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In cooperation with:

U.S.D.A. Soil
Conservation Service

Regents of the
University of California
(Agricultural Experiment
Station)

Soil Survey

Tahoe

National Forest Area

California



How To Use This Soil Survey

General Soil Map

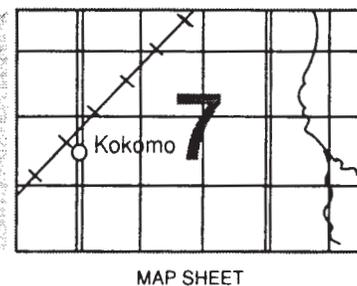
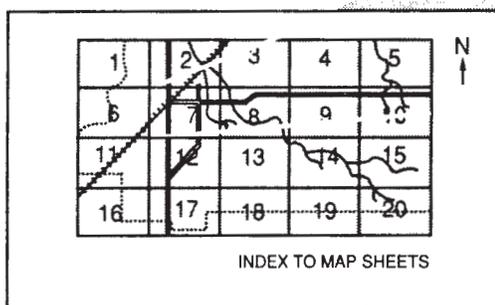
The general soil map, which is the small scale map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

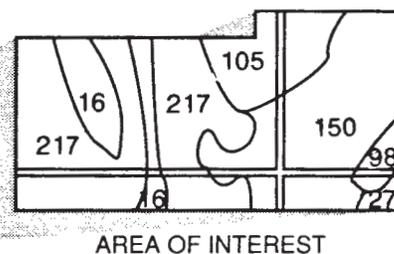
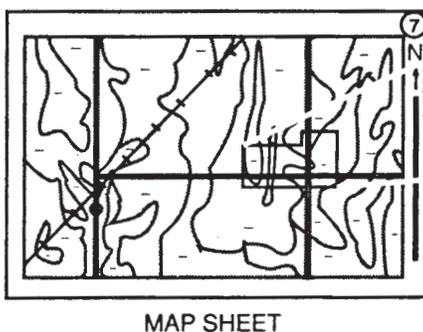
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

Tahoe National Forest Area, California

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, and state agencies including The Regents of the University of California (Agricultural Experiment Station). The field work and technical quality control for this survey were conducted by the Forest Service. The correlation of the soils was conducted by the Soil Conservation Service in consultation with the Forest Service. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major field work for this soil survey was performed in the period 1973 to 1979. Soil names and descriptions were approved in 1982. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1980. This survey was made cooperatively by the Forest Service and the Soil Conservation Service. The survey area consists of the Tahoe National Forest and a portion of the Toiyabe National Forest. It is bordered by the Plumas National Forest and Sierra Valley in the north. The California - Nevada state line is the eastern boundary. The southern boundary is the Lake Tahoe basin watershed boundary and the Eldorado National Forest. The western boundary is the Tahoe National Forest boundary.

Soil maps in this survey may be copied without permission.

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Taxonmoic Unit Descriptions

| | | | |
|-----------------------------|-----|------------------------------|-----|
| Ahart series | 274 | Holland series | 312 |
| Aiken series | 275 | Horseshoe series | 313 |
| Aldi series | 277 | Hotaw series | 315 |
| Aldi Variant | 278 | Hotaw Variant | 316 |
| Aquolls | 279 | Hurlbut series | 317 |
| Aspen Variant | 280 | Huysink series | 318 |
| Badenaugh series | 281 | Inville series | 320 |
| Boomer series | 283 | Jocal series | 321 |
| Boomer Variant | 284 | Jocal Variant | 322 |
| Borolls | 285 | Jorge series | 324 |
| Bucking series | 286 | Jorge Variant | 325 |
| Bucking Variant | 287 | Kinkel Variant | 326 |
| Celio series | 288 | Kyburz series | 327 |
| Celio Variant | 289 | Ledford series | 328 |
| Chaix series | 290 | Ledford Variant | 329 |
| Chaix Variant | 291 | Ledmount series | 330 |
| Chawanakee series | 292 | Ledmount Variant | 331 |
| Cohasset series | 293 | Lorack series | 332 |
| Crozier series | 294 | Lorack Variant | 334 |
| Cryumbrepts, wet | 295 | Mariposa series | 335 |
| Deadwood series | 296 | Martineck series | 337 |
| Delleker series | 297 | Martis series | 338 |
| Dotta series | 298 | Martis Variant | 340 |
| Dubakella series | 299 | McCarthy series | 341 |
| Dubakella Variant | 300 | Meiss series | 342 |
| Euer series | 301 | Musick series | 343 |
| Euer Variant | 302 | Neer series | 344 |
| Forbes series | 304 | Ponto Variant | 345 |
| Franktown series | 305 | Portola series | 346 |
| Fugawee series | 306 | Putt series | 347 |
| Fugawee Variant | 307 | Rouen Variant | 349 |
| Gefo series | 308 | Sattley series | 350 |
| Gefo Variant | 309 | Sierraville series | 351 |
| Haypress series | 310 | Sites series | 352 |
| Hoda series | 311 | Smokey series | 353 |

| | | | |
|--------------------------|-----|----------------------------|-----|
| Smokey Variant | 354 | Umpa series | 362 |
| Tahoma series | 355 | Waca series | 363 |
| Tahoma Variant | 356 | Windy series | 364 |
| Tallac series | 357 | Woodseye series | 365 |
| Tinker series | 358 | Woodseye Variant | 366 |
| Toiyabe series | 359 | Zeibright series | 367 |
| Trojan series | 360 | | |

Index to Detailed Soil Map Units by Symbol

| | | |
|------|--|----|
| ACE | Ahart-Waca, rhyolitic substratum complex, 2 to 30 percent slopes | 19 |
| ACF | Ahart-Waca, rhyolitic substratum complex, 30 to 50 percent slopes | 20 |
| ADE | Ahart-Waca, rhyolitic substratum-Cryumbrepts, wet complex, 2 to 30 percent slopes | 21 |
| ADF | Ahart-Waca, rhyolitic substratum-Cryumbrepts, wet complex, 30 to 50 percent slopes | 22 |
| AEE | Ahart-Rock outcrop-Ledmount Variant complex, 2 to 30 percent slopes | 23 |
| AEF | Ahart-Rock outcrop-Ledmount Variant complex, 30 to 50 percent slopes | 24 |
| AIE | Aiken-Cohasset complex, 2 to 30 percent slopes | 25 |
| AIE5 | Aiken-Cohasset complex, 2 to 30 percent slopes, altered | 26 |
| AQB | Aquolls and Borolls, 0 to 5 percent slopes | 27 |
| ARE | Aldi-Kuburz complex, 2 to 30 percent slopes | 28 |
| BCE | Bucking-Bucking Variant complex, 2 to 30 percent slopes | 29 |
| BCG | Bucking-Bucking Variant complex, 30 to 75 percent slopes | 30 |
| BDE | Bucking-Bucking Variant-Cryumbrepts, wet complex, 2 to 30 percent slopes | 31 |
| BDF | Bucking-Bucking Variant-Cryumbrepts, wet complex, 30 to 50 percent slopes | 32 |
| BME | Badenaugh-Martineck-Dotta association, 2 to 30 percent slopes | 33 |
| BSE | Boomer-Boomer Variant-Sites complex, 2 to 30 percent slopes | 34 |
| BSF | Boomer-Boomer Variant-Sites complex, 30 to 50 percent slopes | 35 |
| BSG | Boomer-Boomer Variant complex, 50 to 75 percent slopes | 36 |
| CEE | Celio-Gefo-Aquolls complex, 2 to 30 percent slopes | 37 |
| CGF | Chaix-Chawanakee-Hotaw complex, 30 to 50 percent slopes | 38 |
| CHG | Chawanakee-Chaix-Hotaw complex, 30 to 75 percent slopes | 39 |
| CIF | Cinder land-Sierraville-Kyburz complex, 30 to 50 percent slopes | 40 |
| CKE | Chaix Variant-Rock outcrop-Cryumbrepts, wet complex, 2 to 30 percent slopes | 41 |
| CKF | Chaix Variant-Rock outcrop-Cryumbrepts, wet complex, 30 to 50 percent slopes | 42 |
| COE | Cohasset-Aiken-Crozier complex, 2 to 30 percent slopes | 43 |
| COE5 | Cohasset-Aiken-Crozier complex, 2 to 30 percent slopes, altered | 44 |
| COF | Cohasset-Aiken-Crozier complex, 30 to 50 percent slopes | 45 |
| CRB | Aldi Variant-Martis Variant-Aquolls complex, 2 to 5 percent slopes | 46 |
| CRE | Aldi Variant-Kyburz-Jorge Variant complex, 2 to 30 percent slopes | 47 |
| CRF | Aldi Variant-Kyburz-Jorge Variant complex, 30 to 50 percent slopes | 48 |
| CSE | Crozier-Cohasset complex, 2 to 30 percent slopes | 49 |
| CSE5 | Crozier-Cohasset complex, 2 to 30 percent slopes, altered | 50 |
| CSF | Crozier-Cohasset complex, 30 to 50 percent slopes | 51 |
| CSF6 | Crozier-Cohasset complex, 30 to 50 percent slopes, terraced | 52 |
| CTE | Crozier-McCarthy-Cohasset complex, 2 to 30 percent slopes | 53 |
| CTE5 | Crozier-McCarthy-Cohasset complex, 2 to 30 percent slopes, altered | 54 |
| CTG | Crozier-McCarthy-Cohasset complex, 30 to 75 percent slopes | 55 |
| CUG | Crozier-Mariposa-Cryumbrepts, wet complex, 30 to 75 percent slopes | 56 |
| CYD | Cryumbrepts, wet, 2 to 15 percent slopes | 57 |
| DDH | Rock outcrop-Deadwood association, 50 to 100 percent slopes | 58 |
| DEG | Deadwood-Rock outcrop-Hurlbut complex, 30 to 75 percent slopes | 59 |
| DLE | Delleker-Kyburz-Trojan complex, 2 to 30 percent slopes | 60 |
| DUE | Dubakella-Dubakella Variant-Rock outcrop complex, 2 to 30 percent slopes | 61 |
| DUF | Dubakella-Dubakella Variant-Rock outcrop complex, 30 to 50 percent slopes | 62 |
| ETE | Euer-Aquolls-Martis Variant complex, 2 to 30 percent slopes | 63 |

| | | |
|------|---|-----|
| EUB | Euer-Martis Variant complex, 2 to 5 percent slopes | 64 |
| EUE | Euer-Martis Variant complex, 5 to 30 percent slopes | 65 |
| EVB | Inville-Martis Variant complex, 2 to 5 percent slopes | 66 |
| EWB | Inville-Riverwash-Aquolls complex, 2 to 5 percent slopes | 67 |
| EXE | Lorack Variant gravelly loam, 2 to 30 percent slopes | 68 |
| FFE | Ponto Variant-Neer complex, 2 to 30 percent slopes | 69 |
| FFF | Ponto Variant-Neer complex, 30 to 50 percent slopes | 70 |
| FGG3 | Ponto Variant-Neer-Rock outcrop complex, 30 to 75 percent slopes, severely eroded | 71 |
| FJG2 | Fugawee-Jorge-Rubble land complex, 30 to 75 percent slopes, eroded | 72 |
| FME | Fugawee sandy loam, 2 to 30 percent slopes | 73 |
| FME5 | Fugawee sandy loam, 2 to 30 percent slopes, altered | 74 |
| FMF | Fugawee sandy loam, 30 to 50 percent slopes | 75 |
| FMF2 | Fugawee sandy loam, 30 to 50 percent slopes, eroded | 76 |
| FRE | Fugawee-Rock outcrop-Tahoma complex, 2 to 30 percent slopes | 77 |
| FRE5 | Fugawee-Rock outcrop-Tahoma complex, 2 to 30 percent slopes, altered | 78 |
| FRF | Fugawee-Rock outcrop-Tahoma complex, 30 to 50 percent slopes | 79 |
| FRF2 | Fugawee-Rock outcrop-Tahoma complex, 30 to 50 percent slopes, eroded | 80 |
| FRF6 | Fugawee-Rock outcrop-Tahoma complex, 30 to 50 percent slopes, terraced | 81 |
| FTE | Fugawee-Tahoma complex, 2 to 30 percent slopes | 82 |
| FTF | Fugawee-Tahoma complex, 30 to 50 percent slopes | 83 |
| FUC | Kyburz-Trojan-Sierraville complex, 2 to 9 percent slopes | 84 |
| FUE | Kyburz-Trojan complex, 9 to 30 percent slopes | 85 |
| FUE5 | Kyburz-Trojan complex, 2 to 30 percent slopes, altered | 86 |
| FUF | Kyburz-Trojan complex, 30 to 50 percent slopes | 87 |
| FUF6 | Kyburz-Trojan complex, 30 to 50 percent slopes, terraced | 88 |
| FVE | Fugawee-Tahoma-Aquolls complex, 2 to 30 percent slopes | 89 |
| GBF | Celio Variant-Rock outcrop-Cryumbrepts, wet complex, 30 to 50 percent slopes | 90 |
| GEC | Gefo-Aquolls-Celio complex, 2 to 9 percent slopes | 91 |
| GGF | Celio Variant-Rock outcrop complex, 30 to 50 percent slopes | 92 |
| GID | Gefo Variant-Cryumbrepts, wet complex, 2 to 15 percent slopes | 93 |
| GRG | Rock outcrop, granitic | 94 |
| HAE | Haypress-Toiyabe complex, 2 to 30 percent slopes | 95 |
| HAG | Haypress-Toiyabe complex, 30 to 75 percent slopes | 96 |
| HAG2 | Haypress-Toiyabe-Rock outcrop complex, 30 to 75 percent slopes, eroded | 97 |
| HBE | Haypress-Toiyabe-Cryumbrepts, wet complex, 2 to 30 percent slopes | 98 |
| HBG | Haypress-Toiyabe-Cryumbrepts, wet complex, 30 to 75 percent slopes | 99 |
| HOE | Hoda-Musick complex, 2 to 30 percent slopes | 100 |
| HOF | Hoda-Musick complex, 30 to 50 percent slopes | 101 |
| HPE | Holland-Hoda-Hotaw complex, 2 to 30 percent slopes | 102 |
| HPF | Holland-Hoda-Hotaw complex, 30 to 50 percent slopes | 103 |
| HPF2 | Holland-Hoda-Hotaw complex, 10 to 40 percent slopes, eroded | 104 |
| HPF5 | Holland-Hoda-Aquolls complex, 2 to 40 percent slopes, altered | 105 |
| HRE | Horseshoe-Jocal-Mariposa complex, 2 to 30 percent slopes | 106 |
| HSE | Huysink-Horseshoe complex, 2 to 30 percent slopes | 107 |
| HSF | Huysink-Horseshoe complex, 30 to 50 percent slopes | 108 |
| HTF | Hotaw, rhyolitic substratum-McCarthy-Cryumbrepts, wet complex, 30 to 75 percent slopes | 109 |
| HUE | Hurlbut-Deadwood-Mariposa complex, 2 to 30 percent slopes | 110 |
| HUE3 | Hurlbut, thin surface-Deadwood-Rock outcrop complex, 2 to 30 percent slopes, severely eroded | 111 |
| HUE5 | Hurlbut, thin surface-Hurlbut-Deadwood complex, 2 to 30 percent slopes, altered | 112 |
| HUG | Hurlbut-Deadwood-Rock outcrop complex, 30 to 75 percent slopes | 113 |
| HUG3 | Hurlbut, thin surface-Deadwood-Rock outcrop complex, 30 to 75 percent slopes, severely eroded | 114 |
| HUG5 | Hurlbut, thin surface-Hurlbut-Deadwood complex, 30 to 75 percent slopes, altered | 115 |
| HYE | Pits, hydraulic | 116 |
| IME | Ledmount-McCarthy-Rock outcrop complex, 2 to 30 percent slopes | 117 |
| IMG | Ledmount-McCarthy-Rock outcrop complex, 30 to 75 percent slopes | 118 |
| ISE | Forbes-Dubakella complex, 2 to 30 percent slopes | 119 |

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|------|---|-----|
| ISE5 | Forbes-Dubakella complex, 2 to 30 percent slopes, altered | 120 |
| ISF | Forbes-Dubakella complex, 30 to 50 percent slopes | 121 |
| JSE | Jorge-Cryumbrepts, wet-Tahoma complex, 2 to 30 percent slopes | 122 |
| JSG | Jorge-Cryumbrepts, wet complex, 30 to 75 percent slopes | 123 |
| JTE | Jorge-Tahoma complex, 2 to 30 percent slopes | 124 |
| JTF | Jorge very stony sandy loam, 30 to 50 percent slopes | 125 |
| JUE | Jorge-Rubble land complex, 2 to 30 percent slopes | 126 |
| JUG | Jorge-Rubble land complex, 30 to 75 percent slopes | 127 |
| JWE | Jorge-Waca-Tahoma complex, 2 to 30 percent slopes | 128 |
| JWF | Jorge-Waca-Tahoma complex, 30 to 50 percent slopes | 129 |
| JXE | Jorge-Waca-Cryumbrepts, wet complex, 2 to 30 percent slopes | 130 |
| JXF | Jorge-Waca-Cryumbrepts, wet complex, 30 to 50 percent slopes | 131 |
| JYE | Jocal-Sites-Mariposa complex, 2 to 30 percent slopes | 132 |
| JYE5 | Jocal-Sites-Mariposa complex, 2 to 30 percent slopes, altered | 133 |
| JYF | Jocal-Sites-Mariposa complex, 30 to 50 percent slopes | 134 |
| JZG | Jocal-Jocal Variant-Cryumbrepts, wet complex, 50 to 75 percent slopes | 135 |
| KIE | Kinkel Variant-Cohasset complex, 2 to 30 percent slopes | 136 |
| KIE5 | Kinkel Variant-Cohasset complex, 2 to 30 percent slopes, altered | 137 |
| KIF | Kinkel Variant-Cohasset complex, 30 to 50 percent slopes | 138 |
| KJF | Kinkel Variant-Rock outcrop complex, 2 to 40 percent slopes | 139 |
| KME | Kyburz-Aldi complex, 2 to 30 percent slopes | 140 |
| KME5 | Kyburz-Aldi complex, 2 to 30 percent slopes, altered | 141 |
| KMF | Kyburz-Aldi complex, 30 to 50 percent slopes | 142 |
| KMF2 | Kyburz-Aldi complex, 30 to 50 percent slopes, eroded | 143 |
| KPC | Aldi-Aquolls-Kyburz complex, 2 to 9 percent slopes | 144 |
| KRE | Kyburz-Rock outcrop-Trojan complex, 2 to 30 percent slopes | 145 |
| KRF | Kyburz-Rock outcrop-Trojan complex, 30 to 50 percent slopes | 146 |
| KRF2 | Kyburz-Rock outcrop-Trojan complex, 30 to 50 percent slopes, eroded | 147 |
| KRG | Aldi-Kyburz-Rock outcrop complex, 30 to 75 percent slopes | 148 |
| KRG2 | Aldi-Kyburz-Rock outcrop complex, 30 to 75 percent slopes, eroded | 149 |
| KVE | Kyburz-Trojan-Aquolls complex, 2 to 30 percent slopes | 150 |
| LCE | Ledford-Ledford Variant complex, 2 to 30 percent slopes | 151 |
| LCF | Ledford-Ledford Variant complex, 30 to 50 percent slopes | 152 |
| LDE | Ledford-Ledford Variant-Cryumbrepts, wet complex, 2 to 30 percent slopes | 153 |
| LDF | Ledford-Ledford Variant-Cryumbrepts, wet complex, 30 to 50 percent slopes | 154 |
| LOE | Lorack-Smokey-Cryumbrepts, wet complex, 2 to 30 percent slopes | 155 |
| LOF | Lorack-Smokey-Cryumbrepts, wet complex, 30 to 50 percent slopes | 156 |
| MAE | Mariposa-Jocal complex, 2 to 30 percent slopes | 157 |
| MAE5 | Mariposa-Jocal complex, 2 to 30 percent slopes, altered | 158 |
| MAG | Mariposa-Jocal complex, 30 to 75 percent slopes | 159 |
| MCE | McCarthy-Ledmount-Crozier complex, 2 to 30 percent slopes | 160 |
| MCE5 | McCarthy-Ledmount-Crozier complex, 2 to 30 percent slopes, altered | 161 |
| MCG | McCarthy-Ledmount-Crozier complex, 30 to 75 percent slopes | 162 |
| MCG6 | McCarthy-Ledmount-Crozier complex, 30 to 60 percent slopes, terraced | 163 |
| MEB | Martis-Euer Variant complex, 2 to 5 percent slopes | 164 |
| MHG | Meiss-Gullied land-Rock outcrop complex, 30 to 75 percent slopes | 165 |
| MIE | Meiss-Rock outcrop complex, 2 to 30 percent slopes | 166 |
| MIG | Meiss-Rock outcrop complex, 30 to 75 percent slopes | 167 |
| MIG3 | Meiss-Rock outcrop complex, 30 to 75 percent slopes, severely eroded | 168 |
| MKE | Meiss-Waca complex, 2 to 30 percent slopes | 169 |
| MKF | Meiss-Waca complex, 30 to 50 percent slopes | 170 |
| MKF3 | Meiss-Waca-Rock outcrop complex, 30 to 50 percent slopes, severely eroded | 171 |
| MLE | Meiss-Waca-Cryumbrepts, wet complex, 2 to 30 percent slopes | 172 |
| MLG | Meiss-Waca-Cryumbrepts, wet complex, 30 to 75 percent slopes | 173 |
| MMG | Rock outcrop, metamorphic-Putt-Deadwood complex, 30 to 75 percent slopes | 174 |
| MMH | Rock outcrop, metamorphic-Rubble land-Gullied land complex | 175 |

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|------|--|-----|
| MMRE | Rock outcrop, metamorphic-Tinker-Cryumbrepts, wet complex, 2 to 30 percent slopes | 176 |
| MMRG | Rock outcrop, metamorphic-Tinker-Cryumbrepts, wet complex, 30 to 75 percent slopes | 177 |
| MNG | Rock outcrop, metamorphic-Woodseye complex, 30 to 75 percent slopes | 178 |
| MOE | Franktown-Aldi-Rock outcrop complex, 2 to 30 percent slopes | 179 |
| MOG | Franktown-Aldi-Rock outcrop complex, 30 to 75 percent slopes | 180 |
| MPC | Fugawee Variant-Aquolls-Fugawee complex, 2 to 9 percent slopes | 181 |
| MRE | Fugawee Variant-Fugawee complex, 2 to 30 percent slopes | 182 |
| MRG | Fugawee Variant-Fugawee-Rock outcrop complex, 30 to 75 percent slopes | 183 |
| MUE | Tahoma Variant-Hotaw Variant-Cryumbrepts, wet complex, 2 to 30 percent slopes | 184 |
| MUF | Tahoma Variant-Hotaw Variant-Cryumbrepts, wet complex, 30 to 50 percent slopes | 185 |
| PBE | Portola gravelly fine sandy loam, 2 to 30 percent slopes | 186 |
| PBF | Portola gravelly fine sandy loam, 30 to 50 percent slopes | 187 |
| PCG | Portola-Rock outcrop complex, 30 to 75 percent slopes | 188 |
| PME | Putt-McCarthy-Zeibright complex, 2 to 30 percent slopes | 189 |
| PMG | Putt-McCarthy-Zeibright complex, 30 to 75 percent slopes | 190 |
| PTE | Putt-Rock outcrop-Cryumbrepts, wet complex, 2 to 30 percent slopes | 191 |
| PTG | Putt-Rock outcrop-Cryumbrepts, wet complex, 30 to 75 percent slopes | 192 |
| PUE | Putt-Zeibright complex, 2 to 30 percent slopes | 193 |
| PUF | Putt-Zeibright complex, 30 to 50 percent slopes | 194 |
| PVE | Putt-Rock outcrop, granitic-Zeibright complex, 2 to 30 percent slopes | 195 |
| PVG | Putt-Rock outcrop, granitic-Zeibright complex, 30 to 75 percent slopes | 196 |
| PWE | Putt-Rock outcrop, metamorphic-Zeibright complex, 2 to 30 percent slopes | 197 |
| PWG | Putt-Rock outcrop, metamorphic-Zeibright complex, 30 to 75 percent slopes | 198 |
| PX | Pits, borrow | 199 |
| R | Riverwash | 200 |
| RAG | Rock outcrop-Franktown-Kyburz complex, 50 to 75 percent slopes | 201 |
| RCG | Rock outcrop-Chawanakee-Chaix complex, 50 to 75 percent slopes | 202 |
| RDE | Rock outcrop-Dubakella-Dubakella Variant complex, 2 to 40 percent slopes | 203 |
| RDG | Rock outcrop-Dubakella-Dubakella Variant complex, 40 to 75 percent slopes | 204 |
| RPE | Rock outcrop, granitic-Putt complex, 2 to 30 percent slopes | 205 |
| RPG | Rock outcrop, granitic-Putt complex, 30 to 75 percent slopes | 206 |
| RRG | Rock outcrop, granitic-Tinker complex, 30 to 75 percent slopes | 207 |
| RSE | Rock outcrop, granitic-Tinker-Cryumbrepts, wet complex, 2 to 30 percent slopes | 208 |
| RSG | Rock outcrop, granitic-Tinker-Cryumbrepts, wet complex, 30 to 75 percent slopes | 209 |
| RTG | Rock outcrop-Toiyabe complex, 50 to 75 percent slopes | 210 |
| RUG | Rock outcrop-Woodseye Variant-Umpa complex, 30 to 75 percent slopes | 211 |
| RVE | Rock outcrop-Waca, rhyolitic substratum-Ledmount Variant complex, 2 to 30 percent slopes | 212 |
| RWG | Rock outcrop-Waca-Meiss association, 50 to 75 percent slopes | 213 |
| SIE | Sierraville-Trojan-Kyburz complex, 2 to 30 percent slopes | 214 |
| SKE | Sites-Jocal complex, 2 to 30 percent slopes | 215 |
| SKE5 | Sites-Jocal complex, 2 to 30 percent slopes, altered | 216 |
| SKF | Sites-Jocal-Mariposa complex, 30 to 50 percent slopes | 217 |
| SME | Smokey-Smokey Variant-Woodseye complex, 2 to 30 percent slopes | 218 |
| SMG | Smokey-Woodseye-Rock outcrop complex, 30 to 75 percent slopes | 219 |
| SOE | Smokey-Lorack-Cryumbrepts, wet complex, 2 to 30 percent slopes | 220 |
| SOF | Smokey-Lorack-Cryumbrepts, wet complex, 30 to 504 percent slopes | 221 |
| SPG | Smokey-Rock outcrop, metamorphic-Rubble land complex, 30 to 75 percent slopes | 222 |
| STE | Rubble land-Jorge complex, 2 to 30 percent slopes | 223 |
| STG | Rubble land-Jorge complex, 30 to 75 percent slopes | 224 |
| SUG | Rubble land-Rock outcrop complex | 225 |
| TAE | Tallac very gravelly sandy loam, 2 to 30 percent slopes | 226 |
| TAF | Tallac very gravelly sandy loam, 30 to 50 percent slopes | 227 |
| TBE | Tallac-Cryumbrepts, wet complex, 2 to 30 percent slopes | 228 |
| TBF | Tallac-Cryumbrepts, wet complex, 30 to 50 percent slopes | 229 |
| THF | Tallac-Gullied land-Cryumbrepts, wet complex, 30 to 60 percent slopes | 230 |
| TIE | Tinker-Rock outcrop, granitic-Cryumbrepts, wet complex, 2 to 30 percent slopes | 231 |

| | | |
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| TIG | Tinker-Rock outcrop, granitic-Cryumbrepts, wet complex, 30 to 75 percent slopes | 232 |
| TPG3 | Toiyabe-Rock outcrop-Haypress complex, 30 to 75 percent slopes, severely eroded | 233 |
| TTE | Trojan-Sattley-Kyburz complex, 2 to 30 percent slopes | 234 |
| TTF | Trojan-Sattley-Kyburz complex, 30 to 50 percent slopes | 235 |
| TUE | Trojan-Sattley-Cryumbrepts, wet complex, 2 to 30 percent slopes | 236 |
| TWE | Rouen Variant-Aspen Variant-Sierraville complex, 2 to 30 percent slopes | 237 |
| TWF | Rouen Variant-Aspen Variant-Sierraville complex, 30 to 50 percent slopes | 238 |
| TWF6 | Rouen Variant-Aspen Variant-Sierraville complex, 20 to 50 percent slopes, terraced | 239 |
| TXE | Rouen Variant-Cryumbrepts, wet-Aspen Variant complex, 2 to 30 percent slopes | 240 |
| ULC | Kyburz loam, 2 to 9 percent slopes | 241 |
| UME | Umpa stony sandy loam, 2 to 30 percent slopes | 242 |
| UMF | Umpa stony sandy loam, 30 to 50 percent slopes | 243 |
| UNE | Umpa-Cryumbrepts, wet complex, 2 to 30 percent slopes | 244 |
| UOE | Umpa-Rock outcrop complex, 2 to 30 percent slopes | 245 |
| UOG | Umpa-Rock outcrop complex, 30 to 75 percent slopes | 246 |
| VRG | Rock outcrop, volcanic | 247 |
| W | Water | 248 |
| WAE | Waca-Windy complex, 2 to 30 percent slopes | 249 |
| WAF | Waca-Windy complex, 30 to 50 percent slopes | 250 |
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Forward

The Soil Survey of the Tahoe National Forest Area, California was designed to furnish soils information for Forest-wide resource management planning as specified in the "Forest and Rangeland Renewable Resources Planning Act of 1974" and the "National Forest Management Act of 1976." It was designed to obtain soils information to facilitate Forest Land and Resource Management Planning and to provide soils information at the position statement phase of project plans.

The Soil Survey is also useful as a training guide to acquaint land managers, technicians, and other personnel with the soils of the Tahoe National Forest area.

Great differences in soil properties can occur even within short distances. Soil may be shallow to bedrock and incapable of producing commercial timber. Soils may be seasonally wet or subject to flooding. A soil property may make a soil poorly suited to reforestation.

These and many other properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each soil map unit is shown on detailed soil maps. Each kind of soil in the survey area is described, and information is given about each soil for specific uses.

This soil survey can be useful in the conservation, improvement, and productive use of soil, water, and other resources.

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Soil Survey of Tahoe National Forest Area, California

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How This Survey was Made

This Order 3 soil survey has followed the directives and guidelines in the Forest Service Manual and Handbooks. It has also followed the concepts, procedures, and guidelines of the National Cooperative Soil Survey as specified in the *Soil Survey Manual* (9), the *National Soils Handbook* (7), and the classification system as stated in *Soil Taxonomy* (10).

Soil Scientists begin the inventory by collecting, studying, and correlating all the existing data and information concerning the survey area that is related to soil genesis and morphology. This includes lithological, geomorphological, topographical and elevational, climatic, vegetative, and existing soil survey data both within and adjoining the survey area.

This data and information was assimilated and transferred to a single base map of suitable scale and accuracy forming the beginning soil map unit delineations or a schematic map. With the schematic map and aerial photo field sheets (stereo-pair coverage) in hand, the soil scientist made a reconnaissance study of the survey area. At this time, the delineations on the schematic map are checked for accuracy of content and location. The aerial photos were studied stereoscopically and the photo images were compared to the conditions found on the ground to insure that later recognition by photo interpretation would be credible. Lithologic, geomorphic, soil, and vegetative characteristics were recognized and recorded in field notes, on the schematic map, and on the aerial photo field sheets.

Using the augmented and corrected schematic map, field notes, and an understanding of how the photo images relate to actual conditions on the ground, the soil scientist delineated map units on the aerial photographs. The map units corresponded to segments of the landscape having similar landform, vegetative cover, and soils as determined by a knowledge of ground conditions and by stereoscopic aerial photo interpretation. These

aerial photos with the delineated map units and delineation symbols became the exploratory or preliminary soils map.

With the aerial photo (exploratory soils maps) and a field stereoscope, the soil scientist examined on the ground as many delineations of each map unit as was possible, considering the access and time allowed to complete the survey. In this way, each different map unit was examined, studied, and described by aerial photo interpretations and on-the-ground investigation. However, because of the design of the survey, Order 3 in intensity, and the time allotted for its completion, every delineation of each different map unit was not visited and examined on the ground. Those delineations with no easy access were rarely visited other than by aerial photo interpretation. In this way, possibly one-third of the delineations on the field sheets and maps would not have been entered and examined by an on-the-ground investigation. *This is one of the main aspects of this survey that limits its reliability. It is one reason that the survey is unsuited for project planning without field verification.* As each map unit was visited and examined, individual soils were recognized, studied, described, classified, and enough data was collected to furnish the information needed to make interpretations and predictions concerning the use and management of each soil. *However, the exact location of each soil was not delineated.* The map units usually consist of a group of soils that occupy a particular portion of the landscape which has been delineated on the aerial photo field sheets. Depending on the area location and extent of the individual soils that are components of the delineated map unit, a map unit is called an association or complex of soil components. The soil scientist makes a field and aerial photo examination to estimate the soil component percentage composition for each map unit. These map units *do not necessarily consist of similar soils.* They consist of geographically associated soils that may be, and usually are, quite different in their characteristics and their suitability for use and management. *These are other aspects of the survey that*

limit its reliability and make it unsuitable for project planning without field verification.

This field examination and study, and the associated correction and refinement of the aerial photo field sheets, produces the Order 3 intensity soil maps called for in this system of survey.

The interpretations and predictions concerning use and management found in this report are based on the soil scientist's knowledge and understanding of the conditions recognized and measured in the time allotted to this inventory. By classifying the soils, the soil scientist can also, with acceptable reliability, bring information concerning use and management of a particular soil from other survey areas where this same soil occurs and has been recognized and studied. Because of the time allocation for the completion of this survey, these use and management interpretations and predictions should be considered as first or second approximations due to the relatively few examinations and measurements that have been made. *This is still another aspect of the survey that limits its reliability and makes it unsuitable for project planning without field verification.*

Despite the cautions that have been made in the above paragraphs concerning the use of this survey information for project level planning, it is adequate and reliable for its intended and designed purpose: a base for a Forest-wide system of land management planning.

General Nature of the Survey Area

This section describes the physiography, relief, and drainage of the survey area and its geology and geomorphic history. It also gives information on the climate and vegetation of the survey area.

Physiography, Relief, and Drainage

The Tahoe National Forest Area is located in the central Sierra Nevada. It is roughly divided into three physiographic areas by a glacially sculptured crest zone that trends north-south. The western third of the survey area is dominated by deeply incised canyons separated by long, narrow, gently sloping ridges. The eastern third is characterized by low foothills and broad valleys.

The ascent from the Central Valley through the western third of the Area toward the crest is gentle, with the average slope through a west-to-east transect about 3 to 5 percent. The underlying rock formations generally trend northwest by southeast. Drainages are generally toward the southwest, with main stream channels cut through and across geologic formations. The headwaters of major drainages start in the glaciated crest zone,

and descend through gently sloping volcanic and granitic bedrock to deeply entrenched V-shaped canyons along the western edge of the area, where metamorphic rocks are exposed. Typically, the land surfaces of the folded and faulted metamorphic rocks are steep and angular, the land surfaces of granitic rocks rounded, smooth, and often have a basin-like appearance, and the land surfaces of volcanic rocks are flat and relatively smooth, reflecting their origin.

The western portion of the Survey Area contains the headwaters of the South, Middle, and North Forks of the Yuba River and its tributaries, and the headwaters of the North and Middle Forks of the American River. The eastern portion contains the headwaters of the Little Truckee River, and the headwaters of the Truckee River from near Lake Tahoe to the State line. The northeastern portion of the Area is drained by the Feather River.

Geology and Geomorphic History

The Tahoe National Forest Area is in the Sierra Nevada geomorphic province and lies on the western slope of the Sierra Nevada range. Early in geologic time, in the late Paleozoic period, the area was covered by a vast inland sea in which large amounts of several kinds of sediment were deposited. The sediment of this sea was uplifted, and intensely folded and metamorphosed. This resulted in a nearly continuous belt of undifferentiated metamorphic rocks, tilted almost vertically, forming ridges extending generally to the northwest. The metamorphism changed the fine grained sedimentary rocks to slate, the siliceous sediments to quartzites and metacherts, the volcanic rock to amphibolitic schists and greenstone, and the calcareous ooze to crystalline limestone.

The folding and uplifting was followed by intrusions of ultrabasic rock, most of which was altered to peridotite and serpentine. This was followed by a sequence of major intrusions of granitic-type rocks, beginning with the more basic gabbrodiorite and followed by the more acid granodiorite. At this time the slopes in the survey area were aligned more gently westward than they are today, with the crest of the Sierra Nevada approximately in its present location. The surface of the folded sedimentary and igneous rocks was then eroded away during a long period of erosion, exposing the underlying granitic batholith.

Volcanic activity began in the Sierra Nevada in the late Eocene period. Rhyolitic ash was deposited over large areas, both as flows and ash falls. These ash falls and flows formed the Valley Springs formation. This formation choked stream channels, completely changing the drainage system. Following the rhyolitic emissions,

the volcanoes began to discharge andesitic material, mostly mud flows, dust, and lava flows. These flows formed the Mehrten formation, a volcanic plain. This formation also choked stream channels and caused a new drainage pattern to form. The geologic activity of this period marked the beginning of the present landforms, and had a strong influence in forming the soil patterns in the Area.

In Pleistocene times, a major uplift of the Sierra Nevada Range was controlled by faulting along the Range's east flank. The western slope was uniformly tilted downwards in relation to the crest. This caused the west-flowing rivers and streams in the newly uplifted area to remove much of the volcanic debris and to cut deep canyons into the underlying materials. This downcutting left long, tabular, volcanic ridges between the canyons, with exposures of Tertiary river gravel, rhyolitic tuff, granitic rock, and metamorphic rock. Glaciers were active from the crest down to about 4,800 feet. Glaciation sculptured the present day crest zone, exposing large areas of glaciated granitic rock. Glacial till and outwash material was deposited in basins and along drainages at the margin of the crest glaciation.

Climate

The Tahoe National Forest Area has abundant sunshine in summer, low to heavy precipitation in winter, and wide temperature ranges. Precipitation ranges from about 15 inches in the northeast corner of the area near Balls Canyon to over 80 inches in the mountains and western part of the area. At high elevations, much of the precipitation falls as snow, providing a water supply that lasts into summer. Precipitation in summer is light and generally limited to a few scattered thundershowers in the western part of the area, which increase in frequency and intensity from west to east.

Temperatures range from very warm in the canyons in the western part during summer to very cold in the high areas and eastern parts in the winter. All of the area experiences freezing temperatures at some time during the year.

The Sierra Nevada and the Verdi and Bald Mountain ranges in the eastern part of the area, play a dominant role in determining the climate. Differences in elevation affect both temperatures and precipitation. On the western slopes of the Sierra Nevada, precipitation increases with elevation up to about 6,000 feet, and decreases slowly above that level. Temperatures also decrease with elevation, except in some of the canyons where cold air drainage has made them cooler than the slopes above. The same process is also taking place on the western slopes of the Verdi and Bald Mountain

ranges, leading to desert-like conditions on their eastern flank.

The average annual temperature in the Tahoe National Forest Area ranges from 38°F at the higher elevations and on the eastside to 62°F at the lower elevations in the west.

In general, prevailing winds are from the south or southwest. Wind speeds average less than 10 miles per hour. Winter wind speeds occasionally reach 50 miles per hour. Snow cover on the higher elevations reduces the depth of soil freezing. The coarse textures are not highly susceptible to frost heaving. Frost heaving is most prevalent along the transition elevations between snow and rain. Except for granulation of the surface horizon, soil structure is not greatly influenced by frost action.

Cool temperatures at the higher elevations favor the accumulation of organic matter and the formation of thick, dark colored soil surface horizons in areas where tree and shrub cover is most abundant.

Chemical weathering of the soil is dominant over physical weathering in the lower elevations, giving way to physical weathering at higher elevations because of cooler temperatures. A lack of soil moisture in summer when temperature conditions are more favorable for chemical action, also retards the weathering processes.

Vegetation

Vegetation was mapped concurrently with the soil survey mapping. Various stages of plant succession are reflected in some of the vegetative series. For ease of recognition, commonly known plant names are used in the name of the series and in the series description. The percentages used in the description indicate the relative populations of typifying plants and do not reflect total plant composition or density measurements.

Alder series. Typically 90 percent dense alders with sedges and some willows.

Barren. Typically 90 percent devoid of vegetation. Most areas occur on exposed rockland with no soil. Some areas have inclusions of soil and have scattered mixed brush, grass, conifers, or hardwoods.

Barren-Conifer/Meadows series. Typically 50 percent barren, 30 percent mixed conifers, and 20 percent meadow (or Alder/Willows with patches of huckleberry oak). Conifers are red fir, Jeffrey pine, or lodgepole pine.

Barren-Live oak series. Typically 60 percent barren and 40 percent live oak. The oak is mostly canyon live

oak with some interior live oak. Included are small areas of scattered conifers, black oak, grass, or mixed brush. Digger pine may be included in canyons below an elevation of 3,000 feet.

Barren-Mixed brush series. Typically 60 percent barren and 40 percent mixed brush with scattered mixed conifers. Brush consists of mainly huckleberry oak, with chinquapin oak, mountain whitethorn, greenleaf manzanita, or bittercherry.

Barren-Mixed conifer series. Typically 60 to 70 percent barren and 20 to 30 percent mixed conifers with some mixed brush. Included may be 20 percent hardwoods and manzanita. At higher elevations the conifers are Jeffrey pine, red fir, western white pine, lodgepole pine, or, in some areas, juniper. All are commonly stunted or deformed. At lower elevations the conifers are ponderosa pine, Douglas fir, incense cedar, or white fir. The manzanitas are greenleaf manzanita or whiteleaf manzanita. The hardwoods are black oak or canyon live oak, with some interior live oak.

Barren-Manzanita series. Typically 60 percent barren, 30 percent manzanita, and 0 to 10 percent mixed conifers. The manzanita is greenleaf manzanita or whiteleaf manzanita. The mixed conifers are ponderosa pine, Douglas fir, or white fir. This series represents a successional stage created by past disturbance.

Barren-Red fir series. Typically 70 percent barren and 30 percent red fir with some wyethia and mixed brush.

Barren-Red fir/Hemlock series. Typically 60 percent barren, a 30 percent mixture of red fir, mountain hemlock, and lodgepole pine, and 10 percent Alder/Willow and meadows.

Ceanothus-Alder/Willow series. Typically 80 percent snowbrush and 20 percent alder, willow, or meadow. It includes small areas of mountain whitethorn, bittercherry, greenleaf manzanita, or wyethia. This series represents a successional stage created by past disturbance.

Ceanothus-Jeffrey/Ponderosa series. Typically 70 percent snowbrush and 30 percent Jeffrey/Ponderosa series. It includes small areas of greenleaf manzanita, sagebrush, bittercherry, wyethia, or a few lodgepole pine. This series represents a successional stage created by past management.

Ceanothus-Mixed conifer series. Typically 70 percent snowbrush and 30 percent mixed conifers. It includes small areas of mountain whitethorn, bittercherry, greenleaf manzanita, wyethia, sagebrush, or bitterbrush. Conifers

consist of Jeffrey pine, ponderosa pine, white fir, or red fir. This series represents a successional stage created by past disturbance.

Ceanothus-Red fir series. Typically 70 percent snowbrush and 30 percent red fir. Included are small areas of mountain whitethorn, bittercherry, greenleaf manzanita, or wyethia. This series represents a successional stage created by past disturbance.

California bay-Mixed brush series. Typically 50 percent California bay (shrub form) and 50 percent mixed brush. Included are small areas of incense cedar, Jeffrey pine, Douglas fir, knobcone pine, or leather oak. The mixed brush is whiteleaf manzanita, buckbrush, and Yerba Santa. This series occurs on serpentinitic soils and represents a successional stage created by past disturbance.

Grass series. Mostly perennial grasses, with sedges, white alder, and willows. A few hardwoods and conifers may be included.

Hardwoods-Mixed conifer series. Typically 60 percent Hardwoods and 40 percent mixed conifer. The hardwoods consist of 50 percent canyon live oak and 50 percent black oak, with inclusions of interior live oak. The conifers are ponderosa pine, Douglas fir, and white fir.

Jeffrey/Ponderosa series. Typically a mixture of Jeffrey pine and ponderosa pine with up to 10 percent inclusions of lodgepole pine or white fir and bitterbrush or wyethia.

Jeffrey/Ponderosa-Mahogany series. Typically 60 percent Jeffrey/Ponderosa series, 20 percent mahogany, and 20 percent sagebrush with some bitter brush and wyethia.

Jeffrey/Ponderosa-Sagebrush/Bitterbrush series. Typically 60 percent Jeffrey/Ponderosa series and 40 percent Sagebrush/Bitterbrush series, with some wyethia and rabbitbrush, and a few white fir and lodgepole pine.

Live oak series. Typically more than 80 percent live oak on canyonsides. The oak is mostly canyon live oak, with some interior live oak. Some areas may have up to 20 percent black oak, conifers, grasses, mixed brush, or barren.

Lodgepole-Alder/Meadow series. Typically 80 percent lodgepole pine and 20 percent alder and meadows. Small amounts of red fir or white fir may be included. Meadows are mostly sedges with some rushes and hairgrass; perennial grasses are on the drier fringes with some stringers of aspen and cottonwood included.

Lodgepole-Meadow/Willow series. Typically 75 percent lodgepole pine and 25 percent meadow and willow, with small amounts of Jeffrey pine or white fir. Meadow consists of sedges, some rushes and hairgrass, with perennial grasses on the drier fringes.

Manzanita-Jeffrey pine series. Typically 60 percent whiteleaf manzanita, 20 percent Jeffrey pine, and 20 percent mixed brush. Mixed brush is Yerba Santa, buckbrush, and leather oak. Included are small amounts of incense cedar, Douglas fir, and digger pine.

Manzanita-Open conifer series. Typically 30 percent manzanita, 50 percent barren, and 20 percent mixed conifers. Manzanita is greenleaf and whiteleaf manzanita. The conifers are Douglas fir, ponderosa pine, and white fir with some knobcone pine.

Meadow series. Typically sedges with some rushes and hairgrass. Perennial grasses or sagebrush are on the drier fringes. Small areas of willows, lodgepole pine, or aspen may be included. Meadows are open and normally more than 10 acres in size.

Meadow/Willow series. Typically sedges with some rushes and hairgrass. Perennial grasses or sagebrush occur on drier fringes of the meadow. Included are stringers or patches of willow, alder, lodgepole pine, aspen, or cottonwood.

Mixed brush-Alder/Willow series. Typically 60 percent mixed brush, 20 percent alder or willow stringers with openings or fringes of sedges, and 20 percent wyethia. The mixed brush is huckleberry oak, with some greenleaf manzanita and mountain whitethorn.

Mixed brush-Barren series. Typically 70 percent mixed brush and 30 percent barren with scattered mixed conifers. The brush consists of huckleberry oak, with chinquapin oak, mountain whitethorn, greenleaf manzanita, and bittercherry.

Mixed brush-Conifer/Meadow series. Typically 40 percent mixed brush, 20 percent mixed conifers, 20 percent meadows with alders or willows, and 20 percent barren. The brush is huckleberry oak with some greenleaf manzanita and mountain whitethorn. Conifers are Jeffrey pine, red fir, western white pine, or lodgepole pine.

Mixed brush-Mixed conifer series. Typically 60 to 70 percent mixed brush and 30 to 40 percent mixed conifers. The brush is huckleberry oak, mountain whitethorn, chinquapin oak, or greenleaf manzanita. The conifers are Jeffrey pine, ponderosa pine, Douglas fir, red fir, white fir, or western white pine.

Mixed conifer series. At lower elevations, a mixture of ponderosa pine, Douglas fir, incense cedar, white fir, or sugar pine, with inclusions of black oak. At higher elevations, a mixture of white fir, Jeffrey pine, and red fir, with inclusions of western white pine or sugar pine. Lodgepole pine are along drainages. The understory may include mountain whitethorn and wyethia.

Mixed conifer-Alder/Willow series. Typically 80 percent mixed conifers and 20 percent alders or willows with inclusions of sedges in openings, aspen, cottonwood, or lodgepole pine.

Mixed conifer-Barren series. Typically 50 to 60 percent mixed conifer, 30 percent barren, and 10 to 20 percent wyethia, huckleberry oak, greenleaf manzanita, sagebrush, or bitterbrush.

Mixed conifer-Ceanothus series. Typically 60 percent higher elevation mixed conifer and 40 percent snowbrush, with some mountain whitethorn, bittercherry, greenleaf manzanita, or wyethia. This series represents a successional stage created by past disturbance.

Mixed conifer-Mixed brush series. Typically 60 percent mixed conifer and 40 percent mixed brush. The brush is huckleberry oak, mountain whitethorn, chinquapin oak, greenleaf manzanita, or pinemat manzanita.

Mixed conifer-Sagebrush series. Typically 60 percent higher elevation mixed conifer and 40 percent sagebrush, with some lodgepole pine, bitterbrush, and wyethia.

Mixed conifer-Wyethia series. Typically 60 percent higher elevation mixed conifer and 40 percent Wyethia series.

Mixed conifer-Black oak series. Typically 70 percent lower elevation mixed conifer and 30 percent black oak.

Mixed conifer-California bay series. Typically 80 percent lower elevation mixed conifer and 20 percent California bay with canyon live oak.

Mixed conifer-Dogwood/Maple series. Typically 60 percent lower elevation mixed conifer and 40 percent dogwood and maple, with white alder and yew along stinger seeps or areas of high water table.

Mixed conifer-Dwarf Tanbark series. Typically 50 percent lower elevation mixed conifer and 50 percent dwarf tanbark with inclusions of huckleberry oak, greenleaf or whiteleaf manzanita, bear grass, or canyon live oak or black oak.

Mixed conifer-Mixed hardwood series. Typically 60 percent lower elevation mixed conifer and 40 percent mixed hardwoods. The hardwoods consist of madrone with tan oak and black oak.

Plantation. Typically plantations of ponderosa pine, at or near crown closure.

Red fir series. Typically 90 percent red fir. Included are small amounts of western white pine, lodgepole pine, white fir, and hemlock near high ridges. There are small amounts of mountain whitethorn or pinemat manzanita in the understory.

Red fir-Alder/Willow series. Typically 80 percent red fir and 20 percent alder or willow stringers. Included are sedges in openings and small amounts of lodgepole pine, aspen, wyethia, and meadows.

Red fir-Barren series. Typically 60 percent Red fir series and 40 percent barren.

Red fir-Wyethia series. Typically 60 percent Red fir series and 40 percent Wyethia series, with some mountain whitethorn and huckleberry oak.

Red fir/Hemlock-Alder/Willow series. Typically 40 percent red fir, 40 percent mountain hemlock, and 20 percent alders, willows, or meadows with some lodgepole pine.

Sagebrush/Bitterbrush series. Typically sagebrush with bitterbrush and small amounts of wyethia and rabbitbrush. The common perennial grass is squirreltail.

Sagebrush/Bitterbrush-Jeffrey/Ponderosa series. Typically 60 percent Sagebrush/Bitterbrush series and 40 percent Jeffrey/Ponderosa series.

Sagebrush/Bitterbrush-Meadow/Willow series. Typically 70 percent Sagebrush/Bitterbrush series and 30 percent Meadow/Willow series.

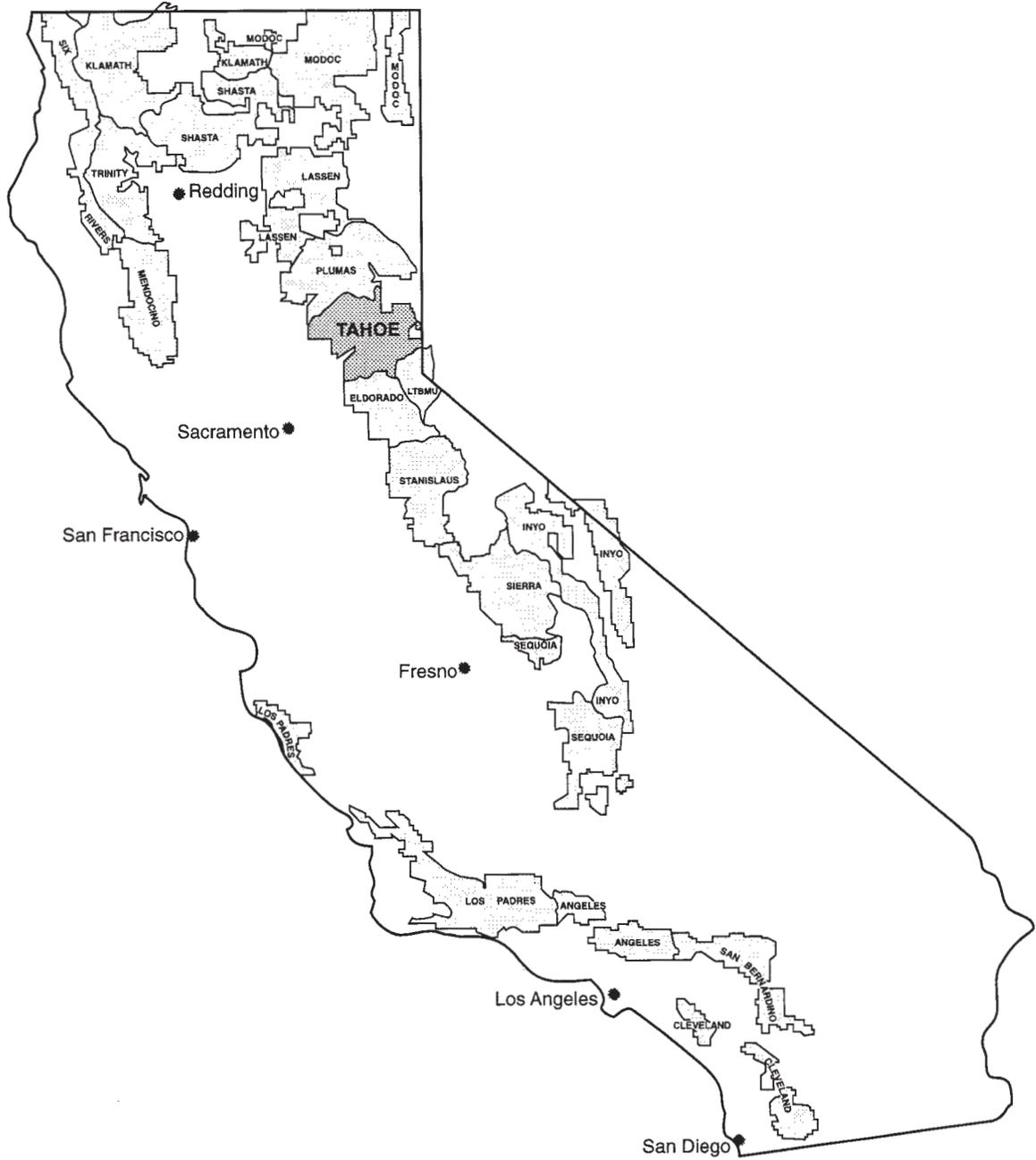
Sagebrush/Bitterbrush-Mixed conifer series. Typically 60 percent Sagebrush/Bitterbrush series and 40 percent mixed conifers, consisting of white fir, Jeffrey pine, and ponderosa pine.

Sagebrush-Mahogany series. Typically 70 percent sagebrush, 20 percent mountain mahogany, and 10 percent Jeffrey pine, with some wyethia.

Wyethia series. Wyethia with 10 to 40 percent barren areas and small amounts of sagebrush and bitterbrush. The common grass is squirreltail.

Wyethia-Alder/Willow series. Typically 60 percent Wyethia series, 20 percent stringers of alder and willow with sedges in openings, and 20 percent red fir, mixed conifers, or lodgepole pine.

Wyethia-Red fir series. Typically 60 percent Wyethia series and 40 percent Red fir series.



Location of Tahoe National Forest, California

General Soil Map

General Soil Map Units

The general soil map shows map units which consist of many individual soils. A map unit typically is made up of one or more soils of major extent and several soils of minor extent. Map units are named for the major soils occurring in the unit. The soils in one unit can occur in other units. The soils are classified at the series level or at a higher taxonomic level.

The map furnishes a broad perspective of the soils in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. General areas which are capable of timber production or range production can be identified on the map. Likewise, general areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of the generalization of map units and the small scale of the map, the location of specific soils are not shown. The map and map unit information is not suitable for Forest or project level land management planning. They give a very general overview of soil conditions and are suitable for State or Regional planning.

The 10 general soil map units have been separated into 3 groups based on physiography:

I. DOMINANTLY NEARLY LEVEL TO VERY STEEP SOILS OF THE WESTSIDE.

The soils in this group are well drained and somewhat excessively drained. They formed in material weathered from volcanic, metasedimentary, granitic, or ultra basic rock, as well as in glacial or alluvial deposits. Rock outcrops are numerous in many areas. Slopes are 2 to 75 percent.

These soils are on the lower slopes of the western Sierra Nevada, at elevations of 1,800 to 6,000 feet. The annual precipitation is 40 to 80 inches, and the frost-free growing season is 130 to 200 days.

Three map units are in this group. They make up about 33 percent of the survey area.

1 - Hurlbut-Deadwood-Putt

Moderately deep and shallow, nearly level to very steep, well drained and somewhat excessively drained soils on mountainsides.

This map unit is on the sides of the East-West oriented ridges above the forks and tributaries of the American and Yuba Rivers in the western part of the survey area. The soils formed in materials weathered from

metasedimentary rocks of the Calaveras Formation and glacial deposits. Elevations range from 2,000 to 6,000 feet. Slopes range from 2 to 75 percent.

Important soils in this unit are the Hurlbut, Deadwood, and Putt soils. Other soils are of minor extent.

Hurlbut soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is gravelly loam. The subsoil is silt loam over weathered metasedimentary rock.

Deadwood soils are shallow and somewhat excessively drained. Slopes range from 2 to 75 percent. Typically the surface layer is very gravelly sandy loam. The subsoil is extremely gravelly sandy loam over metasedimentary rock.

Putt soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is very cobbly sandy loam. The underlying material is very cobbly sandy loam over cemented glacial deposits.

Areas of this unit are used mainly for timber production. The flatter areas are generally harvested by tractor, and the steeper mountainsides are harvested by aerial systems.

The timber producing soils in this unit have moderate available water capacity and moderate timber productivity.

2 - Cohasset-Jocal-Holland

Very deep and deep, nearly level to very steep, well drained soils on broad, flat ridgetops and mountainsides.

This map unit is on the tops and upper slopes of the East-West oriented ridges above the forks and tributaries of the American and Yuba Rivers in the western part of the survey area. The soils formed in materials weathered from andesitic conglomerate of the Mehrten Formation, metasedimentary rocks of the Calaveras Formation, and granitic rocks. Elevations range from 1,800 feet to 5,800 feet. Slopes range from 2 to 75 percent.

Important soils in this unit are the Cohasset, Jocal, and Holland soils. Other soils are of minor extent.

Cohasset soils are deep and very deep, and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is loam. The subsoil is clay loam over weathered andesitic conglomerate.

Jocal soils are deep and very deep, and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is loam. The subsoil is silty clay loam over weathered slate and shale.

Holland soils are deep and very deep, and well drained. Slopes range from 2 to 50 percent. Typically the surface layer is loam. The subsoil is clay loam over weathered granitic rock.

Areas of this unit are used mainly for timber production. The flatter ridgetops are generally harvested by tractor, and the steeper mountainsides are harvested by aerial systems.

All soils in this map unit have high available water capacity and have high timber productivity.

3 - McCarthy-Crozier-Ledmount

Moderately deep and shallow, nearly level to very steep, well drained soils on ridgetops and mountainsides.

This map unit is on the top and upper slopes of the East-West oriented ridges above the forks and tributaries of the American and Yuba Rivers in the western part of the survey area. The soils formed in materials weathered from andesitic tuff breccia mudflows of the Mehrten Formation. Elevations range from 2,000 to 6,000 feet. Slopes range from 2 to 75 percent.

Important soils in this unit are the McCarthy, Crozier, and Ledmount soils. Other soils are of minor extent.

McCarthy soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is gravelly sandy loam. The subsoil is very gravelly sandy loam over weathered andesitic tuff breccia.

Crozier soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is loam. The subsoil is gravelly clay loam over weathered andesitic tuff breccia.

Ledmount soils are shallow and well drained soils. Slopes range from 2 to 75 percent. Typically the surface layer is sandy loam over andesitic tuff breccia.

Areas of this unit are used mainly for timber production. The flatter areas are generally harvested by tractor, and the steeper mountainsides are harvested by aerial systems.

The Crozier and McCarthy soils in this unit have low to moderate available water capacity and moderate to high timber productivity.

II. DOMINANTLY NEARLY LEVEL TO VERY STEEP SOILS OF HIGH ELEVATION MOUNTAINSIDES

The soils in this group are excessively drained to moderately well drained. They formed in material weathered from volcanic, metasedimentary, and granitic rock, as well as glacial or alluvial deposits. Rock outcrops are numerous in many areas. Glaciated rockland also occurs throughout the area. Slopes range from 2 to 75 percent.

These soils are along the crest of the Sierra Nevada, at elevations of 5,400 to 10,000 feet. The annual precipitation is 35 to 80 inches, and the frost-free growing season is 25 to 125 days.

Two map units and one miscellaneous land type are in this group. They make up about 48 percent of the survey area.

4 - Tallac-Smokey-Meiss

Deep, moderately deep, and shallow, nearly level to very steep, moderately well drained to somewhat excessively drained soils on moraines, outwash terraces, and mountainsides.

This map unit is on the sides of the ridges of the Sierra Nevada crest and in valleys between. The soils formed in materials weathered from glacial alluvial deposits, meta-sedimentary rocks of the Calaveras Formation, and andesitic tuff breccia mudflows of the Mehrten Formation. Elevations range from 5,500 to 10,000 feet.

Important soils in this unit are the Tallac, Smokey, and Meiss soils. Other soils are of minor extent.

Tallac soils are deep and moderately well drained. Slopes range from 2 to 60 percent. Typically the surface layer is very gravelly sandy loam. The underlying material is extremely gravelly loam over cemented till. Gravel and cobbles in excess of 35 percent are found throughout most of the profile.

Smokey soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically surface layer is gravelly sandy loam. The subsoil is very gravelly loam over weathered metasedimentary rock.

Meiss soils are shallow and somewhat excessively drained. Slopes range from 2 to 75 percent. Typically the surface layer is sandy loam over hard volcanic rock.

Areas of this unit are used mainly for timber production and range forage. The flatter ridgetops and benches with deep and moderately deep soils are generally harvested

by tractor. The steeper mountainsides are harvested by aerial systems. The gentler slopes with shallow soils are used for summer range.

The soils in this map unit have moderate to very low available water capacity and have moderate to low timber productivity. The shallow soils which are primarily used for range land are not suitable for timber production.

5 - Bucking-Ledford

Deep, nearly level to very steep, somewhat excessively drained and excessively drained soils on mountainsides.

This map unit is on the sides of mountains. The soils formed in materials weathered from granitic rocks. Elevations range from 5,000 to 9,000 feet.

Important soils in this unit are the Bucking and Ledford soils. Other soils are of minor extent.

Bucking soils are deep and somewhat excessively drained. Slopes range from 2 to 75 percent. Typically the surface layer is loamy sand. The underlying material is loamy sand over highly weathered granitic rock.

Ledford soils are deep and excessively well drained. Slopes range from 2 to 75 percent. Typically the surface layer is fine sandy loam. The underlying material is very gravelly sandy loam over highly weathered granitic rock.

The soils in this map unit have high to very high timber productivity. Slopes less than 30 percent are generally tractor logged, and the steeper slopes are harvested by aerial systems. These soils are very susceptible to erosion when vegetation and litter are removed.

All soils in this map unit have low to moderate available water capacity and have high to very high timber productivity.

6 - Fugawee-Waca-Ahart

Moderately deep, nearly level to very steep, well drained soils on mountainsides.

This map unit is on the mountainsides of the Sierra Nevada crest and the higher elevations of the eastern slopes. The soils formed in material weathered from volcanic rocks, andesitic tuff breccia mudflows of the Mehrten Formation, and rhyolitic tuff breccia of the Valley Springs Formation. Elevations range from 5,500 to 9,000 feet.

Important soils in this unit are the Fugawee, Waca, and Ahart soils. Other soils are of minor extent.

Fugawee soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is sandy loam. The subsoil is gravelly clay loam over weathered andesite.

Waca soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is gravelly sandy loam. The underlying material is very gravelly sandy loam over weathered andesitic tuff breccia. Gravel is in excess of 35 percent throughout the profile.

Ahart soils are moderately deep and well drained. Slopes range from 2 to 50 percent. Typically the surface layer is gravelly sandy loam. The underlying material is gravelly fine sandy loam over weathered rhyolitic tuff.

Areas of this unit are used mainly for timber production. The flatter slopes are generally harvested by tractor, and the steeper slopes are harvested by aerial systems.

Soils in this map unit have low to moderate available water capacity and low to high timber productivity.

7 - Rock outcrop

Nearly level to very steep Rock outcrop and areas of rockland.

This map unit is located throughout the Sierra Nevada crest zone where erosion or glaciation has exposed the underlying bedrock. Rock outcrops may be volcanic, granitic, rhyolitic, ultra basic, or metasedimentary. Elevations range from 5,400 to 10,000 feet.

This map unit makes up about 5 percent of the survey area.

Other soils in this unit are predominantly soils of glacial origin. Waterbodies and poorly drained soils such as Aquolls, Borolls, and Cryumbrepts, wet, are also included.

This unit can be found in minor extent throughout all the other mapping units.

Areas of this unit are used mainly for watershed, wildlife habitat, and recreation.

III. DOMINANTLY NEARLY LEVEL TO VERY STEEP SOILS OF THE EASTSIDE

The soils in this group are somewhat excessively drained to well drained. They formed in material weathered from volcanic, rhyolitic, and granitic rock, and alluvial deposits. Rock outcrops are numerous in many areas. Slopes range from 2 to 75 percent.

These soils are on the lower slopes of the eastern Sierra Nevada, Bald Mountain, and Verdi ranges, at elevations of 4,800 to 6,500 feet. The annual precipitation is 15 to 40 inches, and the frost-free growing season is 20 to 75 days.

Three map units are in this group. They make up about 19 percent of the survey area.

8 - Euer-Martis

Deep and very deep, nearly level to steep, well drained soils on glacial terraces.

This map unit is north and south of the Truckee River east of Truckee. The soils formed in materials weathered from glacial deposits of Donner age. Elevations range from 5,000 to 6,500 feet.

Important soils in this unit are the Euer and Martis soils. Other soils are of minor extent.

Euer soils are deep and well drained. Slopes range from 2 to 30 percent. Typically the surface layer is sandy loam. The subsoil is very gravelly sandy clay loam and the underlying material is extremely gravelly sandy loam.

Martis soils are deep and very deep, and well drained. Slopes range from 2 to 5 percent. Typically the surface layer sandy loam. The subsoil is gravelly sandy clay loam over highly weathered glacial deposits. The subsoil contains a layer of very high bulk density.

Areas of this unit are used for limited timber production and range forage. Timber harvest is by tractor.

Available water capacity is low due to gravel content or limited effective rooting depth.

9 - Aldi-Franktown-Kyburz

Shallow and moderately deep, nearly level to very steep, and well drained soils on mountainsides.

This map unit is on mountainsides. The soils formed in materials weathered from basic volcanic rocks. Eleva-

tions range from 4,800 to 6,500 feet. Slopes range from 2 to 75 percent.

Important soils in this unit are the Aldi, Franktown, and Kyburz soils. Other soils are of minor extent.

Aldi soils are shallow and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is loam. The subsoil is clay loam over weathered andesite.

Franktown soils are shallow and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is gravelly loam and extremely gravelly coarse sandy clay loam over weathered volcanic rock.

Kyburz soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is gravelly sandy loam. The subsoil is gravelly clay loam over weathered andesitic rock.

The Kyburz soils in this map unit have low to very low timber productivity. The Aldi and Franktown soils are moderately productive range soils when used for unimproved range. Slopes less than 30 percent are generally tractor logged, and the steeper slopes are harvested by aerial systems.

Soils in this map unit have very low to moderate available water capacity. Aldi and Franktown soils are not considered to be timber producing soils.

10 - Trojan-Kyburz-Portola

Very deep, deep, and moderately deep, level to very steep, well drained soils on mountainsides.

This map unit is on mountainsides. The soils formed in materials weathered from basic and acidic rocks. Elevations range from 4,800 to 8,000 feet.

Important soils in this unit are the Trojan, Kyburz, and Portola soils. Other soils are of minor extent.

Trojan soils are deep and very deep, and well drained. Slopes range from 2 to 50 percent. Typically the surface layer is gravelly sandy loam. The subsoil is gravelly clay loam over andesite.

Kyburz soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically the surface layer is gravelly sandy loam. The subsoil is gravelly clay loam over weathered andesitic rock.

Portola soils are moderately deep and well drained. Slopes range from 2 to 75 percent. Typically the surface

layer is gravelly fine sandy loam. The subsoil is gravelly sandy loam over weathered rhyolite.

The soils in this map unit have moderate to very low timber productivity. Slopes less than 30 percent are generally tractor logged, and the steeper slopes are

harvested by aerial systems.

Soils in this map unit have low to high available water capacity and moderate to low timber productivity. Low precipitation is a major factor in determining productivity.

Detailed Soil Map Units

The map unit symbols on the soil maps are described in this section. The map unit descriptions, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses.

Each map unit on the soil maps represents an area on the landscape and consists of one or more soils for which the unit is named. The symbol from the soil map precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses. The map unit descriptions are arranged alphabetically by symbol.

Soils that have profiles that are almost alike make up a soil series. Except for differences in texture of the surface layer or of the underlying material, all soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into soil phases. Most of the areas shown on the soil maps are phases of a soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Fugawee sandy loam, 2 to 30 percent slopes, is one of the several phases in the Fugawee series. A soil variant is 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.

Erosion phases used in this report are eroded and severely eroded. The eroded phase is used when part, but not generally all, of the A horizon or surface layer has been removed from the soil. The severely eroded phase is used when most all of the A horizon or surface layer has been removed and the subsoil is exposed. In many places, a part of the subsoil is also removed.

Other phases used in this report are altered and terraced. The altered phase is used for soils when much of the surface layer has been displaced into windrows or piles. The terraced phase is used for soils on which contoured furrows or ditches have been constructed.

Many map units are made up of two or more major soils. These map units are called soil complexes or soil associations.

Soil complex consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Ahart-Rock outcrop-Ledmount Variant complex, 2 to 30 percent slopes, is an example.

Soil association is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar. Badenaugh-Martineck-Dotta association, 2 to 30 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description.

This survey includes miscellaneous areas. Such areas have little or no soil material and support little or no vegetation. Cinder land is an example. Miscellaneous areas are described in the map units, but they are not rated for soil management interpretations.

The Soil Map Unit Legend, Map Unit Area and Proportionate Extent Table (Table 2) at the back of this report gives the acreage and proportionate extent of each map unit.

Explanations of entries in the map unit descriptions are explained next.

Soil Map Unit Component. The name of each major soil or miscellaneous area.

Approximate Proportion. The portion of the map unit occupied by each component.

Surface Layer. The uppermost part of the soil, usually designated as the A horizon, equivalent to the depth of soil moved in tillage and ranging in depth from 3 to 10 inches.

Subsoil. The soil between the surface layer and the uppermost substratum. All parts of B horizons 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.

Effective Rooting Depth. The vertical distance from the soil surface to bedrock or any other layer that stops or hinders that penetration of roots.

Available Water Capacity Class. The capacity of the soil to hold water available for use by most plants. It is expressed as total inches of water for the effective rooting depth or to 60 inches. The 5 classes and their ratings are:

Very low is less than 3 inches

Low is 3 to 6 inches

Moderate is 6 to 9 inches

High is 9 to 12 inches

AWC for top 20" is the water capacity in a typical soil profile to a depth of 20 inches or to bedrock, whichever is less, available to plants. This moisture content is used in evaluating the probability of seedling survival for revegetation on specific soils.

On soils with an AWC of greater than 3.0 inches, almost all planted seedlings would survive.

On soils with an AWC between 2.0 and 3.0, most planted seedlings would survive.

On soils with an AWC between 1.0 and 2.0 inches, few planted seedlings would survive. The primary limiting factors of these soils are shallow soils and/or high percentage of rock fragments.

On soils with an AWC of less than 1.0 inch, very few planted seedlings would survive. The soils are shallow and have a very high rock fragment content.

Permeability. Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior. The ratings of permeability are very slow, slow, moderately slow, moderate, moderately rapid, rapid, and very rapid.

Drainage Class. Drainage class refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained. Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained. Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained. Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained. Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained. Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained. Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious

layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained. Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Maximum Erosion Hazard

Many land use activities have the potential to cause erosion rates to exceed natural soil erosion or soil formation rates. Potential consequences of accelerated erosion include reductions in the productive capacity of the soil and adverse effects on water quality. Many interrelated factors are evaluated in an EHR system to determine whether land use activities would cause accelerated erosion, and to what degree accelerated erosion would cause adverse effects. It is designed to appraise the relative risk of accelerated sheet and rill erosion. The system does not rate gully erosion, dry ravel, wind erosion, or mass wasting.

The adjective erosion hazard ratings are described below in terms of the likelihood and consequences of accelerated erosion. As the risk of accelerated erosion increases, so does the likelihood that accelerated erosion will exceed soil formation rates. The risk and consequence becomes especially critical for shallow and moderately deep soils over consolidated materials.

The maximum EHR are based on little or no vegetative cover present and on the long-term average occurrence of 2-year, 6-hour storm events. Erosion hazard risks are greater when storm frequency, intensity and/or duration exceed long-term average occurrence, and risks are less when occurrence is below "average". The risks and consequences for adjective erosion hazard ratings are described below.

Low EHR. Accelerated erosion is not likely to occur, except in the upper part of the Low EHR numerical range, or during periods of above average storm occurrence. If accelerated erosion does occur, adverse effects on soil productivity and to nearby water quality are not expected. Erosion control measures are usually not needed for these areas.

Moderate EHR. Accelerated erosion is likely to occur in most years. Adverse effects on soil productivity (especially to shallow and moderately deep soils) and to nearby water quality may occur for the upper part of

the Moderate EHR numerical range, or during periods of above average storm occurrence. The need for erosion control should be evaluated for these areas. A wide selection of measures and application methods are available.

High EHR. Accelerated erosion will occur in most years. Adverse effects on soil productivity (especially to shallow and moderately deep soils) and to nearby water quality are likely to occur, especially during periods of above average storm occurrence. Erosion control is necessary for these areas to prevent accelerated erosion. The selection of measures and methods of application are somewhat limited.

Very high EHR. Accelerated erosion will occur in most years. Adverse effects on soil productivity and to nearby water quality are very likely to occur, even during periods of below average storm occurrence. Erosion control is essential for these areas to prevent accelerated erosion. The selection of measures and methods of application are limited.

Equipment Limitations. Ratings of equipment limitations (4) reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of slight indicates that use of equipment is not limited to a particular kind of equipment or time of year; moderate indicates a short seasonal limitation or a need for some modification in management or in equipment; and severe indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling Mortality. Rating of seedling mortality (5) indicates the degree to which the soil affects the mortality of tree seedlings growing on a south aspect. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A south aspect is used to determine the rating because this aspect normally has the highest mortality due to temperature and moisture stresses. Ratings are normally lower for the other aspects. A rating of slight indicates that no problem is expected under normal conditions; moderate indicates that extra precautions are advisable; and severe indicates that precautions are important and replanting may be necessary.

Soil properties that commonly influence seedling mortality include texture, the amount of rock fragments, temperature, and drainage. Soils with available water capacities (AWC) of less than 2.5 inches in the upper 24 inches of the soil cause severe limitations for seedlings, especially on south and west facing slopes below 6,000

feet. Low available water capacity is less critical at the higher elevations where the potential plant water use is generally less. Species selection, type of planting stock, competition from undesirable plants, type of site preparation, and the available water capacity and rock fragment content of the soil need to be considered when reforesting soils at higher elevations.

Revegetating Exposed Subsoil. A rating of revegetating exposed subsoil (5) indicates the degree of difficulty in revegetating exposed subsoil. Subsoil horizons are frequently exposed during forest management activities. This occurs on road cuts and fills, and on some skid roads. Land managers may desire to revegetate these areas. Characteristics of the subsoil which influence planting conditions, germination, and subsequent growth rate are considered in the ratings. These are general ratings; they do not preclude the need for on-site investigation of individual projects.

A rating of slight indicates there are few problems with revegetation. If locally adapted grasses are properly seeded, a good stand can be expected to reduce surface erosion. If trees are planted, good survival and growth can be expected. Natural revegetation will be better on these subsoils than on those with moderate or severe ratings. Moderate indicates that additional care is needed in choosing methods or types of plants for erosion control. If trees are planted, some mortality can be expected and growth rates will be below those on undisturbed areas. Severe indicates that intensive and expensive measures would be needed to establish erosion control plants. Some soils with a severe rating have little need for erosion control plantings because the exposed areas have large amounts of hard rock with only a small amount of erodible soils. Tree planting would be very difficult, survival would be low, or growth rates would be very slow or greatly reduced below those of undisturbed areas. On site evaluation is essential when considering revegetation on severe sites.

Soil Productivity.

Forest survey site class. The timber productivity of the soil components is expressed by the Forest Survey Site Class (FSSC). The FSSC estimated for each soil component is an average over the map unit. Site index values were obtained by using available site index data and appropriate guides for converting into FSSC. On a specific site in the map unit, FSSC might be more or less than what is given in the report. FSSC is an expression of the volume of bole wood produced on an acre in one year in a normal even-aged stand at culmination mean annual increment. Below are the seven FSSC's and their corresponding volume in cubic feet per acre:

| | |
|---|------------------|
| 1 | greater than 225 |
| 2 | 165 to 225 |
| 3 | 120 to 165 |
| 4 | 85 to 120 |
| 5 | 50 to 85 |
| 6 | 20 to 50 |
| 7 | less than 20 |

The term NC means not capable of growing commercial conifer species.

Annual Forage. The production of forage is expressed in pounds per acre of grasses, forbs, and browse. A range of productivity is given to reflect different site conditions and for forested soils, to reflect an unharvested state ranging to conditions 10 years after harvesting. Only slopes of less than 50 percent are rated.

Soil Manageability. The ease of managing land depends on the kinds and intensities of cultivation and harvest techniques. It is also dependent on soil and topographic features, although the importance of these features is related to the type of management system. Soil manageability classification rates soils and their topography on the basis of features which reduce the ease of equipment operation and increase required soil protection measures for most systems, particularly those commonly practiced in forestry and intensive range management.

CLASSES. The soil manageability classes are based on soil and topographic features and are applied to the individual soils of a map unit. Soils are classified on the basis of ease of equipment operation and need for soil protection measures. Miscellaneous land types, such as Rock outcrop, are not rated. Classes are designated by arabic numerals and may have management modifiers designated by letters.

Class 1. - Easy to manage. Soils in this class are on stable slopes of less than 30 percent. They are moderately deep or deep and do not have any more than slight management problems. Management modifiers are not applied to this class.

Class 2. - Readily manageable. Soils in this class are on slopes of less than 30 percent, and have a moderate management modifier (designated by lowercase letters), such as moderate erosion potential.

Class 3. - Moderately difficult to manage. Soils in this class are on steep slopes (30 to 50 percent), or have a substantial management modifier (designated by uppercase letters), or both.

Class 4. - Very difficult to manage. Soils in this class are on very steep slopes (greater than 50 percent), or have more than one substantial management modifier, or have been altered, terraced, or severely eroded.

The management modifiers are:

- “S” if the slope stability is low and “s” if it is moderate.
- “E” if the maximum erosion hazard is high or very high and “e” if it is moderate.
- “D” if the soil depth is less than 10 inches and “d” if it is 10 to 20 inches.
- “P” if the upper 20 inches of soil has an available water capacity of less than 1.2 inches and “p” if it is 1.2 to 2.4 inches.
- “W” if the soil is poorly drained and “w” if it is somewhat poorly drained.
- “X” if cobbles or stones comprise greater than 15 percent of the surface and “x” if they comprise 3 to 15 percent of the surface.

GROUPS. Land management planners dealing with Forests and larger areas may not be concerned with every soil taxonomic unit, or individual components of soil map units. They generally want to avoid the complications of having more than one soil manageability symbol for a delineation or a soil map unit. Therefore, soil manageability groups have been developed for utilization in broad planning. The groups rate soil map units and only one group applies to a map unit, whereas soil manageability classes rate map unit components and as many classes may apply to a map unit as there are major components in the map unit.

The groups are ratings for the map unit and are determined by the soil manageability classes which were applied to the map unit components. They are designated by Roman numerals in order to distinguish them from soil manageability class symbols, which are designated by Arabic numerals. A map unit is always placed in the group with the lowest numeral in cases where the group definitions would allow it to be in more than one soil manageability group.

Group IA. - Class 1 components predominate with less than 30 percent of class 2, and less than 10 percent of class 3 and 4 components.

Group I. - Class 1 components predominate, with less than 50 percent of class 2, less than 20 percent

of class 3, and less than 10 percent of class 4 components by area.

Group II. - Class 2 components predominate with less than 50 percent of class 3 components and less than 20 percent of class 4 components by area.

Group III. - Class 3 components predominate, with less than 40 percent of class 4 components by area.

Group IV. - Class 4 components predominate, or occupy at least 40 percent of the map unit area.

Management group modifiers were assigned to each group based on the following criteria:

- E Components rated E make up at least 50 percent of the map unit.
- e Components rated e make up at least 50 percent of the map unit.
- X Rock outcrop makes up at least 40 percent of the map unit, or if components rated X make up at least 40 percent of the map unit, or if Rock outcrop plus the components rated X make up at least 40 percent of the unit.
- x Rock outcrop makes up 10 to 39 percent of the map unit, or if Rock outcrop plus the components rated X make up 10 to 39 percent of the unit.
- W Components rated W make up at least 50 percent of the map unit.
- w Components rated w make up at least 10 percent of the map unit and the percentage is greater than the percentage rated X.
- D Components rated D make up at least 40 percent of the map unit.
- d Components rated d make up at least 40 percent of the map unit.
- P Components rated P make up at least 40 percent of the map unit, or if components rated P plus D make up at least 40 percent of the map unit.
- p Component rated p make up at least 40 percent of the map unit, or if components rated p plus d make up at least 40 percent of the map unit.
- G Slope gradient in the map unit is greater than 50 percent.
- g Slope gradient in the map unit is 30 to 50 percent.

ACF Ahart-Waca, rhyolitic substratum complex, 30 to 50 percent slopes

Elevation: 5,500 to 8,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation Red fir series; Mixed conifer series.

| | | |
|--------------------------|--------------|-----------------------------------|
| Soil Map Unit Components | Ahart | Waca, rhyolitic substratum |
| Proportion (percent) | 60 | 30 |

Soil Profile Description

| | | |
|---------------|---|--|
| Surface Layer | 0 to 8 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid. | 0 to 14 inches; dark grayish brown very gravelly sandy loam; weak granular structure; slightly acid. |
| Subsoil | 8 to 31 inches; brown gravelly fine sandy loam; weak subangular blocky structure; medium acid to strongly acid. | 14 to 32 inches; brown very gravelly sandy loam; weak subangular blocky structure; slightly acid. |
| Substratum | 31 inches; weathered rhyolitic tuff. | 32 inches; weathered rhyolitic tuff. |

Soil Properties & Management Interpretations

| | | |
|----------------------------------|------------------|--------------------|
| Effective Rooting Depth (inches) | 20 to 40 | 20 to 40 |
| Available Water Capacity Class | Low | Low |
| AWC for top 20" | 2.5-2.8 | 2.1-2.3 |
| Permeability: Subsoil | Moderately rapid | Moderately rapid |
| Substratum | Moderately slow | Moderately slow |
| Drainage Class | Well drained | Well drained |
| Max Erosion Hazard | High | High |
| Seedling Mortality | Slight | Slight to moderate |
| Revegetating Exposed Subsoil | Slight | Moderate |
| Soil Productivity | | |
| Forest Survey Site Class | 3,4 RF, WF | 4,5 RF, WF |
| Annual Forage (lbs/acre) | 100 to 180 | 60 to 140 |
| Soil Manageability | | |
| Group | III | III |
| Class | 3E | 3Ep |

Inclusions Included in this unit are small areas of Tinker and Waca soils; soils similar to Ahart but shallower than 20 inches; soils similar to Ahart but deeper than 40 inches; and similar soils but with ochric epipedons. Included areas make up about 10 percent of the total area.

Management Considerations Steep slopes and moderately deep soils. Waca, rhyolitic substratum soils have a high amount of rock fragments.

ADE Ahart-Waca, rhyolitic substratum-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 5,500 to 8,000 feet Annual Precipitation: 50 to 70 inches

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

| Soil Map Unit Components | Ahart | Waca, rhyolitic substratum | Cryumbrepts, wet |
|--------------------------|--------------|-----------------------------------|-------------------------|
| Proportion (percent) | 50 | 30 | 15 |

Soil Profile Description *Cb-s1*

| | | | |
|---------------|---|--|--|
| Surface Layer | 0 to 8 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid. | 0 to 14 inches; dark grayish brown very gravelly sandy loam; weak granular structure; slightly acid. | Thick and dark colored; stratified sandy loam; silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | 8 to 31 inches; brown gravelly fine sandy loam; weak subangular blocky structure; medium acid to strongly acid. | 14 to 32 inches; brown very gravelly sandy loam; weak subangular blocky structure; slightly acid. | |
| Substratum | 31 inches; weathered rhyolitic tuff. | 32 inches; weathered rhyolitic tuff. | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

Soil Properties & Management Interpretations

| | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------|
| Effective Rooting Depth (inches) | 20 to 40 | 20 to 40 | Variable |
| Available Water Capacity Class | Low | Low | Very low |
| AWC for top 20" | 2.5-2.8 | 2.1-2.3 | |
| Permeability: Subsoil Substratum | Moderately rapid Moderately slow | Moderately rapid Moderately slow | Moderately rapid Very slow |
| Drainage Class | Well drained | Well drained | Poorly drained |
| Max Erosion Hazard | Moderate | Moderate | Very high |
| Seedling Mortality | Slight | Slight to moderate | Severe |
| Revegetating Exposed Subsoil | Slight | Slight | Severe |
| Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre) | 3,4 RF, WF 100 to 180 | 4,5 RF, WF 60 to 140 | Not capable 170 to 640 |
| Soil Manageability Group Class | II 2e | II 2ep | II 4EW |

Inclusions Included in this unit are small areas of Tallac, Tinker, and Waca soils; soils similar to Ahart but shallower than 20 inches; soils similar to Ahart but deeper than 40 inches; and similar soils but with ochric epipedons. Included areas make up about 15 percent of the total area.

Management Considerations Moderately deep soils. Waca, rhyolitic substratum soils have a high amount of rock fragments. Cryumbrepts, wet have a high watertable most of the year, are susceptible to puddling, and normally have impermeable layers between 1 and 2 feet.

ADF Ahart-Waca, rhyolitic substratum-Cryumbrepts, wet complex, 30 to 50 percent slopes

Elevation: 5,500 to 8,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation

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

Soil Map Unit Components

Ahart **Waca, rhyolitic substratum** **Cryumbrepts, wet**

Proportion (percent)

50 20 15

Soil Profile Description *cb-sf*

Surface Layer

0 to 8 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid. 0 to 14 inches; dark grayish brown very gravelly sandy loam; weak granular structure; slightly acid. Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.

Subsoil

8 to 31 inches; brown gravelly fine sandy loam; weak subangular blocky structure; medium acid to strongly acid. 14 to 32 inches; brown very gravelly sandy loam; weak subangular blocky structure; slightly acid.

Substratum

31 inches; weathered rhyolitic tuff. 32 inches; weathered rhyolitic tuff. Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

20 to 40 20 to 40 Variable

Available Water Capacity Class

Low Low Very low

AWC for top 20"

2.5-2.8 2.1-2.3

Permeability: Subsoil Substratum

Moderately rapid Moderately rapid Moderately rapid Moderately slow Moderately slow Very slow

Drainage Class

Well drained Well drained Poorly drained

Max Erosion Hazard

High High Very high

Seedling Mortality

Slight Moderate to slight Severe

Revegetating Exposed Subsoil

Slight Moderate Severe

Soil Productivity

Forest Survey Site Class Annual Forage (lbs/acre)

3,4 RF, WF 4,5 RF, WF Not capable
100 to 180 60 to 140 170 to 640

Soil Manageability

Group Class

III III III
3e 3ep 4EW

Inclusions

Included in this unit are small areas of Tallac, Tinker, and Waca soils; soils similar to Ahart but shallower than 20 inches; soils similar to Ahart but deeper than 40 inches; similar soils but with ochric epipedons; and soils that are loamy-skeletal with umbric epipedons and are less than 20 inches deep to cemented glacial till. Included areas make up about 15 percent of the total area.

Management Considerations

Steep slopes. Moderately deep soils. Waca, rhyolitic substratum soils have 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.

AEE Ahart-Rock outcrop-Ledmount Variant complex, 2 to 30 percent slopes

Elevation: 5,500 to 8,000 feet Annual Precipitation: 50 to 70 inches

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

| Soil Map Unit Components | Ahart | Rock outcrop | Ledmount Variant |
|--------------------------|-------|--------------|------------------|
| Proportion (percent) | 35 | 25 | 25 |

Soil Profile Description

| | | | |
|---------------|---|-------------------------|--|
| Surface Layer | 0 to 8 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid. | Rhyolitic rock outcrop. | 0 to 19 inches; dark grayish brown very gravelly sandy loam; weak granular structure; slightly acid. |
| Subsoil | 8 to 31 inches; brown gravelly fine sandy loam; weak subangular blocky structure; medium acid to strongly acid. | | |
| Substratum | 31 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" | 2.5-2.8 | 1.4-1.6 |
| Permeability: Subsoil | Moderately rapid | Moderately rapid |
| Substratum | Moderately slow | Slow |
| Drainage Class | Well drained | Well drained |
| Max Erosion Hazard | Moderate | Moderate |
| Seedling Mortality | Slight | Severe |
| Revegetating Exposed Subsoil | Slight | Severe |
| Soil Productivity | | |
| Forest Survey Site Class | 3,4 RF, WF | Not capable |
| Annual Forage (lbs/acre) | 100 to 180 | 160 to 270 |
| Soil Manageability | | |
| Group | II | II |
| Class | 2e | 2ed |

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

Management Considerations Ahart soils are moderately deep. Ledmount Variant soils are shallow to hard bedrock and have a high amount of rock fragments. These soils reach field capacity rapidly and can produce surface runoff. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils. Rock outcrop areas are a potential aggregate source.

AEF/Ahart-Rock outcrop-Ledmount Variant complex, 30 to 50 percent slopes

Elevation: 5,500 to 8,000 feet Annual Precipitation: 50 to 70 inches

Typical Vegetation

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

Soil Map Unit Components

Ahart

Rock outcrop

Ledmount Variant

Proportion (percent)

30

30

25

Soil Profile Description

Surface Layer

0 to 8 inches; dark brown gravelly sandy loam; weak granular structure; slightly acid.

Rhyolitic rock outcrop.

0 to 19 inches; dark grayish brown very granular structure; slightly acid.

Subsoil

8 to 31 inches; brown gravelly fine sandy loam; weak subangular blocky structure; medium acid to strongly acid.

Substratum

31 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"

2.5-2.8

1.4-1.6

Permeability: Subsoil
Substratum

Moderately rapid
Moderately slow

Moderately rapid
Slow

Drainage Class

Well drained

Well drained

Max Erosion Hazard

High

High

Seedling Mortality

Slight

Severe

Revegetating Exposed Subsoil

Slight

Severe

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

4,5 RF, WF
100 to 180

Not capable
160 to 270

Soil Manageability

Group
Class

III
3E

III
3Ed

Inclusions

Included in this unit are small areas of Tallac, Tinker, and Waca soils. Included areas make up about 15 percent of the total area.

Management Considerations

Steep slopes. Ahart soils are moderately deep. Ledmount Variant soils are shallow to hard bedrock and have a high amount of rock fragments. These soils reach field capacity rapidly and can produce surface runoff. Concentrated surface runoff from Rock outcrop areas can increase the erosion on adjacent soils. Rock outcrop areas are a potential aggregate source.

AIE5 Aiken-Cohasset complex, 2 to 30 percent slopes, altered

Elevation: 2,000 to 4,500 feet Annual Precipitation: 50 to 65 inches

Typical Vegetation Mixed conifer series; Plantations.

| | | |
|---------------------------------|-----------------------|--------------------------|
| Soil Map Unit Components | Aiken, altered | Cohasset, altered |
|---------------------------------|-----------------------|--------------------------|

| | | |
|----------------------|----|----|
| Proportion (percent) | 70 | 20 |
|----------------------|----|----|

Soil Profile Description

| | | |
|---------------|--|--|
| Surface Layer | 0 to 8 inches; yellowish red loam; massive; neutral. | 0 to 12 inches; brown loam; massive; neutral. |
| Subsoil | 8 to 46 inches; red clay; moderate subangular blocky structure; neutral. | 12 to 65 inches; yellowish red gravelly clay loam; massive; slightly acid. |
| Substratum | 46 inches; highly weathered tuff breccia mudflow. | 65 inches; weathered mudflow. |

Soil Properties & Management Interpretations

| | | |
|----------------------------------|-----------------|-----------------|
| Effective Rooting Depth (inches) | 60 to 90 | 40 to 80 |
| Available Water Capacity Class | Low to moderate | Low to moderate |
| AWC for top 20" | 2.9-3.4 | 2.8-3.5 |
| Permeability: Subsoil | Slow | Moderately slow |
| Substratum | Slow | Slow |
| Drainage Class | Well drained | Well drained |
| Max Erosion Hazard | High | High |
| Seedling Mortality | Slight | Slight |
| 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 Crozier soils and unaltered Aiken and Cohasset soils. Included areas make up about 10 percent of the total area.

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

V V AQB Aquolls and Borolls, 0 to 5 percent slopes

Elevation: 5,000 to 8,500 feet Annual Precipitation: 30 to 60 inches

Typical Vegetation Meadow series; Meadow/Willow series.

| | | |
|--------------------------|----------------|----------------|
| Soil Map Unit Components | Aquolls | Borolls |
| Proportion (percent) | 45 | 45 |

Soil Profile Description

| | | |
|---------------|---|---|
| Surface Layer | Thick and dark colored; stratified coarse sand to clay. | Thick and dark colored; stratified coarse sand to clay. |
| Subsoil | Stratified layers with mottles; sandy loam to clay; some are very gravelly. | Stratified sandy loam to clay; some very gravelly. |
| Substratum | Stratified alluvium. | Stratified alluvium. |

Soil Properties & Management Interpretations

| | | |
|----------------------------------|---------------------|--------------------------|
| Effective Rooting Depth (inches) | 10 to 30 | 10 to 30 |
| Available Water Capacity Class | Variable | Very low |
| AWC for top 20" | | |
| Permeability: | | |
| Subsoil | Variable | Variable |
| Substratum | Slow and very slow | Moderately slow and slow |
| Drainage Class | Very poorly drained | Poorly drained |
| Max Erosion Hazard | High | High |
| Seedling Mortality | Severe | Severe |
| Revegetating Exposed Subsoil | Severe | Moderate |
| Soil Productivity | | |
| Forest Survey Site Class | Not capable | Not capable |
| Annual Forage (lbs/acre) | 1,040 to 2,670 | 1,040 to 2,670 |
| Soil Manageability | | |
| Group | IV | IV |
| Class | 4EW | 3eW |

Inclusions Included in this unit are small areas of Celio and Gefo soils, Rock outcrop, and soils less than 20 inches deep. Included areas make up about 10 percent of the total area.

Management Considerations This map unit is subject to flooding. Aquolls have a high water table during most of the year and are susceptible to puddling. Borolls have high water tables during part of the year, are susceptible to puddling, and have high amounts of rock fragments.

ARE Aldi-Kyburz complex, 2 to 30 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 20 to 30 inches

Typical Vegetation Sagebrush/Bitterbrush-Mixed conifer series.

| | | |
|--------------------------|-------------|---------------|
| Soil Map Unit Components | Aldi | Kyburz |
| Proportion (percent) | 55 | 30 |

Soil Profile Description

| | | |
|---------------|--|---|
| Surface Layer | 0 to 8 inches; brown loam; weak granular structure; slightly acid. | 0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid. |
| Subsoil | 8 to 18 inches; brown clay loam; moderate angular blocky structure; neutral. | 6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid. |
| Substratum | 18 inches; weathered andesite. | 34 inches; weathered andesitic rock. |

Soil Properties & Management Interpretations

| | | |
|----------------------------------|-----------------|-----------------|
| Effective Rooting Depth (inches) | 10 to 20 | 20 to 40 |
| Available Water Capacity Class | Very low to low | Low |
| AWC for top 20" | 2.7-3.3 | 2.2-2.7 |
| Permeability: Subsoil | Slow | Moderately slow |
| Substratum | Very slow | Moderately slow |
| Drainage Class | Well drained | Well drained |
| Max Erosion Hazard | High | High |
| Seedling Mortality | Slight | Slight |
| Revegetating Exposed Subsoil | Severe | Slight |
| Soil Productivity | | |
| Forest Survey Site Class | Not capable | 5,6 P |
| Annual Forage (lbs/acre) | 120 to 190 | 120 to 190 |
| Soil Manageability | | |
| Group | II | II |
| Class | 2ed | 2ep |

Inclusions Included in this unit are small areas of Franktown and Trojan soils; Rock outcrop; soils similar to Aldi but with fine-loamy textures in the subsoil; soils similar to Aldi but with a paralithic contact; and soils similar to Kyburz but with mollic epipedons. Included areas make up about 15 percent of the total area.

Management Considerations Aldi soils are shallow to hard bedrock. They have very low subsoil strength when wet. The subsoil tends to perch water during spring. These soils reach field capacity rapidly and can produce surface runoff. Kyburz soils are moderately deep, have thin surface layers, and a relatively short growing season.

BCG Bucking-Bucking Variant complex, 30 to 75 percent slopes

Elevation: 5,400 to 7,400 feet Annual Precipitation: 50 to 60 inches

Typical Vegetation Mixed conifer series; Red fir series.

Soil Map Unit
Components

Bucking

Bucking Variant

Proportion (percent)

50

20

Soil Profile Description

Surface Layer

0 to 11 inches; brown loamy sand; weak granular structure; slightly acid.

0 to 11 inches; grayish brown loamy coarse sand; weak granular structure; slightly acid.

Subsoil

11 to 51 inches; pale brown loamy sand; massive; slightly acid to medium acid.

11 to 29 inches; pale brown loamy coarse sand; massive; medium acid.

Substratum

51 inches; highly weathered granitic rock.

29 inches; weathered granitic rock.

Soil Properties & Management Interpretations

Effective Rooting
Depth (inches)

40 to 60

20 to 40

Available Water
Capacity Class

Very low to low

Very low

AWC for top 20"

1.2-1.6

1.2-1.6

Permeability: Subsoil
Substratum

Rapid
Slow

Rapid
Slow

Drainage Class

Somewhat excessively drained

Somewhat excessively drained

Max Erosion Hazard

High

High

Seedling Mortality

Severe to moderate

Severe to moderate

Revegetating Exposed
Subsoil

Slight

Slight

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

3 RF, WF
140 to 180

4 RF, WF
100 to 140

Soil Manageability

Group
Class

IV
4Gp

IV
4Gp

Inclusions

Included in this unit are small areas of Celio Variant soils; Rock outcrop; similar soils that are pachic; and similar soils that are moderately deep or deep and have ochric epipedons. Included areas make up about 30 percent of the total area.

Management
Considerations

Steep and very steep slopes. Sandy soil textures and relatively low cation exchange capacity (CEC). Bucking Variant soils are moderately deep.

BDE Bucking-Bucking Variant-Cryumbrepts, wet complex, 2 to 30 percent slopes

Elevation: 5,400 to 7,400 feet Annual Precipitation: 50 to 60 inches

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

| Soil Map Unit Components | Bucking | Bucking Variant | Cryumbrepts, wet |
|--------------------------|----------------|------------------------|-------------------------|
| Proportion (percent) | 45 | 20 | 15 |

Soil Profile Description

| Soil Profile Description | Bucking | Bucking Variant | Cryumbrepts, wet |
|--------------------------|--|--|--|
| Surface Layer | 0 to 11 inches; brown loamy sand; weak granular structure; slightly acid. | 0 to 11 inches; grayish brown loamy coarse sand; weak granular structure; slightly acid. | Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony. |
| Subsoil | 11 to 51 inches; pale brown loamy sand; massive; slightly acid to medium acid. | 11 to 29 inches; pale brown loamy coarse sand; massive; medium acid. | |
| Substratum | 51 inches; highly weathered granitic rock. | 29 inches; weathered granitic rock. | Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony. |

Soil Properties & Management Interpretations

| | | | |
|-------------------------------------|------------------------------|------------------------------|-------------------------------|
| Effective Rooting Depth (inches) | 40 to 60 | 20 to 40 | Variable |
| Available Water Capacity Class | Very low to low | Very low | Very low |
| AWC for top 20" | 1.2-1.6 | 1.2-1.6 | |
| Permeability: Subsoil Substratum | Rapid Slow | Rapid Slow | Moderately rapid Very slow |
| Drainage Class | Somewhat excessively drained | Somewhat excessively drained | Poorly drained |
| Max Erosion Hazard | High | High | Very high |
| Seedling Mortality | Severe to moderate | Severe to moderate | Severe |
| Revegetating Exposed Subsoil | Slight | Slight | Severe |
| Soil Productivity | | | |
| Forest Survey Site Class | 2,3 RF, WF | 4 RF, WF | Not capable |
| Annual Forage (lbs/acre) | 140 to 220 | 100 to 140 | 170 to 640 |
| Soil Manageability | | | |
| Group | II | II | II |
| Class | 2ep | 2ep | 4EW |

Inclusions Included in this unit are small areas of Celio Variant soils; similar soils that are pachic; and similar soils that are moderately deep or deep with ochric epipedons. Included areas make up about 20 percent of the total area.

Management Considerations Sandy soil textures and relatively low cation exchange capacity (CEC). Bucking Variant soils are moderately deep. 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.

BME Badenaugh-Martineck-Dotta association, 2 to 30 percent slopes

Elevation: 5,000 to 5,800 feet Annual Precipitation: 14 to 18 inches

Typical Vegetation

Sagebrush/Bitterbrush-Jeffrey/Ponderosa series.

Soil Map Unit Components

Badenaugh **Martineck** **Dotta**

Proportion (percent)

35 30 20

Soil Profile Description

Surface Layer

ve cobbly loam; weak and moderate granular structure; neutral. 0 to 6 inches; brown brown extremely stony sandy loam; weak platy structure; medium acid. 0 to 6 inches; grayish loam; moderate platy structure; slightly acid.

Subsoil

6 to 27 inches; brown very cobbly clay loam; moderate subangular blocky structure; slightly acid. 6 to 19 inches; brown extremely stony sandy clay loam; strong prismatic structure; medium acid. 13 to 41 inches; grayish brown sandy clay loam; weak prismatic structure; slightly acid.

Substratum

27 to 60 inches; brown extremely cobbly sandy clay loam; massive; medium acid. 19 inches; pale yellow indurated duripan. 41 to 68 inches; light brownish gray sandy loam; massive; slightly acid.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

48 to 60 10 to 20 40 to 60

Available Water Capacity Class

Low Very low Low to moderate

AWC for top 20"

1.5-1.8 0.5-0.6 2.0-2.9

Permeability: Subsoil Substratum

Moderately rapid Moderately rapid Very slow Very slow Moderately slow Moderate

Drainage Class

Well drained Well drained Well drained

Max Erosion Hazard

High High High

Seedling Mortality

Severe to moderate Severe Slight

Revegetating Exposed Subsoil

Slight Severe Slight

Soil Productivity

Forest Survey Site Class Annual Forage (lbs/acre)

Not capable Not capable Not capable
120 to 190 60 to 120 190 to 250

Soil Manageability

Group Class

III III III
2pX 4epX 2p

Inclusions

Included in this unit are small areas of deep soils with fine textured subsoils and deep soils that are fine-loamy and have aquic moisture regime. In the vicinity of Verdi, the soils in this unit are more moist than normal. Included areas make up about 15 percent of the total area.

Management Considerations

Low annual rainfall and a relatively short growing season. These soils reach field capacity rapidly and can produce surface runoff. Badenaugh soils have high amounts of rock fragments. Martineck soils are shallow to a hardpan, have high amounts of rock fragments and surface stones, and have low subsoil strength when wet.

BSE Boomer-Boomer Variant-Sites complex, 2 to 30 percent slopes

Elevation: 1,500 to 3,200 feet Annual Precipitation: 50 to 60 inches

Typical Vegetation

Mixed conifer-Mixed hardwood series.

Soil Map Unit Components

| Boomer | Boomer Variant | Sites |
|--------|----------------|-------|
|--------|----------------|-------|

Proportion (percent)

| | | |
|----|----|----|
| 55 | 20 | 15 |
|----|----|----|

Soil Profile Description

Surface Layer

| | | |
|--|---|--|
| 0 to 3 inches; brown sandy loam; moderate granular structure; medium acid. | 0 to 9 inches; brown cobbly sandy loam; strong granular structure; slightly acid. | 0 to 9 inches; reddish brown clay loam; moderate subangular blocky structure; slightly acid. |
|--|---|--|

Subsoil

| | | |
|---|---|---|
| 3 to 60 inches; reddish yellow sandy clay loam; massive; medium acid. | 9 to 90 inches; red very cobbly clay loam; weak subangular blocky structure; slightly acid. | 9 to 45 inches; yellowish red gravelly clay; strong subangular blocky structure; medium acid. |
|---|---|---|

Substratum

45 inches; weathered metasedimentary rock.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

| | | |
|----------|----------|----------|
| 40 to 65 | 50 to 90 | 40 to 65 |
|----------|----------|----------|

Available Water Capacity Class

| | | |
|------------------|-----|-----------------|
| Moderate to high | Low | Low to moderate |
|------------------|-----|-----------------|

AWC for top 20"

| | | |
|---------|---------|---------|
| 3.1-3.6 | 1.4-2.0 | 2.6-3.1 |
|---------|---------|---------|

Permeability: Subsoil Substratum

| | | |
|------------------------------------|-------------------------|---------------------------------|
| Moderately slow Moderately slow | Moderately slow Slow | Moderately slow to slow Slow |
|------------------------------------|-------------------------|---------------------------------|

Drainage Class

| | | |
|--------------|--------------|--------------|
| Well drained | Well drained | Well drained |
|--------------|--------------|--------------|

Max Erosion Hazard

| | | |
|------|----------|------|
| High | Moderate | High |
|------|----------|------|

Seedling Mortality

| | | |
|--------|--------------------|--------------------|
| Slight | Severe to moderate | Moderate to slight |
|--------|--------------------|--------------------|

Revegetating Exposed Subsoil

| | | |
|--------|--------|--------|
| Slight | Slight | Slight |
|--------|--------|--------|

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

| | | |
|-------------------------|-----------------------|-------------------------|
| 1,2 P, DF 240 to 640 | 2 P, DF 240 to 440 | 1,2 P, DF 240 to 640 |
|-------------------------|-----------------------|-------------------------|

Soil Manageability

Group
Class

| | | |
|----------|------------|----------|
| II 2e | II 3epX | II 2e |
|----------|------------|----------|

Inclusions

Included in this unit are small areas of Jocal soils; soils similar to Boomer but with clay in the subsoil; and similar soils without argillic horizons; also small areas having up to 80 inches of precipitation. Included areas make up about 10 percent of the total area.

Management Considerations

Boomer Variant soils have a high amount of rock fragments. Sites soils have low subsoil strength when wet.

✓ **BSF Boomer-Boomer Variant-Sites complex, 30 to 50 percent slopes**

Elevation: 1,500 to 3,200 feet Annual Precipitation: 50 to 65 inches

Typical Vegetation

Mixed conifer-Mixed hardwood series.

Soil Map Unit Components

| Boomer | Boomer Variant | Sites |
|--------|----------------|-------|
|--------|----------------|-------|

Proportion (percent)

| | | |
|----|----|----|
| 55 | 20 | 15 |
|----|----|----|

Soil Profile Description

Surface Layer

0 to 3 inches; brown sandy loam; moderate granular structure; medium acid.

0 to 9 inches; brown cobbly sandy loam; strong granular structure; slightly acid.

0 to 9 inches; reddish brown clay loam; moderate subangular blocky structure; slightly acid.

Subsoil

3 to 60 inches; reddish yellow sandy clay loam; massive; medium acid.

9 to 90 inches; red very cobbly clay loam; weak subangular blocky structure; slightly acid.

9 to 45 inches; yellowish red gravelly clay; strong subangular blocky structure; medium acid.

Substratum

45 inches; weathered metasedimentary rock.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

40 to 65

50 to 90

40 to 65

Available Water Capacity Class

Moderate to high

Low

Low to moderate

AWC for top 20"

3.1-3.6

1.4-2.0

2.6-3.1

Permeability: Subsoil
Substratum

Moderately slow
Moderately slow

Moderately slow
Slow

Moderately slow to slow
Slow

Drainage Class

Well drained

Well drained

Well drained

Max Erosion Hazard

High

High

High

Seedling Mortality

Slight

Severe to moderate

Moderate to slight

Revegetating Exposed Subsoil

Slight

Slight

Slight

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

1,2 P, DF
240 to 640

2 P, DF
240 to 440

1, 2 P, DF
240 to 640

Soil Manageability

Group
Class

III
3E

III
4EpX

III
3E

Inclusions

Included in this unit are small areas of Jocal soils; soils similar to Boomer but with clay in the subsoil; and similar soils without argillic horizons; also small areas having up to 80 inches of precipitation.

Management Considerations

Steep slopes. Boomer Variant soils have a high amount of rock fragments. Sites soils have low subsoil strength when wet.

BSG Boomer-Boomer Variant complex, 50 to 75 percent slopes

Elevation: 1,500 to 3,200 feet Annual Precipitation: 50 to 65 inches

Typical Vegetation Mixed conifer-Mixed hardwood series.

| Soil Map Unit Components | Boomer | Boomer Variant |
|--------------------------|---------------|-----------------------|
| Proportion (percent) | 55 | 30 |

Soil Profile Description

| | Boomer | Boomer Variant |
|---------------|--|---|
| Surface Layer | 0 to 3 inches; brown sandy loam; moderate granular structure; medium acid. | 0 to 9 inches; brown cobbly sandy loam; strong granular structure; slightly acid. |
| Subsoil | 3 to 60 inches; reddish yellow sandy clay loam; massive; medium acid. | 9 to 90 inches; red very cobbly clay loam; weak subangular blocky structure; slightly acid. |
| Substratum | | |

Soil Properties & Management Interpretations

| | Boomer | Boomer Variant |
|----------------------------------|------------------------------------|-------------------------|
| Effective Rooting Depth (inches) | 40 to 65 | 50 to 90 |
| Available Water Capacity Class | Moderate to high | Low |
| AWC for top 20" | 3.1-3.6 | 1.4-2.0 |
| Permeability: Subsoil Substratum | Moderately slow Moderately slow | Moderately slow Slow |
| Drainage Class | Well drained | Well drained |
| Max Erosion Hazard | High | High |
| Seedling Mortality | Slight | Severe to moderate |
| Revegetating Exposed Subsoil | Slight | Slight |
| Soil Productivity | | |
| Forest Survey Site Class | 1,2 P, DF | 2 P, DF |
| Annual Forage (lbs/acre) | Not rated | Not rated |
| Soil Manageability | | |
| Group | III | III |
| Class | 3E | 4EpX |

Inclusions Included in this unit are small areas of soils similar to Boomer but with a clay subsoil; soils less than 40 inches deep; and soils without argillic horizons; also small areas with up to 80 inches of precipitation. Included areas make up about 15 percent of the total area.

Management Considerations Very steep slopes. Boomer Variant soils have a high amount of rock fragments.

CEE Celio-Gefo-Aquolls complex, 2 to 30 percent slopes

Elevation: 6,200 to 6,800 feet Annual Precipitation: 35 to 50 inches

Typical Vegetation Lodgepole-Meadow/Willow series.

Soil Map Unit Components

Celio

Gefo

Aquolls

Proportion (percent)

55

15

15

GR-0251

Soil Profile Description

Surface Layer

0 to 12 inches; grayish brown gravelly sandy loam; weak granular structure; slightly acid.

0 to 15 inches; grayish brown loamy sand; weak granular structure; medium acid.

Thick and dark colored; stratified coarse sand to clay.

Subsoil

12 to 40 inches; light yellowish brown extremely gravelly loamy coarse sand; medium acid to strongly acid.

15 to 40 inches; pale brown loamy fine sand; massive; medium acid.

Stratified layers with mottles; sandy loam to clay; some are very gravelly.

Substratum

40 inches; extremely gravelly loamy coarse sand; weakly cemented with silica.

40 to 60 inches; pale brown loamy fine sand; massive; medium acid.

Stratified alluvium.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

40 to 60

40 to 60

10 to 30

Available Water Capacity Class

Very low

Low to moderate

Variable

AWC for top 20"

1.2-1.7

1.5-2.2

Permeability: Subsoil
Substratum

Rapid
Slow

Very rapid to rapid
Very rapid

Variable
Slow or very slow

Drainage Class

Somewhat excessively drained

Somewhat excessively drained

Very poorly drained

Max Erosion Hazard

High

High

High

Seedling Mortality

Severe to moderate

Moderate to slight

Severe

Revegetating Exposed Subsoil

Severe

Slight

Severe

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

5 LP
60 to 100

5 LP
60 to 100

Not capable
1,040 to 2,670

Soil Manageability

Group
Class

III
3pW

III
2p

III
4EW

Inclusions

Included in this unit are small areas of Tallac soils; soils similar to Celio which are well drained; loamy soils similar to Celio; soils similar to Gefo that are pachic; coarse-loamy soils with a hardpan above 20 inches; and soils similar to Woodseye in the Cisco Grove area. Included areas make up about 15 percent of the total area.

Management Considerations

Celio and Gefo soils have sandy textures, high amounts of rock fragments, and low cation exchange capacity (CEC). Celio soils have a cemented pan below 40 inches that holds a fluctuating water table near the surface in the spring and early summer. Gefo soils have a seasonal watertable. Aquolls have a high water table during most of the year, are susceptible to puddling, and are subject to flooding. Lodgepole pine is the adapted species.

CGF Chaix-Chawanakee-Hotaw complex, 30 to 50 percent slopes

Elevation: 2,000 to 4,000 feet Annual Precipitation: 40 to 60 inches

Typical Vegetation

Hardwoods-Mixed conifer series.

Soil Map Unit Components

Chaix

Chawanakee

Hotaw

Proportion (percent)

35

25

15

Soil Profile Description

Surface Layer

0 to 9 inches; grayish brown coarse sandy loam; weak granular structure; slightly acid.

0 to 5 inches; grayish brown coarse sandy loam; weak granular structure; slightly acid.

0 to 12 inches; brown loam; moderate granular structure; slightly acid.

Subsoil

9 to 29 inches; very pale brown coarse sandy loam; weak subangular blocky structure; slightly acid.

5 to 15 inches; very pale brown coarse sandy loam; massive; strongly acid.

12 to 34 inches; light yellowish brown sandy clay loam; moderate subangular blocky structure; medium acid.

Substratum

29 inches; weathered granodiorite.

15 inches; highly weathered granodiorite.

34 inches; weathered granitic rock.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

20 to 40

12 to 20

20 to 40

Available Water Capacity Class

Very low to low

Very low

Low to Moderate

AWC for top 20"

1.6-2.6

1.2-2.0

2.9-3.6

Permeability: Subsoil
Substratum

Moderately rapid
Moderately slow

Moderately rapid
Moderately slow

Moderately slow
Moderately slow

Drainage Class

Well drained

Somewhat excessively drained

Well drained

Max Erosion Hazard

High

Very high

Very high

Seedling Mortality

Severe to slight

Severe

Slight

Revegetating Exposed Subsoil

Moderate

Severe

Slight

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

5 DF, P
70 to 120

7 DF, P
20 to 80

3 DF, P
50 to 250

Soil Manageability

Group
Class

III
3Ep

III
3Ep

III
3E

Inclusions

Included in this unit are small areas of Holland soils; ridgetops with slopes of less than 30 percent; and Rock outcrop. Included areas make up about 25 percent of the total area.

Management Considerations

Steep slopes. Chaix and Hotaw soils are moderately deep. Chaix and Chawanakee soils have coarse textures, thin surface layers, and relatively low cation exchange capacity (CEC). Chawanakee soils are shallow and reach field capacity rapidly, which can produce surface runoff.

CHG Chawanakee-Chaix-Hotaw complex, 30 to 75 percent slopes

Elevation: 1,500 to 4,000 feet Annual Precipitation: 40 to 60 inches

Typical Vegetation

Hardwoods-Mixed conifer series.

Soil Map Unit Components

Chawanakee

Chaix

Hotaw

Proportion (percent)

60

15

15

Soil Profile Description

Surface Layer

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.

0 to 12 inches; brown loam; moderate 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.

12 to 34 inches; light yellowish brown sandy clay loam; moderate subangular blocky structure; medium acid.

Substratum

15 inches; highly weathered granodiorite.

29 inches; weathered granodiorite.

34 inches; weathered granitic rock.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

12 to 20

20 to 40

20 to 40

Available Water Capacity Class

Very low

Very low to low

Low to moderate

AWC for top 20"

1.2-2.0

1.6-2.6

2.9-3.6

Permeability: Subsoil
Substratum

Moderately rapid
Moderately slow

Moderately rapid
Moderately slow

Moderately slow
Moderately slow

Drainage Class

Somewhat excessively drained

Well drained

Well drained

Max Erosion Hazard

Very high

High

Very high

Seedling Mortality

Severe

Severe to slight

Slight

Revegetating Exposed Subsoil

Severe

Slight

Slight

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

7 DF, P
70 to 120

5 DF, P
20 to 80

3 DF, P
50 to 240

Soil Manageability

Group
Class

IV
4Edp

IV
4Ep

IV
4E

Inclusions

Included in this unit are small areas of granitic Rock outcrop; eroded areas of Chaix and Chawanakee soils; soils similar to Chaix but with a mollic epipedon; and soils similar to Holland but with a thermic soil temperature regime. Included areas make up about 10 percent of the total area.

Management Considerations

Steep and very steep slopes. Chaix and Hotaw soils are moderately deep. Chaix and Chawanakee soils have coarse textures, thin surface layers, and relatively low cation exchange capacity (CEC). Chawanakee soils are shallow and reach field capacity rapidly, which can produce surface runoff.

CIF Cinder land-Sierraville-Kyburz complex, 30 to 50 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 30 to 40 inches

Typical Vegetation

Mixed conifer-Barren series; Mixed conifer-Mixed brush series.

Soil Map Unit Components

Cinder land **Sierraville** **Kyburz**

Proportion (percent)

40 20 15

Soil Profile Description

Surface Layer

| | | |
|--|--|---|
| Blister cones and cinder cones consisting of scoria, rock outcrop, and soil material in cracks and crevices. | 0 to 9 inches; reddish brown stony sandy loam; moderate granular 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. | 6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid. |
|--|---|

Substratum

| | |
|---|--------------------------------------|
| 75 inches; slightly weathered andesite. | 34 inches; weathered andesitic rock. |
|---|--------------------------------------|

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

| | |
|----------|----------|
| 40 to 60 | 20 to 40 |
|----------|----------|

Available Water Capacity Class

| | |
|-------------|-----|
| Low to high | Low |
|-------------|-----|

AWC for top 20"

| | |
|---------|---------|
| 2.4-2.8 | 2.2-2.7 |
|---------|---------|

Permeability: Subsoil
Substratum

| | |
|-----------------|-----------------|
| Moderately slow | Moderately slow |
| Moderately slow | Moderately slow |

Drainage Class

| | |
|--------------|--------------|
| Well drained | Well drained |
|--------------|--------------|

Max Erosion Hazard

| | |
|------|------|
| High | High |
|------|------|

Seedling Mortality

| | |
|--------|--------|
| Slight | Slight |
|--------|--------|

Revegetating Exposed Subsoil

| | |
|--------|--------|
| Slight | Slight |
|--------|--------|

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

| | |
|------------|------------|
| 4,5 P, WF | 5,6 P |
| 120 to 190 | 120 to 190 |

Soil Manageability

Group
Class

| | |
|-----|-----|
| III | III |
| 3eX | 2ep |

Inclusions

Included in this unit are small areas of Trojan soils and soils similar to Kyburz and Sierraville without argillic horizons. Included areas make up about 25 percent of the total area.

Management Considerations

Steep slopes. Relatively short growing season. Sierraville soils have stones in the surface layer and a subsoil with low strength when wet. Fugawee soils are moderately deep and have a thin surface layer. Cinder land is a potential aggregate source.

CKE Chaix Variant-Rock outcrop-Cryumbrepts, wet complex, 2 to 30 percent slopes

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

Typical Vegetation

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

Soil Map Unit Components

Chaix Variant Rock outcrop Cryumbrepts, wet

Proportion (percent)

40 20 15

Soil Profile Description

Surface Layer

0 to 10 inches; reddish yellow gravelly sandy 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

10 to 22 inches; yellow sandy loam; massive; very strongly acid.

Substratum

22 inches; highly weathered granodiorite. 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"

1.4-2.3

Permeability: Subsoil Substratum

Moderately rapid Moderately slow Moderately rapid 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 Annual Forage (lbs/acre)

4,3 P, WF Not capable
50 to 240 170 to 640

Soil Manageability

Group Class

III III
3Ed 4EW

Inclusions

Included in this unit are small areas of Chaix, Hotaw, and Hotaw Variant soils; soils similar to Chaix Variant but with more than 35 percent rock fragments; and soils similar to Hotaw Variant but with coarse sandy loam subsoils. Included areas make up about 25 percent of the total area.

Management Considerations

Chaix Variant soils are moderately deep, have coarse textures, thin surface layers, relatively low cation exchange capacity (CEC), and a very acid subsoil. Cryumbrepts, wet have a high watertable most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet. Rock outcrop areas are a potential aggregate source and produce concentrated surface runoff that can increase erosion on adjacent soils.

CKF Chaix Variant-Rock outcrop-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 brush-Alder/Willow series.

Soil Map Unit Components

Chaix Variant

Rock outcrop

Cryumbrepts, wet

Proportion (percent)

40

20

15

Soil Profile Description

Surface Layer

0 to 10 inches; reddish yellow gravelly sandy 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

10 to 22 inches; yellow sandy loam; massive; very strongly acid.

Substratum

22 inches; highly weathered granodiorite.

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"

1.4-2.3

Permeability: Subsoil Substratum

Moderately rapid
Moderately slow

Moderately rapid
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
Annual Forage (lbs/acre)

4,3 P, WF
50 to 240

Not capable
170 to 640

Soil Manageability

Group
Class

III
3Ed

III
4EW

Inclusions

Included in this unit are small areas of Chaix, Hotaw, and Hotaw Variant soils; soils similar to Chaix Variant but with more than 35 percent rock fragments; soils similar to Hotaw Variant but with coarse sandy loam subsoils. Included areas make up about 25 percent of the total area.

Management Considerations

Steep slopes. Chaix Variant soils are moderately deep, have coarse textures, thin surface layers, relatively low cation exchange capacity (CEC), and a very acid subsoil. 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. Rock outcrop areas are a potential aggregate source and produce concentrated surface runoff that can increase erosion on adjacent soils.

COE Cohasset-Aiken-Crozier complex, 2 to 30 percent slopes

Elevation: 2,000 to 4,500 feet Annual Precipitation: 55 to 65 inches

Typical Vegetation Mixed conifer series.

| Soil Map Unit Components | Cohasset | Aiken | Crozier |
|--------------------------|----------|-------|---------|
| Proportion (percent) | 55 | 20 | 15 |

Soil Profile Description

| | Cohasset | Aiken | Crozier |
|---------------|---|---|---|
| Surface Layer | 0 to 12 inches; brown loam; moderate granular structure; slightly acid. | 0 to 10 inches; brown and reddish brown loam; weak granular and subangular blocky structure; neutral. | 0 to 15 inches; brown loam; moderate granular structure; slightly acid. |
| Subsoil | 12 to 61 inches; yellowish red clay loam; weak angular blocky structure; slightly acid. | 10 to 22 inches; reddish brown loam; weak subangular blocky structure; slightly acid. | 15 to 38 inches; yellowish red gravelly clay loam; weak subangular blocky structure; medium acid. |
| Substratum | 61 inches; weathered andesitic conglomerate. | 22 to 70 inches; red and strong brown clay; massive; medium acid to strongly acid. | 38 inches; weathered andesitic tuff breccia. |

Soil Properties & Management Interpretations

| | Cohasset | Aiken | Crozier |
|----------------------------------|------------------|------------------|-----------------|
| Effective Rooting Depth (inches) | 40 to 80 | 60 to 90 | 20 to 40 |
| Available Water Capacity Class | Moderate to high | Moderate to high | Low to moderate |
| AWC for top 20" | 2.6-3.4 | 2.6-3.4 | 2.6-3.4 |
| Permeability: Subsoil | Moderately slow | Slow | Moderately slow |
| Permeability: Substratum | Slow | Slow | Moderately slow |
| Drainage Class | Well drained | Well drained | Well drained |
| Max Erosion Hazard | Moderate | Moderate | Moderate |
| Seedling Mortality | Slight | Slight | Slight |
| Revegetating Exposed Subsoil | Slight | Slight | Slight |
| Soil Productivity | | | |
| Forest Survey Site Class | 1,2 DF, P | 1,2 DF, P | 2,3 DF, P |
| Annual Forage (lbs/acre) | 240 to 640 | 240 to 640 | 50 to 440 |
| Soil Manageability | | | |
| Group | II | II | II |
| Class | 2e | 2e | 2e |

Inclusions Included in this unit are small areas of McCarthy soils and, in the area of Derbec Spring, soils similar to Cohasset with a dark surface layer and brown colors in the subsoil. Included areas make up about 10 percent of the total area.

Management Considerations Aiken soils have low subsoil strength when wet. Crozier soils are moderately deep.

COE5 Cohasset-Aiken-Crozier complex, 2 to 30 percent slopes, altered

Elevation: 2,000 to 4,500 feet Annual Precipitation: 55 to 65 inches

Typical Vegetation

Plantations.

Soil Map Unit Components

Cohasset, altered

Aiken, altered

Crozier, altered

Proportion (percent)

55

20

15

Soil Profile Description

Surface Layer

0 to 12 inches; brown loam; massive; neutral.

0 to 8 inches; yellowish red loam; massive; neutral.

0 to 3 inches; brown loam; massive; slightly acid.

Subsoil

12 to 65 inches; yellowish red gravelly clay loam; massive; slightly acid.

8 to 46 inches; red clay; moderate subangular blocky structure; neutral.

3 to 38 inches; yellowish red clay loam; weak subangular blocky structure; medium acid.

Substratum

65 inches; weathered mudflow.

46 inches; highly weathered tuff breccia mudflow.

38 inches; weathered tuff breccia.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

40 to 80

60 to 90

20 to 40

Available Water Capacity Class

Low to moderate

Low to moderate

Low to moderate

AWC for top 20"

2.8-3.5

2.9-3.4

2.6-3.3

Permeability: Subsoil Substratum

Moderately slow Slow

Slow Slow

Moderately slow Moderately slow

Drainage Class

Well drained

Well drained

Well drained

Max Erosion Hazard

High

High

High

Seedling Mortality

Slight

Slight

Slight

Revegetating Exposed Subsoil

Slight

Slight

Slight

Soil Productivity

Forest Survey Site Class Annual Forage (lbs/acre)

Not rated Not rated

Not rated Not rated

Not rated Not rated

Soil Manageability

Group Class

IV 4e

IV 4e

IV 4e

Inclusions

Included in this unit are small areas of unaltered Aiken, Cohasset, and Crozier soils and areas of a shallow soil which is a heavily altered Crozier. Included areas make up about 10 percent of the total area.

Management Considerations

Surface layers in this map unit have been disturbed. On-site investigations are needed to determine if corrective treatments are needed. Aiken soils have low subsoil strength when wet. Crozier soils are moderately deep.

CRB Aldi Variant-Martis Variant-Aquolls complex, 2 to 5 percent slopes

Elevation: 5,500 to 6,300 feet Annual Precipitation: 25 to 35 inches

Typical Vegetation

Sagebrush/Bitterbrush-Meadow/Willow series.

Soil Map Unit Components

Aldi Variant **Martis Variant** **Aquolls**

Proportion (percent)

35 25 15

Soil Profile Description

Surface Layer

0 to 8 inches; dark grayish brown cobbly sandy loam; moderate granular structure; neutral. 0 to 10 inches; dark grayish brown gravelly loam; moderate granular structure; medium acid. Thick and dark colored; stratified coarse sand to clay.

Subsoil

8 to 32 inches; brown clay; massive; neutral. 10 to 51 inches; brownish yellow extremely gravelly sandy clay loam; massive; neutral. Stratified layers with mottles; sandy loam to clay; some are very gravelly.

Substratum

32 inches; lake sediments. Stratified alluvium.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

20 to 40 18 to 26 10 to 30

Available Water Capacity Class

Low Very low to low Variable

AWC for top 20"

2.5-3.1 1.8-2.3

Permeability: Subsoil Substratum

Slow Slow Rapid over slow Rapid Variable Slow and very slow

Drainage Class

Well drained Well drained Very poorly drained

Max Erosion Hazard

Moderate Moderate High

Seedling Mortality

Slight Moderate Severe

Revegetating Exposed Subsoil

Slight Moderate Severe

Soil Productivity

Forest Survey Site Class Annual Forage (lbs/acre)

Not capable 190 to 250 Not capable 120 to 190 Not capable 1,040 to 2,670

Soil Manageability

Group Class

III 3eX III 2p III 4EW

Inclusions

Included in this unit are small areas of Borolls and Kyburz soils. Included areas make up about 25 percent of the total area.

Management Considerations

Short growing season. Aldi Variant soils have a shallow effective rooting depth because of a dense clay subsoil and they have very low subsoil strength when wet. The subsoil tends to perch water during spring and the soils reach field capacity rapidly and can produce surface runoff. Martis Variant soils are moderately deep, have a dense subsoil which restricts roots, are susceptible to puddling in the spring, have high amounts of rock fragments, and have a coarse textured surface layer. Aquolls have a high water table during most of the year, are susceptible to puddling, and are subject to flooding.

✓ **CRE Aldi Variant-Kyburz-Jorge Variant complex, 2 to 30 percent slopes**

Elevation: 5,500 to 6,400 feet Annual Precipitation: 25 to 30 inches

Typical Vegetation Sagebrush/Bitterbrush-Jeffrey/Ponderosa series.

| Soil Map Unit Components | Aldi Variant | Kyburz | Jorge Variant |
|--------------------------|--------------|--------|---------------|
| Proportion (percent) | 50 | 20 | 20 |

Soil Profile Description

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

Soil Properties & Management Interpretations

| | Aldi Variant | Kyburz | Jorge Variant |
|----------------------------------|--------------|-----------------|--------------------|
| Effective Rooting Depth (inches) | 20 to 40 | 20 to 40 | 20 to 40 |
| Available Water Capacity Class | Low | Low | Low |
| AWC for top 20" | 2.5-3.1 | 2.2-2.7 | 1.7-2.3 |
| Permeability: Subsoil | Slow | Moderately slow | Moderate |
| Substratum | Slow | Moderate | 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 capable | 5 P | 5,6 P |
| Annual Forage (lbs/acre) | 190 to 250 | 120 to 190 | 120 to 190 |
| Soil Manageability | | | |
| Group | III | III | III |
| Class | 3eX | 2ep | 2ep |

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

Management Considerations Aldi Variant soils have a shallow effective rooting depth because of a dense clay subsoil and they have very low subsoil strength when wet. The subsoil tends to perch water during the spring and the reach field capacity rapidly and can produce surface runoff. Jorge Variant soils are moderately deep and have a high amount of rock fragments.

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

Elevation: 5,500 to 6,400 feet Annual Precipitation: 20 to 30 inches

Typical Vegetation Sagebrush/Bitterbrush-Jeffrey/Ponderosa series.

| Soil Map Unit Components | Aldi Variant | Kyburz | Jorge Variant |
|--------------------------|---------------------|---------------|----------------------|
| Proportion (percent) | 55 | 20 | 15 |

Soil Profile Description

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

Soil Properties & Management Interpretations

| | Aldi Variant | Kyburz | Jorge Variant |
|----------------------------------|---------------------|-----------------|----------------------|
| Effective Rooting Depth (inches) | 20 to 40 | 20 to 40 | 20 to 40 |
| Available Water Capacity Class | Low | Low | Low |
| AWC for top 20" | 2.5-3.1 | 2.2-2.7 | 1.7-2.3 |
| Permeability: Subsoil | Slow | Moderately slow | Moderate |
| Substratum | Slow | Moderately slow | Moderately rapid |
| Drainage Class | Well drained | Well drained | Well drained |
| Max Erosion Hazard | High | High | High |
| Seedling Mortality | Slight | Slight | Slight |
| Revegetating Exposed Subsoil | Moderate | Slight | Slight |
| Soil Productivity | | | |
| Forest Survey Site Class | Not capable | 5 P | 5,6 P |
| Annual Forage (lbs/acre) | 190 to 250 | 120 to 190 | 120 to 190 |
| Soil Manageability | | | |
| Group | IV | IV | IV |
| Class | 4EX | 3Ep | 3Ep |

Inclusions Included in this unit are small areas of soils without argillic horizons and shallow soils. Included areas make up about 10 percent of the total area.

Management Considerations Steep slopes. Aldi Variant soils have a shallow effective rooting depth because of a dense clay subsoil and the subsoil strength is very low when wet. The subsoil tends to perch water during the spring and the soils reach field capacity rapidly and can produce surface runoff. Jorge Variant soils have a high amount of rock fragments.

CSE5 Crozier-Cohasset complex, 2 to 30 percent slopes, altered

Elevation: 2,000 to 5,000 feet Annual Precipitation: 55 to 70 inches

Typical Vegetation

Plantations.

Soil Map Unit
Components

Crozier, altered

Cohasset, altered

Proportion (percent)

60

25

Soil Profile Description

Surface Layer

0 to 3 inches; brown loam; massive; slightly acid.

0 to 12 inches; brown loam; massive; neutral.

Subsoil

3 to 38 inches; yellowish red clay loam; weak subangular blocky structure; medium acid.

12 to 65 inches; yellowish red gravelly clay loam; massive; slightly acid.

Substratum

38 inches; weathered tuff breccia.

65 inches; weathered mudflow.

Soil Properties & Management Interpretations

Effective Rooting
Depth (inches)

20 to 40

40 to 86

Available Water
Capacity Class

Low to moderate

Low to moderate

AWC for top 20"

2.6-3.3

2.8-3.5

Permeability: Subsoil
Substratum

Moderately slow
Moderately slow

Moderately slow
Slow

Drainage Class

Well drained

Well drained

Max Erosion Hazard

High

High

Seedling Mortality

Slight

Slight

Revegetating Exposed
Subsoil

Slight

Slight

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

Not rated
Not rated

Not rated
Not rated

Soil Manageability

Group
Class

IV
4e

IV
4e

Inclusions

Included in this unit are small areas of McCarthy and Aiken soils. Included areas make up about 15 percent of the total area.

Management
Considerations

Soils in this map unit have been disturbed. On-site investigations are needed to determine if corrective treatments are needed. Crozier soils are moderately deep.

✓ **CSF6 Crozier-Cohasset complex, 30 to 50 percent slopes, terraced**

Elevation: 2,000 to 5,000 feet Annual Precipitation: 55 to 65 inches

Typical Vegetation

Plantations.

Soil Map Unit Components

Crozier, terraced

Cohasset, terraced

Proportion (percent)

60

25

Soil Profile Description

Surface Layer

0 to 6 inches; strong brown loam; moderate granular structure; slightly acid.

0 to 8 inches; brown sandy loam; weak granular structure; slightly acid.

Subsoil

6 to 38 inches; red clay loam; weak subangular blocky structure; medium acid.

8 to 42 inches; reddish brown clay loam; weak subangular blocky structure; medium acid.

Substratum

38 inches; weathered tuff breccia.

42 inches; weathered mudflow.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

20 to 40

40 to 80

Available Water Capacity Class

Low to moderate

Low to moderate

AWC for top 20"

3.1-3.6

2.7-3.3

Permeability: Subsoil Substratum

Moderately slow
Moderately slow

Moderately slow
Slow

Drainage Class

Well drained

Well drained

Max Erosion Hazard

High

High

Seedling Mortality

Slight

Slight

Revegetating Exposed Subsoil

Slight

Slight

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

Not rated
Not rated

Not rated
Not rated

Soil Manageability

Group
Class

IV
4e

IV
4e

Inclusions

Included in this unit are small areas of McCarthy and Aiken soils on mudflow material and Hurlbut and Jocal soils on metasedimentary material. Included areas make up about 15 percent of the total area.

Management Considerations

Steep slopes. These areas have been terraced. On-site investigations are necessary to determine if corrective treatment is needed. Crozier soils are moderately deep.

✓ **CTE Crozier-McCarthy-Cohasset complex, 2 to 30 percent slopes**

Elevation: 2,000 to 5,500 feet Annual Precipitation: 55 to 70 inches

Typical Vegetation

Mixed conifer-Mixed hardwood series.

Soil Map Unit Components

Crozier

McCarthy

Cohasset

Proportion (percent)

55

25

10

Soil Profile Description

Surface Layer

0 to 15 inches; brown loam; moderate granular structure; slightly acid.

0 to 15 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.

0 to 12 inches; brown loam; moderate granular structure; slightly acid.

Subsoil

15 to 38 inches; yellowish red gravelly clay loam; weak subangular blocky structure; medium acid.

15 to 28 inches; brown very gravelly sandy loam; weak subangular blocky structure; slightly acid.

12 to 61 inches; yellowish red clay loam; weak angular blocky structure; slightly acid.

Substratum

38 inches; weathered andesitic tuff breccia.

28 inches; weathered andesitic tuff breccia.

61 inches; weathered andesitic conglomerate.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

20 to 40

20 to 40

40 to 80

Available Water Capacity Class

Low to moderate

Low

Moderate to high

AWC for top 20"

2.6-3.4

2.3-2.6

2.6-3.4

Permeability: Subsoil Substratum

Moderately slow
Moderately slow

Moderately rapid
Moderately slow

Moderately slow
Slow

Drainage Class

Well drained

Well drained

Well drained

Max Erosion Hazard

Moderate

High

Moderate

Seedling Mortality

Slight

Moderate

Slight

Revegetating Exposed Subsoil

Slight

Slight

Slight

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

2,3 DF, P
50 to 440

4 DF, P
120 to 170

1,2 DF, P
240 to 640

Soil Manageability

Group
Class

II
2e

II
2ep

II
2e

Inclusions

Included in this unit are small areas of Aiken and Ledmount soils; Rock outcrop; Cryumbrepts, wet near Fir Cap and Deadwood Peak; and soils similar to Crozier but with umbric epipedons. Included areas make up about 10 percent of the total area.

Management Considerations

Crozier soils are moderately deep. McCarthy soils are moderately deep and have a high amount of rock fragments.

CTE5 Crozier-McCarthy-Cohasset complex, 2 to 30 percent slopes, altered

Elevation: 2,000 to 5,500 feet Annual Precipitation: 55 to 70 inches

Typical Vegetation

Plantations.

Soil Map Unit Components

Crozier, altered McCarthy, altered Cohasset, altered

Proportion (percent)

55 25 10

Soil Profile Description

Surface Layer

0 to 3 inches; brown loam; massive; slightly acid. 0 to 10 inches; brown gravelly sandy loam; moderate granular structure; neutral. 0 to 12 inches; brown loam; massive; neutral.

Subsoil

3 to 38 inches; yellowish red clay loam; weak subangular blocky structure; medium acid. 10 to 28 inches; brown very cobbly loam; weak subangular blocky structure; neutral. 12 to 65 inches; yellowish red gravelly clay loam; massive; slightly acid.

Substratum

38 inches; weathered tuff breccia. 28 inches; weathered tuff breccia. 65 inches; weathered mudflow.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

20 to 40 20 to 40 40 to 80

Available Water Capacity Class

Low to moderate Low Low to moderate

AWC for top 20"

2.6-3.3 2.6-3.0 2.8-3.5

Permeability: Subsoil Substratum

Moderately slow Moderately rapid Moderately slow
Moderately slow Moderately slow Slow

Drainage Class

Well drained Well drained Well drained

Max Erosion Hazard

High High High

Seedling Mortality

Slight Moderate Slight

Revegetating Exposed Subsoil

Slight Slight Slight

Soil Productivity

Not rated Not rated Not rated

Forest Survey Site Class
Annual Forage (lbs/acre)

Not rated Not rated Not rated

Soil Manageability

Group
Class

IV IV IV
4E 4Ep 4E

Inclusions

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

Management Considerations

Soils in this map unit have been disturbed. On-site investigations are needed to determine if corrective treatments are needed. Crozier soils are moderately deep. McCarthy soils are moderately deep and have a high amount of rock fragments.

CTG Crozier-McCarthy-Cohasset complex, 30 to 75 percent slopes

Elevation: 2,000 to 5,500 feet Annual Precipitation: 55 to 70 inches

Typical Vegetation Mixed conifer-Black oak series.

| Soil Map Unit Components | Crozier | McCarthy | Cohasset |
|--------------------------|----------------|-----------------|-----------------|
| Proportion (percent) | 50 | 25 | 10 |

Soil Profile Description

| Soil Profile Description | Crozier | McCarthy | Cohasset |
|--------------------------|---|---|---|
| Surface Layer | 0 to 15 inches; brown loam; moderate granular structure; slightly acid. | 0 to 15 inches; brown gravelly sandy loam; moderate granular structure; slightly acid. | 0 to 12 inches; brown loam; moderate granular structure; slightly acid. |
| Subsoil | 15 to 38 inches; yellowish red gravelly clay loam; weak subangular blocky structure; medium acid. | 15 to 28 inches; brown very gravelly sandy loam; weak subangular blocky structure; slightly acid. | 12 to 61 inches; yellowish red clay loam; weak angular blocky structure; slightly acid. |
| Substratum | 38 inches; weathered andesitic tuff breccia. | 28 inches; weathered andesitic tuff breccia. | 61 inches; weathered andesitic conglomerate. |

Soil Properties & Management Interpretations

| Soil Properties & Management Interpretations | Crozier | McCarthy | Cohasset |
|--|-----------------|------------------|------------------|
| Effective Rooting Depth (inches) | 20 to 40 | 20 to 40 | 40 to 80 |
| Available Water Capacity Class | Low to moderate | Low | Moderate to high |
| AWC for top 20" | 2.6-3.4 | 2.3-2.6 | 2.3-2.6 |
| Permeability: Subsoil | Moderately slow | Moderately rapid | Moderately slow |
| Permeability: Substratum | Moderately slow | Moderately slow | Slow |
| Drainage Class | Well drained | Well drained | Well drained |
| Max Erosion Hazard | High | High | High |
| Seedling Mortality | Slight | Moderate | Slight |
| Revegetating Exposed Subsoil | Slight | Moderate | Slight |
| Soil Productivity | | | |
| Forest Survey Site Class | 2,3 DF, P | 3,4 DF, P | 1,2 DF, P |
| Annual Forage (lbs/acre) | 50 to 440 | 120 to 170 | 240 to 640 |
| Soil Manageability | | | |
| Group | IV | IV | IV |
| Class | 4E | 4Ep | 4E |

Inclusions Included in this unit are small areas of Aiken and Ledmount soils; Rock outcrop; and soils similar to Cohasset but with umbric epipedons. Included areas make up about 15 percent of the total area.

Management Considerations Steep and very steep slopes. Crozier soils are moderately deep. McCarthy soils are moderately deep and have a high amount of rock fragments.

✓

CYD Cryumbrepts, wet, 2 to 15 percent slopes

Elevation: 3,800 to 8,000 feet Annual Precipitation: 30 to 70 inches

Typical Vegetation

Alder series; Meadow/Willow series.

Soil Map Unit
Components**Cryumbrepts, wet**

Proportion (percent)

85

Soil Profile Description

Surface Layer

Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.

Subsoil

Substratum

Stratified loam to clay loam with dark colored mottles; gravelly, cobbly, or stony.

Soil Properties & Management InterpretationsEffective Rooting
Depth (inches)

Variable

Available Water
Capacity Class

Very low

AWC for top 20"

Permeability: Subsoil
SubstratumModerately rapid
Very slow

Drainage Class

Poorly drained

Max Erosion Hazard

Very high

Seedling Mortality

Severe

Revegetating Exposed
Subsoil

Severe

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)Not capable
170 to 640

Soil Manageability

Group
ClassIV
4EW

Inclusions

Included in this unit are small areas of moderately well drained soils; soils with histic epipedons; and soils with a mesic or frigid temperature regime. Included areas make up about 15 percent of the total area.

Management
Considerations

These soils have a high water table most of the year, are susceptible to puddling, and often have impermeable layers between 1 and 2 feet.

DEG Deadwood-Rock outcrop-Hurlbut complex, 30 to 75 percent slopes

Elevation: 2,000 to 5,000 feet Annual Precipitation: 60 to 65 inches

Typical Vegetation Live oak series; Mixed conifer series.

| Soil Map Unit Components | Deadwood | Rock outcrop | Hurlbut |
|--------------------------|-----------------|---------------------|----------------|
| Proportion (percent) | 50 | 25 | 15 |

Soil Profile Description

| | | | |
|---------------|---|-----------------------|--|
| Surface Layer | 0 to 3 inches; dark gray very gravelly sandy loam; weak subangular blocky structure; medium acid. | Metasedimentary rock. | 0 to 4 inches; reddish yellow gravelly loam; moderate subangular blocky and granular structure; medium acid. |
| Subsoil | 3 to 13 inches; light yellowish brown extremely gravelly sandy loam; weak subangular blocky structure; medium acid. | | 4 to 27 inches; reddish yellow silt loam; weak angular blocky structure; medium acid. |
| Substratum | 13 inches; hard metasedimentary rock. | | 27 inches; weathered metasedimentary rock. |

Soil Properties & Management Interpretations

| | | | |
|---|------------------------------|--|-----------------------------|
| Effective Rooting Depth (inches) | 10 to 20 | | 20 to 40 |
| Available Water Capacity Class | Very low | | Very low to low |
| AWC for top 20" | 0.4-0.7 | | 2.1-2.8 |
| Permeability: Subsoil Substratum | Moderately rapid Slow | | Moderate Moderately slow |
| Drainage Class | Somewhat excessively drained | | Well drained |
| Max Erosion Hazard | High | | High |
| Seedling Mortality | Severe | | Moderate to slight |
| Revegetating Exposed Subsoil | Severe | | Moderate |
| Soil Productivity Forest Survey Site Class Annual Forage (lbs/acre) | Not capable 20 to 80 | | 5,6 P, DF 20 to 120 |
| Soil Manageability Group Class | IV 4EP | | IV 3Ep |

Inclusions Included in this unit are small areas of soils similar to Hurlbut but with more than 35 percent rock fragments; soils similar to Jocal but with more than 35 percent rock fragments; and very gravelly colluvial soils without argillic horizons. Included areas make up about 10 percent of the total area.

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

DLE Delleker-Kyburz-Trojan complex, 2 to 30 percent slopes

Elevation: 4,800 to 5,400 feet Annual Precipitation: 15 to 26 inches

Typical Vegetation

Sagebrush/Bitterbrush-Mixed conifer series.

Soil Map Unit Components

Delleker

Kyburz

Trojan

Proportion (percent)

50

20

20

Cb-s/

Soil Profile Description

St-s/

Surface Layer

0 to 12 inches; grayish brown sandy loam; moderate platy structure; slightly acid.

0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid.

0 to 10 inches; dark brown gravelly sandy loam; weak platy structure; slightly acid.

Subsoil

12 to 46 inches; light brown 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.

10 to 67 inches; brown and light brown clay loam; moderate angular blocky structure; medium acid.

Substratum

46 to 50 inches; very pale brown loam; massive; medium acid.

34 inches; weathered andesitic rock.

67 inches; slightly fractured andesite.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

40 to 70

20 to 40

40 to 80

Available Water Capacity Class

Low to moderate

Low

Low to moderate

AWC for top 20"

2.2-2.9

2.2-2.7

1.8-2.5

Permeability: Subsoil
Substratum

Moderate
Moderate

Moderately slow
Moderately slow

Moderately slow
Moderately slow

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
Annual Forage (lbs/acre)

4,5 P, WF
120 to 190

5,6 P, WF
120 to 190

4,5 P, WF
190 to 250

Soil Manageability

Group
Class

II
2ep

II
2ep

II
2ep

Inclusions

Included in this unit are small areas of Sattley soils; soils similar to Delleker, Kyburz, and Trojan but with thinner A horizons; and similar soils with a coarse-loamy argillic horizon. Included areas make up about 10 percent of the total area.

Management Considerations

Relatively short growing season. Delleker soils have thin surface layers. Kyburz soils are moderately deep and have thin surface layers.

ETE Euer-Aquolls-Martis Variant complex, 2 to 30 percent slopes

Elevation: 5,000 to 6,500 feet Annual Precipitation: 25 to 30 inches

Typical Vegetation Jeffrey/Ponderosa-Sagebrush/Bitterbrush series.

| Soil Map Unit Components | Euer | Aquolls | Martis Variant |
|--------------------------|-------------|----------------|-----------------------|
| Proportion (percent) | 50 | 15 | 15 |

Soil Profile Description

| | | | |
|---------------|---|---|---|
| Surface Layer | 0 to 15 inches; brown sandy loam; moderate granular structure; slightly acid. | Thick and dark colored; stratified coarse sand to clay. | 0 to 10 inches; dark grayish brown gravelly loam; moderate granular structure; medium acid. |
| Subsoil | 15 to 47 inches; yellowish brown very gravelly sandy clay loam; massive; slightly acid. | Stratified layers with mottles; sandy loam to clay; some are very gravelly. | 10 to 51 inches; brownish yellow extremely gravelly sandy clay loam; massive; neutral. |
| Substratum | 47 to 65 inches; brownish yellow extremely gravelly sandy loam; massive; medium acid. | Stratified alluvium. | |

Soil Properties & Management Interpretations

| | | | |
|----------------------------------|--------------------|---------------------|-----------------|
| Effective Rooting Depth (inches) | 40 to 60 | 10 to 30 | 18 to 26 |
| Available Water Capacity Class | Very low to low | Variable | Very low to low |
| AWC for top 20" | 2.0-2.5 | | 1.8-2.3 |
| Permeability: Subsoil | Moderate | Variable | Rapid over slow |
| Substratum | Rapid | Slow and very slow | Rapid |
| Drainage Class | Well drained | Very poorly drained | Well drained |
| Max Erosion Hazard | High | High | High |
| Seedling Mortality | Moderate to slight | Severe | Moderate |
| Revegetating Exposed Subsoil | Slight | Severe | Moderate |
| Soil Productivity | | | |
| Forest Survey Site Class | 6,5 P | Not capable | Not capable |
| Annual Forage (lbs/acre) | 120 to 190 | 1,040 to 2,670 | 120 to 190 |
| Soil Manageability | | | |
| Group | II | II | II |
| Class | 2ep | 4EW | 2ep |

Inclusions Included in this unit are small areas of Aldi Variant, Borolls, Kyburz, and Martis soils, and areas where slopes are 30 to 50 percent. Included areas make up about 20 percent of the total area.

Management Considerations Short growing season. Euer soils have a high amount of rock fragments. The substratum is a potential gravel source. Martis Variant soils are moderately deep to a root limiting, dense subsoil, are susceptible to puddling in the spring, have a high amount of rock fragments, and have a coarse textured surface layer. Aquolls have a high water table during most of the year, are susceptible to puddling, and are subject to flooding.

EUB Euer-Martis Variant complex, 2 to 5 percent slopes

Elevation: 5,500 to 6,300 feet Annual Precipitation: 25 to 35 inches

Typical Vegetation

Jeffrey/Ponderosa-Sagebrush/Bitterbrush series; Sagebrush/Bitterbrush-Jeffrey/Ponderosa series.

Soil Map Unit
Components

Euer

Martis Variant

Proportion (percent)

55

35

Soil Profile Description

Surface Layer

0 to 15 inches; brown sandy loam; moderate granular structure; slightly acid.

0 to 10 inches; dark grayish brown gravelly loam; moderate granular structure; medium acid.

Subsoil

15 to 47 inches; yellowish brown very gravelly sandy clay loam; massive; slightly acid.

10 to 51 inches; brownish yellow extremely gravelly sandy clay loam; massive; neutral.

Substratum

47 to 65 inches; brownish yellow extremely gravelly sandy loam; massive; medium acid.

Soil Properties & Management Interpretations

Effective Rooting
Depth (inches)

40 to 60

18 to 26

Available Water
Capacity Class

Very low to low

Very low to low

AWC for top 20"

2.0-2.5

1.8-2.3

Permeability: Subsoil
Substratum

Moderate
Rapid

Rapid over slow
Rapid

Drainage Class

Well drained

Well drained

Max Erosion Hazard

Moderate

Moderate

Seedling Mortality

Moderate to slight

Moderate

Revegetating Exposed
Subsoil

Slight

Moderate

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

6,5 P
120 to 190

Not capable
120 to 190

Soil Manageability

Group
Class

II
2p

II
2p

Inclusions

Included in this unit are small areas of Kyburz and Martis soils. Included areas make up about 10 percent of the total area.

Management
Considerations

Short growing season. Euer soils have a high amount of rock fragments. The substratum is a potential gravel source. Martis Variant soils are moderately deep to a root limiting, dense subsoil, are susceptible to puddling in the spring, have a high amount of rock fragments, and have a coarse textured surface layer.

EVB Inville-Martis Variant complex, 2 to 5 percent slopes

Elevation: 5,500 to 6,300 feet Annual Precipitation: 25 to 35 inches

Typical Vegetation

Sagebrush/Bitterbrush series.

Soil Map Unit Components

Inville

Martis Variant

Proportion (percent)

60

25

S1-Cos/

Soil Profile Description

Surface Layer

0 to 6 inches; grayish brown cobbly coarse sandy loam; weak granular structure; strongly acid.

0 to 10 inches; dark grayish brown gravelly loam; moderate granular structure; medium acid.

Subsoil

6 to 30 inches; yellowish brown very cobbly coarse sandy loam; weak subangular blocky structure; medium acid.

10 to 51 inches; brownish yellow extremely gravelly sandy clay loam; massive; neutral.

Substratum

30 to 60 inches; yellowish brown extremely cobbly coarse sandy loam; weak subangular blocky structure; medium acid.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

30 to 40

18 to 26

Available Water Capacity Class

Very low

Very low to low

AWC for top 20"

0.9-1.4

1.8-2.3

Permeability: Subsoil
Substratum

Moderately rapid
Rapid

Rapid over slow
Rapid

Drainage Class

Well drained

Well drained

Max Erosion Hazard

Moderate

Moderate

Seedling Mortality

Severe to moderate

Moderate

Revegetating Exposed Subsoil

Moderate

Moderate

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

Not capable
60 to 120

Not capable
120 to 190

Soil Manageability

Group
Class

III
3pX

III
2p

Inclusions

Included in this unit are small areas of Euer soils, riverwash, and soils without argillic horizons. Included areas make up about 15 percent of the total area.

Management Considerations

Short growing season. Inville soils are moderately deep, have coarse textures, have high amounts of rock fragments, and have a thin surface layer. The substratum is a potential gravel source. Martis Variant soils are moderately deep to a root limiting, dense subsoil, are susceptible to puddling in the spring, have a high amount of rock fragments, and have a coarse textured surface layer.

EWB Inville-Riverwash-Aquolls complex, 2 to 5 percent slopes

Elevation: 5,500 to 6,300 feet Annual Precipitation: 25 to 35 inches

Typical Vegetation Sagebrush/Bitterbrush-Meadow/Willow series.

| Soil Map Unit Components | Inville | Riverwash | Aquolls |
|--------------------------|---------|-----------|---------|
| Proportion (percent) | 55 | 20 | 15 |

st. cos/ **Soil Profile Description**

| | | | |
|---------------|---|---|---|
| Surface Layer | 0 to 6 inches; grayish brown cobbly coarse sandy loam; weak granular structure; strongly acid. | Stony, cobbly, gravelly fluvial material along streams and waterways. | Thick and dark colored; stratified coarse sand to clay. |
| Subsoil | 6 to 30 inches; yellowish brown very cobbly coarse sandy loam; weak subangular blocky structure; medium acid. | | Stratified layers with mottles; sandy loam to clay; some are very gravelly. |
| Substratum | 30 to 60 inches; yellowish brown extremely cobbly coarse sandy loam; weak subangular blocky structure; medium acid. | | Stratified alluvium. |

Soil Properties & Management Interpretations

| | | |
|----------------------------------|--|---------------------|
| Effective Rooting Depth (inches) | 30 to 40 | 10 to 30 |
| Available Water Capacity Class | Very low | Variable |
| AWC for top 20" | 0.9-1.4 | |
| Permeability: Subsoil | Moderately rapid | Variable |
| Substratum | Rapid | Slow and very slow |
| Drainage Class | Well drained | Very poorly drained |
| Max Erosion Hazard | Moderate | High |
| Seedling Mortality | Severe to moderate | Severe |
| Revegetating Exposed Subsoil | Moderate | Severe |
| Soil Productivity | | |
| Forest Survey Site Class | Not capable | Not capable |
| Annual Forage (lbs/acre) | 60 to 120 | 1,040 to 2,670 |
| Soil Manageability | | |
| Group | IV | IV |
| Class | 4EpX | 4EW |
| Inclusions | Included in this unit are small areas of Borolls and soils without argillic horizons. Included areas make up about 10 percent of the total area. | |
| Management Considerations | Inville soils are moderately deep, have coarse textures, have high amounts of rock fragments, and have a thin surface layer. The substratum is a potential gravel source. Riverwash areas are a potential aggregate source and are subject to flooding. Aquolls have a high water table during most of the year, are susceptible to puddling, and are subject to flooding. | |

✓ **EXE Lorack Variant gravelly loam, 2 to 30 percent slopes**

Elevation: 5,500 to 6,500 feet Annual Precipitation: 30 to 45 inches

Typical Vegetation Mixed conifer series; Jeffrey/Ponderosa series.

Soil Map Unit **Lorack Variant gravelly loam**

Components
Proportion (percent) 85

Soil Profile Description

Surface Layer 0 to 7 inches; brown gravelly loam; weak granular structure; neutral.

Subsoil 7 to 25 inches; dark brown very gravelly clay loam; weak subangular blocky structure; neutral.

Substratum 25 to 36 inches; brown extremely gravelly sandy loam; massive; slightly acid; over weakly cemented till.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches) 33 to 40

Available Water Capacity Class Very low to low

AWC for top 20" 2.1-2.5

Permeability: Subsoil Moderately slow
Substratum Very slow

Drainage Class Moderately well drained

Max Erosion Hazard High

Seedling Mortality Slight

Revegetating Exposed Subsoil Moderate

Soil Productivity
Forest Survey Site Class 3,4 P, WF
Annual Forage (lbs/acre) 50 to 240

Soil Manageability
Group II
Class 2ep

Inclusions Included in this unit are small areas of Tallac and Waca soils, and similar soils with umbric epipedons. Included areas make up about 15 percent of the total area.

Management Considerations These soils are moderately deep and have a high amount of rock fragments.

FFE Ponto Variant-Neer complex, 2 to 30 percent slopes

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

Typical Vegetation

Mixed conifer series; Mixed conifer-Mixed brush series.

Soil Map Unit
Components

Ponto Variant

Neer

Proportion (percent)

60

25

Soil Profile Description

Surface Layer

0 to 7 inches; gray sandy loam; massive; neutral.

0 to 6 inches; pale brown extremely gravelly sandy loam; moderate granular structure; slightly acid.

Subsoil

7 to 22 inches; gray fine sandy loam; moderate angular blocky structure; slightly acid.

6 to 29 inches; very pale brown extremely gravelly sandy loam; massive; medium acid.

Substratum

22 inches; highly weathered rhyolitic tuff.

29 inches; weathered rhyolitic tuff.

Soil Properties & Management Interpretations

Effective Rooting
Depth (inches)

20 to 40

20 to 40

Available Water
Capacity Class

Low

Very low

AWC for top 20"

3.0-3.4

0.6-0.7

Permeability: Subsoil
Substratum

Moderately rapid
Moderately slow

Moderately rapid
Moderately slow

Drainage Class

Well drained

Well drained

Max Erosion Hazard

High

Moderate

Seedling Mortality

Slight

Severe

Revegetating Exposed
Subsoil

Slight

Severe

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

3 WF, P
50 to 240

5,4 WF, P
70 to 170

Soil Manageability

Group
Class

II
2e

II
3eP

Inclusions

Included in this unit are small areas of Ahart, Crozier, and McCarthy soils and Hotaw rhyolitic substratum soils in the area of Scott's Flat reservoir. Included areas make up about 15 percent of the total area.

Management
Considerations

Ponto Variant soils are moderately deep and have a thin surface layer. Neer soils are moderately deep, have a high amount of rock fragments, and have a thin surface layer.

FFF Ponto Variant-Neer complex, 30 to 50 percent slopes

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

Typical Vegetation

Mixed conifer series; Mixed conifer-Mixed brush series.

Soil Map Unit
Components

Ponto Variant

Neer

Proportion (percent)

60

25

Soil Profile Description

Surface Layer

0 to 7 inches; gray sandy loam; massive; neutral.

0 to 6 inches; pale brown extremely gravelly sandy loam; moderate granular structure; slightly acid.

Subsoil

7 to 22 inches; gray fine sandy loam; moderate angular blocky structure; slightly acid.

6 to 29 inches; very pale brown extremely gravelly sandy loam; massive; medium acid.

Substratum

22 inches; highly weathered rhyolitic tuff.

29 inches; weathered rhyolitic tuff.

Soil Properties & Management Interpretations

Effective Rooting
Depth (inches)

20 to 40

20 to 40

Available Water
Capacity Class

Low

Very low

AWC for top 20"

3.0-3.4

0.6-0.7

Permeability: Subsoil
Substratum

Moderately rapid
Moderately slow

Moderately rapid
Moderately slow

Drainage Class

Well drained

Well drained

Max Erosion Hazard

High

High

Seedling Mortality

Slight

Severe

Revegetating Exposed
Subsoil

Slight

Severe

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

3,4 WF, P
50 to 240

4 P
70 to 170

Soil Manageability

Group
Class

III
3E

III
4EP

Inclusions

Included in this unit are small areas of Ahart, Crozier, and McCarthy soils; Hotaw rhyolitic substratum soils in the area of Scott's Flat Reservoir; soils similar to Neer but with hard rock at a depth of less than 20 inches; and Rock outcrop. Included areas make up about 15 percent of the total area.

Management
Considerations

Steep slopes. Ponto Variant soils are moderately deep and have a thin surface layer. Neer soils are moderately deep, have a high amount of rock fragments, and a thin surface layer.

FJG2 Fugawee-Jorge-Rubble land complex, 30 to 75 percent slopes, eroded

Elevation: 6,000 to 7,500 feet Annual Precipitation: 35 to 45 inches

Typical Vegetation Ceanothus-Jeffrey/Ponderosa series.

| Soil Map Unit Components | Fugawee, eroded | Jorge, eroded | Rubble land |
|--------------------------|-----------------|---------------|-------------|
| Proportion (percent) | 40 | 30 | 20 |

Soil Profile Description

| | | | |
|---------------|---|---|--|
| Surface Layer | 0 to 4 inches; brown sandy loam; weak granular structure; slightly acid. | 0 to 10 inches; dark grayish brown gravelly loam; weak granular structure; neutral. | Angular stones and cobbles with some soil material between rock fragments. |
| Subsoil | 4 to 35 inches; brown clay loam; moderate subangular blocky structure; medium acid. | 10 to 41 inches; brown cobbly clay loam; weak subangular blocky structure; medium acid. | |
| Substratum | 35 inches; weathered volcanic rock (andesitic flow rock or tuff breccia). | 41 inches; weathered volcanic rock. | |

Soil Properties & Management Interpretations

| | | |
|----------------------------------|---|--------------|
| Effective Rooting Depth (inches) | 20 to 40 | 40 to 60 |
| Available Water Capacity Class | Low | Very low |
| AWC for top 20" | 2.4-3.0 | 2.0-2.8 |
| Permeability: Subsoil | Moderate to moderately slow | Moderate |
| Substratum | Moderately slow | Moderate |
| Drainage Class | Well drained | Well drained |
| Max Erosion Hazard | Very high | Very high |
| Seedling Mortality | Slight | Moderate |
| Revegetating Exposed Subsoil | Slight | Slight |
| Soil Productivity | | |
| Forest Survey Site Class | 6 P | 5 P |
| Annual Forage (lbs/acre) | Not rated | Not rated |
| Soil Manageability | | |
| Group | IV | IV |
| Class | 4Ep | 3ep |
| Inclusions | Included in this unit are small areas of Rock outcrop and soils similar to Kyburz but the subsoil has more than 35 percent rock fragments. Included areas make up about 10 percent of the total area. | |

Management Considerations Step and very steep slopes. Surface soils have been eroded. On-site investigations are necessary to determine if corrective treatments are needed. Fugawee soils have a moderate soil depth and a thin surface layer. Jorge soils have coarse textures and a high amount of rock fragments. Rubble land areas are a potential aggregate source and have a potential for raveling.

✓ **FME Fugawee sandy loam, 2 to 30 percent slopes**

Elevation: 6,000 to 7,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation Jeffrey/Ponderosa-Sagebrush/Bitterbrush series.

Soil Map Unit Components **Fugawee sandy loam**

Proportion (percent) 90

s+s/ **Soil Profile Description**

Surface Layer 0 to 7 inches; dark brown sandy loam; moderate granular structure; slightly acid

Subsoil 7 to 35 inches; light reddish brown gravelly clay loam; moderate subangular blocky structure; strongly acid.

Substratum 35 inches; weathered andesite.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches) 20 to 40

Available Water Capacity Class Low

AWC for top 20" 2.1-2.7

Permeability: Subsoil Moderate to moderately slow
Substratum Moderately slow

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) 70 to 120

Soil Manageability

Group II
Class 2ep

Inclusions Included in this unit are small areas of Tahoma soils and shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 10 percent of the total area.

Management Considerations These soils are moderately deep and have a thin surface layer.

FME5 Fugawee sandy loam, 2 to 30 percent slopes, altered

Elevation: 6,000 to 7,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation

Plantations.

Soil Map Unit Components

Fugawee sandy loam, altered

Proportion (percent)

90

Soil Profile Description

Surface Layer

0 to 4 inches; brown sandy loam; moderate granular structure; slightly acid.

Subsoil

4 to 25 inches; strong brown clay loam; moderate subangular blocky structure; medium acid.

Substratum

25 inches; weathered volcanic rock (andesitic flow rock or tuff breccia).

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

20 to 40

Available Water Capacity Class

Low

AWC for top 20"

2.1-3.3

Permeability: Subsoil Substratum

Moderate to moderately slow
Moderately slow

Drainage Class

Well drained

Max Erosion Hazard

High

Seedling Mortality

Slight

Revegetating Exposed Subsoil

Slight

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

Not rated
Not rated

Soil Manageability

Group
Class

IV
4ep

Inclusions

Included in this unit are small areas of shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 10 percent of the total area.

Management Considerations

These soils have a moderate soil depth and a thin surface layer.

FMF2 Fugawee sandy loam, 30 to 50 percent slopes, eroded

Elevation: 6,000 to 7,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation

Jeffrey/Ponderosa-Sagebrush/Bitterbrush series; Mixed conifer-Sagebrush series.

Soil Map Unit Components

Fugawee sandy loam, eroded

Proportion (percent)

90

Soil Profile Description

Surface Layer

0 to 4 inches; brown sandy loam; weak granular structure; slightly acid.

Subsoil

4 to 35 inches; brown clay loam; moderate subangular blocky structure; medium acid.

Substratum

35 inches; weathered volcanic rock (andesitic flow rock or tuff breccia).

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

20 to 40

Available Water Capacity Class

Low

AWC for top 20"

2.4-3.0

Permeability: Subsoil Substratum

Moderate to moderately slow
Moderately slow

Drainage Class

Well drained

Max Erosion Hazard

High

Seedling Mortality

Slight

Revegetating Exposed Subsoil

Slight

Soil Productivity

Forest Survey Site Class Annual Forage (lbs/acre)

6 P
Not rated

Soil Manageability

Group Class

IV
4Ep

Inclusions

Included in this unit are small areas of Tahoma soils and shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 10 percent of the total area.

Management Considerations

Steep slopes. These soils have a moderate soil depth and a thin surface layer.

FRE Fugawee-Rock outcrop-Tahoma complex, 2 to 30 percent slopes

Elevation: 6,500 to 8,000 feet Annual Precipitation: 35 to 50 inches

Typical Vegetation Mixed conifer-Barren series.

| Soil Map Unit Components | Fugawee | Rock outcrop | Tahoma |
|--------------------------|----------------|---------------------|---------------|
| Proportion (percent) | 55 | 20 | 15 |

Soil Profile Description

| | Fugawee | Rock outcrop | Tahoma |
|---------------|--|--------------------------|---|
| Surface Layer | 0 to 7 inches; dark brown sandy loam; moderate granular structure; slightly acid | Weathered volcanic rock. | 0 to 8 inches; brown gravelly loam; moderate granular structure; slightly acid. |
| Subsoil | 7 to 35 inches; light reddish brown gravelly clay loam; moderate subangular blocky structure; strongly acid. | | 8 to 41 inches; strong brown gravelly clay loam; weak subangular blocky structure; neutral. |
| Substratum | 35 inches; weathered andesite. | | 41 inches; highly weathered andesitic tuff. |

Soil Properties & Management Interpretations

| | Fugawee | Rock outcrop | Tahoma |
|----------------------------------|---|---------------------|-----------------|
| Effective Rooting Depth (inches) | 20 to 40 | | 40 to 60 |
| Available Water Capacity Class | Low | | Low |
| AWC for top 20" | 2.1-2.7 | | 2.3-2.7 |
| Permeability: Subsoil | Moderate to moderately slow | | Moderately slow |
| Substratum | Moderately slow | | Moderately slow |
| Drainage Class | Well drained | | Well drained |
| Max Erosion Hazard | High | | High |
| Seedling Mortality | Slight | | Slight |
| Revegetating Exposed Subsoil | Slight | | Slight |
| Soil Productivity | | | |
| Forest Survey Site Class | 5,6 P, WF | | 4,5 P, WF |
| Annual Forage (lbs/acre) | 20 to 120 | | 70 to 170 |
| Soil Manageability | | | |
| Group | II | | II |
| Class | 2ep | | 2ep |
| Inclusions | Included in this unit are small areas of shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 10 percent of the total area. | | |
| Management Considerations | Fugawee soils have a moderate soil depth and a thin surface layer. Rock outcrop areas are a potential aggregate source. Concentrated surface runoff can increase erosion on adjacent soils. | | |

FRES Fugawee-Rock outcrop-Tahoma complex, 2 to 30 percent slopes, altered

Elevation: 6,500 to 8,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation

Plantations.

Soil Map Unit Components

Fugawee, altered

Rock outcrop

Tahoma, altered

Proportion (percent)

50

20

15

Soil Profile Description

Surface Layer

0 to 4 inches; brown sandy loam; moderate granular structure; slightly acid.

Weathered volcanic rock.

0 to 5 inches; brown loam; moderate granular structure; slightly acid.

Subsoil

4 to 25 inches; strong brown clay loam; moderate subangular blocky structure; medium acid.

5 to 41 inches; brown clay loam; weak subangular blocky structure; medium acid.

Substratum

25 inches; weathered volcanic rock (andesitic flow rock or tuff breccia).

41 inches; weathered volcanic rock.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

20 to 40

40 to 60

Available Water Capacity Class

Low

Low

AWC for top 20"

2.1-3.3

2.6-3.3

Permeability: Subsoil
Substratum

Moderate to moderately slow
Moderately slow

Moderately slow
Moderately slow

Drainage Class

Well drained

Well drained

Max Erosion Hazard

High

High

Seedling Mortality

Slight

Slight

Revegetating Exposed Subsoil

Slight

Slight

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

Not rated
Not rated

Not rated
Not rated

Soil Manageability

Group
Class

IV
4ep

IV
4ep

Inclusions

Included in this unit are small areas of shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 15 percent of the total area.

Management Considerations

Surface layers have been disturbed. On-site investigations are needed to determine if corrective treatments are needed. Fugawee soils are moderately deep and have a thin surface layer. Rock outcrop areas are a potential source of aggregate. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils.

FRF Fugawee-Rock outcrop-Tahoma complex, 30 to 50 percent slopes

Elevation: 6,500 to 8,000 feet Annual Precipitation: 35 to 50 inches

Typical Vegetation ✓ Mixed conifer-Barren series.

| Soil Map Unit Components | Fugawee | Rock outcrop | Tahoma |
|--------------------------|---------|--------------|--------|
| Proportion (percent) | 50 | 25 | 15 |

Soil Profile Description

| | Fugawee | Rock outcrop | Tahoma |
|---------------|--|----------------|---|
| Surface Layer | 0 to 7 inches; dark brown sandy loam; moderate granular structure; slightly acid | Volcanic rock. | 0 to 8 inches; brown gravelly loam; moderate granular structure; slightly acid. |
| Subsoil | 7 to 35 inches; light reddish brown gravelly clay loam; moderate subangular blocky structure; strongly acid. | | 8 to 41 inches; strong brown gravelly clay loam; weak subangular blocky structure; neutral. |
| Substratum | 35 inches; weathered andesite. | | 41 inches; highly weathered andesitic tuff. |

Soil Properties & Management Interpretations

| | Fugawee | Rock outcrop | Tahoma |
|----------------------------------|-----------------------------|--------------|-----------------|
| Effective Rooting Depth (inches) | 20 to 40 | | 40 to 60 |
| Available Water Capacity Class | Low | | Low |
| AWC for top 20" | 2.1-2.7 | | 2.3-2.7 |
| Permeability: Subsoil | Moderate to moderately slow | | Moderately slow |
| Substratum | Moderately slow | | Moderately slow |
| Drainage Class | Well drained | | Well drained |
| Max Erosion Hazard | High | | High |
| Seedling Mortality | Slight | | Slight |
| Revegetating Exposed Subsoil | Slight | | Slight |
| Soil Productivity | | | |
| Forest Survey Site Class | 5,6 P, WF | | 4,5 P, WF |
| Annual Forage (lbs/acre) | 20 to 120 | | 70 to 170 |
| Soil Manageability | | | |
| Group | III | | III |
| Class | 3Ep | | 3Ep |

Inclusions Included in this unit are small areas of Jorge soils and shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 10 percent of the total area.

Management Considerations Steep slopes. Fugawee soils have a moderate soil depth and a thin surface layer. Rock outcrop areas are a potential source of aggregate. Concentraed surface runoff from Rock outcrop areas can increase erosion on adjacent soils.

FRF2 Fugawee-Rock outcrop-Tahoma complex, 30 to 50 percent slopes, eroded

Elevation: 6,500 to 8,000 feet Annual Precipitation: 35 to 50 inches

Typical Vegetation

Ceanothus-Mixed conifer series.

Soil Map Unit Components

Fugawee, eroded

Rock outcrop

Tahoma, eroded

Proportion (percent)

50

25

15

Soil Profile Description

Surface Layer

0 to 4 inches; brown sandy loam; weak granular structure; slightly acid.

Volcanic rock.

0 to 5 inches; brown loam; moderate granular structure; slightly acid.

Subsoil

4 to 35 inches; brown clay loam; moderate subangular blocky structure; medium acid.

5 to 41 inches; brown clay loam; weak subangular blocky structure; medium acid.

Substratum

35 inches; weathered volcanic rock (andesitic flow rock or tuff breccia).

41 inches; weathered volcanic rock.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

20 to 40

40 to 60

Available Water Capacity Class

Low

Low

AWC for top 20"

2.4-3.0

2.6-3.3

Permeability: Subsoil
Substratum

Moderate to moderately slow
Moderately slow

Moderately slow
Moderately slow

Drainage Class

Well drained

Well drained

Max Erosion Hazard

High

High

Seedling Mortality

Slight

Slight

Revegetating Exposed Subsoil

Slight

Slight

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

6 P
Not rated

5 P, WF
Not rated

Soil Manageability

Group
Class

IV
4Ep

IV
4Ep

Inclusions

Included in this unit are small areas of Jorge soils and shallow soils with fine-loamy or clayey argillic horizons. Included areas make up about 10 percent of the total area.

Management Considerations

Steep slopes. Surface soils have been eroded. On-site investigations are necessary to determine if corrective treatments are needed. Fugawee soils have moderate soil depth and a thin surface layer. Rock outcrop areas are a potential source of aggregate. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soils.

✓ **FRF6 Fugawee-Rock outcrop-Tahoma complex, 30 to 50 percent slopes, terraced**

Elevation: 6,500 to 8,000 feet Annual Precipitation: 35 to 50 inches

✓
Typical Vegetation

Plantations.

Soil Map Unit Components

Fugawee, terraced

Rock outcrop

Tahoma, terraced

Proportion (percent)

50

25

15

Soil Profile Description

Surface Layer

0 to 5 inches; dark yellowish brown sandy loam; weak granular structure; slightly acid.

Volcanic rock.

0 to 4 inches; brown gravelly loam; massive; slightly acid.

Subsoil

5 to 34 inches; yellowish brown clay loam; moderate subangular blocky structure; medium acid.

4 to 42 inches; pale brown gravelly clay loam; massive; strongly acid.

Substratum

34 inches; weathered volcanic rock (andesitic flow rock or tuff breccia).

42 inches; weathered volcanic rock.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

20 to 40

40 to 60

Available Water Capacity Class

Low

Low

AWC for top 20"

2.2-2.9

2.2-2.8

Permeability: Subsoil Substratum

Moderate to moderately slow Moderately slow

Moderately slow Moderately slow

Drainage Class

Well drained

Well drained

Max Erosion Hazard

High

High

Seedling Mortality

Slight

Slight

Revegetating Exposed Subsoil

Slight

Slight

Soil Productivity

Forest Survey Site Class Annual Forage (lbs/acre)

Not rated Not rated

Not rated Not rated

Soil Manageability

Group Class

IV 4Ep

IV 4Ep

Inclusions

Included in this unit are small areas of Jorge soils and soils with fine-loamy or clayey argillic horizons. Included areas make up about 10 percent of the total area.

Management Considerations

Steep slopes. These areas have been terraced. On-site investigations are necessary to determine if corrective treatments are needed. Fugawee soils have moderate soil depth and thin surface layers. Rock outcrop areas are a potential source of aggregate. Concentrated surface runoff from Rock outcrop areas can increase erosion on adjacent soil.

FTE Fugawee-Tahoma complex, 2 to 30 percent slopes

Elevation: 6,500 to 8,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation

Mixed conifer series; Red fir series.

Soil Map Unit
Components

Fugawee

Tahoma

Proportion (percent)

50

40

Soil Profile Description

Surface Layer

0 to 7 inches; dark brown sandy loam; moderate granular structure; slightly acid

0 to 8 inches; brown gravelly loam; moderate granular structure; slightly acid.

Subsoil

7 to 35 inches; light reddish brown gravelly clay loam; moderate subangular blocky structure; strongly acid.

8 to 41 inches; strong brown gravelly clay loam; weak subangular blocky structure; neutral.

Substratum

35 inches; weathered andesite.

41 inches; highly weathered andesitic tuff.

Soil Properties & Management Interpretations

Effective Rooting
Depth (inches)

20 to 40

40 to 60

Available Water
Capacity Class

Low

Low

AWC for top 20"

2.1-2.7

2.3-2.7

Permeability: Subsoil
Substratum

Moderate to moderately slow
Moderately slow

Moderately slow
Moderately slow

Drainage Class

Well drained

Well drained

Max Erosion Hazard

High

High

Seedling Mortality

Slight

Slight

Revegetating Exposed
Subsoil

Slight

Slight

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

3,4 RF, WF
100 to 180

3 RF, WF
140 to 180

Soil Manageability

Group
Class

II
2ep

II
2ep

Inclusions

Included in this unit are small areas of Jorge, Kyburz, and Waca soils, and similar soils with umbric epipedons. Included areas make up about 10 percent of the total area.

Management
Considerations

Fugawee soils have moderate soil depth and a thin surface layer.

FUC Kyburz-Trojan-Sierraville complex, 2 to 9 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 18 to 40 inches

Typical Vegetation Mixed conifer series; Jeffrey/Ponderosa series.

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

Soil Profile Description

| | Kyburz | Trojan | Sierraville |
|---------------|---|---|--|
| Surface Layer | 0 to 6 inches; brown gravelly sandy loam; moderate granular structure; slightly acid. | 0 to 10 inches; dark brown gravelly sandy loam; weak platy structure; slightly acid. | 0 to 9 inches; reddish brown stony sandy loam; moderate granular structure; slightly acid. |
| Subsoil | 6 to 34 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; very strongly acid. | 10 to 67 inches; brown and light brown clay loam; moderate angular blocky structure; medium acid. | 9 to 75 inches; weak red clay; moderate angular blocky structure; medium acid. |
| Substratum | 34 inches; weathered andesitic rock. | 67 inches; slightly fractured andesite. | 75 inches; slightly weathered andesite. |

Soil Properties & Management Interpretations

| | Kyburz | Trojan | Sierraville |
|-------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| Effective Rooting Depth (inches) | 20 to 40 | 40 to 80 | 40 to 80 |
| Available Water Capacity Class | Low | Low to moderate | Low to high |
| AWC for top 20" | 2.2-2.7 | 1.8-2.5 | 2.4-2.8 |
| Permeability: Subsoil Substratum | Moderately slow Moderately slow | Moderately slow Moderately slow | Moderately slow Moderately slow |
| Drainage Class | Well drained | Well drained | Well drained |
| Max Erosion Hazard | Moderate | Moderate | Moderate |
| Seedling Mortality | Slight | Moderate to slight | Slight |
| Revegetating Exposed Subsoil | Slight | Slight | Slight |
| Soil Productivity | | | |
| Forest Survey Site Class | 5 P | 4,5 P | 4,5 P |
| Annual Forage (lbs/acre) | 120 to 190 | 190 to 250 | 120 to 190 |
| Soil Manageability | | | |
| Group | II | II | II |
| Class | 2p | 2p | 1 |

Inclusions Included in this unit are small areas of deep very gravelly alluvial soils. Included areas make up about 15 percent of the total area.

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

FUE Kyburz-Trojan complex, 9 to 30 percent slopes

Elevation: 5,500 to 6,400 feet Annual Precipitation: 18 to 40 inches

Typical Vegetation Mixed conifer series; Jeffrey/Ponderosa series.

| | | |
|--------------------------|---------------|---------------|
| Soil Map Unit Components | Kyburz | Trojan |
|--------------------------|---------------|---------------|

| | | |
|----------------------|----|----|
| Proportion (percent) | 60 | 25 |
|----------------------|----|----|

Soil Profile Description

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

Soil Properties & Management Interpretations

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

Inclusions Included in this unit are small areas of Aldi and Sierraville soils; soils similar to Kyburz but with more than 35 percent rock fragments; shallow soils with fine-loamy argillic horizons; and areas with slope of less than 9 percent. Included areas make up about 15 percent of the total area.

Management Considerations Relatively short growing season. Kyburz soils are moderately deep and have thin surface layers.

✓ **FUF6 Kyburz-Trojan complex, 30 to 50 percent slopes, terraced**

Elevation: 5,500 to 6,400 feet Annual Precipitation: 18 to 40 inches

Typical Vegetation

Plantations.

Soil Map Unit Components

Kyburz, terraced

Trojan, terraced

Proportion (percent)

65

20

Soil Profile Description

Surface Layer

0 to 5 inches; dark brown sandy loam; weak granular structure; slightly acid.

0 to 5 inches; brown sandy loam; weak granular structure; slightly acid.

Subsoil

5 to 27 inches; brown clay loam; moderate subangular blocky structure; medium acid.

5 to 48 inches; reddish brown gravelly clay loam; moderate subangular blocky structure; strongly acid.

Substratum

27 inches; weathered volcanic rock.

48 inches; weathered volcanic rock.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

20 to 40

40 to 80

Available Water Capacity Class

Low

Low to moderate

AWC for top 20"

2.8-2.9

2.0-2.6

Permeability: Subsoil
Substratum

Moderately slow
Moderately slow

Moderately slow
Moderately slow

Drainage Class

Well drained

Well drained

Max Erosion Hazard

High

High

Seedling Mortality

Slight

Moderate

Revegetating Exposed Subsoil

Slight

Slight

Soil Productivity

Forest Survey Site Class
Annual Forage (lbs/acre)

Not rated
Not rated

Not rated
Not rated

Soil Manageability

Group
Class

IV
4ep

IV
4ep

Inclusions

Included in this unit are small areas of Aldi, Sattley, and Sierraville soils; shallow soils with fine-loamy argillic horizons; and Rock outcrop. Included areas make up about 15 percent of the total area.

Management Considerations

Steep slopes and a relatively short growing season. These areas have been terraced. On-site investigations are necessary to determine if corrective treatments are needed. Kyburz soils are moderately deep and have a thin surface layer.

FVE Fugawee-Tahoma-Aquolls complex, 2 to 30 percent slopes

Elevation: 6,000 to 8,000 feet Annual Precipitation: 35 to 60 inches

Typical Vegetation Mixed conifer-Alder/Willow series.

| Soil Map Unit Components | Fugawee | Tahoma | Aquolls |
|--------------------------|----------------|---------------|----------------|
| Proportion (percent) | 50 | 20 | 15 |

Soil Profile Description

| | | | |
|---------------|--|---|---|
| Surface Layer | 0 to 7 inches; dark brown sandy loam; moderate granular structure; slightly acid | 0 to 8 inches; brown gravelly loam; moderate granular structure; slightly acid. | Thick and dark colored; stratified coarse sand to clay. |
| Subsoil | 7 to 35 inches; light reddish brown gravelly clay loam; moderate subangular blocky structure; strongly acid. | 8 to 41 inches; strong brown gravelly clay loam; weak subangular blocky structure; neutral. | Stratified layers with mottles; sandy loam to clay; some are very gravelly. |
| Substratum | 35 inches; weathered andesite. | 41 inches; highly weathered andesitic tuff. | Stratified alluvium. |

Soil Properties & Management Interpretations

| | | | |
|--|--|------------------------------------|-------------------------------|
| Effective Rooting Depth (inches) | 20 to 40 | 40 to 60 | 10 to 30 |
| Available Water Capacity Class | Low | Low | Variable |
| AWC for top 20" | 2.1-2.7 | 2.3-2.7 | |
| Permeability: Subsoil Substratum | Moderate to moderately slow Moderately slow | Moderately slow Moderately slow | Variable Slow to very slow |
| Drainage Class | Well drained | Well drained | Very poorly drained |
| Max Erosion Hazard | High | High | High |
| Seedling Mortality | Slight | Slight | Severe |
| Revegetating Exposed Subsoil | Slight | Slight | Severe |
| Soil Productivity | | | |
| Forest Survey Site Class | 5,6 P, WF | 4,5 P, WF | |
| Annual Forage (lbs/acre) | 20 to 120 | 70 to 170 | 1,040 to 2,670 |
| Soil Manageability | | | |
| Group | II | II | II |
| Class | 2ep | 2ep | 4EW |

Inclusions Included in this unit are small areas of Aldi, Borolls, Jorge, Kyburz, and Waca soils; and deep very gravelly alluvial soils. Included areas make up about 15 percent of the total area.

Management Considerations Fugawee soils have a moderate soil depth and a thin surface layer. Aquolls have a high water table during most of the year, are susceptible to puddling, and are subject to flooding.

GBF Celio Variant-Rock outcrop-Cryumbrepts, wet complex, 30 to 50 percent slopes

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

slow
Typical Vegetation

Mixed conifer-Alder/Willow series.

Soil Map Unit Components

Celio Variant

Rock outcrop

Cryumbrepts, wet

Proportion (percent)

45

30

15

Soil Profile Description

Surface Layer

0 to 10 inches; dark grayish brown stony sandy loam; strong granular structure; slightly acid or medium acid.

Granitic rock.

Thick and dark colored; stratified sandy loam, silt loam, and clay loam; gravelly, cobbly, or stony.

Subsoil

10 to 42 inches; pale brown very stony loamy coarse sand; weak granular structure; medium acid.

Substratum

42 to 61 inches; very pale brown very stony loamy coarse sand; massive; medium acid.

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 to low

Very low

AWC for top 20"

1.0-1.4

Permeability: Subsoil Substratum

Rapid Slow

Moderately rapid Very slow

Drainage Class

Excessively drained

Poorly drained

Max Erosion Hazard

High

Very high

Seedling Mortality

Severe to moderate

Severe

Revegetating Exposed Subsoil

Slight

Severe

Soil Productivity

Forest Survey Site Class Annual Forage (lbs/acre)

4 RF, WF 100 to 140

Not capable 170 to 640

Soil Manageability

Group Class

IV 4EpX

IV 4EW

Inclusions

Included in this unit are small areas of similar soils that are shallow or moderately deep. Included areas make up about 10 percent of the total area.

Management Considerations

Steep slopes. Celio Variant soils have sandy textures, high amounts of rock fragments, and a low cation exchange capacity (CEC). Concentrated surface runoff from Rock outcrop areas can increase 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. Rock outcrop areas are a potential source of aggregate.

✓ **GEC Gefo-Aquolls-Celio complex, 2 to 9 percent slopes**

Elevation: 6,200 to 6,800 feet Annual Precipitation: 40 to 50 inches

Typical Vegetation

Lodgepole-Meadow/Willow series; Lodgepole-Alder/Willow series.

Soil Map Unit Components

Gefo **Aquolls** **Celio**

Proportion (percent)

55 20 15

Soil Profile Description

Surface Layer

0 to 15 inches; grayish brown loamy sand; weak granular structure; medium acid. Thick and dark colored; stratified coarse sand to clay. 0 to 12 inches; grayish brown gravelly sandy loam; weak granular structure; slightly acid.

Subsoil

15 to 40 inches; pale brown loamy fine sand; massive; medium acid. 40 to 60 inches; pale Stratified layers with mottles; sandy loam to clay; some are very gravelly. 12 to 40 inches; light yellowish brown extremely gravelly loamy coarse sand; medium acid to strongly acid.

Substratum

brown loamy fine sand; massive; medium acid. Stratified alluvium. 40 inches; extremely gravelly loamy coarse sand; weakly cemented with silica.

Soil Properties & Management Interpretations

Effective Rooting Depth (inches)

40 to 60 10 to 30 40 to 60

Available Water Capacity Class

Low to moderate Variable Very low

AWC for top 20"

1.5-2.2 1.2-1.7

Permeability: Subsoil Substratum

Very rapid to rapid Very rapid Variable Slow to very slow Rapid Slow

Drainage Class

Somewhat excessively drained Very poorly drained Somewhat poorly drained

Max Erosion Hazard

Moderate High Moderate

Seedling Mortality

Moderate to slight Severe Severe to moderate

Revegetating Exposed Subsoil

Slight Severe Severe

Soil Productivity

Forest Survey Site Class Annual Forage (lbs/acre)

5 LP 60 to 100 Not capable 1,040 to 2,670 5 LP 60 to 100

Soil Manageability Group Class

2p 4EW 2p

Inclusions

Included in this unit are small areas of Borolls and Tallac soils, and soils similar to Celio which are loamy-skeletal. Included areas make up about 10 percent of the total area.

Management Considerations

Gefo soils are sandy, have a seasonal water table, and have a low cation exchange capacity (CEC). Aquolls have a high water table during most of the year, are susceptible to puddling, and are subject to flooding. Celio soils have sandy textures, high amounts of rock fragments, and a low cation exchange capacity (CEC). A cemented pan below 40 inches holds a fluctuating water table near the surface in the spring and early summer. Lodgepole pine is the adapted species.

GRG Rock outcrop, granitic

Elevation: 6,000 to 8,500 feet Annual Precipitation: 60 to 80 inches

Typical Vegetation

Barren.

Soil Map Unit
Components

Rock outcrop

Proportion (percent)

90

Soil Profile Description

Surface Layer

Glaciated granitic rock with some soil material in cracks and crevices.

Subsoil

Substratum

Soil Properties & Management Interpretations

Effective Rooting
Depth (inches)

granitic

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 Aquolls, Celio, Putt, Tallac, Tinker, and Zeibright soils. Included areas make up about 10 percent of the total area.

Management
Considerations

Steep and very steep slopes. Rock outcrop areas produce concentrated surface runoff that can increase erosion on adjacent soils.

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