9
Water Runoff Potential	Slow	Slow	Rapid
Watershed Sensitivity	7 (Moderate)	7	4
Hydrologic Soil Group	B	B	D
Available Water Capacity (AWC)	Low to Moderate	Low to Moderate	Very Low to Low
Upper 20 inches	2.3 inches	2.1 inches	1.2 to 2.5 inches
Susceptibility to Burning Damage	Moderate	Moderate	Moderate
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	2 tons/acre/year	2 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Low to Moderate	Low	Not Rated
Rating for Timber Site	Poor (1,4,7)	Poor (1,4,7)	Not Rated
R-Value	30-60	30-60	30-60

233 PATIO-SMARTS-ANATONE FAMILIES ASSOCIATION (continued)

Soil horizons in inches, USDA, Unified, AASHTO

<p>0-28; Very gravelly loam Unified: SM, SM-SC AASHTO: A-2-4, A-2-6</p> <p>28+; Unweathered bedrock</p>	<p>0-20; Stony loam, very cobbly loam Unified: ML, ML-CL AASHTO: A-4</p> <p>20-28; Very gravelly loam Unified: SM-SC, SC AASHTO: A-4, A-6</p> <p>28-35; Extremely gravelly clay loam Unified: GC AASHTO: A-2-6, A-2-7</p> <p>35+; Weathered bedrock</p>	<p>0-8; Cobbly loam Unified: ML, ML-CL AASHTO: A-4</p> <p>8-17; Very cobbly loam Unified: SM, SC AASHTO: A-4, A-6</p> <p>17+; Unweathered bedrock</p>
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Included Areas:

Included with these units in mapping and making up about 15 percent of the acreage are the Lamondi, Wapal, Mascamp families, Patio and Smarts families, deep, Lithic Xerorthents, frigid, and Rock outcrop.

235 PULS-PACKWOOD-DITCHCAMP FAMILIES COMPLEX 1 to 10 percent slopes

Map Unit Components	Puls family (40 percent)	Packwood family (30 percent)	Ditchcamp family (15 percent)
Position, Slope, and Elevation	On intermound areas between 10 to 30 foot diameter mounds on basalt plateaus; 1 to 2 percent slopes; 4400 to 5500 feet.	On intermound areas between 10 to 30 foot diameter mounds on basalt plateaus; 1 to 3 percent slopes; 4400 to 5500 feet.	On 10 to 30 foot diameter mounds normally from 100 to 150 feet of each other on basalt plateaus; 2 to 10 percent slopes; 4400 to 5500 feet.
Typical Vegetation and Precipitation (ppt)	Black sagebrush, low sagebrush, few western juniper, buckwheat, Idaho fescue, other grasses; 12 to 14 inches ppt.	Low sagebrush, few western juniper, bluebunch wheatgrass, cheatgrass, other grasses; 12 to 14 inches ppt.	
Surface Layer	0 to 5 inches; pinkish gray very stony clay loam, granular structure, slightly hard, pH 6.3.	0 to 5 inches; light yellowish brown very stony loam to loam, platy and blocky structure, slightly hard to hard, pH 6.2 to 6.5.	0 to 15 inches; brown loam, platy and blocky structure, hard, pH 6.5.
Substratum	19 to 28 inches; indurated silica cemented duripan.	8 to 16 inches; weakly to strongly cemented yellow and brown silica duripan.	30 to 34 inches; strongly cemented reddish yellow silica duripan.
Rooting Depth (in.) to Underlying Material	5 to 10; dense very hard clay over silica duripan at 10 to 20 inches	7 to 20; silica duripan over basalt	20 to 35; silica duripan over basalt
Erosion Factor (K)	.37	.43	.43
Max. Erosion Hazard	Moderate	Moderate	Moderate
Soil Permeability	Very slow	Slow	Slow
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	3eDx II	2edx	2e
Forest Site Class	7 (non-commercial)	7 (non-commercial)	7 (non-commercial)
Range Site	1	7,1	12
Water Runoff Potential	Moderate	Moderate	Slow
Watershed Sensitivity	5 (Moderate)	6	7
Hydrologic Soil Group	D	D	C
Available Water Capacity (AWC) Upper 20 inches	Very Low to Low 1.1 to 2.7 inches	Very Low to Low 1.3 to 3.1 inches	Low to Moderate 3.4 inches
Susceptibility to Burning Damage	Low	Low	Low
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	1 tons/acre/year	1 tons/acre/year	2 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated	Not Rated
R-Value	0-30	30-60	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-5; Very stony clay loam Unified: ML,CL AASHTO: A-6, A-7 5-19; Clay loam, clay Unified: CL, CH AASHTO: A-7 19-28; Silica duripan 28+; Unweathered bedrock	0-5; Very stony loam, loam Unified: ML-CL, CL AASHTO: A-4, A-6 5-8; Clay loam Unified: CL AASHTO: A-6 8-16; Silcia duripan 16+; Unweathered bedrock	0-15; Loam Unified: ML-CL, CL AASHTO: A-4, A-6 15-30; Clay loam Unified: CL, CH AASHTO: A-6, A-7 30-34; Silica duripan 34+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up about 15 percent of the acreage are the Castlevale, Dishner, Aikman, Bieber and Roval families, Lithic Xerorthents, mesic, Rock outcrop, and unnamed soils similar to Ditchcamp family but are Mollisols.		

236 PULS-ROVAL-DISHNER FAMILIES COMPLEX, 0 to 5 percent slopes

Map Unit Components	Puls family (50 percent)	Roval family (20 percent)	Dishner family (15 percent)
Position, Slope, and Elevation	On shallow nearly level basins on undulating basalt plateaus; 0 to 2 percent slopes; 4500 to 5500 feet.	On upper areas of undulating basalt plateaus; 1 to 5 percent slopes; 4500 to 5500 feet.	On upper areas and gentle sideslopes of undulating basalt plateaus; 1 to 5 percent slopes; 4500 to 5500 feet.
Typical Vegetation and Precipitation (ppt)	Low sagebrush, black sagebrush, few forbes, cheatgrass; 14 to 16 inches ppt.	Western juniper, low sagebrush, few big sagebrush, Idaho fescue, sandberg bluegrass, bottlegrass, cheatgrass; 14 to 16 inches ppt.	
Surface Layer	0 to 5 inches; pinkish gray very stony clay loam, granular structure, slightly hard, pH 6.3.	0 to 2 inches; brown very cobbly loam, platy and granular structure, slightly hard, pH 6.6.	0 to 5 inches; light brownish gray cobbly sandy clay loam, platy and granular structure, slightly hard, pH 6.8.
Substratum	19 to 28 inches; indurated silica cemented duripan.	13 to 14 inches; strongly cemented silica duripan.	
Rooting Depth (in.) to Underlying Material	5 to 10; dense very hard clay over silica duripan below 10 to 20 inches.	10 to 20; silica duripan over basalt.	8 to 16; basalt
Erosion Factor (K)	.37	.37	.43
Max. Erosion Hazard	Moderate	Moderate	Moderate
Soil Permeability	Very Slow	Slow	Slow
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	3eDX III	2ed	2ed
Forest Site Class	7 (non-commercial)	7 (non-commercial)	7 (non-commercial)
Range Site	1	8	8,1
Water Runoff Potential	Moderate	Moderate	Moderate
Watershed Sensitivity	4 (Moderate)	6	5
Hydrologic Soil Group	D	D	D
Available Water Capacity (AWC) Upper 20 inches	Very Low to Low 1.1 to 2.7 inches	Low 1.5 to 3.0 inches	Very Low to Low 1.1 to 2.1 inches
Susceptibility to Burning Damage	Low	Low	Low
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	1 tons/acre/year	1 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated	Not Rated
R-Value	0-30	30-60	0-30
Soil horizons in inches, USDA, Unified, AASHTO	0-5; Very stony clay loam Unified: ML, CL AASHTO: A-6, A-7 5-19; Clay loam, Unified: CL, CH AASHTO: A-7 19-28; Silica duripan 28+; Unweathered bedrock	0-2; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4 2-10; Clay loam Unified: CL, MH AASHTO: A-6, A-7 10-13; Clay Unified: CH AASHTO: A-7 13-14; Silica duripan 14+; Unweathered bedrock	0-9; Cobbly sandy clay loam silty clay loam Unified: CL AASHTO: A-6 9-16; Clay loam, cobbly clay Unified: CL, CH AASHTO: A-7 16+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up about 15 percent of the acreage are the Aikman, Bierber, Castlevale, Packwood, Indian Creek, Barnard, Deven and Ditchcamp families, Lithic Xerorthents, mesic, and Rock outcrop.		

237 RIDD-LOS GATOS-GWIN FAMILIES ASSOCIATION, 5 to 35 percent slopes

Map Unit Components	Ridd family (40 percent)	Los Gatos family (25 percent)	Gwin family (20 percent)
Position, Slope, and Elevation	On sideslopes and convex areas of mountain uplands; 5 to 35 percent slopes; 4400 to 5800 feet.	On lower sideslopes and toeslopes of mountain uplands; 5 to 30 percent slopes; 4400 to 5800 feet.	On upper sideslopes ridges and convex areas of mountain uplands; 10 to 35 percent slopes; 4400 to 5800 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, few ponderosa pine, big sagebrush, rabbitbrush, bitterbrush, vetch, mulesear, Phlox spp., Idaho fescue, sandberg bluegrass, bluebunch wheatgrass; 14 to 18 inches ppt.	Western juniper, few ponderosa pine, big sagebrush, rabbitbrush, bitterbrush, vetch mulesear, Phlox spp., Idaho fescue, sandberg bluegrass, bluebunch wheatgrass; 14 to 18 inches ppt.	
Surface Layer	0 to 15 inches; dark grayish brown cobbly loam, granular structure, slightly hard, pH 6.0.	0 to 19 inches; brown gravelly loam, granular and blocky structure, soft, pH 6.8 to 7.0.	0 to 11 inches; dark grayish brown very cobbly loam, granular and blocky structure, slightly hard, pH 6.8.
Rooting Depth (in.) to Underlying Material	20 to 40; basalt	20 to 40; basalt	10 to 20; basalt
Erosion Factor (K)	.32	.32	.37
Max. Erosion Hazard	Low to moderate	Low to moderate	Moderate
Soil Permeability	Moderately slow	Moderate	Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	2e II	2e	2ed
Forest Site Class	7 (non-commercial)	7 (non-commercial)	7 (non-commercial)
Range Site	18	13	8
Water Runoff Potential	Slow	Slow	Rapid
Watershed Sensitivity	7 (Moderate)	7	5
Hydrologic Soil Group	B	B	D
Available Water Capacity (AWC) Upper 20 inches	Low to Moderate 2.4 inches	Low to Moderate 2.8 inches	Very Low to Low 1.0 to 2.0 inches
Susceptibility to Burning Damage	Moderate	Moderate	Low
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	2 tons/acre/year	2 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated	Not Rated
R-Value	30-60	30-60	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-5; Cobbly loam Unified: ML, ML-CL AASHTO: A-4 5-37; Very cobbly clay loam Unified: CL AASHTO: A-6, A-7 37+; Unweathered bedrock	0-19; Gravelly loam Unified: ML, ML-CL AASHTO: A-4 19-38; Clay loam, gravelly clay loam Unified: CL, MH AASHTO: A-6, A-7 38+; Unweathered bedrock	0-11; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4 11-18; Extremely cobbly clay loam Unified: SC, CL AASHTO: A-6 18+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up about 15 percent of the acreage are the Supan, Keating, Bakeoven and Pass Canyon families and Rock outcrop.		

238 RIDD-RUCKLES-KEATING FAMILIES COMPLEX, 1 to 20 percent slopes

Map Unit Components	Ridd family (35 percent)	Ruckles family (30 percent)	Keating family (20 percent)
Position, Slope, and Elevation	On smooth lower sideslopes and toeslopes of mountain uplands and alluvial fans; 1 to 20 percent slopes; 4400 to 5500 feet.	On knolls and ridges and upper sideslopes of mountain uplands and alluvial fans; 2 to 20 percent slopes; 4400 to 5500 feet.	On smooth lower sideslopes and toeslopes of mountain uplands and alluvial fans; 1 to 20 percent slopes; 4400 to 5500 feet.
Typical Vegetation and Precipitation (ppt)	Big sagebrush, rabbitbrush, bitterbrush, few western juniper, Idaho fescue, Poa spp., needlegrass; bottlebrush; 14 to 18 inches.	Western juniper, low sagebrush, big sagebrush, buckwheat, Phlox spp., Idaho fescue, cheatgrass; 14 to 18 inches ppt.	
Surface Layer	0 to 5 inches; dark grayish brown cobbly loam, granular structure, slightly hard, pH 6.0.	0 to 4 inches; brown very cobbly loam, granular structure, soft, pH 7.0.	0 to 2 inches; dark grayish brown cobbly clay loam, granular structure, hard, pH 6.8.
Rooting Depth (in.) to Underlying Material	20 to 40; basalt, tuff	10 to 20; basalt, tuff	20 to 40; basalt, tuff
Erosion Factor (K)	.32	.37	.32
Max. Erosion Hazard	Low to moderate	Moderate	Low to moderate
Soil Permeability	Moderately slow	Slow	Slow
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	2e II	2ed	2e
Forest Site Class	7 (non-commercial)	7 (non-commercial)	7 (non-commercial)
Range Site	18	8	18
Water Runoff Potential	Slow	Moderate	Slow
Watershed Sensitivity	8 (moderate)	5	6
Hydrologic Soil Group	B	D	C
Available Water Capacity (AWC) Upper 20 inches	Low to Moderate 2.4 inches	Very Low to Low 1.0 to 2.0 inches	Low to Moderate 2.7 inches
Susceptibility to Burning Damage	Low	Low	Low
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	2 tons/acre/year	1 tons/acre/year	2 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated	Not Rated
R-Value	30-60	0-30	0-30
Soil horizons in inches, USDA, Unified, AASHTO	0-5; Cobbly loam Unified: ML, ML-CL AASHTO: A-4 5-37; Very cobbly clay loam Unified: CL AASHTO: A-6, A-7 37+; Unweathered bedrock	0-4; Very cobbly loam Unified: SM, SC AASHTO: A-4, A-6 4-14; Very gravelly clay Unified: GC, CH AASHTO: A-7 14+; Unweathered bedrock	0-6; Cobbly clay loam, clay loam Unified: CL, MH, CH AASHTO: A-6, A-7 6-32; Clay Unified: CH AASHTO: A-7 32+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up about 15 percent of the acreage are the Supan, Puls, Bieber, Deven, and Gwin families.		

239 ROCK OUTCROP-BAKEOVEN-WENATCHEE FAMILIES ASSOCIATION, 20 to 60 percent slopes

Map Unit Components	Rock outcrop (40 percent)	Bakeoven family (30 percent)	Wentchee family (15 percent)
Position, Slope, and Elevation	On upper slopes and ridges of mountain uplands and basalt plateau breaks; 30 to 60 percent slopes; 4200 to 5500 feet.	On sideslopes and convex areas of mountain uplands and plateau breaks; 20 to 50 percent slopes; 4200 to 5500 feet.	On lower sideslopes and toeslopes of mountain uplands and plateau breaks; 20 to 40 percent slopes; 4200 to 5500 feet.
Typical Vegetation and Precipitation (ppt)	Barren; 10 to 16 inches ppt.	Western juniper, rabbitbrush, big sage- brush, low sagebrush, Ribes spp., mules-ear, cheatgrass, sandberg bluegrass, needlegrass, Idaho fescue; 10 to 16 inches ppt.	
Surface Layer	NOT APPLICABLE: Basalt, bedrock with minor accumulations of aeolian soil deposition in some fractures.	A thin pumice overburden of up to 5 inches thick may be present, OVER 0 to 11 inches; dark grayish brown and grayish brown very cobbly fine sandy loam, subangular blocky structure; slightly hard, pH 6.6.	9 inches of pumice overburden consisting of brown gravelly coarse sandy loam over very pale brown extremely gravelly coarse loamy sand (pumice thickness in this map unit ranges from 0 to 5 inches) OVER 9 to 15 inches; pale brown fine sandy loam, subangular blocky sturcture, soft, pH 6.8.
Rooting Depth (in.) to Underlying Material		8 to 20; basalt	20 to 40; basalt
Erosion Factor (K)		.24	.20
Max. Erosion Hazard		Moderate to high	Moderate
Soil Permeability		Moderately rapid	Moderate
Drainage Class		Well drained	Well drained
Soil Manageability Class Group	Not rated III	3EPx	2e
Forest Site Class		7 (non-commercial)	7 (non-commercial)
Range Site		7,1	16
Water Runoff Potential	Very Rapid	Rapid	Slow
Watershed Sensitivity	2 (High)	5	7
Hydrologic Soil Group		D	B
Available Water Capacity (AWC) Upper 20 inches		Very Low to Low 0.8 to 1.9 inches	Low to Moderate 2.6 inches
Susceptibility to Burning Damage		Low	Moderate
Slope Stability Hazard		Low	Low
Allowable Soil Loss		1 tons/acre/year	2 tons/acre/year
Chance of Seedling Survival		Not Rated	Not Rated
Rating for Timber Site		Not Rated	Not Rated
R-Value		30-60	30-60

239 ROCK OUTCROP-BAKEOVEN-WENATCHEE FAMILIES ASSOCIATION (continued)

Soil horizons in
inches, USDA,
Unified, AASHTO

0-11;	Very cobbly fine sandy loam Unified: SM, SM-SC AASHTO: A-4	0-5;	Gravelly coarse sandy loam Unified: SM AASHTO: A-1-b
11+;	Unweathered bedrock	5-9;	Extremely gravelly loamy coarse sand Unified: SW-SM AASHTO: A-1-a
		9-27;	Fine sandy loam, loam Unified: ML, ML-CL, CL AASHTO: A-4, A-6
		27+;	Unweathered bedrock

Included Areas:

Included with this unit in mapping and making up about 15 percent of the acreage are the Searles, Fordice, Elmore, Cowiche and Stukel families.

240 ROCK OUTCROP-RUBBLE LAND-BAKEOVEN FAMILY ASSOCIATION, 40 to 90 percent slopes

Map Unit Components	Rock outcrop (35 percent)	Rubble land (30 percent)	Bakeoven family (20 percent)
Position, Slope, and Elevation	On ridge tops and scarp breaks of mountain uplands; 40 to 90 percent slopes; 4400 to 7000 feet.	On smooth concave mountain sideslopes; 50 to 90 percent slopes; 4400 to 7000 feet.	On smooth mountain sideslopes; 40 to 70 percent slopes; 4400 to 7000 feet.
Typical Vegetation and Precipitation (ppt)	Generally barren with few scattered trees, forbes, shrubs and grasses in some rock fractures; 14 to 20 inches ppt.	Barren; 14 to 20 inches ppt.	
Surface Layer	NOT APPLICABLE; Basalt, andesite or conglomerated tuff bedrock with minor accumulations of aeolian soil deposition in some fractures.	NOT APPLICABLE: Colluvial deposition of angular cobbles, stones and boulders of basalt or andesite rock material.	0 to 11 inches; dark grayish brown and grayish brown very cobbly fine sandy loam, subangular blocky structure; slightly hard, pH 6.6.
Rooting Depth (in.) to Underlying Material			7 to 20; basalt, andesite
Erosion Factor (K)			.24
Max. Erosion Hazard			High to Very High
Soil Permeability			Moderately rapid
Drainage Class			Well drained
Soil Manageability Class Group	Not Rated IV	4GdX	
Forest Site Class			7 (non-commercial)
Range Site			8,1
Water Runoff Potential	Very Rapid	Very Rapid	Rapid
Watershed Sensitivity	0 (Very High)	2	4
Hydrologic Soil Group			D
Available Water Capacity (AWC) Upper 20 inches			Very Low to Low 0.6 to 1.9 inches
Susceptibility to Burning Damage			Moderate
Slope Stability Hazard			Low to Moderate
Allowable Soil Loss			1 tons/acre/year
Chance of Seedling Survival			Not Rated
Rating for Timber Site R-Value			Not Rated 30-60
Soil horizons in inches, USDA, Unified, AASHTO			0-11; Very cobbly fine sandy loam Unified: SM, SM-SC AASHTO: A-4
Included Areas:	Included with this unit in mapping and making up about 15 percent of the acreage are the Fordice, Smarts, Keating, Gwin, Anatone families and Lithic Xerorthents.		

241 ROCK OUTCROP-RUBBLE LAND-CHEADLE FAMILY ASSOCIATION, 60 to 100 percent slopes

Map Unit Components	Rock outcrop (35 percent)	Rubble land (30 percent)	Cheadle family (25 percent)
Position, Slope, and Elevation	On ridges and scarp breaks of mountain uplands; 60 to 100 percent slopes; 7000 to 9900 feet.	On smooth sideslopes and strongly dissected drainages of mountain uplands; 60 to 100 percent slopes; 7000 to 9900 feet.	On sideslopes and ridges of mountain uplands; 60 to 90 percent slopes; 7000 to 9900 feet.
Typical Vegetation and Precipitation (ppt)	Barren; 25 to 35 inches ppt.	Barren; 25 to 35 inches ppt.	
Surface Layer	NOT APPLICABLE; Basalt, andesite or conglomerated tuff bedrock with minor accumulations of aeolian soil deposition in some fractures.	NOT APPLICABLE: Colluvial deposition of angular cobbles, stones and boulders of basalt or andesite rock material.	0 to 17 inches; dark grayish brown to brown very cobbly loam to very cobbly clay loam; granular and subangular blocky structure, slightly hard to hard, pH 6.6.
Rooting Depth (in.) to Underlying Material			8 to 20; andesite
Erosion Factor (K)			.37
Max. Erosion Hazard			Very High
Soil Permeability			Moderately rapid
Drainage Class			Well drained
Soil Manageability Class	Not Rated	4Gd	
Group	IV		
Forest Site Class			7 (non-commercial)
Range Site			9,1
Water Runoff Potential	Very Rapid	Very Rapid	Very Rapid
Watershed Sensitivity	0 (Very High)	2	2
Hydrologic Soil Group			D
Available Water Capacity (AWC) Upper 20 inches			Very Low to Low 1.0 to 2.4 inches
Susceptibility to Burning Damage			Moderate
Slope Stability Hazard			Moderate
Allowable Soil Loss			1 tons/acre/year
Chance of Seedling Survival			Not Rated
Rating for Timber Site			Not Rated
R-Value			30-60
Soil horizons in inches, USDA, Unified, AASHTO			0-12; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4, A-6 12-17; Very cobbly clay loam Unified: SC AASHTO: A-6, A-7 17+; Unweathered bedrock
Included Areas:	Included with this unit in mapping and making up about 10 percent of the acreage are the Behanin, Supervisor families and Lithic Cryochrepts.		

242 ROVAL-DEVEN FAMILIES ASSOCIATION, 1 to 10 percent slopes

Map Unit Components	Roval family (50 percent)	Deven family (35 percent)
Position, Slope, and Elevation	On upper sideslopes and slightly convex areas of undulating basalt plateaus; 2 to 10 percent slopes; 4700 to 5800 feet.	On nearly level to slight concave areas of undulating basalt plateaus; 1 to 10 percent slopes; 4700 to 5800 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, few ponderosa pine, mountain mahogany, low sagebrush, big sagebrush, sandberg bluegrass, cheatgrass; 14 to 16 inches ppt.	Western juniper, low sagebrush, Phlox spp., sandberg bluegrass, Idaho fescue, cheatgrass, bottlebrush; 14 to 16 inches ppt.
Surface Layer	0 to 2 inches; brown very cobbly loam, platy and granular structure, slightly hard, pH 6.6.	0 to 2 inches; brown cobbly loam, granular structure, soft, pH 6.3.
Substratum	13 to 14 inches; strongly cemented silica duripan.	
Rooting Depth (in.) to Underlying Material	10 to 20; silica duripan over basalt	10 to 20; basalt
Erosion Factor (K)	.37	.37
Max. Erosion Hazard	Moderate	Moderate
Soil Permeability	Slow	Slow
Drainage Class	Well drained	Well drained
Soil Manageability Class	2ed	2ed
Soil Manageability Group	II	
Forest Site Class	7 (non-commercial)	7 (non-commercial)
Range Site	8	8
Water Runoff Potential	Moderate	Moderate
Watershed Sensitivity	6 (Moderate)	5
Hydrologic Soil Group	D	D
Available Water Capacity (AWC)	Low	Very Low to Low
Upper 20 inches	1.5 to 3.0 inches	1.4 to 2.8 inches
Susceptibility to Burning Damage	Low	Low
Slope Stability Hazard	Low	Low
Allowable Soil Loss	1 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated
R-Value	30-60	0-30
Soil horizons in inches, USDA, Unified, AASHTO	0-2; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4 2-10; Clay loam Unified: CL, MH AASHTO: A-6, A-7 10-13; Clay Unified: CH AASHTO: A-7 13-14; Silica duripan 14+; Unweathered bedrock	0-2; Cobbly loam Unified: ML-CL, CL AASHTO: A-4, A-6 2-7; Clay loam Unified: CL, MH, CH AASHTO: A-6, A-7 7-16; Clay Unified: CH AASHTO: A-7 16+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up about 15 percent of the acreage are the Bieber, Pass Canyon, Barnard families, Lithic Xerorthents, mesic, and Rock outcrop.	

243 ROVAL-PASS CANYON FAMILIES COMPLEX, 1 to 15 percent slopes

Map Unit Components	Roval family (45 percent)	Pass Canyon family (40 percent)
Position, Slope, and Elevation	On nearly level to undulating basalt plateaus; 1 to 15 percent slopes; 4500 to 5800 feet.	On nearly level to undulating basalt plateaus; 1 to 15 percent slopes; 4500 to 5800 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, low sagebrush, rabbitbrush, Phlox spp., Idaho fescue, sandberg bluegrass, bottlebrush, cheatgrass; 14 to 16 inches ppt.	Western juniper, low sagebrush, rabbitbrush, Phlox spp., Idaho fescue, sandberg bluegrass, bottlebrush, cheatgrass; 14 to 16 inches ppt.
Surface Layer	0 to 2 inches; brown very cobbly loam, platy and granular structure, slightly hard, pH 6.6	0 to 4 inches; very dark grayish brown to dark brown very cobbly loam and loam, granular and platy structure, slightly hard, pH 6.8 to 6.6.
Substratum	13 to 14 inches; strongly cemented silica duripan.	
Rooting Depth (in.) to Underlying Material	10 to 20; silica duripan over basalt.	10 to 20; basalt
Erosion Factor (K)	.37	.32
Max. Erosion Hazard	Moderate	Moderate
Soil Permeability	Slow	Moderately slow
Drainage Class	Well drained	Well drained
Soil Manageability Class	2ed	2ed
Soil Manageability Group	II	
Forest Site Class	7 (non-commercial)	7 (non-commercial)
Range Site	8	8
Water Runoff Potential	Moderate	Moderate
Watershed Sensitivity	6 (Moderate)	6
Hydrologic Soil Group	D	D
Available Water Capacity (AWC)	Low	Very Low to Low
Upper 20 inches	1.5 to 3.0 inches	1.3 to 2.6 inches
Susceptibility to Burning Damage	Low	Low
Slope Stability Hazard	Low	Low
Allowable Soil Loss	1 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated
R-Value	30-60	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-2; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4 2-10; Clay loam Unified: CL, MH AASHTO: A-6, A-7 10-13; Clay Unified: CH AASHTO: A-7 13-14; Silica duripan 14+; Unweathered bedrock	0-2; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4 2-4; Loam Unified: ML-CL, CL AASHTO: A-4, A-6 4-12; Clay loam, cobbly clay loam Unified: CL, MH AASHTO: A-6, A-7 12+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up about 15 percent of the acreage are the Barnard, Bieber, Deven, Puls and Gwin families and Lithic Xerorthents, mesic.	

244 RUCKLES-BIEBER FAMILIES COMPLEX, 2 to 30 percent slopes

Map Unit Components	Ruckles family (45 percent)	Bieber family (35 percent)
Position, Slope, and Elevation	On sideslopes and toeslopes of mountain uplands; 5 to 30 percent slopes; 4800 to 5800 feet.	On toeslopes and alluvial fans of mountain uplands; 2 to 20 percent slopes; 4800 to 5800 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, low sagebrush, big sagebrush, rabbitbrush, Idaho fescue, bottlebrush, Poa spp.; 14 to 16 inches ppt.	Few western juniper, low sagebrush, Phlox spp., western yarrow, Idaho fescue, bottlebrush, Poa spp.; 14 to 16 inches ppt.
Surface Layer	0 to 4 inches; brown, very cobbly loam, granular structure, soft, pH 7.0.	0 to 4 inches; brown very cobbly loam, blocky and granular structure, hard, pH 6.8.
Substratum		18 plus inches; strongly cemented silica duripan
Rooting Depth (in.) to Underlying Material	10 to 20; basalt, tuff	10 to 20; silica duripan over basalt, tuff
Erosion Factor (K)	.37	.37
Max. Erosion Hazard	Moderate	Moderate
Soil Permeability	Slow	Very slow
Drainage Class	Well drained	Well drained
Soil Manageability Class	2edx	2edx
Group	II	
Forest Site Class	7 (non-commercial)	7 (non-commercial)
Range Site	8	8
Water Runoff Potential	Rapid	Moderate
Watershed Sensitivity	4 (Moderate)	5
Hydrologic Soil Group	D	D
Available Water Capacity (AWC)	Very Low to Low	Very Low to low
Upper 20 inches	1.0 to 2.0 inches	1.2 to 2.5 inches
Susceptibility to Burning Damage	Low	Low
Slope Stability Hazard	Low to Moderate	Low
Allowable Soil Loss	1 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated
R-Value	0-30	0-30
Soil horizons in inches, USDA, Unified, AASHTO	0-4; Very cobbly loam Unified: SM, SC AASHTO: A-4, A-6 4-14; Very gravelly clay Unified: GC, CH AASHTO: A-7 14+; Unweathered bedrock	0-4; Very cobbly loam Unified: SC, CL AASHTO: A-6 4-18; Clay Unified: CH AASHTO: A-7 18+; Silica duripan
Included Areas:	Included with these soils in mapping and making up about 20 percent of the acreage are the Deven, Aikman and Keating families and Lithic Xerorthents, mesic.	

245 RUCKLES-GWIN FAMILIES-ROCK OUTCROP ASSOCIATION, 20 to 40 percent slopes

Map Unit Components	Ruckles family (35 percent)	Gwin family (30 percent)	Rock outcrop (20 percent)
Position, Slope, and Elevation	Mostly on southerly aspects of sideslopes of mountain uplands; 20 to 40 percent slopes; 4600 to 6000 feet.	Mostly on southerly aspects of upper sideslopes and ridges of mountain uplands; 20 to 40 percent slopes; 4600 to 6000 feet.	On ridges, and knolls of mountain uplands; 20 to 40 percent slopes; 4600 to 6000 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, few ponderosa pine, mountain mahogany, bitterbrush, mulesear, low sagebrush, Idaho fescue, bottlebrush, sandberg bluegrass; 14 to 18 inches ppt.	Western juniper, mountain mahogany, low sagebrush, big sagebrush, Idaho fescue, sandberg bluegrass, cheatgrass; 14 to 18 inches ppt.	
Surface Layer	0 to 4 inches; brown very cobbly loam, granular structure, soft, pH 7.0.	0 to 11 inches; dark grayish brown very cobbly loam, granular and blocky structure, slightly hard, pH 6.8.	NOT APPLICABLE: Basalt, andesite or conglomerated tuff bedrock with minor accumulations of aeolian soil deposition in some fractures.
Rooting Depth (in.) to Underlying Material	10 to 20; basalt, tuff	8 to 20; basalt	
Erosion Factor (K)	.37	.37	
Max. Erosion Hazard	Moderate to high	Moderate to high	
Soil Permeability	Slow	Moderately slow	
Drainage Class	Well drained	Well drained	
Soil Manageability Class Group	3Ed III	2Edx	
Forest Site Class	7 (non-commercial)	7 (non-commercial)	
Range Site	8	8, 1	
Water Runoff Potential	Rapid	Rapid	Very Rapid
Watershed Sensitivity	4 (High)	5	2
Hydrologic Soil Group	D	D	
Available Water Capacity (AWC) Upper 20 inches	Very Low to Low 1.0 to 2.0 inches	Very Low to Low 0.8 to 1.9 inches	
Susceptibility to Burning Damage	Moderate	Moderate	
Slope Stability Hazard	Low to Moderate	Low	
Allowable Soil Loss	1 tons/acre/year	1 tons/acre/year	
Chance of Seedling Survival	Not Rated	Not Rated	
Rating for Timber Site R-Value	Not Rated 0-30	Not Rated 30-60	
Soil horizons in inches, USDA, Unified, AASHTO	0-4; Very cobbly loam Unified: SM, SC AASHTO: A-4, A-6 4-14; Very gravelly clay Unified: GC, CH AASHTO: A-7 14+; Unweathered bedrock	0-11; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4 11-18; Extremely cobbly clay loam Unified: SC, CL AASHTO: A-6 18+; Unweathered bedrock	
Included Areas:	Included with this unit in mapping and making up about 15 percent of the acreage are the Fordice, Lawyer, Pass Canyon, Deven families and Lithic Xerorthents, mesic.		

**246 MENZEL-HOLLAND FAMILIES, 4 to 15 inch pumice overburden-ROCK OUTCROP ASSOCIATION,
15 to 40 percent slopes**

Map Unit Components	Menzel family (35 percent)	Holland family (25 percent)	Rock outcrop (25 percent)
Position, Slope, and Elevation	On basalt plateau scarp breaks; 15 to 40 percent slopes; 4300 to 4700 feet.	On basalt plateau scarp breaks; 15 to 40 percent slopes; 4300 to 4700 feet.	On ridges and upper sideslopes of basalt plateau scarp breaks; 20 to 40 percent slopes; 4300 to 4700 feet.
Typical Vegetation and Precipitation (ppt)	Ponderosa pine, bitterbrush, big sagebrush, rabbitbrush, greenleaf manzanita, Ross's sedge, few grasses; 16 to 20 inches ppt.	Ponderosa pine, western juniper, big sagebrush, bitterbrush, rabbitbrush, Ribes spp., needlegrass, Idaho fescue, Ross's sedge, other grasses; 16 to 20 inches ppt.	
Surface Layer	1/2 to 0 inches of ponderosa pine needles and pumice gravel pavement, over 14 inches of pumice overburden consisting of grayish brown gravelly coarse sand grading to very pale brown extremely gravelly coarse sand (pumice thickness ranges from 4 to 15 inches) OVER 14 to 18 inches; yellowish brown gravelly sandy loam, granular and blocky structure, soft, pH 6.8.	1 to 0 inches ponderosa pine needles and twigs, over 12 inches of pumice overburden consisting of 0 to 5 inches grayish brown gravelly coarse sand; 5 to 12 inches; very pale brown extremely gravelly coarse sand (thickness ranges from 4 to 15 inches) OVER 12 to 21 inches; brown loam, subangular blocky structure, hard, pH 6.6.	NOT APPLICABLE: Basalt bedrock with minor accumulations of aeolian soil deposition in some fractures.
Rooting Depth (in.) to Underlying Material	40 plus; basalt, colluvium	20 to 40; basalt	
Erosion Factor (K)	.15	.20	
Max. Erosion Hazard	Moderate	Moderate	
Soil Permeability	Rapid in the pumice overburden to moderately rapid below.	Rapid in the pumice overburden to moderately slow below.	
Drainage Class	Well drained	Well drained	
Soil Manageability Class Group	2ep II	2ep	
Forest Site Class	5 (3-4)	6 (4-5)	
Range Site	Not placed in a range site.	Not placed in a range site.	
Water Runoff Potential	Very Slow	Slow	Very Rapid
Watershed Sensitivity	9 (Moderate)	8	2
Hydrologic Soil Group	A	B	
Available Water Capacity (AWC) Upper 20 inches	Moderate to High 2.4 inches	Low to Moderate 2.6 inches	
Susceptibility to Burning Damage	Moderate to High	Moderate to High	
Slope Stability Hazard	Low	Low	
Allowable Soil Loss	3 tons/acre/year	2 tons/acre/year	
Chance of Seedling Survival	Moderate	Moderate	
Rating for Timber Site R-Value	Fair (5, 10) 60+	Fair (5, 7, 10) 30-60	

246 MENZEL-HOLLAND FAMILIES, 4 to 15 inch pumice overburden-ROCK OUTCROP ASSOCIATION

(continued)

Soil horizons in
inches, USDA,
Unified, AASHTO

0-4; Gravelly coarse sand Unified: SM AASHTO: A-1-b	0-5; Gravelly coarse sand Unified: SW-SM, SM AASHTO: A-1-b
4-14; Extremely gravelly coarse sand Unified: GW-GM AASHTO: A-1-a	5-12; Extremely gravelly coarse sand Unified: GW-GM AASHTO: A-1-a
14-60; Gravelly sandy loam, very gravelly sandy loam Unified: SM AASHTO: A-1-b, A-2-4	12-21; Loam Unified: CL AASHTO: A-6
	21-37; Clay loam Unified: CL, MH AASHTO: A-6, A-7
	37+; Unweathered bedrock

Included Areas:

Included with this unit in mapping and making up about 15 percent of the acreage are the Alcot, Skalan families and Lithic Xerorthents, mesic, areas of steeper slopes, and soils similar to the Menzel and Holland families but with a deeper pumice overburden.

247 SEARLES-GWIN FAMILIES-LAVA FLOW COMPLEX, 1 to 10 percent slopes

Map Unit Components	Searles family (40 percent)	Gwin family (25 percent)	Lava flow (20 percent)
Position, Slope, and Elevation	On knolls and depressions of undulating basalt plateaus; 1 to 10 percent slopes; 4200 to 5000 feet.	On knolls and depressions of undulating basalt plateaus; 1 to 10 percent slopes; 4200 to 5000 feet.	On ridges and moundlike protrusions of fractured and disaggregated lava flow rock on undulating basalt plateaus; 2 to 10 percent slopes 4200 to 5000 feet.
Typical Vegetation and Precipitation (ppt)	Bitterbrush, big sagebrush, mountain mahogany, Idaho fescue, stipa, bluebunch wheatgrass, Bromus spp., other grasses, 10 to 14 inches ppt.	Bitterbrush, big sagebrush, Idaho fescue, bluebunch wheatgrass, Bromus spp., Agropiran spp., Stipa, other grasses, western juniper and mountain mahogany, 10 to 14 inches ppt.	
Surface Layer	0 to 7 inches; brown gravelly sandy loam, granular structure, soft, pH 7.0.	0 to 11 inches; dark grayish brown very cobbly loam, subangular blocky and granular structure, slightly hard, pH 6.8.	NOT APPLICABLE: Fractured vesicular basalt flow rock with minor accumulations of aeolian soil deposition in some fractures.
Rooting Depth (in.) to Underlying Material	20 to 40; basalt	10 to 20; basalt	
Erosion Factor (K)	.24	.37	
Max. Erosion Hazard	Low	Moderate	
Soil Permeability	Moderately slow	Moderately slow	
Drainage Class	Well drained	Well drained	
Soil Manageability Class	2x	2edx	
Soil Manageability Group	II		
Forest Site Class	7 (non-commercial)	7 (non-commercial)	
Range Site	17, 16	7	
Water Runoff Potential	Very Slow	Slow	Rapid
Watershed Sensitivity	8 (Moderate)	6	5
Hydrologic Soil Group	B	D	
Available Water Capacity (AWC)	Low to Moderate	Very Low to Low	
Upper 20 inches	2.3 inches	1.0 to 2.0 inches	
Susceptibility to Burning Damage	Low	Low	
Slope Stability Hazard	Low	Low	
Allowable Soil Loss	2 tons/acre/year	1 tons/acre/year	
Chance of Seedling Survival	Not Rated	Not Rated	
Rating for Timber Site	Not Rated	Not Rated	
R-Value	30-60	30-60	

247 SEARLES-GWIN FAMILIES-LAVA FLOW COMPLEX (continued)

Soil horizons in
inches, USDA,
Unified, AASHTO

0-7; Gravelly sandy loam Unified: SM, SM-SC AASHTO: A-4	0-11; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4
7-14; Cobbly loam Unified: ML-CL, CL AASHTO: A-4, A-6	11-18; Extremely cobbly clay loam Unified: SC, CL AASHTO: A-6
14-34; Extremely cobbly loam Unified: SC AASHTO: A-6	18+; Unweathered bedrock
34+; Unweathered bedrock	

Included Areas:

Included with this unit in mapping and making up about 15 percent of the acreage are the Lithic Xerorthents, mesic, Pass Canyon, Bakeoven, Stukel, Fordice, and Neer families and lava flow rock with steeper slopes.

249 SHELD-AHART FAMILIES ASSOCIATION, 2 to 20 percent slopes

Map Unit Components	Sheld family (50 percent)	Ahart family (30 percent)
Position, Slope, and Elevation	On sideslopes of volcanic mountain uplands; 5 to 20 percent slopes; 5600 to 6200 feet.	On toeslopes and alluvial draws of volcanic mountain uplands; 2 to 15 percent slopes; 5600 to 6200 feet.
Typical Vegetation and Precipitation (ppt)	Mixed conifer forest of white fir, ponderosa pine, incense cedar, plus greenleaf manzanita, snowberry ceonothus, currant spp., Ross's sedge, grasses; 30 to 40 inches ppt.	Mixed conifer forest of white fir, ponderosa pine, incense-cedar, plus greenleaf manzanita, snowberry, coenothus, currant spp., Ross's sedge, grasses; 30 to 40 ppt.
Surface Layer	2 to 0 inches of white fir and ponderosa pine needles and twigs, over 0 to 25 inches; dark grayish brown and brown gravelly fine sandy loam and very cobbly loam, granular and subangular blocky structure; soft, pH 5.8 to 6.2.	1/2 to 0 inches mostly undecomposed white fir needles and grass over 0 to 12 inches; brown gravelly fine sandy loam; granular structure; soft; pH 6.2.
Substratum	44 to 50 inches; light yellowish brown extremely cobbly loam, massive, soft, pH 6.2.	28 to 60 inches; light yellowish brown very gravelly fine sandy loam; massive; soft; pH 6.0.
Rooting Depth (in.) to Underlying Material	40 plus inches; hard basalt.	40 plus inches; hard basalt, alluvium
Erosion Factor (K)	.20	.20
Max. Erosion Hazard	Low to moderate	Low
Soil Permeability	Moderate	Moderate
Drainage Class	Well drained	Well drained
Soil Manageability Class	2e	1
Group	II	
Forest Site Class	4 (2-3)	4 (2-3)
Range Site	Not placed in a range site.	Not placed in a range site.
Water Runoff Potential	Slow	Very slow
Watershed Sensitivity	9 (Low)	9
Hydrologic Soil Group	B	B
Available Water Capacity (AWC)	Moderate to High	Moderate to High
Upper 20 inches	3.1 inches	3.0 inches
Susceptibility to Burning Damage	Moderate	Moderate
Slope Stability Hazard	Low	Low
Allowable Soil Loss	3 tons/acre/year	3 tons/acre/year
Chance of Seedling Survival	High	High
Rating for Timber Site	Good	Good
R-Value	60+	60+
Soil horizons in inches, USDA, Unified, AASHTO	0-12; Gravelly fine sandy loam Unified: SM AASHTO: A-4 12-50; Very cobbly loam, very gravelly loam, extremely cobbly loam Unified: SM, SM-SC AASHTO: A-4 50+; Unweathered bedrock	0-60; Gravelly fine sandy loam Unified: SM AASHTO: A-2-4, A-4
Included Areas:	Included with these soils in mapping and making up about 20 percent of the acreage are the Lithic Xerumbrepts, Stonewell and Yallani families and Rock outcrop.	

250 SIMPSON FAMILY, 1 to 10 percent slopes

Map Unit Components	Simpson family (75 percent)
Position, Slope, and Elevation	On lower sideslopes, toeslopes and alluvial basins of basalt plateaus; 1 to 10 percent slopes; 4300 to 4700 feet.
Typical Vegetation and Precipitation (ppt)	Rabbitbrush, big sagebrush, few western juniper, sandberg bluegrass, wheatgrass; 10 to 14 inches ppt.
Surface Layer	0 to 3 inches; brown loam, granular structure, slightly hard, pH 7.2.
Substratum	28 to 30 inches; yellowish brown semi-consolidated ashy tuff which rubs to a clay loam, massive, very hard, pH 7.6.
Rooting Depth (in.) to Underlying Material	20 to 40; basalt
Erosion Factor (K)	.43
Max. Erosion Hazard	Low
Soil Permeability	Slow
Drainage Class	Well drained
Soil Manageability Class	1
Group	I
Forest Site Class	7 (non-commercial)
Range Site	12
Water Runoff Potential	Slow
Watershed Sensitivity	6 (Moderate)
Hydrologic Soil Group	C
Available Water Capacity (AWC)	Low to Moderate
Upper 20 inches	2.7 inches
Susceptibility to Burning Damage	Low
Slope Stability Hazard	Low
Allowable Soil Loss	2 tons/acre/year
Chance of Seedling Survival	Not Rated
Rating for Timber Site	Not Rated
R-Value	0-30
Soil horizons in inches, USDA, Unified, AASHTO	0-3; Loam Unified: ML-CL, CL AASHTO: A-4, A-6 3-8; Silty clay loam Unified: CL, MH, CH AASHTO: A-6, A-7 8-28; Silty clay Unified: CH AASHTO: A-7 28-30; Clay loam Unified: CL, MH, CH AASHTO: A-6, A-7 30+; Unweathered bedrock
Included Areas:	Included with this soil in mapping and making up about 25 percent of the acreage are the Deven, Dishner, Pass Canyon families and Lithic Xerorthents, mesic.

251 SIMPSON-DEVEN FAMILIES ASSOCIATION, 1 to 20 percent slopes

Map Unit Components	Simpson family (55 percent)	Deven family (25 percent)
Position, Slope, and Elevation	On lower sideslopes, toeslopes and alluvial fans of basalt plateaus; 1 to 15 percent slopes; 4300 to 4800 feet.	On upper sideslopes, ridges and knolls of basalt plateaus; 2 to 20 percent slopes; 4300 to 4800 feet.
Typical Vegetation and Precipitation (ppt)	Big sagebrush, rabbitbrush, Phlox spp., Idaho fescue, sandberg bluegrass; 10 to 14 inches ppt.	Western juniper, low sagebrush, rabbitbrush, Phlox spp., Idaho fescue, sandberg bluegrass cheatgrass; 10 to 14 inches ppt.
Surface Layer	0 to 3 inches; brown loam, granular structure, slightly hard, pH 7.2.	0 to 2 inches; brown cobbly loam, granular structure, soft, pH 6.3.
Substratum	28 to 30 inches; yellowish brown semi-consolidated ashy tuff which rubs to a clay loam, massive, very hard, pH 7.6.	
Rooting Depth (in.) to Underlying Material	20 to 40; hard basalt	10 to 20; hard basalt
Erosion Factor (K)	.43	.37
Max. Erosion Hazard	Low to moderate	Moderate
Soil Permeability	Slow	Slow
Drainage Class	Well drained	Well drained
Soil Manageability Class	2e	2ed
Soil Manageability Group	II	
Forest Site Class	7 (non-commercial)	7 (non-commercial)
Range Site	12, 17	7
Water Runoff Potential	Slow	Moderate
Watershed Sensitivity	6 (Moderate)	5
Hydrologic Soil Group	C	D
Available Water Capacity (AWC)	Low to Moderate	Very Low to Low
Upper 20 inches	2.7 inches	1.4 to 2.8 inches
Susceptibility to Burning Damage	Low	Low
Slope Stability Hazard	Low	Low
Allowable Soil Loss	2 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated
R-Value	0-30	0-30
Soil horizons in inches, USDA, Unified, AASHTO	0-3; Loam Unified: ML-CL, CL AASHTO: A-4, A-6 3-8; Silty clay loam Unified: CL, MH, CH AASHTO: A-6, A-7 8-28; Silty clay Unified: CH AASHTO: A-7 28-30; Clay loam Unified: CL, MH, CH AASHTO: A-6, A-7	0-2; Cobbly loam Unified: ML-CL, CL AASHTO: A-4, A-6 2-7; Clay loam Unified: CL, MH, CH AASHTO: A-6, A-7 7-16; Clay Unified: CH AASHTO: A-7 16+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up about 20 percent of the acreage are the Dishner, Castlevale, Barnard, Jacknife, Bieber, Pass Canyon Families, Lithic Xerorthents, mesic, and rock outcrop.	

252 SMARTS deep-SMARTS FAMILY COMPLEX, 2 to 20 percent slopes

Map Unit Components	Smarts family, deep (50 percent)	Smarts family (30 percent)
Position, Slope, and Elevation	On sideslopes and toeslopes of mountain uplands; 2 to 20 percent slopes; 5300 to 7500 feet.	On upper sideslopes, knolls and incised drainages of mountain uplands; 2 to 20 percent slopes; 5300 to 7500 feet.
Typical Vegetation and Precipitation (ppt)	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, plus green leaf manzanita, snowberry, serviceberry, Ross's sedge, few grasses, (Note - in the northeastern part of the survey area stands of ponderosa pine/ jeffrey pine are found); 20 to 30 inches ppt.	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, plus few western juniper, few lodgepole pine at higher elevations, greenleaf manzanita, serviceberry, Ross's sedge, few grasses, (Note- in the northeastern part of the survey area stands of ponderosa pine/jeffrey pine are found); 20 to 30 inches ppt.
Surface Layer	2 to 0 inches of decomposed and undecomposed white for needles and twigs, over 0 to 18 inches; brown stony loam, granular structure, soft, pH 6.2.	1/2 to 0 inches of ponderosa pine and white fir needles and twigs, over 0 to 20 inches reddish brown stony loam and very cobbly loam, granular and blocky structure, slightly hard and hard, pH 6.6 to 6.8.
Rooting Depth (in.) to Underlying Material	40 plus; basalt, tuff	20 to 40; basalt, tuff
Erosion Factor (K)	.32	.32
Max. Erosion Hazard	Low to moderate	Low to moderate
Soil Permeability	Moderately slow	Moderately slow
Drainage Class	Well drained	Well drained
Soil Manageability Class	2ep	2epx
Group	II	
Forest Site Class	4 (2-3)	5 (3-4)
Range Site	Not placed in a range site.	Not placed in a range site
Water Runoff Potential	Very Slow	Slow
Watershed Sensitivity	8 (Low)	7
Hydrologic Soil Group	B	B
Available Water Capacity (AWC)	Moderate	Low to Moderate
Upper 20 inches	2.6 inches	2.1 inches
Susceptibility to Burning Damage	Low to Moderate	Moderate
Slope Stability Hazard	Low	Low
Allowable Soil Loss	3 tons/acre/year	2 tons/acre/year
Chance of Seedling Survival	Moderate	Low
Rating for Timber Site	Fair (1)	Fair (1,3,7)
R-Value	30-60	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-18; Stony loam Unified: ML-CL, CL AASHTO: A-4 18-50; Extremely gravelly clay loam, extremely gravelly loam Unified: SC AASHTO: A-2-6, A-6 50+; Weathered bedrock	1-20; Stony loam, very cobbly loam Unified: ML-CL, ML AASHTO: A-4 20-28; Very gravelly loam Unified: SM-SC, SC AASHTO: A-4, A-6 28-35; Extremely gravelly clay loam Unified: GC AASHTO: A-2-6, A-2-7 35+; Weathered bedrock
Included Areas:	Included with these soils in mapping and making up about 20 percent of the acreage are the Mascamp, Lamondi, DeMasters and Merlin families.	

253 SMARTS deep-SMARTS FAMILY COMPLEX, 20 to 40 percent slopes

Map Unit Components	Smarts family, deep (45 percent)	Smarts family (35 percent)
Position, Slope, and Elevation	On sideslopes of mountain uplands; 20 to 35 percent slopes; 5500 to 7500 feet.	On upper sideslopes, ridges and incised drainages of mountain uplands; 20 to 40 percent slopes; 5500 to 7500 feet.
Typical Vegetation and Precipitation (ppt)	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, plus greenleaf manzanita, snowberry, serviceberry, Ross's sedge, few grasses; 20 to 30 inches ppt.	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, plus few western juniper, few lodgepole pine at higher elevations; greenleaf manzanita, mulesear, serviceberry, Ross's sedge, few grasses; 20 to 30 inches ppt.
Surface Layer	2 to 0 inches of decomposed and undecomposed white fir needles and twigs over 0 to 18 inches; brown stony loam, granular structure, soft, pH 6.2.	1/2 to 0 inches; ponderosa pine and white fir needles and twigs, over 0 to 20 inches; reddish brown stony loam and very cobbly loam, granular and blocky structure, slightly hard and hard, pH 6.6 to 6.8.
Rooting Depth (in.) to Underlying Material	40 plus; basalt	20 to 40; basalt
Erosion Factor (K)	.32	.32
Max. Erosion Hazard	Moderate	Moderate
Soil Permeability	Moderately slow	Moderately slow
Drainage Class	Well drained	Well drained
Soil Manageability Class	2ep	2epx
Soil Manageability Group	II	
Forest Site Class	4 (2-3)	5 (3-4)
Range Site	Not placed in a range site.	Not placed in a range site.
Water Runoff Potential	Slow	Slow
Watershed Sensitivity	7 (Moderate)	7
Hydrologic Soil Group	B	B
Available Water Capacity (AWC)	Moderate	Low to Moderate
Upper 20 inches	2.6 inches	2.1 inches
Susceptibility to Burning Damage	Low to Moderate	Moderate
Slope Stability Hazard	Low	Low
Allowable Soil Loss	3 tons/acre/year	2 tons/acre/year
Chance of Seedling Survival	Moderate	Low
Rating for Timber Site	Fair (1)	Fair (1,3,7)
R-Value	30-60	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-18; Stony loam Unified: ML-CL, CL AASHTO: A-4 18-50; Extremely gravelly clay loam, extremely gravelly loam Unified: SC AASHTO: A-2-6, A-6 50+; Weathered bedrock	0-20; Stony loam, very cobbly loam Unified: ML-CL, ML AASHTO: A-4 20-28; Very gravelly loam Unified: SM-SC, SC AASHTO: A-4, A-6 28-35; Extremely gravelly clay loam Unified: GC AASHTO: A-2-6, A-2-7 35+; Weathered bedrock
Included Areas:	Included with these soils in mapping and making up about 20 percent of the acreage are the DeMasters, Lamondi, Mascamp, Anatone families, Lithic Xerorthents, frigid, and rock outcrop.	

254 SMARTS-BERTAG-DEMASTERS FAMILIES, deep ASSOCIATION, 10 to 35 percent slopes

Map Unit Components	Smarts family, deep (35 percent)	Bertag family, deep (25 percent)	DeMasters family, deep (20 percent)
Position, Slope, and Elevation	On upper sideslopes and ridges of mountain uplands;; 10 to 35 percent slopes; 5500 to 7500 feet.	On middle to lower sideslopes and draws of mountain uplands; 10 to 35 percent slopes; 5500 to 7500 feet.	On lower sideslopes, toeslopes and alluvial fans of mountain uplands; 10 to 35 percent slopes; 5500 to 7500 feet.
Typical Vegetation and Precipitation (ppt)	White fir forest, or mixed conifer forest of white fir, ponderosa pine, plus mountain mahogany, big sagebrush, ceonothus, mulesear, snowberry, Ross's sedge, few grasses; 20 to 30 inches ppt.	White fir forest, or mixed conifer forest of white fir, ponderosa pine, plus few quaking aspen, snowberry, serviceberry, current spp., Ross's sedge, few grasses; 20 to 30 inches ppt.	
Surface Layer	2 to 0 inches of decomposed and undecomposed white fir needles and twigs, over 0 to 18 inches; brown stony loam, granular structure, soft, pH 6.2.	1-1/2 to 0 inches of ponderosa pine and white fir needles and twigs, over 0 to 13 inches; dark brown loam, granular and blocky structure, slightly hard, pH 6.4.	1-1/2 to 0 inches of ponderosa pine and white fir needles and twigs, over 0 to 14 inches; brown loam, granular and blocky structure, soft, pH 5.6 to 6.4.
Rooting Depth (in.) to Underlying Material	40 plus; basalt tuff	40 plus; tuff	40 plus; basalt, tuff, alluvium
Erosion Factor (K)	.32	.43	.32
Max. Erosion Hazard	Low to moderate	Moderate	Low to moderate
Soil Permeability	Moderately slow	Slow	Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	2ep II	2s	2e
Forest Site Class	4 (2-3)	4 (2-3)	4 (2-3)
Range Site	No placed in a range site.	Not placed in a range site.	Not placed in a range site.
Water Runoff Potential	Slow	Moderate	Slow
Watershed Sensitivity	7 (Moderate)	5	7
Hydrologic Soil Group	B	C	B
Available Water Capacity (AWC) Upper 20 inches	Moderate 2.6 inches	Moderate to High 2.9 inches	Moderate to High 3.4 inches
Susceptibility to Burning Damage	Low to Moderate	Low to Moderate	Low to Moderate
Slope Stability Hazard	Low	Low to Moderate	Low
Allowable Soil Loss	3 tons/acre/year	3 tons/acre/year	3 tons/acre/year
Chance of Seedling Survival	Moderate	Moderate to High	High
Rating for Timber Site	Fair (1)	Good	Good
R-Value	30-60	0-30	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-18; Stony loam Unified: ML-CL, CL AASHTO: A-4 18-50; Extremely gravelly clay loam, extremely gravelly loam Unified: SC AASHTO: A-2-6, A-6 50+; Weathered bedrock	0-13; Loam Unified: ML-CL, CL AASHTO: A-4, A-6 13-20; Cobbly clay loam Unified: CL, CH AASHTO: A-6, A-7 20-60; Gravelly clay Unified: CH AASHTO: A-7	0-14; Loam Unified: ML-CL, CL AASHTO: A-4, A-6 14-37; Gravelly clay loam Unified: CL AASHTO: A-6 37-60; Extremely cobbly clay loam Unified: SC, CL AASHTO: A-6, A-7

254 SMARTS-BERTAG-DEMASTERS FAMILIES, deep ASSOCIATION (continued)

Included Areas:

Included with these soils in mapping and making up about 20 percent of acreage are the Cavanaugh, Mascamp, Merlin, Manila, Lamondi and Vipont families, and moderately deep Smarts and DeMasters families.

255 SMARTS deep-CAVANAUGH FAMILIES COMPLEX, 10 to 35 percent slopes

Map Unit Components	Smarts family, deep (50 percent)	Cavanaugh Family (30 percent)
Position, Slope, and Elevation	On sideslopes of mountain uplands; 10 to 35 percent slopes; 5500 to 6600 feet.	On sideslopes and toeslopes of mountain uplands; 10 to 35 percent slopes; 5500 to 6600 feet.
Typical Vegetation and Precipitation (ppt)	White fire forest, or mixed conifer forest of ponderosa pine, white fir, plus squaw carpet mulesear, snowberry, bitterbrush, Ross's sedge, grasses; 20 to 30 inches ppt.	White fir forest, or mixed conifer forest of ponderosa pine, white fir, plus western juniper, mountain mahogany, squaw carpet, big sagebrush, bitterbrush, mulesear, Ross's sedge, grasses; 20 to 30 inches ppt.
Surface Layer	2 to 0 inches of decomposed and undecomposed white fir needles and twigs, over 0 to 18 inches; stony loam, granular structure, soft, pH 6.2.	1 to 0 inches of white fir and ponderosa pine needles, over 0 to 13 inches; dark brown and brown cobbly loam to very cobbly loam, granular and blocky structure, slightly hard, pH 6.4.
Substratum	32 to 50 inches; pale brown extremely gravelly loam, massive, soft, pH 6.0.	
Rooting Depth (in.) to Underlying Material	40 plus; basalt, tuff	30 plus; tuff basalt
Erosion Factor (K)	.32	.37
Max. Erosion Hazard	Moderate	Moderate
Soil Permeability	Moderately slow	Slow
Drainage Class	Well drained	Well drained
Soil Manageability Class	2ep	2s
Group	II	
Forest Site Class	4 (2-3)	4-5 (3-4)
Range Site	Not palced in a range site.	Not placed in a range site.
Water Runoff Potential	Slow	Moderate
Watershed Sensitivity	7 (Moderate)	5
Hydrologic Soil Group	B	C
Available Water Capacity (AWC)	Moderate	Low to Moderate
Upper 20 inches	2.6 inches	2.5 inches
Susceptibility to Burning Damage	Low to Moderate	Moderate
Slope Stability Hazard	Low	Low to Moderate
Allowable Soil Loss	3 tons/acre/year	2, 3 tons/acre/year
Chance of Seedling Survival	Moderate	Low to Moderate
Rating for Timber Site	Fair (1)	Fair (3)
R-Value	30-60	0-30
Soil horizons in inches, USDA, Unified, AASHTO	0-18; Stony loam Unified: ML-CL, CL AASHTO: A-4 18-50; Extremely gravelly clay loam, extremely gravelly loam Unified: SC AASHTO: A-2-6, A-6 50+; Weathered bedrock	0-7; Cobbly loam Unified: ML-CL, CL AASHTO: A-4, A-6 7-13; Very cobbly loam Unified: SM-SC, SC AASHTO: A-4, A-6 13-18; Very cobbly clay loam Unified: CL AASHTO: A-6 18-60; Very gravelly clay, extremely gravelly clay loam Unified: GC AASHTO: A-2-7, A-7
Included Areas:	Included with these soils in mapping and making up about 20 percent of the acreage are the DeMasters, Manila, Bertag and Anatone families, Rock outcrop and Smarts family, moderately deep.	

256 SMARTS deep-CAVANAUGH FAMILIES COMPLEX, 35 to 60 percent slopes

Map Unit Components	Smarts family, deep (55 percent)	Cavanaugh Family (25 percent)
Position, Slope, and Elevation	On sideslopes of basalt plateau breaks and mountain uplands; 35 to 60 percent slopes; 5500 to 6600 feet.	On sideslopes of basalt plateau breaks and mountain uplands; 35 to 60 percent slopes; 5500 to 6600 feet.
Typical Vegetation and Precipitation (ppt)	White fir forest, or mixed conifer forest of ponderosa pine, white fir, plus squaw carpet mulesear, snowberry, bitterbrush, Ross's sedge, grasses; 20 to 30 inches ppt.	White fir forest, or mixed conifer forest of ponderosa pine, white fir, plus western juniper, mountain mahogany, squaw carpet, big sagebrush, bitterbrush, mulesear, Ross's sedge, grasses; 20 to 30 inches ppt.
Surface Layer	2 to 0 inches of decomposed and undecomposed white fir needles and twigs, over 0 to 18 inches; stony loam, granular structure, soft, pH 6.2.	1 to 0 inches of white fir and ponderosa pine needles, over 0 to 13 inches; dark brown and brown cobbly loam to very cobbly loam, granular and blocky structure, slightly hard, pH 6.4.
Substratum	32 to 50 inches; pale brown extremely gravelly loam, massive, soft, pH 6.0.	
Rooting Depth (in.) to Underlying Material	40 plus; basalt, tuff	30 plus; tuff basalt
Erosion Factor (K)	.32	.37
Max. Erosion Hazard	High	High
Soil Permeability	Moderately slow	Slow
Drainage Class	Well drained	Well drained
Soil Manageability Class	3ep	3s
Soil Manageability Group	III	
Forest Site Class	4 (2-3)	4-5 (3-4)
Range Site	Not palced in a range site.	Not placed in a range site.
Water Runoff Potential	Moderate	Rapid
Watershed Sensitivity	6 (Moderate)	4
Hydrologic Soil Group	B	C
Available Water Capacity (AWC)	Moderate	Low to Moderate
Upper 20 inches	2.6 inches	2.5 inches
Susceptibility to Burning Damage	Moderate	Moderate
Slope Stability Hazard	Low	High
Allowable Soil Loss	3 tons/acre/year	2, 3 tons/acre/year
Chance of Seedling Survival	Moderate	Low to Moderate
Rating for Timber Site	Fair (1,8)	Fair (3,8)
R-Value	30-60	0-30
Soil horizons in inches, USDA, Unified, AASHTO	0-18; Stony loam Unified: ML-CL, CL AASHTO: A-4 18-50; Extremely gravelly clay loam, extremely gravelly loam Unified: SC AASHTO: A-2-6, A-6 50+; Weathered bedrock	0-7; Cobbly loam Unified: ML-CL, CL AASHTO: A-4, A-6 7-13; Very cobbly loam Unified: SM-SC, SC AASHTO: A-4, A-6 13-18; Very cobbly clay loam Unified: CL AASHTO: A-6 18-60; Very gravelly clay, extremely gravelly loam Unified: GC AASHTO: A-2-7, A-7
Included Areas:	Included with these soils in mapping and making up about 20 percent of the acreage are the DeMasters, Manila, Anatone and Merlin families, Rock outcrop and Smarts family, moderately deep.	

257 SMARTS-MASCAMP FAMILIES ASSOCIATION, 40 to 60 percent slopes

Map Unit Components	Smarts family (50 percent)	Mascamp family (30 percent)
Position, Slope, and Elevation	On sideslopes of mountain uplands; 40 to 60 percent slopes; 5500 to 7500 feet.	On upper sideslopes, ridges and knolls of mountain uplands; 40 to 60 percent slopes; 5500 to 7500 feet.
Typical Vegetation and Precipitation (ppt)	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, plus squaw carpet, snowbrush, serviceberry, manzanita, viola, mulesear, Ross's sedge, few grasses; 20 to 30 inches ppt.	Western juniper, low sagebrush, big sagebrush, rabbitbrush, mountain mahogany, Idaho fescue, cheatgrass, other grasses; 20 to 30 inches ppt.
Surface Layer	1/2 to 0 inches; ponderosa pine and white fir needles and twigs, over 0 to 20 inches; reddish brown stony loam and very cobbly loam, granular and blocky structure, slightly hard and hard, pH 6.6 to 6.8.	0 to 6 inches; dark grayish brown very cobbly loam, granular structure, slightly hard, pH 6.8.
Rooting Depth (in.) to Underlying Material	20 to 40; basalt, tuff	10 to 20; basalt, tuff
Erosion Factor (K)	.32	.37
Max. Erosion Hazard	High	High to very high
Soil Permeability	Moderately slow	Moderate
Drainage Class	Well drained	Well drained
Soil Manageability Class	3Ep	3Ed
Group	III	
Forest Site Class	5 (3-4)	7 (non-commercial)
Range Site	Not placed in a range site	9
Water Runoff Potential	Moderate	Rapid
Watershed Sensitivity	6 (Moderate)	4
Hydrologic Soil Group	B	D
Available Water Capacity (AWC) Upper 20 inches	Low to Moderate 2.1 inches	Very Low to Low 1.2 to 2.5 inches
Susceptibility to Burning Damage	Moderate to High	Moderate
Slope Stability Hazard	Low	Low
Allowable Soil Loss	2 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Low to Moderate	Not Rated
Rating for Timber Site	Fair (1,3,7,8)	Not Rated
R-Value	30-60	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-20; Stony loam, very cobbly loam Unified: ML, ML-CL AASHTO: A-4 20-28; Very gravelly loam Unified: SM-SC, SC AASHTO: A-4, A-6 28-35; Extremely gravelly clay loam Unified: GC AASHTO: A-2-6, A-2-7 35+; Weathered bedrock	0-12; Very cobbly loam, very gravelly loam Unified: SM-SC, SC AASHTO: A-4 12-19; Very gravelly clay loam Unified: SC AASHTO: A-2-6, A-6 19+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up about 20 percent of the acreage are the Anatone, Bearskin, DeMasters, Lamondi, Bertag, Cavanaugh, Hades and Vipont families, Rock outcrop, Rubble land and unnamed soils similar to DeMasters family but not Pachic.	

258 SMARTS-MASCAMP-DEMASTERS deep FAMILIES ASSOCIATION, 2 to 20 percent slopes

Map Unit Components	Smarts family (40 percent)	Mascamp family (25 percent)	DeMasters family, deep (20 percent)
Position, Slope, and Elevation	On sideslopes of mountain uplands; 2 to 20 percent slopes; 5500 to 7500 feet.	On upper sideslopes, ridges and knolls of mountain uplands; 5 to 20 percent slopes; 5500 to 7500 feet.	On lower sideslopes and alluvial draws of mountain uplands; 2 to 20 percent slopes; 5500 to 7500 feet.
Typical Vegetation and Precipitation (ppt)	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, plus squaw carpet, snowbrush, serviceberry, manzanita, viola, mulesear, Ross's sedge, few grasses; 20 to 30 inches ppt.	Western juniper, low sagebrush, big sagebrush, rabbitbrush, mountain mahogany, Idaho fescue, cheatgrass, other grasses; 20 to 30 inches ppt.	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, plus few quaking aspen, snowbrush, service- berry, forbes, Ross's sedge, few grasses; 20 to 30 inches ppt.
Surface Layer	1/2 to 0 inches; ponderosa pine and white fir needles and twigs, over 0 to 20 inches; reddish brown stony loam and very cobbly loam, granular and blocky structure, stlightly hard and hard, pH 6.6 to 6.8.	0 to 6 inches; dark grayish brown very cobbly loam, granular structure, slightly hard, pH 6.8.	1-1/2 to 0 inches of ponderosa pine and white fir needles and twigs, over 0 to 14 inches; brown loam, granular and blocky structure, soft, pH 5.6 to 6.4.
Rooting Depth (in.) to Underlying Material	20 to 40; basalt, tuff	10 to 20; basalt, tuff	40 plus; basalt, tuff, alluvium
Erosion Factor (K)	.32	.37	.32
Max. Erosion Hazard	Low to Moderate	Moderate	Low to Moderate
Soil Permeability	Moderately slow	Moderate	Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	2ep II	2ed	2e
Forest Site Class	5 (3-4)	7 (non-commercial)	4 (2-3)
Range Site	Not placed in a range site	9	Not placed in a range site
Water Runoff Potential	Slow	Moderate	Very Slow
Watershed Sensitivity	7 (Moderate)	6	8
Hydrologic Soil Group	B	D	B
Available Water Capacity (AWC) Upper 20 inches	Low to Moderate 2.1 inches	Very Low to Low 1.2 to 2.5 inches	Moderate to High 3.4 inches
Susceptibility to Burning Damage	Low to Moderate	Low	Low
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	2 tons/acre/year	1 tons/acre/year	3 tons/acre/year
Chance of Seedling Survival	Low to Moderate	Not Rated	High
Rating for Timber Site	Fair (1,3,7)	Not Rated	Good
R-Value	30-60	30-60	30-60

258 SMARTS-MASCAMP-DEMASTERS deep FAMILIES ASSOCIATION (continued)

Soil horizons in
inches, USDA,
Unified, AASHTO

0-20; Stony loam, very cobbly loam Unified: ML, ML-CL AASHTO: A-4	0-12; Very cobbly loam, very gravelly loam Unified: SM-SC, SC AASHTO: A-4	0-14; Loam Unified: ML-CL, CL AASHTO: A-4, A-6
20-28; Very gravelly loam Unified: SM-SC, SC AASHTO: A-4, A-6	12-19; Very gravelly clay loam Unified: SC AASHTO: A-2-6, A-6	14-37; Gravelly clay loam Unified: CL AASHTO: A-6
28-35; Extremely gravelly clay loam Unified: GC AASHTO: A-2-6, A-2-7	19+; Unweathered bedrock	37-60; Extremely cobbly clay loam Unified: SC, CL AASHTO: A-6, A-7
35+; Weathered bedrock		

Included Areas:

Included with these soils in mapping and making up about 15 percent of the acreage are the Anatone, Bearskin, Lamondi, Bertag, Cavanaugh, Hades and Vipont families, and Rock outcrop.

259 SMARTS-MASCAMP-DEMASTERS deep FAMILIES ASSOCIATION, 20 to 40 percent slopes

Map Unit Components	Smarts family (40 percent)	Mascamp family (30 percent)	DeMasters family, deep (15 percent)
Position, Slope, and Elevation	On sideslopes of mountain uplands; 20 to 40 percent slopes; 5500 to 7500 feet.	On upper sideslopes, ridges and knolls of mountain uplands; 20 to 40 percent slopes; 5500 to 7500 feet.	On lower sideslopes and alluvial draws of mountain uplands; 20 to 35 percent slopes; 5500 to 7500 feet.
Typical Vegetation and Precipitation (ppt)	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, plus squaw carpet, snowbrush, serviceberry, manzanita, viola, mulesear, Ross's sedge, few grasses; 20 to 30 inches ppt.	Western juniper, low sagebrush, big sagebrush, rabbitbrush, mountain mahogany, Idaho fescue, cheatgrass, other grasses; 20 to 30 inches ppt.	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, plus few quaking aspen, snowbrush, service- berry, forbes, Ross's sedge, few grasses; 20 to 30 inches ppt.
Surface Layer	1/2 to 0 inches; ponderosa pine and white fir needles and twigs, over 0 to 20 inches; reddish brown stony loam and very cobbly loam, granular and blocky structure, slightly hard and hard, pH 6.6 to 6.8.	0 to 6 inches; dark grayish brown very cobbly loam, granular structure, slightly hard, pH 6.8.	1-1/2 to 0 inches of ponderosa pine and white fir needles and twigs, over 0 to 14 inches; brown loam, granular and blocky structure, soft, pH 5.6 to 6.4.
Rooting Depth (in.) to Underlying Material	20 to 40; basalt, tuff	10 to 20; basalt, tuff	40 plus; basalt, tuff, alluvium
Erosion Factor (K)	.32	.37	.32
Max. Erosion Hazard	Moderate	Moderate to High	Moderate
Soil Permeability	Moderately slow	Moderate	Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	2ep II	3Ed	2e
Forest Site Class	5 (3-4)	7 (non-commercial)	4 (2-3)
Range Site	Not placed in a range site	9	Not placed in a range site
Water Runoff Potential	Slow	Rapid	Slow
Watershed Sensitivity	7 (Moderate)	5	7
Hydrologic Soil Group	B	D	B
Available Water Capacity (AWC) Upper 20 inches	Low to Moderate 2.1 inches	Very Low to Low 1.2 to 2.5 inches	Moderate to High 3.4 inches
Susceptibility to Burning Damage	Moderate	Moderate	Low to Moderate
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	2 tons/acre/year	1 tons/acre/year	3 tons/acre/year
Chance of Seedling Survival	Low to Moderate	Not Rated	High
Rating for Timber Site	Fair (1,3,7)	Not Rated	Good
R-Value	30-60	30-60	30-60

259 SMARTS-MASCAMP-DEMASTERS deep FAMILIES ASSOCIATION (continued)

Soil horizons in inches, USDA, Unified, AASHTO

0-20; Stony loam, very cobbly loam Unified: ML, ML-CL AASHTO: A-4	0-12; Very cobbly loam, very gravelly loam Unified: SM-SC, SC AASHTO: A-4	0-14; Loam Unified: ML-CL, CL AASHTO: A-4, A-6
20-28; Very gravelly loam Unified: SM-SC, SC AASHTO: A-4, A-6	12-19; Very gravelly clay loam Unified: SC AASHTO: A-2-6, A-6	14-37; Gravelly clay loam Unified: CL AASHTO: A-6
28-35; Extremely gravelly clay loam Unified: GC AASHTO: A-2-6, A-2-7	19+; Unweathered bedrock	37-60; Extremely cobbly clay loam Unified: SC, CL AASHTO: A-6, A-7
35+; Weathered bedrock		

Included Areas:

Included with these soils in mapping and making up about 15 percent of the acreage are the Anatone, Bearskin, Lamondi, Bertag, Cavanaugh, Hades and Vipont families, Rock outcrop and unnamed soils similar to DeMasters and Smarts families but no Pachic.

260 STONEWELL FAMILY, 40 to 60 inch pumice, 15 to 40 percent slopes

Map Unit Components	Stonewell family, pumice (75 percent)
Position, Slope, and Elevation	On sideslopes and toeslopes of volcanic mountain uplands with a deep deposit of recent pyroclastic pumice; 15 to 40 percent slopes; 5400 to 6400 feet.
Typical Vegetation and Precipitation (ppt)	Open mixed conifer stands of ponderosa pine, sugar pine, white fir and incense-cedar, and more dense stands of lodgepole pine above 5700 feet in some areas, plus greenleaf manzanita, bitterbrush, ceonothus, Ross's sedge, bunchgrasses; 25 to 40 inches ppt.
Surface Layer	1 to 0 inches; scattered ponderosa pine needles mixed with pumice gravels over, 0 to 4 inches; dark grayish brown very gravelly loamy sand (pumice) single grain structure, loose, pH 6.2.
Substratum	4 to 50 inches; light gray extremely gravelly coarse sand (pumice) grading to gravelly coarse sand at 44 to 50 inches over extremely cobbly sandy loam from 50 to 60 plus inches, single grain structure, loose, pH 6.2. to 6.8.
Rooting Depth (in.) to Underlying Material	40 plus; pumice, cinders, basalt
Erosion Factor (K)	.15
Max. Erosion Hazard	Moderate
Soil Permeability	Rapid
Drainage Class	Somewhat excessively drained
Soil Manageability Class	3eP
Group	III
Forest Site Class	6-7 (4 to non-commercial)
Range Site	Not placed in a range site.
Water Runoff Potential	Very Slow
Watershed Sensitivity	8 (Low)
Hydrologic Soil Group	A
Available Water Capacity (AWC)	Moderate to High
Upper 20 inches	2.4 inches
Susceptibility to Burning Damage	High
Slope Stability Hazard	Low
Allowable Soil Loss	3 tons/acre/year
Chance of Seedling Survival	Low to Moderate
Rating for Timber Site	Fair (6)
R-Value	60+
Soil horizons in inches, USDA, Unified, AASHTO	0-4; Very gravelly loamy sand Unified: SW-SM, SM AASHTO: A-1-a 4-44; Extremely gravelly coarse sand Unified: GP AASHTO: A-1-a 44-50; Gravelly coarse sand Unified: SM AASHTO: A-1-a, A-1-b 50-60; Extremely cobbly sandy loam Unified: SM AASHTO: A-1-b, A-2-4
Included Areas:	Included with this soil in mapping and making up about 25 percent of the acreage are unnamed Cindery over Medial, and Cindery over Medial-Skeletal, frigid soils, Lithic Xerorthents frigid, Rock outcrop, areas of deeper pumice and steeper slopes.

**261 STONEWELL-YALLANI FAMILIES ASSOCIATION, 6 to 20 inch pumice overburden,
5 to 30 percent slopes**

Map Unit Components	Stonewell family, pumice overburden phase (50 percent)	Yallani family, pumice overburden phase (30 percent)
Position, Slope, and Elevation	On toeslopes and lower sideslopes of volcanic mountain uplands; 5 to 25 percent slopes; 5300 to 6300 feet.	On sideslopes and knolls of volcanic mountain uplands; 10 to 30 percent slopes; 5300 to 6300 feet.
Typical Vegetation and Precipitation (ppt)	Mixed conifer forest of ponderosa pine, white fir, sugar pine, incense-cedar, plus greenleaf manzanita, bitterbrush, Ross's sedge, bunchgrasses; 25 to 40 inches ppt.	Mixed conifer forest of ponderosa pine, white fir, sugar pine, incense-cedar, plus greenleaf manzanita, bitterbrush, Ross's sedge, bunchgrasses; 25 to 40 inches ppt.
Surface Layer	1 to 0 inches white fir needles and twigs; over 9 inches of pumice overburden consisting of light gray and yellowish brown gravelly and very gravelly loamy coarse sand; granular structure, soft, pH 6.6 (Thickness ranges from 6 to 20 inches) OVER 9 to 27 inches; brown gravelly and very gravelly sandy loam; granular and sub- angular blocky structure; soft; pH 6.4. *SUBSTRATUM: 27 to 60 inches; reddish yellow and brownish yellow very gravelly loamy coarse sand; massive; soft; pH 6.2.	1 to 0 inches; ponderosa pine and white fir needles and twigs, over 17 inches of pumice overburden consisting of 0 to 2 inches; gray extremely gravelly loamy coarse sand; 2 to 17 inches; white extremely gravelly coarse sand. (Thickness ranges from 6 to 20 inches) OVER 17 to 23 inches; yellowish brown gravelly coarse sandy loam, granular structure, soft, pH 6.2. *SUBSOIL: 23 to 60 inches; yellowish brown to dark yellowish brown extremely cobbly and stony coarse sandy loam, granular and blocky structure, soft, pH 6.8.
Rooting Depth (in.) to Underlying Material	40 plus; cinders, basalt	40 plus; basalt, andesite
Erosion Factor (K)	.15	.15
Max. Erosion Hazard	Low to Moderate	Low to Moderate
Soil Permeability	Rapid in the pumice overburden to moderately rapid below.	Rapid in the pumice overburden to moderately rapid below.
Drainage Class	Somewhat excessively drained	Well drained
Soil Manageability Class	2ep	2ep
Soil Manageability Group	II	
Forest Site Class	4 (2-3)	4-5 (2-4)
Range Site	Not placed in a range site.	Not placed in a range site
Water Runoff Potential	Very Slow	Slow
Watershed Sensitivity	9 (Low)	8
Hydrologic Soil Group	A	B
Available Water Capacity (AWC)	Moderate to High	Moderate
Upper 20 inches	2.6 inches	2.3 inches
Susceptibility to Burning Damage	High	High
Slope Stability Hazard	Low	Low
Allowable Soil Loss	3 tons/acre/year	3 tons/acre/year
Chance of Seedling Survival	Moderate	Moderate
Rating for Timber Site	Fair (5)	Fair (3,5)
R-Value	60+	60+

261 STONEWELL-YALLANI FAMILIES ASSOCIATION (continued)

Soil horizons in
inches, USDA,
Unified, AASHTO

0-9; Gravelly loamy coarse sand,
very gravelly loamy coarse sand
Unified: SW-SM, SM
AASHTO: A-1-a, A-1-b
9-27; Gravelly sandy loam, very gravelly
sandy loam
Unified: SM
AASHTO: A-1-b
27-60; Very gravelly loamy coarse sand
Unified: SW-SM, SM
AASHTO: A-1-a, A-1-b

0-2; Extremely gravelly loamy coarse
sand
Unified: SW-SM
AASHTO: A-1-a
2-17; Extremely gravelly coarse sand
Unified: GW-GM
AASHTO: A-1-a
17-60; Gravelly coarse sandy loam,
extremely stony coarse sandy loam,
extremely cobbly coarse sandy loam
Unified: SM
AASHTO: A-1-b, A-2-4

Included Areas:

Included with these soils in mapping and making up about 20 percent of the acreage are the Zynbar and Inville families, unnamed Cindery over Medial, and Cindery over Medial-Skeletal, frigid soils and Rock outcrop.

262 STONEWELL-YALLANI FAMILIES ASSOCIATION, 35 to 70 percent slopes

Map Unit Components	Stonewell family, (50 percent)	Yallani family, (25 percent)
Position, Slope, and Elevation	On smooth to concave sideslopes of volcanic cinder cones; 35 to 70 percent slopes; 4600 to 6000 feet.	On lower sideslopes of volcanic cinder cones; 35 to 60 percent slopes; 4600 to 6000 feet.
Typical Vegetation and Precipitation (ppt)	Mixed conifer forest of ponderosa pine, white fir, incense-cedar, plus greenleaf manzanita, bitterbrush, Ross's sedge, squaw carpet; 25 to 40 inches ppt.	Mixed conifer forest of ponderosa pine, white fir, incense-cedar, plus greenleaf manzanita, bitterbrush, Ross's sedge, squaw carpet; 25 to 40 inches ppt.
Surface Layer	1 to 0 inches white fir and ponderosa pine needles and twigs, over 0 to 4 inches; dark grayish brown gravelly sandy loam, granular structure, soft, pH 6.4.	3 to 0 inches of mostly decomposed white fir twigs and needles over: 0 to 4 inches; brown gravelly sandy loam; granular and subangular blocky structure; soft; pH 6.4.
Rooting Depth (in.) to Underlying Material	30 plus inches, cinders, ash, vesicular basalt.	40 plus inches; basalt
Erosion Factor (K)	.20	.20
Max. Erosion Hazard	Moderate to high	Moderate to high
Soil Permeability	Moderately rapid	Moderately rapid
Drainage Class	Somewhat excessively drained	Well drained
Soil Manageability Class Group	3E III	3Ex
Forest Site Class	5-6 (3-5)	4-5 (2-4)
Range Site	Not placed in a range site.	Not placed in a range site
Water Runoff Potential	Moderate	Moderate
Watershed Sensitivity	7 (Moderate)	7
Hydrologic Soil Group	B	B
Available Water Capacity (AWC) Upper 20 inches	Moderate 2.6 inches	Moderate to high 2.4 inches
Susceptibility to Burning Damage	Moderate to High	Moderate to High
Slope Stability Hazard	Low	Low
Allowable Soil Loss	2,3 tons/acre/year	3 tons/acre/year
Chance of Seedling Survival	Moderate	Low to Moderate
Rating for Timber Site	Fair (8)	Fair (3,8)
R-Value	60+	60+
Soil horizons in inches, USDA, Unified, AASHTO	0-24; Gravelly sandy loam, very gravelly sandy loam Unified: SM AASHTO: A-1-b 24-42; Extremely gravelly loamy sand, extremely gravelly coarse sand Unified: GP AASHTO: A-1-a 42-51; Very fine sandy loam, silt loam, very gravelly coarse sand Unified: SM, ML AASHTO: A-1-a, A-4 51-60; Extremely gravelly coarse sand Unified: GP AASHTO: A-1-a	0-18; Gravelly sandy loam, extremely cobbly fine sandy loam Unified: SM, SM-SC AASHTO: A-2-4 18-60; Extremely cobbly loam Unified: SM, SM-SC AASHTO: A-2-4, A-4
Included Areas:	Included with these soils in mapping and making up about 25 percent of the acreage are the Lithic Xerorthents, frigid, Zynbar family, Rock outcrop, Stonewell family pumice and pumice overburden phases, and unnamed Medial over Cindery, frigid soils.	

**263 STONEWELL-YALLANI FAMILIES-LITHIC XERORTHENTS, FRIGID ASSOCIATION,
30 to 55 percent slopes**

Map Unit Components	Stonewell family (40 percent)	Yallani family (30 percent)	Lithic Xerorthents, frigid (15 percent)
Position, Slope, and Elevation	On smooth sideslopes of volcanic mountain uplands; 30 to 50 percent slopes; 5600 to 6900 feet.	On sideslopes of volcanic mountain uplands; 30 to 55 percent slopes; 5600 to 6900 feet.	On upper sideslopes and ridges of volcanic mountain uplands; 35 to 55 percent slopes; 5600 to 6900 feet.
Typical Vegetation and Precipitation (ppt)	White fir forest or mixed conifer forest of white fir, red fir, ponderosa pine plus snowbrush, greenleaf manzanita, Ross's sedge, mint., few grasses; 30 to 40 inches ppt.	White fir forest or mixed conifer forest of white fir, red fir, ponderosa pine plus snowbrush, greenleaf manzanita, Ross's sedge, mint., few grasses; 30 to 40 inches ppt.	
Surface Layer	1 to 0 inches; white fir and ponderosa pine needles and twigs, over 0 to 4 inches; dark grayish brown gravelly sandy loam, granular structure, soft, pH 6.4.	3 to 0 inches of mostly decomposed white fir twigs and needles over: 0 to 4 inches; brown gravelly sandy loam; granular and subangular blocky structure; soft; pH 6.4.	0 to 2 inches; yellowish brown very gravelly sandy loam; platy and granular structure; slightly hard, pH 6.6
Rooting Depth (in.) to Underlying Material	30 plus inches; cinders, basalt	40 plus inches; basalt	6 to 20; basalt
Erosion Factor (K)	.20	.20	Variable
Max. Erosion Hazard	Moderate to High	Moderate to High	High
Soil Permeability	Moderately rapid	Moderately rapid	Moderately rapid
Drainage Class	Somewhat excessively drained	Well drained	Somewhat excessively drained
Soil Manageability Class Group	3E III	3Ex	3Edx
Forest Site Class	5 (3-4)	4-5 (2-4)	7 (non-commercial)
Range Site	Not placed in a range site.	Not placed in a range site	9
Water Runoff Potential	Moderate	Moderate	Rapid
Watershed Sensitivity	7 (Moderate)	7	5
Hydrologic Soil Group	B	B	D
Available Water Capacity (AWC) Upper 20 inches	Moderate 2.6 inches	Moderate to High 2.4 inches	Very Low to Low 0.6 to 2.5 inches
Susceptibility to Burning Damage	Moderate to High	High	High
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	2,3 tons/acre/year	3 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Moderate	Low to Moderate	Not Rated
Rating for Timber Site	Fair (8)	Fair (3,7,8)	Not Rated
R-Value	60+	60+	Not Rated

263 STONEWELL-YALLANI FAMILIES-LITHIC XERORTHENTS, FRIGID ASSOCIATION (continued)

Soil horizons in
inches, USDA,
Unified, AASHTO

<p>0-24; Gravelly sandy loam, very gravelly sandy loam Unified: SM AASHTO: A-1-b</p> <p>24-42; Extremely gravelly loamy sand, extremely gravelly coarse sand Unified: GP AASHTO: A-1-a</p> <p>42-51; Very fine sandy loam, silt loam, very gravelly coarse sand Unified: SM, ML AASHTO: A-1-a, A-4</p> <p>51-60; Extremely gravelly coarse sand Unified: GP AASHTO: A-1-a</p>	<p>0-18; Gravelly sandy loam, extremely cobbly fine sandy loam Unified: SM, SM-SC AASHTO: A-1-b, A-2-4</p> <p>18-60; Extremely cobbly loam Unified: SM, SM-SC AASHTO: A-2-4, A-4</p>	<p>0-6; Variable Unified: Not Rated AASHTO: Not Rated</p> <p>6+; Unweathered bedrock</p>
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Included Areas:

Included with these soils in mapping and making up about 15 percent of the acreage are Zynbar and Kinzel families, Rock outcrop, and Yallani soils that are moderately deep.

264 STONEWELL-YALLANI-ZYNBAR FAMILIES ASSOCIATION, 2 to 20 percent slopes

Map Unit Components	Stonewell family (40 percent)	Yallani family (25 percent)	Zynbar family (20 percent)
Position, Slope, and Elevation	On sideslopes of cinder cones and volcanic mountain uplands; 2 to 15 percent slopes; 5500 to 6400 feet.	On upper sideslopes, ridges and knolls of volcanic mountain uplands and cinder cones; 5 to 20 percent slopes; 5500 to 6400 feet.	On sideslopes and toeslopes of cinder cones and volcanic mountain uplands; 2 to 15 percent slopes; 5500 to 6400 feet.
Typical Vegetation and Precipitation (ppt)	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar. plus Ribes spp., rabbitbrush, mint., Ross's sedge, Stipa spp.; 30 to 40 inches ppt.	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar. plus Ribes spp., rabbitbrush, mint., Ross's sedge, Stipa spp.; 30 to 40 inches ppt.	
Surface Layer	1 to 0 inches; white fir and ponderosa pine needles and twigs, over 0 to 4 inches; dark grayish brown gravelly sandy loam, granular structure, soft, pH 6.4	3 to 0 inches of mostly decomposed white fir twigs and needles over: 0 to 4 inches; brown gravelly sandy loam granular and subangular blocky structure; soft; pH 6.4.	0 to 11 inches; brown and dark yellowish brown gravelly coarse sandy loam, granular structure, soft, pH 6.6 to 7.0.
Rooting Depth (in.) to Underlying Material	40 plus; cinders, basalt	40 plus; basalt, andesite	30 plus; basalt, cinders, andesite
Erosion Factor (K)	.20	.20	.20
Max. Erosion Hazard	Low	Low to moderate	Low
Soil Permeability	Moderately rapid	Moderately rapid	Moderately rapid
Drainage Class	Somewhat excessively drained	Well drained	Well drained
Soil Manageability Class	1	2e	1
Soil Manageability Group	I		
Forest Site Class	4 (2-3)	4-5 (2-4)	4 (1-3)
Range Site	Not placed in a range site.	Not placed in a range site.	Not placed in a range site.
Water Runoff Potential	Very slow	Very slow	Very slow
Watershed Sensitivity	9 (Low)	9	9
Hydrologic Soil Group	B	B	B
Available Water Capacity (AWC)	Moderate	Moderate to High	Moderate to High
Upper 20 inches	2.6 inches	2.4 inches	3.0 inches
Susceptibility to Burning Damage	Moderate	Moderate	Moderate
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	3 tons/acre/year	3 tons/acre/year	2,3 tons/acre/year
Chance of Seedling Survival	Moderate	Low to Moderate	Moderate to High
Rating for Timber Site	Good	Fair (3)	Good
R-Value	60+	60+	60+

264 STONEWELL-YALLANI-ZYNBAR FAMILIES ASSOCIATION (continued)

Soil horizons in
inches, USDA,
Unified, AASHTO

0-24; Gravelly sandy loam, very gravelly sandy loam Unified: SM AASHTO: A-1-b	0-18; Gravelly sandy loam, extremely cobbly fine sandy loam Unified: SM, SM-SC	0-34; Gravelly coarse sandy loam Unified: SM AASHTO: A-2-4
24-42; Extremely gravelly loamy sand, extremely gravelly coarse sand Unified: GP AASHTO: A-1-a	18-60; Extremely cobbly loam Unified: SM, SM-SC AASHTO: A-2-4, A-4	34+; Unweathered bedrock
42-51; Very fine sandy loam, silt loam, very gravelly coarse sand Unified: SM, ML AASHTO: A-1-a, A-4		
51-60; Extremely gravelly coarse sand Unified: GP AASHTO: A-1-a		

Included Areas:

Included with these soils in mapping and making up about 15 percent of the acreage are the Lithic Xerorthents, frigid, Sheld and Ahart families and Rock outcrop.

265 STONEWELL-ZYNBAR FAMILIES ASSOCIATION, 15 to 35 percent slopes

Map Unit Components	Stonewell family (45 percent)	Zynbar family (35 percent)
Position, Slope, and Elevation	Upper sideslopes of volcanic cinder cones; 20 to 35 percent slopes; 5800 to 6600 feet.	Lower sideslopes of volcanic cinder cones; 15 to 35 percent slopes; 5800 to 6600 feet.
Typical Vegetation and Precipitation (ppt)	White fir forest, or mixed conifer forest of white fir, ponderosa pine, plus snowbrush, greenleaf manzanita, chinqupine, Ross's sedge, grasses; 30 to 40 inches ppt.	White fir forest, or mixed conifer forest of white fir, ponderosa pine, plus snowbrush, Greenleaf manzanita, chinqupine, Ross's sedge, grasses; 30 to 40 inches ppt.
Surface Layer	1 to 0 inches; white fir and ponderosa pine needles and twigs, over 0 to 4 inches; dark grayish brown gravelly sandy loam, granular structure, soft, pH 6.4.	0 to 11 inches; brown and dark yellowish brown gravelly coarse sandy loam, granular structure, soft, pH 6.6 to 7.0.
Rooting Depth (in.) to Underlying Material	40 plus; cinders, basalt	30 plus; basalt, cinders, andesite
Erosion Factor (K)	.20	.20
Max. Erosion Hazard	Moderate	Moderate
Soil Permeability	Moderately rapid	Moderately rapid
Drainage Class	Somewhat excessively drained	Well drained
Soil Manageability Class	2e	2e
Soil Manageability Group	II	
Forest Site Class	4 (2-3)	3 (1-3)
Range Site	Not placed in a range site.	Not placed in a range site.
Water Runoff Potential	Slow	Slow
Watershed Sensitivity	9 (Low)	8
Hydrologic Soil Group	B	B
Available Water Capacity (AWC) Upper 20 inches	Moderate	Moderate to High
Susceptibility to Burning Damage	2.6 inches	3.0 inches
Slope Stability Hazard	Moderate	Moderate
Allowable Soil Loss	Low	Low
Chance of Seedling Survival	3 tons/acre/year	2, 3 tons/acre/year
Rating for Timber Site	Moderate	Moderate to High
R-Value	Good	Good
Soil horizons in inches, USDA, Unified, AASHTO	60+	60+
	0-24; Gravelly sandy loam, very gravelly sandy loam Unified: SM AASHTO: A-1-b	0-34; Gravelly coarse sandy loam Unified: SM AASHTO: A-2-4
	24-42; Extremely gravelly loamy sand, extremely gravelly coarse sand Unified: GP AASHTO: A-1-a	34+; Unweathered bedrock
	42-51; Very fine sandy loam, silt loam, very gravelly coarse sand Unified: SM, ML AASHTO: A-1-a, A-4	
	51-60; Extremely gravelly coarse sand Unified: GP AASHTO: A-1-a	
Included Areas:	Included with these soils in mapping and making up about 20 percent of the acreage are the Yallani, Sheld and Ahart families, Lithic Xerorthents, frigid and Rock outcrop.	

266 STUKEL FAMILY-LAVA FLOW ASSOCIATION, 1 to 20 percent slopes

Map Unit Components	Stukel family (55 percent)	Lava flow (20 percent)
Position, Slope, and Elevation	On nearly level to undulating basalt plateaus; 1 to 10 percent; 4200 to 4500 feet.	Hummocky disaggregated lava flow rock and collapsed lava tubes with slope lengths of 10 to 40 feet on undulating basalt plateaus; 5 to 20 percent slopes; 4200 to 4500 feet.
Typical Vegetation and Precipitation (ppt)	Few western juniper, rabbitbrush, big sagebrush, low sagebrush, cheatgrass, Idaho fescue, bottlebrush; 10 to 14 inch ppt.	Barren; 10 to 14 inch ppt.
Surface Layer	0 to 11 inches; grayish brown to brown very cobbly loam to loam, granular and blocky structure, soft to slightly hard, pH 6.2 to 7.2.	NOT APPLICABLE: Fractured vesicular basalt flow rock with minor accumulations of aeolian soil deposition in some fractures.
Rooting Depth (in.) to Underlying Material	8 to 15; basalt	
Erosion Factor (K)	.37	
Max. Erosion Hazard	Moderate	
Soil Permeability	Moderate	
Drainage Class	Well drained	
Soil Manageability Class	2ed	
Group	II	
Forest Site Class	7 (non-commercial)	
Range Site	7, 1	
Water Runoff Potential	Slow	Moderate
Watershed Sensitivity	6 (Moderate)	6
Hydrologic Soil Group	D	
Available Water Capacity (AWC)	Very Low to Low	
Upper 20 inches	1.1 to 2.1 inches	
Susceptibility to Burning Damage	Low	
Slope Stability Hazard	Low	
Allowable Soil Loss	1 tons/acre/year	
Chance of Seedling Survival	Not Rated	
Rating for Timber Site	Not Rated	
R-Value	30-60	
Soil horizons in inches, USDA, Unified, AASHTO	0-3; Very cobbly loam Unified: SM, SM-SC, ML, ML-CL AASHTO: A-2-4, A-4 3-11; Loam Unified: ML, ML-CL AASHTO: A-4 11+; Unweathered bedrock	
Included Areas:	Included with this unit in mapping and making up about 25 percent of the acreage are the Bakeoven, Searles, Gwin, Pass Canyon, Cowiche families and Lithic Xerorthents, mesic and lava flow rock with steeper slopes.	

267 STUKEL-LOS GATOS-PASS CANYON FAMILIES COMPLEX, 1 to 10 percent slopes

Map Unit Components	Stukel family (35 percent)	Los Gatos family (30 percent)	Pass Canyon family (20 percent)
Position, Slope, and Elevation	On nearly level to undulating basalt plateaus; 1 to 10 percent slopes; 4400 to 5200 feet.	On nearly level to undulating basalt plateaus; 1 to 10 percent slopes; 4400 to 5200 feet.	On nearly level to undulating basalt plateaus; 1 to 10 percent slopes; 4400 to 5200 feet.
Typical Vegetation and Precipitation (ppt)	Western juniper, low sagebrush, rabbitbrush, big sagebrush, cheatgrass, bottlebrush, Idaho fescue; 14 to 16 inches ppt.	Western juniper, big sagebrush, bitterbrush, Phlox spp., mustard, western yarrow, sandberg bluegrass, Idaho fescue, bottlebrush; 14 to 16 inches ppt.	
Surface Layer	0 to 11 inches; grayish brown to brown very cobbly loam to loam, granular and blocky structure, soft, pH 6.2 to 7.2.	0 to 19 inches; brown gravelly loam, granular and blocky structure, soft, pH 6.8 to 7.0.	0 to 4 inches; very dark grayish brown to dark brown very cobbly loam and loam, granular and platy structure, slightly hard, pH 6.8 to 6.6.
Rooting Depth (in.) to Underlying Material	10 to 20; basalt, tuff	20 to 40; basalt, tuff	14 to 20; basalt, tuff
Erosion Factor (K)	.37	.32	.32
Max. Erosion Hazard	Moderate	Low	Moderate
Soil Permeability	Moderate	Moderately Slow	Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	2ed II	1	2ed
Forest Site Class	7 (non-commercial)	7 (non-commercial)	7 (non-commercial)
Range Site	4, 8	13	8, 4
Water Runoff Potential	Slow	Very Slow	Moderate
Watershed Sensitivity	6 (Moderate)	8	6
Hydrologic Soil Group	D	B	D
Available Water Capacity (AWC)	Low	Low to Moderate	Low
Upper 20 inches	1.5 to 2.8 inches	2.8 inches	1.8 to 2.6 inches
Susceptibility to Burning Damage	Low	Moderate	Low
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	1 tons/acre/year	2 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated	Not Rated
R-Value	30-60	30-60	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-3; Very cobbly loam Unified: SM, SM-SC, ML, ML-CL AASHTO: A-2-4, A-4 3-11; Loam Unified: ML, ML-CL AASHTO: A-4 11+; Unweathered bedrock	0-19; Gravelly loam Unified: ML, ML-CL AASHTO: A-4 19-38; Clay loam, gravelly clay loam Unified: CL, MH AASHTO: A-6, A-7 38+; Unweathered bedrock	0-2; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4 2-4; Loam Unified: ML-CL, CL ASHTO: A-4, A-6 4-12; Clay loam, cobbly clay loam Unified: CL, MH AASHTO: A-6, A-7 12+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up about 15 percent of the acreage are the Bakeoven, Roval, Deven, Supan, Elmore and Lawyer families.		

268 SUPAN-SUPAN deep-PASS CANYON FAMILIES ASSOCIATION, 1 to 20 percent slopes

Map Unit Components	Supan family (40 percent)	Supan family, deep (25 percent)	Pass Canyon family (20 percent)
Position, Slope, and Elevation	On sideslopes of undulating basalt plateaus and mountain uplands; 1 to 20 percent slopes; 4300 to 6000 feet.	On lower sideslopes and depressions of undulating basalt plateaus and mountain uplands; 1 to 15 percent slopes; 4300 to 6000 feet.	On sideslopes ridges and knolls of undulating basalt plateaus and mountain uplands; 1 to 20 percent slopes; 4300 to 6000 feet.
Typical Vegetation and Precipitation (ppt)	May have dense western juniper and big sagebrush, with mountain mahogany, bitterbrush, rabbitbrush, Idaho fescue, wheatgrass, Ross's sedge, other grasses; 14 to 16 inches ppt.	May have dense western juniper and big sagebrush, with bitterbrush, rabbitbrush, mountain mahogany, Idaho fescue, wheatgrass, bluegrass, Ross's sedge, other grasses; 14 to 16 inches ppt.	
Surface Layer	0 to 11 inches; brown loam, granular and blocky structure, slightly hard, pH 6.8.	0 to 23 inches; brown loam, granular and blocky structure, soft to slightly hard, pH 6.8 to 7.0.	0 to 4 inches; very dark grayish brown to dark brown very cobbly loam and loam, granular and platy structure, slightly hard, pH 6.6 to 6.8.
Rooting Depth (in.) to Underlying Material	20 to 40; soft to hard basalt, tuff	40 plus; soft to hard basalt, tuff	10 to 20; basalt, tuff
Erosion Factor (K)	.32	.32	.32
Max. Erosion Hazard	Low to moderate	Low	Moderate
Soil Permeability	Moderately slow	Moderately slow	Moderately slow
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	2e II	1	2ed
Forest Site Class	7 (non-commercial)	7 (non-commercial)	7 (non-commercial)
Range Site	13	13	8, 4
Water Runoff Potential	Very Slow	Very Slow	Moderate
Watershed Sensitivity	8 (Low)	8	6
Hydrologic Soil Group	B	B	D
Available Water Capacity (AWC) Upper 20 inches	Moderate 3.3 inches	Moderate to High 3.4 inches	Very Low to Low 1.3 to 2.6 inches
Susceptibility to Burning Damage	Low to Moderate	Low	Low
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	2 tons/acre/year	3 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated	Not Rated
Rating for Timber Site R-Value	Not Rated 30-60	Not Rated 30-60	Not Rated 30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-11; Loam Unified: ML, ML-CL AASHTO: A-4 11-31; Cobbly clay loam Unified: CL, CH AASHTO: A-6, A-7 31+; Weathered bedrock	0-23; Loam Unified: ML, ML-CL AASHTO: A-4 23-60; Gravelly clay loam Very gravelly clay loam, extremely cobbly clay loam Unified: CL, CH AASHTO: A-6, A-7	0-2; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4 2-4; Loam Unified: ML-CL, CL AASHTO: A-4, A-6 4-12; Clay loam, cobbly clay loam Unified: CL, MH AASHTO: A-6, A-7 12+; Unweathered bedrock

Included Areas:

Included with these soils in mapping and making up about 15 percent of the acreage are the Deven, Roval, Barnard, Ridd, Gwin, Alicel, Wrentham, Sutkel, Bieber, Los Gatos, Elmore and Fordice families, Rock outcrop and unnamed soils similar to Wrentham family but not Pachic, and soils similar to the Skalan family.

269 SUPERVISOR-CHEADLE FAMILIES-ROCK OUTCROP ASSOCIATION, 15 to 35 percent slopes

Map Unit Components	Supervisor family (45 percent)	Cheadle family (20 percent)	Rock outcrop (20 percent)
Position, Slope, and Elevation	On sideslopes and toeslopes of mountain uplands; 15 to 35 percent slopes; 7000 to 9700 feet.	On upper sideslopes and ridges of mountain uplands; 20 to 35 percent slopes; 7000 to 9700 feet.	On ridges and sideslopes of deeply incised drainages of mountain uplands; 20 to 35 percent slopes; 7000 to 9700 feet.
Typical Vegetation and Precipitation (ppt)	White bark pine, few lodgepole pine, mulesear, lupine, penstamin, Ross's sedge, few grasses; 30 to 35 inches ppt.	Big sagebrush, low sagebrush, mulesear, lupine, phlox spp., buckwheat, Idaho fescue, other grasses; 30 to 35 inches ppt.	
Surface Layer	1 to 0 inches; lodgepole pine needles, over 0 to 12 inches; dark grayish brown to brown gravelly fine sandy loam, granular and blocky structure, slightly hard, pH 6.0 to 6.2.	0 to 17 inches; dark grayish brown to brown very cobbly loam to very cobbly clay loam; granular and subangular blocky structure, slightly hard to hard, pH 6.6.	NOT APPLICABLE: Basalt, andesite or conglomerated tuff bedrock with minor accumulations of aeolian soil deposition in some fractures.
Substratum	26 to 37 inches; weathering in place pale brown to reddish brown semi-soft tuff conglomerate.		
Rooting Depth (in.) to Underlying Material	20 to 40; andesite, tuff	10 to 20; andesite	
Erosion Factor (K)	.20	.37	
Max. Erosion Hazard	Moderate	Moderate to high	
Soil Permeability	Moderate	Moderate	
Drainage Class	Well drained	Well drained	
Soil Manageability Class	2ep	2ed	
Soil Manageability Group	II		
Forest Site Class	6-7 (4-5 at 7000 to 8000 feet elevation, and non-commercial above 8000 feet elevation)	7 (non-commercial)	
Range Site	Not placed in a range site.	9	
Water Runoff Potential	Slow	Rapid	Very Rapid
Watershed Sensitivity	7 (Moderate)	4	2
Hydrologic Soil Group	B	D	
Available Water Capacity (AWC)	Low to Moderate	Very Low to Low	
Upper 20 inches	2.2 inches	1.2 to 2.4 inches	
Susceptibility to Burning Damage	Moderate	Low	
Slope Stability Hazard	Low	Low	
Allowable Soil Loss	2 tons/acre/year	1 tons/acre/year	
Chance of Seedling Survival	Low to Moderate (Not Rated above 8,000 feet elevation)	Not Rated	
Rating for Timber Site	Fair to Poor (7,12,13)	Not Rated	
R-Value	60+	30-60	

269 SUPERVISOR-CHEADLE FAMILIES-ROCK OUTCROP ASSOCIATION (continued)

Soil horizons in
inches, USDA,
Unified, AASHTO

0-12; Gravelly fine sandy loam Unified: SM AASHTO: A-2-4, A-4	0-12; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4, A-6
12-26; Very gravelly sandy loam Unified: SM AASHTO: A-1-b	12-17; Very cobbly clay loam Unified: SC AASHTO: A-6, A-7
26+; Weathered bedrock	17+; Unweathered bedrock

Included Areas:

Included with this unit in mapping and making up about 15 percent of the acreage are the Duncom, Gralic and Behanin families, Lithic Cryochrepts, and Rubble land.

270 SUPERVISOR-CHEADLE FAMILIES-ROCK OUTCROP ASSOCIATION, 35 to 60 percent slopes

Map Unit Components	Supervisor family (40 percent)	Cheadle family (25 percent)	Rock outcrop (20 percent)
Position, Slope, and Elevation	On sideslopes and toeslopes of mountain uplands; 35 to 60 percent slopes; 8000 to 9000 feet.	On upper sideslopes and ridges of mountain uplands; 35 to 60 percent slopes; 8000 to 9900 feet.	On ridges and sideslopes of deeply incised drainages of mountain uplands; 35 to 60 percent slopes; 8000 to 9900 feet.
Typical Vegetation and Precipitation (ppt)	Semi-dense and stunted white bark pine forest with few lodgepole pine, plus mules-ear, lupine, penstamin, Ross's sedge, few grasses; 30 to 35 inches ppt.	Big sagebrush, low sagebrush, mulesear, lupine, Phlox spp., buckwheat, Idaho fescue, other grasses; 30 to 35 inches ppt.	
Surface Layer	1 to 0 inches; lodgepole pine needles over 0 to 12 inches; dark grayish brown to brown gravelly fine sandy loam, granular and blocky structure, slightly hard, pH 6.0 to 6.2.	0 to 17 inches; dark grayish brown to brown very cobbly loam to very cobbly clay loam; granular and subangular blocky structure, slightly hard to hard, pH 6.6.	NOT APPLICABLE: Basalt, andesite or conglomerated tuff bedrock with minor accumulations of aeolian soil deposition in some fractures.
Substratum	26 to 37 inches; weathering in place pale brown to reddish brown semi-soft tuff conglomerate.		
Rooting Depth (in.) to Underlying Material	20 to 40; andesite, tuff	10 to 20; andesite	
Erosion Factor (K)	.20	.37	
Max. Erosion Hazard	High	High to very high	
Soil Permeability	Moderate	Moderate	
Drainage Class	Well drained	Well drained	
Soil Manageability Class Group	3Ep III	3Ed	
Forest Site Class	7 (non-commercial)	7 (non-commercial)	
Range Site	Not placed in a range site.	9	
Water Runoff Potential	Moderate	Very Rapid	Very Rapid
Watershed Sensitivity	6 (High)	3	0
Hydrologic Soil Group	B	D	
Available Water Capacity (AWC) Upper 20 inches	Low to Moderate 2.2 inches	Very Low to Low 1.2 to 2.4 inches	
Susceptibility to Burning Damage	Moderate to High	Moderate	
Slope Stability Hazard	Low	Low	
Allowable Soil Loss	2 tons/acre/year	1 tons/acre/year	
Chance of Seedling Survival	Not Rated	Not Rated	
Rating for Timber Site	Poor (7, 8, 13)	Not Rated	
R-Value	60+	30-60	
Soil horizons in inches, USDA, Unified, AASHTO	0-12; Gravelly fine sandy loam Unified: SM AASHTO: A-2-4, A-4 12-26; Very gravelly sandy loam Unified: SM AASHTO: A-1-b 26+; Weathered bedrock	0-12; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4, A-6 12-17; Very cobbly clay loam Unified: SC AASHTO: A-6, A-7 17+; Unweatheed bedrock	
Included Areas:	Included with this unit in mapping and making up about 15 percent of the acreage are the Duncom family, Lithic Cryochrepts, and Rubble land.		

271 SUPERVISOR-CHEADLE FAMILIES-ROCK OUTCROP ASSOCIATION, 60 to 90 percent slopes

Map Unit Components	Supervisor family (30 percent)	Cheadle family (30 percent)	Rock outcrop (25 percent)
Position, Slope, and Elevation	On sideslopes of mountain uplands; 60 to 80 percent slopes; 8000 to 9700 feet.	On upper sideslopes and ridges of mountain uplands; 60 to 90 percent slopes; 8000 to 9700 feet.	On ridges and sideslopes of deeply incised drainages; 60 to 90 percent slopes; 8000 to 9700 feet.
Typical Vegetation and Precipitation (ppt)	Semi-dense and stunted white bark pine forest with few lodgepole pine, plus mules-ear, lupine, penstamin, Ross's sedge, few grasses; 30 to 35 inches ppt.	Big sagebrush, low sagebrush, mulesear, lupine, Phlox spp., buckwheat, Idaho fescue, other grasses; 30 to 35 inches ppt.	
Surface Layer	1 to 0 inches; lodgepole pine needles, over 0 to 12 inches; dark grayish brown to brown gravelly fine sandy loam, granular and blocky structure, slightly hard, pH 6.0 to 6.2.	0 to 17 inches; dark grayish brown to brown very cobbly loam to very cobbly clay loam; granular and subangular blocky structure, slightly hard to hard, pH 6.6.	NOT APPLICABLE: Basalt, andesite or conglomerated tuff bedrock with minor accumulations of aeolian soil deposition in some fractures.
Substratum	26 to 37 inches; weathering in place pale brown to reddish brown semi-soft tuff conglomerate.		
Rooting Depth (in.) to Underlying Material	20 to 40; andesite,	10 to 20; andesite	
Erosion Factor (K)	.20	.37	
Max. Erosion Hazard	Very high	Very high	
Soil Permeability	Moderate	Moderate	
Drainage Class	Well drained	Well drained	
Soil Manageability Class Group	4Gp IV	4Gd	
Forest Site Class	7 (non-commercial)	7 (non-commercial)	
Range Site	Not placed in a range site.	9	
Water Runoff Potential	Rapid	Very Rapid	Very Rapid
Watershed Sensitivity	4 (Very High)	2	0
Hydrologic Soil Group	B	D	
Available Water Capacity (AWC) Upper 20 inches	Low to Moderate 2.2 inches	Very Low to Low 1.2 to 2.4 inches	
Susceptibility to Burning Damage	High	Moderate	
Slope Stability Hazard	Moderate	Moderate	
Allowable Soil Loss	2 tons/acre/year	1 tons/acre/year	
Chance of Seedling Survival	Not Rated	Not Rated	
Rating for Timber Site R-Value	Poor (7, 9, 13) 60+	Not Rated 30-60	
Soil horizons in inches, USDA, Unified, AASHTO	0-12; Gravelly fine sandy loam Unified: SM AASHTO: A-2-4, A-4 12-26; Very gravelly sandy loam Unified: SM AASHTO: A-1-b 26+; Weathered bedrock	0-12; Very cobbly loam Unified: SM, SM-SC AASHTO: A-4, A-6 12-17; Very cobbly clay loam Unified: SC AASHTO: A-6, A-7 17+; Unweathered bedrock	
Included Areas:	Included with this unit in mapping and making up about 15 percent of the acreage are the Duncom family, Lithic Cryochrepts, and Rubble land.		

272 ROCK OUTCROP, tuff-LITHIC XERORTHENTS, FRIGID COMPLEX, 60 to 100 percent slopes

Map Unit Components	Rock outcrop, tuff (45 percent)	Lithic Xerorthents, frigid (40 percent)
Position, Slope, and Elevation	On ridges, knolls and deeply incised drainages of mountain uplands; 60 to 100 percent slopes; 5000 to 8000 feet.	On sideslopes and ridges of mountain uplands; 60 to 100 percent slopes; 5000 to 8000 feet.
Typical Vegetation and Precipitation (ppt)	Barren; 16 to 30 inches ppt.	Very sparse vegetation consisting of Buckwheat, Phlox spp., low sagebrush, Idaho fescue, trace of western juniper; 16 to 30 inches ppt.
Surface Layer	NOT APPLICABLE: Platy and massive paralithic volcanic tuff which rubs to a sandy loam, loam, or clay loam texture.	0 to 2 inches; yellowish brown very gravelly sandy loam; platy and granular structure; slightly hard, pH 6.6.
Rooting Depth (in.) to Underlying Material		4 to 10; andesite, conglomerated tuff, sandstone
Erosion Factor (K)		Variable
Max. Erosion Hazard		Very high
Soil Permeability		Moderate
Drainage Class		Somewhat excessively drained
Soil Manageability Class	Not rated	4GD
Soil Manageability Group	IV	
Forest Site Class		7 (non-commercial)
Range Site		1
Water Runoff Potential	Very Rapid	Very Rapid
Watershed Sensitivity	0 (Very High)	0
Hydrologic Soil Group		D
Available Water Capacity (AWC) Upper 20 inches		Very low
Susceptibility to Burning Damage		0.6 to 1.5 inches
Slope Stability Hazard		Low
Allowable Soil Loss		Moderate
Chance of Seedling Survival		1 tons/acre/year
Rating for Timber Site		Not Rated
R-Value		Not Rated
Soil horizons in inches, USDA, Unified, AASHTO		0-6; Variable Unified: Not Rated AASHTO: Not Rated
Included Areas:	6+; Weathered bedrock	
	Included with this unit in mapping and making up about 15 percent of the acreage are the Cheadle, Anatone, Patio and Smarts families, Lithic Cryochrepts, Rubble land, and areas of lesser and greater slopes.	

273 VIPONT-GINSER-ANATONE FAMILIES ASSOCIATION, 15 to 40 percent slopes

Map Unit Components Position, Slope, and Elevation	Vipont family (40 percent)	Ginsler family (25 percent)	Anatone family (20 percent)
Typical Vegetation and Precipitation (ppt)	Few ponderosa pine, white fir, western juniper, big sagebrush, mountain mahogany, bitterbrush, ceonothus, greenleaf manzanita, Carex spp., wheatgrass, Ross's sedge, Idaho fescue; 20 to 22 inches ppt.	Few ponderosa pine, white fir, western juniper big sagebrush, mountain mahogany, bitterbrush, ceonothus, greenleaf manzanita, Carex spp., wheatgrass, Idaho fescue; Ross's sedge, 20 to 22 inches ppt.	On southeast to westerly aspects of upper sideslopes, ridges, and knolls of mountain uplands; 20 to 40 percent slopes; 5500 to 7000 feet.
Surface Layer	0 to 16 inches; brown very gravelly loam, granular and blocky structure, slightly hard, pH 6.8.	0 to 24 inches; dark brown to to dark yellowish brown cobbly loam, very cobbly loam and extremely cobbly loam, granular and blocky structure, slightly hard to hard, pH 6.4 to 6.8.	0 to 17 inches; brown cobbly loam to very cobbly loam, granular and blocky structure, slightly hard, pH 6.8 to 7.0.
Rooting Depth (in.) to Underlying Material	20 to 40; basalt	20 to 40; andesite, basalt	10 to 20; andesite, basalt
Erosion Factor (K)	.28	.32	.37
Max. Erosion Hazard	Moderate	Moderate	Moderate to high
Soil Permeability	Moderately slow	Moderate	Moderate
Drainage Class	Well drained	Well drained	Well drained
Soil Manageability Class Group	2e II	2ep	3Ed
Forest Site Class	5-6 (4-5)	6 (4-5)	7 (non-commercial)
Range Site	Not placed in a range site.	Not placed in a range site.	9
Water Runoff Potential	Slow	Slow	Rapid
Watershed Sensitivity	7 (Moderate)	7	4
Hydrologic Soil Group	B	B	D
Available Water Capacity (AWC) Upper 20 inches	Low to Moderate 2.8 inches	Low to Moderate 2.3 inches	Very Low to Low 1.2 to 2.5 inches
Susceptibility to Burning Damage	Moderate	Moderate	Moderate
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	2 tons/acre/year	2 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Moderate	Low	Not Rated
Rating for Timber Site R-Value	Poor (1,7,11) 30-60	Poor (1,7,11) 30-60	Not Rated 30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-16; Very gravelly loam Unified: SM, SM-SC AASHTO: A-4 16-32; Very gravelly clay loam, very cobbly clay loam, extremely cobbly clay loam Unified: SC, CL AASHTO: A-6, A-7 32+; Weathered bedrock	0-24; Cobbly loam, very cobbly loam, extremely cobbly loam Unified: SM, SC, ML, CL AASHTO: A-4, A-6 24+; Weathered bedrock	0-8; Cobbly loam Unified: ML, ML-CL AASHTO: A-4 8-17; Very cobbly loam Unified: SM, SC AASHTO: A-4, A-6 17+; Unweathered bedrock

273 VIPONT-GINSER-ANATONE FAMILIES ASSOCIATION (continued)

Included Areas:

Included with these soils in mapping and making up about 15 percent of the acreage are the Hades, Mascamp, Lamondi and Smarts families, and Rock outcrop.

Map Unit Components	Aquolls (70 percent)
Position, Slope, and Elevation	On nearly level slightly concave alluvial basins and drainages; (subject to spring flooding); 0 to 5 percent slopes; 4800 to 6400 feet.
Typical Vegetation and Precipitation (ppt)	Kentucky bluegrass, other <i>Poa</i> spp., timothy, willows, forbes, sedges, other grasses; 14 to 25 inches ppt.
Surface Layer	0 to 4 inches very dark gray silty clay loam; platy and granular structure; hard; pH 7.4.
Substratum	27 to 60 inches; light gray and gray with yellowish brown and yellowish red mottles; silty clay loam and clay loam; massive and blocky structure; slightly hard and very hard; pH 6.4.
Rooting Depth (in.) to Underlying Material	40 plus; alluvium
Erosion Factor (K)	Variable
Max. Erosion Hazard	Moderate
Soil Permeability	Variable
Drainage Class	Poorly drained
Soil Manageability Class	3W
Group	III
Forest Site Class	7 (non-commercial)
Range Site	25
Water Runoff Potential	Very Slow
Watershed Sensitivity	7 (Moderate)
Hydrologic Soil Group	D
Available Water Capacity (AWC)	Moderate to High
Upper 20 inches	3.3 inches
Susceptibility to Burning Damage	Low
Slope Stability Hazard	Low
Allowable Soil Loss	5 tons/acre/year
Chance of Seedling Survival	Not Rated
Rating for Timber Site	Not Rated
R-Value	Not Rated
Soil horizons in inches, USDA, Unified, AASHTO	0-60; Variable Unified: Not Rated AASHTO: Not Rated
Included Areas:	Included with this soil in mapping and making up about 30 percent of the acreage are the Jacknife, Aikman, Smarts and Los Gatos families and unnamed Fluvents, Saprists, and Fluvaquents.

275 WOODHURST-BEHANIN deep FAMILIES COMPLEX, 10 to 35 percent slopes

Map Unit Components	Woodhurst family (45 percent)	Behanin family, deep (35 percent)
Position, Slope, and Elevation	On sideslopes and toeslopes of mountain uplands; 10 to 30 percent slopes; 7000 to 8000 feet.	On sideslopes and ridges of mountain uplands; 10 to 35 percent slopes; 7000 to 8000 feet.
Typical Vegetation and Precipitation (ppt)	White fir, lodgepole pine, few quaking aspen, snowberry, forbes, Ross's sedge, few grasses; 25 to 35 inches ppt.	White fir, lodgepole pine, western white pine, few quaking aspen, snowberry, forbes, Ross's sedge, few grasses; 25 to 35 inches ppt.
Surface Layer	3 to 0 inches; white fir and lodgepole pine needles and twigs, over 0 to 25 inches; brown to yellowish brown cobbly fine sandy loam, very stony loam and extremely stony loam, granular and blocky structure, slightly hard, pH 6.4 to 6.8.	1-1/2 to 0 inches of white fir needles and twigs, over 0 to 60 inches; very dark grayish brown to brown very gravelly loam, very stony loam and extremely gravelly loam, granular to subangular blocky structure, slightly hard, pH 6.0 to 6.4.
Rooting Depth (in.) to Underlying Material	40 plus; basalt	40 plus; basalt, andesite
Erosion Factor (K)	.20	.28
Max. Erosion Hazard	Moderate	Moderate
Soil Permeability	Moderate	Moderate
Drainage Class	Well drained	Well drained
Soil Manageability Class	2ep	2e
Group	II	
Forest Site Class	5 (3-4)	5 (3-4)
Range Site	Not placed in a range site.	Not placed in a range site.
Water Runoff Potential	Slow	Slow
Watershed Sensitivity	7 (Moderate)	7
Hydrologic Soil Group	B	B
Available Water Capacity (AWC)	Moderate	Moderate
Upper 20 inches	2.5 inches	2.4 inches
Susceptibility to Burning Damage	Low to Moderate	Low to Moderate
Slope Stability Hazard	Low	Low
Allowable Soil Loss	3 tons/acre/year	3 tons/acre/year
Chance of Seedling Survival	Moderate	Moderate
Rating for Timber Site	Fair (1,3,12)	Fair (1,12)
R-Value	30-60	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-34; Cobbly fine sandy loam, very stony loam, extremely stony loam Unified: SM, SM-SC AASHTO: A-4 34-60; Very cobbly loam Unified: ML, CL AASHTO: A-4, A-6	0-34; Very gravelly loam, very stony loam Unified: SM, ML, ML-CL AASHTO: A-4 34-60; Extremely gravelly loam Unified: GM, GM-GC AASHTO: A-2-4, A-2-6
Included Areas:	Included with these soils in mapping and making up about 20 percent of the acreage are the Supervisor, Gallatin, Duncom and Cheadle families and Lithic Cryochrepts.	

276 WRENTHAM-BAKEOVEN FAMILIES ASSOCIATION, 10 to 40 percent slopes

Map Unit Components	Wrenthan family (65 percent)	Bakeoven family (20 percent)
Position, Slope, and Elevation	Mainly on sideslopes and toeslopes of mountain uplands; 10 to 35 percent slopes; 4600 to 5600 feet.	Mainly on upper sideslopes and ridges of Mountain uplands; 15 to 40 percent slopes; 4600 to 5600 feet.
Typical Vegetation and Precipitation (ppt)	Big sagebrush, rabbitbrush, bitterbrush, Ribes spp., lupine, arrowleaf balsam root, western yarrow, crested wheatgrass, bluebunch wheatgrass, sandberg bluegrass, thurbers needlegrass, Idaho fescue; 12 to 14 inches ppt.	Low sagebrush, big sagebrush, rabbitbrush, Phlox spp., Idaho fescue, sandberg bluegrass, cheatgrass; 12 to 14 inches ppt.
Surface Layer	0 to 23 inches; dark grayish brown, grayish brown and brown very gravelly loam, granular structure, slightly hard, pH 6.6 to 6.8.	0 to 11 inches; dark grayish brown and grayish brown very cobbly fine sandy loam, subangular blocky structure; slightly hard, pH 6.6.
Substratum	23 to 33 inches; pale brown very gravelly loam, massivé, slightly hard, pH 6.4.	
Rooting Depth (in.) to Underlying Material	20 to 40; andesite	8 to 20; andesite, basalt
Erosion Factor (K)	.28	.24
Max. Erosion Hazard	Moderate	Moderate to high
Soil Permeability	Moderate	Moderately rapid
Drainage Class	Well drained	Well drained
Soil Manageability Class	2e	3Edx
Soil Manageability Group	II	
Forest Site Class	7 (non-commercial)	7 (non-commercial)
Range Site	12	7, 1
Water Runoff Potential	Slow	Rapid
Watershed Sensitivity	7 (Moderate)	5
Hydrologic Soil Group	B	D
Available Water Capacity (AWC)	Low to Moderate	Very Low to Low
Upper 20 inches	2.5 inches	0.8 to 1.9 inches
Susceptibility to Burning Damage	Low	Low
Slope Stability Hazard	Low	Low
Allowable Soil Loss	2 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Not Rated	Not Rated
Rating for Timber Site	Not Rated	Not Rated
R-Value	30-60	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-33; Very gravelly loam Unified: GM, GM-GC, SM, SM-SC AASHTO: A-2-4, A-4 33+; Unweathered bedrock	0-11; Very cobbly fine sandy loam Unified: SM, SM-SC AASHTO: A-4 11+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up about 15 percent of the acreage are the Searles, Supan, Simpson, Pass Canyon and Alicel families, Rock outcrop, soils similar to Wrenthan family but not Pachic, and areas of greater slope.	

277 YALLANI-SHELD FAMILIES COMPLEX, 5 to 30 percent slopes

Map Unit Components

Position, Slope, and Elevation

Typical Vegetation and Precipitation (ppt)

Surface Layer

Rooting Depth (in.) to Underlying Material

Erosion Factor (K)

Max. Erosion Hazard

Soil Permeability

Drainage Class

Soil Manageability

Class

Group

Forest Site Class

Range Site

Water Runoff Potential

Watershed Sensitivity

Hydrologic Soil Group

Available Water

Capacity (AWC)

Upper 20 inches

Susceptibility to

Burning Damage

Slope Stability Hazard

Allowable Soil Loss

Chance of Seedling

Survival

Rating for Timber Site

R-Value

Soil horizons in

inches, USDA,

Unified, AASHTO

Included Areas:

Yallani family (60 percent)

On sideslopes, toeslopes and alluvial fans of volcanic mountain uplands; 5 to 30 percent slopes; 5800 to 7000 feet.

White fir forest, or mixed conifer forest of white fir, some red fir, ponderosa pine, and lodgepole pine above 6500 feet, plus current spp., snowberry, Ross's sedge, bunchgrasses; 35 to 45 inches ppt.

3 to 0 inches of mostly decomposed white fir twigs and needles over: 0 to 4 inches; brown gravelly sandy loam; granular and subangular blocky structure; soft; pH 6.4.

40 plus; basalt, andesite

.20

Low to moderate

Moderately rapid

Well drained

2e

II

4 (2-3)

Not placed in a range site.

Slow

8(Low)

B

Moderate to High

2.4 inches

Moderate

Low

3 tons/acre/year

Low to Moderate

Fair (3)

60+;

0-18; Gravelly sandy loam, extremely cobbly fine sandy loam

Unified: SM, SM-SC

AASHTO: A-2-4, A-1-b

18-60; Extremely cobbly loam

Unified: SM, SM-SC

AASHTO: A-2-4, A-4

Sheld family (25 percent)

On sideslopes, toeslopes and alluvial fans of volcanic mountain uplands; 5 to 30 percent slopes; 5800 to 7000 feet.

White fir forest, or mixed conifer forest of white fir, ponderosa pine, some red fir and lodgepole pine above 6500 feet, current spp., snowberry, Ross's sedge, bunchgrasses: 35 to 45 inches ppt.

2 to 0 inches of white fir and ponderosa pine needles and twigs, over 0 to 25 inches; dark grayish brown and brown gravelly fine sandy loam and very cobbly loam, granular and subangular blocky structure, soft, pH 5.8 to 6.2.

40 plus inches, hard basalt

.20

Low to moderate

Moderate

Well drained

2e

4 (2-3)

Not placed in a range site.

Slow

8

B

Moderate to High

3.1 inches

Moderate

Low

3 tons/acre/year

High

Good

60+

0-12; Gravelly fine sandy loam

Unified: SM

AASHTO: A-4

12-50; Very cobbly loam, Very gravelly

loam, extremely cobbly loam

Unified: SM, SM-SC

AASHTO: A-4

50+; Unweathered bedrock

Included with these soils in mapping and making up about 15 percent of the acreage are the Lithic Xerumbrepts, Ahart, Stonewell, Kinzel and Divers families, rock outcrop, and soils similar to the Germany family but medial-skeletal.

278 YALLANI-INVILLE FAMILIES COMPLEX, 8 to 20 inch pumice overburden, 5 to 30 percent slopes

Map Unit Components	Yallani family, pumice overburden phase (60 percent)	Inville family (20 percent)
Position, Slope, and Elevation	On sideslopes of volcanic mountain uplands; 5 to 30 percent slopes; 5400 to 6500 feet.	On sideslopes of volcanic mountain uplands; 5 to 30 percent slopes; 5400 to 6500 feet.
Typical Vegetation and Precipitation (ppt)	White fir forest, or mixed conifer forest of ponderosa pine, white fir, red fir, plus greenleaf manzanita, bitterbrush, rabbit- brush, Ross's sedge, grasses; 20 to 30 inches ppt.	White fir forest, or mixed conifer forest of white fir, ponderosa pine, red fir, plus greenleaf manzanita, bitterbrush, rabbitbrush, Ross's sedge, grasses; 20 to 30 inches ppt.
Surface Layer	1 to 0 inches; ponderosa pine and white fir needles and twigs, over 17 inches of pumice overburden consisting of 0 to 2 inches; gray extremely gravelly loamy coarse sand; 2 to 17 inches; white extremely gravelly coarse sand. (Thickness ranges from 8 to 20 inches) OVER 17 to 23 inches; yellowish brown gravelly coarse sandy loam, granular structure, soft, pH 6.2.	2 to 0 inches of undecomposed and decomposed ponderosa pine needles, over 12 inches of pumice consisting of 0 to 2 inches; pale brown and grayish brown gravelly loamy coarse sand and gravelly loamy fine sand. (Thickness ranges from 8 to 20 inches) OVER 12 to 15 inches; yellowish brown very gravelly sandy loam, granular structure, soft, pH 6.4
Rooting Depth (in.) to Underlying Material	40 plus; basalt, andesite	40 plus; basalt
Erosion Factor (K)	.15	.17
Max. Erosion Hazard	Low to moderate	Low to moderate
Soil Permeability	Rapid in the pumice overburden to moderately rapid below.	Rapid in the pumice overburden to moderate below.
Drainage Class	Well drained	Well drained
Soil Manageability Class Group	2ep II	2ep
Forest Site Class	5 (3-4)	4-5 (2-4)
Range Site	Not placed in a range site.	Not placed in a range site.
Water Runoff Potential	Slow	Slow
Watershed Sensitivity	8 (Low)	8
Hydrologic Soil Group	B	B
Available Water Capacity (AWC) Upper 20 inches	Moderate 2.3 inches	Moderate to high 2.3 inches
Susceptibility to Burning Damage	High	High
Slope Stability Hazard	Low	Low
Allowable Soil Loss	3 tons/acre/year	3 tons/acre/year
Chance of Seedling Survival	Moderate	Moderate
Rating for Timber Site	Fair (3,5)	Fair (5)
R-Value	60+	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-2; Extremely gravelly loamy coarse sand Unified: SW-SM AASHTO: A-1-a 2-17; Extremely gravelly coarse sand Unified: GW-GM AASHTO: A-1-a 17-60; Gravelly coarse sandy loam, extremely stony coarse sandy loam, extremely cobbly coarse sandy loam Unified: SM AASHTO: A-1-b, A-2-4	0-6; Very gravelly loamy coarse sand Unified: SW-SM, SM AASHTO: A-1-a 6-12; Very gravelly loamy fine sand Unified: SM AASHTO: A-2-4 12-21; Very gravelly sandy loam Unified: SM AASHTO: A-1-b 21-60; Very gravelly loam Unified: SM, SM-SC AASHTO: A-2-4, A-2-6

278 YALLANI-INVILLE FAMILIES COMPLEX (continued)

Included Areas:

Included with these soils in mapping and making up about 20 percent of the acreage are the Stonewell family pumice phase, Kinzel family, unnamed cindery over medial-skeletal, frigid soils, and Rock outcrop.

279 YALLANI-STONEWELL FAMILIES ASSOCIATION, 15 to 35 percent slopes

Map Unit Components	Yallani family (50 percent)	Stonewell family (30 percent)
Position, Slope, and Elevation	On knolls, ridges and sideslopes of volcanic mountain uplands; 20 to 35 percent slopes; 5600 to 6800 feet.	On smooth sideslopes of volcanic mountain uplands; 15 to 30 percent slopes; 5600 to 6800 feet.
Typical Vegetation and Precipitation (ppt)	White fir forest, or mixed conifer forest of white fir, some red fir and incense-cedar, plus greenleaf manzanita, snowbrush, Ross's sedge, few grasses; 30 to 40 inches ppt.	White fir forest, or mixed conifer forest of white fir, some red fir, ponderosa pine, and incense-cedar, plus greenleaf manzanita, snowbrush, Ross's sedge, few grasses; 30 to 40 inches ppt.
Surface Layer	3 to 0 inches of mostly decomposed white fir twigs and needles over: 0 to 4 inches; brown gravelly sandy loam; granular and subangular blocky structure; soft, pH 6.4.	1 to 0 inches; white fir and ponderosa pine needles and twigs, over 0 to 4 inches; dark grayish brown gravelly sandy loam, granular structure, soft, pH 6.4.
Rooting Depth (in.) to Underlying Material	40 plus; basalt, andesite	40 plus; cinders, basalt
Erosion Factor (K)	.20	.20
Max. Erosion Hazard	Moderate	Moderate
Soil Permeability	Moderately Rapid	Moderately rapid
Drainage Class	Well drained	Somewhat excessively drained
Soil Manageability Class Group	2e II	2e
Forest Site Class	4 (2-3)	4 (2-3)
Range Site	Not placed in a range site.	Not placed in a range site.
Water Runoff Potential	Slow	Slow
Watershed Sensitivity	8 (Low)	9
Hydrologic Soil Group	B	B
Available Water Capacity (AWC)	Moderate to High	Moderate
Upper 20 inches	2.4 inches	2.6 inches
Susceptibility to Burning Damage	Moderate	Moderate
Slope Stability Hazard	Low	Low
Allowable Soil Loss	3 tons/acre/year	3 tons/acre/year
Chance of Seedling Survival	Low to Moderate	Moderate
Rating for Timber Site	Fair (3)	Good
R-Value	60+	60+
Soil horizons in inches, USDA, Unified, AASHTO	0-18; Gravelly sandy loam, extremely cobbly fine sandy loam Unified: SM, SM-SC AASHTO: A-2-4, A-1-b 18-60; Extremely cobbly loam Unified: SM, SM-SC AASHTO: A-2-4, A-4	0-24; Gravelly sandy loam, very gravelly sandy loam Unified: SM AASHTO: A-1-b 24-42; Extremely gravelly loamy sand, extremely gravelly coarse sand Unified: GP AASHTO: A-1-a 42-51; Very fine sandy loam, silt loam, very gravelly coarse sand Unified: SM, ML AASHTO: A-4, A-1-a 51-60; Extremely gravelly coarse sand Unified: GP AASHTO: A-1-a
Included Areas:	Included with these soils in mapping and making up about 20 percent of the acreage are the Zynbar, Sheld and Ahart families, Lithic Xerorthents, frigid, and rock outcrop.	

280 WAPAL-ANATONE-PATIO deep FAMILIES ASSOCIATION, 60 to 90 percent slopes

Map Unit Components	Wapal family (40 percent)	Anatone family (25 percent)	Patio family, deep (20 percent)
Position, Slope, and Elevation	On sideslopes and deeply incised drainages of mountain uplands; 60 to 90 percent slopes; 5500 to 7000 feet.	On ridges, knolls and upper sideslopes of mountain uplands; 60 to 90 percent slopes; 5500 to 7000 feet.	On sideslopes and lower slopes of mountain uplands; 60 to 80 percent slopes; 5500 to 7000 feet.
Typical Vegetation and Precipitation (ppt)	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, plus few western juniper, big sagebrush, ceonothus, rabbitbrush, Ross's sedge, few grasses; 20 to 30 inches ppt.	Western juniper, few ponderosa pine, mountain mahogany, low sagebrush, big sagebrush, bottlebrush, Idaho fescue, other grasses; 20 to 30 inches ppt.	
Surface Layer	1/2 to 0 inches; ponderosa pine needles and twigs, over 0 to 6 inches; gray to light yellowish brown gravelly fine sandy loam, granular structure, loose, pH 6.6.	0 to 17 inches; brown cobbly loam to very cobbly loam, granular and blocky structure, slightly hard, pH 6.8 to 7.0.	1 to 0 inches of white fir needles, over 0 to 18 inches; yellowish brown very gravelly loam, granular structure, slightly hard, pH 6.2 to 6.8.
Rooting Depth (in.) to Underlying Material	40 plus; andesite tuff, obsidian	10 to 20; andesite, tuff, obsidian	40 plus; andesite, tuff, obsidian
Erosion Factor (K)	.20	.37	.28
Max. Erosion Hazard	High to very high	Very high	High to very high
Soil Permeability	Moderately rapid	Moderate	Moderate
Drainage Class	Somewhat excessively drained	Well drained	Well drained
Soil Manageability Class Group	4Gp IV	4Gd	4Gp
Forest Site Class	6 (4-5)	7 (Non-commercial)	5 (3-4)
Range Site	Not placed in a range site.	9	Not placed in a range site.
Water Runoff Potential	Rapid	Very Rapid	Rapid
Watershed Sensitivity	5 (High)	2	5
Hydrologic Soil Group	A	D	B
Available Water Capacity (AWC) Upper 20 inches	Low 1.5 inches	Very Low to Low 1.2 to 2.5 inches	Moderate 2.3 inches
Susceptibility to Burning Damage	High	Moderate	High
Slope Stability Hazard	Moderate	Moderate	Moderate
Allowable Soil Loss	3 tons/acre/year	1 tons/acre/year	3 tons/acre/year
Chance of Seedling Survival	Low to Very Low	Not Rated	Low to Moderate
Rating for Timber Site	Poor (9)	Not Rated	Poor (9)
R-Value	60+	30-60	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-6; Gravelly fine sandy loam Unified: SM AASHTO: A-4 6-60; Very gravelly loamy fine sand, very gravelly loamy sand Unified: SM AASHTO: A-1-b, A-2-4	0-8; Cobbly loam Unified: ML, ML-CL AASHTO: A-4 8-17; Very cobbly loam Unified: SM, SC AASHTO: A-4, A-6 17+; Unweathered bedrock	0-60; Very gravelly loam, extremely gravelly loam, extremely cobbly loam Unified: SM, SM-SC AASHTO: A-2-4, A-2-6
Included Areas:	Included with these soils in mapping and making up about 15 percent of the acreage are the Mascamp family, Lithic Xerorthents, frigid, rock outcrop and Rubble land.		

281 WAPAL-PATIO deep FAMILIES ASSOCIATION, 15 to 35 percent slopes

Map Unit Components	Wapal family (55 percent)	Patio family, deep (25 percent)
Position, Slope, and Elevation	On upper sideslopes, ridges and knolls of mountain uplands; 20 to 35 percent slopes; 5500 to 7000 feet.	On lower sideslopes and toeslopes of mountain uplands; 15 to 35 percent slopes; 5500 to 7000 feet.
Typical Vegetation and Precipitation (ppt)	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, washoe pine, plus few western juniper, mountain mahogany, big sagebrush, ceonothus, rabbitbrush, Ross's sedge, few grasses 20 to 30 inches ppt.	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, washoe pine plus big sagebrush, ceonothus, rabbitbrush, Ross's sedge, few grasses; 20 to 30 inches ppt.
Surface Layer	1/2 to 0 inches; ponderosa pine needles and twigs, over 0 to 6 inches; gray to light yellowish brown gravelly fine sandy loam, granular structure, loose, pH 6.6.	1 to 0 inches of white fir needles, over 0 to 18 inches; yellowish brown very gravelly loam, granular structure, slightly hard, pH 6.2 to 6.8.
Rooting Depth (in.) to Underlying Material	40 plus; andesite, tuff, obsidian	40 plus; andesite, tuff, obsidian
Erosion Factor (K)	.20	.28
Max. Erosion Hazard	Moderate	Moderate
Soil Permeability	Moderately rapid	Moderate
Drainage Class	Somewhat excessively drained	Well drained
Soil Manageability Class	2ep	2ep
Group	II	
Forest Site Class	6 (4-5)	5 (3-4)
Range Site	Not placed in a range site.	Not placed in a range site.
Water Runoff Potential	Slow	Slow
Watershed Sensitivity	8 (Low)	7
Hydrologic Soil Group	A	B
Available Water Capacity (AWC)	Low	Moderate
Upper 20 inches	1.5 inches	2.3 inches
Susceptibility to Burning Damage	Moderate	Moderate
Slope Stability Hazard	Low	Low
Allowable Soil Loss	3 tons/acre/year	3 tons/acre/year
Chance of Seedling Survival	Low to Very Low	Low to Moderate
Rating for Timber Site	Good	Good
R-Value	60+	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-6; Gravelly fine sandy loam Unified: SM AASHTO: A-4 6-60: Very gravelly loamy fine sand, very gravelly loamy sand Unified: SM AASHTO: A-1-b, A-2-4	0-60; Very gravelly loam, extremely gravelly loam, extremely cobbly loam Unified: SM, SM-SC AASHTO: A-2-4, A-2-6
Included Areas:	Included with these soils in mapping and making up about 20 percent of the acreage are the Anatone, Smarts, Gleason, Merkel, and Lamondi families, Rock outcrop, and unnamed soils similar to the Inville family.	

282 WAPAL-PATIO deep-ANATONE FAMILIES ASSOCIATION, 35 to 60 percent slopes

Map Unit Components	Wapal family (40 percent)	Patio family, deep (25 percent)	Anatone family (20 percent)
Position, Slope, and Elevation	On sideslopes and deeply incised drainages of mountain uplands; 35 to 60 percent slopes; 5500 to 7000 feet.	On sideslopes and lower slopes of mountain uplands; 35 to 60 percent slopes; 5500 to 7000 feet.	On ridges, knolls and upper sideslopes of mountain uplands; 40 to 60 percent slopes; 5500 to 7000 feet.
Typical Vegetation and Precipitation (ppt)	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, plus washoe pine few western juniper, big-sage- brush ceonothus, rabbitbrush, Ross's sedge, few grasses; 20 to 30 inches ppt.	White fir forest, or mixed conifer forest of white fir, ponderosa pine, incense-cedar, washoe pine, plus few western juniper, big sagebrush, ceonothus, rabbitbrush, Ross's sedge, few grasses; 20 to 30 inches ppt.	
Surface Layer	1/2 to 0 inches; ponderosa pine needles and twigs, over 0 to 6 inches; gray to light yellowish brown gravelly fine sandy loam, granular structure, loose, pH 6.6.	1 to 0 inches of white fir needles, over 0 to 18 inches; yellowish brown very gravelly loam, granular structure, slightly hard, pH 5.8 to 6.0.	0 to 17 inches; brown cobbly loam to very cobbly loam, granular and blocky structure, slightly hard, pH 6.8 to 7.0.
Rooting Depth (in.) to Underlying Material	40 plus; andesite, tuff, obsidian	40 plus; andesite, tuff, obsidian	10 to 20; andesite, tuff, obsidian
Erosion Factor (K)	.20	.28	.37
Max. Erosion Hazard	High	High	High to very high
Soil Permeability	Moderately rapid	Moderate	Moderate
Drainage Class	Somewhat excessively drained	Well drained	Well drained
Soil Manageability Class Group	3Ep III	3Ep	3Ed
Forest Site Class	6 (4-5)	5 (3-4)	7 (non-commercial)
Range Site	Not placed in a range site.	Not placed in a range site.	9
Water Runoff Potential	Moderate	Moderate	Rapid
Watershed Sensitivity	7 (Moderate)	6	3
Hydrologic Soil Group	A	B	D
Available Water Capacity (AWC)	Low	Moderate	Very Low to Low
Upper 20 inches	1.5 inches	2.3 inches	1.2 to 2.5 inches
Susceptibility to Burning Damage	High	Moderate to High	Moderate
Slope Stability Hazard	Low	Low	Low
Allowable Soil Loss	3 tons/acre/year	3 tons/acre/year	1 tons/acre/year
Chance of Seedling Survival	Low to Very Low	Low to Moderate	Not Rated
Rating for Timber Site	Fair (8)	(Fair 8)	Not Rated
R-Value	60+	30-60	30-60
Soil horizons in inches, USDA, Unified, AASHTO	0-6; Gravelly fine sandy loam Unified: SM AASHTO: A-4 6-60; Very gravelly loamy fine sand, very gravelly loamy sand Unified: SM AASHTO: A-1-b, A-2-4	0-60; Very gravelly loam, extremely gravelly loam, extremely cobbly loam Unified: SM, SM-SC AASHTO: A-2-4, A-2-6	0-8; Cobbly loam Unified: ML, ML-CL AASHTO: A-4 8-17; Very cobbly loam Unified: SM, SC AASHTO: A-4, A-6 17+; Unweathered bedrock
Included Areas:	Included with these soils in mapping and making up about 15 percent of the acreage are the Mascamp, Gleason, Merkel, Smarts families, Lithic Xerorthents, frigid, Rock outcrop, Rubble land and unnamed soils similar to the Inville family.		

