## RAG Rock outcrop-Franktown-Kyburz complex, 50 to 75 percent slopes

Elevation: 5,500 to 6,400 feet  Annual Precipitation: 18 to 30 inches

| | | | |
|---|---|---|---|
| Typical Vegetation | Barren-Mixed conifer series; Sagebrush/Bitterbrush-Jeffrey/Ponderosa series. | | |
| Soil Map Unit Components | **Rock outcrop** | **Franktown** | **Kyburz** |
| Proportion (percent) | 35 | 20 | 15 |
| **Soil Profile Description** | | | |
| Surface Layer | Volcanic rock. | 0 to 15 inches; brown gravelly loam; moderate granular structure; slightly acid. | 0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid. |
| Subsoil | | | 6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid. |
| Substratum | | 15 inches; weathered volcanic rock. | 34 inches; weathered andesitic rock. |
| **Soil Properties & Management Interpretations** | | | |
| Effective Rooting Depth (inches) | | 15 to 20 | 20 to 40 |
| Available Water Capacity Class | | Very low | Low |
| AWC for top 20" | | 1.1-1.3 | 2.2-2.7 |
| Permeability: Subsoil<br>Substratum | | Moderately rapid<br>Very slow | Moderately slow<br>Moderately slow |
| Drainage Class | | Well drained | Well drained |
| Max Erosion Hazard | | Very high | High |
| Seedling Mortality | | Severe | Slight |
| Revegetating Exposed Subsoil | | Severe | Slight |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | | <br>Not capable<br>Not rated | <br>5,6 P<br>Not rated |
| Soil Manageability<br>Group<br>Class | | <br>IV<br>4Ep | <br>IV<br>4Ep |

Inclusions: Included in this unit are small areas of Aldi, Fugawee, and Fugawee Variant soils, and gullied land. Included areas make up about 30 percent of the total area.

Management Considerations: Very steep slopes. Relatively short growing season. Franktown soils are shallow to bedrock, have high amounts of rock fragments, reach field capacity rapidly, and can produce surface runoff. Kyburz soils are moderately deep and have a thin surface layer. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

## RCG Rock outcrop-Chawanakee-Chaix complex, 50 top 75 percent slopes

Elevation: 2,000 to 5,000 feet  Annual Precipitation: 40 to 60 inches

Typical Vegetation: Barren-Mixed conifer series.

| Soil Map Unit Components | Rock outcrop | Chawanakee | Chaix |
|---|---|---|---|
| Proportion (percent) | 55 | 20 | 15 |
| **Soil Profile Description** | | | |
| Surface Layer | Granitic rock. | 0 to 5 inches; grayish brown coarse sandy loam; weak granular structure; slightly acid. | 0 to 9 inches; grayish brown coarse sandy loam; weak granular structure; slightly acid. |
| Subsoil | | 5 to 15 inches; very pale brown coarse sandy loam; massive; strongly acid. | 9 to 29 inches; very pale brown coarse sandy loam; weak subangular blocky structure; slightly acid. |
| Substratum | | 15 inches; highly weathered granodiorite. | 29 inches; weathered granodiorite. |
| **Soil Properties & Management Interpretations** | | | |
| Effective Rooting Depth (inches) | | 12 to 20 | 20 to 40 |
| Available Water Capacity Class | | Very low | Very low to low |
| AWC for top 20" | | 1.2-2.0 | 1.6-2.6 |
| Permeability: Subsoil<br>Substratum | | Moderately rapid<br>Moderately slow | Moderately rapid<br>Moderately slow |
| Drainage Class | | Somewhat excessively drained | Well drained |
| Max Erosion Hazard | | Very high | High |
| Seedling Mortality | | Severe | Severe to slight |
| Revegetating Exposed Subsoil | | Severe | Slight |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | | <br>7 P<br>Not rated | <br>5 P<br>Not rated |
| Soil Manageability Group<br>Class | | IV<br>4Ep | IV<br>4Ep |

Inclusions: Included in this unit are small areas of Hotaw soils. Included areas make up about 10 percent of the total area.

Management Considerations: Very steep slopes. Chawanakee soils are shallow, have coarse textures, a thin surface layer, and a relatively low cation exchange capacity. These soils reach field capacity rapidly and can produce surface runoff. Chaix soils are moderately deep, have coarse textures, a thin surface layer, and a relatively low cation exchange capacity. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

## RDE Rock outcrop-Dubakella-Dubakella Variant complex, 2 to 40 percent slopes

Elevation: 2,500 to 4,500 feet  Annual Precipitation: 40 to 60 inches

Typical Vegetation: Manzanita-Jeffrey pine series; Barren-Manzanita series.

| Soil Map Unit Components | Rock outcrop | Dubakella | Dubakella Variant |
|---|---|---|---|
| Proportion (percent) | 45 | 25 | 15 |
| **Soil Profile Description** | | | |
| Surface Layer | Serpentinitic rock. | 0 to 3 inches; dark red loam; moderate granular structure; slightly acid. | 0 to 5 inches; brown gravelly loam; strong granular structure; slightly acid. |
| Subsoil | | 3 to 32 inches; yellowish red very cobbly clay loam; massive; mildly alkaline. | 5 to 13 inches; brown very cobbly clay loam; strong subangular blocky structure; neutral. |
| Substratum | | 32 inches; serpentinitic bedrock. | 13 inches; fractured serpentinitic rock. |
| **Soil Properties & Management Interpretations** | | | |
| Effective Rooting Depth (inches) | | 20 to 40 | 12 to 20 |
| Available Water Capacity Class | | Low | Very low |
| AWC for top 20" | | 2.3-2.6 | 1.3-1.6 |
| Permeability: Subsoil<br>Substratum | | Slow<br>Slow | Moderately slow<br>Very slow |
| Drainage Class | | Well drained | Well drained |
| Max Erosion Hazard | | High | High |
| Seedling Mortality | | Moderate | Severe |
| Revegetating Exposed Subsoil | | Severe | Severe |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | | <br>5 P<br>70 to 120 | <br>Not capable<br>20 to 80 |
| Soil Manageability Group<br>Class | | <br>II<br>2ep | <br>II<br>2ep |

Inclusions: Included in this unit are small areas of Forbes soils, soils similar to Dubakella but with a thick dark surface layer, and moderately deep loamy soils with a high amount of rock fragments. Included areas make up about 15 percent of the total area.

Management Considerations: Low fertility due to the serpentitic nature of the parent material, thin surface layers, and a high amount of rock fragments. Dubakella soils are moderately deep and have a low subsoil strength when wet. Dubakella Variant soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

## RDG Rock outcrop-Dubakella-Dubakella Variant complex, 40 to 75 percent slopes

Elevation: 2,500 to 4,500 feet  Annual Precipitation: 40 to 60 inches

Typical Vegetation: Manzanita-Jeffrey pine series; Barren-Manzanita series.

| Soil Map Unit Components | Rock outcrop | Dubakella | Dubakella Variant |
|---|---|---|---|
| Proportion (percent) | 45 | 25 | 15 |
| **Soil Profile Description** | | | |
| Surface Layer | Serpentinitic rock. | 0 to 3 inches; dark red loam; moderate granular structure; slightly acid. | 0 to 5 inches; brown gravelly loam; strong granular structure; slightly acid. |
| Subsoil | | 3 to 32 inches; yellowish red very cobbly clay loam; massive; mildly alkaline. | 5 to 13 inches; brown very cobbly clay loam; strong subangular blocky structure; neutral. |
| Substratum | | 32 inches; serpentinitic bedrock. | 13 inches; fractured serpentinitic rock. |
| **Soil Properties & Management Interpretations** | | | |
| Effective Rooting Depth (inches) | | 20 to 40 | 12 to 20 |
| Available Water Capacity Class | | Low | Very low |
| AWC for top 20" | | 2.3-2.6 | 1.3-1.6 |
| Permeability: Subsoil | | Slow | Moderately slow |
| Substratum | | Slow | Very slow |
| Drainage Class | | Well drained | Well drained |
| Max Erosion Hazard | | High | High |
| Seedling Mortality | | Moderate | Severe |
| Revegetating Exposed Subsoil | | Severe | Severe |
| Soil Productivity | | | |
| Forest Survey Site Class | | 5 P | Not capable |
| Annual Forage (lbs/acre) | | Not rated | Not rated |
| Soil Manageability | | | |
| Group | | IV | IV |
| Class | | 4Ep | 4Ep |

Inclusions: Included in this unit are small areas soils similar to Dubakella but with a thick dark surface layer, moderately deep soils with a high amount of rock fragments, and shallow dark colored loamy soils with a high amount of rock fragments in the vicinity of Goodyears Bar to Poker Flat. Included areas make up about 15 percent of the total area.

Management Considerations: Steep and very steep slopes. Low fertility due to the serpentitic nature of the parent material, thin surface layers, and a high amount of rock fragments. Dubakella soils are moderately deep and have a low subsoil strength when wet. Dubakella Variant soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

## RPE Rock outcrop, granitic-Putt complex, 2 to 30 percent slopes

Elevation: 4,000 to 6,000 feet  Annual Precipitation: 50 to 70 inches

| | | |
|---|---|---|
| Typical Vegetation | Barren-Mixed conifer series; Barren-Mixed brush series. | |
| Soil Map Unit Components | **Rock outcrop, granitic** | **Putt** |
| Proportion (percent) | 60 | 25 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | Granitic rock. | 0 to 20 inches; dark grayish brown very cobbly sandy loam; moderate granular structure; slightly acid. |
| Subsoil | | 20 to 55 inches; pale yellow very cobbly sandy loam; weakly cemented with silica. |
| Substratum | | |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | granitic | 20 to 34 |
| Available Water Capacity Class | | Very low |
| AWC for top 20" | | 0.9-1.1 |
| Permeability: Subsoil<br>Substratum | | Moderately rapid<br>Very slow |
| Drainage Class | | Well drained |
| Max Erosion Hazard | | High |
| Seedling Mortality | | Severe |
| Revegetating Exposed Subsoil | | Moderate |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | | <br>4 P<br>120 to 170 |
| Soil Manageability<br>Group<br>Class | | <br>IV<br>4ePX |

Inclusions: Included in this unit are small areas of Zeibright soils; shallow loamy soils with a high amount of rock fragments; and areas where Rock outcrop is gabbro. Included areas make up about 15 percent of the total area.

Management Considerations: Putt soils are moderately deep to a root restricting pan and have a high amount of rock fragments. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils.

## RPG Rock outcrop, granitic-Putt complex, 30 to 75 percent slopes

Elevation: 4,000 to 6,000 feet  Annual Precipitation: 50 to 70 inches

Typical Vegetation: Barren-Mixed conifer series; Barren-Mixed brush series.

| Soil Map Unit Components | Rock outcrop, granitic | Putt |
|---|---|---|
| Proportion (percent) | 60 | 25 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | Granitic rock. | 0 to 20 inches; dark grayish brown very cobbly sandy loam; moderate granular structure; slightly acid. |
| Subsoil | | 20 to 55 inches; pale yellow very cobbly sandy loam; weakly cemented with silica. |
| Substratum | | |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | granitic | 20 to 34 |
| Available Water Capacity Class | | Very low |
| AWC for top 20" | | 0.9-1.1 |
| Permeability: Subsoil<br>Substratum | | Moderately rapid<br>Very slow |
| Drainage Class | | Well drained |
| Max Erosion Hazard | | High |
| Seedling Mortality | | Severe |
| Revegetating Exposed Subsoil | | Moderate |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | | <br>4 P<br>120 to 170 |
| Soil Manageability Group<br>Class | | <br>IV<br>4EPX |

Inclusions: Included in this unit are small areas of Zeibright soils; shallow laomy soils with a high amount of rock fragments; areas where Rock outcrop is gabbro; and soils similar to Zeibright but are sandy with high amounts of rock fragments. Included areas make up about 15 percent of the total area.

Management Considerations: Steep and very steep slopes. Putt soils are moderately deep to a root restricting pan and have a high amount of rock fragments. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils.

## RRG Rock outcrop, granitic-Tinker complex, 30 to 75 percent slopes

Elevation: 6,000 to 8,600 feet  Annual Precipitation: 50 to 80 inches

| | | |
|---|---|---|
| Typical Vegetation | Barren-Mixed conifer series; Barren-Red fir series. | |
| Soil Map Unit Components | **Rock outcrop, granitic** | **Tinker** |
| Proportion (percent) | 60 | 20 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | Glaciated granitic rock. | 0 to 21 inches; brown cobbly loam; weak granular structure; medium acid. |
| Subsoil | | 21 to 33 inches; reddish brown very cobbly loam; massive; slightly acid. |
| Substratum | | 33 inches; pale olive cobbly coarse sandy loam; weakly cemented with silica. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | granitic | 22 to 40 |
| Available Water Capacity Class | | Very low |
| AWC for top 20" | | 1.4-1.6 |
| Permeability: Subsoil | | Moderately rapid |
| Substratum | | Very slow |
| Drainage Class | | Well drained |
| Max Erosion Hazard | | High |
| Seedling Mortality | | Severe to moderate |
| Revegetating Exposed Subsoil | | Moderate |
| Soil Productivity | | |
| Forest Survey Site Class | | 5 RF, LP |
| Annual Forage (lbs/acre) | | 270 to 380 |
| Soil Manageability | | |
| Group | | IV |
| Class | | 4Epx |

Inclusions

Included in this unit are small areas of Smokey and Tallac soils; sandy soils similar to Tinker with high amounts of rock fragments; soils similar to Tinker but with a surface layer less than 20 inches thick; and shallow loamy soils with a high amount of rock fragments. Included areas make up about 20 percent of the total area.

Management Considerations

Steep and very steep slopes. Tinker soils are moderately deep to a root resticting pan, have a high amount of rock fragments, and the subsoil remains moist above the pan during most of the growing season. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils.

## RSE Rock outcrop, granitic-Tinker-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,000 feet  Annual Precipitation: 60 to 80 inches

Typical Vegetation: Barren-Red fir/Hemlock series.

| Soil Map Unit Components | Rock outcrop, granitic | Tinker | Cryumbrepts, wet |
|---|---|---|---|
| Proportion (percent) | 45 | 30 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | Glaciated granitic rock. | 0 to 21 inches; brown cobbly loam; weak granular structure; medium acid. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | | 21 to 33 inches; reddish brown very cobbly loam; massive; slightly acid. | |
| Substratum | | 33 inches; pale olive cobbly coarse sandy loam; weakly cemented with silica. | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | granitic | 22 to 40 | Variable |
| Available Water Capacity Class | | Very low | Very low |
| AWC for top 20" | | 1.4-1.6 | |
| Permeability: Subsoil | | Moderately rapid | Moderately rapid |
| Substratum | | Very slow | Very slow |
| Drainage Class | | Well drained | Poorly drained |
| Max Erosion Hazard | | High | Very high |
| Seedling Mortality | | Severe to moderate | Severe |
| Revegetating Exposed Subsoil | | Moderate | Severe |
| Soil Productivity | | | |
| Forest Survey Site Class | | 5 RF, LP | Not capable |
| Annual Forage (lbs/acre) | | 270 to 380 | 170 to 640 |
| Soil Manageability | | | |
| Group | | III | III |
| Class | | 3epX | 4EW |

Inclusions: Included in this unit are small areas of Tallac soils; soils similar to Tinker but with a surface layer less than 20 inches thick; and shallow loamy soils with a high amount of rock fragments. Included areas make up about 10 percent of the total area.

Management Considerations: Tinker soils are moderately deep to a root resticting pan, have a high amount of rock fragments, and the subsoil remains moist above the pan during most of the growing season. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils.

## RSG Rock outcrop, granitic-Tinker-Cryumbrepts, wet complex, 30 to 75 percent slopes

Elevation: 6,000 to 8,000 feet  Annual Precipitation: 60 to 80 inches

| | | | |
|---|---|---|---|
| Typical Vegetation | Barren-Red fir/Hemlock series. | | |
| Soil Map Unit Components | **Rock outcrop, granitic** | **Tinker** | **Cryumbrepts, wet** |
| Proportion (percent) | 55 | 25 | 10 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | Glaciated granitic rock. | 0 to 21 inches; brown cobbly loam; weak granular structure; medium acid. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | | 21 to 33 inches; reddish brown very cobbly loam; massive; slightly acid. | |
| Substratum | | 33 inches; pale olive cobbly coarse sandy loam; weakly cemented with silica. | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | granitic | 22 to 40 | Variable |
| Available Water Capacity Class | | Very low | Very low |
| AWC for top 20" | | 1.4-1.6 | |
| Permeability: Subsoil<br>Substratum | | Moderately rapid<br>Very slow | Moderately rapid<br>Very slow |
| Drainage Class | | Well drained | Poorly drained |
| Max Erosion Hazard | | High | Very high |
| Seedling Mortality | | Severe to moderate | Severe |
| Revegetating Exposed Subsoil | | Moderate | Severe |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | | <br>5 RF, LP<br>270 to 380 | <br>Not capable<br>170 to 640 |
| Soil Manageability<br>Group<br>Class | | <br>IV<br>4EpX | <br>IV<br>4EW |

Inclusions

Included in this unit are small areas of Tallac soils and shallow loamy soils with a high amount of rock fragments. Included areas make up about 10 percent of the total area.

Management Considerations

Steep and very steep slopes. Tinker soils are moderately deep to a root resticting pan, have a high amount of rock fragments, and the subsoil remains moist above the pan during most of the growing season. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils.

## RTG Rock outcrop-Toiyabe complex, 50 to 75 percent slopes

Elevation: 5,000 to 6,200 feet  Annual Precipitation: 20 to 40 inches

| | | |
|---|---|---|
| Typical Vegetation | Mixed brush-Barren series; Barren-Mixed brush series. | |
| Soil Map Unit Components | **Rock outcrop** | **Toiyabe** |
| Proportion (percent) | 55 | 35 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | Granitic rock. | 0 to 8 inches; grayish brown gravelly loamy coarse sand; single grained; slightly acid. |
| Subsoil | | 8 to 16 inches; pale brown cobbly loamy coarse sand; single grained; strongly acid. |
| Substratum | | 16 inches; highly weathered granitic rock. |

### Soil Properties & Management Interpretations

| | |
|---|---|
| Effective Rooting Depth (inches) | 10 to 20 |
| Available Water Capacity Class | Very low |
| AWC for top 20" | 0.8-1.0 |
| Permeability: Subsoil<br>Substratum | Rapid<br>Moderate |
| Drainage Class | Somewhat excessively drained |
| Max Erosion Hazard | Very high |
| Seedling Mortality | Severe |
| Revegetating Exposed Subsoil | Severe |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>6 P<br>60 to 120 |
| Soil Manageability<br>Group<br>Class | <br>IV<br>4EP |

Inclusions: Included in this unit are small areas of Tallac and Tinker soils. Included areas make up about 10 percent of the total area.

Management Considerations: Very steep slopes. Toiyabe soils are sandy, have a thin surface layer, and a low cation exchange capacity. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

## RUG Rock outcrop-Woodseye Variant-Umpa complex, 30 to 75 percent slopes

Elevation: 7,000 to 8,500 feet  Annual Precipitation: 35 to 45 inches

Typical Vegetation: Barren-Mixed brush series; Barren-Mixed conifer series.

| Soil Map Unit Components | Rock outcrop | Woodseye Variant | Umpa |
|---|---|---|---|
| Proportion (percent) | 40 | 35 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | Volcanic rock. | 0 to 14 inches; grayish brown very gravelly sandy loam; moderate granular structure; slightly acid. | 0 to 8 inches; dark brown stony sandy loam; weak granular structure; medium acid. |
| Subsoil | | | 8 to 24 inches; pale brown very gravelly sandy loam; weak subangular blocky structure; medium acid. |
| Substratum | | 14 inches; hard volcanic rock. | 24 inches; weathered coarse grained andesite. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 12 to 20 | 20 to 40 |
| Available Water Capacity Class | Very low | Very low |
| AWC for top 20" | 0.6-1.0 | 1.2-1.9 |
| Permeability: Subsoil | Moderately rapid | Moderately rapid |
| Substratum | Moderate | Moderate |
| Drainage Class | Well drained | Well drained |
| Max Erosion Hazard | High | High |
| Seedling Mortality | Severe | Severe to moderate |
| Revegetating Exposed Subsoil | Severe | Moderate |
| Soil Productivity | | |
| Forest Survey Site Class | Not capable | 5 RF, WF |
| Annual Forage (lbs/acre) | 60 to 160 | 60 to 160 |
| Soil Manageability | | |
| Group | IV | IV |
| Class | 4EP | 4EpX |

Inclusions: Included in this unit are small areas of Meiss and Waca soils. Included areas make up about 10 percent of the total area.

Management Considerations: Steep and very steep slopes. High amounts of rock fragments. Woodseye Variant soils are shallow to hard bedrock and have a thin surface layer. They reach field capacity rapidly and can produce surface runoff. Umpa soils are moderately deep, have coarse textures, a relatively low cation exchange capacity, and a thin stony surface layer. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

## RVE Rock outcrop-Waca, rhyolitic substratum-Ledmount Variant complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,000 feet  Annual Precipitation: 50 to 70 inches

Typical Vegetation: Barren-Mixed brush series; Barren-Red fir series.

| Soil Map Unit Components | Rock outcrop | Waca, rhyolitic substratum | Ledmount Variant |
|---|---|---|---|
| Proportion (percent) | 50 | 20 | 15 |
| **Soil Profile Description** | | | |
| Surface Layer | Rhyolitic rock bluffs. | 0 to 14 inches; dark grayish brown very gravelly sandy loam; weak granular structure; slightly acid. | 0 to 19 inches; dark grayish brown very gravelly sandy loam; weak granular structure; slightly acid. |
| Subsoil | | 14 to 32 inches; brown very gravelly sandy loam; weak subangular blocky structure; slightly acid. | |
| Substratum | | 32 inches; weathered rhyolitic tuff. | 19 inches; hard rhyolitic rock. |
| **Soil Properties & Management Interpretations** | | | |
| Effective Rooting Depth (inches) | | 20 to 40 | 11 to 19 |
| Available Water Capacity Class | | Low | Very low |
| AWC for top 20" | | 2.1-2.3 | 1.4-1.6 |
| Permeability: Subsoil<br>Substratum | | Moderately rapid<br>Moderately slow | Moderately rapid<br>Slow |
| Drainage Class | | Well drained | Well drained |
| Max Erosion Hazard | | Moderate | Moderate |
| Seedling Mortality | | Moderate to slight | Severe |
| Revegetating Exposed Subsoil | | Slight | Severe |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | | <br>4,5 RF, WF<br>60 to 140 | <br>Not capable<br>160 to 270 |
| Soil Manageability<br>Group<br>Class | | <br>II<br>2ep | <br>II<br>2ep |

Inclusions: Included in this unit are small areas of Ahart and Tinker soils. Included areas make up about 15 percent of the total area.

Management Considerations: High amounts of rock fragments. Waca, rhyolitic substratum soils are moderately deep. Ledmount Variant soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

## RWG Rock outcrop-Waca-Meiss association, 50 to 75 percent slopes

Elevation: 7,000 to 9,000 feet  Annual Precipitation: 50 to 60 inches

Typical Vegetation: Barren-Red fir series; Wyethia series.

| Soil Map Unit Components | Rock outcrop | Waca | Miess |
|---|---|---|---|
| Proportion (percent) | 40 | 30 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | Volcanic rock. | 0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid. | 0 to 19 inches; brown sandy loam; moderate granular structure; neutral. |
| Subsoil | | 12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid. | |
| Substratum | | 32 inches; weathered andesitic tuff breccia. | 19 inches; hard volcanic rock. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | | 20 to 40 | 12 to 20 |
| Available Water Capacity Class | | Low | Very low |
| AWC for top 20" | | 2.1-2.3 | 2.6-2.9 |
| Permeability: Subsoil | | Moderately rapid | Moderately rapid |
| Substratum | | Slow | Very slow |
| Drainage Class | | Well drained | Somewhat excessively drained |
| Max Erosion Hazard | | High | High |
| Seedling Mortality | | Moderate to slight | Slight |
| Revegetating Exposed Subsoil | | Slight | Severe |
| Soil Productivity | | | |
| Forest Survey Site Class | | 4,5 RF, WF | Not capable |
| Annual Forage (lbs/acre) | | Not rated | Not rated |
| Soil Manageability | | | |
| Group | | IV | IV |
| Class | | 4Ep | 4Ed |

Inclusions: Included in this unit are small areas of gullied land. Included areas make up about 15 percent of the total area.

Management Considerations: Very steep slopes. Waca soils are moderately deep, have a high amount of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum. Meiss soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

## SIE Sierraville-Trojan-Kyburz complex, 2 to 30 percent slopes

Elevation: 5,500 to 6,400 feet  Annual Precipitation: 20 to 40 inches

| | | | |
|---|---|---|---|
| Typical Vegetation | Mixed conifer series. | | |
| Soil Map Unit Components | **Sierraville** | **Trojan** | **Kyburz** |
| Proportion (percent) | 45 | 25 | 20 |
| **Soil Profile Description** | | | |
| Surface Layer | 0 to 9 inches; reddish brown stony sandy loam; moderate granular structure; slightly acid. | 0 to 10 inches; dark brown gravelly sandy loam; weak platy structure; slightly acid. | 0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid. |
| Subsoil | 9 to 75 inches; weak red clay; moderate angular blocky structure; medium acid. | 10 to 67 inches; brown and light brown clay loam; moderate angular blocky structure; medium acid. | 6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid. |
| Substratum | 75 inches; slightly weathered andesite. | 67 inches; slightly fractured andesite. | 34 inches; weathered andesitic rock. |
| **Soil Properties & Management Interpretations** | | | |
| Effective Rooting Depth (inches) | 40 to 80 | 40 to 80 | 20 to 40 |
| Available Water Capacity Class | Low to high | Low to moderate | Low |
| AWC for top 20" | 2.4-2.8 | 1.8-2.5 | 2.2-2.7 |
| Permeability: Subsoil | Moderately slow | Moderately slow | Moderately slow |
| Substratum | Moderately slow | Moderately slow | Moderately slow |
| Drainage Class | Well drained | Well drained | Well drained |
| Max Erosion Hazard | High | High | High |
| Seedling Mortality | Slight | Moderate to slight | Slight |
| Revegetating Exposed Subsoil | Slight | Slight | Slight |
| Soil Productivity | | | |
| Forest Survey Site Class | 4,5 P, WF | 4,5 P, WF | 5,6 P, WF |
| Annual Forage (lbs/acre) | 120 to 190 | 190 to 250 | 120 to 190 |
| Soil Manageability | | | |
| Group | III | III | III |
| Class | 3eX | 2ep | 2ep |

Inclusions: Included in this unit are small areas of Sattley soils and Rock outcrop. Included areas make up about 10 percent of the total area.

Management Considerations: Relatively short growing season. Sierraville soils have surface stones and a subsoil with low strength when wet. Kyburz soils are moderately deep and have a thin surface layer.

## SKE Sites-Jocal complex, 2 to 30 percent slopes

Elevation: 2,000 to 4,000 feet  Annual Precipitation: 50 to 70 inches

| | | |
|---|---|---|
| Typical Vegetation | Mixed conifer-Mixed hardwood series. | |
| Soil Map Unit Components | **Sites** | **Jocal** |
| Proportion (percent) | 55 | 35 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | 0 to 9 inches; reddish brown clay loam; moderate subangular blocky structure; slightly acid. | 0 to 18 inches; reddish brown loam; weak granular structure; slightly acid. |
| Subsoil | 9 to 45 inches; yellowish red gravelly clay; strong subangular blocky structure; medium acid. | 18 to 70 inches; reddish yellow silty clay loam; moderate angular blocky structure; strongly acid. |
| Substratum | 45 inches; weathered metasedimentary rock. | 70 inches; weathered slate and shale. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 40 to 65 | 40 to 70 |
| Available Water Capacity Class | Low to moderate | Low to high |
| AWC for top 20" | 2.6-3.1 | 2.4-3.1 |
| Permeability: Subsoil<br>Substratum | Moderately slow to slow<br>Slow | Moderately slow<br>Moderately slow |
| Drainage Class | Well drained | Well drained |
| Max Erosion Hazard | High | Moderate |
| Seedling Mortality | Moderate to slight | Slight |
| Revegetating Exposed Subsoil | Slight | Slight |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>1,2 DF, P<br>240 to 640 | <br>1,2 DF, P<br>240 to 640 |
| Soil Manageability Group<br>Class | <br>II<br>2e | <br>II<br>2e |

Inclusions: Included in this unit are small areas of Boomer and Mariposa soils and moderately deep loamy soils without a clay increase in the subsoil and with a high amount of rock fragments. Included areas make up about 10 percent of the total area.

Management Considerations: Sites soils have low subsoil strength when wet.

## SKE5 Sites-Jocal complex, 2 to 30 percent slopes, altered

Elevation: 2,000 to 4,000 feet  Annual Precipitation: 60 to 70 inches

| | | |
|---|---|---|
| Typical Vegetation | Grass series; Plantation. | |
| Soil Map Unit Components | **Sites, altered** | **Jocal, altered** |
| Proportion (percent) | 55 | 40 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | 0 to 4 inches; dark reddish brown loam; moderate granular structure; slightly acid. | 0 to 9 inches; reddish brown loam; weak granular structure; slightly acid. |
| Subsoil | 4 to 43 inches; reddish yellow cobbly clay; massive; medium acid. | 9 to 50 inches; reddish brown gravelly clay loam; weak subangular blocky structure; medium acid. |
| Substratum | 43 inches; weathered metasedimentary rock. | 50 inches; weathered metasedimentary rock. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 40 to 65 | 40 to 70 |
| Available Water Capacity Class | Low to moderate | Low to moderate |
| AWC for top 20" | 2.7-3.3 | 2.2-3.0 |
| Permeability: Subsoil | Moderately slow to slow | Moderately slow |
| Substratum | Slow | Moderately slow |
| Drainage Class | Well drained | Well drained |
| Max Erosion Hazard | High | High |
| Seedling Mortality | Moderate to slight | Slight to moderate |
| Revegetating Exposed Subsoil | Slight | Slight |
| Soil Productivity | | |
| Forest Survey Site Class | Not rated | Not rated |
| Annual Forage (lbs/acre) | Not rated | Not rated |
| Soil Manageability | | |
| Group | IV | IV |
| Class | 4e | 4e |

Inclusions: Included in this unit are small areas of Mariposa soils. Included areas make up about 5 percent of the total area.

Management Considerations: Surface soils have been disturbed. On-site investigations are needed to determine if corrective treatments are needed. Sites soils have low subsoil strength when wet.

## SKF Sites-Jocal-Mariposa complex, 30 to 50 percent slopes

Elevation: 1,800 to 3,000 feet  Annual Precipitation: 50 to 70 inches

**Typical Vegetation**

Mixed conifer-Mixed hardwood series.

| Soil Map Unit Components | Sites | Jocal | Mariposa |
|---|---|---|---|
| Proportion (percent) | 45 | 25 | 20 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 9 inches; reddish brown clay loam; moderate subangular blocky structure; slightly acid. | 0 to 18 inches; reddish brown loam; weak granular structure; slightly acid. | 0 to 6 inches; dark brown gravelly loam; strong granular structure; neutral. |
| Subsoil | 9 to 45 inches; yellowish red gravelly clay; strong subangular blocky structure; medium acid. | 18 to 70 inches; reddish yellow silty clay loam; moderate angular blocky structure; strongly acid. | 6 to 33 inches; yellowish red gravelly clay loam; massive; strongly acid. |
| Substratum | 45 inches; weathered metasedimentary rock. | 70 inches; weathered slate and shale. | 33 inches; hard and semi-hard metasediments. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | 40 to 65 | 40 to 70 | 15 to 33 |
| Available Water Capacity Class | Low to moderate | Low to high | Low |
| AWC for top 20" | 2.6-3.1 | 2.4-3.1 | 2.2-2.8 |
| Permeability: Subsoil | Moderately slow to slow | Moderately slow | Moderate |
| Substratum | Slow | Moderately slow | Moderately slow |
| Drainage Class | Well drained | Well drained | Well drained |
| Max Erosion Hazard | High | High | High |
| Seedling Mortality | Moderate to slight | Slight | Moderate to slight |
| Revegetating Exposed Subsoil | Slight | Slight | Moderate |
| Soil Productivity | | | |
| Forest Survey Site Class | 1,2 DF, P | 1,2 DF, P | 4,3 P, DF |
| Annual Forage (lbs/acre) | 240 to 640 | 240 to 640 | 120 to 170 |
| Soil Manageability | | | |
| Group | III | III | III |
| Class | 3E | 3E | 3Ep |

**Inclusions**

Included in this unit are small areas of Boomer, Boomer Variant, and Hurlbut soils. Included areas make up about 10 percent of the total area.

**Management Considerations**

Steep slopes. Sites soils have low subsoil strength when wet. Mariposa soils are shallow and moderately deep, and have a thin surface layer. They reach field capacity rapidly and can produce surface runoff.

## SME Smokey-Smokey Variant-Woodseye complex, 2 to 30 percent slopes

Elevation: 5,500 to 7,200 feet  Annual Precipitation: 65 to 75 inches

Typical Vegetation: Mixed conifer-Mixed brush series.

| Soil Map Unit Components | Smokey | Smokey Variant | Woodseye |
|---|---|---|---|
| Proportion (percent) | 45 | 25 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 4 inches; brown gravelly sandy loam; moderate granular structure; strongly acid. | 0 to 3 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid. | 0 to 14 inches; very dark grayish brown very gravelly sandy loam; weak granular structure; medium acid. |
| Subsoil | 4 to 24 inches; light yellowish brown very gravelly loam; weak subangular blocky; very strongly acid. | 3 to 47 inches; yellowish brown very gravelly loam; weak subangular blocky structure; neutral. | 14 to 19 inches; light yellowish brown extremely gravelly loam; massive; slightly acid. |
| Substratum | 24 inches; weathered metasedimentary rock. | 47 inches; highly weathered metasedimentary rock. | 19 inches; hard metasedimentary rock. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | 20 to 40 | 40 to 60 | 9 to20 |
| Available Water Capacity Class | Very low | Very low to low | Very low |
| AWC for top 20" | 1.3-1.8 | 1.3-1.7 | 0.6-0.9 |
| Permeability: Subsoil<br>Substratum | Moderate<br>Slow | Moderate<br>Slow | Moderate<br>Slow |
| Drainage Class | Well drained | Well drained | Somewhat excessively drained |
| Max Erosion Hazard | High | High | High |
| Seedling Mortality | Moderate | Severe | Severe |
| Revegetating Exposed Subsoil | Moderate | Slight | Severe |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>4,5 P, RF<br>100 to 140 | <br>4,5 RF<br>100 to 140 | <br>Not capable<br>160 to 270 |
| Soil Manageability Group<br>Class | II<br>2ep | II<br>2ep | II<br>3eP |

Inclusions: Included in this unit are small areas of Rock outcrop; soils similar to Smokey but with clay loam textures; shallow soils similar to Woodseye but with light colored surface layers; and soils similar to Woodseye but with a paralithic contact. Included areas make up about 15 percent of the total area.

Management Considerations: High amount of rock fragments. Smokey soils are moderately deep and have a thin surface layer. Woodseye soils are shallow to hard bedrock, have a thin surface layer, they reach field capacity rapidly, and can produce surface runoff.

## SMG Smokey-Woodseye-Rock outcrop complex, 30 to 75 percent slopes

Elevation: 5,500 to 7,200 feet  Annual Precipitation: 65 to 75 inches

| | | | |
|---|---|---|---|
| Typical Vegetation | Mixed conifer-Mixed brush series; Red fir-Mixed brush series. | | |
| Soil Map Unit Components | **Smokey** | **Woodseye** | **Rock outcrop** |
| Proportion (percent) | 45 | 20 | 10 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 4 inches; brown gravelly sandy loam; moderate granular structure; strongly acid. | 0 to 14 inches; very dark grayish brown very gravelly sandy loam; weak granular structure; medium acid. | Metasedimentary rock. |
| Subsoil | 4 to 24 inches; light yellowish brown very gravelly loam; weak subangular blocky; very strongly acid. | 14 to 19 inches; light yellowish brown extremely gravelly loam; massive; slightly acid. | |
| Substratum | 24 inches; weathered metasedimentary rock. | 19 inches; hard metasedimentary rock. | |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 20 to 40 | 9 to 20 |
| Available Water Capacity Class | Very low | Very low |
| AWC for top 20" | 1.3-1.8 | 0.6-0.9 |
| Permeability: Subsoil | Moderate | Moderate |
| Substratum | Slow | Slow |
| Drainage Class | Well drained | Somewhat excessively drained |
| Max Erosion Hazard | High | High |
| Seedling Mortality | Moderate | Severe |
| Revegetating Exposed Subsoil | Moderate | Severe |
| Soil Productivity | | |
| Forest Survey Site Class | 4 RF; 5 P | Not capable |
| Annual Forage (lbs/acre) | 100 to 140 | 160 to 270 |
| Soil Manageability | | |
| Group | IV | IV |
| Class | 4Ep | 4EP |

Inclusions

Included in this unit are small areas of Smokey Variant soils; soils similar to Smokey but with clay loam textures; in the Ladies Canyon area, soils similar to Smokey but with a clay accumulation in the subsoil; Cryumbrepts, wet; soils similar to Smokey but with redder colors in the subsoil; and shallow soils similar to Woodseye but with a light colored surface layer. Included areas make up about 25 percent of the total area.

Management Considerations

Steep and very steep slopes. These soils have a thin surface layer and a high amount of rock fragments. Smokey soils are moderately deep. Woodseye soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Concentrated surface runoff from areas of Rock outcrop can increase erosion from adjacent soils. Rock outcrop areas are a potential source of aggregate.

## SOE Smokey-Lorack-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 5,500 to 7,000 feet  Annual Precipitation: 65 to 75 inches

Typical Vegetation: Mixed conifer-Alder/Willow series; Mixed conifer-Mixed brush series; Red fir-Mixed brush series.

| Soil Map Unit Components | Smokey | Lorack | Cryumbrepts, wet |
|---|---|---|---|
| Proportion (percent) | 50 | 20 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 4 inches; brown gravelly sandy loam; moderate granular structure; strongly acid. | 0 to 8 inches; dark brown very gravelly fine sandy loam; weak granular structure; medium acid. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | 4 to 24 inches; light yellowish brown very gravelly loam; weak subangular blocky; very strongly acid. | 8 to 56 inches; yellowish brown extremely gravelly loam; weak subangular blocky structure; strongly acid. | |
| Substratum | 24 inches; weathered metasedimentary rock. | 56 to 75 inches; extremely gravelly sandy loam; weakly cemented; extremely acid. | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | 20 to 40 | 45 to 70 | Variable |
| Available Water Capacity Class | Very low | Very low to low | Very low |
| AWC for top 20" | 1.3-1.8 | 1.0-1.4 | |
| Permeability: Subsoil<br>Substratum | Moderate<br>Slow | Moderate<br>Moderately slow | Moderately rapid<br>Very slow |
| Drainage Class | Well drained | Well drained | Poorly drained |
| Max Erosion Hazard | High | High | Very high |
| Seedling Mortality | Moderate | Severe to moderate | Severe |
| Revegetating Exposed Subsoil | Moderate | Moderate | Severe |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>4,5 RF<br>100 to 140 | <br>2,3 RF<br>140 to 220 | <br>Not capable<br>170 to 640 |
| Soil Manageability<br>Group<br>Class | <br>II<br>2ep | <br>II<br>2ep | <br>II<br>4EW |

Inclusions: Included in this unit are small areas of Tinker and Woodseye soils, and Rock outcrop. Included areas make up about 15 percent of the total area.

Management Considerations: These soils have a high amount of rock fragments. Smokey soils have a thin surface layer. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

## SOF Smokey-Lorack-Cryumbrepts, wet complex, 30 to 50 percent slopes

Elevation: 5,500 to 7,000 feet  Annual Precipitation: 65 to 75 inches

**Typical Vegetation**: Mixed conifer-Alder/Willow series; Mixed conifer-Mixed brush series; Red fir-Mixed brush series.

| Soil Map Unit Components | Smokey | Lorack | Cryumbrepts, wet |
|---|---|---|---|
| Proportion (percent) | 50 | 20 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 4 inches; brown gravelly sandy loam; moderate granular structure; strongly acid. | 0 to 8 inches; dark brown very gravelly fine sandy loam; weak granular structure; medium acid. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | 4 to 24 inches; light yellowish brown very gravelly loam; weak subangular blocky; very strongly acid. | 8 to 56 inches; yellowish brown extremely gravelly loam; weak subangular blocky structure; strongly acid. | |
| Substratum | 24 inches; weathered metasedimentary rock. | 56 to 75 inches; extremely gravelly sandy loam; weakly cemented; extremely acid. | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | 20 to 40 | 45 to 70 | Variable |
| Available Water Capacity Class | Very low | Very low to low | Very low |
| AWC for top 20" | 1.3-1.8 | 1.0-1.4 | |
| Permeability: Subsoil | Moderate | Moderate | Moderately rapid |
| Substratum | Slow | Moderately slow | Very slow |
| Drainage Class | Well drained | Well drained | Poorly drained |
| Max Erosion Hazard | High | High | Very high |
| Seedling Mortality | Moderate | Severe to moderate | Severe |
| Revegetating Exposed Subsoil | Moderate | Moderate | Severe |
| Soil Productivity | | | |
| Forest Survey Site Class | 4,5 RF | 2,3 RF | Not capable |
| Annual Forage (lbs/acre) | 100 to 140 | 140 to 220 | 170 to 640 |
| Soil Manageability | | | |
| Group | III | III | III |
| Class | 3Ep | 3Ep | 4EW |

**Inclusions**: Included in this unit are small areas of Tinker and Woodseye soils, and Rock outcrop. Included areas make up about 15 percent of the total area.

**Management Considerations**: Steep slopes. These soils have a high amount of rock fragments. Smokey soils have a thin surface layer. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

## SPG Smokey-Rock outcrop, metamorphic-Rubble land complex, 30 to 75 percent slopes

Elevation: 5,500 to 7,000 feet  Annual Precipitation: 65 to 75 inches

Typical Vegetation: Mixed brush-Mixed conifer series; Mixed brush-Barren series; Mixed brush-Red fir series.

| Soil Map Unit Components | Smokey | Rock outcrop, metamorphic | Rubble land |
|---|---|---|---|
| Proportion (percent) | 45 | 25 | 20 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 4 inches; brown gravelly sandy loam; moderate granular structure; strongly acid. | Metamorphic rock. | Angular stones and cobbles with some soil material between rock fragments. |
| Subsoil | 4 to 24 inches; light yellowish brown very gravelly loam; weak subangular blocky; very strongly acid. | | |
| Substratum | 24 inches; weathered metasedimentary rock. | | |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 20 to 40 | metamorphic |
| Available Water Capacity Class | Very low | |
| AWC for top 20" | 1.3-1.8 | |
| Permeability: Subsoil | Moderate | |
| Substratum | Slow | |
| Drainage Class | Well drained | |
| Max Erosion Hazard | High | |
| Seedling Mortality | Moderate | |
| Revegetating Exposed Subsoil | Moderate | |
| Soil Productivity | | |
| Forest Survey Site Class | 4,5 RF | |
| Annual Forage (lbs/acre) | 100 to 140 | |
| Soil Manageability | | |
| Group | IV | |
| Class | 4Ep | |

Inclusions: Included in this unit are small areas of Lorack and Woodseye soils. Included areas make up about 10 percent of the total area.

Management Considerations: Steep and very steep slopes. Smokey soils are moderately deep, have a high amount of rock fragments, and a thin surface layer. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rubble land areas have a potential for raveling. Rubble land and Rock outcrop areas are a potential source of aggregate.

## STE Rubble land-Jorge complex, 2 to 30 percent slopes

Elevation: 6,000 to 9,000 feet  Annual Precipitation: 35 to 45 inches

Typical Vegetation: Barren-Red fir series; Barren-Mixed conifer series.

| Soil Map Unit Components | Rubble land | Jorge |
|---|---|---|
| Proportion (percent) | 60 | 30 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | Angular stones and cobbles with some soil material between rock fragments. | 0 to 13 inches; brown sandy loam; weak granular structure; slightly acid. |
| Subsoil | | 13 to 41 inches; brown very cobbly sandy loam; weak subangular blocky structure; medium acid. |
| Substratum | | 41 to 47 inches; brown very cobbly sandy loam; massive; strongly acid. |

### Soil Properties & Management Interpretations

| | |
|---|---|
| Effective Rooting Depth (inches) | 40 to 60 |
| Available Water Capacity Class | Very low to low |
| AWC for top 20" | 1.7-1.8 |
| Permeability: Subsoil | Moderate |
| Substratum | Moderate |
| Drainage Class | Well drained |
| Max Erosion Hazard | High |
| Seedling Mortality | Moderate |
| Revegetating Exposed Subsoil | Slight |
| Soil Productivity | |
| Forest Survey Site Class | 4 RF, WF |
| Annual Forage (lbs/acre) | 100 to 140 |
| Soil Manageability Group | II |
| Class | 2p |

Inclusions: Included in this unit are small areas of Fugawee soils and Rock outcrop. Included areas make up about 10 percent of the total area.

Management Considerations: Jorge soils have coarse textures and a high amount of rock fragments. Rubble land areas are a potential source of aggregate.

## STG Rubble land-Jorge complex, 30 to 75 percent slopes

Elevation: 6,000 to 9,000 feet  Annual Precipitation: 35 to 45 inches

Typical Vegetation: Barren-Red fir series; Barren-Mixed conifer series.

| Soil Map Unit Components | Rubble land | Jorge |
|---|---|---|
| Proportion (percent) | 60 | 25 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | Angular stones and cobbles with some soil material between rock fragments. | 0 to 13 inches; brown sandy loam; weak granular structure; slightly acid. |
| Subsoil | | 13 to 41 inches; brown very cobbly sandy loam; weak subangular blocky structure; medium acid. |
| Substratum | | 41 to 47 inches; brown very cobbly sandy loam; massive; strongly acid. |

### Soil Properties & Management Interpretations

| | |
|---|---|
| Effective Rooting Depth (inches) | 40 to 60 |
| Available Water Capacity Class | Very low to low |
| AWC for top 20" | 1.7-1.8 |
| Permeability: Subsoil | Moderate |
| Substratum | Moderate |
| Drainage Class | Well drained |
| Max Erosion Hazard | High |
| Seedling Mortality | Moderate |
| Revegetating Exposed Subsoil | Moderate |
| Soil Productivity | |
| Forest Survey Site Class | 4 RF, WF |
| Annual Forage (lbs/acre) | 100 to 140 |
| Soil Manageability | |
| Group | IV |
| Class | 4ep |

Inclusions: Included in this unit are small areas of Fugawee soils and Rock outcrop. Included areas make up about 15 percent of the total area.

Management Considerations: Steep and very steep slopes. Jorge soils have coarse textures and a high amount of rock fragments. Rubble land areas are a potential source of aggregate. Areas of Rubble land have a potential for raveling.

## SUG Rubble land-Rock outcrop complex

Elevation: 6,000 to 9,000 feet  Annual Precipitation: 35 to 45 inches

Typical Vegetation: Barren-Mixed conifer series.

| Soil Map Unit Components | Rubble land | Rock outcrop |
|---|---|---|
| Proportion (percent) | 65 | 30 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | Angular stones and cobbles with some soil material between rock fragments. | Volcanic rock. |
| Subsoil | | |
| Substratum | | |

### Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

Available Water Capacity Class

AWC for top 20"

Permeability: Subsoil
Substratum

Drainage Class

Max Erosion Hazard

Seedling Mortality

Revegetating Exposed Subsoil

Soil Productivity
Forest Survey Site Class
Annual Forage (lbs/acre)

Soil Manageability Group
Class

Inclusions: Included in this unit are small areas of Jorge soils. Included areas make up about 5 percent of the total area.

Management Considerations: Steep and very steep slopes (30 to 75 percent). Areas of Rubble land are a potential source of aggregate and have a potential for raveling. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Areas of Rock outcrop are a potential source of aggregate.

## TAE Tallac very gravelly sandy loam, 2 to 30 percent slopes

Elevation: 5,500 to 9,000 feet  Annual Precipitation: 40 to 80 inches

| | |
|---|---|
| Typical Vegetation | Mixed conifer series; Red fir series. |
| Soil Map Unit Components | **Tallac very gravelly sandy loam** |
| Proportion (percent) | 85 |

### Soil Profile Description

| | |
|---|---|
| Surface Layer | 0 to 22 inches; very dark gray very gravelly sandy loam; moderate granular structure; medium acid. |
| Subsoil | 22 to 41 inches; pale brown extremely gravelly loam; massive; slightly acid. |
| Substratum | 41 inches; light yellowish brown weakly cemented till. |

### Soil Properties & Management Interpretations

| | |
|---|---|
| Effective Rooting Depth (inches) | 40 to 60 |
| Available Water Capacity Class | Very low |
| AWC for top 20" | 0.9-1.4 |
| Permeability: Subsoil<br>Substratum | Moderately rapid<br>Very slow |
| Drainage Class | Moderately well drained |
| Max Erosion Hazard | High |
| Seedling Mortality | Severe to moderate |
| Revegetating Exposed Subsoil | Moderate |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>3,4 RF, WF<br>100 to 180 |
| Soil Manageability Group<br>Class | <br>III<br>3eP |
| Inclusions | Included in this unit are small areas of Celio and Tinker soils; soils similar to Tallac with a surface layer less than 20 inches thick; soils similar to Tallac but without high amounts of rock fragments; and soils that are deep, loamy, and have thin or light colored surface layers. Included areas make up about 15 percent of the total area. |
| Management Considerations | Tallac soils have coarse textures, a high amount of rock fragments, and a relatively low cation exchange capacity. |

## TAF Tallac very gravelly sandy loam, 30 to 50 percent slopes

Elevation: 5,500 to 9,000 feet  Annual Precipitation: 40 to 80 inches

| | |
|---|---|
| Typical Vegetation | Mixed conifer series; Red fir series. |
| Soil Map Unit Components | **Tallac very gravelly sandy loam** |
| Proportion (percent) | 85 |

### Soil Profile Description

| | |
|---|---|
| Surface Layer | 0 to 22 inches; very dark gray very gravelly sandy loam; moderate granular structure; medium acid. |
| Subsoil | 22 to 41 inches; pale brown extremely gravelly loam; massive; slightly acid. |
| Substratum | 41 inches; light yellowish brown weakly cemented till. |

### Soil Properties & Management Interpretations

| | |
|---|---|
| Effective Rooting Depth (inches) | 40 to 60 |
| Available Water Capacity Class | Very low |
| AWC for top 20" | 0.9-1.4 |
| Permeability: Subsoil<br>Substratum | Moderately rapid<br>Very slow |
| Drainage Class | Moderately well drained |
| Max Erosion Hazard | High |
| Seedling Mortality | Severe to moderate |
| Revegetating Exposed Subsoil | Moderate |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>3,4 RF, WF<br>100 to 180 |
| Soil Manageability Group<br>Class | <br>III<br>3eP |
| Inclusions | Included in this unit are small areas of Tinker, Waca, and Windy soils; soils similar to Tallac with a surface layer less than 20 inches thick; soils similar to Tallac but without high amounts of rock fragments; and soils that are deep, loamy, and have thin or light colored surface layers. Included areas make up about 15 percent of the total area. |
| Management Considerations | Steep slopes. Tallac soils have coarse textures, a high amount of rock fragments, and a relatively low cation exchange capacity. |

## TBE Tallac-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,500 feet  Annual Precipitation: 40 to 80 inches

| | | |
|---|---|---|
| Typical Vegetation | Red fir-Alder/Willow series; Mixed conifer-Alder/Willow series. | |
| Soil Map Unit Components | **Tallac** | **Cryumbrepts, wet** |
| Proportion (percent) | 60 | 25 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | 0 to 22 inches; very dark gray very gravelly sandy loam; moderate granular structure; medium acid. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | 22 to 41 inches; pale brown extremely gravelly loam; massive; slightly acid. | |
| Substratum | 41 inches; light yellowish brown weakly cemented till. | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 40 to 60 | Variable |
| Available Water Capacity Class | Very low | Very low |
| AWC for top 20" | 0.9-1.4 | |
| Permeability: Subsoil | Moderately rapid | Moderately rapid |
| Substratum | Very slow | Very slow |
| Drainage Class | Moderately well drained | Poorly drained |
| Max Erosion Hazard | High | Very high |
| Seedling Mortality | Severe to moderate | Severe |
| Revegetating Exposed Subsoil | Moderate | Severe |
| Soil Productivity | | |
| Forest Survey Site Class | 3,4 RF, WF | Not capable |
| Annual Forage (lbs/acre) | 100 to 180 | 170 to 640 |
| Soil Manageability Group | III | III |
| Class | 3eP | 4EW |

Inclusions: Included in this unit are small areas of Celio, Tinker, Waca, and Windy soils; sandy soils similar to Tallac; soils similar to Tallac but with cemented till above 20 inches; and soils similar to Tallac but without high amounts of rock fragments. Included areas make up about 15 percent of the total area.

Management Considerations: Tallac soils have coarse textures, a high amount of rock fragments, and a relatively low cation exchange capacity. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

## TBF Tallac-Cryumbrepts, wet complex, 30 to 50 percent slopes

Elevation: 6,000 to 8,500 feet  Annual Precipitation: 40 to 80 inches

| | | |
|---|---|---|
| Typical Vegetation | Red fir-Alder/Willow series; Mixed conifer-Alder/Willow series. | |
| Soil Map Unit Components | **Tallac** | **Cryumbrepts, wet** |
| Proportion (percent) | 65 | 25 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | 0 to 22 inches; very dark gray very gravelly sandy loam; moderate granular structure; medium acid. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | 22 to 41 inches; pale brown extremely gravelly loam; massive; slightly acid. | |
| Substratum | 41 inches; light yellowish brown weakly cemented till. | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 40 to 60 | Variable |
| Available Water Capacity Class | Very low | Very low |
| AWC for top 20" | 0.9-1.4 | |
| Permeability: Subsoil | Moderately rapid | Moderately rapid |
| Substratum | Very slow | Very slow |
| Drainage Class | Moderately well drained | Poorly drained |
| Max Erosion Hazard | High | Very high |
| Seedling Mortality | Severe to moderate | Severe |
| Revegetating Exposed Subsoil | Moderate | Severe |
| Soil Productivity | | |
| Forest Survey Site Class | 3,4 RF, WF | Not capable |
| Annual Forage (lbs/acre) | 100 to 180 | 170 to 640 |
| Soil Manageability | | |
| Group | IV | IV |
| Class | 4EP | 4EW |

Inclusions: Included in this unit are small areas of Tinker, Waca, and Windy soils; shallow soils with a high amount of rock fragments over hard grantic rock; and soils similar to Tallac but without high amounts of rock fragments. Included areas make up about 10 percent of the total area.

Management Considerations: Steep slopes. Tallac soils have coarse textures, a high amount of rock fragments, and a relatively low cation exchange capacity. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

## THF Tallac-Gullied land-Cryumbrepts, wet complex, 30 to 60 percent slopes

Elevation: 7,000 to 8,500 feet  Annual Precipitation: 60 to 70 inches

Typical Vegetation: Red fir-Alder/Willow series; Red fir/Hemlock-Alder/Willow series.

| Soil Map Unit Components | Tallac | Gullied land | Cryumbrepts, wet |
|---|---|---|---|
| Proportion (percent) | 55 | 15 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 22 inches; very dark gray very gravelly sandy loam; moderate granular structure; medium acid. | A network of moderately deep to deep V-shaped channels. Many have eroded down to bedrock. Erosion may be active. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | 22 to 41 inches; pale brown extremely gravelly loam; massive; slightly acid. | | |
| Substratum | 41 inches; light yellowish brown weakly cemented till. | | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 40 to 60 | Variable |
| Available Water Capacity Class | Very low | Very low |
| AWC for top 20" | 0.9-1.4 | |
| Permeability: Subsoil<br>Substratum | Moderately rapid<br>Very slow | Moderately rapid<br>Very slow |
| Drainage Class | Moderately well drained | Poorly drained |
| Max Erosion Hazard | High | Very high |
| Seedling Mortality | Severe to moderate | Severe |
| Revegetating Exposed Subsoil | Moderate | Severe |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>4 RF, WF<br>100 to 180 | <br>Not capable<br>170 to 640 |
| Soil Manageability<br>Group<br>Class | <br>IV<br>4EP | <br>IV<br>4EW |

Inclusions: Included in this unit are small areas of Meiss, Tinker, and Waca soils, and Rock outcrop. Included areas make up about 15 percent of the total area.

Management Considerations: Steep and very steep slopes. Tallac soils have coarse textures, a high amount of rock fragments, and a relatively low cation exchange capacity. Areas of Gullied land produce concentrated surface runoff which can increase the erosion on adjacent soils and they need on-site investigations to determine if restoration is needed. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

## TIE Tinker-Rock outcrop, granitic-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,600 feet  Annual Precipitation: 70 to 80 inches

| | | | |
|---|---|---|---|
| Typical Vegetation | Mixed conifer-Mixed bursh series; Lodgepole-Alder/Meadow series; Red fir-Mixed brush series. | | |
| Soil Map Unit Components | **Tinker** | **Rock outcrop, granitic** | **Cryumbrepts, wet** |
| Proportion (percent) | 40 | 15 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 21 inches; brown cobbly loam; weak granular structure; medium acid. | Granitic rock. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | 21 to 33 inches; reddish brown very cobbly loam; massive; slightly acid. | | |
| Substratum | 33 inches; pale olive cobbly coarse sandy loam; weakly cemented with silica. | | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | 22 to 40 | granitic | Variable |
| Available Water Capacity Class | Very low | | Very low |
| AWC for top 20" | 1.4-1.6 | | |
| Permeability: Subsoil<br>Substratum | Moderately rapid<br>Very slow | | Moderately rapid<br>Very slow |
| Drainage Class | Well drained | | Poorly drained |
| Max Erosion Hazard | High | | Very high |
| Seedling Mortality | Severe to moderate | | Severe |
| Revegetating Exposed Subsoil | Moderate | | Severe |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>5 RF, LP<br>270 to 380 | | <br>Not capable<br>170 to 640 |
| Soil Manageability<br>Group<br>Class | <br>III<br>3epX | | <br>III<br>4EW |

Inclusions

Included in this unit are small areas of Tallac soils; sandy soils similar to Tallac with high amounts of rock fragments; soils similar to Tinker but with a thin surface layer; shallow or moderately deep soils similar to Tinker; and soils similar to Tinker but with a thinner surface layer with less than 50 percent base saturation. Included areas make up about 30 percent of the total area.

Management Considerations

Tinker soils are moderately deep to a root restricting pan, have a high amount of rock fragments, and the subsoil remains moist above the pan during most of the growing season. Areas of granitic Rock outcrop can produce concentrated surface runoff than can increase the erosion on adjacent soils. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

## TIG/Tinker-Rock outcrop, granitic-Cryumbrepts, wet complex, 30 to 75 percent slopes

Elevation: 6,000 to 8,600 feet  Annual Precipitation: 70 to 80 inches

Typical Vegetation: Mixed conifer-Mixed bursh series; Lodgepole-Alder/Meadow series; Red fir-Mixed brush series.

| Soil Map Unit Components | Tinker | Rock outcrop, granitic | Cryumbrepts, wet |
|---|---|---|---|
| Proportion (percent) | 35 | 20 | 15 |
| **Soil Profile Description** | | | |
| Surface Layer | 0 to 21 inches; brown cobbly loam; weak granular structure; medium acid. | Granitic rock. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | 21 to 33 inches; reddish brown very cobbly loam; massive; slightly acid. | | |
| Substratum | 33 inches; pale olive cobbly coarse sandy loam; weakly cemented with silica. | | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |
| **Soil Properties & Management Interpretations** | | | |
| Effective Rooting Depth (inches) | 22 to 40 | granitic | Variable |
| Available Water Capacity Class | Very low | | Very low |
| AWC for top 20" | 1.4-1.6 | | |
| Permeability: Subsoil | Moderately rapid | | Moderately rapid |
| Substratum | Very slow | | Very slow |
| Drainage Class | Well drained | | Poorly drained |
| Max Erosion Hazard | High | | Very high |
| Seedling Mortality | Severe to moderate | | Severe |
| Revegetating Exposed Subsoil | Severe | | Severe |
| Soil Productivity | | | |
| Forest Survey Site Class | 5 RF, LP | | Not capable |
| Annual Forage (lbs/acre) | 270 to 380 | | 170 to 640 |
| Soil Manageability | | | |
| Group | IV | | IV |
| Class | 4EpX | | 4EW |

Inclusions: Included in this unit are small areas of Celio and Tallac soils; sandy soils similar to Tallac with high amounts of rock fragments; soils similar to Tinker but with a thin surface layer; shallow or moderately deep soils similar to Tinker; and soils similar to Tinker but with a thinner surface layer with less than 50 percent base saturation. Included areas make up about 30 percent of the total area.

Management Considerations: Steep and very steep slopes. Tinker soils are moderately deep to a root restricting pan, have a high amount of rock fragments, and the subsoil remains moist above the pan during most of the growing season. Areas of granitic Rock outcrop can produce concentrated surface runoff than can increase the erosion on adjacent soils. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

## TPG3 Toiyabe-Rock outcrop-Haypress complex, 30 to 75 percent slopes, severely eroded

Elevation: 6,000 to 7,000 feet  Annual Precipitation: 20 to 25 inches

| | | | |
|---|---|---|---|
| Typical Vegetation | Jeffrey/Ponderosa-Mahogany series. | | |
| Soil Map Unit Components | **Toiyabe** | **Rock outcrop** | **Haypress** |
| Proportion (percent) | 50 | 25 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 8 inches; grayish brown gravelly loamy coarse sand; single grained; slightly acid. | Granitic rock. | 0 to 14 inches; grayish brown loamy coarse sand; weak platy structure; medium acid. |
| Subsoil | 8 to 16 inches; pale brown cobbly loamy coarse sand; single grained; strongly acid. | | 14 to 49 inches; pale brown loamy coarse sand; massive; medium acid. |
| Substratum | 16 inches; highly weathered granitic rock. | | 49 inches; weathered granitic rock. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 10 to 20 | 40 to 60 |
| Available Water Capacity Class | Very low | Very low |
| AWC for top 20" | 0.7-0.8 | 1.2-1.6 |
| Permeability: Subsoil<br>Substratum | Rapid<br>Moderate | Rapid<br>Slow |
| Drainage Class | Somewhat excessively drained | Excessively drained |
| Max Erosion Hazard | Very high | Very high |
| Seedling Mortality | Severe | Severe to moderate |
| Revegetating Exposed Subsoil | Severe | Slight |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>Not capable<br>Not rated | <br>Not rated<br>Not rated |
| Soil Manageability<br>Group<br>Class | <br>IV<br>4EP | <br>IV<br>4Ep |

Inclusions: Included in this unit are small areas of moderately deep soils similar to Haypress. Included areas make up about 10 percent of the total area.

Management Considerations: Steep and very steep slopes. On-site investigations are needed to determine if corrective treatment is needed. Sandy soils and a relatively low cation exchange capacity. Toiyabe soils have a thin surface layer. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

## TTE Trojan-Sattley-Kyburz complex, 2 to 30 percent slopes

Elevation: 5,500 to 6,400 feet  Annual Precipitation: 20 to 40 inches

Typical Vegetation: Mixed conifer series.

| Soil Map Unit Components | Trojan | Sattley | Kyburz |
|---|---|---|---|
| Proportion (percent) | 45 | 25 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 10 inches; dark brown gravelly sandy loam; weak platy structure; slightly acid. | 0 to 15 inches; grayish brown stony sandy loam; weak subangular blocky structure; slightly acid. | 0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid. |
| Subsoil | 10 to 67 inches; brown and light brown clay loam; moderate angular blocky structure; medium acid. | 15 to 46 inches; light brownish gray extremely stony sandy clay loam; moderate subangular blocky structure; medium acid. | 6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid. |
| Substratum | 67 inches; slightly fractured andesite. | 46 inches; cemented andesitic conglomerate. | 34 inches; weathered andesitic rock. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | 40 to 80 | 40 to 60 | 20 to 40 |
| Available Water Capacity Class | Low to moderate | Very low to low | Low |
| AWC for top 20" | 1.8-2.5 | 1.5-2.1 | 2.2-2.7 |
| Permeability: Subsoil<br>Substratum | Moederately slow<br>Moderately slow | Moderate<br>Moderate | Moderately slow<br>Moderately slow |
| Drainage Class | Well drained | Well drained | Well drained |
| Max Erosion Hazard | Moderate | Moderate | Moderate |
| Seedling Mortality | Moderate to slight | Moderate | Slight |
| Revegetating Exposed Subsoil | Slight | Severe | Slight |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>4,5 P, WF<br>190 to 250 | <br>4,5 P, WF<br>120 to 190 | <br>5,6 P, WF<br>120 to 190 |
| Soil Manageability<br>Group<br>Class | <br>II<br>2ep | <br>II<br>3epX | <br>II<br>2ep |

Inclusions: Included in this unit are small areas of Rock outcrop; soils similar to Sattley and Trojan but without a thick dark surface layer; and soils similar to Sattley and Trojan but without a clay increase in the subsoil. Included areas make up about 15 percent of the total area.

Management Considerations: Relatively short growing season. Sattley soils have coarse textures, a stony surface layer, and high amounts of rock fragments. Kyburz soils are moderately deep and have a thin surface layer.

## TTF Trojan-Sattley-Kyburz complex, 30 to 50 percent slopes

Elevation: 5,500 to 6,400 feet  Annual Precipitation: 20 to 40 inches

| | | | |
|---|---|---|---|
| Typical Vegetation | Mixed conifer series. | | |
| Soil Map Unit Components | **Trojan** | **Sattley** | **Kyburz** |
| Proportion (percent) | 45 | 25 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 10 inches; dark brown gravelly sandy loam; weak platy structure; slightly acid. | 0 to 15 inches; grayish brown stony sandy loam; weak subangular blocky structure; slightly acid. | 0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid. |
| Subsoil | 10 to 67 inches; brown and light brown clay loam; moderate angular blocky structure; medium acid. | 15 to 46 inches; light brownish gray extremely stony sandy clay loam; moderate subangular blocky structure; medium acid. | 6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid. |
| Substratum | 67 inches; slightly fractured andesite. | 46 inches; cemented andesitic conglomerate. | 34 inches; weathered andesitic rock. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | 40 to 80 | 40 to 60 | 20 to 40 |
| Available Water Capacity Class | Low to moderate | Very low to low | Low |
| AWC for top 20" | 1.8-2.5 | 1.5-2.1 | 2.2-2.7 |
| Permeability: Subsoil | Moderately slow | Moderate | Moderately slow |
| Substratum | Moderately slow | Moderate | Moderately slow |
| Drainage Class | Well drained | Well drained | Well drained |
| Max Erosion Hazard | High | High | High |
| Seedling Mortality | Moderate to slight | Moderate | Slight |
| Revegetating Exposed Subsoil | Slight | Severe | Slight |
| Soil Productivity | | | |
| Forest Survey Site Class | 4,5 P, WF | 4,5 P, WF | 5,6 P, WF |
| Annual Forage (lbs/acre) | 190 to 250 | 120 to 190 | 120 to 190 |
| Soil Manageability | | | |
| Group | III | III | III |
| Class | 3Ep | 4EpX | 3Ep |

Inclusions: Included in this unit are small areas of Rock outcrop; soils similar to Sattley and Trojan but without a thick dark surface layer; and soils similar to Sattley and Trojan but without a clay increase in the subsoil. Included areas make up about 15 percent of the total area.

Management Considerations: Steep slopes. Relatively short growing season. Sattley soils have coarse textures, a stony surface layer, and high amounts of rock fragments. Kyburz soils are moderately deep and have a thin surface layer.

## TUE Trojan-Sattley-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 5,500 to 6,400 feet  Annual Precipitation: 20 to 40 inches

| | | | |
|---|---|---|---|
| Typical Vegetation | Mixed conifer-Alder/Willow series. | | |
| Soil Map Unit Components | **Trojan** | **Sattley** | **Cryumbrepts, wet** |
| Proportion (percent) | 25 | 25 | 20 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 10 inches; dark brown gravelly sandy loam; weak platy structure; slightly acid. | 0 to 15 inches; grayish brown stony sandy loam; weak subangular blocky structure; slightly acid. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | 10 to 67 inches; brown and light brown clay loam; moderate angular blocky structure; medium acid. | 15 to 46 inches; light brownish gray extremely stony sandy clay loam; moderate subangular blocky structure; medium acid. | |
| Substratum | 67 inches; slightly fractured andesite. | 46 inches; cemented andesitic conglomerate. | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | 40 to 80 | 40 to 60 | Variable |
| Available Water Capacity Class | Low to moderate | Very low to low | Very low |
| AWC for top 20" | 1.8-2.5 | 1.5-2.1 | |
| Permeability: Subsoil<br>Substratum | Moederately slow<br>Moderately slow | Moderate<br>Moderate | Moderately rapid<br>Very slow |
| Drainage Class | Well drained | Well drained | Poorly drained |
| Max Erosion Hazard | High | High | Very high |
| Seedling Mortality | Moderate to slight | Moderate | Severe |
| Revegetating Exposed Subsoil | Slight | Severe | Severe |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>4,5 P, WF<br>190 to 250 | <br>4,5 P, WF<br>120 to 190 | <br>Not capable<br>170 to 640 |
| Soil Manageability Group<br>Class | III<br>2ep | III<br>3epX | III<br>4EW |

Inclusions: Included in this unit are small areas of Kyburz soils; Rock outcrop; soils similar to Sattley and Trojan but without a thick dark surface layer; and slopes steeper than 30 percent. Included areas make up about 30 percent of the total area.

Management Considerations: Relatively short growing season. Sattley soils have coarse textures, a stony surface layer, and high amounts of rock fragments. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

## TWE Rouen Variant-Aspen Variant-Sierraville complex, 2 to 30 percent slopes

Elevation: 5,200 to 7,800 feet  Annual Precipitation: 20 to 25 inches

Typical Vegetation: Mixed conifer-Ceanothus series; Ceanothus-Mixed conifer series.

| Soil Map Unit Components | Rouen Variant | Aspen Variant | Sierraville |
|---|---|---|---|
| Proportion (percent) | 45 | 25 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 12 inches; brown silt loam; moderate granular structure; neutral. | 0 to 18 inches; dark grayish brown gravelly very fine sandy loam; weak granular structure; mildly alkaline. | 0 to 9 inches; reddish brown stony sandy loam; moderate granular structure; slightly acid. |
| Subsoil | 12 to 50 inches; very pale brown gravelly silt loam; moderate subangular blocky structure; slightly acid. | 18 to 40 inches; light brownish gray very cobbly fine sandy loam; slightly acid to medium acid. | 9 to 75 inches; weak red clay; moderate angular blocky structure; medium acid. |
| Substratum | | 40 inches; weathered metavolcanic rock. | 75 inches; slightly weathered andesite. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | 40 to 60 | 40 to 60 | 40 to 51 |
| Available Water Capacity Class | Low to moderate | Very low to low | Low to high |
| AWC for top 20" | 2.4-3.2 | 1.7-2.4 | 2.4-2.8 |
| Permeability: Subsoil | Moderate | Moderately rapid | Moderately slow |
| Substratum | Moderate | Moderate | Moderate |
| Drainage Class | Well drained | Well drained | Well drained |
| Max Erosion Hazard | Moderate | High | High |
| Seedling Mortality | Slight | Moderate to slight | Slight |
| Revegetating Exposed Subsoil | Slight | Slight | Slight |
| Soil Productivity | | | |
| Forest Survey Site Class | 5 P | 5 P | 5 P |
| Annual Forage (lbs/acre) | 120 to 190 | 120 to 190 | 120 to 190 |
| Soil Manageability | | | |
| Group | II | II | II |
| Class | 2ep | 2ep | 3eX |

Inclusions: Included in this unit are small areas of Kyburz, Sattley, and Trojan soils, and shallow soils. Included areas make up about 15 percent of the total area.

Management Considerations: Short growing season. Rouen Variant soils have a thin surface layer. Aspen Variant soils have coarse textures and a high amount of rock fragments. Sierraville soils have stones in the surface layer and low subsoil strength when wet.

## TWF Rouen Variant-Aspen Variant-Sierraville complex, 30 to 50 percent slopes

Elevation: 5,200 to 7,800 feet  Annual Precipitation: 20 to 25 inches

**Typical Vegetation**

Mixed conifer-Ceanothus series; Ceanothus-Mixed conifer series.

| Soil Map Unit Components | Rouen Variant | Aspen Variant | Sierraville |
|---|---|---|---|
| Proportion (percent) | 35 | 35 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 12 inches; brown silt loam; moderate granular structure; neutral. | 0 to 18 inches; dark grayish brown gravelly very fine sandy loam; weak granular structure; mildly alkaline. | 0 to 9 inches; reddish brown stony sandy loam; moderate granular structure; slightly acid. |
| Subsoil | 12 to 50 inches; very pale brown gravelly silt loam; moderate subangular blocky structure; slightly acid. | 18 to 40 inches; light brownish gray very cobbly fine sandy loam; slightly acid to medium acid. | 9 to 75 inches; weak red clay; moderate angular blocky structure; medium acid. |
| Substratum | | 40 inches; weathered metavolcanic rock. | 75 inches; slightly weathered andesite. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | 40 to 60 | 40 to 60 | 40 to 51 |
| Available Water Capacity Class | Low to moderate | Very low to low | Low to high |
| AWC for top 20" | 2.4-3.2 | 1.7-2.4 | 2.4-2.8 |
| Permeability: Subsoil | Moderate | Moderately rapid | Moderately slow |
| Substratum | Moderate | Moderate | Moderate |
| Drainage Class | Well drained | Well drained | Well drained |
| Max Erosion Hazard | High | High | High |
| Seedling Mortality | Slight | Moderate to slight | Slight |
| Revegetating Exposed Subsoil | Slight | Slight | Slight |
| Soil Productivity | | | |
| Forest Survey Site Class | 5 P | 5 P | 5 P |
| Annual Forage (lbs/acre) | 120 to 190 | 120 to 190 | 120 to 190 |
| Soil Manageability | | | |
| Group | III | III | III |
| Class | 3Ep | 3Ep | 4EX |

**Inclusions**

Included in this unit are small areas of Kyburz, Sattley, and Trojan soils, Rock outcrop, and shallow soils. Included areas make up about 15 percent of the total area.

**Management Considerations**

Steep slopes. Short growing season. Rouen Variant soils have a thin surface layer. Aspen Variant soils have coarse textures and a high amount of rock fragments. Sierraville soils have stones in the surface layer and low subsoil strength when wet.

## TWF6 Rouen Variant-Aspen Variant-Sierraville complex, 20 to 50 percent slopes, terraced

Elevation: 6,000 to 7,800 feet  Annual Precipitation: 20 to 25 inches

| | | | |
|---|---|---|---|
| Typical Vegetation | Mixed conifer-Ceanothus series; Ceanothus-Mixed conifer series. | | |
| Soil Map Unit Components | **Rouen Variant, terraced** | **Aspen Variant, terraced** | **Sierraville, terraced** |
| Proportion (percent) | 35 | 35 | 15 |
| **Soil Profile Description** | | | |
| Surface Layer | 0 to 6 inches; brown silt loam; moderate granular structure; neutral. | 0 to 20 inches; brown very cobbly sandy loam; weak granular structure; neutral. | 0 to 6 inches; yellowish brown gravelly loam; moderate granular structure; slightly acid. |
| Subsoil | 6 to 50 inches; very pale brown gravelly silt loam; moderate subangular blocky structure; slightly acid. | 20 to 42 inches; pale brown very cobbly fine sandy loam; massive; slightly acid. | 6 to 45 inches; light yellowish brown gravelly clay; massive; medium acid. |
| Substratum | | 42 inches; weathered metavolcanic rock-Gabro. | 45 inches; weathered metavolcanic rock-Gabbro. |
| **Soil Properties & Management Interpretations** | | | |
| Effective Rooting Depth (inches) | 40 to 60 | 40 to 60 | 40 to 51 |
| Available Water Capacity Class | Low to moderate | Very low to low | Low to moderate |
| AWC for top 20" | 2.4-3.2 | 1.2-1.9 | 2.4-3.0 |
| Permeability: Subsoil | Moderate | Moderately rapid | Moderately slow |
| Substratum | Moderate | Moderate | Moderate |
| Drainage Class | Well drained | Well drained | Well drained |
| Max Erosion Hazard | High | High | High |
| Seedling Mortality | Slight | Moderate to severe | Slight |
| Revegetating Exposed Subsoil | Slight | Slight | Slight |
| Soil Productivity | | | |
| Forest Survey Site Class | Not rated | Not rated | Not rated |
| Annual Forage (lbs/acre) | Not rated | Not rated | Not rated |
| Soil Manageability | | | |
| Group | IV | IV | IV |
| Class | 4ep | 4ep | 4eX |

Inclusions: Included in this unit are small areas of Kyburz, Rock outcrop, and shallow soils. Included areas make up about 15 percent of the total area.

Management Considerations: Steep slopes. Short growing season. These areas have been terraced and on-site investigations are necessary to determine if corrective treaatment is needed. Rouen Variant soils have a thin surface layer. Aspen Variant soils have coarse textures and a high amount of rock fragments. Sierraville soils have stones in the surface layer and low subsoil strength when wet.

## TXE Rouen Variant-Cryumbrepts, wet-Aspen Variant complex, 2 to 30 percent slopes

Elevation: 6,000 to 7,800 feet  Annual Precipitation: 20 to 25 inches

Typical Vegetation: Ceanothus-Mixed conifer series; Mixed conifer-Ceanothus series.

| Soil Map Unit Components | Rouen Variant | Cryumbrepts, wet | Aspen Variant |
|---|---|---|---|
| Proportion (percent) | 35 | 20 | 15 |
| **Soil Profile Description** | | | |
| Surface Layer | 0 to 12 inches; brown silt loam; moderate granular structure; neutral. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. | 0 to 18 inches; dark grayish brown gravelly very fine sandy loam; weak granular structure; mildly alkaline. |
| Subsoil | 12 to 50 inches; very pale brown gravelly silt loam; moderate subangular blocky structure; slightly acid. | | 18 to 40 inches; light brownish gray very cobbly fine sandy loam; slightly acid to medium acid. |
| Substratum | | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. | 40 inches; weathered metavolcanic rock. |
| **Soil Properties & Management Interpretations** | | | |
| Effective Rooting Depth (inches) | 40 to 60 | Variable | 40 to 60 |
| Available Water Capacity Class | Low to moderate | Very low | Low to moderate |
| AWC for top 20" | 2.4-3.2 | | 1.7-2.4 |
| Permeability: Subsoil<br>Substratum | Moderate<br>Moderate | Moderately rapid<br>Very slow | Moderately rapid<br>Moderate |
| Drainage Class | Well drained | Poorly drained | Well drained |
| Max Erosion Hazard | Moderate | Very high | High |
| Seedling Mortality | Slight | Severe | Moderate to slight |
| Revegetating Exposed Subsoil | Slight | Severe | Slight |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>5 P<br>120 to 190 | <br>Not capable<br>170 to 640 | <br>5 P<br>120 to 190 |
| Soil Manageability Group<br>Class | <br>III<br>2ep | <br>III<br>4EW | <br>III<br>2ep |

Inclusions: Included in this unit are small areas of Kyburz and Sierraville soils, Rock outcrop, and shallow soils. Included areas makeup about 30 percent of the total area.

Management Considerations: Short growing season. Rouen variant soils have a thin surface layer. Aspen Variant soils have coarse textures and a high amount of rock fragments. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

## √ULC Kyburz loam, 2 to 9 percent slopes

Elevation: 5,800 to 6,400 feet Annual Precipitation: 20 to 30 inches

| | |
|---|---|
| Typical Vegetation | Sagebrush/Bitterbrush-Jeffrey/Ponderosa series. |
| Soil Map Unit Components | **Kyburz loam** |
| Proportion (percent) | 85 |

### Soil Profile Description

| | |
|---|---|
| Surface Layer | 0 to 5 inches; brown loam; moderate granular structure; neurtral. |
| Subsoil | 5 to 26 inches; brown clay loam; massive; slightly acid. |
| Substratum | 26 inches; weathered andisite. |

### Soil Properties & Management Interpretations

| | |
|---|---|
| Effective Rooting Depth (inches) | 20 to 40 |
| Available Water Capacity Class | Low |
| AWC for top 20" | 2.2-2.7 |
| Permeability: Subsoil | Moderately slow |
| Substratum | Moderate |
| Drainage Class | Well drained |
| Max Erosion Hazard | High |
| Seedling Mortality | Slight |
| Revegetating Exposed Subsoil | Slight |
| Soil Productivity | |
| Forest Survey Site Class | 5 P |
| Annual Forage (lbs/acre) | 120 to 190 |
| Soil Manageability | |
| Group | II |
| Class | 2p |
| Inclusions | Included in this unit are small areas of shallow soils. Included areas make up about 15 percent of the total area. |
| Management Considerations | Kyburz soils are moderately deep, have a thin surface layer, and a relatively short growing season. |

## UME Umpa stony sandy loam, 2 to 30 percent slopes

Elevation: 7,000 to 8,500 feet  Annual Precipitation: 40 to 45 inches

| | |
|---|---|
| Typical Vegetation | Red fir series; Red fir-Wyethia series; Mixed conifer series; Mixed conifer-Ceanothus series. |
| Soil Map Unit Components | **Umpa stony sandy loam** |
| Proportion (percent) | 85 |

### Soil Profile Description

| | |
|---|---|
| Surface Layer | 0 to 8 inches; dark brown stony sandy loam; weak granular structure; medium acid. |
| Subsoil | 8 to 24 inches; pale brown very gravelly sandy loam; weak subangular blocky structure; medium acid. |
| Substratum | 24 inches; weathered coarse grained andesite. |

### Soil Properties & Management Interpretations

| | |
|---|---|
| Effective Rooting Depth (inches) | 20 to 40 |
| Available Water Capacity Class | Very low |
| AWC for top 20" | 1.2-1.9 |
| Permeability: Subsoil | Moderately rapid |
| Substratum | Moderate |
| Drainage Class | Well drained |
| Max Erosion Hazard | Moderate |
| Seedling Mortality | Severe to moderate |
| Revegetating Exposed Subsoil | Moderate |
| Soil Productivity | |
| Forest Survey Site Class | 4,5 RF, WF |
| Annual Forage (lbs/acre) | 60 to 160 |
| Soil Manageability | |
| Group | III |
| Class | 3eX |
| Inclusions | Included in this unit are small areas of Jorge, Tahoma, and Waca soils; Rock outcrop; and deep soils similar to Umpa but with less than 50 percent base saturation in the surface layer. Included areas make up about 15 percent of the total area. |
| Management Considerations | Umpa soils are moderately deep, have coarse textures, have a high amount of rock fragments, have a relatively low cation exchange capacity, and have a thin stony surface layer. |

## UMF Umpa stony sandy loam, 30 to 50 percent slopes

Elevation: 7,000 to 8,500 feet  Annual Precipitation: 40 to 45 inches

| | |
|---|---|
| Typical Vegetation | Red fir series; Red fir-Wyethia series; Mixed conifer series; Mixed conifer-Ceanothus series. |
| Soil Map Unit Components | **Umpa stony sandy loam** |
| Proportion (percent) | 85 |

### Soil Profile Description

| | |
|---|---|
| Surface Layer | 0 to 8 inches; dark brown stony sandy loam; weak granular structure; medium acid. |
| Subsoil | 8 to 24 inches; pale brown very gravelly sandy loam; weak subangular blocky structure; medium acid. |
| Substratum | 24 inches; weathered coarse grained andesite. |

### Soil Properties & Management Interpretations

| | |
|---|---|
| Effective Rooting Depth (inches) | 20 to 40 |
| Available Water Capacity Class | Very low |
| AWC for top 20" | 1.2-1.9 |
| Permeability: Subsoil<br>Substratum | Moderately rapid<br>Moderate |
| Drainage Class | Well drained |
| Max Erosion Hazard | High |
| Seedling Mortality | Severe to moderate |
| Revegetating Exposed Subsoil | Moderate |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>4,5 RF, WF<br>60 to 160 |
| Soil Manageability Group<br>Class | <br>IV<br>4EX |
| Inclusions | Included in this unit are small areas of Jorge, Tahoma, and Waca soils; Rock outcrop; and deep soils similar to Umpa but with less than 50 percent base saturation in the surface layer. Included areas make up about 15 percent of the total area. |
| Management Considerations | Steep slopes. Umpa soils are moderately deep, have coarse textures, have a high amount of rock fragments, have a relatively low cation exchange capacity, and have a thin stony surface layer. |

## UNE Umpa-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 7,000 to 8,500 feet  Annual Precipitation: 40 to 45 inches

| | | |
|---|---|---|
| Typical Vegetation | Red fir series; Meadow/Willow series. | |
| Soil Map Unit Components | **Umpa** | **Cryumbrepts, wet** |
| Proportion (percent) | 70 | 15 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | 0 to 8 inches; dark brown stony sandy loam; weak granular structure; medium acid. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | 8 to 24 inches; pale brown very gravelly sandy loam; weak subangular blocky structure; medium acid. | |
| Substratum | 24 inches; weathered coarse grained andesite. | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 20 to 40 | Variable |
| Available Water Capacity Class | Very low | Very low |
| AWC for top 20" | 1.2-1.9 | |
| Permeability: Subsoil | Moderately rapid | Moderately rapid |
| Substratum | Moderate | Very slow |
| Drainage Class | Well drained | Poorly drained |
| Max Erosion Hazard | Moderate | Very high |
| Seedling Mortality | Severe to moderate | Severe |
| Revegetating Exposed Subsoil | Moderate | Severe |
| Soil Productivity | | |
| Forest Survey Site Class | 4,5 RF, WF | Not capable |
| Annual Forage (lbs/acre) | 60 to 160 | 170 to 640 |
| Soil Manageability | | |
| Group | III | III |
| Class | 3eX | 4EW |

Inclusions: Included in this unit are small areas of Jorge, Umpa Variant, and Waca soils, and Rock outcrop. Included areas make up about 15 percent of the total area.

Management Considerations: Umpa soils are moderately deep, have coarse textures, have a high amount of rock fragments, have a relatively low cation exchange capacity, and have a thin stony surface layer. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

## UOE Umpa-Rock outcrop complex, 2 to 30 percent slopes

Elevation: 7,000 to 8,500 feet  Annual Precipitation: 40 to 45 inches

| | | |
|---|---|---|
| Typical Vegetation | Mixed conifer-Ceanothus series; Ceanothus-Mixed conifer series; Red fir-Ceanothus series. | |
| Soil Map Unit Components | **Umpa** | **Rock outcrop** |
| Proportion (percent) | 65 | 20 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | 0 to 8 inches; dark brown stony sandy loam; weak granular structure; medium acid. | Coarse grained vescicular basalt. |
| Subsoil | 8 to 24 inches; pale brown very gravelly sandy loam; weak subangular blocky structure; medium acid. | |
| Substratum | 24 inches; weathered coarse grained andesite. | |

### Soil Properties & Management Interpretations

| | |
|---|---|
| Effective Rooting Depth (inches) | 20 to 40 |
| Available Water Capacity Class | Very low |
| AWC for top 20" | 1.2-1.9 |
| Permeability: Subsoil<br>Substratum | Moderately rapid<br>Moderate |
| Drainage Class | Well drained |
| Max Erosion Hazard | Moderate |
| Seedling Mortality | Severe to moderate |
| Revegetating Exposed Subsoil | Moderate |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>4,5 RF, WF<br>60 to 160 |
| Soil Manageability Group<br>Class | <br>III<br>3eX |

Inclusions: Included in this unit are small areas of Umpa Variant and Waca soils. Included areas make up about 15 percent of the total area.

Management Considerations: Umpa soils are moderately deep, have coarse textures, have a high amount of rock fragments, have a relatively low cation exchange capacity, and have a thin stony surface layer. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

## UOG Umpa-Rock outcrop complex, 30 to 75 percent slopes

Elevation: 7,000 to 8,500 feet  Annual Precipitation: 40 to 45 inches

Typical Vegetation: Mixed conifer-Ceanothus series; Ceanothus-Mixed conifer series; Red fir-Ceanothus series.

| Soil Map Unit Components | Umpa | Rock outcrop |
|---|---|---|
| Proportion (percent) | 60 | 25 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | 0 to 8 inches; dark brown stony sandy loam; weak granular structure; medium acid. | Coarse grained vescicular basalt. |
| Subsoil | 8 to 24 inches; pale brown very gravelly sandy loam; weak subangular blocky structure; medium acid. | |
| Substratum | 24 inches; weathered coarse grained andesite. | |

### Soil Properties & Management Interpretations

| | |
|---|---|
| Effective Rooting Depth (inches) | 20 to 40 |
| Available Water Capacity Class | Very low |
| AWC for top 20" | 1.2-1.9 |
| Permeability: Subsoil | Moderately rapid |
| Substratum | Moderate |
| Drainage Class | Well drained |
| Max Erosion Hazard | High |
| Seedling Mortality | Severe to moderate |
| Revegetating Exposed Subsoil | Moderate |
| Soil Productivity | |
| Forest Survey Site Class | 4,5 RF, WF |
| Annual Forage (lbs/acre) | 60 to 160 |
| Soil Manageability | |
| Group | IV |
| Class | 4EX |

Inclusions: Included in this unit are small areas of Umpa Variant and Waca soils. Included areas make up about 15 percent of the total area.

Management Considerations: Steep and very steep slopes. Umpa soils are moderately deep, have coarse textures, have a high amount of rock fragments, have a relatively low cation exchange capacity, and have a thin stony surface layer. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

## VRG Rock outcrop, volcanic

Elevation: 4,000 to 9,500 feet  Annual Precipitation: 60 to 80 inches

Typical Vegetation: Barren.

Soil Map Unit Components: **Rock outcrop, volcanic**

Proportion (percent): 90

### Soil Profile Description

Surface Layer: Exposures of tuff-brecia, andesite, or basalt.

Subsoil

Substratum

### Soil Properties & Management Interpretations

Effective Rooting Depth (inches): volcanic

Available Water Capacity Class

AWC for top 20"

Permeability: Subsoil

Substratum

Drainage Class

Max Erosion Hazard

Seedling Mortality

Revegetating Exposed Subsoil

Soil Productivity

Forest Survey Site Class

Annual Forage (lbs/acre)

Soil Manageability Group

Class

Inclusions: Included in this unit are small areas of Fugawee, Ledmount, Meiss, McCarthy, Umpa Variant, and Waca soils, and soils similar to Windy but with a thin surface layer. Included areas make up about 10 percent of the total area.

Management Considerations: Steep and very steep slopes (30 to 75 percent). Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Volcanic Rock outcrop areas are a potential source of aggregate.

## W Water

Elevation: Variable feet  Annual Precipitation: Variable inches

| | |
|---|---|
| Typical Vegetation | None |
| Soil Map Unit Components | **Ponds and lakes** |
| Proportion (percent) | 100 |

## Soil Profile Description

| | |
|---|---|
| Surface Layer | |
| Subsoil | |
| Substratum | |

## Soil Properties & Management Interpretations

| | |
|---|---|
| Effective Rooting Depth (inches) | |
| Available Water Capacity Class | |
| AWC for top 20" | |
| Permeability: Subsoil<br>Substratum | |
| Drainage Class | |
| Max Erosion Hazard | |
| Seedling Mortality | |
| Revegetating Exposed Subsoil | |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | |
| Soil Manageability Group<br>Class | |
| Inclusions | Included in this unit are occassional islands. |
| Management Considerations | Not rated. |

## WAE Waca-Windy complex, 2 to 30 percent slopes

Elevation: 6,000 to 9,000 feet  Annual Precipitation: 60 to 80 inches

| | | |
|---|---|---|
| Typical Vegetation | Red fir series. | |
| Soil Map Unit Components | **Waca** | **Windy** |
| Proportion (percent) | 60 | 30 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | 0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid. | 0 to 6 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid. |
| Subsoil | 12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid. | 6 to 46 inches; brown gravelly sandy loam; weak subangular blocky structure; slightly acid. |
| Substratum | 32 inches; weathered andesitic tuff breccia. | 46 inches; weathered andesitic tuff breccia. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 20 to 40 | 40 to 60 |
| Available Water Capacity Class | Low | Low |
| AWC for top 20" | 2.1-2.3 | 2.2-2.6 |
| Permeability: Subsoil | Moderately rapid | Moderately rapid |
| Substratum | Slow | Slow |
| Drainage Class | Well drained | Well drained |
| Max Erosion Hazard | Moderate | Moderate |
| Seedling Mortality | Moderate to slight | Slight |
| Revegetating Exposed Subsoil | Slight | Slight |
| Soil Productivity | | |
| Forest Survey Site Class | 4 RF, WF | 3,4 RF, WF |
| Annual Forage (lbs/acre) | 60 to 160 | 100 to 180 |
| Soil Manageability | | |
| Group | II | II |
| Class | 2ep | 2ep |

Inclusions

Included in this unit are small areas of metamorphic Rock outcrop; glacial soils with high amounts of rock fragments; similar soils with thin surface layers; sandy soils similar to Waca; moderately deep soils with a thin surface layer and a loamy subsoil; and deep and moderately deep soils developed from metamorphic rock in the Royal Gorge area. Included areas make up about 10 percent of the total area.

Management Considerations

A high amount of rock fragments. Waca soils are moderately deep and snowmelt tends to accumulate for short periods over the impermeable substratum.

## WAF Waca-Windy complex, 30 to 50 percent slopes

Elevation: 6,000 to 9,000 feet  Annual Precipitation: 60 to 80 inches

| | | |
|---|---|---|
| Typical Vegetation | Red fir series. | |
| Soil Map Unit Components | **Waca** | **Windy** |
| Proportion (percent) | 65 | 25 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | 0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid. | 0 to 6 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid. |
| Subsoil | 12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid. | 6 to 46 inches; brown gravelly sandy loam; weak subangular blocky structure; slightly acid. |
| Substratum | 32 inches; weathered andesitic tuff breccia. | 46 inches; weathered andesitic tuff breccia. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 20 to 40 | 40 to 60 |
| Available Water Capacity Class | Low | Low |
| AWC for top 20" | 2.1-2.3 | 2.2-2.6 |
| Permeability: Subsoil<br>Substratum | Moderately rapid<br>Slow | Moderately rapid<br>Slow |
| Drainage Class | Well drained | Well drained |
| Max Erosion Hazard | High | High |
| Seedling Mortality | Moderate to slight | Slight |
| Revegetating Exposed Subsoil | Slight | Slight |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>4 RF, WF<br>60 to 160 | <br>3,4 RF, WF<br>100 to 180 |
| Soil Manageability<br>Group<br>Class | <br>III<br>3Ep | <br>III<br>3Ep |

Inclusions

Included in this unit are small areas of Meiss and Tallac soils;similar soils with thin surface layers; sandy soils similar to Waca; similar soils without high amounts of rock fragments; and deep and moderately deep soils developed from metamorphic rock in the Royal Gorge area. Included areas make up about 10 percent of the total area.

Management Considerations

Steep slopes. A high amount of rock fragments. Waca soils are moderately deep and snowmelt tends to accumulate for short periods over the impermeable substratum.

## WBE Waca-Cryumbrepts, wet-Windy complex, 2 to 30 percent slopes

Elevation: 6,000 to 9,000 feet  Annual Precipitation: 60 to 80 inches

Typical Vegetation: Red fir-Alder/Willow series.

| Soil Map Unit Components | Waca | Cryumbrepts, wet | Windy |
|---|---|---|---|
| Proportion (percent) | 40 | 25 | 20 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. | 0 to 6 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid. |
| Subsoil | 12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid. | | 6 to 46 inches; brown gravelly sandy loam; weak subangular blocky structure; slightly acid. |
| Substratum | 32 inches; weathered andesitic tuff breccia. | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. | 46 inches; weathered andesitic tuff breccia. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | 20 to 40 | Variable | 40 to 60 |
| Available Water Capacity Class | Low | Very low | Low |
| AWC for top 20" | 2.1-2.3 | | 2.2-2.6 |
| Permeability: Subsoil | Moderately rapid | Moderately rapid | Moderately rapid |
| Substratum | Slow | Very slow | Slow |
| Drainage Class | Well drained | Poorly drained | Well drained |
| Max Erosion Hazard | Moderate | Very high | Moderate |
| Seedling Mortality | Moderate to slight | Severe | Slight |
| Revegetating Exposed Subsoil | Slight | Severe | Slight |
| Soil Productivity | | | |
| Forest Survey Site Class | 4 RF, WF | Not capable | 3,4 RF, WF |
| Annual Forage (lbs/acre) | 60 to 140 | 170 to 640 | 100 to 180 |
| Soil Manageability | | | |
| Group | III | III | III |
| Class | 2ep | 4EW | 2ep |

Inclusions: Included in this unit are small areas of Ahart, Meiss, Tallac, and Waca, rhyolitic substratum soils; soils similar to Waca but with a light colored surface layer; and soils similar to Waca but without a high amount of rock fragments. Included areas make up about 15 percent of the total area.

Management Considerations: A high amount of rock fragments. Waca soils are moderately deep and snowmelt tends to accumulate for short periods over the impermeable substratum. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

## WBF Waca-Cryumbrepts, wet-Windy complex, 30 to 50 percent slopes

Elevation: 6,000 to 9,000 feet  Annual Precipitation: 60 to 80 inches

Typical Vegetation: Red fir-Alder/Willow series.

| Soil Map Unit Components | Waca | Cryumbrepts, wet | Windy |
|---|---|---|---|
| Proportion (percent) | 40 | 25 | 20 |
| **Soil Profile Description** | | | |
| Surface Layer | 0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. | 0 to 6 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid. |
| Subsoil | 12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid. | | 6 to 46 inches; brown gravelly sandy loam; weak subangular blocky structure; slightly acid. |
| Substratum | 32 inches; weathered andesitic tuff breccia. | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. | 46 inches; weathered andesitic tuff breccia. |
| **Soil Properties & Management Interpretations** | | | |
| Effective Rooting Depth (inches) | 20 to 40 | Variable | 40 to 60 |
| Available Water Capacity Class | Low | Very low | Low |
| AWC for top 20" | 2.1-2.3 | | 2.2-2.6 |
| Permeability: Subsoil<br>Substratum | Moderately rapid<br>Slow | Moderately rapid<br>Very slow | Moderately rapid<br>Slow |
| Drainage Class | Well drained | Poorly drained | Well drained |
| Max Erosion Hazard | High | Very high | High |
| Seedling Mortality | Moderate to slight | Severe | Slight |
| Revegetating Exposed Subsoil | Slight | Severe | Slight |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>4 RF, WF<br>60 to 140 | <br>Not capable<br>170 to 640 | <br>3,4 RF, WF<br>100 to 180 |
| Soil Manageability Group<br>Class | <br>III<br>3Ep | <br>III<br>4EW | <br>III<br>3Ep |

Inclusions: Included in this unit are small areas of Ahart, Meiss, Tallac, and Waca, rhyolitic substratum soils; soils similar to Waca but with a light colored surface layer; and soils similar to Waca but without a high amount of rock fragments. Included areas make up about 15 percent of the total area.

Management Considerations: Steep slopes. A high amount of rock fragments. Waca soils are moderately deep and snowmelt tends to accumulate for short periods over the impermeable substratum. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

## WCF Waca-Gullied land-Cryumbrepts, wet complex, 30 to 50 percent slopes

Elevation: 6,500 to 9,000 feet  Annual Precipitation: 60 to 80 inches

| | | | |
|---|---|---|---|
| Typical Vegetation | Red fir-Barren series; Red fir-Alder/Willow series. | | |
| Soil Map Unit Components | **Waca** | **Gullied land** | **Cryumbrepts,wet** |
| Proportion (percent) | 55 | 15 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid. | A network of moderately deep to deep V-shaped channels. Many have eroded down to bedrock. Erosion may be active. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | 12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid. | | |
| Substratum | 32 inches; weathered andesitic tuff breccia. | | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 20 to 40 | Variable |
| Available Water Capacity Class | Low | Very low |
| AWC for top 20" | 2.1-2.3 | |
| Permeability: Subsoil | Moderately rapid | Moderately rapid |
| Substratum | Slow | Very slow |
| Drainage Class | Well drained | Poorly drained |
| Max Erosion Hazard | High | Very high |
| Seedling Mortality | Moderate to slight | Severe |
| Revegetating Exposed Subsoil | Slight | Severe |
| Soil Productivity | | |
| Forest Survey Site Class | 4,5 RF, WF | Not capable |
| Annual Forage (lbs/acre) | 60 to 140 | 170 to 640 |
| Soil Manageability | | |
| Group | III | III |
| Class | 3Ep | 4EW |

**Inclusions**

Included in this unit are small areas of Ahart, Meiss, Tallac, and Waca, rhyolitic substratum soils; Rock outcrop; soils similar to Waca but with a light colored surface layer; and soils similar to Waca but without a high amount of rock fragments. Included areas make up about 15 percent of the total area.

**Management Considerations**

Steep slopes. Waca soils are moderately deep, have a high amount of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum. Areas of Gullied land produce concentrated surface runoff that can increase erosion on adjacent soils. These lands need on-site investigations to determine if restoration is needed. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

## WDE Waca-Meiss complex, 2 to 30 percent slopes

Elevation: 6,000 to 9,000 feet  Annual Precipitation: 60 to 80 inches

| | | |
|---|---|---|
| Typical Vegetation | Red fir-Wyethia series; Mixed conifer-Wyethia series. | |
| Soil Map Unit Components | **Waca** | **Meiss** |
| Proportion (percent) | 60 | 25 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | 0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid. | 0 to 19 inches; brown sandy loam; moderate granular structure; neutral. |
| Subsoil | 12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid. | |
| Substratum | 32 inches; weathered andesitic tuff breccia. | 19 inches; hard volcanic rock. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 20 to 40 | 12 to 20 |
| Available Water Capacity Class | Low | Very low |
| AWC for top 20" | 2.1-2.3 | 2.6-2.9 |
| Permeability: Subsoil<br>Substratum | Moderately rapid<br>Slow | Moderately rapid<br>Very slow |
| Drainage Class | Well drained | Somewhat excessively drained |
| Max Erosion Hazard | Moderate | High |
| Seedling Mortality | Moderate to slight | Slight |
| Revegetating Exposed Subsoil | Slight | Severe |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>4,5 RF, WF<br>60 to 140 | <br>Not capable<br>60 to 160 |
| Soil Manageability<br>Group<br>Class | <br>II<br>2ep | <br>II<br>2ed |

Inclusions

Included in this unit are small areas of Ahart, Tallac, Waca, rhyolitic substratum, and Windy soils; soils with high amounts of rock fragments similar to Meiss; soils similar to Waca but with a light colored surface layer; and soils without high amounts of rock fragments similar to Waca. Included areas make up about 15 percent of the total area.

Management Considerations

Waca soils are moderately deep, have high amounts of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum. Meiss soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff.

## WDF Waca-Meiss complex, 30 to 50 percent slopes

Elevation: 6,000 to 9,000 feet  Annual Precipitation: 60 to 80 inches

| | | |
|---|---|---|
| Typical Vegetation | Red fir-Wyethia series; Mixed conifer-Wyethia series. | |
| Soil Map Unit Components | **Waca** | **Meiss** |
| Proportion (percent) | 65 | 25 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | 0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid. | 0 to 19 inches; brown sandy loam; moderate granular structure; neutral. |
| Subsoil | 12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid. | |
| Substratum | 32 inches; weathered andesitic tuff breccia. | 19 inches; hard volcanic rock. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 20 to 40 | 12 to 20 |
| Available Water Capacity Class | Low | Very low |
| AWC for top 20" | 2.1-2.3 | 2.6-2.9 |
| Permeability: Subsoil | Moderately rapid | Moderately rapid |
| Substratum | Slow | Very slow |
| Drainage Class | Well drained | Somewhat excessively drained |
| Max Erosion Hazard | High | High |
| Seedling Mortality | Moderate to slight | Slight |
| Revegetating Exposed Subsoil | Slight | Severe |
| Soil Productivity | | |
| Forest Survey Site Class | 4,5 RF, WF | Not capable |
| Annual Forage (lbs/acre) | 60 to 140 | 60 to 160 |
| Soil Manageability | | |
| Group | III | III |
| Class | 3Ep | 3Ed |

Inclusions: Included in this unit are small areas of Ahart, Tallac, Waca, rhyolitic substratum, and Windy soils; soils with high amounts of rock fragments similar to Meiss; soils similar to Waca but with a light colored surface layer; and soils without high amounts of rock fragments similar to Waca. Included areas make up about 10 percent of the total area.

Management Considerations: Steep slopes. Waca soils are moderately deep, have high amounts of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum. Meiss soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff.

## WEE Waca-Meiss-Cryumbrepts, wet complex, 2 to 30 percent slopes.

Elevation: 6,000 to 9,000 feet  Annual Precipitation: 60 to 80 inches

Typical Vegetation: Red fir-Alder/Willow series.

| Soil Map Unit Components | Waca | Meiss | Cryumbrepts, wet |
|---|---|---|---|
| Proportion (percent) | 50 | 20 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid. | 0 to 19 inches; brown sandy loam; moderate granular structure; neutral. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | 12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid. | | |
| Substratum | 32 inches; weathered andesitic tuff breccia. | 19 inches; hard volcanic rock. | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | 20 to 40 | 12 to 20 | Variable |
| Available Water Capacity Class | Low | Very low | Very low |
| AWC for top 20" | 2.1-2.3 | 2.6-2.9 | |
| Permeability: Subsoil | Moderately rapid | Moderately rapid | Moderately rapid |
| Substratum | Slow | Very slow | Very slow |
| Drainage Class | Well drained | Somewhat excessively drained | Poorly drained |
| Max Erosion Hazard | Moderate | High | Very high |
| Seedling Mortality | Moderate to slight | Slight | Severe |
| Revegetating Exposed Subsoil | Slight | Severe | Severe |
| Soil Productivity | | | |
| Forest Survey Site Class | 4,5 RF, WF | Not capable | Not capable |
| Annual Forage (lbs/acre) | 60 to 140 | 60 to 160 | 170 to 640 |
| Soil Manageability Group | II | II | II |
| Class | 2ep | 2ed | 4EW |

Inclusions: Included in this unit are small areas of Ahart, Tallac, Waca, rhyolitic substratum, and Windy soils; soils with high amounts of rock fragments similar to Meiss; soils similar to Waca but with a light colored surface layer; soils without high amounts of rock fragments similar to Waca; and deep soils without high amounts of rock fragments similar to Waca. Included areas make up about 15 percent of the total area.

Management Considerations: Waca soils are moderately deep, have high amounts of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum. Meiss soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

## WEF Waca-Meiss-Cryumbrepts, wet complex, 30 to 50 percent slopes.

Elevation: 6,000 to 9,000 feet  Annual Precipitation: 60 to 80 inches

| | | | |
|---|---|---|---|
| Typical Vegetation | Red fir-Alder/Willow series. | | |
| Soil Map Unit Components | **Waca** | **Meiss** | **Cryumbrepts, wet** |
| Proportion (percent) | 45 | 25 | 20 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid. | 0 to 19 inches; brown sandy loam; moderate granular structure; neutral. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | 12 to 32 inches; yellowish brown very gravelly sandy loam; massive; medium acid. | | |
| Substratum | 32 inches; weathered andesitic tuff breccia. | 19 inches; hard volcanic rock. | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | 20 to 40 | 12 to 20 | Variable |
| Available Water Capacity Class | Low | Very low | Very low |
| AWC for top 20" | 2.1-2.3 | 2.6-2.9 | |
| Permeability: Subsoil | Moderately rapid | Moderately rapid | Moderately rapid |
| Substratum | Slow | Very slow | Very slow |
| Drainage Class | Well drained | Somewhat excessively drained | Poorly drained |
| Max Erosion Hazard | High | High | Very high |
| Seedling Mortality | Moderate to slight | Slight | Severe |
| Revegetating Exposed Subsoil | Slight | Severe | Severe |
| Soil Productivity | | | |
| Forest Survey Site Class | 4,5 RF, WF | Not capable | Not capable |
| Annual Forage (lbs/acre) | 60 to 140 | 60 to 160 | 170 to 640 |
| Soil Manageability | | | |
| Group | III | III | III |
| Class | 3Ep | 3Ed | 4EW |

**Inclusions**

Included in this unit are small areas of Ahart, Tallac, Waca, rhyolitic substratum, and Windy soils; soils with high amounts of rock fragments similar to Meiss; soils similar to Waca but with a light colored surface layer; soils without high amounts of rock fragments similar to Waca; and deep soils without high amounts of rock fragments similar to Waca. Included areas make up about 10 percent of the total area.

**Management Considerations**

Steep slopes. Waca soils are moderately deep, have high amounts of rock fragments, and snowmelt tends to accumulate for short periods over the impermeable substratum. Meiss soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

## WOE Woodseye-Rock outcrop-Smokey complex, 2 to 30 percent slopes

Elevation: 5,500 to 7,200 feet  Annual Precipitation: 65 to 75 inches

**Typical Vegetation**

Mixed brush-Barren series; Red fir-Mixed brush series.

| Soil Map Unit Components | Woodseye | Rock outcrop | Smokey |
|---|---|---|---|
| Proportion (percent) | 45 | 25 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 14 inches; very dark grayish brown very gravelly sandy loam; weak granular structure; medium acid. | Metasedimentary rock. | 0 to 4 inches; brown gravelly sandy loam; moderate granular structure; strongly acid. |
| Subsoil | 14 to 19 inches; light yellowish brown extremely gravelly loam; massive; slightly acid. | | 4 to 24 inches; light yellowish brown very gravelly loam; weak subangular blocky; very strongly acid. |
| Substratum | 19 inches; hard metasedimentary rock. | | 24 inches; weathered metasedimentary rock. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 9 to 20 | 20 to 40 |
| Available Water Capacity Class | Very low | Very low |
| AWC for top 20" | 0.6-0.9 | 1.3-1.8 |
| Permeability: Subsoil | Moderate | Moderate |
| Substratum | Slow | Slow |
| Drainage Class | Somewhat excessively drained | Well drained |
| Max Erosion Hazard | High | High |
| Seedling Mortality | Severe | Moderate |
| Revegetating Exposed Subsoil | Severe | Moderate |
| Soil Productivity | | |
| Forest Survey Site Class | Not capable | 5 RF |
| Annual Forage (lbs/acre) | 160 to 270 | 60 to 100 |
| Soil Manageability | | |
| Group | III | III |
| Class | 3eP | 2ep |

**Inclusions**

Included in this unit are small areas of Tinker soils; soils similar to Woodseye but with a thin surface layer; and soils without high amounts of rock fragments similar to Woodseye. Included areas make up about 15 percent of the total area.

**Management Considerations**

These soils have a thin surface layer and a high amount of rock fragments. Woodseye soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Smokey soils are moderately deep. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

## WOG Woodseye-Rock outcrop-Smokey complex, 30 to 75 percent slopes

Elevation: 5,500 to 7,200 feet  Annual Precipitation: 65 to 75 inches

**Typical Vegetation**

Mixed brush-Barren series; Mixed brush-Red fir series.

| Soil Map Unit Components | Woodseye | Rock outcrop | Smokey |
|---|---|---|---|
| Proportion (percent) | 40 | 30 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 14 inches; very dark grayish brown very gravelly sandy loam; weak granular structure; medium acid. | Metasedimentary rock. | 0 to 4 inches; brown gravelly sandy loam; moderate granular structure; strongly acid. |
| Subsoil | 14 to 19 inches; light yellowish brown extremely gravelly loam; massive; slightly acid. | | 4 to 24 inches; light yellowish brown very gravelly loam; weak subangular blocky; very strongly acid. |
| Substratum | 19 inches; hard metasedimentary rock. | | 24 inches; weathered metasedimentary rock. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 9 to 20 | 20 to 40 |
| Available Water Capacity Class | Very low | Very low |
| AWC for top 20" | 0.6-0.9 | 1.3-1.8 |
| Permeability: Subsoil | Moderate | Moderate |
| Substratum | Slow | Slow |
| Drainage Class | Somewhat excessively drained | Well drained |
| Max Erosion Hazard | High | High |
| Seedling Mortality | Severe | Moderate |
| Revegetating Exposed Subsoil | Severe | Moderate |
| Soil Productivity | | |
| Forest Survey Site Class | Not capable | 5 RF |
| Annual Forage (lbs/acre) | 160 to 270 | 60 to 100 |
| Soil Manageability | | |
| Group | IV | IV |
| Class | 4EP | 4Ep |

**Inclusions**

Included in this unit are small areas of Tinker soils; soils similar to Woodseye but with a thin surface layer; and soils without high amounts of rock fragments similar to Woodseye. Included areas make up about 15 percent of the total area.

**Management Considerations**

Steep and very steep slopes. These soils have a thin surface layer and a high amount of rock fragments. Woodseye soils are shallow to hard bedrock, they reach field capacity rapidly, and can produce surface runoff. Smokey soils are moderately deep. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate.

## WRG Ledford Variant-Rock outcrop complex, 30 to 75 percent slopes

Elevation: 5,000 to 9,000 feet  Annual Precipitation: 50 to 70 inches

| | | |
|---|---|---|
| Typical Vegetation | Mixed conifer series; Red fir series. | |
| Soil Map Unit Components | **Ledford Variant** | **Rock outcrop** |
| Proportion (percent) | 50 | 35 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | 0 to 7 inches; dark grayish brown fine sandy loam; moderate granular structure; slightly acid. | Granitic rock. |
| Subsoil | 7 to 28 inches; yellowish brown gravelly sandy loam; weak subangular blocky structure; medium acid. | |
| Substratum | 28 inches; weathered granitic rock. | |

### Soil Properties & Management Interpretations

| | |
|---|---|
| Effective Rooting Depth (inches) | 20 to 40 |
| Available Water Capacity Class | Very low |
| AWC for top 20" | 1.3-2.1 |
| Permeability: Subsoil<br>Substratum | Rapid<br>Slow |
| Drainage Class | Excessively drained |
| Max Erosion Hazard | High |
| Seedling Mortality | Moderate to slight |
| Revegetating Exposed Subsoil | Slight |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>4 RF, WF<br>100 to 140 |
| Soil Manageability<br>Group<br>Class | <br>IV<br>4Ep |
| Inclusions | Included in this unit are small areas of shallow soils and similar soils with a thin light colored surface layer. Included areas make up about 15 percent of the total area. |
| Management Considerations | Steep and very steep slopes. Ledford Variant soils are moderately deep, have coarse textures, have a thin surface layer, and have a low cation exchange capacity. Concentrated surface runoff from areas of Rock outcrop can increase the erosion on adjacent soils. Rock outcrop areas are a potential source of aggregate. |

## XCE Kyburz-Aldi Variant-Jorge Variant complex, 2 to 30 percent slopes

Elevation: 5,500 to 6,400 feet  Annual Precipitation: 20 to 25 inches

| | | | |
|---|---|---|---|
| Typical Vegetation | Sagebrush/Bitterbrush-Jeffrey/Ponderosa series; Jeffrey/Ponderosa-Sagebrush/Bitterbrush series. | | |
| Soil Map Unit Components | **Kyburz** | **Aldi Variant** | **Jorge Variant** |
| Proportion (percent) | 40 | 25 | 25 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid. | 0 to 8 inches; dark grayish brown cobbly sandy loam; moderate granular structure; neutral. | 0 to 11 inches; dark brown gravelly loam; moderate granular structure; medium acid. |
| Subsoil | 6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid. | 8 to 32 inches; brown clay; massive; neutral. | 11 to 35 inches; brown very gravelly loam; massive; slightly acid. |
| Substratum | 34 inches; weathered andesitic rock. | 32 inches; lake sediments. | 35 inches; highly weathered sediments. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | 20 to 40 | 20 to 40 | 20 to 40 |
| Available Water Capacity Class | Low | Low | Low |
| AWC for top 20" | 2.2-2.7 | 2.5-3.1 | 1.7-2.3 |
| Permeability: Subsoil | Moderately slow | Slow | Moderate |
| Substratum | Moderate | Slow | Moderately rapid |
| Drainage Class | Well drained | Well drained | Well drained |
| Max Erosion Hazard | High | High | High |
| Seedling Mortality | Slight | Slight | Moderate to slight |
| Revegetating Exposed Subsoil | Slight | Slight | Slight |
| Soil Productivity | | | |
| Forest Survey Site Class | Not rated | 5 P | 5,6 P |
| Annual Forage (lbs/acre) | 120 to 190 | 190 to 250 | 120 to 190 |
| Soil Manageability | | | |
| Group | II | II | II |
| Class | 2ep | 3epX | 2ep |

Inclusions: Included in this unit are small areas of Aldi soils, Aquolls, Borolls, and shallow soils. Included areas make up about 10 percent of the total area.

Management Considerations: Relatively short growing season. Kyburz soils are moderately deep and have a thin surface layer. Aldi Variant soils reach field capacity rapidly and can produce surface runoff. They have a shallow effective rooting depth due to a dense clay subsoil, the subsoil has very low strength when wet, and the subsoil tends to perch water during the spring. Jorge Variant soils are moderately deep and have a high amount of rock fragments.

## XCF Kyburz-Aldi Variant-Jorge Variant complex, 30 to 50 percent slopes

Elevation: 5,500 to 6,400 feet  Annual Precipitation: 20 to 25 inches

**Typical Vegetation**: Sagebrush/Bitterbrush-Jeffrey/Ponderosa series; Jeffrey/Ponderosa-Sagebrush/Bitterbrush series.

| Soil Map Unit Components | Kyburz | Aldi Variant | Jorge Variant |
|---|---|---|---|
| Proportion (percent) | 40 | 25 | 25 |
| **Soil Profile Description** | | | |
| Surface Layer | 0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid. | 0 to 8 inches; dark grayish brown cobbly sandy loam; moderate granular structure; neutral. | 0 to 11 inches; dark brown gravelly loam; moderate granular structure; medium acid. |
| Subsoil | 6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid. | 8 to 32 inches; brown clay; massive; neutral. | 11 to 35 inches; brown very gravelly loam; massive; slightly acid. |
| Substratum | 34 inches; weathered andesitic rock. | 32 inches; lake sediments. | 35 inches; highly weathered sediments. |
| **Soil Properties & Management Interpretations** | | | |
| Effective Rooting Depth (inches) | 20 to 40 | 20 to 40 | 20 to 40 |
| Available Water Capacity Class | Low | Low | Low |
| AWC for top 20" | 2.2-2.7 | 2.5-3.1 | 1.7-2.3 |
| Permeability: Subsoil<br>Substratum | Moderately slow<br>Moderate | Slow<br>Slow | Moderate<br>Moderately rapid |
| Drainage Class | Well drained | Well drained | Well drained |
| Max Erosion Hazard | High | High | High |
| Seedling Mortality | Slight | Slight | Moderate to slight |
| Revegetating Exposed Subsoil | Slight | Slight | Slight |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>Not rated<br>120 to 190 | <br>5 P<br>190 to 250 | <br>5,6 P<br>120 to 190 |
| Soil Manageability<br>Group<br>Class | <br>III<br>3Ep | <br>III<br>4EpX | <br>III<br>3Ep |

**Inclusions**: Included in this unit are small areas of Aldi and Fugawee soils, and shallow soils. Included areas make up about 10 percent of the total area.

**Management Considerations**: Steep slopes and a relatively short growing season. Kyburz soils are moderately deep and have a thin surface layer. Aldi Variant soils reach field capacity rapidly and can produce surface runoff. They have a shallow effective rooting depth due to a dense clay subsoil, the subsoil has very low strength when wet, and the subsoil tends to perch water during the spring. Jorge Variant soils are moderately deep and have a high amount of rock fragments.

## XRE Tinker-Rock outcrop, metamorphic-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,600 feet  Annual Precipitation: 60 to 70 inches

**Typical Vegetation**: Red fir-Alder/Willow series; Mixed conifer-Alder/Willow series.

| Soil Map Unit Components | Tinker | Rock outcrop, metamorphif | Cryumbrepts, wet |
|---|---|---|---|
| Proportion (percent) | 45 | 25 | 20 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 21 inches; brown cobbly loam; weak granular structure; medium acid. | Metamorphic rock. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | 21 to 33 inches; reddish brown very cobbly loam; massive; slightly acid. | | |
| Substratum | 33 inches; pale olive cobbly coarse sandy loam; weakly cemented with silica. | | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | 22 to 40 | metamorphic | Variable |
| Available Water Capacity Class | Very low | | Very low |
| AWC for top 20" | 1.4-1.6 | | |
| Permeability: Subsoil | Moderately rapid | | Moderately rapid |
| Substratum | Very slow | | Very slow |
| Drainage Class | Well drained | | Poorly drained |
| Max Erosion Hazard | High | | Very high |
| Seedling Mortality | Severe to moderate | | Severe |
| Revegetating Exposed Subsoil | Moderate | | Severe |
| Soil Productivity | | | |
| Forest Survey Site Class | 5 RF, LP | | Not capable |
| Annual Forage (lbs/acre) | 270 to 380 | | 170 to 640 |
| Soil Manageability | | | |
| Group | III | | III |
| Class | 3epX | | 4EW |

**Inclusions**: Included in this unit are small areas of Celio, Tallac, and Woodseye soils, and soils similar to Tinker but with a thinner surface layer. Included areas make up about 10 percent of the total area.

**Management Considerations**: Tinker soils are moderately deep to a root restricting pan, have a high amount of rock fragments, and the subsoil remains moist above the pan during most of the growing season. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Metamorphic Rock outcrop areas are a potential source of aggretate.

## XRF Tinker-Rock outcrop, metamorphic-Cryumbrepts, wet complex, 30 to 50 percent slopes

Elevation: 6,000 to 8,600 feet  Annual Precipitation: 60 to 70 inches

**Typical Vegetation**

Red fir-Alder/Willow series; Mixed conifer-Alder/Willow series.

| Soil Map Unit Components | Tinker | Rock outcrop, metamorphif | Cryumbrepts, wet |
|---|---|---|---|
| Proportion (percent) | 45 | 25 | 20 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 21 inches; brown cobbly loam; weak granular structure; medium acid. | Metamorphic rock. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | 21 to 33 inches; reddish brown very cobbly loam; massive; slightly acid. | | |
| Substratum | 33 inches; pale olive cobbly coarse sandy loam; weakly cemented with silica. | | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | 22 to 40 | metamorphic | Variable |
| Available Water Capacity Class | Very low | | Very low |
| AWC for top 20" | 1.4-1.6 | | |
| Permeability: Subsoil | Moderately rapid | | Moderately rapid |
| Substratum | Very slow | | Very slow |
| Drainage Class | Well drained | | Poorly drained |
| Max Erosion Hazard | High | | Very high |
| Seedling Mortality | Severe to moderate | | Severe |
| Revegetating Exposed Subsoil | Moderate | | Severe |
| Soil Productivity | | | |
| Forest Survey Site Class | 5 RF, LP | | Not capable |
| Annual Forage (lbs/acre) | 270 to 380 | | 170 to 640 |
| Soil Manageability | | | |
| Group | IV | | IV |
| Class | 4EpX | | 4EW |

**Inclusions**

Included in this unit are small areas of Celio, Tallac, and Woodseye soils, and soils similar to Tinker but with a thinner surface layer. Included areas make up about 10 percent of the total area.

**Management Considerations**

Steep slopes. Tinker soils are moderately deep to a root restricting pan, have a high amount of rock fragments, and the subsoil remains moist above the pan during most of the growing season. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet. Concentrated surface runoff from areas of Rock outcrop can increase erosion on adjacent soils. Metamorphic Rock outcrop areas are a potential source of aggretate.

## XXE Jorge Variant-Kyburz complex, 2 to 30 percent slopes

Elevation: 5,800 to 6,400 feet  Annual Precipitation: 20 to 30 inches

| | | |
|---|---|---|
| Typical Vegetation | Jeffrey/Ponderosa-Sagebrush/Bitterbrush series. | |
| Soil Map Unit Components | **Jorge Variant** | **Kyburz** |
| Proportion (percent) | 60 | 30 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | 0 to 11 inches; dark brown gravelly loam; moderate granular structure; medium acid. | 0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid. |
| Subsoil | 11 to 35 inches; brown very gravelly loam; massive; slightly acid. | 6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid. |
| Substratum | 35 inches; highly weathered sediments. | 34 inches; weathered andesitic rock. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 20 to 40 | 20 to 40 |
| Available Water Capacity Class | Low | Low |
| AWC for top 20" | 1.7-2.3 | 2.2-2.7 |
| Permeability: Subsoil<br>Substratum | Moderate<br>Moderately rapid | Moderate<br>Moderate |
| Drainage Class | Well drained | Well drained |
| Max Erosion Hazard | High | High |
| Seedling Mortality | Moderate to slight | Slight |
| Revegetating Exposed Subsoil | Slight | Slight |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>5,6 P, WF<br>120 to 190 | <br>5 P, WF<br>120 to 190 |
| Soil Manageability Group<br>Class | <br>II<br>2ep | <br>II<br>2ep |

Inclusions: Included in this unit are small areas of Aldi and Trojan soils, and shallow soils. Included areas make up about 10 percent of the total area.

Management Considerations: Relatively short growing season and moderately deep soils. Jorge Variant soils have a high amount of rock fragments. Kyburz soils have a thin surface layer.

## XXF Jorge Variant-Kyburz complex, 30 to 50 percent slopes

Elevation: 5,800 to 6,400 feet  Annual Precipitation: 20 to 30 inches

Typical Vegetation: Jeffrey/Ponderosa-Sagebrush/Bitterbrush series.

| Soil Map Unit Components | Jorge Variant | Kyburz |
|---|---|---|
| Proportion (percent) | 60 | 30 |

### Soil Profile Description

| | | |
|---|---|---|
| Surface Layer | 0 to 11 inches; dark brown gravelly loam; moderate granular structure; medium acid. | 0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid. |
| Subsoil | 11 to 35 inches; brown very gravelly loam; massive; slightly acid. | 6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid. |
| Substratum | 35 inches; highly weathered sediments. | 34 inches; weathered andesitic rock. |

### Soil Properties & Management Interpretations

| | | |
|---|---|---|
| Effective Rooting Depth (inches) | 20 to 40 | 20 to 40 |
| Available Water Capacity Class | Low | Low |
| AWC for top 20" | 1.7-2.3 | 2.2-2.7 |
| Permeability: Subsoil<br>Substratum | Moderate<br>Moderately rapid | Moderately slow<br>Moderate |
| Drainage Class | Well drained | Well drained |
| Max Erosion Hazard | High | High |
| Seedling Mortality | Moderate to slight | Slight |
| Revegetating Exposed Subsoil | Slight | Slight |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>5,6 P, WF<br>120 to 190 | <br>5 P, WF<br>120 to 190 |
| Soil Manageability<br>Group<br>Class | <br>III<br>3Ep | <br>III<br>3Ep |

Inclusions: Included in this unit are small areas of Aldi and Trojan soils, and shallow soils. Included areas make up about 10 percent of the total area.

Management Considerations: Steep slopes. Relatively short growing season and moderately deep soils. Jorge Variant soils have a high amount of rock fragments. Kyburz soils have a thin surface layer.

## ZEE Zeibright gravelly fine sandy loam, 2 to 30 percent slopes

Elevation: 3,500 to 6,000 feet  Annual Precipitation: 50 to 70 inches

| | |
|---|---|
| Typical Vegetation | Mixed conifer-Mixed hardwood series. |
| Soil Map Unit Components | **Zeibright gravelly fine sandy loam** |
| Proportion (percent) | 85 |

### Soil Profile Description

| | |
|---|---|
| Surface Layer | 0 to 21 inches; dark brown gravelly fine sandy loam; weak granular structure; slightly acid. |
| Subsoil | 21 to 62 inches; yellowish brown very cobbly fine sandy loam; massive; strongly acid. |
| Substratum | |

### Soil Properties & Management Interpretations

| | |
|---|---|
| Effective Rooting Depth (inches) | 40 to 80 |
| Available Water Capacity Class | Very low to low |
| AWC for top 20" | 1.2-1.9 |
| Permeability: Subsoil | Moderately rapid |
| Substratum | Rapid |
| Drainage Class | Well drained |
| Max Erosion Hazard | Moderate |
| Seedling Mortality | Severe to moderate |
| Revegetating Exposed Subsoil | Slight |
| Soil Productivity | |
| Forest Survey Site Class | 3,2 SP, WF |
| Annual Forage (lbs/acre) | 50 to 440 |
| Soil Manageability | |
| Group | II |
| Class | 2ep |
| Inclusions | Included in this unit are small areas of McCarthy and Putt soils, and similar soils with a thin dark surface layer. Included areas make up about 15 percent of the total area. |
| Management Considerations | Coarse textures and a high amount of rock fragments. |

## ZEF Zeibright gravelly fine sandy loam, 30 to 50 percent slopes

Elevation: 3,500 to 6,000 feet  Annual Precipitation: 50 to 70 inches

| | |
|---|---|
| Typical Vegetation | Mixed conifer-Mixed hardwood series. |
| Soil Map Unit Components | **Zeibright gravelly fine sandy loam** |
| Proportion (percent) | 75 |

### Soil Profile Description

| | |
|---|---|
| Surface Layer | 0 to 21 inches; dark brown gravelly fine sandy loam; weak granular structure; slightly acid. |
| Subsoil | 21 to 62 inches; yellowish brown very cobbly fine sandy loam; massive; strongly acid. |
| Substratum | |

### Soil Properties & Management Interpretations

| | |
|---|---|
| Effective Rooting Depth (inches) | 40 to 80 |
| Available Water Capacity Class | Very low to low |
| AWC for top 20" | 1.2-1.9 |
| Permeability: Subsoil<br>Substratum | Moderately rapid<br>Rapid |
| Drainage Class | Well drained |
| Max Erosion Hazard | High |
| Seedling Mortality | Severe to moderate |
| Revegetating Exposed Subsoil | Slight |
| Soil Productivity<br>Forest Survey Site Class<br>Annual Forage (lbs/acre) | <br>3,2 SP, WF, P<br>50 to 440 |
| Soil Manageability<br>Group<br>Class | <br>III<br>3Ep |
| Inclusions | Included in this unit are small areas of McCarthy and Putt soils, and similar soils with a thin dark surface layer. Included areas make up about 25 percent of the total area. |
| Management Considerations | Steep slopes, coarse textures, and a high amount of rock fragments. |

## ZFF Zeibright-Putt-Cryumbrepts, wet complex, 30 to 60 percent slopes

Elevation: 3,500 to 6,000 feet  Annual Precipitation: 50 to 70 inches

Typical Vegetation: Mixed conifer-Alder/Willow series.

| Soil Map Unit Components | Zeibright | Putt | Cryumbrepts, wet |
|---|---|---|---|
| Proportion (percent) | 45 | 30 | 15 |

### Soil Profile Description

| | | | |
|---|---|---|---|
| Surface Layer | 0 to 21 inches; dark brown gravelly fine sandy loam; weak granular structure; slightly acid. | 0 to 20 inches; dark grayish brown very cobbly sandy loam; moderate granular structure; slightly acid. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | 21 to 62 inches; yellowish brown very cobbly fine sandy loam; massive; strongly acid. | 20 to 55 inches; pale yellow very cobbly sandy loam; weakly cemented with silica. | |
| Substratum | | | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

### Soil Properties & Management Interpretations

| | | | |
|---|---|---|---|
| Effective Rooting Depth (inches) | 40 to 80 | 20 to 34 | Variable |
| Available Water Capacity Class | Very low to low | Very low | Very low |
| AWC for top 20" | 1.2-1.9 | 0.9-1.1 | |
| Permeability: Subsoil | Moderately rapid | Moderately rapid | Moderately rapid |
| Substratum | Rapid | Very slow | Very slow |
| Drainage Class | Well drained | Well drained | Poorly drained |
| Max Erosion Hazard | High | High | Very high |
| Seedling Mortality | Severe to moderate | Severe | Severe |
| Revegetating Exposed Subsoil | Slight | Moderate | Severe |
| Soil Productivity | | | |
| Forest Survey Site Class | 3 P, WF | 4 P, WF | Not capable |
| Annual Forage (lbs/acre) | 50 to 440 | 70 to 120 | 170 to 640 |
| Soil Manageability | | | |
| Group | IV | IV | IV |
| Class | 4Ep | 4EPX | 4EW |

Inclusions: Included in this unit are small areas of McCarthy soils, Rock outcrop, and soils similar to Zeibright but with a thin dark surface layer. Included areas make up about 10 percent of the total area.

Management Considerations: Steep and very steep slopes. Coarse textures and a high amount of rock fragments. Putt soils are moderately deep to a root restricting pan. Cryumbrepts, wet have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

## Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 9, the soils of the survey area are listed alphabetically and are classified according to the system. The classification categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in "sol". An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Xeralf ("Xer", meaning dry, plus "alf", from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haploxeralf ( "Hapl", meaning minimal horizonation, plus "xeralf", the suborder of the Alfisols that have a xeric moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjectives "Lithic Mollic" identifies the subgroup that has hard parent rock within 20 inches of the surface and is an intergrade between Haploxeralfs and Argixerolls. An example is Lithic Mollic Haploxeralfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are the particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is loamy, mixed, thermic Lithic Mollic Haploxeralfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or the substratum can differ within a series.

## TABLE 1. - Classification by Soil Name

| Soil name | Family or higher taxonomic class |
|---|---|
| Ahart series | Medial, frigid Andic Xerumbrepts |
| Aiken series | Clayey, oxidic, mesic Xeric Haplohumults |
| Aldi series | Clayey, montmorillonitic, frigid Lithic Ultic Argixerolls |
| Aldi Variant | Fine, montmorillonitic, frigid Pachic Ultic Argixerolls |
| Aspen Variant | Loamy-skeletal, mixed, frigid Entic Haploxerolls |
| Badenaugh series | Loamy-skeletal, mixed, mesic Aridic Argixerolls |
| Boomer series | Fine-loamy, mixed, mesic Ultic Haploxeralfs |
| Boomer Variant | Loamy-skeletal, mixed, mesic Ultic Haploxeralfs |
| Bucking series | Sandy, mixed, frigid Entic Xerumbrepts |
| Bucking Variant | Sandy, mixed, frigid Entic Xerumbrepts |
| Celio series | Sandy-skeletal, mixed, frigid Entic Haplumbrepts |
| Celio Variant | Sandy-skeletal, mixed, frigid Entic Xerumbrepts |
| Chaix series | Coarse-loamy, mixed, mesic Dystric Xerochrepts |
| Chaix Variant | Coarse-loamy, mixed, frigid Dystric Xerochrepts |
| Chawanakee series | Loamy, mixed, mesic, shallow Dystric Xerochrepts |
| Cohasset series | Fine-loamy, mixed, mesic Ultic Haploxeralfs |
| Crozier series | Fine-loamy, mixed, mesic Ultic Haploxeralfs |
| Deadwood series | Loamy-skeletal, mixed, mesic Dystric Lithic Xerochrepts |
| Delleker series | Fine-loamy, mixed, frigid Typic Haploxeralfs |
| Dotta series | Fine-loamy, mixed, mesic Pachic Argixerolls |
| *Dubakella series | Clayey-skeletal, serpentinitic, mesic Mollic Haploxeralfs |
| Dubakella Variant | Loamy-skeletal, serpentinitic, mesic Lithic Mollic Haploxeralfs |
| Euer series | Loamy-skeletal, mixed, frigid Ultic Haploxeralfs |
| Euer Variant | Loamy-skeletal, mixed, frigid Ultic Haploxeralfs |
| Forbes series | Fine, oxidic, mesic Ultic Haploxeralfs |
| *Franktown series | Loamy-skeletal, mixed, frigid Lithic Ultic Haploxerolls |
| Fugawee series | Fine-loamy, mixed, frigid Ultic Haploxeralfs |
| Fugawee Variant | Loamy, mixed, frigid, shallow Ultic Haploxeralfs |
| Gefo series | Sandy, mixed, frigid Entic Xerumbrepts |
| Gefo Variant | Coarse-loamy, mixed, frigid Pachic Xerumbrepts |
| Haypress series | Sandy, mixed, frigid Entic Haploxerolls |
| Hoda series | Fine, kaolinitic, mesic Ultic Haploxeralfs |
| Holland series | Fine-loamy, mixed, mesic Ultic Haploxeralfs |
| Horseshoe series | Fine-loamy, mixed, mesic Xeric Haplohumults |
| Hotaw series | Fine-loamy, mixed, mesic Ultic Haploxeralfs |
| Hotaw Variant | Fine-loamy, mixed, frigid Ultic Haploxeralfs |
| Hurlbut series | Fine-loamy, mixed, mesic Dystric Xerochrepts |
| Huysink series | Loamy-skeletal, mixed, mesic Xeric Haplohumults |
| *Inville series | Loamy-skeletal, mixed, frigid Ultic Haploxeralfs |
| Jocal series | Fine-loamy, mixed, mesic Typic Haploxerults |
| Jocal Variant | Loamy-skeletal, mixed, mesic Ultic Haploxeralfs |
| Jorge series | Loamy-skeletal, mixed, frigid Ultic Haploxeralfs |
| Jorge Variant | Loamy-skeletal, mixed, frigid Ultic Haploxeralfs |
| Kinkel Variant | Loamy-skeletal, mixed, mesic Ultic Haploxeralfs |
| Kyburz series | Fine-loamy, mixed, frigid Ultic Haploxeralfs |

| Soil name | Family or higher taxonomic class |
|---|---|
| Ledford series | Coarse-loamy, mixed, friged Entic Xerumbrepts |
| Ledford Variant | Coarse-loamy, mixed, frigid Entic Xerumbrepts |
| Ledmount series | Medial, mesic Lithic Xerumbrepts |
| Ledmount Variant | Medial-skeletal, frigid Lithic Xerumbrepts |
| Lorack series | Loamy-skeletal, mixed, frigid Ultic Haploxeralfs |
| Lorack Variant | Loamy-skeletal, mixed, frigid Ultic Haploxeralfs |
| Mariposa series | Fine-loamy, mixed, mesic Ruptic-Lithic-Xerochreptic Haploxerults |
| Martineck series | Clayey-skeletal, montmorillonitic, mesic, shallow Aridic Durixerolls |
| Martis series | Fine-loamy, mixed, frigid Ultic Haploxeralfs |
| Martis Variant | Loamy-skeletal, mixed, frigid Ultic Haploxeralfs |
| McCarthy series | Medial-skeletal, mesic Andic Xerumbrepts |
| Meiss series | Medial Lithic Cryumbrepts |
| Musick series | Fine-loamy, mixed, mesic Ultic Haploxeralfs |
| *Neer series | Medial-skeletal, mesic Andic Xerochrepts |
| Ponto Variant | Medial, mesic Andic Xerochrepts |
| Portola series | Medial, frigid Andic Xerochrepts |
| Putt series | Loamy-skeletal, mixed, mesic Andic Xerumbrepts |
| Rouen Variant | Fine-silty, mixed, frigid Typic Xerochrepts |
| Sattley series | Loamy-skeletal, mixed, frigid Ultic Argixerolls |
| *Sierraville series | Fine, montmorillonitic, frigid Ultic Haploxeralfs |
| Sites series | Clayey, oxidic, mesic Xeric Haplohumults |
| Smokey series | Loamy-skeletal, mixed, frigid Dystric Xerochrepts |
| Smokey Variant | Loamy-skeletal, mixed, frigid Dystric Xerochrepts |
| Tahoma series | Fine-loamy, mixed, frigid Ultic Haploxeralfs |
| Tahoma Variant | Fine-loamy, mixed, frigid Ultic Haploxeralfs |
| Tallac series | Loamy-skeletal, mixed, frigid Pachic Xerumbrepts |
| Tinker series | Loamy-skeletal, mixed, frigid Andic Haplumbrepts |
| Toiyabe series | Mixed, frigid, shallow Typic Xeropsamments |
| Trojan series | Fine-loamy, mixed, frigid Ultic Argixerolls |
| Umpa series | Loamy-skeletal, mixed, frigid Dystric Xerochrepts |
| Waca series | Medial-skeletal, frigid Andic Xerumbrepts |
| Windy series | Medial-skeletal, frigid Andic Xerumbrepts |
| Woodseye series | Loamy-skeletal, mixed, frigid Lithic Xerumbrepts |
| Woodseye Variant | Loamy-skeletal, mixed, frigid Lithic Xerumbrepts |
| Zeibright series | Loamy-skeletal, mixed, mesic Entic Xerumbrepts |

*Soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series

# Taxonomic Unit Descriptions

In this section, each soil recognized in the survey area is described. The descriptions are arranged in alphabetical order.

Characteristics of the soil and the material in which it formed are identified. A pedon, a small three-dimensional area of soil, that is typical of the soil in the survey area is described. The soil is compared with similar soils in the same taxonomic family and with soils in other closely related families. The soil is also compared with other soils that are associated geographically. The detailed description of each soil horizon follows standards in the Soil Survey Manual (9). Unless otherwise stated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soil.

## AHART SERIES

The Ahart series consists of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from rhyolitic tuff. Ahart soils are usually in areas where the rhyolitic tuff has been exposed from under a capping of andesitic mudflow of the Merhten Formation. Slope ranges from 2 to 50 percent.

The vegetation is mainly semi-dense to dense stands of high elevation mixed confiers, consisting of white fir, red fir, and Jeffrey pine. Elevation is 5,500 to 8,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 38 to 42 degrees F, and the average frost-free season is 50 to 70 days.

Permeability is moderately rapid. Available water capacity is low, runoff is medium, and the erosion potential is moderate to high.

The Ahart soils are similar to the McCarthy, Ponto Variant, and Portola soils, and are associated with the Meiss, Waca, and Leadmount Variant soils. McCarthy and Ponto Variant soils have a mesic soil temperature regime. Portola soils have ochric epipedons and are skeletal. Meiss and Leadmount Variant soils are less than 20 inches deep and have a lithic contact. Waca soils are skeletal.

**Taxonomic class.** These soils are medial, frigid Andic Xerumbrepts.

Typical pedon of Ahart gravelly sandy loam in a unit of Ahart-Waca, rhyolitic substratum complex, 2 to 30 percent slopes, about 1 mile southwest of Ice Lakes in the Onion Creek Experimental Forest, near the center of the NE1/4 of section 2, T. 16 N., R. 14 E.

O1 2 inches to 0; litter and duff.

A11 0 to 8 inches; dark brown (10YR 3/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; few fine roots; many very fine interstitial pores; 16 percent pebbles; slightly acid (pH 6.5); clear irregular boundary.

A12 8 to 18 inches; brown (10YR 4/3) gravelly fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots, and many medium roots; many very fine and fine interstitial pores; 20 percent pebbles; medium acid (pH 5.7); clear wavy boundary.

A13 18 to 31 inches; brown (10YR 5/3) gravelly fine sandy loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine interstitial pores; 16 percent pebbles; strongly acid (pH 5.5); clear wavy boundary.

Cr 31 inches; weathered and fractured rhyolitic tuff, with few roots in cracks 4 to 6 in. apart.

**Range in characteristics.** The depth to weathered rhyolitic tuff is 20 to 40 inches. Thickness of the umbric epipedon is between 20 and 38 inches thick. The average base saturation is between 25 and 50 percent throughout the profile.

The A horizon has dry color of 10YR 3/3, 4/2, 4/3, 5/2, or 5/3 and moist color of 10YR 2/2, 3/2, 3/3, or 7.5YR 3/2. It is gravelly fine sandy loam or gravelly sandy loam and contains 15 to 25 percent gravel. The A horizon is slightly acid to strongly acid.

Some pedons have a C horizon with dry colors of 10YR 4/3, 5/2, 5/3, 5/4, 6/3, or 6/4 and moist colors of 10YR 4/3, 4/4, 5/3, 5/4, 6/3, or 6/4. It is sandy loam, fine sandy loam, or loam and has 5 to 20 percent gravel. The horizon is medium acid or strongly acid.

## AIKEN SERIES

The Aiken series consists of very deep, well drained soils on flat or rounded ridgetops. These soils formed in residuum weathered from andesitic mudflows. Slope ranges from 2 to 50 percent.

The native vegetation is mainly dense stands of mixed conifers and hardwoods, consisting of Douglas-fir, ponderosa pine, white fir, incense cedar, sugar pine, or black oak. Considerable acreage of this soil near Foresthill has been planted to ponderosa pine plantations. Elevation is 2,000 to 4,500 feet. The average annual precipitation is about 50 to 65 inches, the average annual air temperature is about 54 to 60 degrees F, and the average frost-free season is 150 to 200 days.

Permeability is moderately slow to slow. Available water capacity is moderate to high, runoff is medium, and the erosion potential is moderate to high.

The Aiken soils are similar to the Hoda, Musick, Sierraville, and Sites soils and associated with the Cohasset and Crozier soils. Cohasset soils are fine-loamy. Crozier soils are less than 40 inches deep and are fine-loamy. Sierraville soils have a frigid soil temperature regime. Sites soils have metasedimentary parent material and have argillic horizons in which the clay content decreases by more than 20 percent above 60 inches. Hoda and Musick soils have granitic parent material and have greater than 35 percent base saturation in the argillic horizon.

**Taxonomic class.** These soils are clayey, oxidic, mesic Xeric Haplohumults.

Typical pedon of Aiken loam is in a unit of Aiken-Cohasset complex, 2 to 30 percent slopes, about 5 miles northeast of Foresthill, 100 yards west of Foresthill Divide Road, in the center of section 9, T. 14 N., R. 11 E.

A11 0 to 4 inches; brown (7.5YR 4/4) loam, dark reddish brown (5YR 3/3) moist; weak to moderate very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; common to many fine and medium roots; common very fine and fine interstitial pores; neutral (pH 6.7); clear smooth boundary.

A12 4 to 10 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/3) moist; weak very fine and fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots, few medium and coarse roots; common very fine and fine interstitial pores, few fine tubular pores; common fine manganese shot; neutral (pH 6.6); clear smooth boundary.

A3 10 to 22 inches; reddish brown (5YR 4/4) loam, dark reddish brown (2.5YR 3/4) moist; weak fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common fine and medium roots; few very fine and fine interstitial pores; few thin clay films lining pores; common fine manganese shot; slightly acid (pH 6.3); clear smooth boundary.

B1t 22 to 41 inches; yellowish red (5YR 4/8) clay loam, dark red (2.5YR 3/6) moist; massive; hard, firm, sticky and plastic; common to many medium and coarse roots; common very fine and fine interstitial and few very fine tubular pores; common thin clay films lining pores and as bridges between mineral grains; common fine manganese shot; medium acid (pH 5.9); clear wavy boundary.

B21t 41 to 54 inches; red (2.5YR 5/6) clay, dark red (2.5YR 3/6) moist; massive; very hard, very firm, sticky and plastic; few fine and medium roots; many fine and medium tubular pores, common very fine and fine interstitial pores; common moderately thick clay films lining pores and as bridges between mineral grains; common fine manganese shot; medium acid (pH 5.9); clear wavy oundary.

B22t 54 to 70 inches; strong brown (7.5YR 5/6) clay, yellowish red (5YR 4/6) moist; massive; hard, firm, very sticky and very plastic; few to common very fine and fine interstitial and tubular pores; many moderately thick clay films lining pores and as bridges between mineral grains; common fine manganese shot; strongly acid (pH 5.5).

**Range in characteristics.** Thickness of the solum ranges from 60 to 90 inches. Manganese shot less than 5 millimeters in diameter is common throughout the profile. Weathered andesitic cobbles range from 0 to 25 percent, usually increasing in amounts in the lowermost horizon.

The A horizon has dry color of 7.5YR 3/2, 4/2, 4/4, 5/2, 5/4, 5YR 3/3, 4/3, 4/4, or 4/6 and has moist chromas less than 3.5 to a depth of 10 inches. It is neutral or slightly acid.

The upper B2t horizons has colors of 5YR 4/6, 4/8, 5/6, 5/8, 2.5YR 3/6, 4/6, 4/8, 5/6, or 5/8. The lower B2t horizons has colors of 7.5YR 5/4, 5/6, 5YR 4/4, 5/4, 4/6, or 5/6. It is medium acid or strongly acid. Textures are clay in the B2t horizons and when present, the B3t horizon is clay loam. It is massive or has subangular blocky structure.

## ALDI SERIES

The Aldi series consists of shallow, well drained soils on mountainsides. These soils formed in residuum weathered from volcanic rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly bitterbrush, sagebrush with some annual and perennial grasses. Elevation is 5,200 to 6,500 feet. The average annual precipitation is about 15 to 35 inches, the average annual air temperature is about 41 to 44 degrees F., and the average frost-free season is 50 to 75 days.

Permeability is slow. Available water capacity is very low to low. Runoff is medium to rapid and the erosion potential is high to very high.

The Aldi soils are similar to the Franktown and Fugawee Variant soils. Franktown soils are loamy-skeletal. Fugawee Variant soils are fine-loamy.

**Taxonomic class.** These soils are clayey, montmorillonitic, frigid Lithic Ultic Argixerolls.

Typical pedon of Aldi loam in a unit of Aldi-Aquoll-Kyburz complex, 2 to 9 percent slopes, about one mile southeast of Woodchopper Spring near the center of section 19, T. 18 N., R. 17 E.

01 Trace; fresh and slightly decomposed grass and bitterbrush litter.

A1 0 to 8 inches; brown (10YR 4/3) loam, dark reddish brown (5YR 3/2) moist; weak fine granular structure; slightly hard, friable, nonsticky and slightly plastic; common very fine and fine roots, few medium roots; few very fine tubular pores, common very fine and fine interstitial pores; slightly acid (pH 6.5); clear wavy boundary.

B2t 8 to 18 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium and coarse angular blocky structure; hard, firm, sticky and plastic; few very fine roots; common fine tubular and interstitial pores; many moderately thick clay films on faces of peds and lining pores; neutral (pH 7.0); diffuse irregular boundary.

R 18 inches; weathered andesite or basalt.

**Range in characteristics.** Depth to rock is 10 to 20 inches. Base saturation is 50 percent in the soil surface. Thickness of the mollic epipedon is 7 to 14 inches.

The A horizon has dry color of 10YR 5/2, 5/3, or 4/3 and moist color of 5YR 3/2, 7.5YR 3/2, or 10YR 3/2. Texture is loam with 5 percent gravel and it is slightly acid or neutral.

The B2t horizon is 7.5YR 4/4, 5/4, 10YR 5/3 dry and 7.5YR 4/4, 10YR 3/2, 3/4 moist. Texture is clay loam with 5 to 15 percent gravel and it is medium acid to neutral.

## ALDI VARIANT

The Aldi Variant soils consist of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from lake sediments. Slope ranges from 2 to 50 percent.

The vegetation is mainly sagebrush and grass. Elevation is 5,500 to 6,400 feet. The average annual precipitation is about 20 to 35 inches, the average annual air temperature is 42 to 44 degrees F., and the average frost-free season is 20 to 40 days.

Permeability is slow. Available water capacity is low, runoff is medium, and the erosion potential is high.

The Aldi Variant soils are similar to Aldi soils and are associated with the Jorge Variant, Kyburz, and Martis Variant soils. Aldi soils are less than 20 inches deep to a lithic contact. Kyburz soils are fine-loamy. Jorge Variant and Martis Variant soils are skeletal.

**Taxonomic class.** These soils are fine, montmorillonitic, frigid Pachic Ultic Argixerolls.

Typical pedon of Aldi Variant cobbly sandy loam in a unit of Aldi Variant-Kyburz-Jorge Variant complex, 2 to 30 percent slopes, approximately 1/4 mile east of Boca Reservoir along the Boca Spring Road near the center of section 10, T. 18 N., R. 17 E.

A1 0 to 8 inches; dark grayish brown (10YR 4/2) cobbly sandy loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common very fine and fine interstitial pores; 20 percent cobbles; neutral (pH 7.0); clear wavy boundary.

B1t 8 to 19 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common medium and coarse roots; common very fine interstitial pores; common moderately thick clay films lining pores; neutral (pH 7.0); gradual wavy boundary.

B2t 19 to 32 inches; brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; massive; very hard, very firm, very sticky and very plastic; common fine and medium roots, few coarse roots; few very fine interstitial pores; common moderately thick clay films lining pores; neutral (pH 7.0); clear wavy boundary.

Cr 32 inches; lake sediments.

**Range in characteristics:** Depth to soft lake sediments ranges from 20 to 40 inches. Reaction is neutral to medium acid.

The A horizon has dry colors of 10YR 3/3, 4/2, 4/3, or 5/3 with moist colors of 7.5YR 3/2, or 10YR 2/2. Textures are sandy loam, silt loam, or loam with 0 to 20 percent cobbles and stones.

The B horizon has colors of 10YR 5/3, 4/3, 3/3, 7.5YR 5/4, 5/2, 4/4, 4/2, 3/4, or 3/2. Textures are clay loam in the upper B horizon and clay in the lower part. Gravel ranges from 0 to 20 percent throughout the horizon.

## AQUOLLS

Aquolls consist of shallow and moderately deep, very poorly drained soils in drainageways and on valley floors. These soils formed in residuum weathered from mixed alluvium. Slope ranges from 0 to 15 percent.

The native vegetation is mainly wet meadow vegetation consisting of Carex and Juncas with some alder, willow, and aspen. Elevation is 2,000 to 8,500 feet. The average annual precipitation is about 18 to 80 inches; the average annual air temperature is 40 to 52 degrees F, and the average frost-free season is 25 to 200 days.

Typically, the surface layer is thick and dark colored, stratified coarse sand to clay. The subsoil is stratified layers with mottles of sandy loam to clay, underlain by stratified alluvium.

Permeability is variable. Available water capacity varies from very low to moderate and runoff is very slow to ponded. Aquolls are used mainly for meadowland forage. A high water table provides summertime moisture for native meadow vegetation. They commonly develop on broad flats in the flood plains of streams and are naturally wet with mottles in the subsurface horizons. Coarse fragments both pebble and cobble size are highly variable throughout with some profiles having more than 35 percent by volume. B2t horizons are present in some profiles while others have just AC horizons.

## ASPEN VARIANT

Aspen Variant soils consist of deep, well drained soils on mountainsides. These soils formed in residuum weathered from metavolcanic rocks. Slope ranges from 2 to 50 percent.

The native vegetation is mainly semi-dense stands of high elevation mixed conifers and brush, consisting of white fir, Jeffrey pine and ceanothus. Considerable acreage of this soil was burned over during the 1960 Donner Ridge fire. Elevation is 5,200 to 7,800 feet. The average annual precipitation is about 20 to 25 inches, the average annual air temperature is 36 to 40 degrees F, and the average frost-free season is 20 to 25 days.

Permeability is moderately rapid. Available water capacity is very low to low, runoff is medium to rapid, and the erosion potential is high.

The Aspen Variant soils are similar to the Haypress soils and are associated with the Rouen Variant and Sierraville soils. Haypress soils are not skeletal. Sierraville soils are fine textured and Rouen Variant soils have ochric epipedons with low base saturation.

**Taxonomic class.** These soils are loamy-skeletal, mixed, frigid Entic Haploxerolls.

Typical pedon of Aspen Variant in a unit of Rouen Variant-Aspen Variant-Sierraville complex, 30 to 50 percent slopes, in the NW1/4 of section 34, T. 20 N., R. 17 E.

01 Trace; fresh and decomposed litter.

A11 0 to 10 inches; dark grayish brown (2.5Y 4/2) gravelly very fine sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; 20 percent pebbles; mildly alkaline (pH 7.5).

A12 10 to 18 inches; grayish brown (2.5Y 5/2) cobbly fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; 20 percent pebbles, 15 percent cobbles; neutral (pH 7.0).

C1 18 to 29 inches; light brownish gray (2.5Y 6/2) very cobbly fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; 20 percent pebbles, 20 percent cobbles; slightly acid (pH 6.3).

C2 29 to 40 inches; light brownish gray (2.5Y 6/2) very cobbly fine sandy loam, very dark grayish brown (2.5Y 3/2) moist; weak fine and medium subangular blocky structure; 30 percent pebbles, 15 percent cobbles; medium acid (pH 6.0).

C3r 40 inches; weathered metavolcanic rock.

**Range in characteristics.** Depth to weathered metavolcanic rock is greater than 40 inches. Gravel range from 15 to 30 percent and cobbles 0 to 20 percent throughout the profile.

The A horizon has dry colors of 2.5Y 5/2, 4/2, 10YR 5/2, or 4/2 and moist colors of 10YR 3/2, or 2/2. Textures are sandy loam, fine sandy loam, or gravelly very fine sandy loam.

The C horizon has dry colors of 2.5Y 6/2, 6/4, 10YR 6/2, or 6/4. Textures are very cobbly or very gravelly fine sandy loam or sandy loam.

## BADENAUGH SERIES

The Badenaugh Series consists of deep, well drained soils on lacustrine terraces and flood plains. These soils formed in residuum weathered from cobbly mixed alluvium. These sediments are near the shoreline of the ancient lake that once filled valley basins, mostly on the perimeter of Sierra Valley. Slope ranges from 2 to 30 percent.

The vegetation is mainly mixed brush with scattered conifers consisting of sagebrush, bitterbrush, and widely scattered Jeffrey pine and juniper. Elevation is 5,000 to 5,800 feet. The average annual precipitation is about 14 to 18 inches, the average annual air temperature is about 40 to 46 degrees F., and the average frost free season is 50 to 60 days.

Permeability is moderately rapid. Available water capacity is low, runoff is slow to medium, and the erosion potential is high.

The Badenaugh soils are similar to the Aldi Variant and Dotta soils and are associated with the Dotta- and Martineck soils. Aldi Variant and Dotta soils are not skeletal and Aldi Variant soils have a frigid soil temperature regime. Martineck soils have a duripan within 20 inches.

**Taxonomic class.** These soils are loamy-skeletal, mixed, mesic Aridic Argixerolls.

Typical pedon of Badenaugh cobbly loam in a unit of Badenaugh-Martineck-Dotta association 2 to 30 percent slopes, about one mile southeast of the town of Loyalton along the east side of Smithneck Canyon Road, 1,500 feet south-southeast of the N1/4 corner of section 19, T. 21 N., R. 16 E.

A11 0 to 2 inches; brown (7.5YR 4/2) cobbly loam, very dark brown (10YR 2/2) moist; weak fine granular structure; loose, friable, slightly sticky and slightly plastic; many very fine roots, common medium roots, and few coarse roots; many very fine and fine interstitial pores; 10 percent pebbles and 20 percent cobbles; neutral (pH 7.0); abrupt smooth boundary.

A12 2 to 6 inches; brown (7.5YR 4/2) very cobbly loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots, common medium roots, and few coarse roots; common very fine and fine interstitial pores; very few thin clay films lining pores and as bridges between mineral grains; 15 percent pebbles and 25 percent cobbles; neutral (pH 6.8); gradual smooth boundary.

B1t 6 to 12 inches; brown (7.5YR 4/2) very cobbly loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots, few medium roots; common very fine and fine tubular and interstitial pores; few thin clay films lining pores and as bridges between mineral grains; 20 percent pebbles and 30 percent cobbles; slightly acid (pH 6.5); clear smooth boundary.

B2t 12 to 17 inches; brown (7.5YR 4/2) very cobbly clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; very hard, slightly firm, slightly sticky and slightly plastic; common very fine and fine roots, few medium roots; common very fine and fine interstitial pores, few medium tubular pores; common moderately thick clay films lining pores and as bridges between mineral grains; 15 percent pebbles and 35 percent cobbles; slightly acid (pH 6.3); clear smooth boundary.

B3 17 to 27 inches; brown (7.5YR 4/2) variable mineral color and black manganese stains, very cobbly sandy clay loam, brown (10YR 4/3) and dark brown (7.5YR 3/2) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine and medium roots; few very fine and fine tubular and interstitial pores; common moderately thick clay films lining pores, as bridges between mineral grains, and on cobble; 40 percent cobbles and 10 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

C1 27 to 50 inches; brown (7.5YR 4/2) variable mineral color and black manganese stains, extremely cobbly sandy clay loam, mixed brown and dark brown (10YR 5/3, 7.5YR 3/2) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine roots; few very fine interstitial pores; moderately thick clay films on cobbles and bridging sand grains; 50 percent cobbles and 20 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

C2 50 to 60 inches; brown (10YR 5/3) matrix with variable colored mineral grains, extremely cobbly sandy clay loam, mixed brown and dark brown (10YR 5/3, 7.5YR 3/2) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine roots; few very fine and fine pores; moderately thick clay films on cobbles and bridging sand grains; 65 percent cobbles and 10 percent pebbles; medium

acid. (pH 6.0).

**Range in characteristics.** Thickness of the solum ranges from 24 to 48 inches. Andesitic rock fragments of pebble and cobble size occur throughout the profile. The rock fragment content is more than 35 percent and is as much as 80 percent in some pedons.

The A horizon has dry color of 10YR 5/2, 4/2, 5/3, 4/3, 3/3, 7.5YR 5/2, 5/4, 4/2, 4/4, or 3/2. It is cobbly or very cobbly sandy loam or loam.

The B2t horizon has dry color of 10YR 6/2, 5/2, 5/3, 4/3, 7.5YR 4/2, 4/4, 5/2, or 5/4. It is very cobbly clay loam or sandy clay loam.

The C horizon is extremely cobbly sandy loam or sandy clay loam.

## BOOMER SERIES

The Boomer series consists of deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from basic igneous rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly dense stands of mixed conifers and hardwoods consisting of Douglas-fir, white fir, ponderosa pine, sugar pine, incense cedar, black oak, tan oak, and madrone. Elevation is 1,500 to 3,200 feet. The average annual precipitation is about 50 to 65 inches, the average annual air temperature is about 56 to 62 degrees F, and the average frost-free season is 175 to 225 days.

Permeability is moderately slow. Available water capacity is moderate to high, runoff is medium to rapid, and the erosion potential is high.

The Boomer soils are associated with the Boomer Variant, Hoda, Jocal, Mariposa, Musick and Sites. Boomer Variant soils are skeletal. Hoda and Musick soils have granitic parent material and have a higher percentage of coarse sand in the argillic horizon. Jocal, Mariposa, and Sites soils have less than 35 percent base saturation in the Bt horizons.

**Taxonomic class.** These soils are fine-loamy, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Boomer sandy loam in a unit of Boomer-Boomer Variant complex, 50 to 75 slopes, at the base of the Succer Bar Trail, in section 24, T. 19 N., R. 7 E.

O1 1 inch to 0; fresh and decomposed litter.

A1 0 to 3 inches; brown (7.5YR 4/4) sandy loam, dark reddish brown (5YR 3/4) moist; moderate very fine and fine granular structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and fine tubular and interstitial pores; medium acid (pH 5.6); abrupt wavy boundary.

B1t 3 to 16 inches; light brown (7.5YR 6/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine and fine roots, few medium and coarse roots; many fine tubular and intersitital pores; common moderately thick clay films lining pores; medium acid (pH 5.6); gradual wavy boundary.

B2t 16 to 41 inches; reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 4/6) moist; massive; slightly hard, firm, sticky and plastic; few fine, medium, and coarse roots; few fine tubular pores; continuous moderately thick clay films on faces of peds and lining pores; medium acid (pH 5.8); diffuse boundary.

B3t 41 to 60 inches; varigated color, sandy clay loam; massive; slightly hard, firm, slightly sticky and slightly plastic; few medium and coarse roots; common very fine tubular pores; common moderately thick clay films on faces of peds and lining pores; medium acid (pH 5.8); diffuse boundary.

**Range in characteristics.** Thickness of the rooting zone ranges from 40 to 65 inches. The soil is slightly acid to medium acid throughtout the profile.

The A horizon has dry colors of 7.5YR 5/4, 5/2, 4/4, 4/2, 3/4, 3/2, 5YR 4/4, or 4/2 and moist colors of 5YR 3/3, 3/4, 4/3, or 4/4. It is sandy loam or loam. Gravel content ranges from 0 to 15 percent, and cobbles range from 0 to 10 percent.

B2t horizons have dry colors of 5YR 6/8, 6/6, 5/4, 2.5YR 5/8, 5/6, 4/8, or 4/6 and moist colors of 5YR 3/4, 4/4, 4/6, 4/8, 5/6, 5/8, 2.5YR 3/6, 4/8, or 5/8. Textures are sandy clay loam, silty clay loam, or clay loam. Gravel content ranges from 5 to 15 percent and cobbles range from 0 to 5 percent.

## BOOMER VARIANT

The Boomer Variant consists of a deep and very deep, well drained soil on mountainsides. These soils formed in residuum weathered from basic igneous rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly dense stands of mixed conifers and hardwoods and madrone. Elevation is 1,500 to 3,200 feet. The average annual precipitation is about 50 to 65 inches, the average annual air temperature is about 56 to 62 degrees F, and the average frost free season is 175 to 225 days.

Permeability is moderately slow. Available water capacity is low, runoff is medium to rapid, and the erosion potential is moderate to high.

The Boomer Variant soils are associated with the Boomer, Hoda, Jocal, Mariposa, Musick, and Sites soils. Boomer soils are not skeletal. Hoda and Musick soils are formed on granitic rock and have a higher amount of coarse sand in the argillic horizon. Mariposa, Jocal, and Sites soils have less than 35 percent base saturation in the argillic horizon.

**Taxonomic class.** These soils are loamy-skeletal, mixed, mesic Ultic Haploxeralfs

Typical pedon of Boomer Variant cobbly sandy loam in a unit of Boomer-Boomer Variant-Sites complex, 30 to 50 percent slopes, about 1.5 miles west of Camptonville in the NW1/4NW1/4 of section 3, T. 18 N., R. 8 E.

O1 1 inch to 0; litter and duff.

A11 0 to 2 inches; brown (7.5YR 4/2) cobbly sandy loam, dark brown (7.5YR 3/2) moist; strong medium granular structure; soft, friable, nonsticky and slightly plastic; few very fine and fine roots; common very fine and fine interstitial pores, 10 percent pebbles; 10 percent cobbles; slightly acid (pH 6.5); abrupt smooth boundary.

A12 2 to 9 inches; brown (7.5YR 4/4) cobbly sandy loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, firm, nonsticky and slightly plastic; common very fine and fine roots, few medium roots; common very fine and fine interstitial pores; 15 percent pebbles, 15 percent cobbles; slightly acid (pH 6.3); clear smooth boundary.

B1t 9 to 21 inches; red (2.5YR 4/6) very cobbly loam, dark red (2.5YR 3/6) moist; weak medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few very fine roots, common fine, medium, and coarse roots; common fine interstitial pores; many colloids staining mineral grains; 5 percent pebbles, 30 percent cobbles; slightly acid (pH 6.3); diffuse wavy boundary.

B21t 21 to 40 inches; red (2.5YR 4/6) very cobbly clay loam, dark red (2.5YR 3/6) moist; weak medium and coarse subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common fine and medium roots, few coarse roots; few fine and medium tubular pores; many moderately thick clay films on faces of peds and lining pores; 5 percent pebbles, 45 percent cobbles; slightly acid (pH 6.5); gradual wavy boundary.

B22t 40 to 60 inches; red (2.5YR 4/6) very cobbly clay loam, red (2.5YR 4/6) moist; weak coarse subangular blocky structure; slightly hard, firm, sticky and plastic; few fine and medium roots; common fine and medium interstitial pores, few fine tubular pores; continuous thin clay films on faces of peds, many thin clay films lining pores; 5 percent pebbles, 50 percent cobbles; slightly acid (pH 6.5); diffuse wavy boundary.

B3t 60 to 90 inches; red (2.5YR 4/6) very cobbly clay loam, red (2.5YR 4/6) moist; weak coarse subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few fine and medium roots; few fine tubular pores; many thin clay films on faces of peds, common moderately thick clay films lining pores; 5 percent pebbles, 45 percent cobbles; slightly acid (pH 6.5).

**Range in characteristics.** Thickness of the rooting zone ranges from 50 to over 90 inches.

The A horizon has colors of 7.5YR 5/4, 5/2, 4/4, 4/2, 5YR 5/4, 5/3, 4/4, or 4/3. It is sandy loam or loam with 5 to 15 percent gravel and 10 to 15 percent cobbles.

The B horizon has colors of 2.5YR 5/8, 5/6, 4/8, 4/6, 3/6. Textures are very cobbly or extremely cobbly loam or clay loam with 5 to 10 percent gravel and 30 to 55 percent cobbles.

## BOROLLS

Borolls consist of shallow and moderately deep, poorly drained soils on the periphery of wet meadows. The meadows occur in valleys and drainageways. These soils form in residumm weathered from mixed alluvium. Slope ranges from 0 to 5 percent.

The native vegetation is mainly meadow vegetation consisting of carex, juncas, and grasses. Elevation is 5,000 to 8,500 feet. The average annual precipitation is about 30 to 60 inches; the average annual air temperature is 40 to 52 degrees F, and the average frost-free season is 25 to 200 days.

Typically, the surface layer is thick and dark colored, stratified coarse sand to clay. The subsoil is stratified sandy loam to clay. Permeability is variable and mottles are common in lower subsoil. Available water capacity is very low and runoff is slow to very slow.

Borolls commonly develop on the gentle slopes above the floodplains of broad drainages or meadows. Rock fragments, both pebble and cobble size, are highly variable throughout, with some profiles having more than 35 percent. Some soils have Bt horizons between the A and C horizons, while others have only A and C horizons.

## BUCKING SERIES

The Bucking series consists of deep, somewhat excessively drained soils on mountainsides. These soils formed in residuum weathered from granitic rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly dense stands of high elevation mixed conifers, consisting of white fir, red fir and Jeffrey pine. Elevation is 5,400 to 7,400 feet. The average annual precipitation is about 50 to 60 inches, the average annual air temperature is about 40 to 43 degrees F, and the average frost-free season is 80 to 120 days.

Permeability is rapid. Available water capacity is very low to low, runoff is medium, and the erosion potential is high.

The Bucking soils are similar to the Chaix, Gefo, and Haypress soils and they are associated with the Bucking Variant soils. Bucking Variant soils are less than 40 inches deep. Chaix soils have a mesic soil temperature regime and are less than 40 inches deep. Gefo soils formed in alluvium from glacial outwash and do not have a lithic or paralithic contact. Haypress soils have a mollic epipedon.

**Taxonomic class.** Theses soils are sandy, mixed, frigid Entic Xerumbrepts.

Typical pedon of Bucking loamy sand in a unit of Bucking-Bucking Variant complex, 2 to 30 percent slopes, in the NW1/4NW1/4 of section 11, T. 20 N., R. 13 E.

O1 2 inches to 0; litter, duff and twigs.

A11 0 to 6 inches; brown (10YR 5/3) loamy sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots, few fine and medium roots; many very fine interstitial pores; slightly acid (pH 6.5); gradual wavy boundary.

A12 6 to 11 inches; brown (10YR 5/3) loamy sand, dark brown (10YR 3/3) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots, and few medium roots; many very fine interstitial pores; slightly acid (pH 6.3); gradual wavy boundary.

C1 11 to 30 inches; pale brown (10YR 6/3) loamy sand, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium and coarse roots; many very fine interstitial pores; 3 percent pebbles; slightly acid (pH 6.3);7gradual wavy boundary.

C2 30 to 51 inches; pale brown (10YR 6/3) loamy sand, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few medium and coarse roots; many very fine interstitial pores; 3 percent pebbles, 5 percent cobbles; medium acid (pH 6.0); clear wavy boundary.

C3r 51 inches; highly weathered granitic rock.

**Range in characteristics.** Depth to highly weathered granitic rock ranges from 40 to over 60 inches. Textures are loamy sand or loamy coarse sand and the reaction is slightly acid to medium acid throughout the profile.

The A horizon has dry colors of 10YR 4/3, 5/3, 5/2, or 4/2 with moist colors of 10YR 3/1, 3/3, 2/2, or 3/2.

The C horizon has dry colors of 10YR 5/4, 5/6, 6/4, or 6/3, with moist colors of 10YR 3/3, 4/3, 4/4, or 3/4.

## BUCKING VARIANT

The Bucking Variant consists of moderately deep, somewhat excessively drained soils on mountainsides. These soils formed in residuum weathered from granitic rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifers, consisting of red fir, white fir, and ponderosa pine. Elevation is 5,400 to 7,400 feet. The average annual precipitation is about 50 to 60 inches, the average annual air temperature is about 40 to 43 degrees F., and the average frost-free season is 80 to 120 days.

Permeability is rapid. Available water capacity is very low, runoff is slow to medium, and the erosion potential is high.

The Bucking Variant soils are similar to the Chaix, Ledford Variant, and Toiyabe soils and are associated with the Bucking soils. Bucking soils are over 40 inches deep. Chaix soils have a mesic soil temperature regime. Ledford Variant soils are coarse loamy. Toiyabe soils are less than 20 inches deep.

**Taxonomic class.** These soils are sandy, mixed, frigid Entic Xerumbrepts.

Typical pedon of Bucking Variant in a unit of Bucking-Bucking Variant complex, 30 to 75 percent slopes, in the NW1/4NE1/4 of section 2, T. 20 N., R. 13 E.

O1 Trace; needles and litter.

A11 0 to 4 inches; grayish brown (10YR 5/2) loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots, few fine roots; many very fine interstitial pores; 2 percent pebbles, 5 percent cobbles; slightly acid (pH 6.5); gradual smooth boundary.

A12 4 to 11 inches; brown (10YR 5/3) loamy coarse sand, dark brown (10YR 3/3) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots, few fine and coarse roots; many very fine interstitial pores; 2 percent pebbles, 5 percent cobbles; slightly acid (pH 6.2); gradual smooth boundary.

C1 11 to 29 inches; pale brown (10YR 6/3) loamy coarse sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots, few fine and coarse roots; many very fine interstitial pores; 2 percent pebbles, 5 percent cobbles; medium acid (ph 6.0); clear wavy boundary.

C2r 29 inches; weathered granitic rock.

**Range in characteristics.** Depth to weathered granitic rock ranges from 20 to 40 inches. Textures are loamy sand or loamy coarse sand throughout the profile. Reaction is slightly acid to medium acid throughout the profile.

The A horizon has dry colors of 10YR 5/3, 5/2, or 4/3 and moist colors of 10YR 3/3, 3/2, or 2/2.

The C horizon has dry colors of 10YR 6/4, 6/3, or 5/4 and moist colors of 10YR 4/4 or 4/3.

## CELIO SERIES

The Celio series consists of deep, somewhat poorly drained soils on outwash plains. These soils formed in residuum weathered from glacial deposits. Slope ranges from 2 to 30 percent.

The vegetation is mainly dense stands of lodgepole pine with an understory of brush and perennial grasses. Elevation is 6,200 to 6,800 feet. The average annual precipitation is about 35 to 50 inches, the average annual air temperature is about 38 to 42 degrees F, and the average frost-free season is 25 to 75 days.

Permeability is rapid to the silica cemented pan and slow below. Available water capacity is very low, runoff is slow, and the erosion potential is high.

Celio soils are similar to the Tallac and Tinker soils and are associated with the Gefo soils. Tallac and Tinker soils are loamy-skeletal. Gefo soils are not skeletal.

**Taxonomic class.** These soils are sandy-skeletal, mixed, frigid Entic Haplumbrepts.

Typical pedon of Celio gravelly sandy loam in a unit of Celio-Gefo-Aquolls complex, 2 to 30 percent slopes, apporoximately three miles east of Webber Lake on the south side of the Old Henness Pass Road in the southwest quarter of section 16, T. 19 N., R. 15 E.

O1 1 inch to 0; fresh and decomposed conifer needles.

A11 0 to 5 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; soft, friable, nonsticky and nonplastic; many very fine, fine, medium and coarse roots; many very fine interstitial pores; 15 percent pebbles; slightly acid (pH 6.3); diffuse wavy boundary.

A12 5 to 12 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; massive; soft, friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine interstitial pores; 15 percent pebbles; slightly acid (pH 6.2); diffuse wavy boundary.

C1 12 to 30 inches; light yellowish brown (10YR 6/4) very cobbly loamy sand, brown (10YR 4/3) moist; common fine distinct yellowish red (5YR 4/6) mottles; massive; soft, friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine interstitial pores; 20 percent pebbles, 15 percent cobbles; medium acid (pH 6.0); abrupt wavy boundary.

C2 30 to 40 inches; light yellowish brown (10YR 6/4) extremely gravelly loamy coarse sand, brown (10YR 4/3) moist; common fine distinct yellowish red (5YR 4/6) mottles; massive; hard, firm, nonsticky and nonplastic; 45 percent pebbles, 20 percent cobbles; strongly acid (pH 5.5).

C3si 40 inches; variable colored; weakly cemented with silica; extremely gravelly loamy coarse sand; massive, very hard, very firm, nonsticky and nonplastic; roots matted on surface; 50 percent pebbles and 15 percent cobbles.

**Range in characteristics.** The depth to the weakly cemented silica pan ranges from 40 to 60 inches.

The A horizon has dry color of 10YR 3/3, 4/2, 4/3, 5/2, or 5/3 and moist colors of 10YR 3/2 or 3/3. Textures are sandy loam, very fine sandy loam, or loamy sand and contains 15 to 20 percent gravel and 0 to 20 percent cobbles. It is slightly acid to medium acid.

The C horizon has dry color of 10YR 5/3, 5/4, 6/4, or 6/3 and moist colors of 10YR 3/3, 4/3, 4/4, or 7.5YR 4/4. Textures are gravelly or cobbly, very gravelly, or extremely gravelly loamy coarse sand or loamy sand with 20 to 75 percent gravel and 0 to 20 percent cobbles. It is slightly acid to strongly acid. The Csi horizon has variable colors in the hues of 10R through 7.5YR. The duripan is weakly to strongly cemented and is very firm or extremely firm. Mottles occur below 20 inches.

## CELIO VARIANT

Celio Variant soils consist of deep, excessively drained soils on mountainsides. These soils formed in residuum weathered from granitic rocks. Slope ranges from 30 to 50 percent.

The vegetation is mainly mixed conifers, consisting of red fir, white fir, Jeffrey pine with manzanita and mountain whitethorn. Elevation is 5,000 to 9,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 40 to 44 degrees F., and the average frost-free season is 80 to 120 days.

Permeability is rapid. Available water capacity is very low to low, runoff is rapid, and the erosion potential is high.

The Celio Variant soils are similar to the Bucking, Celio, and Ledford soils. Bucking soils have a mollic epipedon and are sandy. Celio soils have a udic soil moisture regime. Ledford soils are not skeletal.

**Taxonomic class.** These soils are sandy-skeletal, mixed, frigid Entic Xerumbrepts.

Typical pedon of Celio Variant sandy loam in a unit of Celio Variant-Rock outcrop-Cryumbrepts, wet complex, 30 to 50 percent slopes, 0.65 miles south from Lunch Creek Road on road to Chapman Creek, in the SE1/4SE1/4 of sec. 29, T. 21 N., R. 13 E.

O1 Trace; litter and duff.

A11 0 to 2 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; strong very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 5 percent pebbles; slightly acid (pH 6.2); clear wavy boundary.

A12 2 to 10 inches; brown (10YR 5/2) stony coarse sandy loam, dark brown (10YR 3/3) moist; strong very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots, common medium roots; many very fine interstitial pores; 10 percent pebbles, 5 percent cobbles, 20 percent stones; medium acid (pH 6.0); clear wavy boundary.

C1 10 to 22 inches; pale brown (10YR 6/3) very stony loamy coarse sand, brown (10YR 4/3) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots, common medium and coarse roots; many very fine interstitial pores; 5 percent pebbles, 10 percent cobbles, 25 percent stones; medium acid (pH 6.0); gradual wavy boundary.

C2 22 to 42 inches; very pale brown (10YR 7/3) very stony loamy coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots, few medium and coarse roots; many very fine interstitial pores; 5 percent pebbles, 10 percent cobbles, 35 percent stones; medium acid (pH 6.0); gradual wavy boundary.

C3 42 to 61 inches; very pale brown (10YR 7/3) very stony loamy coarse sand, pale brown (10YR 6/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; 10 percent pebbles, 15 percent cobbles, 20 percent stones; medium acid (pH 6.0).

**Range in characteristics.** Depth to weathered granitic rock is greater than 40 inches. The soil is 35 to 75 percent rock fragments of which 25 to 50 percent are cobbles and stones.

The A horizon has dry colors of 10YR 5/3, 4/3, or 4/2 and moist colors of 10YR 3/3 or 3/2. Textures are cobbly, stony, very cobbly, or very stony sandy loam or coarse sandy loam. It is slightly acid to medium acid.

The C horizon has dry colors of 10YR 7/3, 6/4, or 6/3 and moist colors of 10YR 6/3, 5/4, 5/3, 4/4, or 4/3. Textures are cobbly, stony, very cobbly, or very stony loamy sand or loamy coarse sand. It is medium acid.

## CHAIX SERIES

The Chaix series consists of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from granodiorite. Slope ranges from 30 to 75 percent.

The vegetation is mainly open stands of hardwoods and mixed conifers with an understory of brush, consisting of black oak, live oak, Douglas-fir, ponderosa pine, incense cedar, manzanita, ceanothus, and bear clover. Elevation is 1,500 to 5,000 feet. The average annual precipitation is about 40 to 60 inches, the average annual air temperature is about 54 to 62 degrees F, and the average frost-free season is 150 to 200 days.

Permeability is moderately rapid. Available water capacity is very low to low, runoff is medium, and the erosion potential is high.

The Chaix soils are similar to the Ahart, Chaix Variant, Chawanakee, and Waca soils and are associated with the Chawanakee, Holland, and Hotaw soils. Ahart and Waca soils are formed in material weathered from volcanic rock and are dominated by amorphous material. Chaix Variant soils have a frigid soil temperature regime. Chawanakee soils are less than 20 inches deep. Holland and Hotaw soils have argillic horizons.

**Taxonomic class.** These soils are coarse-loamy, mixed, mesic Dystric Xerochrepts.

Typical pedon of Chaix coarse sandy loam in a unit of Holland-Hoda-Hotaw complex, 30 to 50 percent slopes, eroded, in the NE1/4NW1/4 of section 28, T. 18 N., R. 8 E.

O1 Trace; litter and duff.

A11 0 to 5 inches; grayish brown (10YR 5/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots and few fine and medium roots; common fine and medium interstitial pores; slightly acid (pH 6.5); abrupt smooth boundary.

A12 5 to 9 inches; pale brown (10YR 6/3) coarse sandy loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, firm, nonsticky and nonplastic; common fine roots; few medium and coarse interstitial pores; slightly acid (pH 6.3); clear wavy boundary.

B2 9 to 15 inches; very pale brown (10YR 7/3) coarse sandy loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine and medium roots; few fine and medium interstitial pores; slightly acid (pH 6.3); clear wavy boundary.

C1 15 to 29 inches; very pale brown (10YR 7/4) coarse sandy loam, light yellowish brown (10YR 6/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; few medium and coarse interstitial pores; strongly acid (pH 5.5); abrupt wavy boundary.

C2r 29 inches; weathered granodiorite.

**Range in characteristics.** Depth to weathered granitic rock is 20 to 40 inches. Textures are coarse sandy loam and sandy loam throughout the profile.

The A horizon has dry colors of 10YR 6/3, 5/3, 5/2, 4/3, or 3/3. Moist chromas are either greater than 3 or values are greater than 5 below the upper six inches of the A horizon. It is slightly acid.

The B2 horizon has color of 10YR 7/3, 7/1, or 6/3. It is slightly acid to strongly acid.

The C horizon has color of 10YR 7/4 or 7/2. It is slightly acid to strongly acid. Mica or light and dark mineral grains are very apparent in the C horizon.

## CHAIX VARIANT

Chaix Variant soils consist of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from granodiorite. Slope ranges from 2 to 50 percent.

The vegetation is mainly open stands of high elevation mixed conifers and brush consisting of red fir, white fir, sugar pine, manzanita, ceanothus, and huckleberry oak. Elevation is 5,500 to 7,000 feet. The average annual precipitation is about 65 to 75 inches, the average annual air temperature is abbout 52 to 56 degrees F, and the average frost-free season is 150 to 175 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is medium, and the erosion potential is high.

The Chaix Variant soils are similar to the Ahart, Chaix, Chawanakee, and Waca soils and are associated with the Hotaw Variant and Tahoma Variant soils. Ahart and Waca soils are formed on volcanic parent material and have textures dominated by amorphous materials. Chaix and Chawanakee soils have a mesic soil temperature regime and Chawanakee soils are less than 20 inches deep. Hotaw Variant and Tahoma Variant soils have argillic horizons.

**Taxonomic class.** These soils are coarse-loamy, mixed, frigid Dystric Xerochrepts.

Typical pedon of Chaix Variant gravelly sandy loam in a unit of Chaix Variant-Rock outcrop-Cryumbrepts,wet complex, 2 to 30 percent slopes, about one-half mile south of Willow Springs in the NW1/4NW1/4 of section 24, T. 18 N., R. 11 E.

O1 1 inch to 0; litter and duff.

A1 0 to 10 inches; reddish yellow (7.5YR 6/6) gravelly sandy loam, strong brown (7.5YR 4/6) moist; weak very fine and fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots, few coarse roots; many very fine interstitial pores; 15 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

B2 10 to 22 inches; yellow (10YR 8/6) sandy loam, reddish yellow (7.5YR 6/6) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine and medium roots; few fine interstitial pores; 10 percent pebbles; very strongly acid (pH 5.0); gradual irregular boundary.

Cr 22 inches; highly weathered granodiorite; mineral grains retaining original rock structure; few coarse roots.

**Range in characteristics.** Depth to weathered granitic rock is from 20 to 40 inches. Textures are coarse sandy loam or sandy loam. Base saturation in the upper 30 inches is less than 60 percent.

The A horizon has dry colors of 7.5YR 6/6, 5/4, 5YR 6/6, or 5/6. Moist colors are 7.5YR 5/6, 4/6; 5YR 5/4, or 4/4. It is slightly acid to medium acid.

The B horizon has dry colors of 10YR 8/8, 8/6, 7/8, 7/6; 7.5YR 7/8, 7/6, 6/8, or 6/6. Moist colors are 7.5YR 7/6, 6/6, 6/4, 5/4; 5YR 6/6, 5/6, or 4/6. It is strongly acid to very strongly acid.

## CHAWANAKEE SERIES

The Chawanakee series consist of shallow, somewhat excessively drained soils on mountainsides. These soils formed in residuum weathered from granodiorite. Slope ranges from 30 to 75 percent.

The vegetation is mainly open stands of hardwoods with brush and scattered mixed conifers consisting of live oak, black oak, tan oak, madrone, manzanita, ceanothus, bear clover, Douglas-fir, ponderosa pine, and incense cedar. Elevation is 1,500 to 5,000 feet. The average annual precipitation is about 40 to 60 inches, the average annual air temperature is about 52 to 62 degrees F, and the average frost-free season is 150 to 200 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is medium, and the erosion potential is very high.

The Chawanakee soils are similar to the Meiss, Ledmount, Ledmount Variant, and Woodseye Variant soils and are associated with the Chaix, Hoda, Holland, and Hotaw soils. Chaix soils are more than 20 inches deep. Hoda, Holland, and Hotaw soils have argillic horizons. Ledmount soils have mollic epipedons and have volcanic parent material. Ledmount Variant, Meiss, and Woodseye Variant soils have a frigid soil temperature regime and have volcanic parent.

**Taxonomic class.** These soils are loamy, mixed, mesic, shallow Dystric Xerochrepts.

Typical pedon of Chawanakee coarse sandy loam in a unit of Chaix-Chawanakee-Hotaw complex, 30 to 50 percent slopes, about 4 miles southwest of Camptonville in the SW1/4SE1/4 of section 21, T. 18 N., R. 8 E.

O1 Scattered litter and duff.

A1 0 to 5 inches; grayish brown (10YR 5/2) coarse sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many fine pores; slightly acid (pH 6.3); clear smooth boundary.

B2 5 to 15 inches; very pale brown (10YR 7/4) coarse sandy loam, yellowish brown (10YR 5/4) moist; massive, soft, very friable, nonsticky and nonplastic, common fine and medium roots; common fine pores; strongly acid (pH 5.5); abrupt wavy boundary.

Cr 15 inches; decomposed granodiorite.

**Range in characteristics.** Depth to weathered granitic rock is from 12 to 20 inches. Textures are coarse sandy loam or sandy loam.

The A horizon has colors of 10YR 6/3, 5/3, 5/2, 4/3, or 2.5Y 5/2. It is slightly acid or medium acid.

The B2 horizon has colors of 10YR 7/4, 7/3, 5/4, 6/4, 6/3, 6/2, 5/4, 5/3, 5/2; 2.5Y 6/4, or 6/2. It is medium acid or strongly acid.

## COHASSET SERIES

The Cohasset series consists of deep and very deep, well drained soils on flat or rounded ridge tops. These soils formed in residuum weathered from andesitic mudflows. Slope ranges from 2 to 75 percent.

The native vegetation is mainly dense stands of mixed conifers and hardwoods, consisting of Douglas-fir, ponderosa pine, white fir, incense cedar, sugar pine, or black oak. Considerable acreage of this soil near Foresthill has been planted to ponderosa pine plantations. Elevation is 2,000 to 5,800 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 48 to 60 degrees F, and the average frost-free season is 150 to 200 days.

Permeability is moderately slow. Available water capacity is moderate to high, runoff is medium, and the erosion potential is moderate to high.

The Cohasset soils are similar to the Jocal, Tahoma, and Trojan soils and are associated with the Aiken and Crozier soils. Aiken soils are clayey. Crozier soils are moderately deep. Jocal soils have metasedimentary parent material and a base saturation which is less than 35 percent in the lower part of the argillic horizon. Tahoma and Trojan soils have a frigid soil temperature regime.

**Taxonomic class.** These soils are fine-loamy, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Cohasset loam in a unit of Cohasset-Aiken-Crozier complex, 2 to 30 percent slopes, about 10 miles north of Foresthill, about 0.1 miles from the intersection of the Giant Ridge Road and the Giant Gap Road in the NW1/4SW1/4 of section 8, T. 15 N., R. 11 E.

A1 0 to 4 inches; brown (7.5YR 4/4) loam, dark reddish brown (5YR 3/2) moist; moderate very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine interstitial pores; slightly acid (pH 6.3); clear smooth boundary.

A3 4 to 12 inches; brown (7.5YR 5/4) loam, dark reddish brown (5YR 3/4) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; common very fine and fine interstitial pores; slightly acid (pH 6.5); gradual smooth boundary.

B1t 12 to 19 inches; reddish brown (5YR 4/3) loam, reddish brown (5YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium and coarse roots; common very fine and fine interstitial pores and few fine tubular pores; common thin clay films lining pores, few thin clay films on faces of peds; slightly acid (pH 6.3); clear smooth boundary.

B2t 19 to 35 inches; yellowish red (5YR 5/6) clay loam, yellowish red (5YR 4/6) moist; weak fine and medium angular blocky structure; hard, firm, slightly sticky and slightly plastic; common medium and coarse roots; common very fine and fine interstitial pores and few very fine and fine tubular pores; many moderately thick clay films lining pores, common thin clay films on faces of peds; slightly acid (pH 6.3); clear smooth boundary.

B3t 35 to 61 inches; reddish yellow (7.5YR 6/6) gravelly clay loam, yellowish red (5YR 4/6) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine, medium, and coarse roots; few very fine and fine tubular pores; many moderately thick clay films in pores; 20 percent pebbles; slightly acid (pH 6.3); abrupt wavy boundary.

Cr 61 inches; weathered andesitic conglomerate.

**Range in characteristics.** Thickness of the solum ranges from 40 to 80 inches. Manganese shot 1 to 2 millimeters in diameter may be present throughout the soil. Cobbles are 0 to 20 percent of the soil material usually increasing in the lower Bt horizons. Gravel ranges from 0 to 20 percent throughout the profile. Soil reaction ranges from neutral to strongly acid, becoming more acidic with depth.

The A horizon has colors of 7.5YR 4/2, 4/4, 5/4, 5YR 3/3, 3/4, 4/3, 4/4, 5/3, 5/4, or 5/6 and has moist chromas greater than 3.5 within a depth of 10 inches. It is neutral to slightly acid and is loam or sandy loam.

The B2t horizon has colors of 7.5YR 5/6, 6/6, 5YR 4/3, 4/4, 4/6, 4/8, or 5/6. It is slightly acid to medium acid and is loam or clay loam. It is massive, or structure is angular blocky or subangular blocky.

## CROZIER SERIES

The Crozier series consists of moderately deep, well drained soils on rounded ridgetops and mountainsides. These soils formed in residuum weathered from andesitic mudflows. Slope ranges from 2 to 75 percents.

The native vegetation is mainly dense stands of mixed conifers and hardwoods, consisting of Douglas-fir, ponderosa, white fir, incense cedar, sugar pine, or black oak. Considerable acreage of this soil near Foresthill has been planted to ponderosa pine plantations. Elevation is 2,000 to 5,500 feet. The average annual precipitation is about 55 to 70 inches, the average annual air temperature is about 50 to 60 degrees F, and the average frost-free season is 150 to 200 days.

Permeability is moderate slow. Available water capacity is low to moderate, runoff is medium, and the erosion potential is moderate to high.

The Crozier soils are similar to the Fugawee and Hotaw soils and are associated with the Aiken, Cohasset, and McCarthy soils. Aiken soils have more than 35 percent clay in the B horizon. Cohasset soils are over 40 inches deep. Fugawee soils have a frigid soil temperature regime. Hotaw soils are formed from granitic rock and contain l6 to 26 percent coarse and very coarse sand. McCarthy soils do not hane an argillic horizon and are skeletal.

**Taxonomic class.** These soils are fine-loamy, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Crozier loam in a unit of Cohasset-Aiken-Crozier complex, 2 to 30 percent slopes, about 12 miles north of Foresthill, approximately 80 yards east and 15 yards north of the intersection of the Giant Gap Road and the Giant Gap Ridge Road (15N24) in the center of section 8, T. 15 N., R. 11 E.

O1 2 inches to 0; litter and duff.

A1 0 to 7 inches; brown (7.5YR 4/4) loam, dark brown (7.5YR 3/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and slightly plastic; common very fine and fine roots, few medium and coarse roots; common very fine and fine interstitial pores; slightly acid (pH 6.3); clear smooth boundary.

A3 7 to 15 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/4) moist; moderate very fine and fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; common very fine and fine interstitial pores; slightly acid (pH 6.3); gradual smooth boundary.

B1t 15 to 24 inches; yellowish red (5YR 4/6) loam, reddish brown (5YR 5/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and coarse roots; common very fine and fine interstitial pores, few medium interstitial pores; common thin clay films lining pores; medium acid (pH 5.7); clear smooth boundary.

B2t 24 to 38 inches; yellowish red (5YR 5/6) gravelly clay loam, yellowish red (5YR 4/6) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few medium and coarse roots; common very fine and fine interstitial pores; many moderately thick clay films on faces of peds and lining pores; 19 percent pebbles; medium acid (pH 5.7); abrupt wavy boundary.

Cr 38 inches; weathered andesitic tuff breccia.

**Range in characteristics.** Depth to weathered rock ranges from 20 to 40 inches. Rock fragments are 0 to 30 percent of the profile, usually increasing in amount in the lower most horizons.

The A horizon has colors of 7.5YR 3/2, 4/2, 4/4, 5/4, 5YR 3/3, 3/4, 4/3, 4/4, 5/3, or 5/4 with moist chromas of 4 in the upper A horizon. Textures are sandy loam or loam and reaction is neutral or slightly acid.

The B2t has colors of 5YR 7/6, 6/6, 5/6, 5/4, 4/6, or 4/4. Texture is clay loam and reaction is slightly acid or medium acid.

## CRYUMBREPTS, WET

Cryumbrepts, wet consist of poorly drained soils in drainageways. These soils formed in alluvium and colluvium from mixed sources. Slope ranges from 2 to 75 percent.

The native vegetation consists of alders, willows, carex, and juncas. Elevation is 2,000 to 9,000 feet. The average annual precipitation is about 20 to 80 inches; the average annual air temperature is 40 to 52 degrees F, and the average frost-free season is 25 to 200 days.

Typically the surface layer is thick and dark colored, stratified gravelly, cobbly, or stony sandy loam, silt loam and clay loam. The substratum is stratified gravelly, cobbly, or stony loam to clay loam with dark colored mottles.

Permeability is moderately rapid, available water capacity is very low, and runoff is slow to medium. They have a high water table most of the year.

Runoff from surrounding areas moves laterally through the soil and provides summer moisture for native vegetation. Mottles with low chroma commonly occur at depths of 6 to 20 inches. Rock fragments range from 3 to 80 percent. Some profiles have cambic horizons.

## DEADWOOD SERIES

The Deadwood series consists of shallow, somewhat excessively drained soils on mountainsides. These soils formed in residuum weathered from metasedimentary rock. Slope ranges from 0 to 75 percent.

The vegetation is mainly open stands of hardwoods with brush and scattered conifers consisting of live oak, huckleberry oak, Douglas-fir, white fir, Jeffrey pine, and ponderosa pines. Elevation is 2,000 to 6,000 feet. The average annual precipitation is about 40 to 70 inches, the average annual air temperature is 47 to 57 degrees F., and the average frost free season is 110 to 225 days.

Permeability is moderately rapid, available water capacity is very low, and runoff is rapid to very rapid. The erosion potential is high.

The Deadwood soils are similar to the Chawanakee, Ledmount, and Woodseye soils and is associated with the Hurlbut and Mariposa soils. Chawanakee soils have formed on granitic parent material, are not skeletal and have a paralithic contact. Hurlbut and Mariposa soils are moderatly deep and are not skeletal. Ledmount soils are influenced by vitric pyroclastic materials and have a umbric epipedon. Woodseye soils have a frigid soil temperature regime.

**Taxonomic class.** These soils are loamy-skeletal, mixed, mesic Dystric Lithic Xerochrepts.

Typical pedon of Deadwood very gravelly sandy loam in a unit of Deadwood-Rock outcrop-Hurlbut complex, 30 to 75 percent slopes, approximately 20 miles northeast of Foresthill, 0.2 miles northwest of Secret Creek on the American Hill Road, near the center of the SE1/4 of section 1, T. 15 N., R. 12 E.

O1 1 inch to 0; pine litter and duff.

A1 0 to 3 inches; dark gray (10YR 4/1) very gravelly sandy loam, very dark gray (10YR 3/1) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common very fine and fine roots; common very fine interstitial pores; 45 percent pebbles; medium acid (pH 5.7); clear smooth boundary.

B2t 3 to 13 inches; light yellowish brown (10YR 6/4) extremely gravelly sandy loam, brown (7.5YR 4/4) moist; brown (10YR 5/3), and dark brown (7.5YR 3/2) moist in the upper 2 inches; weak fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine and fine roots, common medium and coarse roots; common very fine interstitial pores; common thin clay films in pores; 65 percent pebbles; medium acid (pH 6.0); abrupt irregular boundary.

R 13 inches; hard metasedimentary rock; few medium and coarse roots in fractures (6 to 10 inches apart).

**Range in characteristics.** Depth to bedrock ranges from 10 to 20 inches. Rock fragments range from 20 to 75 percent throughout the profile averaging more than 35 percent.

The A horizon has dry colors of 10YR 4/1, 4/2, 4/3, 5/2, 5/3, 5/4, 6/3, 6/4, 7.5YR 4/2, 4/4, or 5/2, and moist colors of 10YR 3/1, 3/2, 3/3, 3/4, 4/2, 4/3, 4/4, 7.5YR 3/2, 4/2, or 4/4. The dark layers are thin or absent in some pedons or may extend into the upper 2 inches of the B horizon. It is sandy loam, loam or silt loam and is gravelly, very gravelly, or extremely gravelly, and is slightly acid or medium acid.

The B2t horizon has dry colors of 10YR 6/3, 6/4, 7/4, 7/6, 7.5YR 5/6, 6/4, or 6/6 and has moist colors of 10YR 6/2, 6/3, 5/4, 5/6, 4/4, 7.5YR 5/4, 4/4, 4/6, or 5/6. It is silt loam, sandy loam, or loam and is very gravelly or extremely gravelly. Structure is weak or moderate subangular blocky. Base saturation is less than 60 percent throughout the horizon.

## DELLEKER SERIES

The Delleker series consists of deep and very deep, well drained soils on terraces. These soils formed in ashy alluvium. Slope ranges from 2 to 30 percent.

The vegetation is mainly Jeffrey pine and sagebrush with some white fir. Elevation is 4,800 to 5,400 feet. The average annual precipitation is about 15 to 26 inches, the average annual air temperature is 45 to 47 degrees F., and the average frost-free season is 50 to 60 days.

Permeability is moderate. Available water capacity is low to moderate, runoff is medium, and the erosion potential is high.

The Delleker soils are similar to the Kyburz, Sattley, Tahoma, and Trojan soils. Kyburz soils are moderatly deep. Sattley and Trojan soils have mollic epipedons and Sattley soils are skeletal. Tahoma soils have base saturation less than 75 percent in the argillic horizon.

**Taxonomic class.** These soils are fine-loamy, mixed, frigid Typic Haploxeralfs.

Typical pedon of Delleker sandy loam in a unit of Delleker-Kybruz-Trojan complex, 2 to 30 percent slopes, about 1 mile north of Calpine in the SW1/4NW1/4 of sec. 17, T. 21 N., R. 14 E.

O1 1 inch to 0; needles, twigs and duff.

A1 0 to 5 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine platy structure parting to weak very fine and fine granular; soft, friable, nonsticky and nonplastic; many very fine roots, few fine and coarse roots; many very fine interstitial pores; 3 percent pebbles; slightly acid (pH 6.2); clear wavy boundary.

A3 5 to 12 inches; light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine roots, few fine and medium roots; many very fine interstitial pores, few fine tubular pores; 3 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

B1t 12 to 24 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots, few fine and medium roots; many very fine interstitial pores, few fine tubular pores; common thin clay films as bridges between mineral grains and lining pores; 3 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

B2t 24 to 46 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; many very fine interstitial pores, few fine tubular pores; many thin clay films as bridges between mineral grains and lining pores; medium acid (pH 6.0); clear wavy boundary.

C1 46 to 50 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; few fine roots; common very fine interstitial pores; medium acid (pH 6.0).

**Range in characteristics.** Thickness of solum ranges from 40 to 70 inches. It is slightly acid or medium acid.

The A horizon has dry colors of 10YR 6/4, 6/3, 5/4, 5/3, or 5/2 and has moist colors of 10YR 4/4, 4/3, 3/3, or 3/2. Textures are sandy loam or loam.

The B2t horizon has dry colors of 10YR 6/6, 6/4, 5/4, 5/4, 7.5YR 6/6, 6/4, 5/6, or 5/4 dry. Moist colors are 10YR 6/4, 5/4, 4/4, 7.5YR 6/4, or 4/4. Textures are sandy clay loam or clay loam.

## DOTTA SERIES

The Dotta series consists of deep, well drained soils on lacustrine terraces and alluvial fans. These soils formed in residuum weathered from near-shore lake deposits and basic alluvium from adjoining uplands. Slope ranges from 2 to 30 percent.

The vegetation is mainly brush and scattered conifers, consisting of sagebrush, bitterbrush, juniper and Jeffrey pine. Elevation is 5,000 to 5,800 feet. The average annual precipitation is about 14 to 18 inches, the average annual air temperature is about 40 to 46 degrees F, and the average frost free season is 50 to 60 days.

Permeability is moderately slow. Available water capacity is low to moderate, runoff is very slow to slow, and the erosion potential is high.

The Dotta soils are similar to the Aldi Variant and Badenaugh soils and are associated with the Martineck soils. Aldi Variant soils have fine textured argillic horizons and have a frigid soil temperature regime. Badenaugh and Martineck soils are skeletal and Martineck soils have a duripan within 20 inches.

**Taxonomic class.** These soils are fine-loamy, mixed, mesic Pachic Argixerolls.

Typical pedon of Dotta sandy loam in a unit of Badenaugh-Martineck-Dotta association, 2 to 30 percent slopes, approximately 3/8 mile east of Highway 49, 4 1/2 miles northeast of Loyalton, about 750 feet south and 750 feet west of the NE corner of section 29, T. 22 N., R. 16 E.

A11 0 to 6 inches; gray (10YR 5/1) sandy loam, very dark brown (10YR 2/2) moist; moderate medium platy structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots, common medium roots; many very fine and fine tubular and interstitial pores; slightly acid (pH 6.2); clear smooth boundary.

A12 6 to 13 inches; gray (10YR 5/1) sandy loam, very dark brown (10YR 2/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots, few medium roots; many very fine and fine tubular and interstitial pores; slightly acid (pH 6.2); gradual smooth boundary.

B1t 13 to 21 inches; gray (10YR 5/1) loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; hard, friable, sticky and slightly plastic; many very fine and fine roots, common medium roots; many very fine and fine tubular pores, common medium tubular and interstitial pores; common thin clay films lining pores and on faces of peds; medium acid (pH 6.0); gradual smooth boundary.

B21t 21 to 30 inches; grayish brown (10YR 5/2) sandy clay loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and slightly plastic; common very fine and fine roots; many very fine and fine tubular and interstitial pores; many thin clay films on faces of peds and lining pores; medium acid (pH 6.0); clear wavy boundary.

B22t 30 to 41 inches; grayish brown (2.5Y 5/2) sandy clay loam, very dark grayish brown (2.5Y 3/2) moist; weak medium prismatic parting to strong fine and medium angular blocky structure; very hard, firm, sticky and plastic; common very fine and fine roots; many very fine and fine tubular and interstitial pores; many thin clay films on faces of peds and lining pores; slightly acid (pH 6.3); clear wavy boundary.

C1 41 to 59 inches; light brownish gray (10YR 6/2) sandy loam, brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and fine tubular and interstitial pores; slightly acid (pH 6.5); clear smooth boundary.

C2 59 to 68 inches; pale brown (10YR 6/3) coarse sandy loam, dark brown (10YR 3/3) moist; massive; hard, firm, nonsticky and nonplastic; few very fine and fine roots; common very fine and fine tubular and interstitial pores; neutral. (pH 7.0).

**Range in characteristics.** Solum thickness ranges from 40 to 60 inches. Gravel and cobble content ranges from 0 to 35 percent.

The A horizon has dry color of 10YR 5/1, 4/1, 3/1, 5/2, 4/2, 5/3, or 4/3. It is sandy loam or loam.

The B2t horizon has dry color of 2.5Y 5/2, 4/2, 10YR 5/2, 5/3, 4/2, 4/3, 3/3, 7.5YR 5/2, 5/4, 4/2, or 4/4. It is loam, sandy clay loam, or clay loam.

## DUBAKELLA SERIES

The Dubakella series consists of moderately deep, well drained soils on rounded ridgetops. These soils formed in residuum weathered from serpentinized bedrock. Slope ranges from 2 to 75 percent.

The vegetation is mainly open stands of conifers, consisting of ponderosa pine, incense cedar and Douglas-fir with manzanita and ceanothus. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 40 to 65 inches, the average annual air temperature is about 48 to 54 degrees F., the average frost-free season is 150 to 225 days.

Permeability is slow. Available water capacity is low, runoff is medium to rapid, and the erosion potential is high.

The Dubakella soils are similar to and associated with the Dubakella Variant and the Forbes soils. Dubakella Variant soils have hard rock within 20 inches of the soil surface. Forbes soils are greater than 40 inches deep.

**Taxonomic class.** These soils are clayey-skeletal, serpentinitic, mesic Mollic Haploxeralfs.

Typical pedon of Dubakella loam in a unit of Dubakella-Dubakella Variant-Rock outcrop complex, 2 to 30 percent slopes in the NE1/4NW1/4 of section 32, T. 15 N., R. 11 E.

O1 1 inch to 0; litter and duff.

A1 0 to 3 inches; dark red (2.5YR 3/6) loam, dark reddish brown (2.5YR 2/4) moist; moderate very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine interstitial pores; 5 percent cobbles; slightly acid (pH 6.5); clear smooth boundary.

B21t 3 to 15 inches; red (2.5YR 4/6) cobbly clay loam, dark red (2.5YR 3/6) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; common very fine, fine, medium and coarse roots; common very fine and fine interstitial pores, few fine and medium tubular pores; many moderately thick clay films on faces of peds and many thick clay films lining pores; 25 percent cobbles; neutral (pH 7.3); clear wavy boundary.

B22t 15 to 32 inches; yellowish red (5YR 4/6) very cobbly clay loam, dark red (2.5YR 3/6) moist; massive; hard, friable, sticky and plastic; common medium and coarse roots; many very fine and fine interstitial pores; many thick clay films lining pores; 60 percent partly weathered serpentinized cobbles; mildly alkaline (pH 7.5); clear wavy boundary.

R 32 inches; serpentinized bedrock.

**Range in characteristics.** Thickness of the solum ranges from 21 to 34 inches, and the depth to bedrock is 20 to 40 inches. It is slightly acid to mildly aklaline throughout the profile.

The A horizon has dry colors of 5YR 5/4, 5/3, 4/4, 4/3; 2.5YR 5/6, 5/4, 4/6, 4/4, or 3/6 and has moist values less than 3.5 in the upper 4 inches after mixing. It is loam with 5 to 20 percent rock fragments.

The B2t horizon has colors of 5YR 5/4, 5/3, 4/6, 4/4, 4/3; 2.5YR 5/8, 5/6, 5/4, 4/8, 4/6, 4/4, or 3/6. It is clay loam or clay with 35 to 60 percent Rock fragments.

The Dubakella soils in this survey area are a taxajunct to the Dubakella series because it has 2.5YR colors in the A and B horizons. This difference, however, does not significantly affect use and management.

## DUBAKELLA VARIANT

Dubakella Variant soils are shallow, well drained soils on rounded ridgetops. These soils formed in residuum weathered from serpentinized bedrock. Slope ranges from 2 to 75 percent.

The vegetation is mainly manzanita and ceanothus with scattered conifers, consisting of ponderosa pine, incense cedar, and Douglas-fir. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 40 to 60 inches, the average annual air temperature is about 48 to 54 degrees F., and the average frost-free season is 150 to 225 days.

Permeability is moderately slow. Available water capacity is very low, runoff is medium to rapid, and the erosion potential is high.

The Dubakella Variant soils are similar to the Ledmount and Meiss soils and are associated with the Forbes and Dubakella soils. Ledmount and Meiss soils do not have argillic horizons and are dominated by vitric pyroclastic material. Dubakella and Forbes soils are over 20 inches deep and do not have lithic contacts.

**Taxonomic class.** These soils are loamy-skeletal, serpentinitic, mesic Lithic Mollic Haploxeralfs.

Typical pedon of Dubakella Variant gravelly loam in a unit of Rock outcrop-Dubakella-Dubakella Variant complex, 40 to 75 percent slopes, in the NE1/4SW1/4 of section 13, T. 17 N., R. 10 E.

O1 Trace; litter and duff.

A1 0 to 5 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/2) moist; strong fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots, few fine roots; many very fine interstitial pores; 15 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

B2t 5 to 13 inches; brown (7.5YR 4/4) very cobbly clay loam, dark reddish brown (5YR 3/4) moist; strong fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots, few medium and coarse roots; many very fine interstitial pores; common thin clay films on faces of peds; 40 percent cobbles, 5 percent pebbles; neutral (pH 7.0); abrupt wavy boundary.

R 13 inches; fractured serpentinitic rock.

**Range in characteristics.** Depth to serpentinized bedrock ranges from 12 to 20 inches. Cobbles range from 0 to 50 percent throughout the profile. It is neutral to slightly acid.

The A horizon has dry colors of 5YR 4/3, 4/4, 5/3, 5/4, or 7.5YR 5/4 and moist colors of 7.5YR 3/2, 4/2, or 4/4. It is loam.

The B horizon has dry colors of 7.5YR 4/4 or 5/4 and moist colors of 5YR 3/3 or 3/4.

## EUER SERIES

The Euer series consists of deep, well drained soils on glacial terraces. These soils formed in deposits of glacial till and outwash of predominately volcanic origin. Slope ranges from 2 to 30 percent.

The vegetation is mainly scattered Jeffrey pine with sagebrush, bitterbrush and grasses. Elevation is 5,000 to 6,500 feet. The average annual precipitation is about 25 to 35 inches, the average annual air temperature is about 42 to 44 degrees F., and the average frost-free season is 20 to 40 days.

Permeability is moderate. Available water capacity is very low to low, runoff is medium, and the erosion potential is high.

The Euer soils are similar to the Tallac and Zeibright soils. They are associated with the Kyburz, Martis, and Trojan soils. The Tallac and Zeibright soils do not have argillic horizons. The Kyburz, Martis, and Trojan soils are not skeletal.

**Taxonomic class.** These soils are loamy-skeletal, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Euer sandy loam in a unit of Euer-Martis Variant complex, 5 to 30 percent slopes, about 5 miles northeast of Truckee; .9 mile west from intersection of East Meadow Road along Slaughter House Road; near center of NW1/4NE1/4, section 23, T. 18 N., R. 16 E.

O1 2 inches to 0; pine litter and duff.

A1 0 to 5 inches; brown (10YR 5/3) sandy loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky and slightly plastic; few very fine, fine, and medium roots; common very fine interstitial pores; 10 percent pebbles; slightly acid (pH 6.2); abrupt wavy boundary.

A3 5 to 15 inches; brown (10YR 4/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; few very fine interstitial pores; about 15 percent pebbles; very few thin clay films lining pores, root channels, and as bridges between mineral grains; slightly acid (pH 6.5); clear wavy boundary.

B2t 15 to 24 inches; yellowish brown (10YR 5/4) very gravelly sandy clay loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine, medium, and coarse roots; few very fine interstitial and tubular pores; few moderately thick clay films lining pores, root channels, and as bridges between mineral grains; 40 percent pebbles and 3 percent cobbles; slightly acid (pH 6.2); gradual irregular boundary.

B3 24 to 47 inches; light yellowish brown (10YR 6/4) extremely gravelly sandy loam, brown (7.5YR 4/4) moist; massive; soft, very friable, nonsticky and slightly plastic; few fine and medium roots; few very fine and fine tubular pores; few colloid stains on minerals grains; 65 percent pebbles and 5 percent cobbles; medium acid (pH 6.0); gradual irregular boundary.

C 47 to 65 inches; brownish yellow (10YR 6/6) extremely gravelly sandy loam, yellowish brown (10YR 5/6) moist; massive; soft, very friable, nonsticky and nonplastic; few medium roots; few very fine and fine tubular pores; few colloid stains on mineral grains; 85 percent pebbles and 5 percent cobbles; medium acid. (pH 6.0).

**Range in characteristics.** The umbric epipedon is 10 to 15 inches thick and in some pedons includes the upper part of the B horizon. The base saturation is 35 to 50 percent in the upper horizons. The effective rooting depth is greater than 40 inches.

The A horizon has dry colors of 10YR 4/2, 4/3, 5/2, or 5/3 and moist colors of 10YR 3/2, 3/3, or 7.5YR 3/2. It is coarse sandy loam, sandy loam, or loam with 10 to 20 percent gravel. This horizon has granular or weak subangular blocky structure. It is slightly acid or medium acid.

The B2t horizon has dry colors of 10YR 5/3, 5/4, or 6/6 and moist colors of 10YR 3/3, 5/6, 7.5YR 3/2, or 4/4. It is clay loam, sandy clay loam, or sandy loam and has 35 to 70 percent rock fragments. This horizon has subangular blocky structure or is massive. It is slightly acid or medium acid.

## EUER VARIANT

The Euer Variant soils consists of deep and very deep, well drained soils on glacial terraces. These soils formed in deposits of glacial till and outwash of mainly volcanic origin. Slope ranges from 2 to 5 percent.

The vegetation is mainly eastside mixed conifer, consisting of Jeffrey pine and ponderosa pine with sagebrush and bitterbrush. Elevation is 5,500 to 6,000 feet. The average annual precipitation is about 25 to 35 inches, the average annual air temperature is about 42 to 44 degrees F. and the average frost-free seasonis 20 to 40 days.

Permeability is moderately slow. Available water capacity is low, runoff is slow, and the erosion potential is moderate.

The Euer Variant soils are similar to the Jorge, Sattley, Tallac, and Zeibright soils and assoicated with the Euer, Kyburz, and Trojan soils. Euer soils are skeletal. Jorge and Sattley soils have from volcanic parent material and are skeletal. Fugawee soils are less than 40 inches deep to a paralithic contact and the Trojan soils have mollic epipedons. Tallac and Zeibright soils do not have argillic horizons and Zeibright soils have a mesic soil temperature regime.

**Taxonomic unit.** These soils are fine-loamy, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Euer Variant gravelly sandy loam in a unit of Martis-Euer Variant complex, 2 to 5 percent slopes, about 0.4 mile north of Interstate 80 and 100 feet east of Highway 89 near the center of NE1/4NW1/4 of section 11, T. 17 N., R. 16 E.

O1 2 inches to 0; litter and duff.

A11 0 to 6 inches; grayish brown (10YR 5/2) gravelly sandy loam, dark brown (7.5YR 3/2) moist; moderate very thick platy parting to moderate fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine and coarse roots, common medium roots; many medium and coarse interstitial pores; 15 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

A12 6 to 12 inches; brown (10YR 5/3) sandy loam, dark brown (7.5YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few fine roots, common coarse roots, and many medium roots; common very fine interstitial pores; 5 percent pebbles; medium acid (pH 6.0); clear wavy boundary.

B21t 12 to 24 inches; pale brown (10YR 6/3) gravelly clay loam, brown (7.5YR 4/4) moist; weak fine and medium subangular blocky structure; hard, friable, sticky and plastic; few fine and many medium roots; common fine interstitial and tubular pores; common moderately thick clay films on faces of peds and continuous thin clay films lining pores; 15 percent pebbles; strongly acid (pH 5.5); clear wavy boundary.

B22t 24 to 33 inches; pale brown (10YR 6/3) very gravelly clay loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; hard, friable, sticky and plastic; few very fine and fine roots; common very fine interstitial and tubular pores; common moderately thick clay films on faces of peds, continuous thin clay films lining pores; 40 percent pebbles; strongly acid (pH 5.5); abrupt irregular boundary.

B23t 33 to 47 inches; pale brown (10YR 6/3) extremely gravelly clay loam, brown (10YR 4/3) moist; massive; hard, friable, sticky and plastic; few medium and coarse roots; very few fine interstitial pores; many moderately thick clay films lining pores and as bridges between mineral grains; 60 percent pebbles, 20 percent cobbles; strongly acid (pH 5.5); clear irregular boundary.

B3t 47 to 70 inches; pale brown (10YR 6/3) extremely gravelly clay loam, brown (10YR 4/3) moist; massive; hard, friable, sticky and plastic; few very fine, medium, and coarse roots; few very fine interstitial pores; many moderately thick clay films lining pores and as bridges between mineral grains; 70 percent pebbles, 20 percent cobbles; strongly acid (pH 5.5).

**Range in characteristics.** Thickness of the solum ranges from 40 to 70 inches. The umbric epipedon is 10 to 20 inches thick and in some pedons includes the upper B horizon. Base saturation is 35 to 50 percent in some portion of the argillic horizon.

The A horizon has dry colors of 10YR 4/3, 4/4,5/3, 5/4, 7.5 YR 4/4, or 5/4. Moist colors are 10YR 2/2, 3/2, 3/3, or 7.5YR 3/2. It is sandy loam or loam with 5 to 20 percent gravel. This horizon has granular, subangular blocky, or thick platy structure. It is slightly acid to strongly acid.

The upper Bt horizon has dry colors of 10YR 5/3, 5/4,

6/3, 6/4. 7.5YR 5/4, or 6/4. Moist colors are 10YR 3/2, 3/3, 3/4, 4/2, 4/3, 4/4, 7.5YR 3/2, 3/4, 4/2, or 4/4. It is clay loam or loam with 15 to 40 percent gravel and 3 to 5 percent cobbles. This horizon has subangular blocky structure structure or is massive. It is medium acid to strongly acid.

The lower part of the Bt horizon has dry colors of 10YR 5/3, 6/3, or 6/4 and moist colors of 7.5YR 3/2, 10YR 3/4, 4/3, or 4/4. It is sandy clay loam or clay loam and has 3 to 20 percent cobbles and 10 to 80 percent gravel. Rock fragments increase with increasing depth and exceed 35 percent below 32 inches in some pedons.

## FORBES SERIES

The Forbes series consists of deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from ultramafic rock. Slope ranges from 2 to 50 percent.

The vegetation is mainly semi-dense to dense mixed conifers, consisting of Douglas-fir, white fir, ponderosa pine and incense cedar. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 40 to 65 inches, the average annual air temperature is 49 to 57 degrees F., and the average frost free season is 110 to 200 days.

Permeability is moderately slow to slow. Available water capacity is low to moderate, runoff is moderate to rapid, and the erosion potential is high.

The Forbes soils are similar to the Aiken, Hoda, Sierraville, and Sites soils and associated with the Dubakella, Jocal, and Mariposa soils. Aiken soils have volcanic parent material and have an umbric epipedon. Dubakella soils are less than 40 inches deep and are skeletal. Hoda soils do not have hues of 2.5YR in the profile and have granitic parent material. Jocal and Mariposa soils have metasedimentary parent material and are fine-loamy. Sierraville soils have a frigid soil temperature regime and are formed from basic volcanic rock. Sites and Aiken soils have base saturation of less than 35 percent in the argillic horizon.

**Taxonomic class.** These soils are fine, oxidic, mesic Ultic Palexeralfs.

Typical pedon of Forbes gravelly loam in a unit of Forbes-Dubakella complex, 2 to 30 percent slopes, approximately 7 miles northeast of Foresthill, in the SW1/4SW1/4 of section 29, T. 15 N., R. 11 E.

O1 2 inches to 0; litter and duff.

A11 0 to 9 inches; dark red (2.5YR 3/6) gravelly loam, dark reddish brown (2.5YR 2/4) moist; weak very fine and fine granular and subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; few very fine and fine tubular pores and common very fine and fine interstitial pores; 20 percent pebbles; neutral (pH 7.0); gradual smooth boundary.

A12 9 to 20 inches; dark red (2.5YR 3/6) gravelly clay loam, dark reddish brown (2.5YR 3/4) moist; moderate fine and medium angular blocky structure; slightly hard, friable, sticky and plastic; common very fine, fine, and medium roots, few coarse roots; common very fine tubular pores and few very fine and fine interstitial pores; 20 percent pebbles; neutral (pH 7.2); clear smooth boundary.

B21t 20 to 31 inches; yellowish red (5YR 4/6) gravelly clay, dark red (2.5YR 3/6) moist; massive; slightly hard, firm, very sticky and very plastic; few very fine and fine roots; common very fine and fine interstitial pores and few very fine and fine tubular pores; many moderately thick clay films lining pores; 25 percent pebbles; mildly alkaline (pH 7.5); clear wavy boundary.

B22t 31 to 53 inches; strong brown (7.5YR 5/8) gravelly silty clay, red (2.5YR 4/6) moist; massive; hard, firm, very sticky and very plastic; few very fine, fine, and medium roots; few very fine and fine interstitial pores and common very fine and fine tubular pores; many moderately thick clay films lining pores; 25 percent pebbles; mildly alkaline (pH 7.5); clear wavy boundary.

B3t 53 to 61 inches; reddish yellow (7.5YR 6/8) gravelly silty clay loam, strong brown (7.5YR 5/8) moist; massive; slightly hard, firm, sticky and plastic; few fine and medium roots; common moderately thick clay films lining pores; 30 percent pebbles; moderately alkaline (pH 8.0).

**Range in characteristics.** Thickness of the solum ranges from 40 to 65 inches. Rock fragment range from 5 to 35 percent.

The A horizon has dry colors of 2.5YR 3/4, 3/6, 4/4, 4/6, 5YR 4/4,or 5/4 and moist colors of 10R 3/4, 2.5YR 2.5/4, 3/4, 3/6, 4/6, or 5YR 4/6 Textures are loam or clay loam. It is slightly acid to neutral and the structure is granular, subangular blocky, or angular blocky.

The B2t horizon has dry colors of 7.5YR 5/8, 5/4, 5YR 4/4, 4/6, 2.5YR 3/6, or 4/6. Moist colors are 5YR 3/4, 2.5YR 3/4, 3/6, 4/6, 10R 3/4, or 3/6. It is clay, silty clay, or clay loam and is neutral to moderately alkaline.

## FRANKTOWN SERIES

The Franktown series consists of shallow, well drained soils on mountainsides. These soils formed in residuum weathered from volcanic rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly sagebrush, squawcarpet, and greenleaf manzanita. Elevation is 5,200 to 6,500 feet. The average annual precipitation is about 15 to 30 inches, the average annual air temperature is about 41 to 44 degrees F., and the average frost-free season ranges from 50 to 75 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is rapid, and the erosion potential is high to very high.

The Franktown soils are similar to the Aldi soils and is associated with the Kyburz soils. Aldi soils have argillic horizons. Kyburz soils are 20 to 40 inches deep to a paralithic contact.

**Taxonomic class.** These soils are loamy-skeletal, mixed, frigid Lithic Ultic Haploxerolls.

Typical pedon of Franktown gravelly loam in a unit of Franktown-Alding-Rock outcrop complex, 2 to 30 percent slopes, about three miles east of Sierraville on the road to Lemon Canyon in the SW1/4 of section 16, T. 20 N., R. 15 E.

O1 1/2 inch to 0; fresh and decomposed grass litter.

A11 0 to 4 inches; brown (10YR 5/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots; common fine and medium tubular and interstitial pores; 17 percent pebbles, 5 percent cobbles; slightly acid (pH 6.5); clear irregular boundary.

A12 4 to 15 inches; brown (10YR 5/3) extremely gravelly coarse sandy clay loam, dark brown (7.5YR 3/2) moist; massive; slightly hard, friable, nonsticky and slightly plastic; common very fine roots; common very fine interstitial pores, few very fine tubular pores; 50 percent pebbles, 15 percent cobbles; neutral (pH 7.0).

R 15 inches; weathered volcanic rock with some soil in cracks.

**Range in characteristics.** The depth of the soil to weathered volcanic rock is 15 to 20 inches. The base saturation of the epipedon is 50 to 75 percent. Rock fragments range from 35 to 65 percent.

The A horizon has colors of 10YR 5/2, 5/3, or 4/3. It is gravelly sandy loam, gravelly loam, and extremely gravelly coarse sandy clay loam. Reaction is slightly acid to neutral.

The Franktown soils in this survey area are a taxajunct to the Franktown series because it has neutral reaction in the lower A horizon, it does not have a C horizon, and it has less than 50 percent rock fragments in the A horizon. This difference, however, does not significantly affect use and management.

## FUGAWEE SERIES

The Fugawee series consists of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from basic igneous rocks, principally latite and andesite flows. Slopes range from 2 to 75 percent.

The vegetation is mainly high elevation mixed conifer, consisting of red fir, white fir, Jeffrey pine, lodgepole pine, and an understory of mountain whitethorn, greenleaf manzanita, prostrate manzanita, and squaw carpet. Elevation is 6,000 to 8,000 feet. The average annual precipitation is about 35 to 60 inches, the average annual air temperature is about 38 to 46 degrees F, and the average frost-free season is 30 to 80 days.

Permeability is moderate to moderately slow. Available water capacity is low, runoff is medium to rapid, and the erosion potential is high.

The Fugawee soils are similar to the Boomer, Cohasset, and Crozier soils and associated with the Jorge, Kyburz, Sierraville, Tahoma, and Trojan soils. Boomer, Cohasset, and Crozier soils have a mesic soil temperature regime. Jorge, Sierraville, Tahoma, and Trojan soils are over 40 inches deep. Kyburz soils have mean annual precipitation between 18 to 35 inches and a base saturation of 50 to 75 percent in the argillic horizon.

**Taxonomic class.** These soils are fine-loamy, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Fugawee sandy loam in a unit of Fugawee-Tahoma complex, 2 to 30 percent slopes, in the NE1/4NE1/4 of section 15, T. 16 N., R. 16 E.

O 1 inch to 0; needles and twigs.

A11 0 to 2 inches; dark brown (7.5YR 4/2) sandy loam, dark brown (7.5YR 3/2) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 10 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

A12 2 to 7 inches; brown (7.5YR 5/2) sandy loam, dark brown (7.5YR 3/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots, common fine roots, few medium roots; many very fine interstitial pores; 10 percent pebbles; medium acid (pH 6.0); clear wavy boundary.

B1t 7 to 13 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure parting to moderate fine and very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots, and few fine, medium, and coarse roots; many very fine interstitial pores; few thin clay films as bridges between mineral grains; 10 percent pebbles, 5 percent cobbles; medium acid (pH 5.7); clear wavy boundary.

B21t 13 to 22 inches; reddish brown (5YR 5/3) gravelly clay loam, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots, few fine and medium roots; many very fine interstitial pores; common thin clay films as bridges between mineral grains and on faces of peds; 15 percent pebbles, 5 percent cobbles, 5 percent stones; strongly acid (pH 5.5); clear wavy boundary.

B22t 22 to 35 inches; light reddish brown (5YR 6/3) gravelly clay loam, reddish brown (5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; common very fine interstitial pores, few fine tubular pores; many thin clay films on faces of peds and lining pores; 20 percent pebbles, 10 percent cobbles; strongly acid (pH 5.5); clear wavy boundary.

Cr 35 inches; fractured, weathered andesite.

**Range in characteristics.** Thickness of the solum ranges from 20 to 40 inches.

The A horizon has dry color of 10YR 3/2, 3/3, 3/4, 4/2, 4/3, 4/4, 5/2, 5/3, 5/4; 7.5YR 3/2, 4/2, 5/2, or 5/4 and moist color of 10YR 3/2, 4/3; 7.5YR 3/2, 3/4; 5YR 2.5/2, 3/2, 3/3, or 3/4. The darker values and lower moist chromas are in the surface few inches. It is loam or sandy loam and it contains 10 to 25 percent gravel and 3 to 10 percent cobbles and stones. It has weak granular or subangular blocky structure and is strongly acid to slightly acid.

The B2t horizons has dry color of 10YR 3/4, 4/2, 4/3, 4/4, 5/3; 7.5YR 3/2, 4/2, 4/4, 5/2, 5/4, 6/4; 5YR 5/3, or 6/3 and moist color of 10YR 3/2, 3/4,; 7.5YR 3/4, 4/4, 5/4, 6/4; 5YR 3/4, or 4/4. It is clay loam, or sandy clay loam and contain 10 to 30 percent gravel and 2 to 10 percent cobbles and stones. It has weak or moderate subangular and angular blocky structure and is strongly acid to medium acid.

## FUGAWEE VARIANT

Fugawee Variant soils consist of shallow, well drained soils on mountainsides. These soils formed in residuum weathered from basic igneous rocks, principally latite and andesite flows. Slope ranges from 2 to 75 percent.

The vegetation is mainly Wyethia, big sagebrush, and widely scattered Jeffrey pine and white fir. Elevation is 6,000 to 8,000 feet. The average annual precipitation is about 35 to 60 inches, the average annual air temperature is 38 to 46 degrees F., and the average frost free season is 30 to 80 days.

Permeability is slow. Available water capacity is very low, runoff is medium, and the erosion potential is high.

The Fugawee Variant soils are similar and associated with the Fugawee soils. Fugawee soils are over 20 inches deep.

**Taxonomic class.** These soils are loamy, mixed, frigid, shallow Ultic Haploxeralfs.

Typical pedon of Fugawee Variant loam in a unit of Fugawee Variant-Fugawee complex, 2 to 30 percent slopes, approximately 100 yards from the watershed break between Martis and Juniper Creeks at the Placer/Nevada County line near the NE corner 23, T. 17 N., R. 17 E.

A1 0 to 3 inches; dark brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; soft, very friable, nonsticky and slightly plastic; common very fine roots, few medium roots; many very fine interstitial pores; 2 percent pebbles, 3 percent cobbles; neutral (pH 6.7); gradual wavy boundary.

A12 3 to 5 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine roots, few fine and medium roots; many very fine interstitial pores; few thin clay films as bridges between mineral grains; 5 percent cobbles; slightly acid (pH 6.5) clear smooth boundary.

B21t 5 to 13 inches; dark brown (7.5YR 4/4) clay loam, dark yellowish brown (10YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots, few fine and medium roots; many very fine interstitial pores; many thin clay films as bridges between mineral grains and lining pores; 3 percent pebbles, 5 percent cobbles; medium acid (pH 6.0); gradual smooth boundary.

B22t 13 to 18 inches; dark brown (10YR 4/3) cobbly clay loam, dark yellowish brown (10YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine interstitial pores, few very fine tubular pores; many thin clay films as bridges between mineral grains and lining pores; 5 percent pebbles, 10 percent cobbles; strongly acid (pH 5.7); clear wavy boundary.

Cr 18 inches; weathered andesitic rock fractures 5 to 7 inches apart.

**Range in characteristics.** Depth to weathered volcanic rock is 15 to 20 inches. Surface stones are 5 to 60 percent.

The A horizon has dry colors of 7.5YR 3/2, 4/2, 5/2, or 10YR 4/3 and moist colors of 7.5YR 3/2, 10YR 3/2, or 3/3. It is loam or silty loam and gravel is 2 to 5 percent, cobbles are 3 to 5 percent and stones are 0 to 5 percent. It is slightly acid to strongly acid.

The B2t horizon has dry colors of 7.5YR 4/4, 5/4, 10YR 4/2, or 4/3 and moist colors of 10YR 3/2 or 3/4. Textures are loam and clay loam. Gravel is 3 to 5 percent, cobbles are 5 to 10 percent. It is slightly acid to strongly acid

## GEFO SERIES

The Gefo series consists of deep, somewhat excessively drained soils on alluvial fans and outwash plains. These soils formed in glacial outwash and alluvium. Slope ranges from 2 to 30 percent.

The vegetation is mainly dense stands of lodgepole pine with an understory of brush and perennial grasses. Elevation is 6,200 to 6,800 feet. The average annual precipitation is about 35 to 50 inches, the average annual air temperature is 40 to 44 degrees F., and the average frost-free season is 25 to 75 days.

Permeability is rapid to very rapid. Available water capacity is low to moderate, runoff is slow, and the erosion potential is high.

The Gefo soils are similar to the Gefo Variant, Zeibright, and associated with the Celio soils. Gefo Variant soils are coarse-loamy. Zeibright soils have mesic temperature regimes and are loamy-skeletal. Celio soils are skeletal and have udic soil moisture regimes.

**Taxonomic class.** These soils are sandy, mixed, frigid Entic Xerumbrepts.

Typical pedon of Gefo loamy sand in a unit of Gefo-Aquoll-Celio complex, 2 to 9 percent slopes about 0.75 mile northeast of Webber Peak in the center of section 20, T. 19 N., R. 14 E.

O1 Trace; litter and duff

A11 0 to 6 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine and fine interstitial pores; 5 percent pebbles; medium acid (pH 5.8); clear wavy boundary.

A12 6 to 15 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and medium roots; many very fine and fine interstitial pores; 5 percent pebbles; medium acid (pH 5.8); clear wavy boundary.

C1 15 to 30 inches; pale brown (10YR 6/3) loamy fine sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots and few fine roots; many very fine and fine interstitial pores; 5 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

C2 30 to 40 inches; pale brown (10YR 6/3) loamy fine sand, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine and fine interstitial pores; 5 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

C3 40 to 60 inches; pale brown (10YR 6/3) loamy fine sand, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine and fine interstitial pores; 10 percent pebbles; medium acid (pH 6.0).

**Range in characteristics.** A thin 0 horizon is present near trees. The solum is 10 to 15 inches thick.

The A horizon has colors of 10YR 5/2, 5/3, 4/3, or 4/2. It is loamy sand to coarse sand with 0 to 30 percent gravel, and is medium acid to slightly acid.

The C horizon has colors of 10YR 7/4, 7/3, 6/4, 6/3, or 5/3. Textures range from loamy sand through coarse sand and have from 5 to 30 percent gravel.

## GEFO VARIANT

Gefo Variant soils consists of deep, well drained soils on alluvial fans. These soils formed in alluvium. Slope ranges from 2 to 15 percent.

The vegetation is mainly grass with scattered Wyethia. Elevation is 6,000 to 8,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 38 to 44 degrees F., and the average frost-free season is 25 to 75 days.

Permeability is moderatley rapid. Available water capacity is low to high, runoff is medium, and the erosion potential is moderate.

The Gefo Variant soils are similar to the Celio, Gefo, and Tallac soils. The Celio soils are sandy-skeletal, the Gefo soils are sandy, and the Tallac soils are loamy-skeletal.

**Taxonomic class.** These soils are coarse-loamy, mixed, frigid Pachic Xerumbrepts.

Typical pedon of Gefo Variant in a unit of Gefo Variant-Cryumbrepts, wet complex, 2 to 15 percent slopes, about 0.75 mile southwest of Mt. Disney in the NW1/4 of section 2, T. 16 N., R. 14 E.

A11 0 to 10 inches; grayish brown (10YR 5/3) very fine sandy loam, dark brown (7.5YR 3/2) moist; strong very fine granular structure; soft, very friable, nonsticky and slightly plastic; many very fine roots; many very fine interstitial pores; 5 percent pebbles; strongly acid (pH 5.5); clear smooth boundary.

A12 10 to 22 inches; dark brown (7.5YR 4/4) very fine sandy loam, dark brown (7.5YR 3/2) moist; moderate very fine granular structure; soft, very friable, nonsticky and slightly plastic; many very fine roots; many very fine interstitial pores; 5 percent gravels; medium acid (pH 6.0); clear wavy boundary.

A13 22 to 33 inches; brown (10YR 5/3) very fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure parting to weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots and few medium roots; many very fine interstitial pores; 5 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

A14 33 to 43 inches; pale brown (10YR 6/3) very fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; few very fine roots; many very fine interstitial pores; 5 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

C1 43 to 61 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist, common distinct medium strong brown (7.5YR 5/6 and 5/8) moist mottles; massive; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine tubular pores, many very fine interstitial pores, and few medium interstitial pores; 5 percent gravel; strongly acid (pH 5.5).

**Range in characteristics.** Depth ranges from 40 to 90 inches. The solum is 10 to 43 inches thick. Textures throughout the soil profile are sandy loam, fine sandy loam, very fine sandy loam, loam with 5 to 40 percent gravel. It is slightly acid to strongly acid.

The upper A horizon has dry color of 10YR 4/2, 4/3, 5/2, 5/3, or 7.5YR 4/4. In addition to these colors, the lower A horizon also has dry color of 10YR 5/4 or 6/3.

The C horizon has dry color of 10YR 5/3, 5/4, 6/3, 6/4, or 7/6.

## HAYPRESS SERIES

The Haypress series consists of deep, somewhat excessively drained soils on mountainsides. These soils formed in residuum weathered from granitic rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly open stands of mixed conifers, consisting of Jeffrey pine and ponderosa pine with manzanita and scattered sagebrush. Elevation is 5,000 to 7,000 feet. The average annual precipitation is about 20 to 25 inches, the average annual air temperature is about 45 to 47 degrees F., and the average frost-free season is 30 to 65 days.

Permeability is rapid. Available water capacity is very low to low, runoff is slow to rapid, and the erosion potential is high.

The Haypress soils are similar to the Bucking, Chaix, and Gefo soils and associated with the Toiyabe soils. Bucking soils have umbric epipedons. Chaix soils have a mesic soil temperature regime and are less than 40 inches deep. Gefo soils are formed in glacial outwash and alluvium, do not have a lithic or paralithic contact and have umbric epipedons. Toiyabe soils are less than 20 inches deep.

**Taxonomic class.** These soils are sandy, mixed, frigid Entic Haploxerolls.

Typical pedon of Haypress loamy coarse sand in a unit of Haypress-Toiyabe complex, 2 to 30 percent slopes, 1,100 feet southwest of the east quarter corner of sec. 4, T. 21 N., R. 14 E.

O1 and O2 3 inches to 0; fresh and partly decomposed litter of pine needles, twigs and leaves; abrupt smooth boundary.

A11 0 to 4 inches; grayish brown (10YR 5/2) loamy coarse sand, very dark gray (10YR 3/1) moist; weak thick platy structure parting to weak fine granular structure; soft, friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common very fine tubular and interstitial pores; medium acid (pH 6.0); clear smooth boundary.

A12 4 to 14 inches; grayish brown (10YR 5/2) loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots, many medium and coarse roots; common very fine tubular and interstitial pores, few medium tubular and interstitial pores; medium acid (pH 6.0); clear smooth boundary.

AC 14 to 28 inches; brown (10YR 5/3) loamy coarse sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many medium and coarse roots; common very fine tubular and interstitial pores; medium acid (pH 6.0); gradual smooth boundary.

C1 28 to 49 inches; pale brown (10YR 6/3) loamy coarse sand, brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; many medium and coarse roots; common very fine tubular pores, few medium tubular pores, and common very fine interstitial pores; medium acid (pH 6.0); clear smooth boundary.

C2r 49 inches; weathered granitic rock, crushes to pale brown (10YR 6/3).

**Range in characteristics.** Depth to weathered granitic rock ranges from 40 to 60 inches. Textures are loamy sand or loamy coarse sand throughout and it is slightly acid to medium acid.

The A horizon has dry colors of 10YR 5/3, 5/2, 5/1, 4/3, 4/2, or 4/1 and moist colors of 10YR 3/3, 3/2, 3/1, 2/2, or 2/1.

The C horizon has dry colors of 10YR 6/4, 6/3, or 5/4 and moist colors of 10YR 4/4, 4/3, or 3/4.

## HODA SERIES

The Hoda series consists of deep to very deep, well drained soils on mountainsides. These soils formed in residuum weathered from granitic rock. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed conifers and hardwoods, consisting of Douglas-fir, ponderosa pine, incense cedar, black oak, and tan oak. Elevation is 2,000 to 4,000 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is about 54 to 60 degrees F., and the average frost-free season is 180 to 230 days.

Permeability is slow. Available water capacity is low to high, runoff is medium, and the erosion potential is high to very high.

The Hoda soils are similar to the Aiken, Jocal, Sierraville, and Sites soils, and associated with the Holland, Hotaw, and Musick soils. Aiken, Jocal, and Sites soils have less than 35 percent base saturation in their argillic horizons. Holland and Musick soils are fine-loamy and the Musick soils have 2.5YR hues in the argillic horizon. Hotaw soils are less than 40 inches deep. Sierraville soils have a frigid soil temperature regime.

**Taxonomic class.** These soils are fine, kaolinitic, mesic Ultic Haploxeralfs.

Typical pedon of Hoda loam in a unit of Holland-Hoda-Hotaw complex, 2 to 30 percent slopes, about 4 miles west of Camptonville in the SE1/4SE1/4 of section 6, T. 18 N., R. 8 E.

O1 1 inch to 0; litter and duff.

A1 0 to 7 inches; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; moderate very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; slightly acid (pH 6.5); clear smooth boundary.

B1t 7 to 14 inches; reddish yellow (5YR 6/6) loam, yellowish red (5YR 5/6) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots, few coarse roots; common very fine and fine interstitial pores; few thin clay films coating mineral grains; slightly acid (pH 6.5); clear smooth boundary.

B21t 14 to 21 inches; yellowish red (5YR 5/8) clay, yellowish red (5YR 4/6) moist; moderate medium angular blocky structure; hard, friable, sticky and plastic; common medium and coarse roots; common very fine and fine tubular pores; common thin clay films on faces of peds andmoderately thick clay films lining pores; slightly acid (pH 6.5); gradual wavy boundary.

B22t 21 to 48 inches; reddish yellow (5YR 6/8) clay, yellowish red (5YR 5/8) moist; moderate medium angular blocky structure; hard, friable, sticky and plastic; common medium and coarse roots; common very fine and fine tubular and interstitial pores; common moderately thick clay films on faces of peds and lining pores; medium acid (pH 6.0); clear irregular boundary.

B3t 48 to 72 inches; reddish yellow (7.5YR 6/8) clay loam, strong brown (7.5YR 5/8) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common medium and coarse roots; few very fine interstitial pores; few thin clay film lining pores; medium acid (pH 6.0).

**Range in characteristics.** Thickness of the solum ranges from 40 to 80 inches and paralithic contacts do not occur above 80 inches.

The A horizon has dry colors of 10YR 5/2, 5/3, 4/3, 3/3, 7.5YR 5/2, 5/4, 4/2, or 4/4 and moist colors of 10YR 4/2, 4/3, 3/3, 3/4, 4/4, 7.5YR 4/2, 4/4, 5/6, or 5/8. It is sandy loam or loam and is slightly acid to medium acid.

The B2t horizons have colors of 7.5YR 8/6, 7/8, 7/6, 6/8, 6/6, 5YR 7/8, 7/6, 6/8, 6/6, 5/8, 5/6, or 4/6. It is clay loam or clay and is slightly acid to strongly acid.

## HOLLAND SERIES

The Holland series consists of very deep, well drained soils on mountainsides. These soils formed in residuum weathered from granitic rock. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed conifers and hardwoods, consisting of Douglas-fir, ponderosa pine, incense cedar, black oak, and tan oak. Elevation is 2,000 to 4,000 feet. The average annual precipitation is about 60 to 80 inches, the average annual air temperature is about 54 to 60 degrees F., and the average frost-free season is 180 to 230 days.

Permeability is moderately slow. Available water capacity is moderate to high, runoff is medium, and the erosion potential is high to very high.

The Holland soils are similar to the Boomer, Cohasset, Jocal, and Tahoma soils and associated with the Hoda, Hotaw, and Musick soils. Boomer, Cohasset, and Jocal soils have less than 20 percent coarse and very coarse sand. Hoda soils have more than 35 percent clay in the argillic horizon. Hotaw soils are less than 40 inches deep. Musick soils have 2.5YR hues in the argillic horizon. Tahoma soils have a frigid soil temperature regime and have volcanic parent material.

**Taxonomic class.** These soils are fine-loamy, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Holland loam is from a unit of Holland-Hoda-Hotaw complex, 2 to 30 percent slopes, about 6 miles west of Camptonville in the SW1/4NW1/4 of section 36, T. 19 N., R. 7 E.

01 2 inches to 0; litter and duff.

A1 0 to 4 inches; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; weak very fine and fine granular structure; soft, friable, nonsticky and plastic; common very fine and fine roots, few medium roots; common very fine and fine interstitial pores; slightly acid (pH 6.3); gradual smooth boundary.

A3 4 to 15 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; soft, friable, nonsticky and plastic; few medium and coarse roots, common fine roots; common very fine and fine interstitial pores; slightly acid (pH 6.3); gradual wavy boundary.

B21t 15 to 35 inches; reddish yellow (5YR 6/8) clay loam, yellowish red (5YR 4/8); moderate fine subangular blocky structure; hard, firm, nonsticky and plastic; few fine, medium, and coarse roots; common fine and very fine interstitial pores; common thin clay films on faces of peds and lining pores; medium acid (pH 6.0); clear wavy boundary.

B22t 35 to 50 inches; reddish yellow (7.5YR 6/8) clay loam, strong brown (7.5YR 5/8) moist; massive; slightly hard, friable, nonsticky and slightly plastic; few medium and coarse roots; common very fine and fine interstitial pores, common fine tubular pores; common thin clay films as bridges between mineral grains; medium acid (pH 6.0); gradual irregular boundary.

B3t 50 to 65 inches; reddish yellow (7.5YR 7/8) clay loam, reddish yellow (7.5YR 6/8) moist; massive; slightly hard, friable, nonsticky and slightly plastic; few medium roots; common very fine and fine interstitial pores; common thin clay films as bridges between mineral grains; strongly acid (pH 5.5).

**Range in characteristics.** Depth to weathered bedrock is 60 to 100 inches.

The A1 horizon has colors of 10YR 5/3, 5/2, 4/3, 4/2, 3/3, 7.5YR 5/4, 5/2, 4/4, 4/2, 3/4, or 3/2. Moist chromas can be 2 or 3 in the upper A but increase to 4 at a depth of 7 to 10 inches but is 4 throughout in some pedons. It is sandy loam or loam and is slightly acid to medium acid.

The B2t horizons has colors of 7.5YR 6/8, 6/6, 6/4, 5/8, 5/6, 5/4, 4/6, 4/4, 5YR 6/8, 6/6, 5/8, 5/6, 5/4, 4/6, or 4/4. It is sandy clay loam or clay loam and is slightly acid to strongly acid.

## HORSESHOE SERIES

The Horseshoe series consists of deep and very deep, well drained soils on river terraces. These soils formed in isolated bodies of Eocene river gravel. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed conifers and hardwoods, consisting of Douglas fir, ponderosa pine, incense cedar, white fir, sugar pine, and black oak. Elevation is 2,500 to 5,500 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 48 to 56 degrees F., and the average frost-free season is 150 to 225 days.

Permeability is moderately slow. Available water capacity is low to moderate, runoff is medium to rapid, and the erosion potential is high.

The Horseshoe soils are similar to the Aiken and Sites soils and associated with the Hurlbut, Huyskink, Jocal, and Mariposa soils. Aiken and Sites soils contain more than 35 percent clay in the textural control section. Hurlbut and Mariposa soils are less than 40 inches deep, and Mariposa soils have a lithic contact intermittently above 20 inches in part of each pedon. Huysink soils are skeletal. Jocal soils have low organic carbon in the surface layer and have metasedimentary parent material.

**Taxonomic class.** These soils are fine-loamy, mixed, mesic Xeric Haplohumults.

Typical pedon of Horseshoe loam in a unit of Horseshoe-Jocal-Mariposa complex, 2 to 30 percent slopes, near the intersection of Gas Canyon and Yuba Close Roads in Cascade Shores subdivision on the south side of Scotts Flat Reservoir in section 7, T. 16 N., R. 10 E.

A1 0 to 3 inches; brown (7.5YR 4/4) loam, dark brown (7.5YR 3/4) moist; weak very fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots; common fine interstitial pores; 5 percent pebbles; slightly acid (pH 6.5); gradual wavy boundary.

A3 3 to 9 inches; brown (7.5YR 4/4) gravelly loam, dark brown (7.5YR 3/4) moist; weak very fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common fine and medium roots; few fine tubular pores, common very fine and fine interstitial pores; few thin clay films on faces of peds; 20 percent pebbles; slightly acid (pH 6.5); gradual wavy boundary.

B1t 9 to 15 inches; brown (7.5YR 5/4) gravelly clay loam, dark brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; common very fine and fine interstitial pores; few thin clay films on faces of peds; 15 percent pebbles and 5 percent cobbles; slightly acid (pH 6.5); clear smooth boundary.

B21t 15 to 24 inches; reddish yellow (7.5YR 6/6) gravelly clay loam, strong brown (7.5YR 4/6) moist; moderate fine subangular blocky structure; hard, firm, sticky and plastic; common fine roots, few coarse roots; common very fine and fine interstitial pores; common thin clay films on faces of peds; 15 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

B22t 24 to 32 inches; reddish yellow (7.5YR 6/6) gravelly clay loam, strong brown (7.5YR 5/6) moist; moderate fine subangular blocky structure; hard, firm, sticky and plastic; few medium roots; common fine and medium tubular and interstitial pores; common moderately thick clay films on faces of peds, common thin clay films lining pores; 20 percent pebbles; medium acid (pH 6.0); clear wavy boundary.

B3t 32 to 55 inches; yellowish red (5YR 5/6) very gravelly clay loam, yellowish red (5YR 4/6) moist; massive; hard, firm, sticky and plastic; few medium roots; common few and medium tubular and interstitial pores; many thick clay films lining pores; 30 percent pebbles, 5 percent cobbles; strongly acid (pH 5.5); clear smooth boundary.

IIC 55 to 65 inches; highly weathered stratified silt stone and clay stone; iron and clay stains and coatings on rock fragments, dark red (2.5YR 3/6) moist.

**Range in characteristics.** Solum thickness is 40 to 60 inches thick. The A horizon has dry colors of 7.5YR 4/4 and moist chromas of 4 or more below 3 inches. It is loam or sandy loam and slightly acid or medium acid. Gravel content ranges from 5 to 20 percent.

The B horizon has colors of 7.5YR 6/6, 6/4, 5/6, 5/4, 4/6, 4/4, 5YR 6/6, 5/6, 5/4, 4/6, or 4/4. It is clay loam or loam and is medium acid or strongly acid. Gravel

content ranges from 15 to 30 percent and cobbles from 0 to 5 percent.

The Horseshoe soils in map units HSE and HSF in this survey area are a taxajunct to the Horseshoe series because of 10YR colors in the A horizon and 7.5YR colors in the B horizon. This difference, however, does not significantly affect use and management.

## HOTAW SERIES

The Hotaw series consists of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from granitic rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifers and hardwoods, consisting of ponderosa pine, Douglas-fir, white fir, black oak, tan oak, and madrone. Elevation is 1,500 to 5,000 feet. The average annual precipitation is about 40 to 80 inches, the average annual air temperature is about 54 to 60 degrees F., the average frost-free season is 180 to 230 days.

Permeability is moderately slow. Available water capacity is moderate to low, runoff is medium to rapid, and the erosion potential is high to very high.

The Hotaw soils are similar to the Crozier and Fugawee soils and associated Chaix, Chawanakee, Hoda, Holland, and Musick soils. Chaix and Chawanakee soils do not have argillic horizons and are less than 20 inches deep. Crozier and Fugawee soils are formed from volcanic rock and the Fugawee soils have a frigid soil temperature regime. Hoda, Holland, and Musick soils are over 40 inches deep.

**Taxonomic class.** These soils are fine-loamy, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Hotaw loam in a unit of Holland-Hoda-Hotaw complex, 2 to 30 percent slopes, about 3 miles west of Camptonville in the center of section 6, T. 18 N., R. 8 E.

O1 1 inch to 0; litter and duff.

A11 0 to 4 inches; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots, common medium roots; many very fine and fine interstitial pores; slightly acid (pH 6.5); gradual smooth boundary.

A12 4 to 12 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak moderate subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots, few coarse roots; many very fine and fine interstitial pores; slightly acid (pH 6.3); gradual wavy boundary.

B2t 12 to 34 inches; light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/6) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common fine and medium roots, many coarse roots; common very fine and fine tubular pores; common moderately thick clay films lining pores; medium acid (pH 6.0); clear wavy boundary.

Cr 34 inches; weathered granitic rock.

**Range in characteristics.** Depth to weathered rock ranges from 20 to 40 inches.

The A horizon has colors of 10YR 6/4, 5/8, 5/6, 5/4, 5/3, 4/3, 7.5YR 6/4, 5/4, 5/2, 4/4, or 4/2. The dry value is 6 below seven inches. It is slightly acid to medium acid and is loam, sandy loam, or coarse sandy loam.

The B2t horizon has colors of 10YR 6/4, 5/3, 4/3, 7.5YR 6/4, 5/8, 5/6, 5/4, 5/2, 4/6, 4/4, or 4/2. It is sandy clay loam or clay loam and slightly acid to strongly acid.

## HOTAW VARIANT

The Hotaw Variant consists of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from granitic rock. Slope ranges from 2 to 50 percent.

The vegetation is mainly high elevation mixed conifers, consisting of red fir and white fir with an understory of manzanita and chinquapin. Elevation is 5,500 to 6,500 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 52 to 56 degrees F, the average frost-free season is 150 to 175 days.

Permeability is moderately slow. Available water capacity is low, runoff is medium, and the erosion potential is high to very high.

The Hotaw Variant soils are similar to the Crozier, Fugawee, and Hotaw soils, and associated with the Chaix Variant and Tahoma Variant soils. Chaix Variant soils do not have argillic horizons. Crozier and Hotaw soils have a mesic soil temperature regime. Fugawee soils have greater than 35 percent base saturation in the argillic horizon. Tahoma Variant soils are over 40 inches deep.

**Taxonomic class.** These soils are fine-loamy, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Hotaw Variant in a unit of Chaix Variant-Rock outcrop-Cryumbrepts, wet complex, 2 to 30 percent slopes, on the road to Murphy Flat, in the NE1/4NW1/4 of section 23, T. 18 N., R. 11 E.

O1 1 inch to 0; needles and duff.

A1 0 to 4 inches; brown (10YR 4/3) gravelly loam, dark brown (7.5YR 3/2) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine interstitial pores; 20 percent pebbles; slightly acid (pH 6.3); clear smooth boundary.

B2t 4 to 11 inches; reddish yellow (7.5YR 6/6) gravelly clay loam, strong brown (7.5YR 5/6) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common fine and medium roots, few coarse roots; common very fine and fine tubular and interstitial pores; common thin clay films lining pores and on faces of peds; few moderately thick clay films lining pores; 25 percent pebbles; medium acid (pH 5.7); gradual smooth boundary.

B3t 11 to 38 inches; yellow (10YR 8/6) gravelly clay loam, yellow (10YR 7/8) moist; massive; slightly hard, friable, slightly sticky and plastic; few coarse roots; common very fine and fine interstitial pores, few fine tubular pores; few thin clay films as bridges between mineral grains; 15 percent pebbles; very strongly acid (pH 5.0); gradual irregular boundary.

Cr 38 inches; weathered granitic rock.

**Range in characteristics.** Depth to weathered rock ranges from 20 to 40 inches. Gravel ranges from 15 to 30 percent throughout the profile.

The A horizon has colors of 10YR 5/4, 5/3, 4/4, 4/3, 7.5YR 4/4, or 3/4 with moist chromas of 4 or more below 4 inches. It is loam or sandy loam and is slightly acid.

The B2t horizon has colors of 7.5YR 6/6, 6/4, 5/6, 5/4, 4/6, or 4/4. It is clay loam or loam and medium acid to very strongly acid.

## HURLBUT SERIES

The Hurlbut series consists of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from metasedimentary rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly semi-open stands of mixed confiers and brush, consisting of ponderosa pine, sugar pine, white fir, dwarf tan oak, chinquapin, manzanita, and ceanothus. Elevation is 2,000 to 5,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 45 to 51 degrees F., and the average frost free season is 100 to 200 days.

Permeability is moderate. Available water capacity is very low to low, runoff is medium to rapid, and the erosion potential is moderate to high.

The Hurlbut soils are similar to the Chaix, Mariposa, and Smokey soils. They are associated with the Deadwood soils. Chaix soils have granitic parent material and are coarse-loamy. Deadwood soils are less than 20 inches deep to a lithic contact and are skeletal. Mariposa soils are fine-loamy and have a lithic contact intermittently above 20 inches. Smokey soils have a frigid soil temperature regime and are skeletal.

**Taxonomic class.** These soils are fine-loamy, mixed, mesic Dystric Xerochrepts.

Typical pedon of Hurlbut gravelly loam in a unit of Hurlbut-Deadwood-Mariposa complex, 2 to 30 percent slopes, about 23 miles northeast of Foresthill, 0.2 miles east of the intersection of American Hill Road and Secret Ridge Road; near the NE1/4NE1/4 of section 12, T. 15 N., R. 12 E.

O1 2 inches to 0; litter and duff.

A1 0 to 4 inches; reddish yellow (7.5YR 6/6) gravelly loam, yellowish red (5YR 5/6) moist; moderate medium subangular blocky and granular structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots; common fine and very fine interstitial pores; 20 percent pebbles; medium acid (pH 5.7); clear smooth boundary.

B21 4 to 17 inches; reddish yellow (7.5YR 7/8) gravelly silt loam, strong brown (7.5YR 5/8) moist; moderate medium and fine angular blocky structure; slightly hard, friable, sticky and slightly plastic; common medium and coarse roots; common fine interstitial and tubular pores; 20 percent pebbles; many thin clay films lining pores; medium acid (pH 5.7); gradual wavy boundary.

B22 17 to 27 inches; reddish yellow (7.5YR 7/8) silt loam, reddish yellow (7.5YR 6/8) moist; weak medium angular blocky structure; slightly hard, friable, sticky and slightly plastic; common medium and coarse roots; common fine interstitial and tubular pores; 10 percent pebbles; common thin clay films lining pores; medium acid (pH 5.7); clear smooth boundary.

Cr 27 inches; weathered metamorphosed sedimentary rock; few medium and coarse roots in fractures.

**Range in characteristics.** Depth to a paralithic contact ranges from 20 to 40 inches. Most profiles have 0 to 30 percent gravel with the larger amounts in the uppermost horizons. Base saturation throughout the soil is 30 to 50 percent.

The A horizon has dry colors of 5YR 3/4, 7.5YR 4/6, 5/4, 5/6, 6/4, 6/6 10YR 4/3, or 6/4 and moist colors of 5YR 5/6, 4/6, 7.5YR 3/2, 3/4, 4/4, 4/6, 10YR 3/2, or 4/3. It is gravelly loam, gravelly sandy loam, or gravelly fine sandy loam. Structure is subangular blocky or granular.

The B horizon has dry colors of 5YR 4/6, 4/4, 5/6, 6/6, 7.5YR 5/6, 7/8, 10YR 5/4, 6/6, or 6/8 and moist colors of 5YR 4/6, 3/4, 5/6 7.5YR 6/8, 5/8, 4/6, 4/4, or 10YR 6/6. It is silt loam, gravelly silt loam, or gravelly loam. Structure is weak or moderate, fine or medium angular blocky.

## HUYSINK SERIES

Huysink soils are deep and very deep, well drained soils on outwash terraces. These soils formed in deposits of glacial till and outwash derived from a mixture of parent materials. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed conifers and hardwoods, consisting of Douglas fir, ponderosa pine, incense cedar, white fir, sugar pine, and black oak. Elevation is 4,500 to 5,500 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 48 to 56 degrees F., and the average frost-free season is 100 to 150 days.

Permeability is moderate. Available water capacity is very low to low, runoff is slow to rapid, and the erosion potential is moderate to high.

The Huysink soils are similar to the Euer, Euer Variant, Lorack, and Martis soils and associated with the Horseshoe soils. Euer and Martis soils have umbric epipedons and a frigid soil temperature regime. Euer Variant soils are not skeletal and have a frigid temperature regime. Horseshoe soils are not skeletal. Lorack soils have a frigid soil temperature regime.

**Taxonomic class.** These soils are loamy-skeletal, mixed, mesic Xeric Haplohumults.

Typical pedon of Huysink gravelly sandy loam in a unit of Huysink-Horseshoe complex, 2 to 30 percent slopes; 1.9 miles south of Emigrant Gap, 1.2 miles along road from Sailor Point to Carpenter Flat, west end of clearcut, 400 feet west of road; 650 feet north of center of NW1/4 of sec. 7, T. 16 N., R. 12 E.

O1 1 inch to 0; fresh and decomposed needles and leaves.

A11 0 to 2 inches; dark yellowish brown (10YR 4/4) very stony loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; common very fine and fine roots; many very fine interstitial pores and few fine tubular pores; 15 percent pebbles, 5 percent cobbles, 25 percent stones; slightly acid (pH 6.5); abrupt smooth boundary.

A12 2 to 7 inches; brown (7.5YR 4/4) very stony loam, dark brown (7.5YR 3/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine and fine roots; many very fine interstitial pores and few fine tubular pores; 10 percent pebbles, 10 percent cobbles, 25 percent stones; slightly acid (pH 6.5); clear wavy boundary.

B1 7 to 14 inches; strong brown (7.5YR 5/6) very stony loam, dark brown (7.5YR 3/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine and fine roots; many very fine interstitial pores and few fine tubular pores; common thin clay films in pores; 20 percent pebbles, 10 percent cobbles, 25 percent stones; slightly acid (pH 6.5); clear wavy boundary.

B21t 14 to 29 inches; strong brown (7.5YR 5/6) extremely stony loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, very friably plastic; many very fine and fine roots, common medium roots; many very fine interstitial pores and common fine tubular pores; common thin clay films lining pores; 50 percent pebbles, 10 percent cobbles, 25 percent stones; medium acid (pH 6.0); clear wavy boundary.

B22t 29 to 41 inches; reddish yellow (7.5YR 6/6) extremely stony loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common medium and coarse roots; many very fine interstitial pores and common fine tubular pores; common thin clay films on faces of peds and lining pores; 30 percent pebbles, 5 percent cobbles, 25 percent stones; medium acid (pH 5.7); abrupt wavy boundary.

B31t 41 to 58 inches; brownish yellow (10YR 6/6) very stony loam, dark yellowish brown (10YR 4/6)) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common medium roots and few coarse roots; common very fine and fine tubular pores; common thin clay films on faces of peds and lining pores; 30 percent pebbles, 3 percent cobbles, 25 percent stones; strongly acid (pH 5.5); clear wavy boundary.

B32t 58 to 69 inches; yellow (10YR 7/6) extremely stony loam, yellowish brown (10YR 5/6) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common medium roots and few coarse roots; common very fine and fine tubular pores; common thin clay films on faces of peds and lining pores; 35 percent pebbles, 3 percent cobbles, 25 percent stones; very strongly acid. (pH 4.5)

**Range in characteristics.** The solum is 40 to 65 inches thick.

The A horizon has dry color of 10YR 4/3, 4/4, 5/3, 5/4, 7.5YR 4/2, 4/4, 5/2, or 5/4 and moist color of 10YR 3/2, 3/3, 3/4, 4/3, 4/4, 7.5YR 4/2, 4/4, or 3/2. Moist chromas of 4 are found below the upper 7 inches of the A horizon. Structure is granular in the upper portion of the A and subangular blocky in the lower portions. Rock fragment content ranges from 10 to 50 percent. It is slightly acid or medium acid.

The B2t horizon has dry color of 10YR 6/6, 6/8, 7/6, 7.5YR 5/6, 5/8, 6/6, 6/8, or 7/8 and has moist color of 10YR 5/6, 5/8, 7.5YR 4/4, 5/6, 5/8, 6/6, or 6/8. It is loam, clay loam, or sandy clay loam. Rock fragment content ranges from 50 to 85 percent. Structure is subangular blocky or massive and it is medium acid to very strongly acid.

## INVILLE SERIES

The Inville soils consist of deep, well drained soils on outwash terraces. These soils formed in deposits of Donner glacial till and outwash of mainly volcanic origin. Slope ranges from 2 to 5 percent.

The vegetation is mainly bitterbrush and open conifer stands, consisting of Jeffrey pine and ponderosa pine. Elevation is 5,500 to 6,300 feet. The average annual precipitation is about 25 to 35 inches, the average annual air temperature is about 42 to 44 degrees F., and the average frost-free season is 20 to 40 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is slow, and the erosion potential is moderate.

The Inville soils are similar to the Jorge, Martis, Sattley, Tallac, and Zeibright soils and associated with the Euer and Martis Variant soils. Euer soils are not cobbly. Jorge soils are greater than 40 inches deep to volcanic parent material. Martis soils are not skeletal. Martis Variant soils have dense, root restricting sub-surface horizons. Tallac soils have silica cemented pans below 40 inches. Sattley soils have mollic epipedons. Zeibright soils have a mesic soil temperatures regimes.

**Taxonomic class.** These soils are loamy-skeletal, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Inville cobbly coarse sandy loam in a unit of Inville-Martis Variant complex, 2 to 5 percent slopes, near the Truckee Airport in section 7, T. 17 N., R. 17 E.

A1 0 to 6 inches; grayish brown (10YR 5/2) cobbly coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many fine interstitial pores; 30 percent cobbles and stones; strongly acid (pH 5.5); gradual wavy boundary.

B2t 6 to 14 inches; yellowish brown (10YR 5/4) very cobbly coarse sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, friable, nonsticky and slightly plastic; few fine and medium roots; many fine interstitial pores; few thin clay films on faces of peds; 35 percent cobbles; medium acid (pH 6.0); clear wavy boundary.

B3 14 to 30 inches; light yellowish brown (10YR 6/4) very cobbly loamy coarse sand, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few medium roots, very few coarse roots; many fine interstitial pores; 50 percent cobbles and stones; slightly acid (pH 6.5).

C 30 to 60 inches; Similar to the above but extremely cobbly.

Range in characteristics. Effective rooting depth ranges from 30 to 40 inches.

The A horizon has colors of 10YR 5/2, 4/2, 3/2, or 2/2. It is coarse sandy loam or sandy loam with 15 to 35 percent cobbles and gravel and is medium acid or strongly acid.

The B2t horizon has dry colors of 10YR 5/4, 5/6, 5/8, or 6/4 and moist colors of 10YR 5/3, 4/3, 4/4, 3/3, or 3/4. It is sandy loam or coarse sandy loam and cobbles and gravel range from 25 to 50 percent but average greater than 35 percent by volume throughout the B horizon. Reaction is slightly acid or medium acid.

The Inville soils in this survey area are a taxajunct to the Inville series because the B2t horizon has colors of 10YR. This difference, however, does not significantly affect use and management.

# JOCAL SERIES

The Jocal series consists of deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from metamorphic rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifer and hardwoods, consisting of Douglas-fir, ponderosa pine, incense cedar with black oak and madrone. Elevation is 1,800 to 5,000 feet. The average annual precipitation is about 45 to 70 inches, the average annual air temperature is 54 to 60 degrees F, and the average frost-free season is 150 to 225 days.

Permeability is moderatly slow. Available water capacity is low to high, runoff is medium to rapid, and the erosion potential is moderate to high.

The Jocal soils are similar to the Cohasset, Holland, and Tahoma soils. They are associated with the Mariposa and Sites soils. Cohasset and Tahoma soils are formed on volcanic parent material and Tahoma soils have a frigid soil temperature regime. Holland soils have more than 20 percent coarse and very coarse sand. Mariposa soils are less than 40 inches deep and have a lithic contact intermittently above 20 inches inpart of each pedon. Sites soils contain more than 35 percent clay in the textural control section.

**Taxonomic class.** These soils are fine-loamy, mixed, mesic Typic Haploxerults.

Typical pedon of Jocal loam in a unit of Sites-Jocal complex, 2 to 30 percent slopes, approximately 14 miles north-northeast of Grass Valley one-quarter mile west of the intersection of Bear Trap Road and Tyler Foote Crossing Road, 1320 feet north and 1000 feet west of the south quarter corner of section 21, T. 18 N., R. 9 E.

O1 and O2 3 inches to 0; needles, litter and duff.

A1 0 to 6 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/3) moist; weak fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and coarse roots; many very fine and fine tubular pores; slightly acid; clear smooth boundary.

A3 6 to 18 inches; reddish brown (5YR 5/4) gravelly loam, yellowish red (5YR 4/6) moist; weak fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; many very fine tubular and interstitial pores and few fine and medium tubular pores; medium acid; gradual wavy boundary.

B21t 18 to 34 inches; reddish yellow (5YR 6/6) silty clay loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; many very fine tubular and interstitial pores and common fine tubular pores; common thin clay films on faces of peds and lining pores; medium acid; gradual smooth boundary.

B22t 34 to 51 inches; reddish yellow (5YR 6/6) silty clay loam, yellowish red (5YR 4/6) moist; moderate fine and medium angular blocky structure; hard, firm, slightly sticky and plastic; few medium and coarse roots; many very fine tubular pores; many thin clay films on faces of peds and lining pores; strongly acid; gradual smooth boundary.

B3 51 to 70 inches; reddish yellow (5YR 6/6) silty clay loam, yellowish red (5YR 4/6) moist; massive; hard, firm, slightly sticky and slightly plastic; few medium and coarse roots; few very fine tubular pores; many thin clay films lining pores; strongly acid; gradual smooth boundary.

Cr 70 inches; variegated strong brown (7.5YR 5/6) and yellowish red (5YR 5/8) weathered slate and shale; yellowish red (5YR 5/8) and red (2.5YR 4/6) moist; strongly acid.

**Range in characteristics.** Depth to slate or shale ranges from 40 to 70 inches. The slate or shale is usually weathered, but in places it changes abruptly to unweathered slate or shale. Cobble content ranges from 0 to 25 percent.

The A horizon has colors of 10YR 5/8, 5/6, 5/4, 5/3, 4/3, 3/3, 7.5YR 5/4, 5/2, 4/4, 4/2, 3/4, 3/2, 5YR 5/4, 5/3, 4/4, or 4/3. It is massive or has weak granular structure and gravel content ranges from 0 to 35 percent.

The B2t horizon has colors of 7.5YR 5/6, 4/6, 5YR 7/6, 6/6, 5/6, 4/6, 2.5YR 5/6, or 4/6. This horizon is clay loam, gravelly clay loam, or silty clay loam.

Overlying the slightly weathered slate and shale in places is a C horizon. It has variegated colors of 7.5YR 5/6 and 5YR 5/8.

## JOCAL VARIANT

Jocal Variant soils consist of deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from metasedimentary rocks. Slope ranges from 50 to 75 percent.

The vegetation is mainly mixed conifer and hardwoods, consisting of Douglas-fir, ponderosa pine, incense cedar, white fir with black oak, live oak, and big leaf maple. Elevation is 2,000 to 5,000 feet. The average annual precipitation is about 45 to 65 inches, the average annual air temperature is 52 to 60 degrees F., and the average frost free season is 125 to 225 days.

Permeability is moderately slow. Available water capacity is low to moderate, runoff is rapid, and the erosion potential is high.

The Jocal Variant soils are similar to the Aiken, Jocal, and Sites soils and are associated with the Deadwood, Hurlbut, and Mariposa soils. All of these soils are not skeletal, except the Deadwood soils. Aiken and Sites soils are clayey. Deadwood soils are less than 20 inches deep to a lithic contact. Hurlbut and Mariposa soils are less than 40 inches deep and Mariposa soils have a lithic contact intermittently above 20 inches in part of each pedon.

**Taxonomic class.** These soils are loamy-skeletal, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Jocal Variant gravelly silt loam in a unit of Hurlbut-Deadwood-Rock outcrop complex, 30 to 75 percent slopes, along the Gaston Road, section 6, T. 17 N., R. 11 E.

O1 1 inch to 0; needles, litter and duff.

A1 0 to 5 inches; light brown (7.5YR 6/4) gravelly silt loam, dark brown (7.5YR 4/4) moist; weak very fine and fine granular structure; slightly hard, friable, nonsticky and slightly plastic; common very fine and fine roots and few medium roots; many very fine interstitial pores and few very fine tubular pores; 25 percent pebbles; slightly acid (pH 6.5); clear smooth boundary.

B1t 5 to 11 inches; reddish yellow (7.5YR 6/6) very gravelly clay loam, strong brown (7.5YR 4/6) moist; weak very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots, common fine and medium roots; common very fine interstitial pores and few very fine tubular pores; common moderately thick clay films as bridges between mineral grains, common thin clay films lining pores, and few thin clay films as bridges between mineral grains; 50 percent pebbles; slightly acid (pH 6.3); gradual wavy boundary.

B21t 11 to 25 inches; reddish yellow (5YR 7/6) very gravelly clay loam, yellowish red (5YR 5/6) moist; weak fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few very fine and coarse roots, common fine and medium roots; common very fine interstitial pores and few very fine tubular pores; many moderately thick clay films as bridges between mineral grains and common thin clay films lining pores; 45 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

B22t 25 to 44 inches; reddish yellow (7.5YR 7/6) very gravelly clay loam, yellowish red (5YR 5/6) moist; weak fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic, few fine, medium, and coarse roots; few very fine interstitial and tubular pores; many moderately thick clay films as bridges between mineral grains and common thin clay films lining pores; 50 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

B23t 44 to 61 inches; reddish yellow (7.5YR 7/6) very gravelly clay loam, yellowish red (5YR 4/6) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; few fine and medium roots; few very fine tubular and interstitial pores; many moderately thick clay films as bridges between mineral grains and common thin clay films lining pores; 40 percent pebbles; strongly acid (pH 5.5); diffuse irregular boundary.

B3t 61 to 65 inches, reddish yellow (7.5YR 7/6) extremely gravelly silt loam, yellowish red (5YR 5/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; few very fine tubular and interstitial pores; common moderately thick clay films as bridges between mineral grains and common thin clay films lining pores; 3 percent cobbles and 65 percent pebbles; strongly acid (pH 5.5).

**Range in characteristics.** The solum is 40 to 80 inches thick.

The A horizon has dry color of 10YR 6/3, 6/4, or 7.5YR 6/4. It is silt loam or loam with 10 to 30 percent pebbles.

The B2t horizon has dry colors of 10YR 7/4, 7.5YR 7/6, or 5YR 7/6 and moist color of 7.5YR 5/6, 5YR 4/6, or 5/6. It is clay loam with 35 to 65 percent pebbles and is slightly acid to strongly acid.

## JORGE SERIES

The Jorge series consists of deep, well drained soils on mountainsides. These soils formed in residuum from volcanic flow rock of andesite, basalt, and latite. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifers, consisting of red fir, white fir, and Jeffrey pine. Elevation is 6,000 to 9,000 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature 40 to 45 degrees F, and the average frost free season 25 to 75 days.

Permeability is moderate. Available water capacity is very low to low, runoff is medium to rapid, and the erosion potential is high.

The Jorge soils are similar to the Sattley and Tallac soils and are associated with the Tahoma soils. Sattley soils have mollic epipedons. Tahoma soils are not skeletal. Tallac soils do not have argillic horizons, are found on glacial outwash and do not have a lithic or paralithic contacts.

**Taxonomic class.** These soils are loamy-skeletal, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Jorge sandy loam in a unit of Jorge-Waca-Tahoma complex, 30 to 50 percent slopes, in the northeast corner of section 8, T. 15 N., R. 16 E.

O1 and O2 3 inches to 0; fresh and decomposed forest litter.

A11 0 to 6 inches; brown (10YR 4/3) sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots, common medium and coarse roots; many very fine and fine interstitial pores; 10 percent pebbles; slightly acid (pH 6.7); gradual wavy boundary.

A12 6 to 13 inches; brown (10YR 4/3) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots, common medium and coarse roots; many very fine and fine interstitial pores; 20 percent pebbles; slightly acid (pH 6.4); clear smooth boundary.

B1 13 to 20 inches; yellowish brown (10YR 5/4) very cobbly sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; many very fine and fine interstitial pores; 30 percent cobbles and 20 percent pebbles; slightly acid (pH 6.2); gradual wavy boundary.

B21t 20 to 31 inches; yellowish brown (10YR 5/4) very cobbly sandy loam, brown (7.5YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots, common medium and coarse roots; many very fine and fine interstitial pores; 20 percent cobbles and 20 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

B22t 31 to 41 inches; brown (10YR 5/3) very cobbly sandy loam, brown (7.5YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; many very fine and fine interstitial pores; 25 percent cobbles and 20 percent pebbles; medium acid (pH 5.8); gradual wavy boundary.

C1 41 to 47 inches; brown (10YR 5/3) very cobbly sandy loam, brown (7.5YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; many very fine and fine interstitial pores; 30 percent cobbles and 20 percent pebbles; strongly acid (pH 5.4); clear wavy boundary.

**Range in characteristics.** Thickness of the solum is greater than 40 inches. Cobbles and stones range from 20 to 50 percent throughout the profile.

The A horizon has dry colors of 10YR 4/2, 4/3, or 5/4 and moist colors of 10YR 2/2, 3/4, or 7.5YR 3/2. It is slightly acid or medium acid.

The B2t horizon has dry colors of 10YR 5/3, 5/4, or 6/4 and moist colors of 10YR 3/4 or 7.5YR 4/4. Rock fragments are greater than 35 percent. It is sandy loam or loam and slightly acid or medium acid.

## JORGE VARIANT

Jorge Variant soils consist of moderately deep, well drained soils on lake terraces and glacial moraines. These soils formed in lake sediments and material weathered from glacial deposits. Slope ranges from 2 to 50 percent.

The vegetation is mainly Jeffrey pine and scattered sagebrush. Elevation is 5,500 to 6,400 feet. The average annual precipitation is about 20 to 30 inches, the average annual air temperature is about 42 to 44 degrees F., and the average frost free season is 20 to 40 days.

Permeability is moderate. Available water capacity is low, runoff is medium, and the erosion potential is high.

The Jorge Variant soils are similar to the Boomer Variant, Euer, Euer Variant, Jorge, and Lorack soils and are associated with the Aldi Variant and Kyburz soils. Aldi Variant and Kyburz soils are not skeletal and Aldi Variant soils have mollic epipedons. Boomer Variant soils have a mesic soil temperature regime. Euer soils are over 40 inches deep. Euer Variant, Jorge, and Lorack soils have ochric epipedons.

**Taxonomic class.** These soils are loamy-skeletal, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Jorge Variant gravelly loam in from a unit of Jorge Variant-Kyburz complex, 2 to 30 percent slopes, near the center of the NE1/4 of section 33, T. 19 N., R. 17 E.

O1 1 inch to 0; fresh and decomposed litter.

A11 0 to 3 inches; dark brown (10YR 3/3) gravelly loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine interstitial pores; 15 percent pebbles; medium acid (pH 6.0); gradual smooth boundary.

A12 3 to 11 inches; dark brown (10YR 4/3) gravelly loam, very dark brown (10YR 2/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots, few medium roots; common very fine and fine tubular pores, few very fine tubular pores; 20 percent pebbles; slightly acid (pH 6.2); gradual smooth boundary.

B21t 11 to 23 inches; brown (7.5YR 4/4) very gravelly loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; few fine, medium, and coarse roots; common very fine and fine interstitial pores, few very fine tubular pores; very few thin clay films as bridges between mineral grains; 50 percent pebbles; slightly acid (pH 6.5); gradual wavy boundary.

B22t 23 to 35 inches; brown (7.5YR 5/4) very gravelly clay loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, nonsticky and slightly plastic; few medium and coarse roots; common very fine and fine interstitial pores, few fine tubular pores; few thin clay films as bridges between mineral grains and lining pores; 40 percent pebbles; neutral (pH 7.0); diffuse irregular boundary.

Cr 35 inches; highly weathered sediments.

**Range in characteristics.** Depth to weathered lake sediments is from 20 to 40 inches.

The A horizon has dry color of 10YR 5/3, 4/3, or 3/3 and moist colors of 10YR 3/2, 2/2, or 7.5YR 3/2. It is gravelly sandy loam, gravelly loam, or loam with 10 to 20 percent gravel and is neutral to medium acid.

The B horizon has colors of 10YR 5/4, 7.5YR 5/4, or 4/4. It is gravelly loam, gravelly sandy clay loam, very gravel[illegible] sandy clay loam, very gravelly clay loam, or very gr[illegible]velly loam. Gravel content ranges from 30 to 50 perce[illegible].

## KINKEL VARIANT

Kinkel Variant soils consist of deep, well drained soils on mountainsides. These soils formed in residuum weathered from pleistocene basalt flows. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed conifer and brush, consisting of white fir, ponderosa pine, Douglas-fir, and ceanothus. Elevation is 4,800 to 5,800 feet. The average annual precipitation is about 60 to 70 inches, the average annual air temperature is about 48 to 58 degrees F, and the average frost-free season is 150 to 200 days.

Permeability is moderate. Available water capacity is very low to low, runoff is medium, and the erosion potential is high.

The Kinkel Variant soils are similar to the Huysink, Jorge, and McCarthy soils and associated with the Cohasset soils. Cohasset soils are not skeletal. Huysink soils have low base saturations. Jorge soils have a frigid soil temperature regime. McCarthy soils do not have an argillic horizon.

**Taxonomic class.** These soils are loamy-skeletal, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Kinkel Variant gravelly sandy loam in a unit of Kinkel Variant-Cohasset complex, 2 to 30 percent slopes near table mountain, in the southeast corner of section 16, T. 19 N., R. 10 E.

O1 and O2 1 inch to 0; fresh and decomposed forest litter.

A11 0 to 7 inches; dark reddish brown (5YR 3/2) gravelly sandy loam, dark reddish brown (5YR 2/2) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots; 20 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

A12 7 to 14 inches; reddish brown (5YR 4/4) gravelly loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots; 30 percent pebbles; medium acid (pH 6.0); clear wavy boundary.

B2t 14 to 26 inches; strong brown (7.5YR 4/6) very gravelly clay loam, dark brown (7.5YR 3/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common medium roots; 40 percent pebbles and 10 percent cobbles; medium acid (pH 5.7); gradual wavy boundary.

B3t 26 to 43 inches; strong brown (7.5YR 5/6) very gravelly clay loam, strong brown (7.5YR 4/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common medium and coarse roots; 45 percent pebbles and 15 percent cobbles; medium acid (pH 5.7).

C1 43 to 54 inches; strong brown (7.5YR 5/8) very gravelly loam, strong brown (7.5 YR 5/6) moist; massive; slightly hard, firm, nonsticky and slightly plastic; few fine and medium roots; 35 percent pebbles and 15 percent cobbles; strongly acid (pH 5.5).

Cr 54 inches; weathered andesitic rock.

**Range in characteristics.** Solum thickness is greater than 40 inches to weathered volcanic rock.

The A horizon has colors of 10YR 4/4, 4/3, 3/3, 3/2, 7.5YR 4/4, 4/2, 3/4, 3/2, 5YR 4/4, 3/4, 3/3, or 3/2, with moist chromas greater than 3.5 in the lower part. It is sandy loam or loam with 0 to 30 percent gravel and 0 to 50 percent cobbles. It is neutral to medium acid.

The B2t horizon has colors of 10YR 5/6, 7.5YR 5/8, 5/6, 5/4, 5/2, 4/6, 4/4, or 4/2. It is loam or clay loam with 15 to 50 percent gravel and 10 to 30 percent cobbles by volume. It is slightly acid or medium acid.

## KYBURZ SERIES

The Kyburz Series consists of moderately deep, well drained soils on mountainsides. These soils formed in material weathered from volcanic rock and lake sediments. Slopes range from 2 to 75 percent.

The vegetation is mainly open stands of Jeffrey pine and ponderosa pine with an understory of sagebrush and bitterbrush. Elevation is 4,800 to 6,400 feet. The average annual precipitation is about 15 to 40 inches, the average annual air temperature is about 40 to 50 degrees F, and the average frost-free season is 20 to 30 days.

Permeability is moderately slow. Available water capacity is low, runoff is slow to rapid, and the erosion potential is high.

The Kyburz soils are similar to the Fugawee, Martis, Sierraville, Tahoma, and Trojan soils and associated with the Sattley, Sierraville, and Trojan soils. Fugawee soils have base saturation of less than 50 percent in the argillic horizon. Sattley, Sierraville, Tahoma, and Trojan soils are more than 40 inches deep. Martis soils do not have a paralithic contact and have umbric epipedons.

**Taxonomic class.** These soils are fine-loamy, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Kyburz gravelly sandy loam in a unit of Kyburz-Trojan complex, 9 to 30 percent slopes about 0.4 miles northwest of Woodchoppers Spring, in the SW1/4SE1/4 of section 13, T. 18 N., R. 16 E.

O1 2 inches to 0; needles, twigs and duff.

A1 0 to 6 inches; brown (10YR 4/3) gravelly sandy loam, dark brown (7.5YR 3/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and slightly plastic; many very fine roots and few fine roots; many very fine intersitial pores; 10 percent pebbles and 5 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

B1t 6 to 12 inches; reddish brown (5YR 4/4) gravelly loam, dark reddish brown (5YR 3/4) moist; weak fine granular and subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common very fine roots and few fine, medium, and coarse roots; many very fine interstitial pores; few thin clay films as bridges between mineral grains; 10 percent pebbles and 5 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

B2t 12 to 23 inches; reddish brown (5YR 5/4) gravelly clay loam, dark reddish brown (5YR 3/4) moist; moderate very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; many very fine interstitial pores and few very fine tubular pores; many thin clay films lining pores and as bridges between mineral grains; 15 percent pebbles and 5 percent cobbles; very strongly acid (pH 5.0); gradual wavy boundary.

B3t 23 to 34 inches; reddish brown (5YR 5/4) gravelly clay loam, dark reddish brown (5YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; many very fine interstitial pores and few fine tubular pores; common thin clay films lining pores and as bridges between mineral grains; 20 percent pebbles; very strongly acid (pH 5.0); abrupt wavy boundary.

Cr 34 inches; fractured weathered andesitic rock, few roots in fractures 5 to 9 in. apart. Range in characteristics. Thickness of the solum is 20 to 40 inches. Rock fragment content ranges from 5 to 35 percent. Base saturation is 50 to 75 percent throughout the argillic horizon.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, 5/3, 7.5YR 4/2, 4/4, 5/2, 5/4, 5YR 4/3, 4/4, or 5/3. Moist colors are 10YR 2/2, 3/2, 3/3, 3/4, 7.5YR 3/2, 5YR 3/2, 3/3, or 3/4 with moist chromas of 3 or less above 7 inches. It is sandy loam or loam and is slightly acid or medium acid.

The Bt horizon has dry color of 10YR 6/3, 7/3, 7/4; 7.5YR 4/4, 5/4, 6/4; 5YR 4/4 or 5/4 and has moist color of 10YR 3/3, 3/4, 4/3, 7.5YR 3/3, 3/4, 4/4, 5YR 3/3, 3/4, 4/3, or 4/4. It is loam, clay loam, or sandy clay loam and is slightly acid to very strongly acid.

## LEDFORD SERIES

The Ledford series consists of deep, excessively drained soils on mountainsides. These soils formed in residuum weathered from granitic rocks. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifer, consisting of red fir and white fir. Elevation is 5,000 to 9,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 46 to 48 degrees F., and the average frost-free season is 80 to 100 days.

Permeability is rapid. Available water capacity is very low to low, runoff is slow to rapid, and the erosion potential is high.

The Ledford soils are similar to the Bucking and Celio Variant soils and associated with the Ledford Variant soils. Bucking soils have a mollic epipedon and are sandy. Celio Variant soils are skeletal. Ledford Variant soils are 20 and 40 inches deep.

**Taxonomic class.** These soils are coarse-loamy, mixed, frigid Entic Xerumbrepts.

Typical pedon of Ledford sandy loam in a unit of Ledford-Ledford Variant complex, 2 to 30 percent slopes, about 4.2 miles northeast of Bassett's; about 1,400 feet west and 1,000 feet south of the NE corner of section 4, T. 20 N., R. 13 E.

O1 1 inch to 0; forest litter of fresh and partially decomposed fir needles and branches.

A11 0 to 4 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots and few fine roots; common very fine and fine interstitial pores; 3 percent pebbles; slightly acid (pH 6.2); diffuse wavy boundary.

A12 4 to 15 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots, many fine roots, and few medium roots; common very fine and fine interstitial pores; 15 percent pebbles; slightly acid (pH 6.3); diffuse wavy boundary.

A3 15 to 33 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; common very fine and fine roots, few medium and coarse roots; common very fine and fine interstitial pores; 20 percent pebbles; medium acid (pH 6.3); clear wavy boundary.

C1 33 to 41 inches; pale brown (10YR 6/3) very gravelly coarse sandy loam; dark brown (10YR 4/3) moist; massive; soft, friable, nonsticky and slightly plastic; common fine roots, few medium and coarse roots; common very fine and fine interstitial pores; 35 percent pebbles; medium acid (pH 5.9); diffuse irregular boundary.

C2 41 to 56 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; massive; soft, friable, nonsticky and slightly plastic; common fine roots, few medium and coarse roots; common very fine and fine interstitial pores; 50 percent pebbles; medium acid (pH 5.7); abrupt wavy boundary.

C3r 56 inches; highly weathered granitic rock.

**Range in characteristics.** Depth to weathered granitic rock ranges from 40 to 60 inches.

The A horizon has dry colors of 10YR 5/3, 5/4, 4/3, 3/3, 7.5YR 5/2, or 5/4 and moist colors of 10YR 2/2, 3/2, 3/3, 4/3, 4/4, 7.5YR 3/2, or 4/4. It is sandy loam or gravelly sandy loam and slightly acid or medium acid.

The C horizon has colors of 10YR 5/4, 6/3, 7/3, 8/3, 7.5YR 6/4 or 6/6. It is gravelly sandy loam or very gravelly sandy loam.

## LEDFORD VARIANT

The Ledford Variant soils consists of moderately deep, excessively drained soils on mountainsides. These soils formed in residuum weathered from granitic rocks. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifers, consisting of red fir and white fir. Elevation is 5,000 to 9,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 46 to 48 degrees F., and the average frost-free season is 80 to 100 days.

Permeability is rapid. Available water capacity is very low, runoff is slow to rapid, and the erosion potential is high.

The Ledford Variant soils are similar to the Celio Variant soils and associated with the Ledford soils. Celio Variant soils are over 40 inches deep and are skeletal. Ledford soils are over 40 inches deep.

**Taxonomic class.** These soils are coarse-loamy, mixed, frigid Entic Xerumbrepts.

Typical pedon of Ledford Variant fine sandy loam in a unit of Ledford-Ledford Variant complex, 30 to 50 percent slopes, 0.35 miles north on Lunch Creek Road from Highway 49, in the NE1/4NE1/4 of section 9, T. 20 N., R. 13 E.

O1 1 inch to 0; fresh and partially decomposed fir needles.

A11 0 to 3 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots, few fine and medium roots; many very fine and fine interstitial pores; 10 percent pebbles; slightly acid (pH 6.2); clear smooth boundary.

A12 3 to 7 inches; brown (7.5YR 5/2) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots, few fine and medium roots; many very fine and fine interstitial pores; 15 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

C1 7 to 10 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine and medium roots; common very fine interstitial pores; 15 percent pebbles; medium acid (pH 6.0); gradual smooth boundary.

C2 10 to 28 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine, medium, and coarse roots; common very fine interstitial pores; 20 percent pebbles; medium acid (pH 5.8); abrupt wavy boundary.

C3r 28 inches; weathered granitic rock.

**Range in characteristics.** Depth to weathered granitic rock ranges from 20 to 40 inches.

The A horizon has dry colors of 10YR 5/2, 4/2, or 7.5YR 5/2 and moist colors of 10YR 3/2, 2/2, or 7.5YR 3/2. It is sandy loam or coarse sandy loam with 10 to 25 percent gravel and is slightly acid to strongly acid.

The C horizon has dry colors of 10YR 6/4, 6/3, or 5/4 and moist colors of 10YR 4/4, 4/3, or 3/4. It is sandy loam or coarse sandy loam with 10 to 25 percent gravel and is medium acid or strongly acid.

## LEDMOUNT SERIES

The Ledmount series consists of shallow, well drained soils on tops and sides of flat volcanic ridges. These soils formed in residuum weathered from andesitic mudflows. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed brush and hardwood, consisting of manzanita, grasses, and forbs with a few scattered black oak, incense cedar, and ponderosa pine. Elvation is 2,000 to 5,500 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 50 to 54 degrees F, and the average frost-free season is 180 to 230 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is medium to very rapid, and the erosion potential is high.

The Ledmount soils are similar to the Chawanakee, Deadwood, and Woodseye soils and associated with the Crozier and McCarthy series. Chawanakee soils have granitic parent material and a paralithic contact. Crozier and McCarthy soils are over 20 inches deep, and Crozier soils have a argillic horizon. Deadwood soils have metasedimentary parent material and ochric epipedons. Woodseye soils have a frigid soil temperature regime.

**Taxonomic class.** These soils are medial, mesic Lithic Xerumbepts.

Typical pedon of Ledmount sandy loam in a unit of Ledmount-McCarthy-Rock outcrop complex, 2 to 30 percent slopes, in the NE1/4NE1/4 of section 27, T. 17 N., R. 11 E.

O1 Trace; litter and duff.

A11 0 to 7 inches; dark grayish brown (10YR 4/2) sandy loam, black (10YR 2/1) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 10 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

A12 7 to 18 inches; brown (10YR 5/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure parting to moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots, few fine, medium,and coarse roots; many very fine interstitial pores; 10 percent pebbles, 5 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.

R 18 inches; fractured andesitic tuff breccia.

**Range in characteristics.** Depth to slightly weathered bedrock ranges from 12 to 20 inches. Cobble content ranges from 0 to 20 percent and gravel ranges from 10 to 25 percent.

The A horizon has dry colors of 10YR 5/3, 5/2, or 4/2 and moist colors of 10YR 2/1, 2/2, or 3/2. It is sandy loam, gravelly sandy loam, cobbly sandy loam, loam, gravelly loam, or cobbly loam.

In places, a C horizon of weathered andesitic conglomerate is present.

## LEDMOUNT VARIANT

The Ledmount Variant soils consists of shallow, well drained soils on mountainsides. These soils formed in residuum weathered from rhyolitic tuff. These soils are usually found in areas where the rhyolitic tuff has been exposed under a capping of andesitic mudflow of the Merhten Formation. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed brush and scattered conifers, consisting of huckleberry oak, whitethorn, and greenleaf manzanita with Jeffrey pine, white fir, and red fir. Elevation is 5,500 to 8,000 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 38 to 42 degrees F, and the average frost-free season is 50 to 70 days.

Permeability is moderately rapid. Available water capacity is very low to low, runoff is medium to rapid, and the erosion potential is moderate to high.

The Ledmount Variant series are similar to the Ledmount, Meiss, and Woodseye soils and associated with the Ahart, Tinker, and Tallac soils. Ahart soils are greater than 20 inches deep to a paralithic contact. Ledmount and Meiss soils have volcanic parent material, also the Ledmount soils have a mesic soil temperature regime and the Meiss soils are not skeletal. Tinker and Tallac soils have glacial outwash parent material and are greater than 20 inches deep. Woodseye soils are not dominated by vitric pyroclastic material.

**Taxonomic class.** These soils are medial-skeletal, frigid Lithic Xerumbrepts.

Typical pedon of Ledmount Variant very gravelly sandy loam in a unit of Ahart-Rock outcrop-Ledmount Variant complex, 30 to 50 percent slopes, about 4 miles south of Soda Springs on the Baker Ranch-Soda Springs Road, in the SE1/4NW1/4 of section 11, T. 16 N., R. 14 E.

O1 1 inch to 0; litter and duff.

A11 0 to 4 inches; dark grayish brown (10YR 4/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine interstitial pores; 30 percent pebbles, 10 percent cobbles; slightly acid (pH 6.3); gradual smooth boundary.

A12 4 to 19 inches; brown (10YR 5/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine interstitial pores; 40 percent pebbles, 10 percent cobbles; medium acid (pH 6.0); abrupt smooth boundary.

R 19 inches; hard rhyolitic rock.

**Range in characteristics.** The depth to rhyolitic rock ranges from 11 to 19 inches. Gravel content ranges from 15 to 40 percent and cobbles range from 5 to 15 percent. Base saturation is less than 50 percent throughout the profile.

The A horizon has dry colors of 10YR 4/2, 4/3, 5/2, or 5/3 and moist colors of 10YR 3/1, 3/2, or 3/3. It is fine sandy loam, sandy loam, or loam. Structure is weak to moderate very fine and fine granular. It is slightly acid or medium acid.

Some pedons have C horizons.

## LORACK SERIES

The Lorack Series consists of deep and very deep, well drained soils on glacial terraces. These soils formed in deposits of glacial till and outwash derived from a mixture of parent materials. Slope ranges from 2 to 50 percent.

The vegetation is mainly dense stands of high elevation mixed conifers, consisting of red fir, white fir, and sugar pine. Elevation is 5,500 to 7,000 feet. The average annual precipitation is about 65 to 75 inches, the average annual air temperature is about 44 to 50 degrees F., the average frost-free season is 100 to 125 days.

Permeability is moderate. Available water capacity is very low to low, runoff is medium, and the erosion potential is high.

The Lorack soils are similar to the Euer, Euer Variant, Horseshoe, Huysink, and Martis soils and associated with the Smokey soils. Euer and Martis soils have umbric epipedons. Euer Variant soils are not skeletal. Horseshoe and Huysink soils have a mesic soil temperature regime. Smokey Variant soils do not have an argillic horizon and are less than 40 inches deep.

**Taxonomic class.** These soils are loamy-skeletal, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Lorack very gravelly fine sandy loam in a unit of Lorack-Smokey-Cryumbrepts, wet complex, 2 to 30 percent slopes, approximately 0.4 miles NE along Carr Lake Road from Bowman Road intersection, near the NW corner of SE1/4SE1/4 of section 30, T. 18 N., R. 12 E.

O1 1 inch to 0; fresh and decomposed needles and leaves.

A1 0 to 3 inches; dark brown (7.5YR 3/4) very gravelly fine sandy loam, dark brown (7.5YR 3/2) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine and fine interstitial pores; 30 percent pebbles, 10 percent cobbles, 10 percent stones; medium acid (pH 6.0); abrupt smooth boundary.

A3 3 to 8 inches; strong brown (7.5YR 5/6) very gravelly fine sandy loam, dark reddish brown (5YR 3/4) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine, fine, and medium roots, common coarse roots; many very fine and fine interstitial pores, few very fine tubular pores; 30 percent pebbles, 10 percent cobbles, 10 percent stones; slightly acid (pH 6.3); clear wavy boundary.

B1 8 to 19 inches; strong brown (7.5YR 5/6) very gravelly loam, strong brown (7.5YR 4/6) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine, fine, and medium roots, common coarse roots; many very fine and fine interstitial pores, common very fine and fine tubular pores; 30 percent pebbles, 10 percent cobbles, 10 percent stones; medium acid (pH 6.0); clear wavy boundary.

B21t 19 to 32 inches; yellowish brown (10YR 5/8) very gravelly loam, strong brown (7.5YR 5/6) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine and fine roots, common medium and coarse roots; many very fine and fine interstitial pores, common fine tubular pores; few thin clay films as bridges between mineral grains; 30 percent pebbles, 10 percent cobbles, 10 percent stones; strongly acid (pH 5.5); clear wavy boundary.

B22t 32 to 45 inches; yellowish brown (10YR 5/8) extremely gravelly loam, strong brown (7.5YR 5/8) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots, few coarse roots; many very fine and fine interstitial pores, common very fine and fine tubular pores; few thin clay films lining pores, root channels, and as bridges between mineral grains; 45 percent pebbles, 10 percent cobbles, 10 percent stones; strongly acid (pH 5.5); clear irregular boundary.

B3t 45 to 56 inches; reddish yellow (7.5YR 6/8) very gravelly clay loam, strong brown (7.5YR 4/6) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common fine and medium roots; many very fine and fine interstitial pores, few fine tubular pores; common thin clay films and few moderately thick clay films lining pores, root channels, and on faces of peds; 20 percent pebbles, 10 percent cobbles, 10 percent stones; very strongly acid (pH 5.0); abrupt wavy boundary.

Csi 56 to 75 inches; yellow (10YR 7/6) intermittently cemented extremely gravelly sandy loam, strong brown (7.5YR 5/8) moist, common fine distinct strong brown (7.5YR 4/6) mottles, moist; massive; very hard, very firm, nonsticky and nonplastic; common fine and medium roots in cracks 6 to

12 inches apart; few thin clay films lining root channels and very few thin clay films as bridges between mineral grains; 70 percent pebbles, 10 percent cobbles, 10 percent stones; extremely acid (pH 4.3).

**Range in characteristics.** The solum is 45 to 70 inches thick. Base saturation in the lower B2t or B3t horizons is between 15 and 33 percent.

The A1 horizon has dry colors of 7.5YR 3/4, 4/4, 5YR 4/4, or 5/6 and moist colors of 7.5YR 3/2, 3/4, 5YR 3/4, or 4/6. It is gravelly fine sandy loam, very gravelly fine sandy loam, very gravelly loam, or gravelly loam and has 15 to 45 percent gravel. The A1 horizon is medium acid or slightly acid.

The B2t horizon has dry colors of 7.5YR 5/6, 6/6, 6/8, 10YR 5/8, or 6/6 and moist colors of 7.5YR 4/6, 5/6, 5/8, 6/6, 5YR 5/6, or 5/8. It is gravelly or very gravelly loam, clay loam, or silty clay loam, and has 15 to 50 percent gravel and 5 to 25 percent cobbles. The B2t horizon is very strongly acid to medium acid.

Some pedons have a C horizon of very gravelly sandy loam texture between the B2t horizon and the compacted glacial till. The glacial till is intermittently cemented.

## LORACK VARIANT

The Lorack Variant soils consist of moderately deep, moderately well drained soils on mountainsides. These soils formed in glacial outwash and material from volcanic sources. Slope ranges from 2 to 30 percent.

The vegetation is mainly mixed conifers, consisting of white fir and sugar pine with an understory of manzanita, bitterbrush, and squaw carpet. Elevation is 5,500 to 6,500 feet. The average annual precipitaton is about 30 to 45 inches. The average annual air temperature is about 42 to 45 degrees F., and the average frost-free season is 25 to 75 days.

Permeability is moderately slow. Available water capacity is very low to low, runoff is medium to rapid, and the erosion potential is high.

The Lorack Variant soils are similar to the Boomer Variant, Euer, Jorge, Lorack, and Sattley soils, and associated with the Tallac and Waca soils. Boomer Variant soils have a mesic soil temperature regime. Euer soils have umbric epipedons. Jorge and Lorack soils have sola over 40 inches thick and Jorge soils are formed on volcanic parent material. Sattley soils have mollic epipedons. Tallac and Waca soils do not have argillic horizons, and Waca is less than 40 inches deep to a paralithic contact.

**Taxonomic class.** These soils are loamy-skeletal, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Lorack Variant gravelly loam in a unit of Lorack Variant gravelly loam, 2 to 30 percent slopes, in the NE1/4NW1/4 of section 28, T. 17 N., R. 16 E.

O 2 inches to 0; mixed conifer needles and decomposed litter.

A1 0 to 7 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/4) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots, few medium and coarse roots; 25 percent pebbles; neutral (pH 7.0); clear smooth boundary.

B1t 7 to 15 inches; brown (7.5YR 5/4) very gravelly sandy clay loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many medium and coarse roots, common fine roots; common very fine and fine tubular and interstitial pores; common moderately thick clay films on faces of peds and lining pores; 5 percent cobbles, 30 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

B2t 15 to 25 inches; dark brown (7.5YR 3/2) very gravelly clay loam, brown (7.5YR 4/4) moist; weak medium and coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine and fine roots, few medium and coarse roots; common very fine and fine tubular and interstitial pores; common moderately thick clay films on faces of peds and lining pores; 10 percent cobbles, 25 percent pebbles; neutral (pH 7.0); clear wavy boundary.

C1 25 to 36 inches; brown (7.5YR 5/4) extremely gravelly sandy loam, dark brown (7.5YR 4/4) moist; massive; hard, firm, slightly sticky and slightly plastic; common very fine and fine roots; few very fine and fine tubular pores; few thin clay films lining pores and as bridges between mineral grains; 10 percent cobbles, 65 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

C2si 36 to 70 inches; weakly cemented till; few coarse roots.

**Range in characteristics.** Depth to weakly cemented till is 30 to 40 inches.

The A1 horizon has dry colors of 10YR 5/3, 4/3, 7.5YR 5/4, 5/2, 4/4, or 4/2 and moist colors are 7.5YR 4/4, 4/2, 3/4, or 3/2. Textures are gravelly loam or very gravelly fine sandy loam. It is medium acid to neutral.

The B2t horizon has dry colors of 10YR 6/4 or 7.5YR 3/2 and moist colors of 10YR 4/3 or 7.5YR 4/4. It is gravelly clay loam or very gravelly sandy clay loam. The B2t is massive or has weak or medium coarse subangular blocky structure and is slightly acid or neutral.

## MARIPOSA SERIES

The Mariposa series consists of shallow and moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from metasedimentary rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly semi-dense to dense stands of mixed conifers, hardwoods, and brush consisting of Douglas-fir, ponderosa pine, white fir, incense cedar, sugar pine, black oak, canyon live oak, or manzanita. Elevation is 1,800 to 5,500 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 50 to 62 degrees F, and the average frost free season is 125 to 225 days.

Permeability is moderate. Available water capacity is low, runoff is medium to rapid, and the erosion potential is high.

The Mariposa soils are similar to the Crozier and Smokey soils and associated with the Deadwood, Jocal, and Hurlbut Soils. Crozier soils are formed on volcanic rock and do not have interrupted B horizons. Deadwood soils are less than 20 inches deep to a lithic contact and are skeletal. Hurlbut soils do not have argillic horizons. Jocal soils are over 40 inches deep to a paralithic contact. Smokey soils have a frigid soil temperature regimes and are skeletal.

**Taxonomic class.** These soils are fine-loamy, mixed, mesic Ruptic-Lithic-Xerochreptic Haploxerults.

Typical pedon of Mariposa gravelly loam in a unit of Mariposa-Jocal complex, 30 to 75 percent slopes, approximately 6 miles north of Foresthill 30 feet above the Sugar Pine pipeline at station 111+00 in the NE1/4NW1/4 of section 36, T. 15 N., R. 10 E.

O1 and O2 2 inches to 0; oak leaves, pine needles, fir needles, partially decomposed litter and duff.

A11 0 to 4 inches; dark brown (7.5YR 4/4) gravelly loam, dark brown (7.5YR 3/4) moist; strong very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine, fine, and medium interstitial pores; 15 percent pebbles; neutral (pH 7.0); abrupt smooth boundary.

A12 4 to 6 inches; strong brown (7.5YR 4/6) gravelly loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common fine roots and few medium roots; common very fine and fine interstitial pores; 20 percent pebbles; neutral (pH 6.7); clear wavy boundary.

B1t 6 to 15 inches; strong brown (7.5YR 4/6) gravelly loam, reddish brown (5YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; common very fine and fine interstitial pores and few medium tubular pores; common thin clay films lining pores and on faces of peds; 20 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

B21t 15 to 20 inches; yellowish red (5YR 5/6) gravelly clay loam, reddish brown (5YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common fine and medium roots and few coarse roots; common fine and medium interstitial and tubular pores; common thin clay films lining pores and on faces of peds; 25 percent pebbles; medium acid (pH 6.0); gradual irregular boundary.

B22t 20 to 33 inches; yellowish red (5YR 5/6) gravelly clay loam, yellowish red (5YR 4/6) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; common fine and medium roots; common fine and medium tubular pores; common thin clay films lining pores; 30 percent pebbles; strongly acid (pH 5.5); gradual irregular boundary.

R 33 inches; fractured hard and semi-hard metasediments. Fractures are 1 to 3 inches apart. Some soil material in some fractures. Rock fragments have not been displaced.

**Range in characteristics.** Depth to slightly weathered slate and shale is more than 20 inches when the B2t horizon is present. Some pedons do not have a B2t horizon and are less than 20 inches deep. Gravel ranges from about 10 to 35 percent. Soil color commonly is influenced by the underlying rock.

The A horizon has colors of 10YR 5/8, 5/6, 5/4, 5/3, 4/3, 3/3, 7.5YR 5/8, 5/6, 5/4, 5/2, 4/6, 4/4, 4/2, 3/4, or 3/2. It is loam or gravelly loam and is slightly acid or medium acid. It has granular or blocky structure.

The B2t horizon has colors of 10YR 5/3, 4/3, 7.5YR 7/8, 7/6, 6/8, 6/6, 5/4, 5/2, or 4/4. It is clay loam or gravelly clay loam, is medium acid to very strongly acid, and has granular or blocky structure. This horizon is interrupted by ledges of bedrock.

An AC horizon is present in some pedons with colors of 7.5YR 8/2, 7/6, or 6/6. It is strongly acid or very strongly acid and gravelly or very gravelly loam or very gravelly clay loam. In some pedons, however, the C horizon is nongravelly. This horizon is massive.

## MARTINECK SERIES

The Martineck series consists of shallow, well drained soils on old terraces. These soils formed in residuum weathered from cobbly and stony alluvium. The alluvium is consisting of derived from basic igneous rock and is underlain by indurated to consolidated lake sediments. Slope ranges from 2 to 30 percent.

The vegetation is mainly brush, grass, and scattered conifers; consisting of low sagebrush, cheatgrass, juniper, and Jeffrey pine on the higher terraces. Elevation is 5,000 to 5,800 feet. The average annual precipitation is about 14 to 18 inches. The average annual air temperature is about 40 to 42 degrees F. and the average frost free season is 50 to 60 days.

Permeability is very slow. Available water capacity is very low, runoff is slow to medium, and the erosion potential is high.

The Martineck soils are similar to the Aldi Variant soils and are associated with the Badenaugh and Dotta soils. These soils do not have duripans. In addition, Aldi Variant and Dotta soils are not skeletal. Aldi Variant soils have a frigid soil temperature regime.

**Taxonomic class.** These soils are clayey-skeletal, montmorillonitic, mesic, shallow Aridic Durixerolls.

Typical pedon of Martineck extremely stony sandy loam in an area of Badenaugh-Martineck-Dotta association, 2 to 30 percent slopes, approximately 2 1/4 miles southeast of Loyalton, 1,320 feet south and 300 feet west of the N1/4 corner of section 29, T. 21 N., R. 16 E..

A11 0 to 2 inches; grayish brown (10YR 5/2) extremely stony sandy loam, very dark brown (10YR 2/2) moist; weak thick platy structure; loose, friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and fine tubular and interstitial pores, common vesicular pores; 60 percent stones and 20 percent cobbles; medium acid (pH 6.0); abrupt wavy boundary.

A12 2 to 6 inches; gray (10YR 5/1) extremely stony sandy loam, very dark brown (10YR 2/2) moist; weak thick platy structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine tubular and interstitial pores; 60 percent stones and 20 percent cobbles; medium acid (pH 6.0); clear wavy boundary.

B1t 6 to 12 inches; dark grayish brown (10YR 4/2) extremely stony sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; very hard, very firm, sticky and plastic; many very fine and fine roots, common medium roots; common very fine and fine tubular and interstitial pores; common thin clay films lining pores and as bridges between mineral grains; 60 percent stones and 20 percent cobbles; slightly acid (pH 6.2); abrupt wavy boundary.

B2t 12 to 19 inches; brown (10YR 4/3) extremely stony sandy clay, with yellowish brown (10YR 5/6) stains, dark brown (10YR 3/3) moist, with lighter and darker mineral colors; strong medium prismatic structure; extemely hard, extremely firm, sticky and very plastic; few fine and very fine tubular pores; continuous moderately thick clay films lining pores and on faces of peds; some nearly black manganese stains on faces of peds; 60 percent stones and 20 percent cobbles; medium acid (pH 6.0); abrupt wavy boundary.

IIC1sim 19 to 24 inches; pale yellow (2.5Y 7/4) indurated duripan with dark gray (10YR 4/1) stains on fracture planes, dark yellowish brown (10YR 4/4) moist; massive; extremely hard, extremely firm; medium acid (pH 5.8).

IIC2 24 to 60 inches; stratified lake sediments becoming less consolidated and less indurated with depth.

**Range in characteristics.** Depth to a strongly cemented or indurated horizon is 10 to 20 inches. The soil profile above the duripan contains 40 to 80 percent rock fragments, mostly cobbles and stones.

The A horizon has dry color of 10YR 4/1, 4/2, 5/1, or 5/2 and moist color of 10YR 2/1, 2/2, 3/1, or 3/2. It is coarse sandy loam, sandy loam, or loam.

The B2t horizon has dry color of 10YR 3/3, 4/3, or 5/3. It is sandy clay loam, sandy clay, or clay.

The IICsim horizon has silica coatings resembling lime but is not effervescent. This horizon does not have the rock fragments of the overlying solum.

# MARTIS SERIES

The Martis series consists of deep and very deep, well drained soils on glacial terraces. These soils formed in deposits of glacial till and outwash of mainly volcanic origin. Slope ranges from 2 to 5 percent.

The vegetation is mainly sagebrush and bitterbrush. Elevation is 5,500 to 6,000 feet. The average annual precipitation is about 25 to 35 inches, the average annual air temperature is about 40 to 45 degrees F., and the average frost-free season is 20 to 40 days.

Permeability is moderately slow. Available water capacity is low to moderate, runoff is slow to medium, and the erosion potential is moderate.

The Martis soils are similar to the Jorge, Sattley, Tallac, and Zeibright soils and associated with the Euer, Kyburz, and Trojan soils. Euer soils are skeletal. Jorge and Sattley soils have volcanic parent material and are skeletal. Kyburz soils are less than 40 inches deep to a paralithic contact and Trojan soils have mollic epipedons. Tallac and Zeibright soils do not have argillic horizons and Zeibright soils have a mesic soil temperature regime.

**Taxonomic class.** These soils are fine-loamy, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Martis sandy loam in a unit of Martis-Euer Variant complex, 2 to 5 percent slopes, about 4 miles northeast of Truckee, 1,000 feet southwest of the south end of Prosser Dam near the center of the SW1/4SE1/4 section 25, T. 18 N., R. 16 E.

A11 0 to 7 inches; dark brown (10YR 4/3) sandy loam, dark brown (7.5YR 3/2) moist; moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; few fine roots, common very fine roots; many very fine interstitial pores; 10 percent pebbles; strongly acid (pH 5.5); clear wavy boundary.

A12 7 to 17 inches; brown (10YR 4/3) sandy loam, dark brown (7.5YR 3/2) moist; moderate fine and medium granular structure; soft, friable, slightly sticky and slightly plastic; few very fine and medium roots; many very fine interstitial pores; 5 percent pebbles; strongly acid (pH 5.5); clear wavy boundary.

B21t 17 to 23 inches; brown (10YR 5/3) gravelly sandy clay loam, dark brown (7.5YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, firm, sticky and slightly plastic; few fine roots; few very fine interstitial and discontinuous tubular pores; few thin clay films as bridges between mineral grains and lining pores, very few moderately thick clay films as bridges between mineral grains; 5 percent stones, 5 percent cobbles, 20 percent pebbles; strongly acid (pH 5.5); abrupt wavy boundary.

B22t 23 to 33 inches; brown (10YR 5/3) gravelly sandy clay loam, dark brown (7.5YR 3/2) moist; massive; hard, firm, sticky and slightly plastic; few fine roots; few very fine vesicular and discontinuous tubular pores; very few moderately thick clay films lining pores and as bridges between mineral grains, common thin clay films as bridges between mineral grains; 7 percent cobbles, 15 percent pebbles; medium acid (6.0); clear wavy boundary.

B31t 33 to 46 inches; brown (10YR 5/3) gravelly sandy clay loam, dark yellowish brown (10YR 3/4) moist; massive; hard, firm, sticky and plastic; few and medium fine roots; few very fine tubular pores; few thin and moderately thick clay films as bridges between mineral grains; 20 percent pebbles; medium acid (pH 6.0); clear wavy boundary.

B32t 46 to 67 inches; brown (10YR 5/3) sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few discontinuous tubular pores; few thin and moderately thick clay films lining pores and as bridges between mineral grains; 10 percent pebbles; medium acid (pH 6.0).

**Range in characteristics.** Thickness of the solum ranges from 40 to 70 inches. The umbric epipedon is 10 to 20 inches thick and in some pedons includes the upper B horizon. Base saturation is 35 to 50 percent in some portions of the argillic horizon.

The A horizon has dry colors of 10YR 3/2, 4/2, 4/3, or 5/3 and moist colors of 10YR 3/1, 3/2, 3/3, or 7.5YR 3/2. It is sandy loam or loam with 5 to 20 percent gravel. This horizon has granular, subangular blocky, or thick platy structure. It is slightly acid to strongly acid.

The upper part of the Bt horizon has dry colors of 10YR 5/2, 5/3, 5/4, 6/3, 6/4, or 7.5YR 5/4, and moist colors of 10YR 3/3, 3/4, 4/4, 7.5YR 3/2, or 4/4. It is sandy clay loam or sandy loam with 15 to 30 percent gravel and 3 to 5 percent cobbles. This horizon has subangular blocky structure or is massive and has high bulk density. It is medium acid to strongly acid.

The lower part of the Bt horizon has dry colors of 10YR 5/3, 6/3, 6/4, 7.5YR 4/4, or 5/4 and moist colors of 10YR 3/4, 4/3, 4/4, 5/6, or 7.5YR 3/2. It is sandy clay loam or sandy loam and has 3 to 20 percent cobbles and 10 to 80 percent gravel. Rock fragments increase with increasing depth and exceed 35 percent below 32 inches in some pedons.

## MARTIS VARIANT

Martis Variant soils consist of deep, well drained soils on outwash terraces. These soils formed in deposits of Donner glacial till and outwash of mainly olcanic origin. Slope ranges from 2 to 30 percent.

The vegetation is mainly brush, consisting of sagebrush and bitterbrush. Elevation is 5,000 to 6,500 feet. The average annual precipitation is about 25 to 35 inches, the average annual air temperature is about 42 to 44 degrees F., and the average frost free season is 20 to 40 days.

Permeability is slow through the dense horizon and rapid both above and below this horizon. Available water capacity is very low to low, runoff is slow, and the erosion potential is high.

The Martis Variant soil is similar to the Jorge, Sattley, Tallac, and Zeibright soils and associated with the Euer and Martis soils. Euer soils do not have a layer of high bulk density. Martis soils are non-skeletal. Jorge soils have ochric epipedons. Sattley soils have mollic epipedons. Tallac soils have a weakly cemented layer below 40 inches. Ziebright soils have a mesic soil temperature regime.

**Taxonomic class.** These soils are loamy-skeletal, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Martis Variant in a unit of Euer-Martis Variant complex, 5 to 30 percent slopes near the center of NW1/4 NE1/4 section 23, T. 18 N., R. 16 E.

A1 0 to 5 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate medium and coarse granular structure; soft, very friable, nonsticky and slightly plastic; many very fine and fine roots; common very fine vesicular and interstitial pores; 20 percent pebbles; medium acid (pH 6.0); clear wavy boundary.

A3 5 to 10 inches; brown (10YR 4/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; many very fine and fine roots, few medium roots; common very fine vesicular and interstitial pores; 15 percent pebbles; slightly acid (pH 6.4); clear wavy boundary.

B21t 10 to 15 inches; brown (10YR 5/3) very gravelly sandy clay loam, dark brown (7.5YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots, few medium roots; many fine vesicular and interstitial pores; few thin clay films on faces of peds and lining pores; 40 percent pebbles; neutral (pH 6.6); abrupt wavy boundary.

B22t 15 to 26 inches; brownish yellow (10YR 6/6) extremely gravelly sandy clay loam, yellowish brown (10YR 5/6) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine vesicular and interstitial pores; common thin clay films lining pores and as bridges between mineral grains; 70 percent pebbles; neutral (pH 6.8); clear irregular boundary.

B3 26 to 51 inches; brownish yellow (10YR 6/6) extremely gravelly sandy loam, brownish yellow (10YR 6/6) moist; massive; very hard, friable, slightly sticky and plastic; very few very fine roots; very few very fine vesicular and interstitial pores; very few thin clay films lining pores; 70 percent pebbles; neutral (pH 6.8).

**Range in characteristics.** The effective rooting depth is 18 to 26 inches because of a horizon of high bulk density in the lower B horizon.

The A horizon has dry colors of 10YR 4/2 or 4/3 and moist colors of 10YR 2/2 or 3/2. It is sandy loam or loam with 15 to 30 percent pebbles. It is slightly acid to medium acid.

The B horizon has dry colors of 10YR 5/3 or 6/6 and moist colors of 7.5YR 3/2, 10YR 5/6, or 6/6. It is sandy clay loam in the B2t horizon and sandy loam in the B3 horizon. Rock fragment ranges from 40 to 90 percent. It is neutral or slightly acid.

## McCARTHY SERIES

The McCarthy series consists of moderately deep, well drained soils on tops and sides of flat volcanic ridges. These soils formed in residuum weathered from andesitic mudflows (Mehrten Formation). Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifer and hardwoods, consisting of white fir, ponderosa pine, and black oak with an understory of manzanita and mountain whitethorn. Elevation is 2,000 to 6,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 50 to 58 degrees F., and the average frost-free season is 130 to 200 days.

Permeability is moderately rapid. Available water capacity is low, runoff is medium to rapid, and the erosion potential is high.

The McCarthy soils are similar to the Ahart, Tinker, and Waca soils and associated with the Cohasset, Crozier, Putt, and Zeibright soils. Ahart and Waca soils have a frigid soil temperature regime. Crozier and Cohasset soils have argillic horizons and are not skeletal. Putt and Tinker soils have a silica cemented duripan in the profile between 20 and 40 inches, and Tinker soils have a frigid soil temperature regime. Zeibright soils are formed on glacial outwash and are greater than 40 inches deep.

**Taxonomic class.** These soils are medial-skeletal, mesic Andic Xerumbrepts.

Typical pedon of McCarthy gravelly sandy loam in a unit of McCarthy-Ledmount-Crozier complex, 2 to 30 percent slopes about 16 miles northeast of Foresthill, 100 feet west of the American Hill Road, in the NE1/4NW1/4 of section 11, T. 15 N., R.12 E.

O1 and O2 2 inches to 0; litter and duff.

A11 0 to 9 inches; brown (10YR 4/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, friable, nonsticky and slightly plastic; common very fine, fine, and medium roots, few coarse roots; common very fine and fine interstitial pores; 15 percent pebbles; slightly acid (pH 6.7); gradual smooth boundary.

A12 9 to 15 inches; brown (10YR 4/3) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, firm, slightly sticky and slightly plastic; common very fine, fine, and medium roots, few coarse roots; common very fine and fine interstitial pores; few thin colloids stain mineral grains; 18 percent pebbles; slightly acid (pH 6.7); clear wavy boundary.

B2t 15 to 28 inches; brown (7.5YR 5/4) very gravelly sandy loam, dark brown (7.5YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; many fine and medium roots; common very fine and fine interstitial pores; few thin clay films lining pores and few thin colloids stain mineral grains; 40 percent pebbles; slightly acid (pH 6.7); abrupt wavy boundary.

Cr 28 inches, weathered andesitic tuff breccia.

**Range in characteristics.** Depth to weathered rock ranges from 20 to 40 inches. Gravel and cobbles range from 15 to 60 percent. Base saturation throughout the soil is betwen 20 and 50 percent.

The A horizon has dry colors of 10YR 5/2, 4/2, 4/3, 3/3, 7.5YR 5/4, 5/3, 4/4, 4/3, 4/2, 3/4, or 3/2 and moist colors of 10YR 3/2, 7.5YR 3/2, or 3/3. It is sandy loam or loam and slightly acid or medium acid.

The B horizon has dry colors of 7.5YR 6/6, 5/4, 5/6, 4/4, 4/6, 5YR 4/4, 5/6, or 4/6 and moist colors of 7.5YR 4/4 or 5YR 3/3. It is sandy loam or loam and is slightly acid or medium acid.

## MEISS SERIES

The Meiss series consist of shallow, somewhat excessively drained soils on mountainsides. These soils formed in residuum weathered from andesitic rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly grasses, forbs, and scattered conifers, consisting of squirreltail, wyethia, and red fir. Elevation is 6,000 to 10,000 feet. The average annual precipitation is about 50 to 80 inches, the average annual air temperature is 36 to 48 degrees F., and the average frost free season is 25 to 125 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is rapid to very rapid, and the erosion potential is high.

The Meiss soils are similar to the Ledmount, Woodseye, and Ledmount Variant soils and associated with the Waca soils. Ledmount soils have a mesic soil temperature regime and a mollic epipedon. Waca soils are 20 and 40 inches deep. Woodseye soils are not dominated by vitric pyroclastic material and have metasedimentary parent material. Ledmount Variant soils are skeletal and are formed on rhyolithic tuff.

**Taxonomic class.** These soils are medial Lithic Cryumbrepts.

Typical pedon of Meiss sandy loam in a unit of Meiss-Rock outcrop complex, 2 to 30 percent slopes, in the NW1/4NE1/4 of section 12, T. 17 N., R. 13 E.

O1 1 inch to 0; scattered litter and duff.

A11 0 to 9 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 5 percent pebbles; neutral (pH 7.0); clear wavy boundary.

A12 9 to 19 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky parting to very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; 10 percent pebbles; neutral (pH 7.0); abrupt wavy boundary.

R 19 inches; hard volcanic rock.

**Range in characteristics.** Depth to bedrock ranges from 12 to 20 inches. These soils are dominated by vitric material. Rock fragments range from 5 to 35 percent throughout the profile.

The A horizon has colors of 10YR 5/4, 5/3, 4/3, 4/2; 7.5YR 5/4,5/2, 4/4, or 4/2. Moist chromas are 3 or less to a depth of 7 inches or more. Texture is loam, sandy loam, or coarse sandy loam and it is neutral to medium to acid.

## MUSICK SERIES

The Musick series consists of deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from granitic rock. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed confier and hardwoods, consisting of Douglas-fir, ponderosa pine, black oak, and tan oak. Elevation is 2,000 to 4,000 feet. The average annual precipitation is about 60 to 80 inches, the average annual air temperature is about 54 to 59 degrees F., and the average frost-free season is 180 to 230 days.

Permeability is moderately slow. Available water capacity is moderate to high, runoff is medium to rapid, and the erosion potential is high to very high.

The Musick soils are similar to the Aiken, Boomer, Cohasset, Jocal, and Sites soils and associated with the Hoda, Holland, and Hotaw soils. Aiken and Sites soils have a base saturation of less than 35 percent in the argillic horizon and are clayey. Boomer and Cohasset soils have less than 16 percent coarse and very coarse sand in the argillic horizon. Cohasset, Holland, and Jocal soils do not have a hue as red as 2.5YR in the argillic horizon. Hoda soils have a fine particle-size class. Hotaw soils are less than 40 inches deep.

**Taxonomic class.** These soils are fine-loamy, mixed, mesic Ultic Haploxeralfs.

Typical pedon of Musick loam in a unit of Hoda-Musick complex, 2 to 30 percent slopes, about 4 miles southwest of Camptonville in the center of the SW1/4SW1/4 of section 17, T. 18 N., R. 8 E.

O1 2 inches to 0; litter and duff.

A11 0 to 3 inches; brown (7.5YR 5/4) loam, dark reddish brown (5YR 3/4) moist; moderate very fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; few very fine interstitial pores; slightly acid (pH 6.3); clear wavy boundary.

A12 3 to 8 inches; brown (7.5YR 5/4) loam, yellowish red (5YR 4/6) moist; moderate very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine and medium roots, few coarse roots; common fine interstitial pores, few medium and coarse tubular pores; few thin clay films on faces of peds; slightly acid (pH 6.3); abrupt smooth boundary.

B21t 8 to 16 inches; reddish brown (2.5YR 4/4) clay loam, dark red (2.5YR 3/6) moist; moderate coarse subangular blocky structure; very hard, firm, sticky and very plastic; few fine and medium roots; few fine interstitial pores; continuous thick clay films on faces of peds and lining pores; slightly acid (pH 6.3); clear irregular boundary.

B22t 16 to 35 inches; red (2.5YR 5/6) clay loam, red (2.5YR 4/6) moist; massive; slightly hard, firm, sticky and plastic; few very fine and fine roots; few very fine interstitial pores; many moderately thick clay films lining pores; medium acid (pH 6.0); gradual irregular boundary.

B3t 35 to 80 inches; red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/8) moist; massive; slightly hard, firm, sticky and plastic; few fine, medium, and coarse roots; many very fine interstitial pores; common moderately thick clay films as bridges between mineral grains; medium acid (pH 6.0); diffuse wavy boundary.

**Range in characteristics.** Depth to weathered granitic rock is from 60 to 80 inches.

The A horizon has dry colors of 10YR 5/3, 5/2, 4/3, 4/2, 7.5YR 5/4, 5/2, 4/4, or 4/2 and moist colors of 10YR 4/4, 3/3, 7.5YR 5/4, 5/2, 4/4, 4/2, 3/4, 3/2, 5YR 5/4, 5/3, 4/6, 4/4, 4/3, 3/4, 3/3, or 3/2. It is coarse sandy loam, fine sandy loam, sandy loam, or loam. It is slightly acid or medium acid.

The B2t horizon has colors of 5YR 5/8, 5/6, 5/4, 4/8, 4/6, 4/4, 2.5YR 5/8, 5/6, 4/8, 4/6, or 3/6. It is clay loam or sandy clay loam and slightly acid to strongly acid.

## NEER SERIES

Neer soils are moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from rhyolitic tuff. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifer, consisting of ponderosa pine, sugar pine, incense cedar, and black oak and an understory story of manzanita. Elevation is 3,000 to 6,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 48 to 52 degrees F, and the average frost-free season is 125 to 200 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is medium, and the erosion potential is moderate to high.

The Neer soils are similar to the Portola and Waca soils and associated with the Ponto Variant and McCarthy soils. McCarthy soils have umbric epipedons and andesitic mudflow parent material. Ponto Variant soils are non-skeletal. Portola and Waca soils have a frigid soil temperature regime.

Taxonomic class. These soils are medial-skeletal, mesic Andic Xerochrepts.

Typical pedon of Neer extremely gravelly sandy loam in a unit of Ponto Variant-Neer complex, 2 to 30 percent slopes, at Sugar Pine Point in section 17, T. 16 N., R. 13 E.

O1 3 inches to 0; litter and duff.

A1 0 to 6 inches; pale brown (10YR 6/3) extremely gravelly sandy loam, brown (10YR 4/3) moist; moderate medium granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 75 percent pebbles; slightly acid (pH 6.2); clear smooth boundary.

B21 6 to 16 inches; very pale brown (10YR 7/3) extremely gravelly sandy loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable. nonsticky and nonplastic; common very fine and fine roots; many very fine interstitial pores; 80 percent pebbles; medium acid (pH 6.0); clear irregular boundary.

B22 16 to 29 inches; very pale brown (10YR 7/4) extremely gravelly sandy loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few medium and coarse roots; common very fine interstitial pores; 80 percent pebbles; medium acid (pH 6.0); abrupt wavy boundary.

Cr 29 inches; weathered rhyolithic tuff.

**Range in characteristics.** Thickness of the solum ranges from 20 to 40 inches. Gravel content ranges from 50 to 80 percent.

The A horizon has colors of 10YR 6/3, 6/2, or 5/2. It is sandy loam or loam and slightly acid or medium acid.

The B horizon has colors of 10YR 8/4, 8/3, 7/4, 7/3, 7/2, 7/1, 6/2, or 6/1. It is sandy loam or loam and medium acid to very strongly acid.

The Neer soils in this survey area are a taxajunct to the Neer series because of the 10YR 6/3 colors in the A horizon. This difference, however, does not significantly affect use and management.

## PONTO VARIANT

Ponto Variant soils are moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from rhyolitic tuff. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifers and brush, consisting of Douglas fir, ponderosa pine, incense cedar, white fir, and manzanita. Elevation is 3,000 to 6,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 50 to 56 degrees F., and the average frost-free season is 150 to 225 days.

Permeability is moderately rapid. Available water capacity is low, runoff is medium to rapid, and the erosion potential is high.

The Ponto Variant soils are similar to the Portola and Waca soils and associated with the Neer soils. Portola and Waca soils have a frigid soil temperature regime. Neer soils are skeletal.

**Taxonomic class.** These soils are medial, mesic Andic Xerochrepts.

Typical pedon of Ponto Variant sandy loam in a unit of Ponto Variant-Neer complex, 30 to 50 percent slopes, near McGuire Mtn. in the NE1/4NW1/4 of sec. 18, T. 16 N., R. 11 E.

O1 4 inches to 0; decomposed pine and fir needles.

A1 0 to 7 inches; gray (10YR 5/1) sandy loam, dark gray (10YR 4/1) moist; massive; soft, friable, nonsticky and nonplastic; many very fine roots; many fine and medium interstitial pores; neutral (pH 6.8); gradual smooth boundary.

B21 7 to 13 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine and medium angular blocky structure; soft, friable, slightly sticky and slightly plastic; common fine and medium roots, few coarse roots; many fine and medium interstitial pores; slightly acid (pH 6.5); gradual smooth boundary.

B22 13 to 22 inches; gray (10YR 6/1) fine sandy loam, dark gray (10YR 4/1) moist; moderate fine and medium angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots, few medium and coarse roots; common fine interstitial pores; slightly acid (pH 6.3); abrupt wavy boundary.

Cr 22 inches; highly weathered rhyolitic tuff.

**Range in characteristics.** Depth to weathered rhyolitic tuff ranges from 20 to 40 inches. Gravel content ranges from 0 to 35 percent throughout the profile.

The A horizon has colors of 10YR 6/3, 6/2, 5/2, or 5/1. It is loamy sand to loam and neutral to medium acid.

The B horizon has colors of 10YR 8/4, 8/3, 7/4, 7/3, 7/2, 7/1, 6/2, or 6/1. It is sandy loam, fine sandy loam, or loam and slightly acid to very strongly acid.

## PORTOLA SERIES

The Portola series consists of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from rhyolitic tuff. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifers, consisting of white fir and Jeffrey pine. Elevation is 5,000 to 6,000 feet. The average annual precipitation is about 20 to 30 inches, the average annual air temperature is about 40 to 44 degrees F., and the average frost-free season is 25 to 75 days.

Permeability is rapid. Available water capacity is low, runoff is medium to rapid, and the erosion potential is moderate to high.

The Portola soils are similar to the Ahart, Ponto Variant, and Waca soils and are associated with the Kyburz and Trojan soils. Ahart and Waca soils have umbric epipedons. Kyburz and Trojan soils have argillic horizons. Ponto Variant soils have a mesic soil temperature regime.

**Taxonomic class.** These soils are medial, frigid Andic Xerochrepts.

Typical pedon of Portola gravelly fine sandy loam in a unit of Portola gravelly fine sandy loam, 30 to 50 slopes, approximately 7 miles southwest of Loyalton, 3 miles south on Alder Creek Road off of Smithneck Road, 100 feet south of road in cutbank on landing site, in the NW1/4NW1/4 of section 23, T. 20 N., R. 16 E.

O1 2 inches to 0; decomposed and partially decomposed fir and pine needles.

A1 0 to 3 inches; brown (10YR 5/3) gravelly fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular strucuture; soft, very friable, nonsticky and slightly plastic; common very fine fine, and medium roots; many very fine interstitial pores; 30 percent pebbles; strongly acid (pH 5.5); abrupt smooth boundary.

B1 3 to 10 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, brown (10YR 4/3) moist; weak very fine and fine granular structure; soft, friable, nonsticky and slightly plastic; many very fine roots, common medium and coarse roots; many very fine, common fine, and few medium interstitial pores; 30 percent pebbles; slightly acid (pH 6.3); clear wavy boundary (5 to 9 inches thick).

B21–10 to 21 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many fine roots, common medium roots, few coarse roots; many very fine interstitial pores; 30 percent pebbles, 3 percent cobbles; medium acid (pH 6.0); clear wavy boundary.

B22 21 to 31 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and medium roots; many very fine interstitial pores; 20 percent pebbles, 10 percent cobbles, 10 percent stones; medium acid (pH 6.0); clear wavy boundary.

B3 31 to 39 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3) moist; massive; soft, friable, nonsticky and nonplastic; common very fine and fine roots, few medium and coarse roots; 25 percent pebbles, 10 percent cobbles, 10 percent stones; medium acid (pH 6.0); clear irregular boundary.

Cr 39 inches; weathered rhyolite with fractures greater than 5 inches apart; few roots in fractures.

**Range in characteristics.** Soil depth ranges from 20 to 40 inches. Rock fragment content ranges from 5 to 35 percent.

The A horizon has colors of 10YR 6/3, 6/2, 5/2, or 4/2. It is loamy sand, sandy loam, or loam and slightly acid or medium acid.

The B horizon has colors of 10YR 8/3, 7/4, 7/3, 6/3, or 6/2. It is fine sandy loam or sandy loam. It has weak or moderate subangular blocky structure and is slightly acid to strongly acid.

## PUTT SERIES

The Putt series consists of moderately deep, well drained soils on lateral and terminal glacial moraines and outwash. These soils formed in residuum weathered from glacial deposits. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifers and hardwoods, consisting of ponderosa pine, white fir, incense cedar, and black oak with an understory of manzanita and mountain whitethorn. Elevation is 3,500 to 6,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 45 to 51 degrees F., and the average frost-free season is 100 to 150 days.

Permeability is moderately rapid above the cemented pan, and very slow within the pan. Available water capacity is very low, runoff is medium to rapid, and the erosion potential is high.

The Putt soils are similar to the Tallac, Tinker, and Woodseye soils and are associated with the Deadwood, Hurlbut, McCarthy, and Zeibright soils. Deadwood and Woodseye soils are less than 20 inches deep to a lithic contact and Woodseye soils have a frigid soil temperature regime. Hurlbut soils have ochric epipedons. McCarthy soils are influenced by pyroclastic materials. Tallac and Zeibright soils are over 40 inches deep and the Tallac soils have a frigid soil temperature regime. Tinker soils have a frigid soil temperature regime.

Taxonomic class. These soils are loamy-skeletal, mixed, mesic Andic Xerumbrepts.

Typical pedon of Putt very cobbly sandy loam in a unit of Putt-Zeibright complex, 2 to 30 percent slopes, 5 miles south of Emigrant Gap; 2.8 miles along the road from Sailor Point to Carpenter Flat, 33 feet east of the road; 500 feet south east of the center of the NE1/4 of section 7, T. 16 N., R. 12 E.

O1 2 inches to 0; fresh and decomposed needles and leaves.

A11 0 to 6 inches; dark grayish brown (10YR 4/2) very cobbly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine and fine interstitial pores, few fine tubular pores; 10 percent pebbles, 30 percent cobbles, 5 percent stones; slightly acid (pH 6.5); clear smooth boundary.

A12 6 to 7 inches; dark brown (10YR 4/3) very cobbly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine and fine interstitial pores, few fine tubular pores; 20 percent pebbles, 30 percent cobbles, 5 percent stones; slightly acid (pH 6.5); gradual smooth boundary.

A13 7 to 20 inches; brown (10YR 5/3) very gravelly sandy loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine and fine interstitial pores, few fine tubular pores; 40 percent pebbles, 30 percent cobbles, 5 percent stones; medium acid (pH 6.0); abrupt smooth boundary.

C1si 20 to 35 inches; pale yellow (2.5Y 7/4) very cobbly sandy loam, yellowish brown (10YR 5/8) moist; strong thick platy structure; very hard, friable, nonsticky and nonplastic; common coarse roots, becoming horizontal on horizon surface; few very fine and fine tubular horizontal pores; continuous opalized coatings on the upper surface of the horizon; 30 percent cobbles, 5 percent stones; medium acid (pH 5.7); clear wavy boundary.

C2 35 to 47 inches; pale yellow (2.5Y 7/4) very cobbly sandy loam, yellowish brown (10YR 5/6) moist; strong thick platy structure; hard, very friable, nonsticky and slightly plastic; few fine roots in fractures greater than 4 to 6 inches apart; common very fine and fine tubular pores, few very fine interstitial pores; few thin clay films as bridges between mineral grains; 30 percent cobbles, 5 percent stones; strongly acid (pH 5.7); abrupt wavy boundary.

C3si 47 to 55 inches; pale yellow (2.5Y 7/4) very cobbly sandy loam, yellowish brown (10YR 5/4) moist; massive; very hard, friable, nonsticky and nonplastic; few fine roots in fractures 4 to 6 inches apart; common very fine and fine horizontal tubular pores; 30 percent cobbles, 5 percent stones; very strongly acid (pH 5.0).

**Range in characteristics.** The depth to the silica cemented C2si horizon is from 20 to 34 inches. The base saturation is less than 50 percent throughout the profile. Thickness of the umbric epipedon ranges from 20 to 29 inches. Cobble and stone content ranges from 15 to 60 percent throughout the profile.

The A1 horizon has colors of 10YR 3/2, 3/3, 4/2, 4/3,

5/3, 3/4, or 7.5YR 3/2. It is fine sandy loam, sandy loam, or loam.

The C horizon has dry colors of 10YR 4/3, 5/6, 5/4, 7/4, 8/1, 2.5Y 7/4, or 8/2 and moist colors of 10YR 3/4, 4/1, 4/3, 4/4, 5/4, 5/6, 5/8, 2.5Y 6/2, or 7/6. It is sandy loam, fine sandy loam, loam, or sand. The Csi horizon has dry colors of 10YR 7/1, 6/1, 5/4, or 2.5Y 7/4 and moist colors of 10YR 3/4, 5/1, or 5/4.

## ROUEN VARIANT

The Rouen Variant soils are deep, well drained soils on mountainsides. These soils formed in residuum weathered from metavolcanic rocks. Slope ranges from 2 to 50 percent.

The vegetation is mainly brush, consisting of ceanothus. Elevation is 5,200 to 7,800 feet. The average annual precipitation is about 20 to 25 inches. The average annual air temperature is about 36 to 42 degrees F., and the average frost-free season is less than 25 days.

Permeability is moderate. Available water capacity is low to moderate, runoff is medium to rapid, and the erosion potential is moderate to high.

The Rouen Variant soils are similar to the Umpa soils and are assoicated with the Aspen Variant and Sierraville soils. The Aspen Variant and Umpa soils are skeletal. Aspen Variant soils have mollic epipedons and Sierraville soils have argillic horizons.

**Taxonomic class.** These soils are fine-silty, mixed, frigid Typic Xerochrepts.

Typical pedon of Rouen Variant silt loam in a unit of Rouen Variant-Aspen Variant-Sierraville complex, 20 to 50 percent slopes, terraced, in the NE1/4NW1/4 of section 10, T. 19 N., R. 17 E.

01 1 inch to 0; fresh and decomposed litter.

A11 0 to 3 inches; brown (10YR 5/3) silt loam, very dark grayish brown (10YR 3/2) moist; moderate very fine granular structure; soft, very friable, nonsticky and slightly plastic; common very fine roots; many vary fine interstitial pores; 5 percent pebbles; neutral (pH 7.0); clear wavy boundary.

A12 3 to 12 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common very fine roots; many very fine interstitial pores; 5 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

B21 12 to 30 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist, moderate medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; few very fine and coarse roots; common very fine interstitial pores; 5 percent pebbles and 2 percent cobbles; slightly acid (pH 6.3); gradual wavy boundry.

B22 30 to 50 inches; very pale brown (10YR 7/3) gravelly silt loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; soft, friable, nonsticky and slightly plastic; few very fine roots; common very fine interstitial pores; 10 percent pebbles and 5 percent cobbles; slightly acid (pH 6.3).

**Range in characteristics.** Depth to weathered rock ranges from 40 to 60 inches.

The A horizon has colors of 10YR 5/2, 5/3, 6/2, or 6/3. It is very fine sandy loam, silt loam, or loam with 0 to 5 percent gravel and slightly acid to mildly alkaline.

The B horizon has colors of 10YR 7/3, 2.5Y 7/4, or 5YR 7/2. It is loam, silt loam, or silt loam and medium acid or slightly acid. Some pedons have B1 horizons.

## SATTLEY SERIES

The Sattley series consists of deep, well drained soils on mountainsides. These soils formed in residuum weathered from andesitic conglomerate, basaltic flow rock, or colluvium from these sources. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed conifers, consisting of Jeffrey pine, ponderosa pine, and incense cedar. Elevation is 5,500 to 6,400 feet. The average annual precipitation is about 20 to 40 inches, the average annual air temperature is about 43 to 45 degrees F., and the average frost-free season is 30 to 60 days.

Permeability is moderate. Available water capacity is very low to low, runoff is medium to rapid, and the erosion potential is high.

The Sattley soils are similar to the Trojan soils and are associated with the Kyburz soils. Kyburz soils do not have mollic epipedons and are less than 40 inches deep. Trojan soils are not skeletal.

**Taxonomic class.** These soils are loamy-skeletal, mixed, frigid Ultic Argixerolls.

Typical pedon of Sattley stony sandy loam in a unit of Trojan -Sattley-Kyburz complex, 2 to 30 percent slopes, 1.5 miles south of Loyalton: 2000 feet southwest of the northeast corner of section 24, T. 21 N., R. 15 E.

O1 and O2 4 inches to 0; fresh pine needles, twigs and litter, decomposed forest litter, duff and humus.

A1 0 to 10 inches; grayish brown (10YR 5/2) stony sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine, fine, and medium roots; common very fine and few fine tubular and interstitial pores; 25 percent stones, cobbles, and pebbles; slightly acid (pH 6.3); gradual smooth boundary.

A3 10 to 15 inches; grayish brown (10YR 5/2) stony sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; many very fine, fine, and medium roots; common very fine and few fine tubular and interstitial pores; 30 percent stones, cobbles, and pebbles; medium acid (pH 6.0); gradual smooth boundary.

B1t 15 to 22 inches; light brownish gray (10YR 6/2) very stony sandy clay loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; slightly sticky and slightly plastic; common very fine and coarse roots; common very fine and few fine tubular and interstitial pores; few thin clay films lining pores, few colloid stains on mineral grains; 35 percent stones, cobbles, and pebbles; medium acid (pH 6.0); clear smooth boundary.

B2t 22 to 40 inches; light brownish gray (10YR 6/2) extremely stony sandy clay loam, dark yellowish brown (10YR 3/4) moist; moderate fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine and coarse roots; common very fine and few fine tubular and interstitial pores; common thin clay films lining pores and on faces of peds; 65 percent stones, cobbles, and pebbles; medium acid (pH 5.8); gradual smooth boundary.

B3 40 to 46 inches; light brownish gray (10YR 6/2) extremely stony sandy clay loam, dark yellowish brown (10YR 3/4) moist; massive; hard, firm, slightly sticky and slightly plastic; common fine and medium roots; common very fine and few fine tubular and interstitial pores; common thin clay films lining pores; 65 percent stones, cobbles, and pebbles; medium acid (pH 5.8).

R 46 inches; cemented andesitic conglomerate.

**Range in characteristics.** Depth to a lithic contact is 40 to 60 inches.

The A1 horizon has colors of 10YR 5/3, 5/2, 5/1, 4/3, 4/2, 4/1, 7.5YR N5/, N4/, 5/4, 5/2, 4/4, or 4/2. It is slightly acid or medium acid.

The B2t horizon has colors of 10YR 6/2, 5/2, 5/3, or 7.5YR 5/2. It is very or extremely stony sandy clay loam or clay loam. The B2t has subangular blocky structure and is medium acid or strongly acid.

## SIERRAVILLE SERIES

The Sierraville series consists of deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from basic volcanic rock. Slope ranges from 2 to 50 percent.

The vegetation is mainly eastside pine and brush, consisting of Jeffrey pine and ponderosa pine with sagebrush and bitterbrush. Elevation is 5,200 to 7,800 feet. The average annual precipitation is about 18 to 40 inches, the average annual air temperature is about 43 to 45 degrees F., the average frost-free season is 25 to 60 days.

Permeability is moderately slow. Available water capacity is low to high, runoff is medium to rapid, and the erosion potential is high.

The Sierraville soils are similar to the Aiken, Hoda, and Sites soils and associated with the Kyburz and Trojan soils. Aiken, Hoda, and Sites soils have a mesic soil temperature regime. Kyburz soils are 20 to 40 inches deep. Trojan soils have mollic epipedons.

**Taxonomic class.** These soils are fine, montmorillonitic, frigid Ultic Haploxeralfs.

Typical pedon of Sierraville stony sandy loam in a unit of Sierraville-Trojan-Kyburz complex, 2 to 30 percent slopes, in the SE1/4NW1/4 of section 30, T. 18 N., R. 17 E.

O1 and O2 2 inches to 0; fresh pine needles, twigs and litter, duff and humus.

A1 0 to 3 inches; reddish brown (5YR 5/3) stony sandy loam, dark reddish brown (5YR 3/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; 15 percent stones; slightly acid (pH 6.5); clear smooth boundary.

A3 3 to 9 inches; reddish brown (2.5YR 4/4) stony loam, dark reddish brown (2.5YR 3/4) moist; weak fine subangular blocky structure and moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots; many very fine and fine tubular and interstitial pores; 15 percent stones; slightly acid (pH 6.5); clear smooth boundary.

B1t 9 to 24 inches; reddish brown (2.5YR 4/4) stony clay loam, dusky red (10R 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; common fine roots, many medium and coarse roots; many very fine and fine tubular and interstitial pores; common thin clay films lining pores;20 percent stones; slightly acid (pH 6.4); clear wavy boundary.

B21t 24 to 48 inches; weak red (10R 5/3) clay loam, dusky red (10R 3/4) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots, common medium and coarse roots; many very fine and fine tubular and interstitial pores; many thin clay films lining pores and few clay films on faces of peds; slightly acid (pH 6.3); gradual smooth boundary.

B22t 48 to 75 inches; weak red (10R 4/3) clay, dark red (10R 3/6) moist; moderate fine angular blocky structure; hard, firm, very sticky and plastic; few fine and coarse roots, common medium roots; common very fine and fine tubular pores, many very fine interstitial pores; many thin clay films lining pores and on faces of peds; medium acid (pH 6.0); abrupt irregular boundary.

R 75 inches; light gray, porous and vesicular, slightly weathered andesite.

**Range in characteristics.** Thickness of the rooting zone ranges from 40 to 80 inches. Rock fragment content ranges from 5 to 30 percent throughout the profile.

The A horizon has colors of 7.5YR 4/4, 4/2, 3/4, 3/2, 5YR 5/4, 5/3, 4/4, 4/3, 3/4, 3/3, 3/2, 2.5YR 5/4, 4/4, or 3/4. It is sandy loam or loam.

The B2t horizon has colors of 5YR 5/4, 5/3, 4/4, 4/3, 2.5YR 5/4, 5/2, 4/4, 4/2, 10R 5/4, 5/3, 4/4, or 4/3. It is clay loam or clay.

The Sierraville soils in map units TWE, TWF, and TWF6 in this survey area are taxajuncts to the Sierraville series because they have 10YR colors throughout the profile. This difference, however, does not significantly affect use and management.

## SITES SERIES

The Sites series consists of deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from metamorphic rock. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed conifers and hardwoods, consisting of ponderosa pine, Douglas-fir, black oak, and tan oak. Elevation is 1,500 to 5,000 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is 54 to 60 degrees F., and the average frost-free season is 150 to 225 days.

Permeability is moderately slow to slow. Available water capacity is low to moderate, runoff is medium to rapid, and the erosion potential is high.

The Sites soils are similar to the Aiken, Cohasset, and Sierraville soils and are associated with the Boomer, Hoda, Holland, Jocal, Mariposa, and Musick soils. Aiken soils have a clay content of the argillic horizon which does not decrease by more than 8 percent of the maximum to a depth of 90 inches. Boomer and Holland soils have greater than 35 percent base saturation in the argillic horizon and are fine-loamy. Cohasset soils are fine-loamy with more than 35 percent base saturation and have volcanic parent material. Hoda and Musick soils are developed from granitic parent material and have 35 to 60 percent base saturation in the argillic horizon. Jocal and Mariposa soils are fine-loamy and Mariposa soils are less than 40 inches deep and have a lithic contact intermittently above 20 inches in part of each pedon. Sierraville soils have a frigid soil temperature regime and have volcanic parent material.

**Taxonomic class.** These soils are clayey, oxidic, mesic Xeric Haplohumults.

Typical pedon of Sites clay loam in a unit of Sites-Josephine complex, 2 to 30 percent slopes, about one mile east of Bullards Bar Dam in the SW1/4SW1/4 of section 30, T. 18 N., R. 8 E.

O1 2 inches to 0; litter and duff.

A1 0 to 9 inches; reddish brown (5YR 4/4) clay loam, dark reddish brown (2.5YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine roots, many medium and coarse roots; many very fine tubular and interstitial pores; 10 percent pebbles; slightly acid (pH 6.3); clear smooth boundary.

B21t 9 to 33 inches; yellowish red (5YR 5/6) gravelly clay, red (2.5YR 4/6) moist; strong moderate and coarse subangular blocky structure; hard, firm, very sticky and plastic; common very fine, medium, and coarse roots; common very fine tubular pores; continuous thick clay films on faces of peds and lining pores; 15 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

B22t 33 to 45 inches; yellowish red (5YR 5/6) gravelly clay, red (2.5YR 4/6) moist; strong moderate and coarse subangular blocky structure; hard, firm, very sticky and plastic; common medium and coarse roots; common very fine tubular pores, few medium tubular pores; continuous thick clay films on faces of peds and lining pores; 25 percent pebbles; medium acid (pH 5.8); clear wavy boundary.

Cr 45 inches; weathered metasedimentary rock.

**Range in characteristics.** Depth to weathered metasedimentary rock ranges from 40 to 65 inches.

The A horizon has dry colors of 7.5YR 5/4, 5/2, 4/4, 4/2, 3/4, 3/2, 5YR 5/4, 5/3, 4/4, or 4/3 and moist colors of 5YR 5/6, 4/6, 3/4, 3/3, 3/2, 2.5YR 3/4, or 2/4. It is sandy loam, loam, or clay loam with 0 to 25 percent rock fragments and slightly acid or medium acid.

The B2t horizon has colors of 5YR 5/6, 5/4, 5/3, 4/6, 4/4, 4/3, 2.5YR 5/6, 5/4, 4/6, or 4/4. It is clay loam or clay with 5 to 30 percent rock fragments. The B2t horizon is medium acid to very strongly acid becoming more acid with depth. Base saturation is about 15 to 35 percent.

## SMOKEY SERIES

The Smokey series consists of moderately deep, well drained soils on mountainsides and outwash terraces. These soils formed in residuum weathered from metasedimentary rock and glacial deposits. Slope ranges from 2 to 75 percent.

The vegetation is mainly semi-open stands of high elevation mixed conifers and shrubs, consisting of sugar pine, Jeffrey pine, white fir, red fir, huckleberry oak, and pinemat manzanita. Elevation is 5,500 to 7,200 feet. The average annual precipitation is about 65 to 75 inches, the average annual air temperature is about 42 to 47 degrees F., and the average frost free season is 75 to 120 days.

Permeability is moderate. Available water capacity is very low, runoff is medium to rapid, and the erosion potential is high.

The Smokey soils are similar to the Chaix, Hurlbut, and Mariposa soils and are associated with the Smokey Variant and Woodseye soils. Chaix, Hurlbut, and Mariposa soils have a mesic soil temperature regime and are not skeletal. Smokey Variant soils are greater than 40 inches deep. Woodseye soils are less than 20 inches deep.

**Taxonomic class.** These soils are loamy-skeletal, mixed, frigid Dystric Xerochrepts.

Typical pedon of Smokey gravelly sandy loam in a unit of Smokey-Smokey Variant-Woodseye complex, 2 to 30 percent slopes, about 25 miles northeast of Foresthill, 2.4 miles east of the interesection of the American Hill Road and the Secret Ridge Road, near the center of section 5, T. 15 N., R. 13 E.

O1 1 inch to 0; litter and duff.

A1 0 to 4 inches; brown (10YR 4/3) gravelly sandy loam, dark brown (10YR 3/3) moist; moderate coarse granular structure; slightly hard, friable, nonsticky and slightly plastic; common very fine and fine roots; common very fine interstitial pores; 18 percent pebbles; strongly acid (pH 5.2); clear smooth boundary.

B2 4 to 14 inches; light yellowish brown (10YR 6/4) very gravelly loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and coarse roots; common fine interstitial and tubular pores; common thin clay films lining pores and on faces of peds; 40 percent pebbles; very strongly acid (pH 5.0); clear irregular boundary.

C1 14 to 24 inches; yellow (10YR 7/6) very gravelly silt loam, brownish yellow (10YR 6/6) moist; massive; slightly hard, friable, sticky and plastic; common medium and coarse roots; few very fine and fine interstitial and tubular pores; 60 percent pebbles; very strongly acid (pH 4.5); abrupt wavy boundary.

C2r 24 inches; weathered metasedimentary rock.

**Range in characteristics.** Depth to a paralithic contact ranges from 20 to 40 inches. Base saturation is less than 60 percent throughout the profile. Stones and cobbles range from 5 to 55 percent throughout the profile.

The A horizon has dry colors of 10YR 5/3, 4/3, 3/3, 7.5YR 5/4, 4/4, or 4/3 and moist colors of 10YR 3/3, 3/2, 7.5YR 5/4, 5/3, 3/2, 3/4 5YR 5/4, or 4/4. It is sandy loam, silt loam, or loam with 10 to 40 percent gravel and 0 to 15 percent cobbles and is medium acid to very strongly acid.

The B horizon has dry colors of 10YR 6/4, 6/6, 5/4, 5/6, 7.5YR 6/4, 5/4, or 4/4 and moist colors of 10YR 5/6, 5/4, 7.5YR 4/4, 5/4, 5YR 4/6, or 5/6. It is loam or silt loam with 30 to 50 percent gravel and 0 to 10 percent cobbles and is medium acid to very strongly acid.

The C horizon has dry colors of 10YR 7/6, 6/4, 6/3, or 7.5YR 4/4 and moist colors of 10YR 6/6, 5/6, 6/4, or 6/3. It is is silt loam, sandy loam, or loam with 40 to 60 percent gravel and 0 to 20 percent cobbles and is strongly acid to very strongly acid.

# SMOKEY VARIANT

The Smokey Variant soils consist of deep, well drained soils on mountainsides. These soils formed in residuum weathered from metasedimentary rock. Slope ranges from 2 to 30 percent.

The vegetation is mainly semi-dense stands of high elevation mixed conifers and shrubs, consisting of sugar pine, Jeffrey pine, white fir, red fir, huckleberry oak, and pinemat manzanita. Elevation is 5,500 to 7,200 feet. The average annual precipitation is about 65 to 75 inches, the average annual air temperature is about 40 to 47 degrees F., and the average frost free season is 75 to 120 days.

Permeability is moderate. Available water capacity is very low to low, runoff is medium to rapid, and the erosion potential is high.

The Smokey Variant soils are similar to the Hurlbut soils and associated with the Deadwood, Mariposa, Smokey, and Woodseye soils. Deadwood and Woodseye soils are less than 20 inches deep and Deadwood soils have a mesic soil temperature regime. Hurlbut and Smokey soils are less than 40 inches deep. Hurlbut soils have a mesic soil temperature regime. Mariposa soils have argillic horizons and have a lithic contact intermittently above 20 inches in part of each pedon.

**Taxonomic class.** These soils are loamy-skeletal, mixed, frigid Dystric Xerochrepts.

Typical pedon of Smokey Variant gravelly sandy loam in a unit of Smokey-Smokey Variant-Woodseye complex, 2 to 30 percent slopes, near the center of section 5, T. 15 N., R. 13 E.

O1 1 1/2 inches to 0; litter and duff.

A1 0 to 3 inches: dark brown (10YR 4/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine interstitial pores; 18 percent pebbles; slightly acid (pH 6.3); abrupt smooth boundary.

B2 3 to 17 inches; yellowish brown (10YR 5/4) very gravelly loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; common very fine interstitial and tubular pores; 40 percent pebbles, 5 percent cobbles and stones; neutral (pH 6.7); abrupt wavy boundary.

C1 17 to 34 inches; very pale brown (10YR 7/4) very gravelly sandy loam, yellowish brown (10YR 5/6) moist; weak medium angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots, few coarse roots; common very fine interstitial and tubular pores; 55 percent pebbles, 5 percent cobbles; neutral (pH 6.7); gradual irregular boundary.

C2 34 to 47 inches; pale yellow (2.5Y 8/4) very gravelly silt loam, brownish yellow (10YR 6/6) moist; weak medium angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; common very fine interstitial and tubular pores; 65 percent pebbles; slightly acid (pH 6.3); gradual irregular boundary.

C3r 47 to 69 inches; highly weathered metasedimentary rock with pockets of soil; few fine and medium roots, and common fine and medium roots in pockets of soil.

**Range in characteristics.** The effective rooting depth ranges from 40 to 60 inches. The base saturation is less than 50 percent between a depth of 10 and 30 inches.

The A horizon has dry colors of 10YR 4/3 or 7.5YR 6/4 and moist colors of 10YR 3/2 or 7.5YR 5/4. It is sandy loam or loam with 15 to 50 percent gravel.

The B horizon has dry colors of 7.5YR 7/8, 10YR 7/6, or 5/4 and moist colors of 7.5YR 6/8, 4/4, or 10YR 5/6. It is loam with 40 to 60 percent gravel and 5 to 10 percent cobbles and stones.

## TAHOMA SERIES

The Tahoma series consists of deep, well drained soils on mountainsides and plateaus. These soils formed in residuum weathered from basic volcanic rocks. Slope ranges from 2 to 75 percent.

The vegetation is mainly dense to semi-dense stands of mixed conifers, consisting of red fir, white fir, and Jeffrey pine with an understory of manzanita and squaw carpet. Elevation is 6,000 to 8,000 feet. The average annual precipitation is about 35 to 60 inches, the average annual air temperature is about 38 to 44 degrees F, and the average frost-free season is 25 to 75 days.

Permeability is moderately slow. Available water capacity is low, runoff is slow to rapid, and the erosion potential is high.

The Tahoma soils are similar to the Kyburz and Martis soils and associated with the Fugawee soils. Fugawee and Kyburz soils are both less than 40 inches deep. Martis soils have an umbric epipedon and are formed in glacial till.

**Taxonomic class.** These soils are fine-loamy, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Tahoma gravelly loam in a unit of Fugawee-Tahoma complex, 2 to 30 percent slopes, about 1 mile on lower Fibreboard Road off of Sagehen Summit, 75 feet east of road, in the SE1/4NW 1/4 of section 32, T. 19 N., R. 16 E.

O1 1 inch to 0; fresh and decomposed litter.

A1 0 to 2 inches; brown (7.5YR 4/2) gravelly loam, dark brown (7.5YR 3/2) moist; moderate fine and medium granular structure; soft, very friable, nonsticky and slightly plastic; many very fine roots; many medium interstitial pores, many very fine tubular and interstital pores; 25 percent pebbles; slightly acid (pH 6.5); abrupt wavy boundary.

B1 2 to 8 inches; brown (7.5YR 5/4) gravelly loam, dark reddish brown (5YR 3/3) moist; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine, fine, and medium roots; many medium interstitial pores, many very fine tubular and interstitial pores; 15 percent pebbles, 10 percent cobbles and stones; slightly acid (pH 6.5); clear wavy boundary.

B21t 8 to 14 inches; brown (7.5YR 5/4) gravelly clay loam, reddish brown (5YR 4/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many medium roots; many medium interstitial pores, many very fine tubular and interstitial pores; many thin clay films on faces of peds and lining pores; 20 percent pebbles, 10 percent cobbles and stones; neutral (pH 6.7); clear wavy boundary.

B22t 14 to 25 inches; strong brown (7.5YR 5/6) gravelly clay loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many medium and coarse roots; common very fine and fine tubular and interstitial pores; continuous moderately thick clay films lining pores, many thin clay films on faces of peds; 15 percent pebbles, 10 percent cobbles and stones; neutral (pH 6.7); gradual wavy boundary.

B3t 25 to 41 inches; strong brown (7.5YR 5/8) very gravelly clay loam, yellowish brown (10YR 5/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many medium and coarse roots; few medium intersititial pores, few very fine and fine tubular and interstitial pores; few thin clay films lining pores; 35 percent pebbles; neutral (pH 6.7); abrupt irregular boundary.

Cr 41 inches; highly weathered andesitic tuff.

**Range in characteristics.** Depth to weathered rock ranges from 40 to 60 inches.

The A horizon has colors of 10YR 5/2, 4/4, 4/3, 4/2, 3/3; 7.5YR 4/2, or 5/4. It is sandy loam or loam with 15 to 60 percent rock fragmen s and is slightly acid or medium acid.

The Bt horizon has colors of 7.5YR 5/4, 4/4, 10YR 6/2, 5YR 6/3, or 6/6. It is loam, sandy clay loam, or clay loam with 0 to 25 percent rock fragments.

# TAHOMA VARIANT

Tahoma Variant soils are deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from granodiorite. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed conifer, consisting of red fir, white fir, incense cedar, and sugar pine. Elevation is 5,500 to 6,500 feet. The average annual precipitation is 50 to 70 inches, the average annual air temperature is about 52 to 56 degrees F., and the average frost-free season is 150 to 175 days.

Permeability is moderately slow. Available water capacity is low to moderate, runoff is medium to rapid, and the erosion potential is high.

The Tahoma Variant soils are similar to the Fugawee, Kyburz, and Tahoma soils and associated with the Chaix Variant and Hotaw Variant soils. Chaix Variant, Fugawee, Hotaw Variant, and Kyburz soils are moderately deep. Tahoma soils have less than 16 percent coarse and very coarse sand and base saturation above 25 percent in the argillic horizon.

**Taxonomic class.** These soils are fine-loamy, mixed, frigid Ultic Halploxeralfs.

Typical pedon of Tahoma Variant gravelly loam in a unit of Tahoma Variant-Hotaw Variant-Cryumbrepts, wet complex, 2 to 30 percent slopes, in section 10, T. 18 N., R. 11 E.

O1 3 inches to 0; litter and duff.

A1 0 to 5 inches; brown (7.5YR 4/4) gravelly loam, dark brown (7.5YR 3/4) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots, many fine and medium roots; common very fine interstitial pores; 15 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

B1 5 to 14 inches; strong brown (7.5YR 5/6) gravelly loam, reddish red (5YR 4/6) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and plastic; common fine and medium roots; common very fine and fine interstitial pores; few thin clay films as bridges between minerals grains; 25 percent pebbles; medium acid (pH 5.7); abrupt wavy boundary.

B21t 14 to 26 inches; strong brown (7.5YR 5/8) clay loam, reddish yellow (7.5YR 6/6) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and very plastic; few medium and coarse roots; common very fine and fine, and few medium interstitial and tubular pores; many moderately thick and few thick clay films on faces of peds; 10 percent pebbles; medium acid (pH 5.7); gradual wavy boundary.

B22t 26 to 37 inches; strong brown (7.5YR 5/8) clay loam, reddish yellow (7.5YR 6/6) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and very plastic; few medium and coarse roots; common very fine and fine tubular and interstitial pores; many moderately thick clay films on faces of peds; 5 percent pebbles; strongly acid (pH 5.5); clear wavy boundary.

B3t 37 to 48 inches; yellow (10YR 7/6) clay loam, yellowish brown (10YR 5/8) moist; massive; slightly hard, friable, sticky and plastic; common medium and coarse roots; common very fine and fine, and few medium interstitial and tubular pores; many moderately thick clay films as bridges between mineral grains and common thin clay films lining pores; 10 percent pebbles; very strongly acid (pH 5.0); clear wavy boundary.

Cr 48 inches; highly weathered granitic rock.

**Range in characteristics.** Depth to weathered granitic rock is from 40 to 80 inches.

The A horizon has dry colors of 7.5YR 7/8, 7/6, 6/8, 6/6, 5/8, 5/6, 5/4, 4/6, 4/4, 5YR 7/6, or 6/6 and moist colors of 7.5YR 4/4, 4/2, 3/4, 3/2, 5YR 5/6, 4/6, 3/4, or 3/3. It is loam or sandy loam with 10 to 35 percent gravel and is slightly acid or medium acid.

The B2t horizon has colors of 7.5YR 7/8, 7/6, 6/8, 6/6, 5/8, 5/6, 4/6, 5YR 7/8, 7/6, 6/8, or 6/6. It is clay loam with 5 to 15 percent gravel and is medium acid to very strongly acid.

## TALLAC SERIES

The Tallac series consists of deep, moderately well drained soils on lateral and terminal glacial moraines and outwash. These soils formed in material weathered from glacial deposits. Slope ranges from 2 to 60 percent.

The vegetation is mainly mixed conifers, consisting of red fir, white fir, Jeffrey pine, and some western white pine. Elevation is 5,500 to 9,000 feet. The average annual precipitation is about 40 to 80 inches, the average annual air temperature is about 39 to 45 degrees F, the average frost-free season is 30 to 75 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is slow to rapid, and the erosion potential is high.

The Tallac soils are similar to the Putt and Zeibright soils and are associated with the Tinker, Waca, and Woodseye soils. Putt and Zeibright soils have a mesic soil temperature regime. Putt and Tinker soils are less than 40 inches deep to a silica cemented pan. Woodseye soils are less than 20 inches deep to lithic contact. Waca soils are influenced by pyroclastic materials.

**Taxonomic class.** These soils are loamy-skeletal, mixed, frigid Pachic Xerumbrepts.

Typical pedon of Tallac very gravelly sandy loam in a unit of Tallac-Cryumbrepts, wet complex, 2 to 30 percent slopes, about two miles southwest of Truckee; 1,000 feet west of Highway 89 along the Jackass Timber Sale Road in the SW1/4NE1/4 of section 21, T. 17 N., R. 16 E.

O1 1 inch to 0; fresh and decomposed conifer needles.

A11 0 to 6 inches; very dark gray (10YR 3/1) very gravelly sandy loam, black (10YR 2/1) moist; moderate medium and coarse granular structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine interstitial pores; 40 percent pebbles; medium acid (pH 6.0); clear wavy boundary.

A12 6 to 16 inches; dark grayish brown (10YR 4/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine granular structure; soft, very friable, nonsticky and slightly plastic; common very fine, fine, and medium roots; many very fine interstitial pores; 5 percent cobbles, 40 percent pebbles; slightly acid (pH 6.3); clear smooth boundary.

A13 16 to 22 inches; brown (10YR 5/3) very cobbly loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and slightly plastic; common very fine, fine, and coarse roots; common fine interstitial pores; 5 percent stones, 35 percent cobbles, 25 percent pebbles; slightly acid (pH 6.3); gradual wavy boundary.

C1 22 to 41 inches; pale brown (10YR 6/3) extremely gravelly loam, brown (10YR 4/3) moist; massive; soft, friable, nonsticky and slightly plastic; common very fine, fine, medium, and few coarse roots; common fine interstitial pores; 15 percent stones, 25 percent cobbles, 30 percent pebbles; slightly acid (pH 6.3); abrupt wavy boundary.

C2si 41 to 60 inches; light yellowish brown and yellowish brown (10YR 6/4, 5/6, 5/8) weakly cemented till; hard, friable; few fine and medium roots.

**Range in characteristics.** Thickness of the solum is 20 to 30 inches.

The A horizon has dry colors of 10YR 5/2, 5/3, 4/1, 4/2, 4/3, 3/1, 3/2, or 3/3 and moist colors of 10YR 3/1, 3/2, 3/3, or 2/1. It is very gravelly sandy loam, gravelly sandy loam, sandy loam, very cobbly loam, gravelly loam, or loam.

The upper C horizon has dry colors of 10YR 6/3, 6/4, 5/3, 5/4, 4/3, or 3/3 and moist colors of 10YR 4/3, 4/4, 3/2, 3/3, or 3/4. It is very gravelly sandy loam, gravelly sandy loam, gravelly fine sandy loam, very gravelly loam, gravelly loam, or loam.

## TINKER SERIES

The Tinker series consists of moderately deep, well drained soils on lateral and terminal glacial moraines and outwash. These soils formed in material weathered from glacial deposits. Slope ranges from 2 to 75 percent.

The vegetation is mainly semi-dense stands of conifers, consisting of lodgepole pine, red fir, and western white pine with an understory of huckleberry oak. Elevation is 6,000 to 8,600 feet. The average annual precipitation is 50 to 80 inches, the average annual air temperature is 38 to 46 degrees F, the average frost-free season is 25 to 75 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is medium to rapid, the erosion potential is high.

The Tinker soils are similar to the Putt and Zeibright soils and are associated with the Tallac, Waca, and Woodseye soils. Putt and Zeibright soils have a mesic soil temperature regime and Zeibright soils are over 40 inches deep. Tallac soils are over 40 inches to a pan. Waca soils are influenced by pryoclastic materials. Woodseye soils are less than 20 inches to a lithic contact.

**Taxonomic class.** These soils are loamy-skeletal, mixed, frigid Andic Haplumbrepts.

Typical pedon of Tinker cobbly loam in a unit of Tinker-Rock outcrop, granitic-Cryumbrepts, wet complex, 2 to 30 percent slopes, 2 miles northeast of Soda Springs; 1/8 mile southwest of Boreal Ridge ski area parking lot on sewage line right-of-way, near the center of the NW1/4NW1/4 of section 24, T. 17 N., R. 14 E.

O1 1 inch to 0; litter and duff.

A11 0 to 5 inches; brown (10YR 4/3) cobbly loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots; common very fine interstitial pores; 10 percent pebbles, 25 percent cobbles and stones; medium acid (pH 5.7); gradual wavy boundary.

A12 5 to 21 inches; brown (10YR 4/3) very cobbly loam, very dark grayish brown (10YR 3/2) moist; massive; soft, friable, nonsticky and nonplastic; common very fine and fine roots, few medium and coarse roots; common very fine interstitial pores; 15 percent pebbles, 45 percent cobbles and stones; medium acid (pH 6.0); clear wavy boundary.

B2 21 to 33 inches; reddish brown (7.5YR 6/6) very cobbly loam, strong brown (7.5YR 5/6) moist; massive; slightly hard, friable, nonsticky and non-plastic; few medium roots; common very fine interstitial pores; 15 percent pebbles, 45 percent cobbles and stones; slightly acid (pH 6.5); abrupt wavy boundary.

C1si 33 to 45 inches; pale olive (5Y 6/3) weakly cemented very cobbly coarse sandy loam, olive (5Y 4/3) moist; massive; very hard, very firm, nonsticky and nonplastic; few medium roots on surface of horizon; few very fine and fine interstitial pores; silica coating on upper surface of horizon; 35 percent pebbles, 25 percent cobbles and stones; medium acid (pH 6.0); clear wavy boundary.

C2 45 to 51 inches; yellow (10YR 7/8) very cobbly coarse sandy loam, brownish yellow (10YR 6/8) moist; massive; hard, firm nonsticky and non-plastic; few fine and medium roots; few very fine and fine interstitial pores; 25 percent pebbles, 25 percent cobbles and stones; medium acid (pH 6.0); abrupt irregular boundary.

C3 51 to 63 inches; very pale brown (10YR 7/4) extremely cobbly coarse sandy loam, yellowish brown (10YR 5/4) moist; massive; hard, firm, nonsticky and nonplastic; few fine roots; no pores noted; 40 percent pebbles; 30 percent cobbles and stones; medium acid (pH 6.0).

**Range in characteristics.** Depth to the silica cemented horizon is from 22 to 40 inches. The umbric epipedon is 20 to 26 inches thick and the base saturation is less than 50 percent throughout the profile.

The A horizon has colors of 10YR 5/3, 5/2, 4/4, 4/3, 4/2, 3/3, or 3/2. It is coarse sandy loam, sandy loam, or loam with 10 to 60 percent rock fragments.

The upper C horizon has colors of 10YR 7/8, 7/4, 7/3, 6/3, 5/6, 5/4 7.5YR 6/6, or 5Y 6/3. It is coarse sandy loam, sandy loam, or loam with 35 to 80 percent rock fragments. The silica cemented horizon has mixed colors of 10YR 6/3, 5/6, 5/4, or 5Y 6/3.

## TOIYABE SERIES

The Toiyabe series consists of shallow, somewhat excessivley drained soils on mountainsides. These soils formed in material weathered from granitic rock. Slopes range from 2 to 75 percent.

The vegetation is mainly mixed brush and widely spaced high elevation mixed conifers, consisting of greenleaf manzanita, prostrate manzanita, squaw carpet, Jeffrey pine, white fir, incense cedar, red fir, or ponderosa pine. Elevation is 5,000 to 7,000 feet. The average annual precipitation is about 20 to 40 inches, the average annual air temperature is about 36 to 42 degrees F., and the average frost-free season is 15 to 20 days.

Permeability is rapid. Available water capacity is very low, runoff is medium to rapid, and the erosion potential is high to very high.

The Toiyabe soils are similar to the Meiss, Ledmount, Chawanakee, and Ledmount Variant soils and are associated with the Haypress soils. Haypress soils are greater than 40 inches deep and have mollic epipedons. Chawanakee and Ledmount soils have a mesic soil temperature regime. Meiss and Ledmount Variant soils have volcanic parent material and are influenced by vitric pyroclastic materials.

**Taxonomic class.** These soils are mixed, frigid, shallow Typic Xeropsamments.

Typical pedon of Toiyabe gravelly loamy coarse sand in a unit of Haypress-Toiyabe-Cryumbrepts, wet complex, 2 to 30 percent slopes, in the NW1/4NE1/4 of section 15, T. 20 N., R. 17 E.

O1 1 inch to 0; litter and duff.

A1 0 to 8 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots and common fine and medium roots; many very fine interstitial pores; 10 percent pebbles and 5 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

C1 8 to 16 inches; pale brown (10YR 6/3) cobbly loamy coarse sand, brown (10YR 4/3) moist; single grained; loose; common fine and medium roots; many very fine interstitial pores; 10 percent pebbles and 10 percent cobbles; strongly acid (pH 5.5); abrupt wavy boundary.

C2r 16 inches; highly weathered granitic rock.

**Range in characteristics.** The effective rooting depth is 10 to 20 inches. It is slightly acid to strongly acid.

The A horizon has dry colors of 10YR 4/2 or 5/2 and moist colors of 10YR 3/2. It is loamy coarse sand or gravelly loamy coarse sand.

The C horizon has dry colors of 10YR 6/2, 6/3, or 6/4 and moist colors of 10YR 4/3. It is gravelly or cobbly loamy coarse sand.

## TROJAN SERIES

The Trojan series consists of deep and very deep, well drained soils on mountainsides. These soils formed in residuum weathered from andesitic and basaltic conglomerate and breccia. Slope ranges from 2 to 50 percent.

The vegetation is mainly semi-dense stands of mixed conifers, consisting of Jeffrey pine, ponderosa pine, and white fir with bitterbrush and big sagebrush. Elevation is 4,800 to 6,400 feet. The average annual precipitation is about 15 to 40 inches, the average annual air temperature is 43 to 45 degrees F, the average frost-free reason is 25 to 75 days.

Permeability is moderately slow. Available water capacity is low to moderate, runoff is medium to rapid, the erosion potential is high.

The Trojan soils are similar to the Sattley soils and are assoicated with the Kyburz soils. Kyburz soils are less than 40 inches deep and do not have a mollic epipedon. Sattley soils are skeletal.

**Taxonomic class.** These soils are fine-loamy, mixed, frigid Ultic Argixerolls.

Typical pedon of Trojan gravelly sandy loam in a unit of Kyburz-Trojan complex, 30 to 50 percent slopes, one mile south of Loyalton, 25 feet south off an old logging road, 1,320 feet north of the center of section 24, T. 21 N., R. 15 E.

O1 and O2 3 inches to 0; mat of pine needles, twigs, and leaves, etc., decomposing with depth; abrupt, smooth boundary.

A1 0 to 3 inches; dark brown (7.5YR 4/2) gravelly sandy loam, dark reddish brown (5YR 3/2) moist; weak thick platy and moderate fine granula. structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots, few medium roots, many very fine interstitial and tubular pores, slightly acid (pH 6.5); clear smooth boundary.

A3 3 to 10 inches; dark brown (7.5YR 4/2) gravelly sandy loam, dark reddish brown (5YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine, fine and medium roots; few very fine and fine tubular pores; slightly acid (pH 6.5); clear smooth boundary.

B1 10 to 21 inches; brown (7.5YR 5/4) gravelly loam, dark reddish brown (5YR 3/4) and yellowish red (5YR 4/6) flecks when moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots, common fine and coarse roots, many medium roots; few fine and medium tubular pores, common very fine tubular pores; medium acid (pH 6.0); clear smooth boundary.

B21t 21 to 37 inches; brown (7.5YR 5/4) and light brown (7.5YR 6/4) gravelly clay loam, reddish brown (5YR 4/4) moist; moderate fine and medium angular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine and coarse roots, common medium roots; few very fine tubular pores; common thin clay films lining pores and on faces of peds; medium acid (pH 6.0); gradual smooth boundary.

B22t 37 to 48 inches; brown (7.5YR 5/4) and light brown (7.5YR 6/4) gravelly clay loam, reddish brown (5YR 4/3) moist; moderate fine and medium angular blocky structure; hard, firm, sticky and slightly plastic; few fine and medium roots; few very fine tubular pores; many thin clay films lining pores and on faces of peds; medium acid (pH 6.0) gradual smooth boundary.

B3t 48 to 61 inches; light brown (7.5YR 6/4) and reddish yellow (7.5YR 6/6) gravelly clay loam, reddish brown (5YR 4/4) moist; moderate medium angular blocky structure; hard, firm, sticky and plastic; few fine and medium roots; common very fine tubular pores; common thin clay films lining pores and as bridges between mineral grains; medium acid (pH 6.0); clear smooth boundary.

C 61 to 67 inches; light brown (7.5YR 6/4) very gravelly loam, reddish brown (5YR 4/4) moist; firm, slightly sticky and slightly plastic; few thin clay films lining pores and as bridges between mineral grains; medium acid (pH 6.0); clear smooth boundary.

R 67 inches: slightly fractured andesite.

**Range in characteristics.** Depth to a lithic contact is 40 to 80 inches.

The A horizon has colors of 10YR 5/2, 5/3, 4/2. 4/3, 7.5YR 5/2, or 4/2. It is sandy loam or loam.

The B2t horizon has colors of 7.5YR 6/4, 5/4, 6/6, 5/6, 5YR 6/4, 5/4, or 6/6. It is loam, clay loam, or sandy clay loam and slightly acid to medium acid.

# UMPA SERIES

The Umpa series consists of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from coarse grain andesite rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly high elevation mixed conifers, consisting of red fir, white fir, and western white pine. Elevation is 7,000 to 8,500 feet. The average annual precipitation is about 35 to 45 inches, the average annual air temperature is about 38 to 42 degrees F, and the average frost-free season is 25 to 75 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is medium to rapid, and the erosion potential is moderate to high.

The Umpa soils are associated with the Fugawee. Jorge, Tahoma, and Waca soils. Fugawee and Tahoma soils have argillic horizons and are not skeletal. Jorge soils are deeper than 40 inches and are formed on Latite flow rock. Waca soils have umbric epipedons.

**Taxonomic class.** These soils are loamy-skeletal, mixed, frigid Dystric Xerochrepts.

Typical pedon of Umpa stony sandy loam in a unit of Umpa stony sandy loam, 2 to 30 percent slopes, about 9 miles southwest of Truckee in the NE1/4NE1/4 of section 11, T. 16 N., R. 15 E.

O1 1 inch to 0; fir litter and duff.

A11 0 to 3 inches; dark brown (10YR 3/3) stony sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; common fine interstitial pores; 10 percent stones, 10 percent pebbles; medium acid (pH 5.7); clear smooth boundary.

A12 3 to 8 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots, few medium roots; common fine interstitial pores; 10 percent stones, 15 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

B21 8 to 16 inches; pale brown (10YR 6/3) gravelly sandy loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots, few coarse roots; few fine and medium tubular pores, common fine interstitial pores; 5 percent cobbles, 5 percent stones and 20 percent pebbles; medium acid (pH 6.0); gradual wavy boundary.

B22 16 to 24 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine, medium, and coarse roots; few fine and medium tubular pores, common fine interstitial pores; 10 percent cobbles, 5 percent stones and 25 percent pebbles; medium acid (ph 6.0); abrupt wavy boundary.

Cr 24 to 36 inches; weathered coarse-grained andesite.

R 36 inches; hard fractured andesite.

**Range in characteristics.** Soil depth to bedrock ranges from 20 to 40 inches. Stones and boulders cover 0 to 10 percent of the surface area. Rock fragments range from 15 to 60 percent throughout the profile and average more than 35 percent.

The A horizon has dry colors of 10YR 5/3, 4/2, 3/3, 7.5YR 6/2, 5/2, or 5YR 6/2, and moist colors of 10YR 3/2, 3/3, 2/2, 7.5YR 3/2, or 5YR 3/4. It is sandy loam or loam and structure is weak to moderate fine granular.

The B2 horizon has dry colors of 10YR 6/3, 7.5YR 7/2, 6/2, 5YR 6/3, or 6/2 and moist colors of 10YR 4/3, 5/1, 5/2, 7.5YR 4/2, 5YR 6/3, or 4/3 [illegible] sandy loam or loam and structure is weak medium subangular blocky.

# WACA SERIES

The Waca series consists of moderately deep, well drained soils on mountainsides. These soils formed in residuum weathered from andesitic mudflows and rhyolitic tuff. Slope ranges from 2 to 75 percent.

The vegetation is mainly semi-dense to dense stands of high elevation mixed conifers consisting of Jeffrey pine, white fir, sugar pine, and western white pine in stands of red fir. Elevation is 6,000 to 9,000 feet. The average annual precipitation is about 35 to 80 inches, the average annual air temperature is about 36 to 42 degrees F., and the average frost free season is 25 to 125 days.

Permeability is moderately rapid. Available water capacity is low, runoff is medium to rapid, and the erosion potential is moderate to high.

The Waca soils are similar to the Ahart, McCarthy, Portola, and Ponto Variant soils and are associated with the Meiss, Tallac, and Windy soils. Ahart and Portola soils are not skeletal. McCarthy and Ponto Variant soils have a mesic soil temperature regime. Meiss soils are less than 20 inches deep to a lithic contact. Tallac soils are formed on glacial outwash material from mixed rock sources and do not have a lithic or paralithic contact. Windy and Tallac soils are greater than 40 inches deep.

**Taxonomic class.** These soils are medial-skeletal, frigid Andic Xerumbrepts.

Typical pedon of Waca gravelly sandy loam in a unit of Waca-Windy complex, 30 to 50 percent slopes, approximately 1 mile southeast of Lake Valley Res., in the NW1/4SW1/4 of section 6, T. 16 N., R. 13 E.

O1 1 inch to 0; needles, twigs and duff.

A11 0 to 7 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine granular structure: soft, very friable, nonsticky and nonplastic: many very fine roots and few fine roots; many very fine interstitial pores; 15 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

A12 7 to 12 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots and few fine roots; many very fine interstitial pores; 15 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

C1 12 to 22 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, nonsticky and nonplastic; common fine roots, few medium and coarse roots; many very fine interstitial pores; 35 percent pebbles, 10 percent cobbles, 5 percent stones; medium acid (pH 6.0); clear wavy boundary.

C2 22 to 32 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, nonsticky and nonplastic; common fine roots, few medium and coarse roots; many very fine interstitial pores; 35 percent pebbles, 15 percent cobbles, 5 percent stones; medium acid (pH 6.0); clear wavy boundary.

C3r 32 inches; weathered andesitic tuff breccia with few medium roots in cracks 8 to 10 inches apart.

**Range in characteristics.** Depth to weathered andesitic tuff breccia or rhyolitic tuff ranges from 20 to 40 inches. The soil has less than 60 percent by weight vitric materials. Bulk density ranges from 0.85 to 1.00 gm/cc.

The A horizon has dry colors of 10YR 4/2, 4/3, 5/3, 5/2, 3/3, 4/4, or 5/4 and moist chromas of 2 or 3 in the upper seven inches. It is sandy loam or loam with 15 to 45 percent gravel.

The C horizon has colors of 10YR 6/4, 6/3, 5/8, 5/6, 5/4, 5/3, 4/4, 4/3, 7.5YR 5/4, or 5/3. It is medium acid or strongly acid fine sandy loam or loam with 35 to 70 percent gravel and cobbles.

## WINDY SERIES

The Windy series consists of deep, well drained soils on mountainsides. These soils formed in residuum weathered from andesitic mudflow. Slope ranges from 2 to 50 percent.

The vegetation is mainly mixed conifer, consisting of red fir and white fir. Elevation is 6,000 to 9,000 feet. The average annual precipitation is about 60 to 80 inches, the average annual air temperature is about 38 to 44 degrees F, and the average frost-free season is 30 to 60 days.

Permeability is moderately rapid. Available water capacity is low, runoff is medium to rapid, and the erosion potential is moderate to high.

The Windy soils are similar to the Ahart, McCarthy, Ponto Variant, Portola, and Tallac soils and associated with the Meiss and Waca soils. Ahart and Portola soils are less than 40 inches deep. McCarthy and Ponto Variant soils have a mesic soil temperature regime. Meiss soils are less than 20 inches deep to a lithic contact and Waca soils are less than 40 inches deep. Tallac soils are formed on glacial outwash from mixed rock sources and do not have a lithic or paralithic contact.

**Taxonomic class:** These soils are medial-skeletal, frigid Andic Xerumbrepts.

Typical pedon of Windy gravelly sandy loam in a unit of Waca-Windy complex, 2 to 30 percent slopes, in the NW1/4SW1/4 of section 6, T. 18 N., R. 12 E.

O1 2 inches to 0; litter and duff.

A1 0 to 6 inches; dark brown (10YR 3/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic, few fine and medium roots; common very fine interstitial pores; 20 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

B2 6 to 17 inches; brown (7.5YR 4/4) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots, few coarse roots; common very fine interstitial pores; 25 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

C1 17 to 35 inches; light brownish gray (10YR 6/2) very gravelly fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common medium and coarse roots, few fine roots; common very fine tubular and interstitial pores; 35 percent pebbles, 5 percent cobbles; medium acid (pH 6.0); clear wavy boundary.

C2 35 to 46 inches; light brownish gray (10YR 6/2) very gravelly fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few medium and coarse roots; common very fine tubular and interstitial pores; 50 percent pebbles, 5 percent cobbles; strongly acid (pH 5.5); abrupt wavy boundary.

C3r 46 inches; hard weathered andesitic tuff breccia, few coarse roots; few thin clay films on fracture planes.

**Range in characteristics.** Depth to weathered rock ranges from 40 to 60 inches. Textures throughout the profile are sandy loam, fine sandy loam, coarse sandy loam, or loam and are cobbly, stony, gravelly, or very gravelly. Rock fragments range from 25 to 55 percent and averages more than 35 percent.

The A and B horizons have dry colors of 10YR 5/3, 4/3, 3/3, 7.5YR 5/4, or 4/4 and moist colors of 10YR 3/4, 3/3, 3/2, 7.5YR 3/4, or 3/2. Structure is weak to strong, very fine to medium granular or subangular blocky.

The C horizon has colors of 10YR 6/4, 6/2, 7.5YR 6/6, or 6/4.

## WOODSEYE SERIES

The Woodseye series consists of shallow, somewhat excessively drained soils on mountainsides. These soils formed in residuum weathered from metasedimentary rock. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed brush consisting of huckleberry oak, greenleaf manzanita, and squaw carpet. Elevation is 5,500 to 8,600 feet. The average annual precipitation is about 50 to 80 inches, the average annual air temperature is 38 to 46 degrees F., and the average frost free season is 25 to 75 days.

Permeability is moderate. Available water capacity is very low, runoff is rapid to very rapid and the erosion potential is high.

The Woodseye soils are similar to the Chawanakee, Deadwood, and Ledmount soils and are associated with the Smokey and Tinker soils. Chawanakee soils have granitic parent material, are not skeletal and have a paralithic contact. Deadwood soils have ochric epipedons and a mesic soil temperature regime. Ledmount soils have volcanic parent material and are dominated by vitric pyroclastic materials. Smokey soils have ochric epipedons and are 20 to 40 inches deep. Tinker soils have glacial outwash parent material and have a silica cemented pan within 20 to 40 inches of the soil surface.

**Taxonomic class.** These soils are loamy-skeletal mixed, frigid Lithic Xerumbrepts.

Typical pedon of Woodseye very gravelly sandy loam in a unit of Rock outcrop, metamorphic-Tinker-Cryumbrepts, wet complex, 30 to 75 percent slopes, 1 mile west of Cisco Grove; 700 feet southeast of microwave relay station on Cisco Butte, in the NW1/4SE1/4 of section 30, T. 17 N., R. 13 E.

O1 1 inch to 0; leaf litter and duff.

A11 0 to 7 inches; very dark grayish brown (10YR 3/2) very gravelly sandy loam, very dark gray (10YR 3/1) moist; weak very fine and fine granular structure; soft, friable, nonsticky and nonplastic; many very fine and fine roots; common very fine interstitial pores; 57 percent pebbles; medium acid (pH 5.7); gradual wavy boundary.inches

A12 7 to 14 inches; brown (10YR 4/3) extremely gravelly loam, very dark grayish brown (10YR 3/2) moist; massive; soft, friable, nonsticky and nonplastic; many very fine and fine roots; common very fine interstitial pores; 67 percent pebbles; slightly acid (pH 6.3); clear wavy boundary.

C 14 to 19 inches; light yellowish brown (10YR 6/4) extremely gravelly loam, brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; 92 percent pebbles; slightly acid (pH 6.3); abrupt wavy boundary.

R 19 inches; hard metasedimentary rock.

**Range in characteristics.** Depth to bedrock ranges from 9 to 20 inches. The umbric epipedon is 7 to 16 inches thick. Angular rock fragments less than 3 inches in size range from 35 to 95 percent throughout the profile.

The A horizon has colors of 10YR 5/3, 4/3, 4/2, 3/3, 3/2, or 3/1. It is very gravelly or extremely gravelly coarse sandy loam, sandy loam, or loam.

The C horizon has colors of 10YR 6/6, 6/4, 6/3, 5/3, 4/3, 7.5YR 5/6, 5/4, 5/2, 4/6, 4/4, or 4/2. It is very gravelly or extremely gravelly sandy loam or loam.

## WOODSEYE VARIANT

The Woodseye Variant soils consist of shallow, well drained soils on mountainsides. These soils formed in residuum weathered from coarse grained andesitic rock. Slope ranges from 30 to 75 percent.

The vegetation is mainly scattered brush and conifers, consisting of ceanothus with red fir and white fir. Elevation is 7,000 to 8,500 feet. The average annual precipitation is about 35 to 45 inches, the average annual air temperature is about 38 to 42 degrees F., and the average frost-free season is 25 to 75 days.

Permeability is moderately rapid. Available water capacity is very low, runoff is rapid, and the erosion potential is high.

The Woodseye Variant soils are similar to the Chawanakee, Deadwood, and Ledmount soils. Chawanakee soils are not skeletal and have a mesic soil temperature regime. Deadwood soils have a mesic soil temperature regime. Ledmount soils have mollic epipedons and are dominated by vitric pyroclastic materials.

**Taxonomic class.** These soils are loamy-skeletal, mixed, frigid Dystric Lithic Xerochrepts.

Typical pedon of Woodseye Variant very gravelly sandy loam in a unit of Rock outcrop-Woodseye Variant-Umpa complex, 30 to 75 percent slopes, in the NE1/4SE1/4 of section 14, T. 16 N., R. 16 E.

O1 1 inch to 0; needles, leaves and twigs.

A11 0 to 6 inches; grayish brown (10YR 5/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 40 percent pebbles; slightly acid (pH 6.3); clear wavy boundary.

A12 6 to 14 inches; light brownish gray (10YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots, common medium and coarse roots; many very fine interstial pores; 40 percent pebbles, 5 percent cobbles; slightly acid (pH 6.3); abrupt wavy boundary.

R 14 inches; hard volcanic rock.

**Range in characteristics.** Depth to bedrock ranges from 12 to 20 inches. Gravel, cobbles, and stones range from 35 to 65 percent throughout the profile.

The A horizon has dry colors of 10YR 6/2, 5/3, or 5/2 and moist colors of 10YR 3/3, 3/2, or 7.5YR 3/2. It is very gravelly or extremely gravelly sandy loam, coarse sandy loam, or sandy loam.

## ZEIBRIGHT SERIES

The Zeibright series consists of deep and very deep, well drained soils on laterial and terminal glacial moraines and outwash. These soils formed in material weathered from glacial deposits. Slope ranges from 2 to 75 percent.

The vegetation is mainly mixed conifer and hardwood, consisting of ponderosa pine, white fir, sugar pine, and black oak. Elevation is 3,500 to 6,000 feet. The average annual precipitation is about 50 to 70 inches, the average annual air temperature is about 45 to 51 degrees F, and the average frost-free season is 100 to 150 days.

Permeability is moderately rapid. Available water capacity is very low to low, runoff is medium, and the erosion potential is moderate to high.

The Zeibright soils are similar to the Tallac and Tinker soils and are associated with the Putt and McCarthy soils. McCarthy soils are found on volcanic parent material and are dominated by pyroclastic materials. Putt soils have a silica cemented pan within 20 to 40 inches of the soil surface. Tallac and Tinker soils have a frigid soil temperature regime.

**Taxonomic class.** These soils are loamy-skeletal, mixed, mesic Entic Xerumbrepts.

Typical pedon of Zeibright gravelly fine sandy loam in a unit of Zeibright gravelly fine sandy loam, 2 to 30 percent slopes, 3 miles west of Emigrant Gap, 0.4 miles southwest of State Highway 20 along Lowell Hill Road near center of NE1/4NE1/4 of section 34, T. 17 N., R. 11 E.

O1 1 inch to 0; litter and duff.

A11 0 to 12 inches; dark brown (10YR 3/3) gravelly fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine interstitial pores; 15 percent pebbles, 5 percent cobbles and stones; slightly acid (pH 6.5); clear irregular boundary.

A12 12 to 21 inches; brown (10YR 4/3) gravelly fine sandy loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots; common very fine interstitial pores; 20 percent pebbles, 10 percent cobbles and stones; slightly acid (pH 6.5); gradual smooth boundary.

C1 21 to 31 inches; yellowish brown (10YR 5/4) very cobbly fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, friable, nonsticky and nonplastic; few fine, medium, and coarse roots; few very fine intersitial pores; 15 percent pebbles, 35 percent cobbles, and 5 percent stones; strongly acid (pH 5.5); clear smooth boundary.

C2 31 to 50 inches; yellowish brown (10YR 5/6) very cobbly fine sandy loam, brown (7.5YR 4/4) moist; massive, soft, friable, nonsticky and nonplastic; few fine, medium, and coarse roots; few very fine interstitial pores; 15 percent pebbles, 35 percent cobbles and 5 percent stones; strongly acid (pH 5.5); clear smooth boundary.

C3 50 to 62 inches; light yellowish brown (10YR 6/4) very cobbly fine sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, friable, nonsticky and nonplastic; common medium and coarse roots; few very fine interstitial pores; 15 percent pebbles, 20 percent cobbles and stones; strongly acid (pH 5.5).

**Range in characteristics.** The thickness of the umbric epipedon ranges from 10 to 20 inches. Rock fragment content ranges from 15 to 60 percent throughout the profile and averages more than 35 percent.

The A horizon has colors of 10YR 3/2, 3/3, 4/2, 4/3, 7.5YR 3/2, 4/2, 5YR 3/3, or 4/3. It is gravelly fine sandy loam or sandy loam.

The C horizon has colors of 10YR 4/4, 5/4, 5/6, 6/3, 6/4, 7.5YR 4/4, 5/4, 6/4, 5YR 4/4, 5/4, 5/6, or 6/4. It is gravelly, very gravelly, or extremely gravelly fine sandy loam or sandy loam.

# Glossary

**Alluvial fan.** A body of alluvium whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a plain.

**Alluvium.** Material, such as sand, silt, and clay deposited by streams.

**Association, soil.** A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

**Base saturation.** The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of calcium, magnesium, sodium, and potassium), expressed as a percentage of the total cation exchange capacity.

**Basic igneous rock.** Rock formed from the cooling and solidification of magma. It is high in iron and magnesium, and relatively low in silica.

**Bedrock.** A generalization for the rock, usually solid, that underlies the soil or other unconsolidated, superficial material.

**Boulder.** Rock fragments larger than 24 inches in diameter

Bulk density, soil. The mass of dry soil per unit bulk volume. The bulk volume is determined before drying to constant weight at 105 degrees centigrade. A unit of measure, usually grams per cubic centimeter or pounds per square foot.

**Cation-exchange capacity.** The sum total of exchangeable cations that a soil can absorb (sometimes called total-exchange capacity, base-exchange capacity, or cation absorption capacity), expressed in milliequivalents per 100 grams of soil or of other absorbing material, such as clay.

**Cemented.** Indurated; having a hard, brittle consistency because the particles are held together by cementing substances such as humus, calcium carbonate, or the oxides of silicon, iron, and aluminum. The hardness and brittleness persist even when wet.

**Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

**Clay film.** A thin coating of oriented clay on the surface of a soil aggregate, or lining pores or root channels. Synonyms: clay skin, clay skin.

**Cobbles.** Rounded or partially rounded fragments of rock 3 to 10 inches in diameter.

**Colluvium.** Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

**Complex, soil.** A map unit of two or more kind of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

**Consistence, soil.** The feel of the soil and ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose. Noncoherent when dry or moist; does not hold together in a mass.

Friable. When moist, crushes easily under pressure between thumb and forefinger and can be pressed together into a lump.

Firm. When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic. When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky. When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to bull free from other material.

Hard. When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft. When dry, breaks into powder or individual grains under very slight pressure.

Cemented. Hard; little affected by moistening.

**Deep.** As a soil depth classification, 40 to 60 inches.

**Duripan.** A subsurface horizon that is cemented by silica to the point that fragments from the air-dry horizon will not slake after prolonged soaking in water or in hydrochloric acid.

**Epipedon.** Soil horizons that form at the surface. It is either darkened by organic matter or eluviated, or both.

**Erosion.** The wearing away of the land surface by wind, water, ice, and other geological agents.

**Erosion potential.** See Maximum erosion hazard rating.

**Flood plain.** The land bordering a stream, built up of sediments from overflow of the stream and subject to inundation when the stream is at flood stage.

**Gravel.** Rounded or angular rock fragments less than 3 inches in diameter; an individual piece is a pebble.

**Horizon, soil.** A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil forming processes. The major horizons are as follows:

O horizon. An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon. The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material.

B horizon. The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon. The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer. Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

**Igneous rock.** Rock that has formed by the cooling and solidification of magma and that has not been changed appreciably since its formation.

**Infiltration.** The downward entry of water into the immediate surface of the soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

**Lithic contact.** The boundary between soil and underlying rock which is a barrier to root penetration and water movement. Rock is essentially unweathered and can only be chipped by a spade.

**Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Mapping unit.** A kind of soil, a combination of kinds of soil, or miscellaneous land types that are delineated on the soil map.

**Maximum erosion hazard rating.** This is an estimate of the relative hazard of the loss of surface soil in an average year assuming no vegetative cover and no soil disturbance. The ratings are low, moderate, high, and very high.

**Metamorphic rock.** Rock derived from pre-existing rocks but that differ from them in physical, chemical, and mineralogical properties as a result of natural geological processes, principally heat and pressure, originating within the earth. The pre-existing rocks may have been igneous, sedimentary, or another form of metamorphic rock. Synonym: metasedimentary rock.

**Moderately deep.** As a soil depth classification, between 20 and 40 inches.

**Moraine.** An accumulation of drift, with an initial topographic expression of its own, built within a glaciated region, chiefly by the direct action of glacial ice. Examples are ground, lateral, recessional, and terminal moraines.

**Mottling, soil.** Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and impeded drainage.

**Mudflow.** A flowage of heterogeneous pyroclastic ma-

terial, lubricated with a large amount of water, on the flank of a volcano. Syn: lahar; Mehrten formation; andesitic mudflow; andesitic tuff breccia; tuff breccia mudflow.

**Organic matter.** Plant and animal residue in the soil in various stages of decomposition.

**Outwash.** Rock material removed from a glacier by meltwater and laid down by streams beyond the glacier itself.

**Pan.** A layer in a soil that is firmly compacted or very rich in clay. Frequently the word "pan" is combined with other words that more explicitly indicate the nature of the layers; for example, hardpan or duripan, fragipan, claypan, and plowpan.

**Paralithic contact.** The boundary between soil and underlying weathered rock which is a barrier to root penetration and water movement. Material retains rock structure but when moist can be dug with a spade.

**Parent material.** The unconsolidated and more or less chemically weathered mineral or organic matter from which the solum of soils is developed by pedogenic processes.

**Ped.** An individual natural soil aggregate, such as a crumb, a prism, or a block.

**Pedon.** The smallest volume that can be called "a soil". A pedon is three dimensional and large enough to permit a study of all horizons. Its area ranges from about 1 square yard to 10 square yards, depending on the variability of the soil.

**Permeability.** The quality of the soil that enables water to move downward through the profile.

**Profile, soil.** A vertical section of the soil through all its horizons and extending into the parent material.

**Reaction.** A measure of acidity or alkalinity of the soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as: Extremely acid, below 4.5; Very strongly acid, 4.5-5.0; Strongly acid, 5.1-5.5; Medium acid, 5.6-6.0; Slightly acid, 6.1-6.5; Neutral, 6.6-7.3; Mildly alkaline, 7.4-7.8; Moderately alkaline, 7.9-8.4; Strongly alkaline, 8.5-9.0; and Very strongly alkaline, higher than 9.0.

**Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

**Sand.** Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be any mineral composition. The texture class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

**Sediment.** Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

**Shallow.** As a soil depth classification, less than 20 inches.

**Silt.** Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

**Slope.** The inclination of the land surface from the horizontal. Percentage of slopes is the vertical distance divided by horizontal distance, then multiplied by 100.

**Soil series.** The basic unit of soil classification, being a subdivision of a family and consisting of soils which are essentially alike in all major profile characteristics except the texture of the A horizon.

**Soil variant.** A soil having properties sufficiently different from other known soils to justify a new series name but making up such a limited geographic area that establishing a new series is not justified.

**Solum.** The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

**Stones.** Detached rock fragments. If rounded, they are more than 10 inches in diameter, or if flattened, more than 17 inches along the long axis.

**Structure, soil.** The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structures are: platy (laminated), prismatic (vertical axis of aggregates longer

than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grain (each grain by itself, as in dune sand) or massive (the particles adhering together without any regular cleavage, as in many claypans and hardpans.)

**Subsoil.** The soil between the surface layer and the uppermost substratum. All parts of B horizon above 80 inches, and any parts of A or C horizons between the surface layer and 40 inches or a more shallow substratum, are subsoil.

**Substratum.** A layer below 40 inches, or beneath the solum if the lower part of the solum is between 40 and 80 inches deep. Any parts of the solum below 80 inches are substrata. Bedrock, hardpan, and unconsolidated geologic materials that are in contrasting particle size classes relative to the surface soil or solum are substrata regardless of depth.

**Surface layer.** The uppermost part of the soil, usually designated as the A horizon, equivilent to the depth of soil moved in tillage and ranging in depth from 3 to 10 inches. Depth may be greater in some forest soils.

**Terrace (geological).** An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

**Texture, soil.** The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

**Till.** Unstratified glacial drift deposited directly by the ice and consisting of clay, sand, gravel, and boulders intermingled in any proportion.

**Water Table.** The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

TABLE 2. - Map Unit Legend, Map Unit Area and Proportionate Extent

| | Map Unit Name | Acres | Percent |
|---|---|---|---|
| ACE | Ahart-Waca, rhyolitic substratum complex, 2 to 30 percent slopes | 3,083 | 0.2 |
| ACF | Ahart-Waca, rhyolitic substratum complex, 30 to 50 percent slopes | 2,761 | 0.2 |
| ADE | Ahart-Waca, rhyolitic substratum-Cryumbrepts, wet complex, 2 to 30 percent slopes | 2,097 | 0.2 |
| ADF | Ahart-Waca, rhyolitic substratum-Cryumbrepts, wet complex, 30 to 50 percent slopes | 3,514 | 0.3 |
| AEE | Ahart-Rock outcrop-Ledmount Variant complex, 2 to 30 percent slopes | 560 | * |
| AEF | Ahart-Rock outcrop-Ledmount Variant complex, 30 to 50 percent slopes | 3,480 | 0.3 |
| AIE | Aiken-Cohasset complex, 2 to 30 percent slopes | 1,076 | 0.1 |
| AIE5 | Aiken-Cohasset complex, 2 to 30 percent slopes, altered | 689 | 0.1 |
| AQB | Aquolls and Borolls, 0 to 5 percent slopes | 15,629 | 1.3 |
| ARE | Aldi-Kuburz complex, 2 to 30 percent slopes | 8,392 | 0.7 |
| BCE | Bucking-Bucking Variant complex, 2 to 30 percent slopes | 1,076 | 0.1 |
| BCG | Bucking-Bucking Variant complex, 30 to 75 percent slopes | 4,362 | 0.4 |
| BDE | Bucking-Bucking Variant-Cryumbrepts, wet complex, 2 to 30 percent slopes | 1,333 | 0.1 |
| BDF | Bucking-Bucking Variant-Cryumbrepts, wet complex, 30 to 50 percent slopes | 1,269 | 0.1 |
| BME | Badenaugh-Martineck-Dotta association, 2 to 30 percent slopes | 4,808 | 0.4 |
| BSE | Boomer-Boomer Variant-Sites complex, 2 to 30 percent slopes | 2,662 | 0.2 |
| BSF | Boomer-Boomer Variant-Sites complex, 30 to 50 percent slopes | 1,760 | 0.1 |
| BSG | Boomer-Boomer Variant complex, 50 to 75 percent slopes | 407 | * |
| CEE | Celio-Gefo-Aquolls complex, 2 to 30 percent slopes | 4,441 | 0.4 |
| CGF | Chaix-Chawanakee-Hotaw complex, 30 to 50 percent slopes | 5,393 | 0.4 |
| CHG | Chawanakee-Chaix-Hotaw complex, 30 to 75 percent slopes | 3,797 | 0.3 |
| CIF | Cinder land-Sierraville-Kyburz complex, 30 to 50 percent slopes | 724 | 0.1 |
| CKE | Chaix Variant-Rock outcrop-Cryumbrepts, wet complex, 2 to 30 percent slopes | 684 | 0.1 |
| CKF | Chaix Variant-Rock outcrop-Cryumbrepts, wet complex, 30 to 50 percent slopes | 3,519 | 0.3 |
| COE | Cohasset-Aiken-Crozier complex, 2 to 30 percent slopes | 7,921 | 0.6 |
| COE5 | Cohasset-Aiken-Crozier complex, 2 to 30 percent slopes, altered | 1,819 | 0.1 |
| COF | Cohasset-Aiken-Crozier complex, 30 to 50 percent slopes | 1,284 | 0.1 |
| CRB | Aldi Variant-Martis Variant-Aquolls complex, 2 to 5 percent slopes | 1,001 | 0.1 |
| CRE | Aldi Variant-Kyburz-Jorge Variant complex, 2 to 30 percent slopes | 2,414 | 0.2 |
| CRF | Aldi Variant-Kyburz-Jorge Variant complex, 30 to 50 percent slopes | 426 | * |
| CSE | Crozier-Cohasset complex, 2 to 30 percent slopes | 6,404 | 0.5 |
| CSE5 | Crozier-Cohasset complex, 2 to 30 percent slopes, altered | 2,191 | 0.2 |
| CSF | Crozier-Cohasset complex, 30 to 50 percent slopes | 3,053 | 0.2 |
| CSF6 | Crozier-Cohasset complex, 30 to 50 percent slopes, terraced | 570 | * |
| CTE | Crozier-McCarthy-Cohasset complex, 2 to 30 percent slopes | 8,223 | 0.7 |
| CTE5 | Crozier-McCarthy-Cohasset complex, 2 to 30 percent slopes, altered | 1,943 | 0.2 |
| CTG | Crozier-McCarthy-Cohasset complex, 30 to 75 percent slopes | 5,601 | 0.5 |
| CUG | Crozier-Mariposa-Cryumbrepts, wet complex, 30 to 75 percent slopes | 11,599 | 0.9 |
| CYD | Cryumbrepts, wet, 2 to 15 percent slopes | 922 | 0.1 |
| DDH | Rock outcrop-Deadwood association, 50 to 100 percent slopes | 16,258 | 1.3 |
| DEG | Deadwood-Rock outcrop-Hurlbut complex, 30 to 75 percent slopes | 71,114 | 5.7 |
| DLE | Delleker-Kyburz-Trojan complex, 2 to 30 percent slopes | 1,784 | 0.1 |
| DUE | Dubakella-Dubakella Variant-Rock outcrop complex, 2 to 30 percent slopes | 1,081 | 0.1 |
| DUF | Dubakella-Dubakella Variant-Rock outcrop complex, 30 to 50 percent slopes | 2,860 | 0.2 |

| | Map Unit Name | Acres | Percent |
|---|---|---|---|
| ETE | Euer-Aquolls-Martis Variant complex, 2 to 30 percent slopes.. | 2,171 | 0.2 |
| EUB | Euer-Martis Variant complex, 2 to 5 percent slopes..... | 1,190 | 0.1 |
| EUE | Euer-Martis Variant complex, 5 to 30 percent slopes..... | 2,657 | 0.2 |
| EVB | Inville-Martis Variant complex, 2 to 5 percent slopes..... | 1,244 | 0.1 |
| EWB | Inville-Riverwash-Aquolls complex, 2 to 5 percent slopes..... | 2,340 | 0.2 |
| EXE | Lorack Variant gravelly loam, 2 to 30 percent slopes..... | 1,556 | 0.1 |
| FFE | Ponto Variant-Neer complex, 2 to 30 percent slopes..... | 416 | * |
| FFF | Ponto Variant-Neer complex, 30 to 50 percent slopes..... | 1,105 | 0.1 |
| FGG3 | Ponto Variant-Neer-Rock outcrop complex, 30 to 75 percent slopes, severely eroded..... | 981 | 0.1 |
| FJG2 | Fugawee-Jorge-Rubble land complex, 30 to 75 percent slopes, eroded..... | 362 | * |
| FME | Fugawee sandy loam, 2 to 30 percent slopes..... | 2,830 | 0.2 |
| FME5 | Fugawee sandy loam, 2 to 30 percent slopes, altered..... | 99 | * |
| FMF | Fugawee sandy loam, 30 to 50 percent slopes..... | 1,690 | 0.1 |
| FMF2 | Fugawee sandy loam, 30 to 50 percent slopes, eroded..... | 322 | * |
| FRE | Fugawee-Rock outcrop-Tahoma complex, 2 to 30 percent slopes..... | 4,739 | 0.4 |
| FRE5 | Fugawee-Rock outcrop-Tahoma complex, 2 to 30 percent slopes, altered..... | 778 | 0.1 |
| FRF | Fugawee-Rock outcrop-Tahoma complex, 30 to 50 percent slopes..... | 5,487 | 0.4 |
| FRF2 | Fugawee-Rock outcrop-Tahoma complex, 30 to 50 percent slopes, eroded..... | 392 | * |
| FRF6 | Fugawee-Rock outcrop-Tahoma complex, 30 to 50 percent slopes, terraced..... | 932 | 0.1 |
| FTE | Fugawee-Tahoma complex, 2 to 30 percent slopes..... | 16,189 | 1.3 |
| FTF | Fugawee-Tahoma complex, 30 to 50 percent slopes..... | 9,006 | 0.7 |
| FUC | Kyburz-Trojan-Sierraville complex, 2 to 9 percent slopes..... | 3,252 | 0.3 |
| FUE | Kyburz-Trojan complex, 9 to 30 percent slopes..... | 14,484 | 1.2 |
| FUE5 | Kyburz-Trojan complex, 2 to 30 percent slopes, altered..... | 1,616 | 0.1 |
| FUF | Kyburz-Trojan complex, 30 to 50 percent slopes..... | 9,567 | 0.8 |
| FUF6 | Kyburz-Trojan complex, 30 to 50 percent slopes, terraced..... | 55 | * |
| FVE | Fugawee-Tahoma-Aquolls complex, 2 to 30 percent slopes..... | 1,745 | 0.1 |
| GBF | Celio Variant-Rock outcrop-Cryumbrepts, wet complex, 30 to 50 percent slopes..... | 1,814 | 0.1 |
| GEC | Gefo-Aquolls-Celio complex, 2 to 9 percent slopes..... | 996 | 0.1 |
| GGF | Celio Variant-Rock outcrop complex, 30 to 50 percent slopes.. | 872 | 0.1 |
| GID | Gefo Variant-Cryumbrepts, wet complex, 2 to 15 percent slopes..... | 535 | * |
| GRG | Rock outcrop, granitic..... | 20,883 | 1.7 |
| HAE | Haypress-Toiyabe complex, 2 to 30 percent slopes..... | 1,566 | 0.1 |
| HAG | Haypress-Toiyabe complex, 30 to 75 percent slopes..... | 1,993 | 0.2 |
| HAG2 | Haypress-Toiyabe-Rock outcrop complex, 30 to 75 percent slopes, eroded..... | 3,276 | 0.3 |
| HBE | Haypress-Toiyabe-Cryumbrepts, wet complex, 2 to 30 percent slopes..... | 312 | * |
| HBG | Haypress-Toiyabe-Cryumbrepts, wet complex, 30 to 75 percent slopes..... | 818 | 0.1 |
| HOE | Hoda-Musick complex, 2 to 30 percent slopes..... | 3,143 | 0.3 |
| HOF | Hoda-Musick complex, 30 to 50 percent slopes..... | 1,205 | 0.1 |
| HPE | Holland-Hoda-Hotaw complex, 2 to 30 percent slopes..... | 1,651 | 0.1 |
| HPF | Holland-Hoda-Hotaw complex, 30 to 50 percent slopes..... | 4,218 | 0.3 |
| HPF2 | Holland-Hoda-Hotaw complex, 10 to 40 percent slopes, eroded.. | 1,363 | 0.1 |
| HPF5 | Holland-Hoda-Aquolls complex, 2 to 40 percent slopes, altered..... | 744 | 0.1 |
| HRE | Horseshoe-Josephine-Mariposa complex, 2 to 30 percent slopes..... | 1,175 | 0.1 |
| HSE | Huysink-Horseshoe complex, 2 to 30 percent slopes..... | 3,728 | 0.3 |
| HSF | Huysink-Horseshoe complex, 30 to 50 percent slopes..... | 1,636 | 0.1 |
| HTF | Hotaw, rhyolitic substratum-McCarthy-Cryumbrepts, wet complex, 30 to 75 percent slopes..... | 635 | 0.1 |
| HUE | Hurlbut-Deadwood-Mariposa complex, 2 to 30 percent slopes.... | 8,595 | 0.7 |
| HUE3 | Hurlbut, thin surface-Deadwood-Rock outcrop complex, 2 to 30 percent slopes, severely eroded..... | 3,306 | 0.3 |
| HUE5 | Hurlbut, thin surface-Hurlbut-Deadwood complex, 2 to 30 percent slopes, altered..... | 6,171 | 0.5 |

| | Map Unit Name | Acres | Percent |
|---|---|---|---|
| HUG | Hurlbut-Deadwood-Rock outcrop complex, 30 to 75 percent slopes | 71,441 | 5.7 |
| HUG3 | Hurlbut, thin surface-Deadwood-Rock outcrop complex, 30 to 75 percent slopes, severely eroded | 10,018 | 0.8 |
| HUG5 | Hurlbut, thin surface-Hurlbut-Deadwood complex, 30 to 75 percent slopes, altered | 5,616 | 0.5 |
| HYE | Pits, hydraulic | 3,698 | 0.3 |
| IME | Ledmount-McCarthy-Rock outcrop complex, 2 to 30 percent slopes | 1,403 | 0.1 |
| IMG | Ledmount-McCarthy-Rock outcrop complex, 30 to 75 percent slopes | 6,543 | 0.5 |
| ISE | Forbes-Dubakella complex, 2 to 30 percent slopes | 1,319 | 0.1 |
| ISE5 | Forbes-Dubakella complex, 2 to 30 percent slopes, altered | 540 | * |
| ISF | Forbes-Dubakella complex, 30 to 50 percent slopes | 1,408 | 0.1 |
| JSE | Jorge-Cryumbrepts, wet-Tahoma complex, 2 to 30 percent slopes | 1,517 | 0.1 |
| JSG | Jorge-Cryumbrepts, wet complex, 30 to 75 percent slopes | 258 | * |
| JTE | Jorge-Tahoma complex, 2 to 30 percent slopes | 10,954 | 0.9 |
| JTF | Jorge very stony sandy loam, 30 to 50 percent slopes | 10,474 | 0.8 |
| JUE | Jorge-Rubble land complex, 2 to 30 percent slopes | 1,086 | 0.1 |
| JUG | Jorge-Rubble land complex, 30 to 75 percent slopes | 2,191 | 0.2 |
| JWE | Jorge-Waca-Tahoma complex, 2 to 30 percent slopes | 753 | 0.1 |
| JWF | Jorge-Waca-Tahoma complex, 30 to 50 percent slopes | 1,596 | 0.1 |
| JXE | Jorge-Waca-Cryumbrepts, wet complex, 2 to 30 percent slopes | 1,309 | 0.1 |
| JXF | Jorge-Waca-Cryumbrepts, wet complex, 30 to 50 percent slopes | 476 | * |
| JYE | Jocal-Sites-Mariposa complex, 2 to 30 percent slopes | 7,797 | 0.6 |
| JYE5 | Jocal-Sites-Mariposa complex, 2 to 30 percent slopes, altered | 704 | 0.1 |
| JYF | Jocal-Sites-Mariposa complex, 30 to 50 percent slopes | 4,694 | 0.4 |
| JZG | Jocal-Josephine Variant-Cryumbrepts, wet complex, 50 to 75 percent slopes | 18,518 | 1.5 |
| KIE | Kinkel Variant-Cohasset complex, 2 to 30 percent slopes | 734 | 0.1 |
| KIE5 | Kinkel Variant-Cohasset complex, 2 to 30 percent slopes, altered | 367 | * |
| KIF | Kinkel Variant-Cohasset complex, 30 to 50 percent slopes | 332 | * |
| KJF | Kinkel Variant-Rock outcrop complex, 2 to 40 percent slopes | 525 | * |
| KME | Kyburz-Aldi complex, 2 to 30 percent slopes | 9,913 | 0.8 |
| KME5 | Kyburz-Aldi complex, 2 to 30 percent slopes, altered | 425 | * |
| KMF | Kyburz-Aldi complex, 30 to 50 percent slopes | 8,788 | 0.7 |
| KMF2 | Kyburz-Aldi complex, 30 to 50 percent slopes, eroded | 1,715 | 0.1 |
| KPC | Aldi-Aquolls-Kyburz complex, 2 to 9 percent slopes | 1,809 | 0.1 |
| KRE | Kyburz-Rock outcrop-Trojan complex, 2 to 30 percent slopes | 4,501 | 0.4 |
| KRF | Kyburz-Rock outcrop-Trojan complex, 30 to 50 percent slopes | 4,610 | 0.4 |
| KRF2 | Kyburz-Rock outcrop-Trojan complex, 30 to 50 percent slopes, eroded | 416 | * |
| KRG | Aldi-Kyburz-Rock outcrop complex, 30 to 75 percent slopes | 17,091 | 1.4 |
| KRG2 | Aldi-Kyburz-Rock outcrop complex, 30 to 75 percent slopes, eroded | 977 | 0.1 |
| KVE | Kyburz-Trojan-Aquolls complex, 2 to 30 percent slopes | 253 | * |
| LCE | Ledford-Ledford Variant complex, 2 to 30 percent slopes | 317 | * |
| LCF | Ledford-Ledford Variant complex, 30 to 50 percent slopes | 1,076 | 0.1 |
| LDE | Ledford-Ledford Variant-Cryumbrepts, wet complex, 2 to 30 percent slopes | 382 | * |
| LDF | Ledford-Ledford Variant-Cryumbrepts, wet complex, 30 to 50 percent slopes | 2,384 | 0.2 |
| LOE | Lorack-Smokey-Cryumbrepts, wet complex, 2 to 30 percent slopes | 2,766 | 0.2 |
| LOF | Lorack-Smokey-Cryumbrepts, wet complex, 30 to 50 percent slopes | 1,299 | 0.1 |
| MAE | Mariposa-Jocal complex, 2 to 30 percent slopes | 5,443 | 0.4 |
| MAE5 | Mariposa-Jocal complex, 2 to 30 percent slopes, altered | 699 | 0.1 |

| | Map Unit Name | Acres | Percent |
|---|---|---|---|
| MAG | Mariposa-Jocal complex, 30 to 75 percent slopes | 20,427 | 1.6 |
| MCE | McCarthy-Ledmount-Crozier complex, 2 to 30 percent slopes | 18,201 | 1.5 |
| MCE5 | McCarthy-Ledmount-Crozier complex, 2 to 30 percent slopes, altered | 5,899 | 0.5 |
| MCG | McCarthy-Ledmount-Crozier complex, 30 to 75 percent slopes | 22,702 | 1.8 |
| MCG6 | McCarthy-Ledmount-Crozier complex, 30 to 60 percent slopes, terraced | 302 | * |
| MEB | Martis-Euer Variant complex, 2 to 5 percent slopes | 5,988 | 0.5 |
| MHG | Meiss-Gullied land-Rock outcrop complex, 30 to 75 percent slopes | 7,951 | 0.6 |
| MIE | Meiss-Rock outcrop complex, 2 to 30 percent slopes | 2,280 | 0.2 |
| MIG | Meiss-Rock outcrop complex, 30 to 75 percent slopes | 7,505 | 0.6 |
| MIG3 | Meiss-Rock outcrop complex, 30 to 75 percent slopes, severely eroded | 9,348 | 0.8 |
| MKE | Meiss-Waca complex, 2 to 30 percent slopes | 6,122 | 0.5 |
| MKF | Meiss-Waca complex, 30 to 50 percent slopes | 14,731 | 1.2 |
| MKF3 | Meiss-Waca-Rock outcrop complex, 30 to 50 percent slopes, severely eroded | 5,452 | 0.4 |
| MLE | Meiss-Waca-Cryumbrepts, wet complex, 2 to 30 percent slopes | 4,957 | 0.4 |
| MLG | Meiss-Waca-Cryumbrepts, wet complex, 30 to 75 percent slopes | 8,496 | 0.7 |
| MMG | Rock outcrop, metamorphic-Putt-Deadwood complex, 30 to 75 percent slopes | 3,594 | 0.3 |
| MMH | Rock outcrop, metamorphic-Rubble land-Gullied land complex | 9,046 | 0.7 |
| MMRE | Rock outcrop, metamorphic-Tinker-Cryumbrepts, wet complex, 2 to 30 percent slopes | 3,480 | 0.3 |
| MMRG | Rock outcrop, metamorphic-Tinker-Cryumbrepts, wet complex, 30 to 75 percent slopes | 14,508 | 1.2 |
| MNG | Rock outcrop, metamorphic-Woodseye complex, 30 to 75 percent slopes | 16,962 | 1.4 |
| MOE | Franktown-Aldi-Rock outcrop complex, 2 to 30 percent slopes | 2,612 | 0.2 |
| MOG | Franktown-Aldi-Rock outcrop complex, 30 to 75 percent slopes | 15,415 | 1.2 |
| MPC | Fugawee Variant-Aquolls-Fugawee complex, 2 to 9 percent slopes | 79 | * |
| MRE | Fugawee Variant-Fugawee complex, 2 to 30 percent slopes | 1,762 | 0.1 |
| MRG | Fugawee Variant-Fugawee-Rock outcrop complex, 30 to 75 percent slopes | 1,467 | 0.1 |
| MUE | Tahoma Variant-Hotaw Variant-Cryumbrepts, wet complex, 2 to 30 percent slopes | 3,267 | 0.3 |
| MUF | Tahoma Variant-Hotaw Variant-Cryumbrepts, wet complex, 30 to 50 percent slopes | 1,363 | 0.1 |
| PBE | Portola gravelly fine sandy loam, 2 to 30 percent slopes | 2,424 | 0.2 |
| PBF | Portola gravelly fine sandy loam, 30 to 50 percent slopes | 2,102 | 0.2 |
| PCG | Portola-Rock outcrop complex, 30 to 75 percent slopes | 1,775 | 0.1 |
| PME | Putt-McCarthy-Zeibright complex, 2 to 30 percent slopes | 615 | * |
| PMG | Putt-McCarthy-Zeibright complex, 30 to 75 percent slopes | 892 | 0.1 |
| PTE | Putt-Rock outcrop-Cryumbrepts, wet complex, 2 to 30 percent slopes | 3,316 | 0.3 |
| PTG | Putt-Rock outcrop-Cryumbrepts, wet complex, 30 to 75 percent slopes | 426 | * |
| PUE | Putt-Zeibright complex, 2 to 30 percent slopes | 3,133 | 0.3 |
| PUF | Putt-Zeibright complex, 30 to 50 percent slopes | 2,340 | 0.2 |
| PVE | Putt-Rock outcrop, granitic-Zeibright complex, 2 to 30 percent slopes | 1,447 | 0.1 |
| PVG | Putt-Rock outcrop, granitic-Zeibright complex, 30 to 75 percent slopes | 3,187 | 0.3 |
| PWE | Putt-Rock outcrop, metamorphic-Zeibright complex, 2 to 30 percent slopes | 1,274 | 0.1 |
| PWG | Putt-Rock outcrop, metamorphic-Zeibright complex, 30 to 75 percent slopes | 1,343 | 0.1 |
| PX | Pits, borrow | 10,682 | 0.9 |

| | Map Unit Name | Acres | Percent |
|---|---|---|---|
| R | Riverwash | 3,167 | 0.3 |
| RAG | Rock outcrop-Franktown-Kyburz complex, 50 to 75 percent slopes | 4,957 | 0.4 |
| RCG | Rock outcrop-Chawanakee-Chaix complex, 50 to 75 percent slopes | 1,046 | 0.1 |
| RDE | Rock outcrop-Dubakella-Dubakella Variant complex, 2 to 40 percent slopes | 872 | 0.1 |
| RDG | Rock outcrop-Dubakella-Dubakella Variant complex, 40 to 75 percent slopes | 6,949 | 0.6 |
| RPE | Rock outcrop, granitic-Putt complex, 2 to 30 percent slopes | 977 | 0.1 |
| RPG | Rock outcrop, granitic-Putt complex, 30 to 75 percent slopes | 6,702 | 0.5 |
| RRG | Rock outcrop, granitic-Tinker complex, 30 to 75 percent slopes | 6,751 | 0.5 |
| RSE | Rock outcrop, granitic-Tinker-Cryumbrepts, wet complex, 2 to 30 percent slopes | 9,234 | 0.7 |
| RSG | Rock outcrop, granitic-Tinker-Cryumbrepts, wet complex, 30 to 75 percent slopes | 11,648 | 0.9 |
| RTG | Rock outcrop-Toiyabe complex, 50 to 75 percent slopes | 3,480 | 0.3 |
| RUG | Rock outcrop-Woodseye Variant-Umpa complex, 30 to 75 percent slopes | 1,249 | 0.1 |
| RVE | Rock outcrop-Waca, rhyolitic substratum-Ledmount Variant complex, 2 to 30 percent slopes | 436 | * |
| RWG | Rock outcrop-Waca-Meiss association, 50 to 75 percent slopes | 917 | 0.1 |
| SIE | Sierraville-Trojan-Kyburz complex, 2 to 30 percent slopes | 2,325 | 0.2 |
| SKE | Sites-Jocal complex, 2 to 30 percent slopes | 5,036 | 0.4 |
| SKE5 | Sites-Jocal complex, 2 to 30 percent slopes, altered | 297 | * |
| SKF | Sites-Jocal-Mariposa complex, 30 to 50 percent slopes | 1,998 | 0.2 |
| SME | Smokey-Smokey Variant-Woodseye complex, 2 to 30 percent slopes | 6,037 | 0.5 |
| SMG | Smokey-Woodseye-Rock Outcrop complex, 30 to 75 percent slopes | 17,993 | 1.4 |
| SOE | Smokey-Lorack-Cryumbrepts, wet complex, 2 to 30 percent slopes | 5,363 | 0.4 |
| SOF | Smokey-Lorack-Cryumbrepts, wet complex, 30 to 50 percent slopes | 3,946 | 0.3 |
| SPG | Smokey-Rock outcrop, metamorphic-Rubble land complex, 30 to 75 percent slopes | 932 | 0.1 |
| STE | Rubble land-Jorge complex, 2 to 30 percent slopes | 734 | 0.1 |
| STG | Rubble land-Jorge complex, 30 to 75 percent slopes | 2,617 | 0.2 |
| SUG | Rubble land-Rock outcrop complex | 5,447 | 0.4 |
| TAE | Tallac very gravelly sandy loam, 2 to 30 percent slopes | 6,573 | 0.5 |
| TAF | Tallac very gravelly sandy loam, 30 to 50 percent slopes | 2,746 | 0.2 |
| TBE | Tallac-Cryumbrepts, wet complex, 2 to 30 percent slopes | 28,055 | 2.3 |
| TBF | Tallac-Cryumbrepts, wet complex, 30 to 50 percent slopes | 5,621 | 0.5 |
| THF | Tallac-Gullied land-Cryumbrepts, wet complex, 30 to 60 percent slopes | 1,200 | 0.1 |
| TIE | Tinker-Rock outcrop, granitic-Cryumbrepts, wet complex, 2 to 30 percent slopes | 12,704 | 1.0 |
| TIG | Tinker-Rock outcrop, granitic-Cryumbrepts, wet complex, 30 to 75 percent slopes | 9,120 | 0.7 |
| TPG3 | Toiyabe-Rock outcrop-Haypress complex, 30 to 75 percent slopes, severely eroded | 858 | 0.1 |
| TTE | Trojan-Sattley-Kyburz complex, 2 to 30 percent slopes | 3,589 | 0.3 |
| TTF | Trojan-Sattley-Kyburz complex, 30 to 50 percent slopes | 4,030 | 0.3 |
| TUE | Trojan-Sattley-Cryumbrepts, wet complex, 2 to 30 percent slopes | 491 | * |
| TWE | Rouen Variant-Aspen Variant-Sierraville complex, 2 to 30 percent slopes | 1,447 | 0.1 |
| TWF | Rouen Variant-Aspen Variant-Sierraville complex, 30 to 50 percent slopes | 2,032 | 0.2 |
| TWF6 | Rouen Variant-Aspen Variant-Sierraville complex, 20 to 50 percent slopes, terraced | 1,581 | 0.1 |
| TXE | Rouen Variant-Cryumbrepts, wet-Aspen Variant complex, 2 to 30 percent slopes | 724 | 0.1 |

| | Map Unit Name | Acres | Percent |
|---|---|---|---|
| ULC | Kyburz loam, 2 to 9 percent slopes | 768 | 0.1 |
| UME | Umpa stony sandy loam, 2 to 30 percent slopes | 3,569 | 0.3 |
| UMF | Umpa stony sandy loam, 30 to 50 percent slopes | 4,045 | 0.3 |
| UNE | Umpa-Cryumbrepts, wet complex, 2 to 30 percent slopes | 704 | 0.1 |
| UOE | Umpa-Rock outcrop complex, 2 to 30 percent slopes | 1,175 | 0.1 |
| UOG | Umpa-Rock outcrop complex, 30 to 75 percent slopes | 2,122 | 0.2 |
| VRG | Rock outcrop, volcanic | 3,286 | 0.3 |
| W | Water | 19,728 | 1.6 |
| WAE | Waca-Windy complex, 2 to 30 percent slopes | 20,893 | 1.7 |
| WAF | Waca-Windy complex, 30 to 50 percent slopes | 18,682 | 1.5 |
| WBE | Waca-Cryumbrepts, wet-Windy complex, 2 to 30 percent slopes | 5,482 | 0.4 |
| WBF | Waca-Cryumbrepts, wet-Windy complex, 30 to 50 percent slopes | 6,310 | 0.5 |
| WCF | Waca-Gullied land-Cryumbrepts, wet complex, 30 to 50 percent slopes | 3,737 | 0.3 |
| WDE | Waca-Meiss complex, 2 to 30 percent slopes | 16,853 | 1.4 |
| WDF | Waca-Meiss complex, 30 to 50 percent slopes | 25,839 | 2.1 |
| WEE | Waca-Meiss-Cryumbrepts, wet complex, 2 to 30 percent slopes | 9,339 | 0.8 |
| WEF | Waca-Meiss-Cryumbrepts, wet complex, 30 to 50 percent slopes | 12,977 | 1.0 |
| WOE | Woodseye-Rock outcrop-Smokey complex, 2 to 30 percent slopes | 1,487 | 0.1 |
| WOG | Woodseye-Rock outcrop-Smokey complex, 30 to 75 percent slopes | 14,443 | 1.2 |
| WRG | Ledford Variant-Rock outcrop complex, 30 to 75 percent slopes | 1,537 | 0.1 |
| XCE | Kyburz-Aldi Variant-Jorge Variant complex, 2 to 30 percent slopes | 1,522 | 0.1 |
| XCF | Kyburz-Aldi Variant-Jorge Variant complex, 30 to 50 percent slopes | 937 | 0.1 |
| XRE | Tinker-Rock outcrop, metamorphic-Cryumbrepts, wet complex, 2 to 30 percent slopes | 5,532 | 0.4 |
| XRF | Tinker-Rock outcrop, metamorphic-Cryumbrepts, wet complex, 30 to 50 percent slopes | 3,143 | 0.3 |
| XXE | Jorge Variant-Kyburz complex, 2 to 30 percent slopes | 2,364 | 0.2 |
| XXF | Jorge Variant-Kyburz complex, 30 to 50 percent slopes | 852 | 0.1 |
| ZEE | Zeibright gravelly fine sandy loam, 2 to 30 percent slopes | 1,428 | 0.1 |
| ZEF | Zeibright gravelly fine sandy loam, 30 to 50 percent slopes | 1,368 | 0.1 |
| ZFF | Zeibright-Putt-Cryumbrepts, wet complex, 30 to 60 percent slopes | 263 | * |
| | Totals | 1,243,000 | 100 |

* less than 0.1 percent.



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