

Interpretation Tables

The following tables are summaries of interpretations given in the preceding pages of this section, "Soil Map Units". They are intended to give the reader a quick reference only, and should not be used in lieu of the full map unit descriptions. Definitions and criteria are given at the beginning of this section and in the glossary. The meaning of each soil's scientific name is given in the appropriate map unit description. A full description of each soil is presented in the following section, "Soil Descriptions: The Taxonomic Units."

Abbreviations used in these tables are as follows:

Conduct. = Conductivity

PAWC = Plant-available water capacity

EHR = Erosion hazard rating

LSH = Landscape stability hazard

Precip. = Precipitation

slt. = slight

med. = medium

mod. = moderate

mod. low = moderately low

mod. high = moderately high

extr. = extreme

usu. = usually

v. = very

mod. well = moderately well drained

sx. = somewhat excessively drained

ex. = excessively drained

n.a. = not applied

101—Mollic Cryoboralfs – Typic Cryumbrepts association, 0 to 30 percent slopes.

Elevation: 6,200 to 8,300 feet.

Precipitation: 15 to 30 inches.

Component	Mollic Cryoboralf	Typic Cryumbrept	
Proportion	45 %	45 %	
Drainage Class	well	well to sx.	
Water Repellency	none or slt. to extr.	none or slt. to mod.	
Hydraulic Conduct.	mod. low or mod.	mod. low or mod. high	
Overland Flow	med. to rapid	med. to rapid	
PAWC	mod. to high	low to mod.	
EHR	mod. to high	mod. to high	
LSH	low	low	
Trails	well suited	well suited	
Campsites	well suited on nearly level to gently sloping	well suited on nearly level to gently sloping	
Grazing	suitable	suitable	
Wildlife Habitat	good	good	
Watershed Rating	mod. high	mod. high	
Fire Impacts	mod.	mod.	
Acidic Precip.	susceptible, well suited for monitoring	susceptible, well suited for monitoring	

102—Xeric Vitricryands, 0 to 30 percent slopes.

Elevation: 7,600 to 10,800 feet.

Precipitation: 40 to 60 inches.

Component	Xeric Vitricryand		
Proportion	75 %		
Drainage Class	well to sx.		
Water Repellency	slt. to extr.		
Hydraulic Conduct.	low, mod. low, or mod. high		
Overland Flow	med. to rapid		
PAWC	mod. to high		
EHR	mod. to high		
LSH	low		
Trails	suitable		
Campsites	suitable on nearly level to gently sloping		
Grazing	poorly suited		
Wildlife Habitat	good		
Watershed Rating	mod. high		
Fire Impacts	slt. to mod.		
Acidic Precip.	susceptible		

103—Xeric Vitricryands, 25 to 55 percent slopes.
 Elevation: 7,300 to 10,000 feet.
 Precipitation: 40 to 60 inches.

Component	Xeric Vitricryand		
Proportion	75 %		
Drainage Class	well to sx.		
Water Repellency	slt. to extr.		
Hydraulic Conduct.	low to mod. high		
Overland Flow	rapid to v. rapid		
PAWC	low to mod.		
EHR	high to v. high		
LSH	mod. low		
Trails	suitable		
Campsites	unsuitable		
Grazing	poorly suited		
Wildlife Habitat	good		
Watershed Rating	mod. high		
Fire Impacts	mod.		
Acidic Precip.	susceptible		

104—Xeric Vitricryands – Typic Cryorthents, tephritic complex, 0 to 45 percent slopes
 Elevation: 6,400 to 9,400 feet.
 Precipitation: 40 to 60 inches.

Component	Xeric Vitricryand	Typic Cryorthent, tephritic	
Proportion	45 %	35 %	
Drainage Class	well to sx.	well to sx.	
Water Repellency	slt. to extr.	usu. extr.	
Hydraulic Conduct.	low, mod. low, or mod. high	low, mod. low, or mod. high	
Overland Flow	med. to v. rapid	med. to v. rapid	
PAWC	low to mod.	low to mod.	
EHR	mod. to v. high	mod. to v. high	
LSH	low to mod. low	low to mod. low	
Trails	suitable	suitable	
Campsites	suitable on nearly level to gently sloping	suitable on nearly level to gently sloping	
Grazing	poorly suited	poorly suited	
Wildlife Habitat	fair to good	fair to good	
Watershed Rating	mod. high	mod. high	
Fire Impacts	slt. to mod.	slt. to mod.	
Acidic Precip.	susceptible	susceptible	

105—Typic Cryorthents, 0 to 35 percent slopes.
 Elevation: 7,100 to 11,800 feet.
 Precipitation: 20 to 50 inches.

Component	Typic Cryorthent		
Proportion	75 %		
Drainage Class	mod. well to sx.		
Water Repellency	none or slt. to extr.		
Hydraulic Conduct.	mod. high to high		
Overland Flow	med. to rapid		
PAWC	low		
EHR	mod. to high		
LSH	low		
Trails	suitable		
Campsites	suitable on nearly level to gently sloping		
Grazing	poorly suited, except low elevation meadows		
Wildlife Habitat	fair		
Watershed Rating	mod. low to mod. high		
Fire Impacts	slt. to mod.		
Acidic Precip.	susceptible		

106—Typic Cryorthents, 15 to 50 percent slopes.

Elevation: 8,800 to 13,200 feet.

Precipitation: 25 to 50 inches.

Component	Typic Cryorthent		
Proportion	80 %		
Drainage Class	mod. well to sx.		
Water Repellency	none or slt. to extr.		
Hydraulic Conduct.	mod. high		
Overland Flow	rapid to v. rapid		
PAWC	low		
EHR	high to v. high		
LSH	mod. low		
Trails	suitable		
Campsites	unsuitable		
Grazing	unsuitable		
Wildlife Habitat	fair to poor		
Watershed Rating	mod.		
Fire Impacts	slt. to mod.		
Acidic Precip.	susceptible		

107—Typic Cryorthents, 50 to 85 percent slopes.

Elevation: 7,800 to 11,200 feet.

Precipitation: 30 to 50 inches.

Component	Typic Cryorthent		
Proportion	85 %		
Drainage Class	mod. well to sx.		
Water Repellency	none or slt. to extr.		
Hydraulic Conduct.	mod. high		
Overland Flow	v. rapid		
PAWC	low		
EHR	v. high		
LSH	high to v. high		
Trails	poorly suited		
Campsites	unsuitable		
Grazing	unsuitable		
Wildlife Habitat	poor		
Watershed Rating	low		
Fire Impacts	slt.		
Acidic Precip.	mod. susceptible		

108—Typic Cryorthents – Dystric Cryochrepts complex, 15 to 60 percent slopes.

Elevation: 6,400 to 11,000 feet.

Precipitation: 35 to 50 inches.

Component	Typic Cryorthent	Dystric Cryochrept	
Proportion	50 %	30 %	
Drainage Class	mod. well to sx.	well to sx.	
Water Repellency	none or slt. to extr.	usu. slt. to extr.	
Hydraulic Conduct.	low to mod. high	low to mod. high	
Overland Flow	rapid to v. rapid	rapid to v. rapid	
PAWC	low	low to mod.	
EHR	high to v. high	high to v. high	
LSH	mod. low to mod. high	mod. low to mod. high	
Trails	suitable to poorly suited	suitable to poorly suited	
Campsites	unsuitable	unsuitable	
Grazing	unsuitable	unsuitable	
Wildlife Habitat	good to fair	good to fair	
Watershed Rating	mod. low to mod. high	mod. low to mod. high	
Fire Impacts	slt.	slt. to mod.	
Acidic Precip.	susceptible	susceptible	

109—Typic Cryorthents – Dystric Cryochrepts – Rock outcrop complex, 0 to 30 percent slopes.

Elevation: 8,100 to 11,200 feet.

Precipitation: 35 to 50 inches.

Component	Typic Cryorthent	Dystric Cryochrept	Rock outcrop
Proportion	40 %	25 %	25 %
Drainage Class	mod. well to sx.	well to sx.	n.a.
Water Repellency	none or slt. to extr.	usu. slt. to extr.	n.a.
Hydraulic Conduct.	low to mod. high	low to mod. high	n.a.
Overland Flow	med. to v. rapid	med. to v. rapid	med. to v. rapid
PAWC	low	low to mod.	n.a.
EHR	mod. to high	mod. to high	n.a.
LSH	low	low	low
Trails	well suited	well suited	suitable
Campsites	well suited to unsuitable	well suited to unsuitable	well suited to unsuitable
Grazing	poorly suited	poorly suited	unsuitable
Wildlife Habitat	good to fair	good to fair	fair to poor
Watershed Rating	mod. high	mod. high	mod. to low
Fire Impacts	slt.	slt. to mod.	negligible
Acidic Precip.	susceptible	susceptible	negligible

110—Typic Cryorthents – Dystric Cryochrepts – Rock outcrop association, 15 to 45 percent slopes.

Elevation: 8,300 to 11,600 feet.

Precipitation: 35 to 50 inches.

Component	Typic Cryorthent	Dystric Cryochrept	Rock outcrop
Proportion	40 %	30 %	25 %
Drainage Class	mod. well to sx.	well to sx.	n.a.
Water Repellency	none or slt. to extr.	usu. slt. to extr.	n.a.
Hydraulic Conduct.	low to mod. high	low to mod. high	n.a.
Overland Flow	rapid to v. rapid	rapid to v. rapid	rapid to v. rapid
PAWC	low	low to mod.	n.a.
EHR	high to v. high	high to v. high	n.a.
LSH	low	low	low
Trails	suitable	suitable	suitable to poorly suited
Campsites	unsuitable	unsuitable	unsuitable
Grazing	unsuitable	unsuitable	unsuitable
Wildlife Habitat	good to fair	good to fair	fair to poor
Watershed Rating	mod.	mod.	mod.
Fire Impacts	slt.	slt. to mod.	negligible
Acidic Precip.	susceptible	susceptible	negligible

111—Typic Cryorthents – Typic Cryochrepts – Rock outcrop complex, 0 to 45 percent slopes.

Elevation: 8,000 to 11,600 feet.

Precipitation: 20 to 50 inches.

Component	Typic Cryorthent	Typic Cryochrept	Rock outcrop
Proportion	40 %	30 %	20 %
Drainage Class	mod. well to sx.	well to sx.	n.a.
Water Repellency	none or slt. to extr.	none or slt. to extr.	n.a.
Hydraulic Conduct.	mod. high to high	mod. high to high	n.a.
Overland Flow	med. to v. rapid	med. to v. rapid	med. to v. rapid
PAWC	low	low to mod.	n.a.
EHR	mod. to high	mod. to high	n.a.
LSH	low	low	low
Trails	well suited	suitable	suitable to poorly suited
Campsites	well suited on nearly level to gently sloping	well suited on nearly level to gently sloping	poorly suited to unsuitable
Grazing	poorly suited	poorly suited	unsuitable
Wildlife Habitat	fair	fair	fair to poor
Watershed Rating	mod. low to mod. high	mod. low to mod. high	mod. to low
Fire Impacts	slt.	slt. to mod.	negligible
Acidic Precip.	susceptible	susceptible	negligible

112—Typic Cryorthents – Entic Cryumbrepts complex, 0 to 45 percent slopes.
Elevation: 7,000 to 10,400 feet.
Precipitation: 30 to 45 inches.

Component	Typic Cryorthent	Entic Cryumbrept	
Proportion	50 %	40 %	
Drainage Class	mod. well to sx.	well to sx.	
Water Repellency	none or slt. to extr.	usu. slt. to extr.	
Hydraulic Conduct.	low to mod. high	low to mod. high	
Overland Flow	med. to v. rapid	med. to v. rapid	
PAWC	low	low	
EHR	mod. to high	mod. to high	
LSH	low	low	
Trails	well suited	well suited	
Campsites	well suited on nearly level to gently sloping	well suited on nearly level to gently sloping	
Grazing	poorly suited	poorly suited	
Wildlife Habitat	good to fair	good to fair	
Watershed Rating	mod. high	mod. high	
Fire Impacts	mod.	mod.	
Acidic Precip.	susceptible	susceptible	

113—Typic Cryorthents – Typic Cryumbrepts – Rock outcrop complex, 0 to 45 percent slopes.
Elevation: 8,000 to 10,400 feet.
Precipitation: 35 to 50 inches.

Component	Typic Cryorthent	Typic Cryumbrept	Rock outcrop
Proportion	35 %	35 %	20 %
Drainage Class	mod. well to sx.	well to sx.	n.a.
Water Repellency	usu. slt. to extr.	none or slt. to mod.	n.a.
Hydraulic Conduct.	mod. high	mod. high	n.a.
Overland Flow	med. to rapid	med. to rapid	med. to v. rapid
PAWC	low	low	n.a.
EHR	mod. to v. high	mod. to high	n.a.
LSH	mod. low	mod. low	low
Trails	well suited	well suited	suitable to poorly suited
Campsites	well suited on nearly level to gently sloping	well suited on nearly level to gently sloping	poorly suited to unsuitable
Grazing	unsuitable	unsuitable	unsuitable
Wildlife Habitat	good to fair	good to fair	fair to poor
Watershed Rating	mod.	mod.	mod. to low
Fire Impacts	slt.	slt. to mod.	negligible
Acidic Precip.	susceptible	susceptible	negligible

114—Typic Cryorthents – Rock outcrop complex, 0 to 45 percent slopes.
Elevation: 7,100 to 12,200 feet.
Precipitation: 20 to 45 inches.

Component	Typic Cryorthent	Rock outcrop	
Proportion	50 %	35 %	
Drainage Class	mod. well to sx.	n.a.	
Water Repellency	none or slt. to extr.	n.a.	
Hydraulic Conduct.	mod. high	n.a.	
Overland Flow	med. to rapid	med. to v. rapid	
PAWC	low	n.a.	
EHR	mod. to v. high	n.a.	
LSH	low	low	
Trails	well suited	suitable to poorly suited	
Campsites	well suited on nearly level to gently sloping	poorly suited to unsuitable	
Grazing	well suited to unsuitable	unsuitable	
Wildlife Habitat	fair to poor	fair to poor	
Watershed Rating	mod. high to mod. low	mod. to low	
Fire Impacts	slt.	negligible	
Acidic Precip.	susceptible	negligible	

115—Typic Cryorthents – Rock outcrop complex, 40 to 85 percent slopes.
Elevation: 6,700 to 13,900 feet.
Precipitation: 20 to 50 inches.

Component	Typic Cryorthent	Rock outcrop	
Proportion	55 %	30 %	
Drainage Class	mod. well to sx.	n.a.	
Water Repellency	none or slt. to extr.	n.a.	
Hydraulic Conduct.	mod. high	n.a.	
Overland Flow	v. rapid	v. rapid	
PAWC	v. low to low	n.a.	
EHR	v. high	n.a.	
LSH	high to v. high	low to v. high	
Trails	poorly suited	poorly suited to unsuitable	
Campsites	unsuitable	unsuitable	
Grazing	unsuitable	unsuitable	
Wildlife Habitat	good to poor	fair to poor	
Watershed Rating	mod. low to mod.	low to mod.	
Fire Impacts	slt.	negligible	
Acidic Precip.	susceptible	negligible	

116—Typic Cryorthents – Rock outcrop – Lithic Cryorthents complex, 0 to 30 percent slopes.
Elevation: 6,700 to 11,600 feet.
Precipitation: 35 to 45 inches.

Component	Typic Cryorthent	Rock outcrop	Lithic Cryorthent
Proportion	50 %	25 %	15 %
Drainage Class	mod. well to sx.	n.a.	well to sx.
Water Repellency	none or slt. to extr.	n.a.	none or mod. to extr.
Hydraulic Conduct.	low to mod. high	n.a.	low to mod. high
Overland Flow	med. to rapid	med. to v. rapid	med. to rapid
PAWC	low	n.a.	low
EHR	mod. to high	n.a.	mod. to high
LSH	low	low	low
Trails	well suited	suitable to poorly suited	well suited
Campsites	well suited on nearly level to gently sloping	poorly suited to unsuitable	well suited on nearly level to gently sloping
Grazing	suitable to poorly suited	unsuitable	unsuitable
Wildlife Habitat	good to fair	fair to poor	fair
Watershed Rating	mod.	mod. to low	mod. to low
Fire Impacts	slt. to mod.	negligible	slt.
Acidic Precip.	susceptible	negligible	susceptible

117—Typic Cryorthents – Rock outcrop – Lithic Cryorthents complex, tephritic, 0 to 30 percent slopes.
Elevation: 7,000 to 10,500 feet.
Precipitation: 40 to 60 inches.

Component	Typic Cryorthent, tephritic	Rock outcrop	Lithic Cryorthent, tephritic
Proportion	45 %	30 %	15 %
Drainage Class	well to sx.	n.a.	well to sx.
Water Repellency	usu. extr.	n.a.	none or mod. to extr.
Hydraulic Conduct.	low to mod. high	n.a.	low to mod. high
Overland Flow	med. to rapid	med. to v. rapid	med. to rapid
PAWC	low	n.a.	low
EHR	mod. to high	n.a.	mod. to high
LSH	low	low	low
Trails	well suited	suitable to poorly suited	well suited
Campsites	well suited on nearly level to gently sloping	poorly suited to unsuitable	suitable on nearly level to gently sloping
Grazing	poorly suited	unsuitable	unsuitable
Wildlife Habitat	good to poor	fair to poor	fair to poor
Watershed Rating	mod. to mod. high	mod. to mod. high	mod. to mod. high
Fire Impacts	slt. to mod.	negligible	slt.
Acidic Precip.	susceptible	negligible	susceptible

118—Typic Cryorthents – Rock outcrop – Lithic Cryorthents complex, tephritic, 30 to 65 percent slopes.

Elevation: 6,400 to 10,800 feet.

Precipitation: 35 to 45 inches.

Component	Typic Cryorthent, tephritic	Rock outcrop	Lithic Cryorthent, tephritic
Proportion	40 %	35 %	15 %
Drainage Class	well to sx.	n.a.	well to sx.
Water Repellency	usu. extr.	n.a.	none or mod. to extr.
Hydraulic Conduct.	low to mod. high	n.a.	low to mod. high
Overland Flow	rapid to v. rapid	rapid to v. rapid	rapid to v. rapid
PAWC	low	n.a.	low
EHR	high to v. high	n.a.	high to v. high
LSH	mod. high to v. high	low to high	mod. high to v. high
Trails	poorly suited	poorly suited to unsuitable	poorly suited to unsuitable
Campsites	unsuitable	unsuitable	unsuitable
Grazing	unsuitable	unsuitable	unsuitable
Wildlife Habitat	good to poor	fair to poor	fair to poor
Watershed Rating	mod.	mod.	mod.
Fire Impacts	slt.	negligible	slt.
Acidic Precip.	susceptible	negligible	susceptible

119—Typic Cryorthents – Xeric Vitricryands – Rock outcrop complex, volcanic, 0 to 45 percent slopes.

Elevation: 8,200 to 10,700 feet.

Precipitation: 40 to 60 inches.

Component	Typic Cryorthent, volcanic	Xeric Vitricryand	Rock outcrop
Proportion	35 %	25 %	20 %
Drainage Class	well	well to sx.	n.a.
Water Repellency	none to mod.	slt. to extr.	n.a.
Hydraulic Conduct.	mod. high to high	mod. high to high	n.a.
Overland Flow	med. to v. rapid	med. to v. rapid	med. to v. rapid
PAWC	low	low	n.a.
EHR	mod. to high	mod. to high.	n.a.
LSH	low	low	low
Trails	well suited to suitable	suitable	suitable to poorly suited
Campsites	suitable on nearly level to gently sloping	suitable on nearly level to gently sloping	poorly suited to unsuitable
Grazing	poorly suited	poorly suited	unsuitable
Wildlife Habitat	fair to poor	fair to poor	fair to poor
Watershed Rating	mod. high	mod. high	mod. high
Fire Impacts	slt. to mod.	slt. to mod.	slt.
Acidic Precip.	susceptible	susceptible	negligible

120—Typic Torriorthents, 5 to 25 percent slopes.

Elevation: 3,700 to 5,000 feet.

Precipitation: 7 to 10 inches.

Component	Typic Torriorthent		
Proportion	90 %		
Drainage Class	sx. to ex.		
Water Repellency	none to slt.		
Hydraulic Conduct.	v. high		
Overland Flow	slow to rapid		
PAWC	v. low to low		
EHR	low to mod.		
LSH	low		
Trails	poorly suited		
Campsites	poorly suited		
Grazing	unsuitable		
Wildlife Habitat	poor		
Watershed Rating	low		
Fire Impacts	negligible		
Acidic Precip.	negligible		

121—Typic Torriorthents – Xeric Torriorthents association, 45 to 75 percent slopes.

Elevation: 4,000 to 7,200 feet.

Precipitation: 8 to 12 inches.

Component	Typic Torriorthent	Xeric Torriorthent	
Proportion	50 %	40 %	
Drainage Class	sx. to ex.	sx. to ex.	
Water Repellency	none to slt.	none to mod.	
Hydraulic Conduct.	v. high	mod. high to high	
Overland Flow	rapid to v. rapid	rapid to v. rapid	
PAWC	v. low to low	v. low to low	
EHR	v. high	v. high	
LSH	mod. low to mod. high	mod. low to mod. high	
Trails	poorly suited	poorly suited	
Campsites	unsuitable	unsuitable	
Grazing	unsuitable	unsuitable	
Wildlife Habitat	fair to poor	fair to poor	
Watershed Rating	low	low	
Fire Impacts	slt.	slt.	
Acidic Precip.	negligible	negligible	

122—Xeric Torriorthents – Typic Torriorthents – Rock outcrop association, 40 to 85 percent slopes.

Elevation: 4,400 to 7,200 feet.

Precipitation: 8 to 12 inches.

Component	Xeric Torriorthent	Typic Torriorthent	Rock outcrop
Proportion	45 %	30 %	20 %
Drainage Class	sx. to ex.	sx. to ex.	n.a.
Water Repellency	none to mod.	none to slt.	n.a.
Hydraulic Conduct.	mod. high to high	v. high	n.a.
Overland Flow	rapid to v. rapid	rapid to v. rapid	v. rapid
PAWC	v. low to low	v. low to low	n.a.
EHR	v. high	v. high	n.a.
LSH	mod. high to v. high	mod. high to v. high	low to v. high
Trails	poorly suited	poorly suited	poorly suited to unsuitable
Campsites	unsuitable	unsuitable	unsuitable
Grazing	unsuitable	unsuitable	unsuitable
Wildlife Habitat	poor	poor	poor
Watershed Rating	low	low	low
Fire Impacts	slt.	slt.	negligible
Acidic Precip.	negligible	negligible	negligible

123—Dystric Xerorthents – Dystric Xerochrepts complex, 15 to 50 percent slopes.

Elevation: 5,900 to 8,400 feet.

Precipitation: 30 to 40 inches.

Component	Dystric Xerorthent	Dystric Xerochrept	
Proportion	40 %	40 %	
Drainage Class	well to sx.	well to sx.	
Water Repellency	none to mod.	usu. slt. to extr.	
Hydraulic Conduct.	mod. high to high	mod. high to high	
Overland Flow	rapid	rapid	
PAWC	low	low	
EHR	high to v. high	high to v. high	
LSH	mod. low to mod. high	mod. low to mod. high	
Trails	suitable	suitable	
Campsites	unsuitable	unsuitable	
Grazing	poorly suited	poorly suited	
Wildlife Habitat	good to fair	good to fair	
Watershed Rating	mod. low	mod. low	
Fire Impacts	slt. or mod. to high	slt. or mod. to high	
Acidic Precip.	susceptible	susceptible	

124—Dystric Xerorthents – Dystric Xerochrepts – Rock outcrop complex, 40 to 85 percent slopes.

Elevation: 2,600 to 8,000 feet.

Precipitation: 30 to 40 inches.

Component	Dystric Xerorthent	Dystric Xerochrept	Rock outcrop
Proportion	40 %	25 %	25 %
Drainage Class	well to sx.	well to sx.	n.a.
Water Repellency	none to mod.	usu. slt. to extr.	n.a.
Hydraulic Conduct.	mod. high to high	mod. high to high	n.a.
Overland Flow	rapid to v. rapid	rapid to v. rapid	v. rapid
PAWC	low	low	n.a.
EHR	high to v. high	high to v. high	n.a.
LSH	mod. high to v. high	mod. high to v. high	mod. high to v. high
Trails	poorly suited	poorly suited	poorly suited to unsuitable
Campsites	unsuitable	unsuitable	unsuitable
Grazing	unsuitable	unsuitable	unsuitable
Wildlife Habitat	fair to poor	fair to poor	poor
Watershed Rating	mod. low	mod. low	low
Fire Impacts	mod. to high	mod. to high	negligible
Acidic Precip.	susceptible	susceptible	negligible

125—Dystric Xerorthents – Typic Xerumbrepts – Rock outcrop complex, 15 to 45 percent slopes.

Elevation: 5,200 to 9,200 feet.

Precipitation: 30 to 40 inches.

Component	Dystric Xerorthent	Typic Xerumbrept	Rock outcrop
Proportion	40 %	30 %	15 %
Drainage Class	well to sx.	well to sx.	n.a.
Water Repellency	none to mod.	slt. to extr.	n.a.
Hydraulic Conduct.	mod. high to high	mod. high to high	n.a.
Overland Flow	med. to rapid	med. to rapid	med. to v. rapid
PAWC	low	low	n.a.
EHR	mod. to v. high	mod. to v. high	n.a.
LSH	mod. low to mod. high	mod. low to mod. high	low
Trails	suitable	suitable	suitable to poorly suited
Campsites	unsuitable	unsuitable	unsuitable
Grazing	unsuitable	unsuitable	unsuitable
Wildlife Habitat	good to fair	good to fair	fair to poor
Watershed Rating	mod.	mod.	mod.
Fire Impacts	slt. to mod.	mod.	slt.
Acidic Precip.	susceptible	susceptible	negligible

126—Dystric Xerorthents – Rock outcrop – Typic Xerumbrepts complex, 0 to 30 percent slopes.

Elevation: 4,800 to 7,100 feet.

Precipitation: 40 to 50 inches.

Component	Dystric Xerorthent	Rock outcrop	Typic Xerumbrept
Proportion	35 %	30 %	25 %
Drainage Class	well to sx.	n.a.	well to sx.
Water Repellency	none to mod.	n.a.	slt. to extr.
Hydraulic Conduct.	mod. high to high	n.a.	mod. high to high
Overland Flow	slow to rapid	med. to v. rapid	slow to rapid
PAWC	low	n.a.	low
EHR	mod. to high	n.a.	mod. to high
LSH	low	low	low
Trails	well suited	suitable to poorly suited	well suited
Campsites	suitable on nearly level to gently sloping	suitable to unsuitable	suitable on nearly level to gently sloping
Grazing	poorly suited	unsuitable	poorly suited
Wildlife Habitat	good	fair to poor	good
Watershed Rating	mod. low	mod. low	mod. low
Fire Impacts	slt.	negligible	slt.
Acidic Precip.	susceptible	negligible	susceptible

127—Typic Xerorthents – Entic Haploxerolls complex, 15 to 50 percent slopes. Elevation: 6,100 to 10,200 feet. Precipitation: 8 to 20 inches.

Component	Typic Xerorthent	Entic Haploxeroll	
Proportion	50 %	35 %	
Drainage Class	well to sx.	well to sx.	
Water Repellency	none to extr.	none or slt. to extr.	
Hydraulic Conduct.	mod. high to v. high	mod. high to v. high	
Overland Flow	rapid	rapid	
PAWC	low	low	
EHR	high to v. high	high to v. high	
LSH	mod. low to mod. high	mod. low to mod. high	
Trails	suitable	suitable	
Campsites	poorly suited	poorly suited	
Grazing	poorly suited	poorly suited	
Wildlife Habitat	fair	fair	
Watershed Rating	low	low	
Fire Impacts	slt.	slt.	
Acidic Precip.	negligible	negligible	

128—Typic Xerorthents – Entic Haploxerolls – Typic Xerochrepts complex, 35 to 75 percent slopes. Elevation: 2,500 to 9,400 feet. Precipitation: 30 to 40 inches.

Component	Typic Xerorthent	Entic Haploxeroll	Typic Xerochrept
Proportion	35 %	30 %	20 %
Drainage Class	well to sx.	well to sx.	sx.
Water Repellency	none to extr.	none or slt. to extr.	mod. to extr.
Hydraulic Conduct.	high to v. high	high to v. high	high to v. high
Overland Flow	v. rapid	v. rapid	v. rapid
PAWC	v. low to low	v. low to low	v. low to low
EHR	v. high	v. high	v. high
LSH	mod. high to v. high	mod. high to v. high	mod. high to v. high
Trails	suitable to poorly suited	suitable to poorly suited	suitable to poorly suited
Campsites	unsuitable	unsuitable	unsuitable
Grazing	unsuitable	unsuitable	unsuitable
Wildlife Habitat	fair	fair	fair
Watershed Rating	low or mod. low to mod.	low or mod. low to mod.	low or mod. low to mod.
Fire Impacts	slt. or mod. high	slt. or mod. high	slt. or mod. high
Acidic Precip.	negligible	negligible	negligible

129—Typic Xerorthents – Rock outcrop complex, 15 to 50 percent slopes. Elevation: 5,200 to 9,300 feet. Precipitation: 8 to 12 inches.

Component	Typic Xerorthent	Rock outcrop	
Proportion	45 %	45 %	
Drainage Class	well to sx.	n.a.	
Water Repellency	none to extr.	n.a.	
Hydraulic Conduct.	mod. high to v. high	n.a.	
Overland Flow	rapid	rapid to v. rapid	
PAWC	v. low to low	n.a.	
EHR	high to v. high	n.a.	
LSH	mod. low to mod. high	low to mod. high	
Trails	suitable	suitable to poorly suited	
Campsites	unsuitable	unsuitable	
Grazing	poorly suited	unsuitable	
Wildlife Habitat	fair to poor	fair to poor	
Watershed Rating	low	low	
Fire Impacts	slt.	negligible	
Acidic Precip.	negligible	negligible	

130—Typic Xerorthents – Rock outcrop complex, 40 to 85 percent slopes.
Elevation: 5,800 to 9,000 feet.
Precipitation: 10 to 18 inches.

Component	Typic Xerorthent	Rock outcrop	
Proportion	55 %	35 %	
Drainage Class	well to sx.	n.a.	
Water Repellency	none to extr.	n.a.	
Hydraulic Conduct.	mod. high to v. high	n.a.	
Overland Flow	rapid to v. rapid	v. rapid	
PAWC	v. low to low	n.a.	
EHR	v. high	n.a.	
LSH	high to v. high	high to v. high	
Trails	poorly suited to unsuitable	poorly suited to unsuitable	
Campsites	unsuitable	unsuitable	
Grazing	unsuitable	unsuitable	
Wildlife Habitat	poor to fair	poor to fair	
Watershed Rating	low	low	
Fire Impacts	slt.	negligible	
Acidic Precip.	negligible	negligible	

131—Typic Torripsamments, 25 to 55 percent slopes.
Elevation: 4,000 to 6,400 feet.
Precipitation: 8 to 12 inches.

Component	Typic Torripsamment		
Proportion	90 %		
Drainage Class	ex.		
Water Repellency	none		
Hydraulic Conduct.	v. high		
Overland Flow	slow		
PAWC	v. low		
EHR	high to v. high		
LSH	mod. low		
Trails	poorly suited		
Campsites	unsuitable		
Grazing	unsuitable		
Wildlife Habitat	poor		
Watershed Rating	low		
Fire Impacts	negligible		
Acidic Precip.	negligible		

132—Typic Torripsamments – Typic Torriorthents – Rock outcrop complex, 25 to 55 percent slopes.
Elevation: 4,200 to 6,800 feet.
Precipitation: 8 to 12 inches.

Component	Typic Torripsamment	Typic Torriorthent	Rock outcrop
Proportion	50 %	30 %	15 %
Drainage Class	ex.	sx. to ex.	n.a.
Water Repellency	none	none to slt.	n.a.
Hydraulic Conduct.	v. high	v. high	n.a.
Overland Flow	slow	slow	rapid to v. rapid
PAWC	v. low	v. low	n.a.
EHR	v. high	high to v. high	n.a.
LSH	mod. low to mod. high	mod. low to mod. high	low to mod. high
Trails	poorly suited	poorly suited	suitable to poorly suited
Campsites	unsuitable	unsuitable	unsuitable
Grazing	unsuitable	unsuitable	unsuitable
Wildlife Habitat	poor to fair	poor to fair	poor to fair
Watershed Rating	low	low	low
Fire Impacts	negligible	negligible	negligible
Acidic Precip.	negligible to slt.	negligible to slt.	negligible

133—Dystric Cryochrepts – Typic Cryorthents association, 0 to 30 percent slopes.
Elevation: 7,200 to 10,500 feet.
Precipitation: 30 to 45 inches.

Component	Dystric Cryochrept	Typic Cryorthent	
Proportion	40 %	40 %	
Drainage Class	well to sx.	mod. well to sx.	
Water Repellency	usu. slt. to extr.	none or slt. to extr.	
Hydraulic Conduct.	low to mod. high	low to mod. high	
Overland Flow	med. to v. rapid	med. to v. rapid	
PAWC	low to mod.	low	
EHR	mod. to high	mod. to high	
LSH	low	low	
Trails	well suited	well suited	
Campsites	well suited on nearly level to gently sloping	well suited on nearly level to gently sloping	
Grazing	poorly suited	poorly suited	
Wildlife Habitat	good	good	
Watershed Rating	mod. high	mod. high	
Fire Impacts	mod. to slt.	mod. to slt.	
Acidic Precip.	susceptible	susceptible	

134—Dystric Cryochrepts – Entic Cryumbrepts – Typic Cryorthents complex, 0 to 45 percent slopes.
Elevation: 8,000 to 12,000 feet.
Precipitation: 30 to 60 inches.

Component	Dystric Cryochrept	Entic Cryumbrept	Typic Cryorthent
Proportion	35 %	25 %	20 %
Drainage Class	well to sx.	well to sx.	mod. well to sx.
Water Repellency	usu. slt. to extr.	usu. slt. to extr.	none or slt. to extr.
Hydraulic Conduct.	mod. high to high	mod. high to high	mod. high to high
Overland Flow	slow to rapid	slow to rapid	slow to rapid
PAWC	low to mod.	low to mod.	low
EHR	mod. to high	mod. to high	mod. to high
LSH	low to mod. low	low to mod. low	low to mod. low
Trails	well suited	well suited	well suited
Campsites	well suited on nearly level to gently sloping	well suited on nearly level to gently sloping	well suited on nearly level to gently sloping
Grazing	suitable to poorly suited	suitable to poorly suited	suitable to poorly suited
Wildlife Habitat	good	good	good
Watershed Rating	mod. high to high	mod. high to high	mod. high to high
Fire Impacts	mod. to slt.	mod. to slt.	mod. to slt.
Acidic Precip.	susceptible	susceptible	susceptible

135—Typic Xerochrepts, 15 to 45 percent slopes.
Elevation: 6,600 to 10,100 feet.
Precipitation: 15 to 25 inches.

Component	Typic Xerochrept		
Proportion	80 %		
Drainage Class	well to ex.		
Water Repellency	mod. to extr.		
Hydraulic Conduct.	mod. high to high		
Overland Flow	rapid		
PAWC	low		
EHR	mod. to high		
LSH	mod. low		
Trails	well suited		
Campsites	poorly suited		
Grazing	poorly suited		
Wildlife Habitat	good		
Watershed Rating	mod.		
Fire Impacts	mod.		
Acidic Precip.	susceptible		

136—Entic Cryumbrepts – Mollic Cryoboralfs association, 0 to 25 percent slopes.
Elevation: 11,200 to 11,700 feet.
Precipitation: 20 to 25 inches.

Component	Entic Cryumbrept	Mollic Cryoboralf	
Proportion	55 %	35 %	
Drainage Class	well to sx.	well	
Water Repellency	usu. slt. to extr.	none or slt. to extr.	
Hydraulic Conduct.	mod. high to high	mod. low to mod.	
Overland Flow	slow to rapid	slow to rapid	
PAWC	low	low	
EHR	low to mod.	low to mod.	
LSH	low	low	
Trails	well suited	well suited	
Campsites	well suited on nearly level to gently sloping	well suited on nearly level to gently sloping	
Grazing	unsuitable	unsuitable	
Wildlife Habitat	poor	poor	
Watershed Rating	low	low	
Fire Impacts	slt.	slt.	
Acidic Precip.	susceptible	susceptible	

137—Typic Cryumbrepts, 0 to 30 percent slopes.
Elevation: 8,000 to 10,600 feet.
Precipitation: 30 to 45 inches.

Component	Typic Cryumbrept		
Proportion	90 %		
Drainage Class	well to sx.		
Water Repellency	none or slt. to mod.		
Hydraulic Conduct.	mod. low or mod. high to high		
Overland Flow	med. to rapid		
PAWC	low		
EHR	low to high		
LSH	low		
Trails	well suited		
Campsites	well suited on nearly level to gently sloping		
Grazing	poorly suited		
Wildlife Habitat	good		
Watershed Rating	mod.		
Fire Impacts	mod.		
Acidic Precip.	susceptible		

138—Typic Cryumbrepts – Xeric Vitricryands – Rock outcrop complex, volcanic, 0 to 45 percent slopes.
Elevation: 7,700 to 11,100 feet.
Precipitation: 40 to 55 inches.

Component	Typic Cryumbrept volcanic	Xeric Vitricryand	Rock outcrop
Proportion	40 %	25 %	20 %
Drainage Class	well to sx.	well to sx.	n.a.
Water Repellency	none or slt. to mod.	slt. to extr.	n.a.
Hydraulic Conduct.	mod. high to high	low, mod. low, or mod. high	n.a.
Overland Flow	slow to rapid	slow to rapid	med. to v. rapid
PAWC	low	low to mod.	n.a.
EHR	mod. to v. high	mod. to v. high	n.a.
LSH	low to mod. low	low to mod. low	low
Trails	well suited	suitable	suitable to poorly suited
Campsites	well suited on nearly level to gently sloping	suitable on nearly level to gently sloping	poorly suited to unsuitable
Grazing	well suited	well suited	unsuitable
Wildlife Habitat	good	good	fair to poor
Watershed Rating	mod. high	mod. high	mod.
Fire Impacts	slt. to mod.	slt. to mod.	negligible
Acidic Precip.	susceptible	susceptible	negligible

139—Typic Cryumbrepts – Typic Cryorthents – Rock outcrop complex, 0 to 30 percent slopes.

Elevation: 8,600 to 10,900 feet.

Precipitation: 30 to 60 inches.

Component	Typic Cryumbrept	Typic Cryorthent	Rock outcrop
Proportion	35 %	30 %	25 %
Drainage Class	well to sx.	mod. well to sx.	n.a.
Water Repellency	none or slt. to mod.	none or slt. to extr.	n.a.
Hydraulic Conduct.	mod. low to mod. high	mod. low to mod. high	n.a.
Overland Flow	med. to rapid	med. to rapid	med. to v. rapid
PAWC	low	low	n.a.
EHR	low to high	low to high	n.a.
LSH	low	low	low
Trails	well suited	well suited	suitable
Campsites	well suited on nearly level to gently sloping	well suited on nearly level to gently sloping	well suited to unsuitable
Grazing	suitable to unsuitable	suitable to unsuitable	unsuitable
Wildlife Habitat	good to fair	good to fair	fair to poor
Watershed Rating	mod. to mod high	mod. to mod. high	mod. to low
Fire Impacts	slt. to mod.	slt. to mod.	negligible
Acidic Precip.	susceptible, well suited for monitoring	susceptible, well suited for monitoring	negligible

140—Typic Cryumbrepts – Dystric Cryochrepts – Typic Cryorthents association, 0 to 30 percent slopes.

Elevation: 7,700 to 10,700 feet.

Precipitation: 40 to 60 inches.

Component	Typic Cryumbrept	Dystric Cryochrept	Typic Cryorthent
Proportion	40 %	30 %	20 %
Drainage Class	well to sx.	well to sx.	mod. well to sx.
Water Repellency	none or slt. to mod.	usu. slt. to extr.	none or slt. to extr.
Hydraulic Conduct.	mod. low to mod. high	mod. low to mod. high	mod. low to mod. high
Overland Flow	med. to rapid	med. to v. rapid	med. to rapid
PAWC	low	low	low
EHR	low to high	low to high	low to high
LSH	low	low	low
Trails	well suited	well suited	well suited
Campsites	well suited on nearly level to gently sloping	well suited on nearly level to gently sloping	well suited on nearly level to gently sloping
Grazing	well suited to poorly suited	well suited to poorly suited	well suited to poorly suited
Wildlife Habitat	good to fair	good to fair	good to fair
Watershed Rating	high	high	high
Fire Impacts	mod.	mod.	mod.
Acidic Precip.	susceptible, well suited for monitoring	susceptible, well suited for monitoring	susceptible, well suited for monitoring

141—Typic Cryumbrepts – Dystric Cryochrepts – Typic Cryorthents complex, 15 to 45 percent slopes.

Elevation: 7,700 to 11,600 feet.

Precipitation: 35 to 55 inches.

Component	Typic Cryumbrept	Dystric Cryochrept	Typic Cryorthent
Proportion	35 %	30 %	25 %
Drainage Class	well to sx.	well to sx.	mod. well to sx.
Water Repellency	none or slt. to mod.	usu. slt. to extr.	none or slt. to extr.
Hydraulic Conduct.	mod. low to mod. high	mod. low to mod. high	mod. low to mod. high
Overland Flow	rapid	rapid	rapid
PAWC	low	low	low
EHR	mod. to high	mod. to high	mod. to high
LSH	mod. low	mod. low	mod. low
Trails	suitable	suitable	suitable
Campsites	unsuitable	unsuitable	unsuitable
Grazing	unsuitable	unsuitable	unsuitable
Wildlife Habitat	good to fair	good to fair	good to fair
Watershed Rating	mod. to mod. high	mod. to mod. high	mod. to mod. high
Fire Impacts	mod.	mod.	mod.
Acidic Precip.	susceptible, well suited for monitoring	susceptible, well suited for monitoring	susceptible, well suited for monitoring

142—Entic Xerumbrepts – Dystric Xerorthents – Rock outcrop association, 40 to 85 percent slopes.
Elevation: 3,000 to 9,600 feet.
Precipitation: 30 to 40 inches.

Component	Entic Xerumbrept	Dystric Xerorthent	Rock outcrop
Proportion	45 %	25 %	20 %
Drainage Class	well to sx.	well to sx.	n.a.
Water Repellency	none or slt. to extr.	none to mod.	n.a.
Hydraulic Conduct.	mod. high to high	mod. high to high	n.a.
Overland Flow	rapid to v. rapid	rapid to v. rapid	v. rapid
PAWC	v. low to low	v. low to low	n.a.
EHR	v. high	v. high	n.a.
LSH	high to v. high	high to v. high	mod. high to v. high
Trails	poorly suited to unsuitable	poorly suited to unsuitable	poorly suited to unsuitable
Campsites	unsuitable	unsuitable	unsuitable
Grazing	unsuitable	unsuitable	unsuitable
Wildlife Habitat	good to poor	good to poor	poor
Watershed Rating	mod. low	mod. low	low
Fire Impacts	slt. to mod. high	mod. to high	negligible
Acidic Precip.	susceptible	susceptible	negligible

143—Typic Xerumbrepts – Entic Xerumbrepts – Dystric Xerorthents complex, 5 to 30 percent slopes.
Elevation: 6,300 to 8,500 feet.
Precipitation: 40 inches.

Component	Typic Xerumbrept	Entic Xerumbrept	Dystric Xerorthent
Proportion	30 %	30 %	25 %
Drainage Class	well to sx.	well to sx.	well to sx.
Water Repellency	slt. to extr.	none or slt. to extr.	none to mod.
Hydraulic Conduct.	mod. low to mod. high	mod. low to mod. high	mod. low to mod. high
Overland Flow	med. to rapid	med. to rapid	med. to rapid
PAWC	low to mod.	low to mod.	low to mod.
EHR	low to high	low to high	low to high
LSH	low	low	low
Trails	well suited	well suited	well suited
Campsites	suitable on most gently sloping	suitable on most gently sloping	suitable on most gently sloping
Grazing	suitable	suitable	suitable
Wildlife Habitat	good	good	good
Watershed Rating	mod.	mod.	mod.
Fire Impacts	mod.	mod.	mod.
Acidic Precip.	susceptible	susceptible	susceptible

144—Entic Haploxerolls – Typic Cryoborolls association, 15 to 45 percent slopes.
Elevation: 7,300 to 10,900 feet.
Precipitation: 8 to 20 inches.

Component	Entic Haploxeroll	Typic Cryoboroll	
Proportion	50 %	40 %	
Drainage Class	well to sx.	well to sx.	
Water Repellency	none or slt. to extr.	usu. slt. to extr.	
Hydraulic Conduct.	mod. high to v. high	mod. high to v. high	
Overland Flow	rapid	rapid	
PAWC	low to mod.	low to mod.	
EHR	mod. to high	mod. to high	
LSH	mod. low	mod. low	
Trails	suitable	suitable	
Campsites	unsuitable	unsuitable	
Grazing	poorly suited	poorly suited	
Wildlife Habitat	good to fair	good to fair	
Watershed Rating	low to mod. low	low to mod. low	
Fire Impacts	slt.	slt.	
Acidic Precip.	susceptible	susceptible	

145—Entic Haploxerolls – Typic Cryoborolls
 – Rock outcrop association, 50 to 85 percent slopes.
 Elevation: 6,800 to 11,200 feet.
 Precipitation: 10 to 25 inches.

Component	Entic Haploxeroll	Typic Cryoboroll	Rock outcrop
Proportion	40 %	30 %	15 %
Drainage Class	well to sx.	well to sx.	n.a.
Water Repellency	none or slt. to extr.	usu. slt. to extr.	n.a.
Hydraulic Conduct.	mod. high to v. high	mod. high to v. high	n.a.
Overland Flow	rapid	rapid	v. rapid
PAWC	low	low	n.a.
EHR	v. high	v. high	n.a.
LSH	mod. high	mod. high	mod. high
Trails	poorly suited to unsuitable	poorly suited to unsuitable	poorly suited to unsuitable
Campsites	unsuitable	unsuitable	unsuitable
Grazing	unsuitable	unsuitable	unsuitable
Wildlife Habitat	fair to poor	fair to poor	poor
Watershed Rating	low	low	low
Fire Impacts	slt.	slt.	negligible
Acidic Precip.	susceptible	susceptible	negligible

146—Rock outcrop and rubble land.
 Elevation: above 8,100 feet.
 Precipitation: 20 to 70 inches.

Component	Rock outcrop and rubble		
Proportion	85 %		
Drainage Class	n.a.		
Water Repellency	n.a.		
Hydraulic Conduct.	n.a.		
Overland Flow	med. to v. rapid		
PAWC	n.a.		
EHR	n.a.		
LSH	low to mod. high		
Trails	suitable to unsuitable		
Campsites	suitable to unsuitable		
Grazing	unsuitable		
Wildlife Habitat	poor		
Watershed Rating	high		
Fire Impacts	negligible		
Acidic Precip.	negligible		

147—Rock outcrop – Typic Cryorthents complex, 0 to 45 percent slopes.
 Elevation: 7,100 to 13,100 feet.
 Precipitation: 40 to 50 inches.

Component	Rock outcrop	Typic Cryorthent	
Proportion	60 %	30 %	
Drainage Class	n.a.	mod. well to sx.	
Water Repellency	n.a.	none or slt. to extr.	
Hydraulic Conduct.	n.a.	mod. high	
Overland Flow	med. to v. rapid	med. to rapid	
PAWC	n.a.	v. low to low	
EHR	n.a.	mod. to high	
LSH	low	low to mod. low	
Trails	suitable to poorly suited	well suited	
Campsites	well suited to unsuitable	well suited on nearly level to gently sloping	
Grazing	unsuitable	suitable to unsuitable	
Wildlife Habitat	poor to fair	poor to fair	
Watershed Rating	mod. to high	mod. to high	
Fire Impacts	negligible	slt. to negligible	
Acidic Precip.	negligible	susceptible	

148—Rock outcrop – Typic Cryorthents complex, 40 to 85 percent slopes.
Elevation: 6,100 to 14,000 feet.
Precipitation: 20 to 65 inches.

Component	Rock outcrop	Typic Cryorthent	
Proportion	70 %	25 %	
Drainage Class	n.a.	mod. well to sx.	
Water Repellency	n.a.	none or slt. to extr.	
Hydraulic Conduct.	n.a.	mod. high	
Overland Flow	v. rapid	v. rapid	
PAWC	n.a.	low	
EHR	n.a.	v. high	
LSH	low to v. high	high to v. high	
Trails	poorly suited to unsuitable	suitable to unsuitable	
Campsites	unsuitable	unsuitable	
Grazing	unsuitable	unsuitable	
Wildlife Habitat	poor	poor	
Watershed Rating	low to high	low to high	
Fire Impacts	negligible	slt.	
Acidic Precip.	negligible	susceptible	

149—Rock outcrop – Typic Cryorthents – Lithic Cryorthents complex, 0 to 30 percent slopes.
Elevation: 7,600 to 11,000 feet.
Precipitation: 40 to 50 inches.

Component	Rock outcrop	Typic Cryorthent	Lithic Cryorthent
Proportion	55 %	25 %	15 %
Drainage Class	n.a.	mod. well to sx.	well to sx.
Water Repellency	n.a.	none or slt. to extr.	none or mod. to extr.
Hydraulic Conduct.	n.a.	low to mod. high	low to mod. high
Overland Flow	med. to v. rapid	med. to rapid	med. to rapid
PAWC	n.a.	low	low
EHR	n.a.	mod. to high	mod. to high
LSH	low	low	low
Trails	suitable to poorly suited	well suited	well suited
Campsites	poorly suited to unsuitable	well suited on nearly level to gently sloping	well suited on nearly level to gently sloping
Grazing	unsuitable	poorly suited	unsuitable
Wildlife Habitat	poor to fair	good to fair	fair
Watershed Rating	mod. to low	mod. low to mod.	mod. low to mod.
Fire Impacts	negligible	slt. to mod.	slt.
Acidic Precip.	negligible	susceptible	susceptible

150—Rock outcrop – Typic Cryorthents complex, volcanic 10 to 45 percent slopes.
Elevation: 8,700 to 11,200 feet.
Precipitation: 35 to 45 inches.

Component	Rock outcrop	Typic Cryorthent, volcanic	
Proportion	55 %	40 %	
Drainage Class	n.a.	well	
Water Repellency	n.a.	none to mod.	
Hydraulic Conduct.	n.a.	mod. high to high	
Overland Flow	med. to v. rapid	med. to v. rapid	
PAWC	n.a.	mod.	
EHR	n.a.	mod. to high	
LSH	low	low to mod. low	
Trails	suitable to poorly suited	well suited to suitable	
Campsites	unsuitable	poorly suited	
Grazing	unsuitable	poorly suited	
Wildlife Habitat	poor to fair	poor to fair	
Watershed Rating	mod. high	mod. high	
Fire Impacts	negligible	slt.	
Acidic Precip.	negligible	susceptible, well suited for monitoring	

151—Rock outcrop – Typic Cryorthents – Lithic Cryorthents association, volcanic, 0 to 30 percent slopes.
Elevation: 8,000 to 11,100 feet.
Precipitation: 50 inches.

Component	Rock outcrop	Typic Cryorthent, volcanic	Lithic Cryorthent
Proportion	50 %	25 %	15 %
Drainage Class	n.a.	well	well to sx.
Water Repellency	n.a.	none to mod.	none or mod. to extr.
Hydraulic Conduct.	n.a.	mod. high to high	mod. high to high
Overland Flow	med. to v. rapid	slow to v. rapid	slow to v. rapid
PAWC	n.a.	mod.	mod.
EHR	n.a.	mod. to high	mod. to high
LSH	low	low	low
Trails	suitable to poorly suited	well suited	well suited
Campsites	suitable to unsuitable	well suited on nearly level to gently sloping	well suited on nearly level to gently sloping
Grazing	unsuitable	unsuitable	unsuitable
Wildlife Habitat	poor to fair	fair	poor to fair
Watershed Rating	mod. to low	mod.	mod.
Fire Impacts	negligible	slt.	slt.
Acidic Precip.	negligible	susceptible	susceptible

152—Rock outcrop – Typic Cryorthents – Typic Cryoborolls complex, volcanic, 25 to 50 percent slopes.
Elevation: 8,900 to 11,600 feet.
Precipitation: 40 to 50 inches.

Component	Rock outcrop	Typic Cryorthent, volcanic	Typic Cryoboroll
Proportion	40 %	35 %	20 %
Drainage Class	n.a.	well	well to sx.
Water Repellency	n.a.	none to mod.	usu. slt. to extr.
Hydraulic Conduct.	n.a.	mod. high to high	mod. high to high
Overland Flow	med. to v. rapid	med. to v. rapid	med. to v. rapid
PAWC	n.a.	mod.	mod.
EHR	n.a.	high to v. high	high to v. high
LSH	mod. low	mod. low to mod. high	mod. low to mod. high
Trails	suitable to poorly suited	suitable	suitable
Campsites	unsuitable	unsuitable	unsuitable
Grazing	unsuitable	unsuitable	unsuitable
Wildlife Habitat	poor to fair	poor to fair	poor to fair
Watershed Rating	mod. low	mod. low	mod. low
Fire Impacts	negligible	slt.	slt.
Acidic Precip.	negligible	susceptible, well suited for monitoring	susceptible, well suited for monitoring

153—Rock outcrop – Dystric Xerorthents complex, 30 to 75 percent slopes.
Elevation: 4,000 to 6,900 feet.
Precipitation: 35 to 40 inches.

Component	Rock outcrop	Dystric Xerorthent	
Proportion	40 %	35 %	
Drainage Class	n.a.	well to sx.	
Water Repellency	n.a.	none to mod.	
Hydraulic Conduct.	n.a.	mod. high to high	
Overland Flow	v. rapid	rapid to v. rapid	
PAWC	n.a.	v. low to low	
EHR	n.a.	v. high	
LSH	mod. low to v. high	mod. low to v. high	
Trails	suitable to poorly suited	suitable to poorly suited	
Campsites	unsuitable	unsuitable	
Grazing	unsuitable	unsuitable	
Wildlife Habitat	poor	poor to fair	
Watershed Rating	mod. low	mod. low	
Fire Impacts	negligible	slt.	
Acidic Precip.	negligible	susceptible	

154—Rock outcrop – Dystric Xerorthents –
Dystric Xerochrepts complex, 15 to 50
percent slopes.
Elevation: 4,000 to 7,800 feet.
Precipitation: 30 to 40 inches.

Component	Rock outcrop	Dystric Xerorthent	Dystric Xerochrept
Proportion	40 %	35 %	20 %
Drainage Class	n.a.	well to sx.	well to sx.
Water Repellency	n.a.	none to mod.	usu. slt. to extr.
Hydraulic Conduct.	n.a.	mod. high to high	mod. high to high
Overland Flow	v. rapid	rapid	rapid
PAWC	n.a.	low	low
EHR	n.a.	high to v. high	high to v. high
LSH	low to mod. low	low to mod. high	low to mod. high
Trails	suitable to poorly suited	suitable	suitable
Campsites	unsuitable	unsuitable	unsuitable
Grazing	unsuitable	poorly suited	poorly suited
Wildlife Habitat	poor	poor to fair	fair
Watershed Rating	low	low	low
Fire Impacts	negligible	slt.	slt.
Acidic Precip.	negligible	susceptible	susceptible

155—Rock outcrop – Typic Torriorthents
complex, 25 to 55 percent slopes.
Elevation: 4,000 to 7,200 feet.
Precipitation: 10 to 16 inches.

Component	Rock outcrop	Typic Torriorthent	
Proportion	45 %	45 %	
Drainage Class	n.a.	sx. to ex.	
Water Repellency	n.a.	none to slt.	
Hydraulic Conduct.	n.a.	v. high	
Overland Flow	rapid to v. rapid	med. to rapid	
PAWC	n.a.	v. low	
EHR	n.a.	high to v. high	
LSH	low to mod. high	mod. low to mod. high	
Trails	poorly suited	poorly suited	
Campsites	unsuitable	unsuitable	
Grazing	unsuitable	unsuitable	
Wildlife Habitat	poor	poor	
Watershed Rating	low	low	
Fire Impacts	negligible	negligible	
Acidic Precip.	negligible	negligible	

Soil Descriptions: The Taxonomic Units

A taxonomic unit description defines and classifies the individual soils identified and mapped in the survey area. Soils in a taxonomic unit are similar within a given range in characteristics determined from field investigations and, to a limited extent, laboratory analyses. Although the taxonomic unit descriptions cover each soil investigated in the survey, they do not include all soils that might be found in the survey area. Undoubtedly, the area contains many more soils that are of minor extent, and that could be included in more intensive mapping, such as at order-3 or order-2.

The following descriptions are considered typical for soils in the taxonomic unit. For each unit, a reference pedon is described, and the range in observed characteristics is given. Unless otherwise noted, all soil depths given in Range in Characteristics indicate depths beyond which digging by hand becomes impracticable because of large rock fragments. Roots and lower C horizon boundaries usually extend below this depth.

The soils are arranged alphabetically within taxonomic groups. They are described according to standards set by the National Cooperative Soil Survey and defined in the *Soil Survey Manual* (Soil Survey Division Staff, 1993). The soil taxonomic system was explained briefly in the Introduction under the heading "Naming the Soils," and additional technical terms are defined in the Glossary. Precise, detailed morphological and taxonomic criteria and definitions can be found in *Soil Taxonomy* (Soil Survey Staff, 1975), *Keys to Soil Taxonomy* (Soil Survey Staff, 1992), and *Soil Survey Manual* (Soil Survey Division Staff, 1993).

ALFISOLS

Mollic Cryoboralfs

Mollic Cryoboralfs are moderately deep to very deep, well drained soils formed in material weathered from volcanic or granitic rock. These soils are on broad, unglaciated mountain ridges, alluvial bottoms, and plateaus at

elevations ranging from 6,200 to 11,700 feet. Slope steepness ranges from 0 to 30 percent. Mean annual precipitation is 15 to 45 inches, most of which falls as snow. Vegetation series include red fir, lodgepole pine, and whitebark pine.

A representative pedon (#46) is a loamy-skeletal, mixed Typic Cryoboralf in a unit of Mollic Cryoboralfs – Typic Cryumbrepts association, 0 to 30 percent slopes (map unit 101). The soil formed in andesitic residuum on a 14 percent southwest facing shoulder slope at 7,980 feet elevation, in the red fir vegetation series. The soil is located in the southwestern portion of Junction Bluffs in SW 1/4, NW 1/4, S 9, T 5 S, R 26 E, MDM; Devils Postpile SW quadrangle; latitude 37° 30' 38", longitude 119° 08' 37".

Oi—1 inch to 0; red fir litter.

A1—0 to 4 inches; dark brown (7.5YR 4/4) stony sandy loam, dark reddish brown (5YR 3/2) moist; weak, very fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, and medium roots; 10 percent gravel, 5 percent cobbles, 15 percent stones; very strongly acid (pH 5.0); abrupt smooth boundary.

A2—4 to 8 inches; brown (7.5YR 4/4) very stony sandy loam, dark reddish brown (5YR 3/3) moist; weak, fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine, many fine, and medium roots; 12 percent gravel, 10 percent cobbles, and 20 percent stones; very strongly acid (pH 5.0); abrupt wavy boundary.

Bt1—8 to 26 inches; brown (7.5YR 5/4) very cobbly loam, dark reddish brown (5YR 3/3) moist; weak, fine subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; very few thin clay films lining pores; common very fine, many fine and medium, and common coarse roots; 15 percent gravel, 40 percent cobbles; strongly acid (pH 5.5); clear wavy boundary.

Bt2—26 to 39 inches; brown (7.5YR 4/4) very cobbly sandy clay loam, dark reddish brown (5YR 3/3) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; common thin clay films lining pores; few very fine, common fine and medium roots; 15 percent gravel, 35 percent cobbles; strongly acid (pH 5.5).

Cr—below 39 inches: hard, clayey saprolite.

Remarks: The A1 and A2 horizons are extremely water repellent; the Bt1 horizon is very slightly water repellent. Surface coarse fragments cover approximately 10 percent of the area. Soil erosion is not evident in the area. Soil temperature at 20 inches depth was 50° F on 7/12/88.

Range in characteristics: Depth of the solum is 18 to 40 inches. Depth to soft bedrock is estimated to be 36 to more than 60 inches. Rock fragment contents, which commonly increase with depth, range from 2 to 45 percent for gravel, and 0 to 40 percent for cobbles, stones and boulders. Surface rock fragments range from 10 to 60 percent. Soil reaction is very strongly acid to moderately acid. Base saturation is assumed to be less than 50 percent throughout the pedon.

A horizon colors are 7.5YR, 10YR, or 2.5Y, with values ranging from 3 to 6 (2 to 4 moist), and chromas from 1 to 4 (1 to 3 moist). Thickness is from 1 to 10 inches. Textures are loamy sand, sandy loam, or loam, commonly with gravelly through very stony modifiers. Structures are single grain to moderate, very fine granular.

Bt horizon colors are 7.5YR, 10YR, or 2.5Y, with values ranging from 4 to 6 (3 to 6 moist), and chromas from 2 to 4 (2 to 4 moist). Thickness ranges from 12 to 32 inches. Textures are sandy loam or sandy clay loam, commonly with gravelly through very stony modifiers. Structures are weak, fine subangular blocky to moderate, medium subangular blocky or massive.

C horizon colors are 7.5YR, 10YR, or 2.5Y, with values of 5 or 6 (4 or 5 moist), and chromas of 3 or 4 (2 or 3 moist).

Remarks: Fewer than half the soils are slightly to extremely water repellent in the surface horizon. Some pedons have BA or BC

transitional horizons. The soil moisture regime is dominantly udic, especially in the red fir zone, and to a lesser extent xeric. Soils near the lower end of the elevational range may be marginal to Eutric Glossoboralfs or Typic Haploxeralfs.

ANDISOLS

Xeric Vitricryands

Xeric Vitricryands are moderately deep to very deep, well drained to somewhat excessively drained soils formed from pumice overlying or mixed with andesitic, basaltic, tuffaceous, or granitic materials. These soils are on mountain sides and ridges, and in glacial till and alluvium, at elevations between 7,300 and 10,800 feet. Slope steepness ranges from 0 to 55 percent. Mean annual precipitation is 30 to 60 inches, most of which falls as snow. Vegetation series include mixed conifer, lodgepole pine, red fir, white-bark pine, and alpine dwarf shrub.

A representative pedon (#81) is an ashy-pumiceous over sandy Xeric Vitricryand in a unit of Xeric Vitricryands, 0 to 30 percent slopes (map unit 102). The soil formed in pumice over mixed granitic glacial drift and colluvium on a 10 percent, southwest facing back slope at 9,000 feet elevation in the lower fringe of the lodgepole pine vegetation series. The soil is located approximately midway between Mammoth Pass and Red Cones in NE 1/4, NE 1/4, S 13, T 4 S, R 26 E, MDM; Devil's Postpile SE quadrangle; latitude 37° 36' 18", longitude 119° 03' 00".

Oi—2 to 1 inch; conifer litter.

Oe—1 inch to 0; decomposing conifer litter.

A—0 to 9 inches; light gray (10YR 7/2) extremely gravelly coarse sand, light yellowish brown (10YR 6/4) moist; single grain; loose, nonsticky, nonplastic; many very fine, common fine, medium, and coarse roots; 75 percent gravel; very strongly acid (pH 4.6); clear wavy boundary.

C—9 to 15 inches; pale brown (10YR 6/3) extremely gravelly coarse sand, yellowish brown (10YR 5/4) moist; massive and single grain; loose, nonsticky, nonplastic; many very fine, common fine, few

medium and coarse roots; 65 percent gravel; very strongly acid (pH 5.0); abrupt smooth boundary.

Cq—15 to 17 inches; light gray (10YR 7/2) very gravelly coarse sand, light yellowish brown (10YR 6/4) moist; massive; slightly hard, very friable, nonsticky, nonplastic; common very fine and fine, few medium roots; 35 percent gravel; strongly acid (pH 5.2); abrupt smooth boundary.

2C1—17 to 27 inches; light yellowish brown (10YR 6/4) loamy coarse sand, strong brown (7.5YR 5/6) moist; weak very fine granular structure; loose, very friable, nonsticky, nonplastic; few very fine, common fine and medium, few coarse roots; 1 percent gravel; moderately acid (pH 6.0); clear smooth boundary.

2C2—27 to 39 inches; brownish yellow (10YR 6/6) loamy coarse sand, yellowish brown (10YR 5/6) moist; massive; loose, very friable, nonsticky, nonplastic; few very fine, common fine, few medium and coarse roots; 2 percent gravel; moderately acid (pH 6.0).

Remarks: The soil to 17 inches depth is derived from pumice (lapilli and ash). Below 17 inches, pumice is mixed with granitic materials, especially in krotovinas. Lapilli in the A horizon tend to be coarser than those in the C horizon. The horizon between 15 and 17 inches depth is distinctly harder, at least when dry, than other horizons. It is given the subdivision q to indicate an accumulation of secondary silica, which is assumed to be present, and the cause of induration. It is hardest in its upper 1/2 inch. Although roots penetrate this layer, they are less abundant below it than above it. Abundant fungal mycelia were noted especially in the C and 2C2 horizons. Water repellency is extreme in the A horizon, moderate in the C horizon, moderate to extreme in the Cq horizon, moderate in the 2C1 horizon, and moderate to extreme in the 2C2 horizon. Surface coarse fragments cover approximately 30 percent of the site. The soil is susceptible to sheet erosion, and small gullies are present over about 20 percent of the site. Soil temperature at 20 inches depth was 52° F on 8/6/88. Vegetation on the site includes lodgepole pine (10 percent cover), mountain

hemlock (10 percent cover), red fir (7 percent cover), western white pine (5 percent cover), and lupine (8 percent cover).

Range in Characteristics: Depth of the solum is 3 to 38 inches. Rock fragment contents range from 1 to 85 percent for gravel throughout, and 0 to 60 percent for cobbles, stones, and boulders in the B and C horizons. Surface rock fragments range from 3 to 90 percent, with the highest values attributed to lapilli. Soil reaction is very strongly acid to slightly acid.

A horizon colors are 7.5YR, 10YR, or 2.5Y, with values ranging from 5 to 8 (2 to 6 moist), and chromas from 1 to 4 (1 to 4 moist). Textures are sand, loamy sand, or sandy loam, commonly with extremely gravelly to gravelly modifiers. Structures are single grain or massive to weak subangular blocky. Horizon thickness is from 3 to 17 inches.

Some soils have B horizons having colors that are 5YR, 7.5YR, 10YR, or 2.5Y, with values ranging from 5 to 8 (3 to 5 moist), and chromas from 1 to 4 (1 to 4 moist). Textures are sand, loamy sand, sandy loam, or loam, commonly with very cobbly to gravelly modifiers. Structures are massive or weak granular. Horizon thickness is from 6 to 34 inches.

C horizon colors are neutral, 5YR, 7.5YR, 10YR, or 2.5Y, with values ranging from 5 to 8 (3 to 6 moist), and chromas from 1 to 6 (1 to 6 moist). Textures are sand, loamy sand, sandy loam, or loam, with extremely cobbly to gravelly modifiers. Structures are single grain or massive to moderate granular or weak subangular blocky.

Remarks: These soils are slightly to extremely water repellent, with the degree of repellency decreasing with increasing soil depth. Surface horizons can become very dusty, and are highly susceptible to sheet, rill, and gully erosion. These soils have subsurface discontinuities marked by tephra over other volcanic, metavolcanic, or granitic materials. Pumice normally is carried to below the discontinuities in krotovinas. Some pedons have AC transitional horizons, and a few have Bw horizons. Soils in the Mammoth Pass-Red Cones-Devil's Postpile area have indurated layers that are penetrable by roots;

these layers are 2 to 3 inches thick, and occur between 12 and 17 inches depth. Base saturations tend to be low, less than about 25 percent.

ENTISOLS—ORTHENTS

Lithic Cryorthents

Lithic Cryorthents are very shallow to shallow well drained to somewhat excessively drained soils formed in residuum and very thin deposits of glacial or colluvial material over granitic, volcanic, or metavolcanic bedrock. These soils are on ridges and mountain sides, along narrow bedrock fringes, and in shallow bedrock depressions, at elevations ranging from 8,000 to 13,000 feet. Slope steepness ranges from 0 to 55 percent. The mean annual precipitation is 30 to 50 inches, most of which falls as snow. Vegetation series include lodgepole pine, whitebark pine, perennial grass, and cushion plant.

A representative pedon (#213) is a sandy-skeletal, mixed Lithic Cryorthent in a unit of Typic Cryorthents – Dystric Cryochrepts – Rock outcrop complex 0 to 30 percent slopes (map unit 109). The soil formed from glacially deposited biotite quartz monzonite on a 2 percent southeast facing moraine at 10,200 feet elevation in the lodgepole pine vegetation series. The soil is located in lower Red Mountain Basin, in the Fleming Creek drainage, approximately 1/2 mile west-northwest of Disappointment Lake in NE 1/4, NE 1/4, S 20, T 9 S, R 29 E, MDM; Blackcap Mountain NE quadrangle; latitude 37° 08' 34", longitude 118° 49' 27".

A1—0 to 2 inches; light brownish gray (2.5Y 6/2) very gravelly loamy coarse sand, very dark grayish brown (2.5Y 3/2) moist; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; 35 percent gravel, 5 percent cobbles; very strongly acid; abrupt smooth boundary.

A2—2 to 6 inches; light brownish gray (2.5Y 6/2) gravelly loamy coarse sand, dark brown (10YR 3/3) moist; weak granular structure; loose, nonsticky, nonplastic; common very fine and fine, few medium roots; 25 percent gravel, 5 percent cob-

bles; very strongly acid; abrupt smooth boundary.

AC—6 to 9 inches; light brownish gray (2.5Y 6/2) very gravelly loamy coarse sand, brown (10YR 4/3) moist; weak granular structure; loose, nonsticky, nonplastic; common very fine and fine, few medium and coarse roots; 45 percent gravel, 5 percent cobbles; very strongly acid; abrupt wavy boundary.

C—9 to 16 inches; light gray (5Y 7/2) very gravelly loamy coarse sand, olive gray (5Y 5/2) moist; massive; loose, nonsticky, nonplastic; common very fine, few fine, medium, and coarse roots; 55 percent gravel; very strongly acid.

R—below 16 inches; biotite quartz monzonite bedrock.

Remarks: Rock outcrop comprises 30 percent of the area, and surface rock fragments cover 60 percent of the remaining ground. The soil occurs in shallow depressions in the bedrock. Water repellency is moderate to extreme in the A1 horizon, and slight to moderate in underlying horizons. The soil is susceptible to sheet erosion. Soil temperature at 16 inches depth was 61° F on 8/4/90. Vegetation on the site was sedge, with lodgepole pine and whitebark pine in the surrounding area.

Range in Characteristics: The following range in characteristics is based on a small number of pedon observations; additional observations may broaden the range somewhat. Depth of the solum is from 3 to 10 inches. Rock fragment contents range from 0 to 55 percent for gravel, and from 0 to 45 percent for cobbles, stones, and boulders, throughout. Surface rock fragments range from 10 to 65 percent. Soil reaction ranges from very strongly acid to moderately acid. Base saturation is less than 50 percent throughout the pedon.

A horizon colors are 10YR or 2.5Y with values ranging from 5 to 7 (3 to 5 moist), and chromas from 1 to 3 (1 to 3 moist). Textures are loamy coarse sand, loamy sand, or sandy loam, commonly with gravelly or very gravelly modifiers. Structures are single grain or weak granular. Horizon thickness is from 1 to 8 inches.

C horizon colors are 10YR, 2.5Y, or 5Y with values ranging from 5 to 7 (4 to 5 moist), and chromas from 2 to 4 (2 to 4 moist). Textures are loamy coarse sand, loamy sand, or sandy loam, commonly with gravelly to extremely gravelly modifiers. Structures are massive, single grain, or weak granular.

Remarks: These soils commonly are moderately to extremely water repellent in the surface horizons. Surface soils are easily disturbed and susceptible to sheet and rill erosion. Soil moisture regimes are xeric.

Lithic Cryorthents, tephritic

Lithic Cryorthents, tephritic are very shallow to shallow well drained to somewhat excessively drained soils formed from residuum and very thin deposits over granitic or volcanic bedrock. They have a distinct superficial layer of volcanic ash and cinders that is at least one inch thick. Tephra often is mixed throughout the soil. Although these soils are enriched with volcanic glass, they fall short of meeting all criteria for andic soil properties. The soils are on ridges and mountain sides at elevations ranging from 8,000 to 13,000 feet. Slope steepness ranges from 0 to 65 percent. The mean annual precipitation is 30 to 60 inches, most of which falls as snow. Vegetation series include mixed conifer, red fir, lodgepole pine, whitebark pine, perennial grass, and cushion plant.

A representative pedon (#43) is a loamy-skeletal, mixed Lithic Cryorthent in a unit of Typic Cryorthents - Rock outcrop - Lithic Cryorthents complex, tephritic, 0 to 30 percent slopes (map unit 117). The soil formed from granodiorite on a 21 percent, south-southwest facing, glaciated backslope at 9,700 feet elevation, in the lodgepole pine vegetative series. The soil is located in Silver Creek drainage, near Coyote Lake in SW 1/4, SE 1/4, S 32, T 5 S, R 27 E, MDM; Kaiser Peak NE quadrangle; latitude 37° 27' 47", longitude 119° 02' 52".

Oi—1/2 inch to 0; lodgepole and whitebark pine litter.

A1—0 to 1 inches; evenly mixed gray (10YR 5/1) and light brownish gray (10YR 6/2)

loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak, very fine granular structure; loose, very friable, nonsticky, nonplastic; common very fine roots; 5 percent gravel; strongly acid; abrupt smooth boundary.

A2—1 to 8 inches; very pale brown (10YR 7/3) very cobbly sandy loam, dark yellowish brown (10YR 4/4) moist; weak, very fine granular structure; loose, very friable, nonsticky, nonplastic; common very fine, few fine, medium, and coarse roots; 5 percent gravel, 35 percent cobbles and stones; strongly acid; clear smooth boundary.

C—8 to 18 inches; brownish yellow (10YR 6/6) very stony coarse sandy loam, dark yellowish brown (10YR 4/6) moist; weak very fine granular structure; loose, very friable, nonsticky, nonplastic; few very fine, fine, medium, and coarse roots; 5 percent gravel, 55 percent stones and cobbles; strongly acid.

Remarks: The A1 horizon consists dominantly of ash and lapilli-sized pumice. Rock outcrop comprises 55 percent of the area, and surface rock fragments cover 15 percent of the remaining ground. The soil occurs along joints and fractures, and in shallow depressions in the bedrock. The A1 and A2 horizons are moderately to extremely water repellent, and are highly susceptible to sheet and rill erosion. The greatest concentration of roots is at the bottom of the A2 horizon, where they dominantly grow horizontally. Depth to the lithic contact is less than 20 inches. Soil temperature at 18 inches depth was 57° F on 7/11/88. Vegetation on the site included lodgepole pine (5 percent cover) whitebark pine (3 percent cover), and sedge (5 percent cover).

Range in Characteristics: The following range in characteristics is based on a small number of pedon observations; additional observations may broaden the range somewhat. Depth of the solum is from 3 to 10 inches. Rock fragment contents range from 0 to 25 percent for gravel, and from 0 to 55 percent for cobbles, stones, and boulders, throughout. Surface rock fragments range from 10 to 50 percent. Soil reaction ranges from strongly acid to slightly acid. Base satu-

ration is assumed to be less than 50 percent throughout the pedon.

A horizon colors are 10YR with values ranging from 5 to 7 (3 to 5 moist), and chromas from 1 to 3 (1 to 4 moist). Textures are loamy coarse sand, loamy sand, coarse sandy loam, or sandy loam, occasionally with gravelly to very cobbly modifiers. Structures are weak very fine granular. Horizon thickness is from 1 to 8 inches.

C horizon colors are 10YR with values ranging from 5 to 7 (4 to 5 moist), and chromas from 5 to 7 (5 to 7 moist). Textures are coarse sandy loam or sandy loam, often with gravelly to very stony modifiers. Structures are weak, very fine granular or subangular blocky.

Remarks: These soils are moderately to extremely water repellent in the surface horizons in about half of the pedons. Volcanic ash and lapilli are dominant in the A horizon, and often extend to the bedrock surface. Surface soils are easily disturbed and susceptible to sheet and rill erosion. Plant roots often are dominantly horizontal, and concentrated above the C horizon. Soil moisture regimes are xeric.

Typic Cryorthents

Typic Cryorthents are deep to very deep, moderately well drained to somewhat excessively drained soils formed in material derived primarily from granitic rock, occasionally with admixtures of volcanic or metavolcanic rock; or infrequently from noncalcareous metamorphic rock. These soils can occur on any landform in the survey area (except rock outcrop and rubble land), at elevations usually ranging from 7,000 to 14,000 feet, although in the northern portion of the survey area they may occur as low as 6,400 feet on some steep, north facing slopes and in densely shaded canyons that receive subsurface flow of cold snow-melt waters from higher elevation. Slope steepness ranges from 0 to 85 percent. Mean annual precipitation is 20 to 60 inches, most of which falls as snow. Vegetation series include Jeffrey pine, red fir, lodgepole pine, whitebark pine, mixed conifer, and alpine dwarf scrub.

A representative pedon (#101) is a loamy-skeletal, mixed Typic Cryorthent in a unit of Rock outcrop – Typic Cryorthents complex, 0 to 45 percent slopes (map unit 147). The soil formed from granodiorite on a 18 percent, west-southwest facing, glaciated backslope at 9,800 feet elevation, in the lodgepole pine vegetation series. The soil is located in Rush Creek drainage, between Waugh Lake and Island Pass, in NW 1/4, SE 1/4, S 27, T 2 S, R 25 E, MDM; Devils Postpile NW quadrangle; latitude 37° 44' 31", longitude 119° 11' 56".

Oi—1/4 inch to 0; lodgepole pine litter.

A—0 to 6 inches; light gray (10YR 7/2) cobbly sandy loam, very dark grayish brown (10YR 3/2) moist; massive breaking to weak, fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, medium, and coarse roots; 6 percent gravel, 20 percent cobbles; very strongly acid (pH 4.5); abrupt smooth boundary.

CA—6 to 17 inches; light brownish gray (10YR 6/2) very cobbly sandy loam, dark yellowish brown (10YR 4/4) moist; weak, fine subangular blocky structure; loose, nonsticky, nonplastic; common very fine, fine, and medium, few coarse roots; 15 percent gravel, 20 percent cobbles, 15 percent stones; very strongly acid (pH 4.5); clear smooth boundary.

C—17 to 34 inches; very pale brown (10YR 7/4) very cobbly sandy loam, dark yellowish brown (10YR 4/6) moist; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; few very fine, common fine, few medium roots; 15 percent gravel, 40 percent cobbles and stones combined; very strongly acid (pH 4.8).

Remarks: Ash-sized pumice is mixed in the A horizon. Surface rock fragments cover 15 percent of the area, and rock outcrop is 30 percent. The site experiences soil creep and minor sheet erosion of the soil surface. Cobbles increase, and roots decrease below 30 inches. Soil in the CA horizon is somewhat mixed, apparently because of creep movement and frost action. Depth to hard rock is estimated to be 4 feet. Soil temperature at 20

inches depth was 44° F on 7/3/89. Vegetation on the site included lodgepole pine and white-bark pine (20 percent cover total), and grasses (60 percent cover).

Range in Characteristics: Depth of the solum is from 3 to 37 inches. Rock fragment contents range from 0 to 75 percent for gravel, and from 0 to 65 percent for cobbles, stones, and boulders, throughout. Surface rock fragments range from 5 to 85 percent. Soil reaction ranges from extremely acid to slightly acid. Base saturation is assumed to be less than 50 percent throughout the pedon.

A horizon colors are 7.5YR, 10YR, or 2.5Y, with values ranging from 3 to 7 (2 to 6 moist), and chromas from 1 to 6 (1 to 6 moist). Textures are loamy coarse sand, loamy sand, sandy loam, or loam, commonly with gravelly, extremely gravelly, or cobbly modifiers. Structures are single grain to moderate, medium granular or massive. Horizon thickness is from 2 to 22 inches.

C horizon colors are 5YR, 7.5YR, 10YR, 2.5Y, or 5Y, with values ranging from 5 to 7 (3 to 7 moist), and chromas from 2 to 6 (2 to 6 moist).

Remarks: These soils are slightly to extremely water repellent in the surface horizons in more than half of the pedons. Ash-sized pumice may be mixed in the A horizon, especially east of the Sierran crest; these soils are prone to dusting when disturbed. Surface soils are easily disturbed and susceptible to sheet and rill erosion. In many pedons, plant roots tend to be dominantly horizontal, and concentrated above the C horizon. Some pedons have AC or CA transitional, or A/C mixed horizons. Soil moisture regimes mostly are xeric, but may be udic in much of the red fir zone because of soil moisture recharge from summer snow melt.

Typic Cryorthents, tephritic

Typic Cryorthents, tephritic are moderately deep to very deep, well drained to somewhat excessively drained soils. They formed in material derived primarily from granitic rocks, occasionally with an admixture of volcanic rocks; or secondarily from volcanic or metavolcanic rocks. They have a distinct superficial layer of volcanic ash and

cinders that is at least one inch thick. Tephra often is mixed throughout the soil. Although these soils are enriched with volcanic glass, they fall short of meeting all criteria for andic soil properties. The soils are on mountain sides, ridges, and small benches, and in glacial till, at elevations normally ranging from 7,000 to 10,800 feet, although they may occur as low as 6,000 feet on some steep, north facing slopes and shady canyons in the northern portion of the survey area. Slope steepness ranges from 0 to 55 percent. The mean annual precipitation is 25 to 60 inches, most of which falls as snow. Vegetation series include mixed conifer, red fir, lodgepole pine, and lodgepole pine–whitebark pine.

A representative pedon (#75) is a loamy-skeletal, mixed, Typic Cryorthent, in a unit of Typic Cryorthents – Rock outcrop – Lithic Cryorthents complex, tephritic, 0 to 30 percent slopes (map unit 117). The soil formed in glacially deposited quartz monzonite on a 25 percent, southeast facing slope at 9,500 feet elevation in the upper red fir to lower lodgepole pine vegetation series. The soil is located in the upper Middle Fork San Joaquin River drainage, approximately 1 1/2 miles west of Devil's Postpile National Monument and 1/4 mile south of Lost Dog Lake, in NW 1/4, NW 1/4, S 4, T 4 S, R 26 E, MDM; Devil's Postpile NE quadrangle; latitude 37° 38' 06", longitude 119° 07' 00".

Oi—1/2 to 0 inch; lodgepole pine and red fir litter.

A1—0 to 4 inches; light brownish gray (10 YR 6/2) very gravelly loamy coarse sand, very dark grayish brown (10 YR 3/2) moist; weak very fine granular structure; loose, nonsticky, nonplastic; many very fine, common fine roots; 35 percent gravel; very strongly acid (pH 4.8); abrupt smooth boundary.

A2—4 to 14 inches; pale brown (10 YR 6/3) gravelly sandy loam, dark yellowish brown (10 YR 3/4) moist; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine, few medium and coarse roots; 15 percent gravel, 10 percent cobbles; very strongly acid (pH 5.0); clear smooth boundary.

C—14 to 26 inches; brownish yellow (10 YR 6/6) extremely cobbly sandy loam, dark yellowish brown (10 YR 4/6) moist; weak very fine granular structure; loose, non-sticky, nonplastic; common very fine, few fine and medium roots; 25 percent gravel, 35 percent cobbles; very strongly acid (pH 5.0).

Remarks: The A1 horizon is derived from pumice (lapilli and ash) with mixed granitic material, and is extremely water repellent. No readily visible pumice or water repellency occurs below 4 inches depth. Surface coarse fragments cover approximately 20 percent of the site. Sheet and rill erosion are common in the surface horizon. Past gully erosion is evident, but the gullies have stabilized. Soil temperature at 20 inches depth was 50° F on 8/4/88. Vegetation on the site included lodgepole pine (10 percent cover), red fir (5 percent cover), lupine (1 percent cover), and grasses (55 percent cover).

Range in Characteristics: The superficial pumice layer is up to 6 inches thick. Depth of the solum is 5 to 30 inches. Surface rock fragments range from 3 to 50 percent. Soil reaction is very strongly acid to slightly acid. Base saturation is assumed to be less than 50 percent throughout the pedon.

A horizon colors are 10YR or 2.5Y, with values ranging from 3 to 7 (2 to 6 moist), and chromas from 2 to 3 (1 to 4 moist). Textures are sand, loamy sand, or sandy loam, commonly with gravelly to extremely gravelly modifiers. Rock fragment content ranges from 2 to 75 percent for gravel, and 0 to 10 percent for cobbles. Structure is single grain to moderate fine granular or massive. Horizon thickness is from 3 to 14 inches.

C horizon colors are 7.5YR, 10YR, or 2.5Y, with values ranging from 5 to 8 (3 to 8 moist), and chromas from 2 to 6 (2 to 6 moist). Textures are loamy sand or sandy loam, commonly with gravelly through extremely cobbly modifiers. Rock fragment content ranges from 1 to 40 percent for gravel, and 2 to 60 percent for cobbles.

Remarks: These soils are extremely water repellent in the surface horizons in more than three-fourths of the pedons tested. Surface horizons can become very dusty, and are

highly susceptible to sheet and rill erosion. Abundant fungal hyphae occupy the upper portion of the C horizon in many pedons. Krotovinas in the C horizon often contain abundant pumice. Some pedons have AC transitional horizons. Soil moisture regimes mostly are xeric, but may be udic in much of the red fir zone because of soil moisture recharge from summer snow melt.

Typic Cryorthents, volcanic

Typic Cryorthents, volcanic are deep to very deep, well drained soils formed in material weathered from andesite, basalt, and mafic metavolcanic rocks. These soils are on mountain sides and ridges and in glacial till, at elevations normally ranging from 7,000 to 11,600 feet, although they occur as low as 6,400 feet on some steep north facing slopes and shady canyons in the northern portion of the survey area. Slope steepness ranges from 0 to 65 percent. Mean annual precipitation is 35 to 50 inches, most of which falls as snow. Vegetation series include Jeffrey pine, red fir, lodgepole pine, whitebark pine, mixed conifer-fir, and mountain whitethorn.

A representative pedon (#74) is a loamy-skeletal, mixed, Typic Cryorthent in a unit of Typic Cryorthents - Rock outcrop - Lithic Cryorthents complex, tephritic, 0 to 30 percent slopes (map unit 117). The soil formed in glacial till containing epidote-bearing basaltic metabreccia on an 11 percent, east-northeast facing slope at 9,200 feet elevation, in the upper red fir-lodgepole pine vegetation series. The soil is located in the King Creek drainage, approximately two miles west of Devils Post Pile National Monument, in SW 1/4, SW 1/4, S 5, T 4S, R 26E, MDM; Devils Post Pile NW quadrangle; latitude 37° 37' 34", longitude 119° 07' 50".

Oi—1/2 inch to 0; lodgepole pine and red fir litter.

A—0 to 11 inches; light brownish gray (10YR 6/2) sandy loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine, few fine and medium, few coarse roots; 5 percent gravel, 2 percent cobbles; very strongly acid (pH 5.0); abrupt smooth boundary.

C1—11 to 17 inches; brownish yellow (10YR 6/6) extremely gravelly fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak very fine granular structure; loose, very friable, nonsticky, nonplastic; common very fine, few fine and medium roots; 50 percent gravel, 10 percent cobbles; very strongly acid (pH 5.0); clear smooth boundary.

C2—17 to 31 inches; brownish yellow (10YR 6/6) extremely cobbly fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive, breaking to weak very fine granular structure; loose, nonsticky, nonplastic; few fine and medium roots; 20 percent gravel, 40 percent cobbles and stones (partially weathered); very strongly acid (pH 5.0).

Remarks: Surface coarse fragments cover approximately 5 percent of the area. Erosion is negligible. Parent material is a thin layer (approximately 5 feet, estimated) of glacially deposited (?) epidote-bearing basaltic metabreccia of the Ritter Range volcanics. Underlying bedrock is similar. The A horizon contains a moderate amount of pumice (ash and fine lapilli). The greatest concentration of roots is oriented laterally at the bottom of the A horizon; this root distribution is typical for these soils. Soil temperature at 20 inches depth was 50° F on 8/4/88. Vegetation on the site included lodgepole pine (20 percent cover), red fir (15 percent cover), mountain hemlock (1 percent cover), grasses (45 percent cover), big sage, and lupine (less than 1 percent each).

Range in Characteristics: Depth of the solum is 11 to 41 inches. Rock fragment contents range from 2 to 75 percent for gravel throughout, and 10 to 40 percent for cobbles, stones and boulders in the C horizons. Surface rock fragments range from 5 to 90 percent. Soil reaction is very strongly acid to moderately acid. Base saturation is assumed to be less than 50 percent throughout the pedon.

A horizon colors are 10YR, with values ranging from 4 to 6 (2 to 4 moist), and chromas from 2 to 4 (2 to 4 moist). Textures are coarse sandy loam, sandy loam, or fine sandy loam, commonly with gravelly or very grav-

elly modifiers. Structures are weak to moderate very fine to fine granular. Soil reaction is moderately acid to very strongly acid. Horizon thickness is from 7 to 11 inches.

C horizon colors are 2.5YR, 7.5YR, or 10YR, with values ranging from 4 to 7 (3 to 5 moist), and chromas from 4 to 6 (3 to 4 moist). Textures are loamy coarse sand, loamy sand, coarse sandy loam, or sandy loam, commonly with gravelly to extremely cobbly modifiers. Gravel content is between 30 and 55 percent, and cobble content is between 10 and 40 percent. Soil reaction is strongly acid.

Remarks: These soils often, but not always, are slightly to moderately water repellent, especially in the A horizon. Dark colors caused by organic enrichment appear limited to the upper 6 inches; dark mineral matter is found throughout the pedon. Volcanic ash may be mixed with the surface horizon. Sheet erosion is negligible to slight on bare soil surfaces, although gently sloping surfaces may be covered by one to three inches of slope wash in the fine gravel and sand size ranges. Some pedons have AC and CA transitional horizons. Soil moisture regimes mostly are xeric, but may be udic in much of the red fir zone because of soil moisture recharge from summer snow melt.

Lithic Xeric Torriorthents

Lithic Xeric Torriorthents are very shallow to shallow, excessively drained soils formed in material weathered from granitic and, less commonly, metamorphic rock. These soils, which are associated with Xeric Torriorthents, occur on steep colluvial mountain sides between 4,500 and 7,000 feet elevation in the southern portion of the eastern Sierra. Slope steepness ranges from 35 to 85 percent. The mean annual precipitation is 6 to 12 inches. Vegetation series is single leaf pinon pine, and to a lesser extent sagebrush shrub.

A representative pedon (#220) is a sandy-skeletal, mixed mesic, Lithic Xeric Torriorthent in a unit of Typic Xerorthents – Entic Haploxerolls – Typic Xerochrepts complex, 35 to 75 percent slopes (map unit 128). The soil formed from mixed granitic colluvium,

dominated by quartz monzonite, with minor amounts of granodiorite, on a 71 percent, northwest facing, backslope at 6,200 feet elevation, in the single leaf pinon pine vegetation series. The soil is located in the Diaz Creek drainage, NW 1/4, NW 1/4, S 28, T 17 S, R 36 E, MDM; Olancha NE quadrangle; latitude 36° 26' 02", longitude 118° 05' 14".

Oi—1 to 0 inches; mixed pinon pine and oak litter.

A1—0 to 4 inches; light yellowish brown (10YR 6/4) extremely gravelly sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky, nonplastic; common very fine roots; 55 percent gravel, 5 percent cobbles; moderately acid (pH 6.0); abrupt wavy boundary.

C—4 to 9 inches; yellowish brown (10YR 5/8) extremely gravelly sand, yellowish brown (10YR 5/8) moist; massive, breaking easily to single grain; loose, nonsticky, nonplastic; few very fine roots; 75 percent gravel, 10 percent boulders; slightly acid (pH 6.5).

R—below 9 inches; somewhat weathered quartz monzonite bedrock.

Remarks: Rock outcrop comprises 35 percent of the area, and surface rock fragments cover 70 percent of the remaining ground. The soil is slightly water repellent in the surface horizon only. Deep-seated stability of the site is high because of the shallow depth to competent bedrock, but surface stability is low. Surface soil readily sloughs and is subject to high sheet erosion. Angular granitic, slope-washed gravel is mixed with the O horizon. Roots of trees and shrubs appear to be growing down cracks in the bedrock. Soil temperature at 9 inches depth was 76° F on 7/6/91. Vegetation at the site consisted of single leaf pinon pine (15 percent cover), goldcup live oak (5 percent cover), big sage, and ephedra (each less than 1 percent cover).

Range in Characteristics: The following range in characteristics is based on a small number of pedon observations; additional observations may broaden the range somewhat. Depth to bedrock is less than 20 inches. Rock fragment contents range from 15 to 75 percent for gravel, and from 0 to 50

percent for cobbles, stones, and boulders throughout. Surface rock fragments range from 40 to 75 percent. Soil reaction ranges from very strongly acid to neutral. Base saturation is greater than 50 percent throughout the pedon.

A horizon colors are 10YR, with values of 5 or 6 (4 or 5 moist), and chromas of 3 or 4 (3 or 4 moist). Textures are extremely gravelly or gravelly coarse sand. Structures are single grain. Horizon thickness is from 3 to 6 inches.

C horizon colors are 10YR with values ranging from 4 to 6 (4 to 6 moist), and chromas of 7 or 8 (7 or 8 moist). Textures are extremely gravelly coarse sand or very gravelly sand. Structures are massive or single grain.

Remarks: Water repellency is not significant in these soils. Surface soils are easily disturbed and susceptible to sheet and rill erosion; dry ravel and superficial sloughing can be initiated by minor disturbance, including wind. Soil temperature regimes are mesic to thermic. These soils occur as scattered, but significant, inclusions in several map units in the extreme southeastern portion of the survey area, where they are associated with Xeric Torriorthents, Typic Torriorthents, and Entic Haploxerolls.

Typic Torriorthents

Typic Torriorthents are moderately deep to very deep, somewhat excessively drained to excessively drained soils formed in material weathered from granitic and, less commonly, metamorphic and volcanic rock. These soils occur on moderately sloping to very steep colluvial mountain sides and aprons, and alluvial cones at elevations ranging from 3,700 to 7,200 feet in the southern portion of the eastern Sierra. Slope steepness ranges from 0 to 85 percent. Mean annual precipitation is less than 16 inches. Vegetation series include sagebrush shrub and desert shrub.

A representative pedon (#217) is a sandy-skeletal, mixed mesic, Typic Torriorthent in a unit of Typic Torriorthents - Xeric Torriorthents association, 45 to 75 percent slopes (map unit 121). The soil formed from mixed granitic colluvium, dominated by quartz mon-

zonite, on a 56 percent, east-southeast facing, backslope at 6,450 feet elevation, in the sagebrush shrub vegetation series. The soil is located in Wormhole Canyon, in the Cottonwood Creek drainage, SW 1/4, NE 1/4, S 28, T 17 S, R 36 E, MDM; Olancho NE quadrangle; latitude 36° 25' 27", longitude 118° 04' 49".

A1—0 to 4 inches; brown (10YR 5/3) extremely gravelly coarse sand, dark yellowish brown (10YR 3/6) moist; single grain; loose, nonsticky, nonplastic; common very fine, few fine and medium roots; 60 percent gravel; strongly acid (pH 5.3); abrupt smooth boundary.

A2—4 to 26 inches; dark yellowish brown (10YR 4/6) very gravelly coarse sand, dark yellowish brown (10YR 3/6) moist; single grain; loose, nonsticky, nonplastic; common very fine and fine, few medium and coarse roots; 40 percent gravel, 5 percent cobbles; moderately acid (pH 5.8); abrupt smooth boundary.

C—26 to 36 inches; yellowish brown (10YR 5/4) extremely gravelly coarse sand, dark yellowish brown (10YR 4/4) moist; massive, breaking to single grain; loose, nonsticky, nonplastic; few fine roots; 75 percent gravel; moderately acid (pH 5.8).

Remarks: Rock outcrop comprises 5 percent of the area, and surface gravel covers 75 percent of the remaining ground. The surface horizon shows very slight water repellency, but other horizons are not water repellent. Deep-seated stability of the site is high, but these soils are subject to failure by debris avalanche on slopes steeper than 60 percent. The surface soil, which is very loose, suffers high sheet erosion. Past erosion is suggested by the horizon boundaries, which appear to be colluvial discontinuities. Soil temperature exceeded 120° F at 1/4 inch depth and was 61° F at 20 inches depth on 7/3/91. Vegetation at the site consisted of big sage (30 percent cover), ephedra (5 percent cover), Eriogonum (5 percent cover), and bitterbrush (2 percent cover).

Range in Characteristics: The following range in characteristics is based on a small number of pedon observations; additional observations may broaden the range

somewhat. Depth of the solum is from 13 to 26 inches. Rock fragment contents range from 15 to 75 percent for gravel, and from 0 to 25 percent for cobbles, stones, and boulders throughout. Surface rock fragments range from 40 to 75 percent. Soil reaction ranges from strongly acid to neutral. Base saturation is assumed to be greater than 50 percent throughout the pedon.

A horizon colors are 10YR, with values ranging from 4 to 6 (3 to 5 moist), and chromas from 3 to 6 (4 to 6 moist). Textures are coarse sand or sand with very gravelly to extremely gravelly modifiers. Structures are single grain. Multiple A horizons may exist, with total thickness of about 13 to 26 inches.

C horizon colors are 10YR, with values ranging from 4 to 5 (4 moist), and chromas from 4 to 6 (4 to 6 moist). Textures are coarse sand or sand with very gravelly or extremely gravelly to very cobbly modifiers. Structures are massive or single grain.

Remarks: Although these soils normally are not water repellent, surface horizons may show slight water repellency. Surface soils are easily disturbed and susceptible to sheet and rill erosion; dry ravel and miniature debris avalanches can be initiated by virtually any surface disturbance, including wind. Soil temperature regimes are mesic to thermic.

Xeric Torriorthents

Xeric Torriorthents are moderately deep to deep, somewhat excessively drained to excessively drained soils formed in material weathered from granitic and, less commonly, metamorphic rock. They occur on steep colluvial mountain sides in the southern portion of the eastern Sierra between Typic Torriorthents at lower elevations and Typic Xerorthents or Typic Xerochrepts at higher elevations. Generally, their elevational range is from approximately 4,500 feet to 7,200 feet. Slope steepness ranges from 50 to 85 percent. The mean annual precipitation is 6 to 12 inches. Vegetation series include single leaf pinon pine, sagebrush, and desert shrub.

A representative pedon (#216) is a sandy, mixed, mesic Xeric Torriorthent in a unit of Typic Torriorthents - Xeric Torriorthents association, 45 to 75 percent slopes (map unit

121). The soil formed from mixed granitic colluvium dominated by hornblende, biotite diorite with smaller amounts of quartz monzonite and epidote-bearing granite. The site is a 60 percent, north-northeast facing colluvial backslope at 6,720 feet elevation in the single leaf pinon pine vegetation series. The soil is located in Wormhole Canyon, in the Cottonwood Creek drainage, SE 1/4, NW 1/4, S 28, T 17 S, R 36 E, MDM; Olancha NE quadrangle; latitude 36° 25' 42", longitude 118° 04' 57".

- A1—0 to 2 inches; dark grayish brown (10YR 4/2) very gravelly coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky, nonplastic; no roots; 35 percent gravel; very strongly acid (pH 4.5); abrupt, smooth boundary.
- A2—2 to 7 inches; grayish brown (10YR 5/2) very gravelly coarse sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky, nonplastic; few very fine, fine, medium, and coarse roots; 40 percent gravel; moderately acid (pH 6); abrupt smooth boundary.
- A3—7 to 11 inches; dark brown (10YR 3/3) very gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, loose, nonsticky, nonplastic; common very fine and fine, few medium and coarse roots; 35 percent gravel; slightly acid (pH 6.3); abrupt wavy boundary.
- C—11 to 20 inches; dark yellowish brown (10YR 4/6) extremely gravelly loamy coarse sand, dark yellowish brown (10YR 4/4) moist; massive; loose, nonsticky, nonplastic; few very fine, fine, and medium roots; 70 percent gravel; slightly acid (pH 6.3); clear wavy boundary.
- Cr—20 to 25 inches; yellowish weathered granitic boulder that chips to angular gravel; few medium roots.

Remarks: Rock outcrop comprises 10 percent of the area; surface gravel covers 50 percent and cobbles, stones, and boulders cover 25 percent of the remaining ground. A very thin layer of pinon pine needles covers 55 percent of the site. The surface soil is highly erodible, and subject to dry ravel and surface creep. Clean, slope-washed sand and

gravel that are mixed in the surface layer lighten the dry color to 10YR 5/3. The 7 to 11 inch depth layer is noticeably firmer than the overlying soil. The soil is moderately water repellent to the 11 inch depth. Soil temperature at 20 inches depth was 63° F on 7/3/91. Vegetation at the site consisted of single leaf pinon pine (45 percent cover), big sage, ephedra, and bitterbrush (each less than 2 percent cover).

Range in Characteristics: The following range in characteristics is based on a small number of pedon observations; additional observations may broaden the range somewhat. Depth of the solum is from 11 to 26 inches. Rock fragment contents range from 15 to 75 percent for gravel, and from 0 to 50 percent for cobbles, stones, and boulders throughout. Surface rock fragments range from 40 to 75 percent. Soil reaction ranges from extremely acid to neutral. Base saturation is greater than 50 percent throughout the pedon.

A horizon colors are 10YR, with values ranging from 3 to 6 (3 to 5 moist), and chromas from 2 to 6 (2 to 6 moist). Textures are coarse sand or loamy coarse sand, with very to extremely gravelly modifiers. Structures are single grain or massive to weak fine granular. Multiple A horizons are common, with total thickness of approximately 13 to 26 inches.

C horizon colors are 10YR or 2.5Y, with values ranging from 4 to 5 (4 moist), and chromas from 4 to 6 (2 to 6 moist). Textures are coarse sand or loamy coarse sand, with very gravelly to extremely gravelly modifiers. Structures are massive or single grain to weak fine granular.

Remarks: Water repellency in these soils is variable, ranging from none to moderate among pedons, but it shows little variability with depth within a single pedon. Surface soils are easily disturbed and susceptible to sheet and rill erosion; dry ravel and miniature debris avalanches can be initiated by virtually any surface disturbance, including wind. Soil temperature regimes are mesic to thermic.

Dystric Xerorthents

Dystric Xerorthents are moderately deep to very deep, well drained to somewhat excessively drained soils formed in material weathered from granitic rock, occasionally with an admixture of volcanic rock. They occur on colluvial mountain sides and ridges, glacial moraines, alluvial bottoms, and in bedrock joints and depressions between 2,600 and 8,400 feet elevation west of the Sierran Crest. Slope steepness ranges from 0 to 85 percent. The mean annual precipitation is 25 to 50 inches. Vegetation series include white leaf manzanita, ponderosa pine, mixed conifer-pine, mixed conifer-fir, Jeffrey pine, and red fir.

A representative pedon (#48) is a loamy-skeletal, mixed, frigid Dystric Xerorthent in a unit of Rock outcrop - Dystric Xerorthents complex, 30 to 75 percent slopes (map unit 153). The soil formed from granodiorite on a 52 percent, north-northwest facing, backslope at 5,000 feet elevation, in the mixed conifer-pine vegetation series. The soil is located in Middle Fork San Joaquin River drainage, near Cassidy Crossing in SW 1/4, NE 1/4, S 23, T 5 S, R 25 E, MDM; Kaiser Peak NW quadrangle; latitude 37° 29' 00", longitude 119° 12' 05".

Oi—3 to 2 inches; ponderosa and sugar pine litter.

Oe—2 inches to 0; decomposing ponderosa and sugar pine litter.

A—0 to 10 inches; pale brown (10YR 6/3) gravelly coarse sandy loam, dark brown (10YR 3/3) moist; moderate, very fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, and medium roots; 15 percent gravel, 2 percent cobbles; very strongly acid (pH 5.0); gradual wavy boundary.

CA—10 to 34 inches; very pale brown (10YR 7/3) very gravelly coarse sandy loam, brown (10YR 4/3) moist; weak, very fine granular structure; loose, very friable, nonsticky, nonplastic; common very fine, common fine and medium, few coarse roots; 40 percent gravel, 2 percent cob-

bles; very strongly acid (pH 5.0); gradual smooth boundary.

C—34 to 47 inches; light yellowish brown (2.5Y 6/4) extremely gravelly coarse sandy loam, dark yellowish brown (10YR 4/6) moist; massive; loose, nonsticky, nonplastic; few very fine, fine, medium, and coarse roots; 40 percent gravel, 35 percent cobbles; strongly acid (pH 5.5).

Remarks: Ash and lapilli-sized pumice is mixed in the A horizon. Rock outcrop comprises 2 percent of the area, and surface rock fragments cover 5 percent of the remaining ground. The A horizon is moderately water repellent, and the CA horizon is very slightly water repellent. No soil erosion was noted at the site. Soil temperature at 20 inches depth was 59° F on 7/13/88. Tree species on the site included ponderosa pine (25 percent cover), incense cedar (30 percent cover), and sugar pine (10 percent cover).

Range in Characteristics: The following range in characteristics is based on a small number of pedon observations; additional observations may broaden the range somewhat. Depth of the solum is from 27 to 34 inches. Rock fragment contents range from 5 to 40 percent for gravel, and from 0 to 40 percent for cobbles and stones throughout. Surface rock fragments range from 5 to 10 percent. Soil reaction ranges from very strongly acid to strongly acid. Base saturation is assumed to be less than 50 percent throughout the pedon.

A horizon colors are 10YR or 2.5Y, with values ranging from 4 to 6 (2 to 3 moist), and chromas from 1 to 4 (1 to 3 moist). Textures are coarse sandy loam or sandy loam, commonly with gravelly modifiers. Structures are weak to moderate very fine granular. Horizon thickness is approximately 10 inches.

C horizon colors are 10YR or 2.5Y, with values ranging from 6 to 7 (3 to 4 moist), and chromas from 2 to 4 (2 to 6 moist). Textures are coarse sandy loam or sandy loam, with extremely gravelly, very gravelly, very cobbly, or cobbly modifiers. Structures are weak, very fine granular or massive.

Remarks: These soils often are moderately water repellent in the surface horizons. Ash-sized pumice may be mixed in the A

horizon. Surface soils are easily disturbed and susceptible to sheet and rill erosion when unprotected by litter. Some pedons have AC or CA transitional horizons. Soil temperature regimes are mesic to frigid.

Typic Xerorthents

Typic Xerorthents are to moderately deep to very deep, well drained to somewhat excessively drained soils formed in material weathered from granitic rock. These soils occur on colluvial mountain sides and ridges, glacial moraines, alluvial bottoms, and in bedrock joints and depressions east of the Sierran crest at elevations between 5,000 and 10,200 feet. Slope steepness ranges from 0 to 85 percent. The mean annual precipitation is 6 to 12 inches. Vegetation series include Jeffrey pine, single leaf pinon pine, green leaf manzanita, white leaf manzanita, curl leaf mountain mahogany, big sagebrush, and perennial grass.

A representative pedon (#168) is a loamy-skeletal, mixed frigid Typic Xerorthent in a unit of Typic Xerorthents – Rock outcrop complex, 40 to 85 percent slopes (map unit 130). The soil formed from biotite granodiorite colluvium on a 66 percent, northeast facing backslope at 8,080 feet elevation, in the Jeffrey pine vegetation series. The soil is located in the Owens River drainage, south of Shingle Mill Bench in SE 1/4, NE 1/4, S 22, T 11 S, R 33 E, MDM; Mt. Pinchot NE quadrangle; latitude 36° 58' 46", longitude 118° 20' 44".

Oi—2 to 0, conifer litter.

A—0 to 5 inches; grayish brown (10YR 5/2) sandy loam, very dark gray (10YR 3/1) moist; weak, very fine granular structure; loose, nonsticky, nonplastic; common very fine, few fine and coarse roots; 10 percent gravel, 2 percent cobbles; very strongly acid (pH 4.8); abrupt wavy boundary.

CA—5 to 29 inches; pale brown (10YR 6/3) gravelly sandy loam, dark grayish brown (10YR 4/2) moist; massive to weak very fine granular structure; loose, nonsticky, nonplastic; common very fine, few fine, medium, and coarse roots; 30 percent

gravel, 2 percent cobbles; very strongly acid (pH 4.8); abrupt wavy boundary.

C1—29 to 39 inches; light yellowish brown (2.5Y 6/4) extremely cobbly loamy coarse sand, olive brown (2.5Y 4/4) moist; massive to weak very fine granular structure; loose, nonsticky, nonplastic; common very fine, few fine, medium, and coarse roots; 25 percent gravel, 35 percent cobbles, 5 percent boulders; very strongly acid (pH 4.8); gradual wavy boundary.

C2—39 to 44 inches; light yellowish brown (2.5Y 6/4) extremely cobbly coarse sandy loam, olive brown (2.5Y 4/4) moist; single grain; loose, nonsticky, nonplastic; few very fine, and fine roots; 30 percent gravel, 35 percent cobbles and boulders.

Remarks: The A horizon contains approximately 5 percent volcanic ash, which decreases to 1 percent or less in the CA horizon. Organic matter of intermediate decomposition is mixed in the A horizon. Very fine and fine roots bind soil particles in the upper 39 inches. Rock fragments cover 30 percent of the ground surface. Water repellency is extreme in the A horizon, moderate in the CA horizon, and slight to undetectable in the C1 and C2 horizons. Sheet erosion is high on portions of the ground surface not protected by an O horizon. Soil temperature at 20 inches depth was 58° F on 8/23/89. Vegetation on the site included Jeffrey pine (35 percent cover) and honey suckle (1 percent cover).

Range in Characteristics: The following range in characteristics is based on a small number of pedon observations; additional observations may broaden the range somewhat. Depth of the solum is from 5 to 40 inches. Rock fragment contents range from 10 to 65 percent for gravel, and from 0 to 40 percent for cobbles and stones throughout. Surface rock fragments range from 15 to 85 percent. Soil reaction ranges from very strongly acid to neutral. Base saturation is less than 50 percent throughout the pedon.

A horizon colors are 10YR, with values ranging from 4 to 6 (3 to 4 moist), and chromas of 2 (1 moist). Textures are sand, loamy sand, coarse sandy loam, or sandy loam, commonly with very gravelly or gravelly

modifiers. Structures are single grain to weak fine granular. Horizon thickness is approximately 3 to 6 inches, although some pedons have multiple A horizons extending to 40 inches.

C horizon colors are 10YR or 2.5Y, with values ranging from 4 to 7 (2 to 6 moist), and chromas from 2 to 4 (2 to 6 moist). Textures are sand, loamy sand, coarse sandy loam, or sandy loam, with extremely cobbly to gravelly modifiers. Structures are single grain, weak, very fine granular, or massive.

Remarks: These soils show a wide range of water repellency, from none to extreme, in the surface horizon. Ash-sized pumice may be mixed in the A horizon. Clean, slope-washed, light colored sand grains often are mixed in the A horizon, even when the overall horizon is darkly colored by incorporated organic matter. Surface soils are easily disturbed and susceptible to sheet and rill erosion when unprotected by litter, and soils commonly are subject to dry ravel, creep, and mixing by colluvial activity. Some pedons have multiple A horizons and AC or CA transitional horizons. Soil moisture regimes are xeric.

ENTISOLS—PSAMMENTS

Typic Torripsamments

Typic Torripsamments are deep to very deep, excessively drained soils formed in granitic sands that are thought to be eolian deposits overlying granitic colluvium. They occur on easterly facing, backslopes and foot-slopes between 4,000 and 6,800 feet elevation above Owens Lake, in the southern portion of the eastern Sierra. Slope steepness ranges from 25 to 55 percent. The mean annual precipitation is 8 to 12 inches. Vegetation series are desert shrub and sagebrush shrub.

A representative pedon (#221) is a mixed, thermic Typic Torripsamment in a unit of Typic Torripsamments, 25 to 55 percent slopes (map unit 131). The soil formed from granitic sand and gravel on a 36 percent, east-southeast facing, backslope at 4,800 feet elevation, in the desert shrub vegetation series. The soil is located at a site overlooking Owens Valley about one-half mile north of Ash Creek

in SE 1/4, SW 1/4, S 2, T 18 S, R 36 E, MDM; Olancho NE quadrangle; latitude 36° 23' 40", longitude 118° 02' 49".

A1—0 to 1/2 inch; very pale brown (10YR 7/3) sand, light yellowish brown (10YR 6/4) moist; massive; soft when dry, loose when moist, nonsticky, nonplastic; no roots; 12 percent gravel; slightly acid (pH 6.5); abrupt smooth boundary.

A2—1/2 to 3 inches; light gray (10YR 7/2) sand, light yellowish brown (10YR 6/4) moist; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; 5 percent gravel; slightly acid (pH 6.5); abrupt wavy boundary.

C1—3 to 12 inches; pale brown (10YR 6/3) loamy sand, yellowish brown (10YR 5/4) moist; massive; slightly hard when dry, loose when moist, nonsticky, nonplastic; few fine and few medium roots; 5 percent gravel; slightly acid (pH 6.5); abrupt wavy boundary.

C2—12 to 20 inches; light yellowish brown (10YR 6/4) loamy sand, yellowish brown (10YR 5/4) moist; massive; slightly hard when dry, loose when moist, nonsticky, nonplastic; few fine, medium, and coarse roots; 8 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

C3—20 to 47 inches; yellow (10YR 7/6) loamy sand, brownish yellow (10YR 6/6) moist; massive; slightly hard when dry, loose when moist, nonsticky, nonplastic; few fine roots; 10 percent gravel; slightly acid (pH 6.5).

Remarks: The ground surface appears deflated—that is, loose, dry silt and clay have been removed by turbulent wind action, leaving behind the appearance of desert pavement. The surface is covered 60 percent by fine gravel and no rock outcrop. Many very fine and fine irregular pores are notable in the surface horizon. Water repellency is not evident in any horizon. Deep-seated stability of the site is high. The surface soil suffers moderate sheet and rill erosion. Soil temperature at 20 inches depth was 83° F on 7/6/91. Vegetation at the site consisted of eriogonum (25 percent cover), *Gutierrezia* (15 percent cover), desert needle grass (3 percent cover), and scattered

individuals of ephedra, cottonthorn horsebrush, mirabilis, Mojave aster, and cholla.

Range in Characteristics: The following range in characteristics is based on a small number of pedon observations; additional observations may broaden the range somewhat. Depth of the solum is from 3 to 6 inches. Rock fragment content is less than 15 percent gravel, except for fine gravel that ranges from 35 to 65 percent on the soil surface. Soil reaction is slightly acid. Base saturation is assumed to be greater than 50 percent throughout the pedon.

A horizon colors are 10YR, with values ranging from 6 to 7 (5 to 6 moist), and chromas from 2 to 4 (4 to 5 moist). Textures are sand. Structures are single grain or massive. Multiple A horizons may exist, with total thickness of about 3 to 6 inches.

C horizon colors are 10YR, with values ranging from 6 to 7 (5 or 6 moist), and chromas from 3 to 6 (4 to 6 moist). Textures range from sand to loamy sand, commonly with gravelly modifiers. Structures are massive.

Remarks: These soils are not water repellent. Surface soils are susceptible to moderate to high sheet, rill, and wind erosion. Soils on the foot slopes suffer gully erosion. Soil temperature regimes are thermic to mesic.

INCEPTISOLS—OCHREPTS

Dystric Cryochrepts

Dystric Cryochrepts are deep to very deep, well drained to somewhat excessively drained soils formed in material weathered from granitic or metamorphic (usually hornfels or gneiss) rocks. These soils are on mountain sides and ridges, and in glacial till and alluvial deposits west of the Sierran Crest, at elevations ranging from 7,200 to 11,600 feet. Slope steepness ranges from 0 to 55 percent. The mean annual precipitation is 35 to 50 inches, most of which falls as snow. Vegetation series include Jeffrey pine, red fir, lodgepole pine, and whitebark pine.

A representative pedon (#50) is a loamy-skeletal, mixed, Dystric Cryochrept in a unit of Typic Cryorthents - Dystric Cryochrepts -

Rock outcrop association, 15 to 45 percent slopes (map unit 110). The soil formed in glacial till consisting of quartz monzonite, with gneiss and a minor amount of low grade schist, on a 38 percent, northeast facing slope at 9,650 feet elevation, in the lodgepole pine-western hemlock vegetation series. The soil is located in the upper Fish Creek drainage, between Tully Hole and Horse Heaven, in SW 1/4, NE 1/4, S 21, T 5 S, R 28 E, MDM; Mt. Abbot NW quadrangle; latitude 37° 29' 59", longitude 118° 54' 57".

Oi—1/2 inch to 0; lodgepole pine and hemlock litter.

A—0 to 10 inches; pale brown (10YR 6/3) coarse sandy loam, brown (10YR 4/3) moist; moderate very fine granular structure; soft, very friable, nonsticky, nonplastic; few very fine and fine, common medium and coarse roots; 8 percent gravel, 5 percent cobbles; very strongly acid (pH 4.8); abrupt smooth boundary.

Bw—10 to 23 inches; very pale brown (10YR 7/3) gravelly coarse sandy loam, yellowish brown (10YR 5/4) moist; moderate fine granular to moderate fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine, common fine and medium, few coarse roots; 15 percent gravel, 10 percent cobbles and stones; strongly acid (pH 5.1); clear smooth boundary.

BC—23 to 32 inches; light gray (10YR 7/2) very gravelly coarse sandy loam, brown (10YR 5/3) moist; massive, breaking to weak, fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine, fine, and medium roots; 40 percent gravel, 15 percent cobbles; strongly acid (pH 5.2); clear smooth boundary.

C—32 to 41 inches; light gray (10YR 7/2), very gravelly coarse sandy loam, pale brown (10YR 6/3) moist; massive; soft, very friable, nonsticky, nonplastic; few fine roots; 30 percent gravel, 10 percent cobbles; strongly acid (pH 5.2).

Remarks: The A horizon is slightly water repellent. Surface rock fragment cover is 35 percent by gravel, and 10 percent by cobbles, stones, and boulders. Sheet erosion is minor.

Roots are most concentrated near the boundary between the A and Bw horizons. Colors in the Bw and BC horizons are somewhat mixed; dominant colors are noted above, included colors are 10YR 6/3 and 10YR 5/3, dry. Much of the sand in the BC and C horizons disintegrates to silt and clay with moist rubbing. These particles presumably are pseudomorphs of feldspars that have weathered in place to silt and clay; the clay at depth appears to be saprolitic, rather than illuvial. The rock below 41 inches is weathered, but very difficult to chip with a shovel. Soil temperature at 20 inches depth was 50° F on 7/20/88. Vegetation on the site includes lodgepole pine (25 percent cover), mountain hemlock (5 percent cover), lupine, and grass (less than 2 percent each).

Range in Characteristics: Depth of the solum is from 16 to 41 inches. Rock fragment contents, which commonly increase with depth, range from 2 to 60 percent for gravel, and from 0 to 65 percent for cobbles, stones, and boulders, throughout. Surface rock fragments range from 2 to 80 percent. Soil reaction ranges from extremely acid to strongly acid. Base saturation is assumed to be less than 50 percent throughout the pedon.

A horizon colors are 10YR or 2.5Y, with values ranging from 4 to 8 (2 to 5 moist), and chromas from 1 to 4 (1 to 4 moist). Soil textures are loamy sand, coarse sandy loam, sandy loam, or loam, commonly with gravelly to very cobbly modifiers. Structures are single grain to moderate, fine subangular blocky or massive. Horizon thickness is from 2 to 13 inches.

Bw horizon colors are 7.5YR, 10YR, or 2.5Y, with values ranging from 4 to 7 (3 to 6 moist), and chromas from 2 to 8 (2 to 6 moist). Textures are coarse sandy loam, sandy loam, or loam, commonly with gravelly to extremely cobbly modifiers. Structures range from weak, very fine granular to moderate, medium subangular blocky. Horizon thickness is from 8 to 35 inches.

C horizon colors are 7.5YR, 10YR, or 2.5Y, with values ranging from 4 to 7 (3 to 6 moist), and chromas from 2 to 6 (2 to 6 moist). Textures are loamy sand, coarse sandy loam, sandy loam, or loam, commonly with gravelly to extremely gravelly modifiers.

Remarks: These soils are slightly to extremely water repellent in the surface horizons in approximately 70 percent of the pedons. Surface horizons are susceptible to sheet erosion when unprotected by litter. Some pedons have AB, BA, BC, or CB transitional horizons, or B/A mixed horizons. Volcanic ash may occur as thin superficial layers or be mixed in the A horizon. Krotovinas often are present in the pedons. Soil moisture regimes are xeric and udic.

Typic Cryochrepts

Typic Cryochrepts are moderately deep to deep, well drained to somewhat excessively drained soils formed in material weathered from granitic or metamorphic rocks. These soils are on mountain sides and ridges, and in glacial till, at elevations ranging from 8,000 to 11,600 feet. Slope steepness ranges from 0 to 45 percent. Vegetation series include lodgepole pine, whitebark pine, foxtail pine, limber pine, and, less frequently, Jeffrey pine and red fir.

A representative pedon (#177) is a loamy-skeletal, mixed, Typic Cryochrept in a unit of Typic Cryorthents – Typic Cryochrepts – Rock outcrop complex, 0 to 45 percent slopes (map unit 111). The soil formed in glacial till consisting of porphyritic biotite-bearing quartz monzonite, on a 23 percent, north facing slope at 10,700 feet elevation, in the lodgepole pine vegetative series. The soil is located in the Cottonwood Creek drainage, south of the Cottonwood Creek trail in NE 1/4, SW 1/4, S 32, T 16 1/2 S, R 35 E, MDM; Olan-cha NW quadrangle; latitude 36° 29' 14", longitude 118° 11' 27".

A—0 to 4 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, black (10YR 2/1) moist; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; 12 percent gravel, 5 percent cobbles; strongly acid, clear irregular boundary.

Bw—4 to 15 inches; very pale brown (10YR 7/4) very gravelly sandy loam, light yellowish brown (10YR 6/4) moist; moderate medium granular structure; soft, very friable, nonsticky, nonplastic; few very fine, common fine, medium, and coarse roots;

40 percent gravel, 15 percent cobbles; moderately acid, clear smooth boundary.

C1—15 to 22 inches; very pale brown (10YR 7/3) extremely gravelly loamy sand, light yellowish brown (10YR 6/4) moist; massive breaking to single grain; loose, non-sticky, nonplastic; few fine and few medium roots; 50 percent gravel, 20 percent cobbles; moderately acid, clear smooth boundary.

C2—22 to 26 inches; white (10YR 8/2), extremely gravelly loamy sand, pale brown (10YR 6/3) moist; massive; hard, friable, nonsticky, nonplastic; few fine roots; 10 percent gravel, 80 percent cobbles.

Remarks: The A horizon is very slightly to moderately water repellent; the Bw horizon is slightly water repellent; and the C1 horizon is wettable. Surface rock fragment cover is 35 percent by gravel, and 25 percent by stones and boulders. Generally, sheet and rill erosion are moderate to severe on the site. Colors in the C1 horizon are somewhat mixed, due to differential weathering of rock. The dominant color is noted above; the included color is 10YR 5/6. The C2 horizon nearly classifies as a Cr horizon. Soil temperature at 20 inches depth was 54° F on 8/14/89. Vegetation at the site consisted of lodgepole pine (30 percent cover).

Range in Characteristics: Depth of the solum is from 15 to 38 inches. Rock fragment contents, which commonly increase with depth, range from 0 to 70 percent for gravel, and from 0 to 80 percent for cobbles, stones, and boulders, throughout. Surface rock fragments range from 0 to 60 percent.

A horizon colors are 10YR or 2.5Y, with values ranging from 4 to 7 (2 to 7 moist), and chromas from 1 to 4 (1 to 4 moist). Soil textures are sand, loamy sand, coarse sandy loam, or sandy loam, commonly with very gravelly or gravelly modifiers. Structures are single grain to moderate granular or massive. Horizon thickness is from 2 to 16 inches.

Bw horizon colors are 7.5YR, 10YR, or 2.5Y, with values ranging from 5 to 8 (3 to 6 moist), and chromas from 1 to 6 (1 to 6 moist). Textures are coarse sandy loam or sandy loam, commonly with extremely gravelly or gravelly modifiers. Structures are

single grain to weak subangular blocky or massive. Horizon thickness is from 6 to 25 inches.

C horizon colors are 10YR or 2.5Y, with values ranging from 4 to 8 (4 to 6 moist), and chromas from 1 to 6 (2 to 6 moist). Textures are loamy sand, coarse sandy loam, or sandy loam, commonly with extremely gravelly to gravelly modifiers. Structural conditions are massive or single grain.

Remarks: These soils are slightly to extremely water repellent in the surface horizons in approximately 50 percent of the pedons. Surface horizons on moderately steep and steep slopes are highly susceptible to sheet and rill erosion when unprotected by litter. Overland flow on water repellent soils readily removes litter layers. Some pedons have AB, BA, or BC transitional horizons. Krotovinas often are present in the pedons. Soil moisture regimes are xeric to udic.

Dystric Xerochrepts

Dystric Xerochrepts are deep to very deep, well drained to somewhat excessively drained soils formed in material weathered from granitic rocks. These soils are in glacial till and on mountain sides and ridges, at elevations ranging from 2,600 to 7,500 feet on the west slope of the Sierra Nevada. Slope steepness ranges from 0 to 85 percent. Mean annual precipitation is 20 to 40 inches, most of which falls as snow. Vegetation series include white leaf manzanita, Jeffrey pine, mixed conifer, and red fir.

A representative pedon (#35) is a loamy-skeletal, mixed, frigid, Dystric Xerochrept in a unit of Dystric Xerorthents – Rock outcrop – Typic Xerumbrepts complex, 0 to 30 percent slopes (map unit 126). The soil formed in glacial till consisting dominantly of granodiorite, on a 6 percent, south-southwest facing slope at 5,800 feet elevation, in the Jeffrey pine vegetation series. The soil is located in the Middle Fork San Joaquin drainage, approximately 1 1/2 miles west of Cassidy Crossing, in NW 1/4, NW 1/4, S 22, T 5 S, R 25 E, MDM; Kaiser Peak NW quadrangle; latitude 37° 29' 01", longitude 119° 13' 48".

Oi—2 inch to 0; conifer and scattered oak litter.

A—0 to 4 inches; dark grayish brown (10 YR 4/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very fine granular structure; loose, very friable, nonsticky, nonplastic; common very fine and fine, few medium roots; 12 percent gravel, 5 percent cobbles; moderately acid (pH 6.0); clear irregular boundary.

Bw—4 to 22 inches; light yellowish brown (10YR 6/4) very cobbly coarse sandy loam, dark yellowish brown (10YR 4/6) moist; weak very fine subangular blocky structure; loose, very friable, nonsticky, nonplastic; common very fine, fine, medium, and coarse roots; 25 percent gravel, 35 percent cobbles; strongly acid (pH 5.5); clear smooth boundary.

C—22 to 35 inches; light yellowish brown (10YR 6/4) very cobbly coarse sandy loam, yellowish brown (10YR 5/6) moist; weak very fine granular structure; loose, very friable, nonsticky, nonplastic; common very fine and fine, few medium and coarse roots; 25 percent gravel, 35 percent cobbles; strongly acid.

Remarks: Surface rock fragment cover is 1 percent. Erosion is negligible. The A horizon is moderately water repellent. Soil temperature at 20 inches depth was 55° F on 7/6/88. Vegetation on the site included Jeffrey pine, sugar pine, incense cedar, (20 percent cumulative cover), black oak, lupine, bracken, and sedge.

Range in Characteristics: Depth of the solum is 15 to 35 inches. Rock fragment content ranges from 5 to 70 percent for gravel, and from 0 to 50 percent for cobbles and stones, throughout. Surface rock fragments range from 1 to 85 percent. Soil reaction ranges from very strongly acid to neutral, with acidity generally decreasing with increasing soil depth. Base saturation is less than 50 percent.

A horizon colors are 10YR, with values ranging from 3 to 5 (2 to 4 moist), and chromas from 2 to 4 (2 to 6 moist). Thickness is from 2 to 8 inches. Textures are loamy coarse sand, loamy sand, coarse sandy loam, sandy loam, or loam with extremely gravelly or

gravelly modifiers. Structures are single grain or massive to moderate fine granular.

Bw horizon colors are 5YR, 7.5YR, 10YR, or 2.5Y, with values ranging from 5 to 7 (3 to 5 moist), and chromas from 2 to 8 (2 to 6 moist). Thickness is from 8 to 34 inches. Textures are coarse sandy loam or sandy loam, commonly with very cobbly to gravelly modifiers. Structures are weak very fine granular to weak fine subangular blocky.

C horizon colors are 10YR, with values ranging from 7 to 8 (5 to 6 moist), and chromas from 1 to 4 (3 to 4 moist). Textures are loamy sand, coarse sandy loam, or sandy loam, commonly with extremely cobbly to gravelly modifiers. Structures are massive to weak very fine granular.

Remarks: These soils may be slightly to extremely water repellent in more than half the pedons. Volcanic ash may be mixed in the A horizon, giving the soil a somewhat smeary feel. Surface horizons generally show little erosion, but are susceptible to sheet and rill erosion when unprotected by litter. Some pedons have AB or BC transitional horizons. Although these soils are classified in the xeric moisture regime, some sites in the red fir zone actually may have a udic moisture regime because of soil moisture recharge from summer snow melt. If adequate substantiating data were available, these soils would be reclassified as Typic Dystrochrepts.

Typic Xerochrepts

Typic Xerochrepts are moderately deep to very deep, well drained to excessively drained soils formed in material weathered from granitic rock. They occur on moderately steep to very steep colluvial mountain sides and ridges, glacial moraines, and alluvial bottoms at elevations from 5,600 to 10,100 feet in the southeastern portion of the survey area. Slope steepness ranges from 15 to 75 percent. The mean annual precipitation is 10 to 25 inches. Vegetation series include mixed conifer-fir, Jeffrey pine, singleleaf pinyon pine, red fir, lodgepole pine, and perennial grass.

A representative pedon (#147) is a loamy-skeletal, mixed, frigid Typic Xerochrept in a unit of Typic Xerochrepts, 15 to 45 percent

slopes (map unit 135). The soil formed from granitic colluvium, dominated by granodiorite, on a 20 percent, southeast facing backslope at 9,650 feet elevation. The soil is located on the north side of Sawmill Creek, north of Mule Lake, in SW 1/4, NW 1/4, S 23, T 12 S, R 33 E, MDM; Mt. Pinchot NE quadrangle; latitude 36° 53' 35", longitude 118° 20' 31".

A—0 to 3 inches; very dark grayish brown (10YR 3/2) extremely gravelly coarse sand, very dark grayish brown (10YR 3/2) moist; single grain to weak very fine granular structure; loose, nonsticky, nonplastic; few very fine roots; 70 percent gravel; abrupt smooth boundary.

Bw—3 to 11 inches; light gray (10YR 7/2) extremely gravelly sandy loam, grayish brown (2.5Y 5/2) moist; massive to weak very fine granular structure; loose, nonsticky, nonplastic; few very fine, common fine, and few medium and roots; 60 percent gravel, 10 percent cobbles; clear irregular boundary.

BC—11 to 23 inches; light gray (10YR 7/1) extremely gravelly sandy loam, pale brown (10YR 6/3) moist; massive; slightly hard, very friable, nonsticky, nonplastic; few very fine, fine, medium, and coarse roots; 50 percent gravel, 20 percent cobbles; clear smooth boundary.

C—23 to 32 inches; white (10YR 8/1) extremely cobbly sandy loam, pale brown (10YR 6/2) moist; massive; hard, friable, nonsticky, nonplastic; 20 percent gravel, 50 percent cobbles.

Remarks: Gravel covers 85 percent of the ground surface. The site suffers from moderate sheet and rill erosion and minor gully erosion. The steep slope above the pedon site (north) has experienced rock fall events. The clay content (field estimated) increases from 1 percent in the A horizon to 9 percent in the Bw horizon, and to 12 percent in the BC horizon, but no evidence of clay illuviation was found; the clay appears to be forming in place. Much of the clay is present as pseudomorphs, primarily from plagioclase. Cobbles in the BC and C horizons are easily broken with a shovel. The C horizon nearly classifies as a Cr horizon. Soil temperature at 20 inches

depth was 62° F on 8/15/89. Vegetation in the area consisted of red fir (15 percent cover), lodgepole pine (10 percent cover), whitebark pine (5 percent cover), mountain mahogany (5 percent cover), ceanothus (5 percent cover), penny royal (<1 percent cover), and bunch grass (2 percent cover).

Range in Characteristics: The following range in characteristics is based on a small number of pedon observations; additional observations may broaden the range somewhat. Depth of the solum is from 16 to 32 inches. Rock fragment contents range from 3 to 70 percent for gravel, and from 0 to 50 percent for cobbles and stones throughout. Surface rock fragments range from 5 to 85 percent. Soil reaction ranges from very strongly acid to slightly acid.

A horizon colors are 10YR and 2.5Y, with values ranging from 3 to 5 (3 moist), and chromas from 1 to 4 (1 to 3 moist). Textures are sand or loamy sand, with gravelly through extremely stony modifiers. Structures are single grain to weak fine granular.

Bw horizon colors are 10YR and 2.5Y, with values ranging from 5 to 7 (4 to 5 moist), and chromas from 2 to 6 (2 to 6 moist). Textures are coarse sandy loam or sandy loam with gravelly to extremely stony modifiers. Structures are weak very fine granular or massive.

Remarks: Surface layers are moderately to extremely water repellent. Surface soils are easily disturbed and susceptible to sheet and rill erosion. Transitional AB and BC horizons are present in some pedons. These soils occur only in small map units and as inclusions in the southeastern portion of the survey area.

INCEPTISOLS—UMBREPTS

Entic Cryumbrepts

Entic Cryumbrepts are moderately deep to very deep, well drained to somewhat excessively drained soils formed in material weathered from granitic or, less commonly, metamorphic rocks. These soils are on colluvial mountain sides and ridges, glacial moraines, alluvial bottoms, and plateaus, at elevations ranging from 7,000 to 12,000 feet. Slope

steepness ranges from 0 to 60 percent, but most commonly is approximately 25 percent. The mean annual precipitation is 20 to 60 inches, most of which falls as snow. Vegetation series include sagebrush, pinyon pine, Jeffrey pine, mixed conifer, red fir, lodgepole pine, whitebark pine, and perennial grass.

A representative pedon (#209) is a sandy, mixed, Entic Cryumbrept in a unit of Typic Cryorthents - Entic Cryumbrepts complex, 0 to 45 percent slopes (map unit 112). The soil formed in mixed granitic glacial till and colluvium dominated by biotite, hornblende granodiorite, on a six percent, southwest facing slope at 8,400 feet elevation, in the lodgepole pine vegetation series. The soil is located in the Post Corral Creek drainage, in SE 1/4, SE 1/4, S 15, T 9 S, R 28 E, MDM; Blackcap Mountain NW quadrangle; latitude 37° 08' 29", longitude 118° 53' 58".

Oi—1 inch to 0; lodgepole pine and grass litter.

A1—0 to 2 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, black (10YR 2/1) moist; single grain; loose, nonsticky, nonplastic; many very fine, common fine, few medium roots; 15 percent gravel; very strongly acid (pH 4.8); abrupt smooth boundary.

A2—2 to 11 inches; grayish brown (10YR 5/2) loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; loose, nonsticky, nonplastic; common very fine, fine, and medium, and few coarse roots; 8 percent gravel; very strongly acid (pH 5.0); clear smooth boundary.

A3—11 to 27 inches; grayish brown (10YR 5/2) loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; loose, nonsticky, nonplastic; few very fine and fine, common medium, and few coarse roots; 8 percent gravel; very strongly acid (pH 5.0); clear smooth boundary.

C1—27 to 35 inches; grayish brown (2.5Y 5/2) loamy coarse sand, dark grayish brown (10YR 4/2) moist; massive to weak very fine granular structure; soft, nonsticky, nonplastic; few very fine, fine, medium, and coarse roots; 5 percent

gravel; very strongly acid (pH 5.0); gradual smooth boundary.

C2—35 to 57 inches; light brownish gray (2.5Y 6/2) loamy coarse sand, grayish brown (2.5Y 5/2) moist; massive to weak very fine granular structure; soft, very friable, nonsticky, nonplastic; few fine, medium, and coarse roots; 2 percent gravel; strongly acid (pH 5.0); clear smooth boundary.

C3—57 to 64 inches; light yellowish brown (2.5Y 6/4) gravelly loamy coarse sand, dark grayish brown (2.5Y 4/2) moist; weak very fine granular structure; loose, nonsticky, nonplastic; few medium roots; 20 percent gravel, 5 percent cobbles; strongly acid (pH 5.0).

Remarks: Rock fragments cover 8 percent of the ground surface. The A1 horizon is a recent slope-wash deposit. The A1 and A2 horizons are extremely water repellent, the A3 horizon is very slightly water repellent, and soil below that is wettable. In the immediate vicinity, sheet erosion is slight and rill erosion is negligible if the soil is covered by grass and litter, but both forms of erosion are high to severe if the surface is unprotected. Sheet and rill erosion are high, even under plant and litter cover, on sites that receive overland flow from upslope; these sites commonly occur below rock outcrops. Soil temperature at 20 inches depth was 52° F on 8/2/90. Vegetation on the site is dominated by lodgepole pine (40 percent cover), with a scattered understory of bunch grasses and sedges.

Range in Characteristics: Depth of the solum is from 8 to 27 inches. Rock fragment contents, which commonly increase with depth, range from 2 to 65 percent for gravel, and from 0 to 55 percent for cobbles, stones, and boulders, throughout. Surface rock fragments range from 6 to 90 percent. Soil reaction is extremely acid to slightly acid. Base saturation is less than 50 percent throughout the pedon.

A horizon colors are 10YR (uncommonly 2.5Y or 7.5YR), with values ranging from 3 to 6 (2 to 4 moist), and chromas from 1 to 4 (1 to 3 moist). Textures are loamy coarse sand, loamy sand, sandy loam, or loam, commonly with gravelly or very gravelly

modifiers. Structures are single grain to moderate, medium granular. Horizon thickness is from 2 to 27 inches.

C horizon colors are 7.5YR, 10YR, or 2.5Y, with values ranging from 5 to 7 (3 to 5 moist), and chromas from 1 to 6 (3 to 6 moist). Textures are loamy coarse sand or loamy sand, commonly with gravelly or very gravelly modifiers. Structural conditions are massive or very fine granular.

Remarks: These soils are slightly to extremely water repellent in the surface horizons in three-fourths of the pedons. Surface horizons are highly susceptible to sheet and rill erosion when unprotected by litter. Some pedons have AC or CA transitional horizons. Other pedons may have Bw horizons that do not qualify as cambic diagnostic horizons because their textures are too coarse (i.e., they are not finer than very fine sand or loamy very fine sand, as required by *Soil Taxonomy*). Volcanic ash may occur as thin superficial layers or be mixed in the A horizon. Krotovinas often are present in the pedons. Soil moisture regimes mostly are xeric, but may be udic in much of the red fir zone because of soil moisture recharge from summer snowmelt.

Entic Cryumbrepts, volcanic

Entic Cryumbrepts, volcanic are moderately deep to deep, moderately well drained to somewhat excessively drained soils formed in material weathered dominantly from mafic volcanic or metavolcanic rocks. The rocks, which may be holocrystalline or pyroclastic, most often are basaltic or andesitic in composition, and may have been metamorphosed to varying degrees (mafic hornfels, metabreccias, and metalapilli tuffs are included). Unconsolidated deposits may contain minor amounts of granitic rock, as well as other volcanic or metamorphic rocks. These soils are on mountain sides and ridges, glacial moraines, and alluvial bottoms, at elevations between 6,400 to 10,700 feet. Slope steepness ranges from 0 to 85 percent. Mean annual precipitation is 30 to 60 inches, most of which falls as snow. Vegetation series include sagebrush, lodgepole pine, and white-bark pine.

A representative pedon (#69) is a coarse-loamy, mixed, Entic Cryumbrept in a unit of Typic Cryorthents, tephritic – Xeric Vitricryands – Rock outcrop complex, volcanic, 0 to 45 percent slopes (map unit 119). The soil, which is an inclusion in this map unit, formed in mixed andesitic glacial till and alluvium, on a 25 percent, west-southwest facing, glacially scoured backslope at 9,600 feet elevation, in the lodgepole pine vegetation series. The soil is located in the upper Middle Fork San Joaquin River drainage, approximately one mile northeast of Garnet Lake, in SW 1/4, SW 1/4, S 32, T 2 S, R 26 E, MDM; Devils Postpile NW quadrangle; latitude 37° 43' 29", longitude 119° 08' 08".

Oi—1 inch to 0; lodgepole pine litter.

A—0 to 6 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, friable, slightly sticky, nonplastic; few very fine, fine, and medium roots; 5 percent gravel; strongly acid (pH 5.5); clear smooth boundary.

AC—6 to 23 inches; light olive brown (2.5Y 5/4) gravelly loam, dark brown (10YR 3/3) moist; weak, very fine subangular blocky structure; soft, friable, slightly sticky, nonplastic; few very fine and fine, common medium and coarse roots; 15 percent gravel, 5 percent cobbles; strongly acid (pH 5.5); gradual smooth boundary.

C—23 to 37 inches; light yellowish brown (2.5Y 6/4) very gravelly loam, dark brown (10YR 3/3) moist; moderate very fine subangular blocky structure; soft, friable, slightly sticky, nonplastic; few very fine and fine, common medium, and few coarse roots; 40 percent gravel, 20 percent cobbles; strongly acid (pH 5.5).

Remarks: Pumice is mixed throughout the solum. The surface horizon is water repellent. Rock outcrop is 20 percent in the vicinity of the pedon, and rock fragments cover 10 percent of the ground surface. Grass cover is approximately 20 percent. Sheet erosion is moderate and gully erosion is slight. Soil temperature at 20 inches depth was 48° F on 8/2/88.

Range in Characteristics: Depth of the solum is from 13 to 27 inches. Rock fragment contents, which commonly increase with depth, range from 5 to 40 percent for gravel, and from 0 to 35 percent for cobbles, stones, and boulders, throughout. Surface rock fragments range from 10 to 80 percent. Soil reaction ranges from extremely acid (pH 4.0) to strongly acid (pH 5.5). Base saturation is less than 50 percent throughout the pedon.

A horizon colors are 10YR, with values ranging from 3 to 5 (2 to 3 moist), and chromas from 2 to 3 (1 to 3 moist). Thickness is from 6 to 14 inches. Textures are sandy loam or loam, commonly with gravelly through extremely cobbly modifiers. Structures are weak, very fine granular to moderate, very fine granular.

C horizon colors are 10YR or 2.5Y, with values ranging from 5 to 6 (3 to 4 moist), and chromas from 2 to 4 (3 to 4 moist). Textures are sandy loam or loam, commonly with gravelly through extremely cobbly modifiers. Structures are subangular blocky or granular.

Remarks: These soils have formed from dark colored, mafic, fine grained parent rocks that influence soil properties, most notably color and texture. The soils are moderately water repellent in the surface horizons in approximately half of the pedons. Surface horizons are susceptible to sheet and rill erosion when unprotected by litter. Some pedons have AC or CA transitional horizons. Volcanic ash may occur as thin superficial layers or be mixed in the A horizon. Krotovinas often are present in the pedons. Soil moisture regimes are xeric.

Typic Cryumbrepts

Typic Cryumbrepts are deep to very deep, well drained to somewhat excessively drained soils formed in material weathered dominantly from granitic rock, and to a minor extent from volcanic or metamorphic rock. These soils are on mountain sides and ridges, glacial moraines, and alluvial bottoms at elevations between 6,400 to 11,600 feet. Slope steepness ranges from 0 to 45 percent. Mean annual precipitation is 15 to 50 inches, most of which falls as snow. Vegetation series in-

clude red fir, lodgepole pine, whitebark pine, and alpine dwarf scrub.

A representative pedon (# 7) is a coarse-loamy, mixed Typic Cryumbrept in a unit of Typic Cryorthents – Typic Cryumbrepts – Rock outcrop complex, 0 to 45 percent slopes (map unit 113). The soil formed in granitic glacial till on a 12 percent, south facing slope at 10,100 feet elevation, in the lodgepole pine vegetative series. The soil is located in the Cold Creek drainage, about 1/2 mile south of Goodale Pass in NE 1/4, SW 1/4, S 5, T 6 S, R 28 E, MDM; Mt. Abbot NW quadrangle; latitude 37° 27' 08", longitude 118° 56' 30".

Oi—1/4 inch to 0; grass and lodgepole pine litter.

A—0 to 10 inches; yellowish brown (10YR 5/4) sandy loam, very dark grayish brown (10YR 3/2) moist; weak, very fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; 8 percent gravel; strongly acid (pH 5.5); clear, smooth boundary.

Bw1—10 to 18 inches; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 3/4) moist; moderate, medium granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine, few medium and coarse roots; 12 percent gravel; strongly acid (pH 5.5); clear, smooth boundary.

Bw2—18 to 30 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam, dark brown (10YR 3/3) moist; massive, breaking to moderate fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; 15 percent gravel, 2 percent cobbles; strongly acid (pH 5.5); clear smooth boundary.

C—30 to 41 inches; dark brown (10YR 4/3) very gravelly coarse sandy loam, dark yellowish brown (10YR 3/4) moist; moderate, fine granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; 35 percent gravel, 15 percent cobbles; strongly acid (pH 5.5).

Remarks: The A horizon is slightly water repellent. Surface coarse fragments, consist-

ing of gravel and scattered stones and boulders, cover approximately 20 percent of the area. Sheet erosion is moderate on bare soil surfaces. No pumice was detected in the soil, although the surface horizon appears to have a low bulk density that is common in pumicious soils. Soil temperature at 20 inches depth was 47° F on 7/17/87.

Range in characteristics: Depth of the solum is 16 to 39 inches. Rock fragment contents throughout range from 0 to 60 percent for gravel, and 0 to 50 percent for cobbles, stones and boulders. Surface rock fragments range from 0 to 65 percent. Soil reaction is extremely acid to strongly acid. Base saturation is less than 50 percent throughout the pedon.

A horizon colors are 10YR, or rarely 7.5 YR, with values ranging from 3 to 6 (2 to 3 moist), and chromas from 2 to 4 (1 to 4 moist). Thickness is from 2 to 21 inches. Textures are loamy sand, coarse sandy loam, sandy loam, or loam, commonly with very gravelly or gravelly modifiers. Structures are single grain to weak, medium subangular blocky or massive.

Bw horizon colors are 7.5YR, 10YR, or 2.5Y, with values ranging from 3 to 6 (2 to 4 moist), and chromas from 3 to 6 (2 to 6 moist). Thickness is from 4 to 20 inches. Textures are loamy sand, coarse sandy loam, sandy loam, or loam, commonly with very cobbly through gravelly modifiers. Structures are weak, fine granular to moderate, fine subangular blocky or massive.

C horizon colors are 5YR, 7.5YR, 10YR, 2.5Y, or 5Y, with values ranging from 5 to 7 (3 to 7 moist), and chromas from 2 to 8 (2 to 6 moist). Gravel content is between 20 and 60 percent. Textures are loamy sand, coarse sandy loam, or sandy loam with very cobbly or very gravelly to gravelly modifiers.

Remarks: Volcanic ash may be mixed in the A horizon. Approximately two-thirds of the pedons are slightly to moderately water repellent in the surface horizon; water repellency tends to increase with the presence of volcanic ash. In some areas, overwash of very gravelly loamy coarse sand or loamy sand covers the surface. Some pedons have AB, BA, BC, or CB transitional horizons.

Rock fragment content is negligible in pedons formed in small flood plains. The soil moisture regime dominantly is xeric, but may be udic in much of the red fir zone because of soil moisture recharge from summer snow melt.

Typic Cryumbrepts, volcanic

Typic Cryumbrepts, volcanic, are moderately deep to deep, well drained to somewhat excessively drained soils formed in material weathered from dark colored, fine grained rock, including andesite, basalt, metavolcanic rock, or, east of the Sierran Crest, hornfels. Occasionally, minor amounts of granitic rock may be mixed with the volcanic deposits. These soils are on mountain sides and ridges, and infrequently on glacial moraines, at elevations between 7,700 and 11,100 feet. Slope steepness ranges from 0 to 60 percent. The mean annual precipitation is 35 to 50 inches, most of which falls as snow. Vegetation series include red fir, lodgepole pine, and whitebark pine.

A representative pedon (#15) is a loamy-skeletal, mixed Typic Cryumbrept, volcanic, in a unit of Typic Cryumbrepts – Xeric Vitricryands – Rock outcrop complex, volcanic, 0 to 45 percent slopes (map unit 138). The soil formed on a 13 percent, west-southwest facing slope of basaltic colluvium at 9,900 feet elevation, in the lodgepole pine vegetation series. The soil is located east of Lake Edison, 1 1/2 miles west-southwest of Volcanic Knob, in NW 1/4, NE 1/4, S 33, T 6 S, R 28 E, MDM; Mt. Abbot NW quadrangle; latitude 37° 23' 18", longitude 118° 54' 54".

Oi—1 inch to 0; lodgepole pine litter.

A—0 to 9 inches; brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3) moist; moderate medium granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine, few medium roots; 35 percent gravel, 2 percent cobbles; strongly acid (pH 5.5); abrupt smooth boundary.

BA—9 to 15 inches; brown (10YR 5/3) cobbly loam, dark brown (7.5YR 3/4) moist; weak, fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine, common fine, medium, and

coarse roots; 8 percent gravel, 20 percent cobbles; strongly acid (pH 5.5); clear smooth boundary.

Bw—15 to 35 inches; brown (10YR 5/3) very cobbly loam, brown (7.5YR 4/4) moist; massive breaking to weak fine subangular blocky structure; soft, very friable, non-sticky, nonplastic; few very fine, common fine and medium, few coarse roots; 16 percent gravel, 20 percent cobbles; strongly acid (pH 5.5); clear smooth boundary.

C—35 to 37 inches; pale brown (10YR 6/3) extremely stony sandy loam, brown (7.5YR 5/4) moist; massive; soft, very friable, nonsticky, nonplastic.

Remarks: The A horizon is slightly water repellent. Surface coarse fragment cover is 40 percent, consisting of gravel. Exposed soil suffers from sheet, rill, and gully erosion. Soil temperature at 20 inches depth was 47° F on 8/12/87. Vegetation on the site included lodgepole pine (40 percent cover), lupine and other forbes (5 percent cover), and grass (2 percent cover).

Range in Characteristics: Depth of the solum is 16 to 48 inches. Surface rock fragments range from 1 to 65 percent. Soil reaction is extremely acid to strongly acid. Base saturation is less than 50 percent throughout the pedon.

A horizon colors are 5YR, 7.5YR, or 10YR, with values ranging from 4 to 5 (2 to 3 moist), and chromas from 2 to 4 (1 to 4 moist). Horizon thickness is from 5 to 11 inches. Textures are sandy loam or loam, commonly with gravelly to very gravelly modifiers. Rock fragment content ranges from 2 to 35 percent for gravel, and 0 to 20 percent for cobbles. Structures are weak, fine granular to moderate, medium subangular blocky.

Bw horizon colors are 7.5YR or 10YR, with values ranging from 5 to 6 (2 to 4 moist), and chromas from 3 to 4 (2 to 4 moist). Thickness is from 6 to 43 inches. Textures are sandy loam or loam, with gravelly to very cobbly modifiers. Rock fragment content ranges from 0 to 45 percent for gravel, and 5 to 45 percent for cobbles and

stones. Structures are weak, fine granular to moderate, medium subangular blocky.

C horizon colors are 7.5YR or 10YR, with values ranging from 5 to 6 (3 to 4 moist), and chromas from 3 to 6 (2 to 6 moist). Textures are sandy loam, commonly with gravelly to extremely stony modifiers. Rock fragment content ranges from 8 to 55 percent for gravel, and 15 to 50 percent for cobbles.

Remarks: These soils may or may not be slightly to moderately water repellent in the surface horizon. Minor amounts of volcanic ash may be mixed in the surface horizon. Surface horizons are susceptible to sheet and rill erosion when unprotected. Some soils have smeary consistence in the Bw horizons. Soils containing volcanic ash and having smeary consistence are marginal to Andisols. Krotovinas often are present. Some pedons have BA, BC, or CB transitional horizons. Soil moisture regimes are xeric to udic.

Entic Xerumbrepts

Entic Xerumbrepts are moderately deep to very deep, well drained to somewhat excessively drained soils formed in material weathered from granitic rocks, with an occasional admixture of volcanic rocks. These soils are on residual and colluvial mountain sides and in glacial till at elevations ranging from 3,000 to 9,600 feet. They reach their maximum elevation east of the Sierran Crest on brush or pinon pine covered southerly facing slopes. West of the Sierran Crest, their upper elevational limit is approximately 1,000 feet lower on comparable landscape positions. Slope steepness ranges from 0 to 85 percent. Mean annual precipitation is 20 to 45 inches. Vegetation series include big sage, white leaf manzanita, single leaf pinon pine, Jeffrey pine, mixed conifer-fir, and mixed conifer-pine.

A representative pedon (#49) is a loamy-skeletal, mixed, frigid, Entic Xerumbrept that is an inclusion in a unit of Rock outcrop – Typic Cryorthents complex, 0 to 45 percent slopes (map unit 147). The soil formed in a granitic glacial deposit, on a 50 percent, southeast facing slope at 8,500 feet elevation, in the manzanita vegetation series. The soil is located in the lower end of North Fork Mono

Creek drainage, in SW 1/4, SE 1/4, S 16, T 6 S, R 28 E, MDM; Mt. Abbot NW quadrangle; latitude 37° 25' 07", longitude 118° 54' 59".

Oi—1/4 inch to 0; manzanita leaves.

A—0 to 8 inches; dark gray (10YR 4/1) coarse sandy loam, black (N 2/0) moist; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; 5 percent gravel, 5 percent cobbles; very strongly acid (pH 5.0); gradual wavy boundary.

AC—8 to 20 inches; very dark gray (10YR 3/1) cobbly coarse sandy loam, black (10YR 2/1) moist; single grain; loose, nonsticky, nonplastic; common very fine, fine, and medium roots; 10 percent gravel, 10 percent cobbles; very strongly acid (pH 5.0); clear wavy boundary.

C—20 to 40 inches; brown (10YR 5/3) extremely stony coarse sandy loam, very dark gray (10YR 3/1) moist; single grain; loose, nonsticky, nonplastic; few very fine, fine, and medium roots; 10 percent gravel, 20 percent cobbles, 50 percent stones; very strongly acid (pH 5.0).

Remarks: The upper 4 inches of the A horizon contains volcanic ash, and is moderately water repellent. Rock outcrop is not exposed in the vicinity of the pedon. Rock fragments cover 35 percent of the ground surface. Sheet erosion is low. Soil temperature at 20 inches depth was 65° F on 7/19/88. Vegetation on the site is manzanita (80 percent cover), bitter cherry (5 percent cover), Jeffrey pine (4 percent cover), and juniper (2 percent cover).

Range in Characteristics: Depth of the solum is from 12 to 20 inches. Rock fragment contents, which tend to increase with depth, range from 5 to 65 percent for gravel, and 0 to 70 percent for cobbles, stones, and boulders, throughout. Surface rock fragments range from 5 to 75 percent. Soil reaction ranges from extremely acid (pH 4.0) to moderately acid (pH 6.0). Base saturation is less than 50 percent throughout the pedon.

A horizon colors are 7.5YR or 10YR, with values ranging from 3 to 4 (2 to 3 moist), and chromas from 1 to 3 (0 to 2 moist). Horizon thickness is from 8 to 9

inches. Textures are sand, loamy sand, coarse sandy loam, or sandy loam, often with very gravelly, gravelly, or cobbly modifiers. Structures are single grain to weak medium subangular blocky.

C horizon colors are 7.5YR or 10YR with values ranging from 5 to 6 (3 to 5 moist), and chromas from 2 to 3 (1 to 3 moist). Textures are loamy sand, coarse sandy loam, or sandy loam, commonly with extremely stony to gravelly modifiers. Structural conditions are single grain or massive.

Remarks: Apart from occurrences in the Monarch Wilderness in the Middle Fork Kings River drainage, these soils are inclusions in several map units, most notably those containing Typic Xerumbrepts and Dystric Xerochrepts. Although they have a mesic or frigid temperature regime, these soils can occur on brush covered southerly aspects in units dominated by cryic temperature regime soils, including Typic Cryorthents. The soils are slightly to extremely water repellent in the surface horizons in approximately 60 percent of the pedons. Surface horizons are highly susceptible to sheet and rill erosion when unprotected by litter. Some pedons have AC or CA transitional horizons. Volcanic ash may occur as thin superficial layers or be mixed in the A horizon. Krotovinas often are present. Soil moisture regimes are xeric.

Typic Xerumbrepts

Typic Xerumbrepts are deep to very deep, well drained to somewhat excessively drained soils formed in material weathered from granitic rock, with an occasional admixture of volcanic rocks. These soils are on colluvial mountain sides, at elevations ranging from 2,600 to 9,400 feet. Slope steepness ranges from 0 to 55 percent. The mean annual precipitation is 20 to 50 inches. Vegetation series is mixed conifer-pine, mixed conifer-fir, white leaf manzanita, and Jeffrey pine.

A representative pedon (#36) is a sandy, mixed, frigid Typic Xerumbrept in a unit of Dystric Xeroorthents – Rock outcrop – Typic Xerumbrepts complex, 0 to 30 percent slopes (map unit 126). The soil formed in granodiorite on a south-southeast facing, 30 percent backslope at 5,360 feet elevation, in the mixed

conifer vegetation series. The soil is located in the Middle Fork San Joaquin River drainage, approximately 1/2 mile southwest of Cassidy Meadows, northeast of Balloon Dome in NE 1/4, NW 1/4, S 26, T 5 S, R 25 E, MDM; Kaiser Peak NW quadrangle; latitude 37° 28' 14", longitude 119° 12' 28".

Oi—1 inch to 0; oak leaves and pine needles.

A1—0 to 2 inches; dark grayish brown (2.5Y 4/2) coarse sandy loam, black (10YR 2/1) moist; massive; soft, very friable, non-sticky, nonplastic; many very fine roots; 10 percent gravel; strongly acid (pH 5.5); clear, smooth boundary.

A2—2 to 6 inches; dark grayish brown (2.5Y 4/2) coarse sandy loam, black (10YR 2/1) moist; moderate, fine subangular blocky structure; soft, friable, nonsticky, nonplastic; common very fine and fine roots; 3 percent gravel; strongly acid (pH 5.5); clear, wavy boundary.

Bw—6 to 14 inches; light olive brown (2.5Y 5/4) sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, non-sticky, nonplastic; many very fine, fine, and medium, and few coarse roots; 3 percent gravel; strongly acid (pH 5.5); clear wavy boundary.

BC—14 to 24 inches; light yellowish brown (2.5Y 6/4) gravelly loamy coarse sand, dark yellowish brown (10YR 4/4) moist; moderate very fine granular structure; soft, friable, nonsticky, nonplastic; common very fine, many fine and medium roots; 15 percent gravel, 2 percent cobbles; strongly acid (pH 5.5); clear, wavy boundary.

C—24 to 34 inches; light olive brown (2.5Y 5/4) very cobbly loamy coarse sand, dark yellowish brown (10YR 3/4) moist; weak, fine granular structure; soft, friable, non-sticky, nonplastic; many fine roots; 25 percent gravel, 25 percent cobbles; strongly acid (pH 5.5).

Remarks: Surface coarse fragments cover approximately 10 percent of the area. The A horizon is extremely water repellent. Sheet erosion is slight on bare soil surfaces. Roots in the A2 horizon dominantly are horizontal. Soil temperature at 20 inches depth was 57° F

on 7/7/88. Vegetation at the site included incense cedar (10 percent cover), ponderosa pine (5 percent cover), sugar pine (5 percent cover), black oak (2 percent cover), honey suckle (7 percent cover), and grass (2 percent cover).

Range in characteristics: The following range in characteristics is based on a small number of pedon observations; additional observations may broaden the range somewhat. Depth of the solum is 20 to 35 inches. Rock fragment contents range from 3 to 30 percent for gravel, and 0 to 30 percent for cobbles, stones, and boulders. Surface rock fragments range from 10 to 25 percent. Soil reaction is very strongly acid to neutral.

A horizon colors are 10Y or 2.5Y, with values ranging from 3 to 5 (2 to 3 moist), and chromas from 1 to 3 (1 to 2 moist). Thickness is from 4 to 8 inches. Textures are coarse sandy loam or sandy loam. Structures are moderate, fine subangular blocky or massive.

Bw horizon colors are 10YR or 2.5Y, with values ranging from 4 to 6 (2 to 4 moist), and chromas from 3 to 5 (2 to 4 moist). Thickness is between 6 and 10 inches. Textures are coarse sandy loam or sandy loam. Structures are weak, fine granular to weak, fine subangular blocky or massive.

C horizon colors are 10YR or 2.5Y, with values ranging from 4 to 6 (2 to 4 moist), and chromas from 3 to 5 (3 to 5 moist). Textures are loamy coarse sand, loamy sand, coarse sandy loam, or sandy loam. Gravel content is between 15 to 30 percent, and cobbles and stones between 0 and 30 percent.

Remarks: These soils are slightly to extremely water repellent in the surface horizons. Some pedons have AB or BC transitional horizons.

MOLLISOLS

Typic Cryoborolls

Typic Cryoborolls are deep to very deep, well drained to somewhat excessively drained soils formed in material weathered from granitic, or less often, volcanic rocks. These

soils occur on moderately steep to extremely steep colluvial mountain sides and glacial moraines at elevations ranging from 6,800 to 11,600 feet, dominantly east of the Sierran Crest. Slope steepness ranges from 15 to 85 percent. Mean annual precipitation is 8 to 25 inches. Vegetation series include single leaf pinon pine, curl leaf mountain mahogany, big sagebrush, limber pine, and Jeffrey pine.

A representative pedon (#152) is a loamy-skeletal, mixed, Typic Cryoboroll in a unit of Entic Haploxerolls – Typic Cryoborolls – Rock outcrop association, 50 to 85 percent slopes (map unit 145). The soil formed from granitic colluvium dominated by quartz monzonite on a 55 percent east-southeast facing backslope at 9,400 feet elevation in the curl leaf mountain mahogany vegetation series. The soil is located in the Shepherd Creek drainage, in the southeastern portion of the survey area, NE 1/4, NW 1/4, S 20, T 14 S, R 34 E, MDM; Mt. Whitney NE quadrangle; latitude 36° 42' 27", longitude 118° 18' 05".

Oi—1/2 inch to 0; mountain mahogany leaves.

A—0 to 9 inches; dark grayish brown (10YR 4/2) extremely gravelly loamy sand, very dark brown (10 YR 2/2) moist; single grain; loose, nonsticky, nonplastic; common very fine roots; 30 percent gravel, 25 percent cobbles, 10 percent stones; neutral (pH 6.8); clear smooth boundary.

AC—9 to 20 inches; brown (10YR 5/3) extremely gravelly coarse sandy loam, dark brown (10YR 3/3) moist; weak, very fine granular structure; soft, very friable, nonsticky, nonplastic; few very fine, fine, and medium roots; 30 percent gravel, 25 percent cobbles, 10 percent stones; neutral (pH 6.8); clear smooth boundary.

CA—20 to 36 inches; pale brown (10YR 6/3) extremely gravelly coarse sandy loam, dark brown (10YR 4/3) moist; weak, very fine granular structure; soft, very friable, nonsticky, nonplastic; few very fine, fine, and medium roots; 35 percent gravel, 30 percent cobbles, 5 percent stones; neutral (pH 6.7); abrupt smooth boundary.

C—36 to 44 inches; pinkish gray (7.5YR 6/2) extremely gravelly sandy loam, brown (7.5YR 5/2) moist; massive; slightly hard,

friable, nonsticky, nonplastic; few very fine, fine, medium, and coarse roots; 65 percent weathered gravel.

Remarks: The A horizon is extremely water repellent; the AC horizon is moderately water repellent; and the CA horizon and substratum are wettable. Rock outcrop comprises 15 percent of the area, and surface coarse fragments cover 75 percent of the remaining ground. Surface stability is low, as evidenced by extreme sheet erosion. Humus is noticeably mixed with the A horizon. The C horizon, which nearly classifies as a Cr horizon, is dominated by soft rock that can be crushed by hand revealing pseudomorphs of weathered feldspar. Deep seated stability of the site appears high. Soil temperature at 20 inches depth was 59° F on 8/13/89. Vegetation on the site included mountain mahogany (60 percent cover, 20 percent dead), single leaf pinon pine (5 percent cover), big sage (5 percent cover).

Range in Characteristics: Depth of the solum is from 8 to 36 inches. Rock fragment contents above any Cr horizon range from 5 to 60 percent for gravel, and 0 to 55 percent for cobbles, stones, and boulders. Surface rock fragments range from 15 to 75 percent.

A horizon colors are 10YR, with values ranging from 3 to 5 (2 to 3 moist), and chromas from 1 to 3 (1 to 3 moist). Thickness is from 4 to 12 inches. Textures are loamy sand, coarse sandy loam, or sandy loam, commonly with extremely gravelly or very cobbly through gravelly modifiers. Structures are single grain to moderate medium granular.

C horizon colors are 10YR or 2.5 Y with values ranging from 5 to 6 (3 to 4 moist), and chromas from 4 to 6 (3 to 6 moist). Textures are loamy sand, coarse sandy loam, or sandy loam, commonly with extremely stony to very gravelly modifiers. Structures are single grain to weak, very fine granular or massive.

Remarks: These soils are slightly to extremely water repellent in the surface horizons in approximately three-fourths of the pedons. Surface horizons are highly susceptible to sheet and rill erosion when unprotected by litter. Some pedons have multiple A horizons or AC or CA transitional horizons. Volcanic

ash normally is not detectable. Soil moisture regimes are xeric or aridic bordering on xeric.

Entic Haploxerolls

Entic Haploxerolls are moderately deep to very deep, well drained to somewhat excessively drained soils formed in material weathered from granitic rock. These soils occur on steep to very steep colluvial mountain sides, ridges, glacial moraines, and canyon bottoms at elevations ranging from 2,500 to 8,400 feet in the lower Middle Fork Kings River drainage and in the southern portion of the eastern Sierra. Slope steepness ranges from 30 to 75 percent. Mean annual precipitation is 8 to 25 inches. Vegetation series include mariposa manzanita, and mixed conifer-pine west of the Sierran Crest and Jeffrey pine, single leaf pinon pine, big sagebrush, and perennial grass east of the Crest.

A representative pedon (#218) is a sandy-skeletal, mixed, mesic, Entic Haploxeroll in a unit of Typic Xerorthents - Entic Haploxerolls - Typic Xerochrepts complex, 35 to 75 percent slopes (map unit 128). The soil formed from mixed granitic colluvium, dominated by quartz monzonite, on a 64 percent, north-northwest facing, backslope at 7,000 feet elevation, in the single leaf pinon pine vegetation series. The soil is located in Wormhole Canyon, in the Cottonwood Creek drainage, SE 1/4, NW 1/4, S 33, T 17 S, R 36 E, MDM; Olancho NE quadrangle; latitude 36° 24' 49", longitude 118° 05' 08".

Oi—1/2 to 0 inches; pinon pine litter.

A1—0 to 6 inches; grayish brown (10YR 5/2) very gravelly sand, very dark grayish brown (10YR 3/2) moist; weak, very fine granular structure; loose, nonsticky, nonplastic; few very fine, fine, and medium roots; 30 percent gravel, 5 percent cobbles; very strongly acid (pH 5.0); abrupt wavy boundary.

A2—6 to 17 inches; brown (10YR 5/3) extremely gravelly loamy coarse sand, dark brown (10YR 3/3) moist; massive, breaking to weak, very fine granular structure; loose, nonsticky, nonplastic; few very fine and fine, common medium, few coarse roots; 50 percent gravel, 10

percent cobbles; moderately acid (pH 5.8); clear wavy boundary.

C—17 to 35 inches; light olive brown (2.5Y 5/4) very bouldery loamy coarse sand, dark grayish brown (2.5Y 4/2) moist; massive, breaking to weak fine granular; loose, nonsticky, nonplastic; few fine and medium roots; 15 percent gravel, 50 percent weathered boulders; moderately acid (pH 5.8).

Remarks: Rock outcrop comprises 5 percent of the area, and surface rock fragments cover 40 percent of the remaining ground. All horizons are moderately water repellent. Surface stability is low, as evidenced by high sheet and rill erosion of the surface soil. The soil's resistance to disturbance increases somewhat at the top of the A2 horizon; nonetheless, the soil breaks out loose, with no apparent cementing agent. The C horizon consists of weathered granitic boulders interspersed with soil and unweathered gravel. Deep-seated stability of the pedon site appears high. Soil temperature was 101° F at 1/4 inch, 84° F at one inch, and 61° F at 20 inches depth on 7/4/91. Vegetation at the site consisted of single leaf pinon pine (55 percent cover), bitterbrush, *Ribes*, big sage, and mountain mahogany (each less than 1 percent cover).

Range in Characteristics: Depth of the solum is from 11 to 19 inches. Rock fragment contents, which commonly increase with depth, range from 0 to 60 percent for gravel, and from 0 to 60 percent for cobbles, stones, and boulders, throughout. Surface rock fragments range from 0 to 60 percent.

A horizon colors are 10YR or 5Y, with values ranging from 3 to 6 (2 to 4 moist), and chromas from 2 to 3 (1 to 3 moist). Horizon thickness is from 8 to 17 inches. Textures are sand, loamy sand, or sandy loam, commonly with extremely gravelly to gravelly modifiers. Structures are single grain to weak, medium subangular blocky or are massive.

C horizon colors are 10YR to 5Y, with values ranging from 4 to 6 (2 to 4 moist), and chromas from 2 to 4 (1 to 3 moist). Textures are sand, loamy sand, or sandy loam, commonly with extremely cobbly or very bouldery to gravelly modifiers. Structures range

from single grain to weak, fine granular, or they are massive.

Remarks: These soils are slightly to extremely water repellent in approximately 50 percent of the pedons. Surface horizons are

susceptible to sheet erosion, and whole soils are susceptible to debris avalanches. Some pedons have AC or CA transitional horizons. Soil moisture regimes are xeric to aridic.

Glossary

- Acid igneous:** A rock formed by solidification of silica-rich magma, and, if crystalline, normally having quartz, orthoclase, sodic plagioclase, and often muscovite as its major minerals. Includes the intrusive rocks granite and quartz monzonite if minerals are large enough to recognize with the naked eye (i.e., phaneritic), and the extrusive rocks rhyolite, latite, and quartz latite if minerals are too small to recognize (i.e., aphanitic). Pumice and obsidian are noncrystalline acid igneous rocks. See also felsic.
- Aggregate, soil:** A group or cluster of soil particles held together by various cementing agents, including clay and humus. See also ped and clod.
- Alluvium:** Material, including cobbles, gravel, sand, silt, and clay, deposited by a stream; a soil parent material.
- Amorphous:** Having a random arrangement of constituents, such as atoms in a rock. Applied to glass, which is noncrystalline rock or soil material of volcanic origin; includes obsidian and pumice in its various forms including ash, lapilli, and cinders.
- Andesite:** A fine grained, mafic volcanic rock rich in plagioclase and ferromagnesian minerals. Similar to, but slightly more silicic than, basalt.
- Andic:** Generally, referring to soils having high aluminum and iron concentrations, high phosphate retention, low bulk density, and usually a significant amount of volcanic glass. A soil must have andic properties to be classified in the soil order Andisol. The complete technical definition is given in *Keys to Soil Taxonomy* (Soil Survey Staff, 1992).
- Aquifer:** An underground reservoir beneath the water table, that stores and transmits water.
- Ash:** Amorphous volcanic debris, including pumice, smaller than 2 mm diameter. Also, residue from a fire.
- Aspect:** The direction a slope faces, such as north-facing or south-facing.
- Association, soil:** A group of soils or miscellaneous areas geographically related in a characteristic repeating pattern, and defined and delineated as a single map unit. The major components can be separated into individual map units with more intensive mapping at a scale of about 1:24,000.
- Back slope:** The landform position or component that comprises the steepest inclined surface and principal element of many hill sides. Back slopes, which descend from the shoulder to the foot slope, commonly are steep and linear in profile, and may or may not include cliff segments.
- Basalt:** A fine grained, dark colored, mafic volcanic rock rich in plagioclase and ferromagnesian minerals, and generally lacking quartz and potassic feldspars. Similar to, but slightly more basic than, andesite.
- Base saturation:** The relative proportion of nonacid cations to total cations adsorbed to soil particle surfaces. Nonacid cations commonly are Ca^{2+} , Mg^{2+} , K^{+} , and Na^{+} ; acidic cations are H^{+} and Al^{3+} . The total of acid and nonacid cations is the soil's cation exchange capacity.
- Basic igneous:** A rock formed by solidification of ferromagnesian-rich (mafic) magma, and, if crystalline, normally having calcic plagioclase, pyroxenes, and often biotite as dominant minerals, while lacking in more silicic minerals such as quartz, orthoclase, and muscovite. Includes the intrusive rocks gabbro and diorite if minerals are large enough to recognize with the naked eye (i.e., phaneritic), and the extrusive rocks basalt and andesite if minerals are too small to recognize (i.e., aphanitic). Scoria is a noncrystalline basic igneous rock. See also mafic.

- Batholith:** A large body of igneous intrusive (plutonic) rock, often regional in extent, such as the Sierra Nevada batholith.
- Boulder:** A rock fragment larger than 2 feet diameter.
- Breccia:** A rock consisting of welded or cemented coarse angular fragments.
- Buffering capacity:** A measure of the soil's ability to resist chemical change, including a decrease in pH caused by acid precipitation, or an increase in pH caused by fire.
- Bulk density:** Mass of soil solids divided by volume of total soil; commonly expressed as g/cm^3 or lb/ft^3 .
- Cation:** An atom carrying a positive electrical charge. Cations adhere to humus and clay surfaces, and some are taken up by plants as nutrients.
- Cation exchange capacity:** The sum mass of cations adsorbed to a given mass of soil; commonly expressed as milliequivalents of cations per 100 grams of dry soil, or centimoles of positive charges held by one kilogram of soil.
- Cinder:** Uncemented, vitric (glassy), vesicular pyroclastic material, more than 2 mm diameter, consisting of pumice or scoria.
- Cirque:** An open, steep-sided, bowl-shaped land form found at the heads of drainages, and created by intense glacial abrasion.
- Clastic:** Pertaining to rock or sediment composed mainly of fragments (clasts) derived from preexisting rocks, and moved from their place of origin. Fragments formed by volcanic explosions are called pyroclastic.
- Clay:** An inorganic soil particle less than 2 micrometers (0.002 mm) in diameter. Also a soil textural class generally containing more than 40 percent clay, less than 45 percent sand, and less than 40 percent silt.
- Clay film:** A thin coating of oriented clay on the surface of a soil aggregates or lining pores or root channels.
- Clod:** A soil aggregate having no particularly distinctive shape and usually formed by soil compaction. See also structure, soil.
- Coarse fragment:** Rock or mineral fragment having a diameter greater than 2 millimeters, including pebbles (gravel), cobbles, stones, and boulders. Commonly synonymous with rock fragment.
- Coarse textured soil:** Sand or loamy sand.
- Cobble:** A rock fragment between 3 inches and 10 inches diameter.
- Colluvium:** Unconsolidated earth material moved by gravity, usually on steep slopes, and deposited lower on the slope; includes material moved by soil creep and landslides.
- Compaction, soil:** A condition in which porosity is decreased and bulk density is increased by pressure applied to the soil. Usually noted by the presence of platy structure or a massive condition and increased soil density.
- Complex, soil:** A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small that separating them is not practical even at a scale of 1:24,000.
- Consistence, soil:** A soil's degree of cohesion and adhesion or resistance to deformation under pressure as noted by crushing between the fingers. Consistence, which varies with moisture content, commonly is described by the following terms:
- Loose—Noncoherent when dry or moist; does not hold together in a mass.
 - Friable—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together in a lump.
 - Firm—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.
 - Plastic—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a wire when rolled between thumb and forefinger.

Sticky—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft—When dry, breaks into powder or individual grains under very slight pressure.

Creep, soil: A type of mass movement involving slow down-slope deformation, as opposed to discrete failure, of a soil mass.

Cryic: A soil temperature regime in which mean annual soil temperature is higher than 32° F but lower than 47° F and the difference between mean winter and mean summer soil temperature is less than 9° F at a depth of 20 inches or at a lithic or paralithic contact, whichever is shallower.

Debris avalanche: A usually long, narrow landslide involving incoherent, unsorted masses of soil and rock material that fail suddenly and flow rapidly down-slope.

Debris torrent: A very long, narrow landslide involving incoherent, unsorted masses of saturated soil and rock material that fail suddenly and flow very rapidly down a drainage.

Delineation: An individual area of a soil map unit.

Depth class, soil: A category of vertical distance from the mineral soil surface to a limiting or strongly contrasting layer that affects interpretations for plant growth, water movement, or other factors of ecological significance, soil behavior, use, and management. The various depth classes are defined as follows:

Very shallow	less than 10 in.
Shallow	10–20 in.
Moderately deep	20–40 in.
Deep	40–60 in.
Very deep	more than 60 in.

Diorite: An igneous intrusive rock having a salt-and-pepper appearance and mineralogical composition between the felsic and mafic rocks, but more mafic than quartz monzonite, richer in calcic plagioclase than in sodic plagioclase or

orthoclase, often rich in hornblende and biotite, and lacking in quartz.

Drainage class: The relative wetness, including frequency and duration of wet periods, of a soil under natural conditions. The various classes are defined under "Special Definitions and Criteria" in the Soil Map Units section.

Dry ravel: A form of erosion, commonly in loose, gravelly, coarse textured soils, on slopes steeper than about 45 percent, by which particles sporadically and spontaneously dislodge and slide down-slope under the direct influence of gravity. Underlying support of the particles is weakened by soil creep, wind disturbance, or animal activity, or it is destroyed by fire.

Earthflow: A mass movement process and landform characterized by moderately rapid to slow flowing of soil and rock material over a shear surface that is roughly parallel to the ground surface, and normally terminating in a lobate form. Earthflows, which may continue to move for thousands of years, are initiated by rotational slumps that may or may not be readily apparent upslope from the flow.

Eluviated: Pertaining to a soil layer that has been leached of clay, humus, or oxides.

Eolian: Pertaining to material transported and deposited by wind.

Epipedon: The upper layer of soil defined and identified for classifying the soil taxonomically. It is a diagnostic surface horizon that may or may not coincide with the corresponding genetic, morphological horizon. See also horizon, diagnostic soil.

Erosion: The wearing away of the land surface by running water, wind, ice, other geological agents, or human activities. Natural erosion often is termed geologic; whereas that caused by human activities is called accelerated. Erosion involves two processes—detachment and transport of soil particles individually (attritional erosion) or *en masse* (mass movement). Four types of attritional water erosion are defined as follows:

Sheet—Nearly uniform removal of surface soil without the development of conspicuous channels.

Rill—Removal of soil through cutting small open channels in its surface. The channels commonly range from less than one to several square inches in cross-sectional area.

Gully—Removal of soil through cutting large open channels in its surface. The channels range from one to tens of square feet in cross-sectional area.

Piping or tunnel—Removal of soil through roughly cylindrical underground channels that may be initiated by animal burrowing, rotting or burned roots, or water flow through subsoil that is less resistant than the overlying material. Frequently, the roof of the tunnel caves in forming a gully.

Mass movement includes landslides and soil creep.

Erosion hazard rating: The relative risk of maximum accelerated erosion based on soil and environmental conditions. The various rating categories are defined under "Special Definitions and Criteria" in the Soil Map Units section.

Exfoliation: The process of physical weathering by which concentric flakes or shells of rock, from less than an inch to several feet thick, are successively broken loose from the outer surface of a larger rock, often resulting in a rounded rock mass or dome-shaped hill. Granitic rocks are particularly susceptible to exfoliation.

Extrusive: Generally very fine grained to glassy igneous rocks derived from magma ejected from deep in the earth, then rapidly cooled and solidified at the surface. Extrusive rocks include the lava-flow varieties (e.g., rhyolite, latite, dacite, andesite, basalt) and those formed by ejection of magma into the atmosphere (e.g., pumice, which is a form of tephra).

Family, soil: The most specific hierarchical category in the soil taxonomy. Refer to "Naming the Soils" in the Introduction.

Feldspar: A group of hard silicate minerals most commonly represented by orthoclase, which is potassium-rich, and plagioclase, which varies from sodium-rich to calcium-rich.

Fell-field: An open, rock-strewn area above timberline that is covered by grasses and sedges, and often is somewhat hummocky as a result of frost action.

Felsic: Pertaining to light-colored igneous rocks dominated by silica- and potassium-rich minerals (e.g., quartz, orthoclase), and low in ferromagnesian components. The opposite of mafic. See also acid igneous.

Field capacity: The percentage of water held in a soil after free drainage from saturation and all capillary-sized pores are filled with water. Also, a soil's water content when the water is held by the soil at a suction of $-1/3$ atmosphere. Generally regarded as the upper limit of water availability to terrestrial plants. Also called field moisture capacity.

Fine textured soil: Sandy clay, silty clay, or clay.

Frigid: A soil temperature regime that has mean annual soil temperature lower than 47° F and the difference between mean winter and mean summer soil temperature is more than 9° F at a depth of 20 inches or at a lithic or paralithic contact, whichever is shallower.

Fluvial: Produced by river or stream action.

Forb: Any herbaceous plant not a grass or sedge.

Gabbro: A mafic igneous intrusive rock characterized by dark color, calcic plagioclase, pyroxene and other ferromagnesian minerals.

Glacial drift: General term for pulverized and other rock material transported by glacial ice or melt water and then deposited.

Glacial till: Unsorted and unstratified glacial drift deposited directly by glacial

ice without subsequent reworking by melt waters. The material of glacial moraines.

Granitic: A rock textural term usually pertaining to an igneous intrusive rock of felsic to intermediate composition. Granite-like, but not necessarily true granite. Commonly applied to granite, quartz monzonite, granodiorite, and diorite.

Granite: A felsic igneous intrusive rock containing quartz and orthoclase, with smaller amounts of sodic plagioclase and often muscovite.

Granodiorite: An igneous intrusive rock intermediate between felsic and mafic in composition, and containing quartz and somewhat more plagioclase than orthoclase.

Gravel: Rounded or angular rock fragments larger than sand and up to 3 inches in diameter. An individual piece is a pebble.

Ground water: Water in the subsurface saturated zone. See also aquifer and water table.

Gully: An erosional channel greater than one square foot in cross sectional area. See also erosion.

Horizon, diagnostic soil: A surface or subsurface soil layer specially defined for taxonomically classifying soils, and which may or may not correspond to natural genetic or morphological horizons. A diagnostic surface horizon is called an epipedon. Complete definitions are given in *Keys to Soil Taxonomy* (Soil Survey Staff, 1992). General characteristics of diagnostic horizons identified in this survey are as follows:

Mollic—A thick, dark colored, organic-rich, surface mineral layer having base saturation greater than 50 percent.

Umbric—Similar to a mollic except that the base saturation is less than 50 percent.

Ochric—A surface mineral layer that fails to meet all criteria for any other surface diagnostic horizon, usually because it is too thin, too light colored, or contains too little organic matter.

Argillic—A subsurface layer enriched in illuvial clay (i.e., the clay has leached from the mineral horizon above).

Cambic—A subsurface layer showing alteration from the soil parent material below, but which does not have the dark color or organic matter content of a mollic or umbric epipedon, nor the clay enrichment of an argillic horizon.

Horizon, genetic soil: A layer of soil, approximately parallel to the ground surface, having distinct characteristics produced by soil-forming processes. Each master horizon is designated by an upper case letter that may be followed by a lower case letter or numeral to designate subdivisions. Full explanations of master horizons and their subdivisions are given in the *Soil Survey Manual* (Soil Survey Division Staff, 1993) and in *Keys to Soil Taxonomy* (Soil Survey Staff, 1992). Transitional horizons are dominated by properties of one master horizon but have subordinate properties of another; the dominant horizon is noted first, followed by the subordinate horizon designation. Major characteristics of master horizons and several subdivisions follow:

O horizon—An organic layer of fresh (Oa), decaying (Oe), or decomposed (Oi) plant residue lying above the mineral soil.

A horizon—A usually dark colored mineral horizon at or near the surface, in which decomposed organic matter has accumulated.

E horizon—A usually light colored mineral horizon, at or near the surface, characterized by strong leaching (i.e., eluviation) that has removed silicate clay, and iron and aluminum oxides, as well as organic matter.

B horizon—A mineral horizon that formed beneath an A, E, or O horizon and that shows chemical weathering of the underlying parent material (Bw), or accumulation from above (i.e., illuviation) of clay (Bt), iron or aluminum oxides (Bs), humus (Bh), silica (Bq), carbonates (Bk), or gypsum (By).

C horizon—A subsurface mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming

processes and does not have the properties typical of the overlying soil material. The C horizon commonly, but not necessarily, is the parent material of the overlying soil, or solum.

R layer—hard bedrock.

Humus: The decomposed, relatively stable, portion of organic matter.

Hydraulic conductivity: The rate of water movement through a soil. The various rating classes are defined under "Special Definitions and Criteria" in the Soil Map Units section.

Hydrograph: A graph showing water discharge or other characteristics of stream flow as a function of time.

Hydrograph response: Time required after the start of precipitation for runoff water to reach a stream. Pulses of runoff water create peaks in the hydrograph.

Hydrophobicity: Water repellency.

Hypha(e): The microscopic filaments that make up fungi.

Igneous rock: Rock formed by solidification of molten material (magma) either slowly deep in the Earth (intrusive) or more rapidly at or near the surface (extrusive). Rocks that show bimodal textures due to a drastic change in the rate of cooling are called porphyritic. See also acid igneous, basic igneous, extrusive, and intrusive.

Illuviation: Accumulation from an overlying horizon of clay, humus, or chemical constituents in a soil horizon.

Infiltration: The downward entry of water into the soil or into a soil horizon.

Intrusive: Generally fine grained to coarse grained igneous rocks derived from magma that cools slowly deep in the earth. Igneous intrusive rocks include rhyolite, latite, dacite, andesite, and basalt.

Krotovina: A filled in animal or insect burrow or root channel.

Krummholz: A stunted forest, characteristic of alpine regions.

Landslide: A general term for any of several processes and forms of earth failure involving discrete detachment and downslope transport of material *en masse*. In addition to direct rockfalls from cliff faces, two categories often are recognized: translational, or planar, which fail along a surface that is roughly parallel to the ground surface, and rotational, which fail along a curved surface. Translational landslides include debris avalanches, debris torrents, and earthflows; rotational failures include slumps. See also erosion, mass movement, mass wasting, and creep.

Lapilli: Fragment of volcanic ejecta (tephra) in the size range of 2 to 64 mm diameter.

Lithic contact: The boundary between soil and underlying bedrock.

Loam: A soil textural class that exhibits roughly equal properties of sand, silt, and clay, but not equal amounts of the three separates.

Mafic: Minerals or igneous rocks rich in ferromagnesian minerals and calcic plagioclase. See also basic igneous and felsic.

Magma: Molten rock material that originates deep in the Earth and solidifies to form igneous rocks.

Map unit: A collection of areas having similar soil components or miscellaneous areas or both, and named and defined the same. An individual area of a map unit on map is a delineation.

Mass movement: A general term for dislodgment and downslope transport of earth material *en masse* under direct gravitational stress. The process includes slow displacements including creep and solifluction, and more rapid landslide movements including slumps, earthflows, debris avalanches, debris torrents, and rockfalls. See also creep, debris avalanche, debris torrent, earthflow, erosion, and landslide.

Medium textured soil: Fine sandy loam, loam, silt loam, or silt.

Metamorphic rock: Rock formed by high heat and pressure usually applied deep in

the earth to a previously existing rock. The process can alter the rock's chemical, mineralogical, and structural features. The preexisting rock most commonly is sedimentary, although igneous and metamorphic rocks also may be metamorphosed. Examples include hornfels, marble, slate, schist, and gneiss.

Metasedimentary rock: A sedimentary rock that shows evidence of metamorphism, but that has not been fully metamorphosed into a metamorphic rock.

Metavolcanic rock: A volcanic rock that shows evidence of metamorphism, but that has not been fully metamorphosed into a metamorphic rock.

Miscellaneous area: A map unit component that has little or no soil and that supports little or no vegetation (e.g., rock outcrop).

Moderately coarse textured soil: Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil: Clay loam, sandy clay loam, or silty clay loam.

Moisture regime, soil: A system that categorizes for taxonomic purposes general, long-term soil water conditions. The various regimes are defined according to the presence or absence either of ground water or of plant-available water in the soil or in specific horizons, by periods of the year. The regimes, which are fully defined in *Keys to Soil Taxonomy* (Soil Survey Staff, 1992), are outlined as follows:

Aquic—The soil normally is saturated to the point that dissolved oxygen is so low that chemical reducing conditions prevail.

Aridic and torric—These terms are used for the same moisture regime but in different categories of the taxonomy. The soil is dry most of the time when soil temperatures are high enough for significant biological activity. These soils, which are found in arid and sometimes in semiarid climates, experience little leaching.

Udic—The soil is moist for more than 90 cumulative days during the year. These soils are found in humid climates that have well distributed rainfall, or that have enough rain in summer so that the amount of stored moisture plus rainfall is approximately equal to, or exceeds, the amount of evapotranspiration. Water moves down through the soil at some time in most years.

Ustic—These soils are intermediate between aridic and udic. Moisture is limited but is present at a time when conditions are suitable for plant growth. This regime is not applied to soils that have cryic or pergelic temperature regimes.

Xeric—The soil is moist in winter and spring but dry in summer and fall. Most moisture comes at the time when soil temperatures are lowest, making it little effective for plant growth but effective for chemical leaching. This regime most commonly is found in areas having a mediterranean climate.

Moraine: A landform consisting of a distinct accumulation of unsorted, unstratified glacial drift deposited by direct action of a glacier. Types include lateral, terminal, and ground moraines.

Mottling: Irregular spots of different colors that vary in number and size, and which generally indicate poor aeration and impeded drainage. In soil taxonomy, mottling is an example of a redoximorphic feature.

Munsell notation: A designation of color according to three characteristics: hue, value, and chroma. Hue is the spectral variable, value is the lightness or darkness, and chroma is the intensity or purity of the color. For example 5YR 6/3, which is light reddish brown, has hue of 5YR (yellow-red), value of 6, and chroma of 3; and 10YR 3/6, which is dark yellowish brown, is more yellow, darker, and brighter.

Nivation: Erosion or disruption of soil and rock by the action of snow and ice, most notably alternating freezing and thawing, apart from glacial activity.

Order, soil: The highest hierarchical category in the soil taxonomic system. Soils are classified into one of eleven soil orders based on certain observable and measurable properties. The orders are Alfisol, Andisol, Aridisol, Entisol, Histosol, Inceptisol, Mollisol, Oxisol, Spodosol, Ultisol, and Vertisol. See the section "Naming the Soils" in the Introduction. Full definitions are given in *Keys to Soil Taxonomy* (Soil Survey Staff, 1992).

Organic matter: Plant and animal residue in various stages of decomposition.

Over-grazing: Feeding livestock on growing herbage to such a degree that range conditions become deteriorated and productivity drops below a minimum threshold.

Paralithic contact: The boundary between soil and underlying, coherent, continuous, partially weathered soft rock.

Parent material: The unconsolidated inorganic and organic material from which the soil formed.

Patterned ground: A ground surface that exhibits polygons, stripes, or steps caused by intensive frost action.

Ped: An individual natural soil aggregate, or structural unit, including granules, blocks, prisms, columns, and plates.

Pedon: The smallest volume that can be called a soil. It is three dimensional, extending from the surface to the parent material below, and covering an area large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet, depending on soil variability. Compare to profile.

Percent slope: See slope.

Permanent wilting point: The percentage of water remaining in a soil when a plant wilts from lack of water. The lower limit of available water capacity. Generally regarded as a soil's water content when the water is held by the soil at a suction of -15 atmospheres.

Perched water table: The upper surface of unconfined ground water separated from

and underlying main body of ground water by and unsaturated zone.

Percolation: The downward movement of water through the soil.

Permeability: See hydraulic conductivity.

Phase, soil: The finest subdivision in a soil map unit name. The phase expresses specific information such as slope steepness or parent material.

pH: A numerical designation of soil acidity or alkalinity also referred to as soil reaction. More specifically, it is the negative logarithm of the hydrogen ion (H^+) concentration in the soil solution. For each unit decrease in pH the hydrogen concentration (acidity) increases by ten times; for each unit increase in pH the hydroxyl ion (OH^-) concentration (alkalinity) increases by ten times. pH 7 is neutral (equal concentrations of H^+ and OH^-), pH less than 7 is acidic, and pH greater than 7 is alkaline. The soil reaction classes are defined according to pH as follows:

Extremely acid	less than 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	greater than 9.1

Piping: Formation of underground tunnels or pipe-like cavities by water moving through the soil. See also erosion.

Plant-available water capacity: The maximum relative amount of plant-available water a soil can hold; usually considered to be the difference in percent water held at field capacity and permanent wilting point. The capacity is given as percent by volume. One percent water by volume equals 0.01 inches of water per inch of soil. Ratings, in percent, are as follows:

Very low	0 to 4
Low	4 to 8
Moderate	8 to 12
High	12 to 16
Very high	more than 16

Plutonic: Pertaining to igneous rocks forming at great depth in the earth. See also igneous and intrusive.

Profile: A two dimensional vertical section of the soil extending from the surface through all horizons and into the parent material. Compare to pedon.

Pyroclastic: Pertaining to fragmental materials produced by usually explosive, aerial ejection of particles from a volcanic vent.

Quartz monzonite: An igneous intrusive rock intermediate in composition between granite and granodiorite, and containing roughly equal amounts of orthoclase and dominantly sodic plagioclase, quartz, and often biotite and muscovite. A granitic rock.

Reaction, soil: See pH.

Residuum: Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place. A category of soil parent material. Soils formed directly from bedrock are said to be residual.

Rhyolite: A light colored, fine grained, felsic volcanic rock rich in quartz and orthoclase.

Rill: A small, surficial erosional channel less than one square foot in cross sectional area. See also erosion, gully.

Rock fragment: Rock or mineral fragment having a diameter greater than 2 millimeters, including pebbles (gravel), cobbles, stones, and boulders. Commonly synonymous with coarse fragment.

Runoff: The precipitation discharged into stream channels by surface and subsurface flow. Surface flow also is called overland flow; subsurface flow also is called seepage flow.

Sand: Individual rock or mineral fragment falling in the size range of 2 mm to 0.05 mm. Also a soil textural class.

Saprolite: Soft, chemically weathered rock formed in place below the soil and grading to bedrock below.

Sedimentary rock: Rock formed by the disintegration, transport, deposition, burial, and cementation of a previously existing rock (the clastic sedimentary rocks), or by chemical or biochemical precipitation of materials in water (the nonclastic sedimentary rocks). Although most sedimentary rocks have both clastic and nonclastic components, those that dominantly are clastic include conglomerate, sandstone, mudstone, and shale, and those that dominantly are nonclastic include limestone.

Separate, soil: Inorganic particle less than 2 mm diameter. The size range in millimeters of the various classes of soil separates are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Silica: Consisting of silicon and oxygen.

Silt: Individual inorganic soil fragment or sediment falling in the size range of 0.05 mm to 0.002 mm. Also a soil textural class.

Slope: The inclination of the land surface from the horizontal. Percentage of slope is equal to the vertical distance divided by the horizontal distance, or the tangent of the inclination angle multiplied by 100. The various slope classes are defined as follows:

Slope Class	Percent slope	
	Lower	Upper
Nearly level	0	2
Gently sloping	2	5
Moderately sloping	5	9
Strongly sloping	9	15
Moderately steep	15	30
Steep	30	50
Very steep	50	75
Extremely steep	75	None

Slump: A landslide characterized by rotational movement of a generally independent mass of cohesive earth material along

a curved slip surface. See also landslide and mass movement.

Soil development: The degree of soil maturity as indicated by clay formation, structural development, and horizon differentiation.

Solifluction: The slow, downslope flow of wet, viscous earth materials in areas of frozen ground, but not necessarily permafrost, initiated by frost action and augmented by melt water.

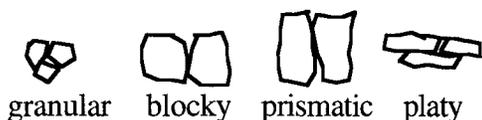
Solum: The upper part of a soil pedon, above the C horizon, where soil forming processes are most active. The solum includes A, E, and B horizons, and their transitions, as well as some O horizons.

Spalling: The breaking off of thin, curved, sharp-edged pieces of a usually large rock, resulting in a rounded shape in the remaining rock.

Stone: A rock fragment 10 to 24 inches diameter.

Stratified: Pertaining to geologic deposits that are formed, arranged, or laid down in layers.

Structure, soil: The arrangement of individual soil particles into aggregates, called peds, that are separated by surfaces of weakness. Types of structure include granular, blocky, prismatic, columnar, and platy. Soils lacking structure because of lack of aggregation are single-grained, and those that are aggregated but lack clearly defined surfaces of weakness are massive. The aggregates in massive soils are called clods instead of peds. The most common structural types are diagrammed as follows:



Subsoil: The soil's B horizon or the part of the solum below the A horizon.

Substratum: The part of the soil below the solum.

Talus: A mass of coarse, angular rocks that have broken off a cliff or steep mountain side and accumulated at the base.

Taxonomic unit: An individual soil member (not including miscellaneous areas) of a soil map unit, that is named, described, and classified in the section Individual Soil Descriptions.

Taxonomy, soil: The Soil Taxonomy is a system for organizing our knowledge of soils in a classification system. It is based on observable and measurable soil properties, and is set up in a hierarchy having six categories from broader to more specific:

Order—Each soil falls into one of eleven orders that reflects the dominant soil forming processes and degree of development, especially as indicated by the presence or absence of diagnostic horizons. The name of each order ends in *sol*. Entisol and Inceptisol are examples of soil orders.

Suborder—Each order is divided into suborders based on properties that influence soil formation and are important to plant growth, or that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Orthent.

Great group—Each suborder is divided into great groups based on close similarities in kind, arrangement, and degree of development of horizons; soil moisture and temperature regimes; and base status. An example is Cryorthent.

Subgroup—A subdivision of great group. The typic subgroup is the central concept of each great group, although it is not necessarily the most extensive. Soils that deviate from the central concept are identified by other subgroup names. Examples are Typic Cryorthents and Lithic Cryorthents.

Family—Subgroups are divided into families having similar, more specifically defined, physical and chemical properties, and other characteristics that affect use and management of the soil. The properties, which mostly are

those of biologically active subsurface horizons, include particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. An example is loamy-skeletal, mixed, Typic Cryorthent.

Series—Soils in a series are in the same family, and have similar horizon characteristics except for the texture of the surface horizon. Soils in this survey were not classified to the series level.

See also horizon (diagnostic and genetic), moisture regime, order, and temperature regime. Full definitions and explanations are given in *Soil Taxonomy* (United States Department of Agriculture, Soil Conservation Service, 1975) and *Keys to Soil Taxonomy* (Soil Survey Staff, 1992).

Temperature regime, soil: A system that categorizes for taxonomic purposes general, long-term soil temperature conditions at the standard depth of 20 inches or at the bedrock surface, whichever is shallower. The various regimes are defined according to the freezing point of water, or to the high and low extremes for significant biological activity. The regimes, which are fully defined in *Keys to Soil Taxonomy* (Soil Survey Staff, 1992), are outlined as follows:

Pergelic—Soils having a mean annual temperature less than 32° F and that have permafrost.

Cryic—Soils having a mean annual temperature between 32° F and 47° F, and which remain cold in summer.

Frigid—Soils having mean annual temperatures similar to those in the cryic regime, but whose average summer temperature is at least 9° F warmer.

Mesic—Soils having mean annual temperatures between 47° F and 59° F, and the difference between mean summer and mean winter temperatures is greater than 9° F.

Thermic—Soils having mean annual temperatures between 59° F and 72° F, and the difference between mean summer and mean winter temperatures is greater than 9° F.

Hyperthermic—Soils having mean annual temperatures greater than 72° F, and the difference between mean summer and mean winter temperatures is greater than 9° F.

Tephra: A collective term for all airborne volcanic ejecta or pyroclastic material of any composition, vesicularity, or size. Compositionally, tephra can vary from felsic (pumice) to mafic (scoria). The diameters in millimeters of the various size classes are as follows:

Blocks and bombs	greater than 64
Lapilli	64 to 2
Ash	less than 2

Cinders are vesicular tephra of lapilli-size.

Texture, soil: The relative proportion of sand, silt, and clay in a mass of soil. The textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be divided further by specifying coarse, fine, or very fine.

Thermic: A soil temperature regime in which mean annual soil temperature is higher than 59° F but lower than 72° F and the difference between mean winter and mean summer soil temperature is less than 9° F at a depth of 20 inches or at a lithic or paralithic contact, whichever is shallower.

Till: Unstratified glacial drift deposited directly by the ice, and consisting of a heterogeneous mixture of clay, sand, gravel, cobbles, stones, and boulders.

Trafficability: The ability of soil to resist damage, usually from compaction, by traffic. In this survey traffic is limited to human and animal feet.

Tuff: A compacted deposit or pyroclastic rock consisting dominantly of volcanic ash.

Tuff-breccia: A compacted deposit or pyroclastic rock consisting of volcanic ash and angular coarse fragments.

Vegetation series: A general site category based on vegetation existing on a site.

See "Vegetation Series" in the section "Special Definitions and Criteria" under Soil Map Units.

Volcanic: Pertaining to igneous extrusive rock. As a soil phase in this survey, volcanic refers to soil parent material usually derived from andesitic or basaltic lava.

Water repellency: A soil condition under which water infiltration is unusually slow because of hydrophobic organic compounds coating soil particle surfaces. See "Water Repellency" in the section "Special

Definitions and Criteria" under Soil Map Units.

Water table: The upper surface of ground water or that level below which the soil is saturated by water. Also, the top of an aquifer.

Weathering: The physical disintegration and chemical decomposition of rocks, ultimately to form soil.

Wilting point: See permanent wilting point.

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Soil Characterization Data

The following tables present field and laboratory data for selected soils. Major morphological features, including textures, are given as they were described in the field. To maintain consistency with descriptions from unsampled sites, textures are not adjusted to conform to laboratory results. For this reason, some field estimates of soil texture do not agree with percentages of sand, silt, and clay measured in the laboratory.

Data are not presented for some horizons, because those horizons either were not sampled or were not completely analyzed. More detailed information collected at the sites may be found in the original field descriptions on file in the Supervisor's Office, Sierra National Forest, Clovis, California.

Abbreviations used in the tables are as follows:

Soil texture: v-very, x-extremely, g-gravelly, cob-cobbly, st-stony, b-bouldery, vcos-very coarse sand, cos-coarse sand, s-sand, fs-fine sand, vfs-very fine sand, lcos-loamy coarse sand, ls-loamy sand, lfs-loamy fine sand, cosl-coarse sandy loam, sl-sandy loam, fsl-fine sandy loam, vfsl-very fine sandy loam, l-loam, si-silt, sil-silt loam, scl-sandy clay loam, cl-clay loam, sicl-silty clay loam, sc-sandy clay, sic-silty clay, c-clay.

Soil structure: m-massive, sg-single grain, 1-weak, 2-moderate, 3-strong, vf-very fine, f-fine, m-medium, c-coarse, vc-very coarse, gr-granular, pl-platy, pr-prismatic, abk-angular blocky, sbk-subangular blocky.

Roots: 1-few, 2-common, 3-many, vf-very fine, f-fine, m-medium, c-coarse.

Boundary: a-abrupt, c-clear, g-gradual, d-diffuse, s-smooth, w-wavy, i-irregular, b-broken.

CEC-cation exchange capacity; meq/100g-milliequivalents of cations per 100 grams of soil.

Cats.-cations

tr-trace

Fraction: VFS-very fine sand, FS-fine sand.

Minerals: AM-amphibole, AR-weathered aggregate, BT-biotite, CA-calcite, CZ-clinozoisite, DL-dolomite, EN-enstatite, EP-epidote, FD-feldspar, FP-plagioclase, GA-glass aggregate, GC-glass coated grain, GN-garnet, GS-glass, HN-hornblende, KK-kaolinite, MI-mica, MS-muscovite, MT-montmorillonite, MZ-monazite, OP-opaques, OT-other, OV-olivine, PO-plant opal, PR-pyroxene, QC-clay coated quartz, QZ-quartz, TM-tourmaline, SO-staurolite, RA-resistant aggregate, VR-vermiculite, ZR-zircon.

SOIL CHARACTERIZATION DATA														
Pedon No. 11	Map Unit 104	Soil Classification ashy, Xeric Vitricryand			Location: about 1/2 mi. SE of Granite Stairway SE 1/4, NE 1/4, S 20, T4S, R26E, MDM Lat./Long. 37-35-18 / 119-07-10				NCSS Sample No. S90CA-039-100		Date Sampled 08/06/87			
Elev. (ft) 8900	Slope (%) 5	Aspect SE	Parent Material pumice over andesite		Vegetation Series lodgpole pine		Soil Temp (F) 43	Litter Layer Oi: 1/2-0	Remarks: pumice dominant in 3-9 in.; krotovinas common 9-14 in.					
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)			Hydrophobicity	Roots	Boundary			
		Dry	Moist			V. Fine	Fine	Med.						
0-3	A	10YR 6/2	10YR 3/2	ls	m	10, 0, 0, 0			strong	3vf	aw			
3-9	C	n8 & 10YR 6/6	n8 & 10YR 6/6	xg s	sg	80, 0, 0, 0				3vf, 1f	as			
9-14	2A	10YR 7/3	10YR 4/3	l	m	2, 0, 0, 0			slight	2vf, 2f, 2m, 2c	as			
14-28	2Bw	10YR 6/4	7.5YR 4/4	l	m	2, 5, 0, 0				1vf, 2f, 2m, 1c	cs			
28-30	2C	10YR 5/6	7.5YR 4/6	l	m	5, 0, 0, 0				1vf, 2f, 1m				
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse			
3-9	C	0.4	8.7	90.0	3.9	4.8	4.2	7.8	12.8	29.5	36.1	10.3	25.75	
9-14	2A	0.5	39.3	60.2	17.8	21.5	30.3	21.3	4.8	2.2	1.5	3.8	7.60	
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)					CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al		
3-9	C	0.38	0.5	0.1	tr	tr	0.6	2.6	0.2	3.2	2.5	0.8	6.25	
9-14	2A	1.12	0.8	0.1	—	0.1	1.0	6.4	0.4	7.4	5.2	1.4	10.40	
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)	
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al			
3-9	C	25	19	24	9.1	4.8	5.2	0.03	0.13	0.04	0.12	8	1.1	
9-14	2A	29	14	19	10.3	4.9	5.2	0.08	0.26	0.12	0.40	33	1.1	
Depth (in)	Horizon	Clay Fraction X-Ray Minerals	Clay Fraction Oxides (%)			Silt and Sand (%)								
			Al ₂ O ₃	Fe ₂ O ₃	K ₂ O	Fraction	Tot Re	Grain Count (%)						
3-9	C	KK1	11.0	3.4		VFS	24	GS 59, QZ 20, GC 9, BT 5, QC 2, AR 1, OP 1, FD 1, KK 1, PR 1, HN tr, FP tr, HY tr, EN tr, SP tr,						
9-14	2A	KK1, MII	13.0	6.9	5.3	VFS	19	GS 75, QZ 16, QC 2, BT 2, FD 2, OP 1, AR 1, HN 1, PR tr, FP tr, AM tr, KK tr						

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: about 1.5 mi. WSW Volcanic Knob				NCSS Sample No.	Date Sampled			
15	138	loamy-skeletal, mixed Typic Cryumbrept			NW 1/4, NE 1/4, S 33, T 6 S, R 28 E, MDM				S90CA-019-018	08/12/87			
Elev. (ft)		Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks:					
9900		13	WSW	volcanic colluvium	lodgpole pine	47	Oi: 1-0 in.						
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-9	A	10YR 5/3	10YR 3/3	vg sl	2mgr	35, 2, 0, 0	slight	2vf, 2f, 1m	aw				
9-15	BA	10YR 5/3	7.5YR 3/4	cob l	1fsbk	8, 20 cob + st, 0	none	1vf, 2f, 2m, 2c	cs				
15-31	Bw1	10YR 5/3	7.5YR 4/4	vcob l	1fsbk	16, 20 cob + st, 0	none	1vf, 2f, 2m, 1c	cs				
31-35	Bw2	10YR 5/3	7.5YR 4/4	vcob l	m	8, 20, 0, 0	none	1vf, 1f, 2m, 1c	—				
35-37	C	lighter color than above		—	—	v. high	—	—	—				
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-9	A	3.3	38.9	57.8	21.5	17.4	10.3	14.5	13.4	9.9	9.7	6.8	2.06
31-35	Bw2	3.7	50.2	46.1	27.7	22.5	608	11.5	10.8	9.0	8.0	6.2	1.68
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)					CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-9	A	3.16	2.1	0.3	—	0.2	2.6	11.1	0.8	13.7	13.6	3.4	4.12
31-35	Bw2	0.71	1.6	0.3	tr	0.1	2.0	9.2		11.2	10.7		2.89
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-9	A	24	19	19	10.5	5.0	5.2	0.20	0.79	0.28	0.98	51	2.3
31-35	Bw2		18	19	10.2	5.1	5.3	0.10	0.76	0.34	0.93	59	

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: Bear Ridge				NCSS Sample No.	Date Sampled			
22	133	sandy, mixed Entic Cryumbrept			SE 1/4, NE 1/4, S 32, T 6 S, R 28 E, MDM				S90CA-019-001	06/22/88			
Elev. (ft)	Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks: krotovinas common						
9440	12	NW	glacial till-granodiorite	r.f. / l.p.p.	47	Oa: 1/2-0							
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-2	A1	10YR 4/2	10YR 2/1	sl	1vfgr to sg	5, 0, 0, 0	yes	—	aw				
2-5	A2	10YR 5/3	10YR 3/2	sl	m to 1mgr	2, 5, 0, 0		1vf	as				
5-17	Bw	10YR 5/4	10YR 3/4	g sl	2msbk to 1fgr	15, 10, 0, 0		2vf, 1f, 2m, 1c	cs				
17-26	BC	10YR 6/3	10YR 3/3	cob sl	2fsbk ot 1fgr	15, 20, 0, 0		1vf, 1f, 2m	cs				
26-32	C1	10YR 7/2	10YR 4/3	cob sl	1fsbk to 1fgr	5, 20, 0, 0		1vf, 1f, 2m	cs				
32-48	C2	10YR 7/3	10YR 4/3	cob sl	1vfsbk to 1fgr	20, 20, 0, 0		1f, 2m					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-2	A1	1.6	17.1	81.3	7.6	9.5	12.3	22.2	16.8	11.8	18.2	8.5	5.31
2-5	A2	0.8	25.2	74.0	11.4	13.8	15.9	24.3	13.9	10.0	9.9	4.0	
5-17	Bw	0.6	20.7	78.7	9.3	11.4	16.8	21.5	17.1	13.4	9.9	3.2	
17-26	BC	0.7	18.7	80.6	8.2	10.6	15.1	21.4	17.7	15.1	11.3	2.2	
26-32	C1	0.8	21.4	77.8	9.4	12.0	14.5	21.1	16.4	13.7	12.1	1.8	
32-48	C2	1.0	14.8	84.2	5.8	9.0	13.3	21.7	18.6	15.7	14.9	1.6	1.60
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)						CEC (meq/100 g)				CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-2	A1	9.92	3.9	0.5	—	0.2	4.6	21.6	1.0	26.2	18.9	5.6	11.81
2-5	A2	1.54	1.3	0.1	—	0.2	1.6	8.3	0.5	9.9	6.7	2.1	
5-17	Bw	1.10	0.7	tr	—	tr	0.7	8.7	0.3	9.4	4.8	1.0	
17-26	BC	0.45	0.2	tr	—	tr	0.2	4.9		5.1	2.6		
26-32	C1	0.38	0.3	tr	—	tr	0.3	4.5		4.8	2.4		
32-48	C2	0.33	0.3	0.1	—	tr	0.4	3.5	0.3	3.9	2.3	0.7	2.30
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-2	A1	18	18	24		3.9	4.5						7.4
2-5	A2	24	16	24		4.7	5.0						5.9
5-17	Bw	30	7	15		4.9	5.2						0.4
17-26	BC		4	8		5.2	5.6						
26-32	C1		6	13		5.2	5.6						
32-48	C2	43	10	17		5.0	5.3						0.1

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: Bear Ridge				NCSS Sample No.	Date Sampled			
24	138	sandy-skeletal, mixed Typic Cryumbrept			NW 1/4, NE 1/4, S 33, T 6 S, R 28 E, MDM				S89CA-019-002	06/23/88			
Elev. (ft)	Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks: Rodents active in this soil.						
9800	20	SSW	basaltic till/colluvium	lodgepole pine	45	Oi: 1-0 in.							
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-5	A	7.5YR 5/2	7.5YR 3/2	sl	2mgr	5, 0, 0, 0		2vf, 1f, 1m	cs				
5-17	Bw1	7.5YR 5/4	7.5YR 3/4	vcob sl	2mgr	50 g + cob, 0, 0		2vf, 2f, 2m, 2c	cs				
17-27	Bw2	7.5YR 5/4	7.5YR 3/4	vcob sl	2mgr	20 g, 40 cob, 0, 0		2vf, 1f, 2vf, 1c	cs				
27-34	Bw3	7.5YR 5/4	7.5YR 3/4	cob sl	1fsbk	20 g, 35 cob, 0, 0		1vf, 1f, 2m	cs				
34-48	Bw4	7.5YR 5/4	7.5YR 3/4	g sl	2msbk	25 g, 5 cob, 0, 0		1vf, 1f, 1m					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)				-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse			V Coarse
0-5	A	1.6	31.5	66.9	15.9	15.6	17.8	21.5	15.2	6.9	5.5	5.9	3.69
5-17	Bw1	1.2	28.8	70.0	15.6	13.2	15.2	20.0	14.8	11.7	8.3	5.8	4.83
17-27	Bw2	1.6	25.0	73.4	14.1	10.9	11.3	19.3	16.6	15.3	10.9	5.3	3.31
27-34	Bw3	1.4	25.6	73.0	13.1	12.5	13.3	22.3	15.7	13.0	8.7	4.7	3.36
34-48	Bw4	1.6	29.0	69.4	15.9	13.1	13.0	17.8	15.0	12.9	10.7		
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-5	A	3.82	3.2	0.8	tr	0.3	4.3	13.3	0.9	17.6	14.8	5.2	9.25
5-17	Bw1	0.90	1.1	0.5	tr	0.3	1.9	10.7		12.6	7.0		5.83
17-27	Bw2	0.61	1.2	0.4	—	0.3	1.9	8.0		9.9	6.2		3.88
27-34	Bw3	0.42	1.1	0.3	—	0.3	1.7	7.2		8.9	5.4		3.86
34-48	Bw4	0.27	0.7	0.4	tr	0.2	1.3	5.9		7.2	4.6		
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-5	A	17	24	29		4.9	5.2						3.0
5-17	Bw1		15	27		5.5	6.1						
17-27	Bw2		19	31		5.6	6.2						
27-34	Bw3		19	31		5.7	6.2						
34-48	Bw4		18	28		5.6	6.1						

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location:			NCSS Sample No.	Date Sampled				
33	141	ashy-skeletal, Humic Xeric Vitricryand			Meadow, Pioneer Basin SE 1/4, SW 1/4, S 34, T 5 S, R 29 E, MDM Lat./Long. 37-27-44 / 118-47-27			S90CA-019-019	06/30/88				
Elev. (ft)	Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks: Recovering from past erosion. 16-30 in. thixotropic. Rounded qtz sand in 30-35 in. Distinct pockets of alluvium						
11,100	9	WSW	porph. granodiorite alluvium	perenn. grass (meadow)	47	none							
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-16	A	10YR 5/2	10YR 3/2	sl	2fgr	none	none noted	2vf, 1f	gs				
16-30	A/2C	10YR 5/3	10YR 3/3 7.5YR 4/6	sl	2fsbk	none		1vf, 1f	cs				
30-35	2C	10YR 7/4	7.5YR 4/6	sl	1fsbk	none		1vf, 1m	cs				
35-47	Ab		7.5YR 4/3	sl	1fsbk	none		none					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)				-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse			V Coarse
1-0	sod	6.4	38.9	54.7	20.0	18.9	20.7	18.8	9.3	3.4	2.5	16.8	2.63
0-16	A	3.7	34.5	61.8	17.6	16.9	14.6	18.7	15.5	8.8	4.2	5.5	1.49
16-30	A/2C	3.2	34.8	62.0	18.6	16.2	7.1	18.3	14.4	12.5	9.7	4.4	1.38
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)						CEC (meq/100 g)				
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	CEC/Clay
1-0	sod	8.17											
0-16	A	2.42	0.6	0.2	—	0.1	0.9	10.6	1.1	11.5	8.2	2.0	2.22
16-30	A/2C	1.09	0.6	0.2	tr	0.1	0.9	9.1	0.4	10.0	5.5	1.3	1.72
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-16	A	55	8	11	10.7	4.6	4.6	0.15	0.35	0.10	0.46	40	0.1
16-30	A/2C	31	9	16	10.9	5.0	5.4	0.10	0.51	0.23	0.78	54	0.0
Depth (in)	Horizon	Clay Fraction X-Ray Minerals	Clay Fraction Oxides (%)			Silt and Sand (%)							
			Al ₂ O ₃	Fe ₂ O ₃	K ₂ O	Fraction	Tot Re	Grain Count (%)					
0-16	A	KK1, MI1, QZ1	13.0	7.1	1.9	VFS	28	GS 62, QZ 28, FD 5, BT 2, HN 1, RA tr, AM tr, KK tr, FP tr, QC tr, PR tr, OP tr, MZ tr, EN tr, GC tr					
16-30	A/2C	MT1, MI1, KK1	15.0	8.0	2.8	FS	54	QZ 48, GS 36, QC 6, BT 5, FD 3, AR 1, FP tr, TM tr, KK tr, HN tr, PR tr, RA tr, GC tr, GN tr, OP tr					

Note: sod contains 8.8 percent total carbon and 88 percent mineral soil.

SOIL CHARACTERIZATION DATA

Pedon No.	Map Unit	Soil Classification			Location:			NCSS Sample No.	Date Sampled				
46	101	loamy-skeletal, mixed Mollic Cryoboralf			Junction Bluffs SW 1/4, NW 1/4, S 9, T 5 S, R 26 E, MDM Lat./Long. 37-30-38 / 119-08-37			S90CA-019-003	07/12/88				
Elev. (ft)	Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks:						
7980	14	SW	porph. andesite	red fir	50	Oi: 1-0 in.							
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-4	A1	7.5YR 4/4	5YR 3/2	st sl	1vfgr	10, 5, 15, 0	extr.	2vf, 2f, 2m	as				
4-8	A2	7.5YR 4/4	5YR 3/3	vst sl	1fsbk to 1fgr	12, 10, 20, 0	extr.	2vf, 3f, 3m	aw				
8-26	Bt1	7.5YR 5/4	5YR 3/3	vcob l	1fsbk to 1fgr	15, 40, 0, 0	slt.	2vf, 3f, 3m, 2,	cw				
26-39	Bt2	7.5YR 4/4	5YR 3/3	vcob scl	m	15, 35, 0, 0		1vf, 2f, 2m					
	Cr			saprolite									
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)				-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse			V Coarse
0-4	A1	3.9	24.4	71.7	13.8	10.6	17.8	19.8	17.6	10.9	5.6		
4-8	A2	1.8	28.7	69.5	16.3	12.4	14.9	19.0	17.1	12.1	6.4	8.0	4.44
8-26	Bt1	9.9	32.9	57.2	19.6	13.3	16.9	19.4	10.3	6.7	3.9	11.3	1.14
26-39	Bt2	18.0	35.5	46.5	23.8	11.7	16.4	15.5	6.8	5.6	2.2	17.9	0.99
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-4	A1	5.74	7.6	0.4	tr	0.4	8.4	16.8		25.2	18.1		
4-8	A2	2.07	1.4	0.2	tr	0.4	2.0	12.7		14.7	11.4		6.33
8-26	Bt1	0.89	3.7	0.4	tr	0.5	4.6	12.4	0.5	17.0	13.9	5.1	1.40
26-39	Bt2	0.46	3.8	1.1	tr	0.8	5.7	11.4		17.1	12.2		0.68
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-4	A1		33	46		5.2	5.8						
4-8	A2		14	18		5.1	5.5						
8-26	Bt1	10	27	33		5.0	5.6						4.4
26-39	Bt2		33	47		5.5	6.1						

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification				Location:				NCSS Sample No.	Date Sampled		
48	153	sandy-skeletal, mixed, frigid, Dystric Xerorthent				near Cassidy Crossing SW 1/4, NE 1/4, S 23, T 5 S, R 25 E, MDM Lat./Long. 37-29-00 / 119-12-05				S90CA-039-004	07/13/88		
Elev. (ft)	Slope (%)	Aspect	Parent Material		Vegetation Series		Soil Temp (F)	Litter Layer		Remarks: fine pumice mixed in 0-10 in.			
5000	52	NNW	granodiorite colluvium		mixed conifer-pine		59	Oi: 3-2 in. Oe: 2-0 in.					
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist			(gvl., cob., st., bldr.)							
0-10	A	10YR 6/3	10YR 3/3	vg cosl	2vfgr	15, 2, 0, 0			mod.	2vf	gw		
10-34	CA	10YR 7/3	10YR 4/3	vg cosl	1vfgr	40, 2, 0, 0			v. slt	2f	gs		
34-47	C	2.5YR 6/4	10YR 4/6	xg cosl	m	40, 25, 0, 0				2m			
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar	-15 Bar/
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse	Water %	Clay
0-10	A	3.1	15.3	81.6	8.3	7.0	15.5	16.6	14.2	16.8	18.5	3.5	1.13
10-34	CA	2.9	14.5	82.6	8.1	6.4	15.2	16.5	14.9	18.1	17.9	2.7	0.93
34-47	C	2.9	14.6	82.5	6.8	7.9	13.9	17.1	15.2	18.4	17.9	2.6	0.90
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-10	A	1.18	2.5	0.3	tr	0.2	3.0	6.6		9.6	7.6		2.45
10-34	CA	0.80	1.2	0.2	—	0.1	1.5	5.2		6.7	4.3		1.48
34-47	C	0.47	0.7	0.1	—	0.2	1.0	4.7		5.7	10.4		3.59
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-10	A		31	39		5.1	5.5						
10-34	CA		22	35		5.4	5.9						
34-47	C		18	10		5.4	5.9						

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification				Location:				NCSS Sample No.	Date Sampled		
50	110	loamy-skeletal, mixed Dystric Cryochrept				south east of Tully Hole SW 1/4, NE 1/4, S 21, T 5 S, R 28 E, MDM 37-29-59 / 118-54-57				S90-019-005	07/20/88		
Elev. (ft)	Slope (%)	Aspect	Parent Material		Vegetation Series		Soil Temp (F)	Litter Layer	Remarks:				
9650	38	NE	glacial, lateral moraine, qtz monz. gneiss, schist, metavolcanics		lodgepole pine, with mixed hemlock trees		48	Oi: 0-1/2	Greatest root concentration at boundary of A and Bw horizons. Charcoal in A horizon. Sands below 23 in. break down with moist rubbing (pseudomorphs). Clay appears formed in place.				
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist			(gvl., cob., st., bldr.)							
0-10	A	10YR 6/3	10YR 4/3	sl	2vfgr, 1fsbk	8, 5, 0, 0			slt.	1vf, 1f, 2m, 2c	as		
10-23	Bw	10YR 7/3	10YR 5/4	g sl	2fgr, 2fsbk	15, 10, 0, 0				1vf, 2f, 2m, 1c	cs		
23-32	BC	10YR 7/2	10YR 5/3	vg sl	m, 1fsbk	40, 15, 0, 0				1vf, 1f, 1m	cs		
32-41	C	10YR 7/2	10YR 6/3	vg .	m	30, 10, 0, 0				1f			
	Cr												
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-10	A	5.7	33.7	60.6	15.4	18.3	17.0	17. 7	12.9	7.2	5.8	3.9	0.68
10-23	Bw	3.6	37.0	59.4	16.0	21.0	16.3	12.8	11.3	9.7	9.3	4.2	1.17
23-32	BC	4.0	41.2	54.8	18.7	22.5	14.5	9.9	10.0	11.0	9.4	4.0	1.00
32-41	C	4.7	41.9	53.4	18.9	23.0	11.7	10.2	10.9	12.0	8.6	3.7	0.79
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-10	A	2.41	0.4	—	—	0.1	0.5	11.0	1.5	11.5	6.2	2.0	1.09
10-23	Bw	1.03	0.1	—	—	0.1	0.2	8.6	0.8	8.8	5.2	1.0	1.44
23-32	BC	0.46	0.1	—	—	tr	0.1	8.1	0.7	8.2	4.9	0.8	1.23
32-41	C	0.33	0.2	—	—	0.2	0.4	7.0	0.4	7.4	4.5	0.8	0.96
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-10	A	75	4	8		4.6	4.8						1.4
10-23	Bw	80	2	4		4.9	5.1						0.3
23-32	BC	88	1	2		4.9	5.2						0.2
32-41	C	50	5	9		4.9	5.2						0.1

Note: Trace of calcium carbonate in the 23 to 32 and 32 to 41 inch horizons.

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location:			NCSS Sample No.	Date Sampled				
81	102	ashy-pumiceous over sandy Xeric Vitricryand			near jct. John Muir and Mammoth Pass trails NE 1/4, NE 1/4, S 13, T 4 S, R 26 E, MDM			S90CA-039-006	08/06/88				
Elev. (ft)	Slope (%)	Aspect	Parent Material		Vegetation Series		Soil Temp (F)	Litter Layer		Remarks:			
9000	10	SW	pumice over mixed granitic		lodgepole pine		50	Oi: 2-1 Oe: 1-0		Pumice-filled krotovinas common in 0-9 and 17-27 in. Abundant fungus in 9-15 and 27-39 in. 15-17 in. appears silica cemented, roots penetrate, most indurated in upper 1/2 in.			
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.)		Hydrophobicity	Roots	Boundary			
		Dry	Moist			(gvl., cob., st., bldr.)							
0-9	A	10YR 7/2	10YR 6/4	exg s	sg	—		extreme	3vf, 2f, 2m, 2c	cw			
9-15	C	10YR 6/3	10YR 5/4	exg s	m, sg	—		moderate	3vf, 2f, 1m, 1c	as			
15-17	Cq	10YR 7/2	10YR 6/4	vg s	m	—		moderate to extreme	2vf, 2f, 1m	as			
17-27	2C1	10YR 6/4	10YR 5/6	sl	1fgr	—		moderate	1vf, 2f, 2m, 1c	cs			
27-39	2C2	10YR 6/6	10YR 5/6	sl	m	—		moderate	1vf, 2f, 1m, 1c				
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)				-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse			V Coarse
0-9	A	2.3	11.8	85.9	8.1	3.7	4.7	6.3	7.6	32.6	34.7	7.0	3.04
9-15	C	1.9	5.7	92.4	5.0	0.7	2.2	6.3	23.0	38.9	22.0	3.2	1.68
15-17	Cq	2.3	11.1	86.6	10.3	0.8	0.9	8.8	31.6	30.3	15.0	2.3	1.00
17-27	2C1	2.2	20.3	77.5	9.9	10.4	16.2	24.0	18.5	13.1	5.7	4.7	2.14
27-39	2C2	2.6	15.3	82.1	9.3	6.0	10.5	16.8	21.9	21.1	11.8	6.0	2.31
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)					
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	CEC/Clay
0-9	A	2.30	1.4	0.1	—	0.3	1.8	5.5	0.4	7.3	8.1	2.2	3.52
9-15	C	0.32	0.1	—	—	0.1	0.2	1.8	tr	2.0	2.3		1.21
15-17	Cq	0.20	—	—	—	—	—	2.4	0.4	2.4	1.6	0.4	0.70
17-27	2C1	0.53	0.2	0.1	—	0.1	0.4	3.7		4.1	3.4		1.55
27-39	2C2	0.53	0.2	tr	—	0.1	0.3	9.7		10.0	4.8		1.85
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-9	A	18	25	22		4.2	4.6						8.4
9-15	C		10	9		4.8	5.0						1.4
15-17	Cq	100	tr	1		4.8	5.2						0.4
17-27	2C1		10	12		6.0	6.0						
27-39	2C2		3	6		5.7	6.0						

Note: Trace of carbonates in 27 to 39 inch horizon.

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification				Location:				NCSS Sample No.	Date Sampled		
89	114	sandy-skeletal, mixed Typic Cryorthent				French Canyon NE 1/4, NW 1/4, S 35, T 7 S, R 29 E, MDM 37-17-25 / 118-56-04				S90CA-019-007	08/31/88		
Elev. (ft)	Slope (%)	Aspect	Parent Material		Vegetation Series	Soil Temp (F)	Litter Layer	Remarks:					
10,400	31	ESE	colluvium-granodiorite, w/ minor qtz monzonite		lodgepole pine	56	none	A1 horizon is erosional debris from upslope.					
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist			(gvl., cob., st., bldr.)							
0-2	A1	10YR 5/3	10YR 4/2	vg cosl	sg	40, 0, 0, 0			moderate	2vf, 1f	as		
2-10	A2	10YR 6/4	10YR 4/3	vg sl	2fgr	35, 5, 5, 0			none	2vf, 2f, 2m	gw		
10-17	AC	10YR 7/3	10YR 5/4	vg sl	2vfgr	35, 10, 10, 0			none	1vf, 1f, 1m	cw		
17-29	C1	10YR 8/1	10YR 7/1	vg cosl	m	50, 2, 0, 0			none	1vf, 1f, 1m	aw		
29-39	C2	10YR 7/2	10YR 5/4	vg cosl	1vfgr	40, 20, 0, 0			none	1f, 1m			
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-2	A1	2.7	12.1	85.2	5.9	6.2	16.8	24.2	17.8	13.8	12.6	2.9	1.07
2-10	A2	2.7	18.1	79.2	9.7	8.4	17.0	22.6	16.9	11.7	11.0	3.4	1.26
10-17	AC	2.6	20.6	76.8	9.0	11.6	16.2	24.9	16.7	11.2	7.8		6.38
17-29	C1	2.5	20.2	77.3	11.0	9.2	14.7	21.0	18.0	13.7	9.9	1.3	0.52
29-39	C2	1.3	22.9	75.8	11.4	11.5	15.3	19.9	17.3	13.9	9.4	2.2	1.69
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)					
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	CEC/Clay
0-2	A1	1.72	0.4	0.1	—	tr	0.5	6.5	0.6	7.0	4.9	1.1	1.81
2-10	A2	1.51	0.2	—	—	tr	0.2	8.6	0.4	8.8	5.3	0.6	1.96
10-17	AC	0.75	0.2	tr	—	tr	0.2	7.2		7.4	3.2		1.23
17-29	C1	0.17	0.2	tr	—	—	0.2	2.8		3.0	1.1		0.44
29-39	C2	0.54	0.2	0.1	—	—	0.3	5.3	0.4	5.6	3.2	0.7	2.46
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-2	A1	55	7	10		4.6	4.7						0.4
2-10	A2	67	2	4		5.0	5.1						0.3
10-17	AC		3	6		5.2	5.3						
17-29	C1		7	18		5.3	5.5						
29-39	C2	57	5	9		5.0	5.1						0.0

Note: Trace of carbonate in the 10 to 17 inch horizon.

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: French Canyon Trail				NCSS Sample No.	Date Sampled			
92	140	sandy-skeletal, mixed Typic Cryumbrept			SE 1/4, NW 1/4, S2, T 8 S, R 29 E, MDM				S90CA-027-008	09/01/88			
Elev. (ft)	Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks: 20-40 in. intermittent compaction and cobbles are more subangular than above.						
9800	15	SSE	glacial-granodiorite	lodgepole pine	48	needles							
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-4	A	10YR 5/2	10YR 2/1	sl	1fsbk	1, 2, 0, 0	none	3vf, 3f, 1m	aw				
4-20	Bw	10YR 4/4	10YR 3/4	g sl	1vfgr	30, 10, 0, 0	slight	3vf, 3f, 1m, 1c	cw				
20-40	C	10YR 5/3	10YR 3/3	vg lcos	m	40, 25, 0, 0		1vf, 1f, 0, 0					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)				-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse			V Coarse
0-4	A	2.2	20.7	77.1	6.9	13.8	15.8	22.2	14.5	13.0	11.6	3.3	1.50
4-20	Bw	1.3	22.9	75.8	8.4	14.5	13.5	22.2	17.2	12.4	10.5	4.6	3.54
20-40	C	0.9	12.6	86.5	4.6	8.0	15.3	23.9	20.3	15.1	11.9	2.4	
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)					
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	CEC/ Clay
0-4	A	2.16	1.7	0.1	—	0.2	2.0	8.0	0.7	10.0	6.9	2.7	3.14
4-20	Bw	2.01	0.6	tr	—	0.1	0.7	15.6	0.8	16.3	8.0	1.5	6.15
20-40	C	0.93	0.4	—	—	tr	0.4	8.0	0.3	8.4	3.6	0.7	
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-4	A	26	20	29		4.4	4.7						5.9
4-20	Bw	53	4	9		4.7	5.0						0.3
20-40	C	43	5	11		4.8	5.2						0.1

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: McGee Creek drainage				NCSS Sample No.	Date Sampled			
109	114	coarse-loamy, mixed Vitrandic Cryorthent			NE 1/4, SW 1/4, S 17, T 5 S, R 29 E, MDM				S90CA-051-100	07/12/89			
Elev. (ft)	Slope (%)	Aspect	Parent Material		Vegetation Series		Soil Temp (F)	Litter Layer	Remarks: Flat area surrounded by granitics. Wet soil, receives much subsurface flow. Mottled colors in 9-26 in. 26-30 in. is smeary & thixotropic				
9300	5	ENE	diorite		lodgpole pine		32	Oi: 2-1 in. Oa: 1-0 in.					
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.)			Hydrophobicity	Roots		Boundary	
		Dry	Moist			(gvl., cob., st., bldr.)							
0-9	A	10YR 7/1	10YR 3/3	ls	lvfgr	10, 1, 0, 0				2vf, 1f, 1m, 1c		aw	
9-26	A/2C1	N8/0 10YR 5/8	10YR 5/3 10YR 5/6	sl	m, lvfgr	—				1vf, 1f, 1m, 1c		aw	
26-30	A/2C2	10YR 3/3	10YR 3/2	sl	m	0, 0, 0, 0				1vf, 1f, 1m, 1c		as	
30-43	3C	10YR	2.5Y 4/2	g sl	m	25, 0, 0, 0				1f, 1m, 1c			
	R												
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
9-26 (m)	A/2C1	0.7	17.5	81.8	6.7	10.9	10.1	23.9	27.9	11.6	8.3	1.9	
9-26 (p)	A/2C1	1.0	80.4	18.6	49.9	30.5	10.2	4.6	2.6	0.8	0.4	3.4	3.40
26-30	A/2C2	3.8	43.9	52.3	21.6	22.3	19.6	16.7	10.2	4.5	1.3	5.2	1.37
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)						CEC (meq/100 g)				CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
9-26 (m)	A/2C1	0.53	0.6	0.2	—	0.1	0.9	2.6	0.8	3.5	2.9	1.7	
9-26 (p)	A/2C1	0.98	1.0	0.3	1.5	0.8	3.6			3.6	9.5		9.50
26-30	A/2C2	1.23	1.0	0.1	tr	0.2	1.3	10.5	0.7	11.8	10.2	2.0	2.68
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Aci0.7d Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
9-26 (m)	A/2C1	47	26	31	9.4	4.7	5.1	0.06	0.26	0.02	0.12	18	0.0
9-26 (p)	A/2C1		100	38	10.5	5.0	5.5					31	
26-30	A/2C2	35	11	13	10.7	5.0	5.2	0.14	0.50	0.25	0.88	55	0.0
Depth (in)	Horizon	Clay Fraction X-Ray Minerals	Clay Fraction Oxides (%)			Silt and Sand (%)							
			Al ₂ O ₃	Fe ₂ O ₃	K ₂ O	Fraction	Tot Re	Grain Count (%)					
9-26 (m)	A/2C1	MI 1, FD 1	11.0	8.1	2.5	VFS	10	GS 84, QZ 8, QC 2, FD 2, BT 1, HN 1, PR tr, OP tr, KK tr, MS tr, AR tr, TM tr, OT tr, FP tr					
9-26 (p)	A/2C1	FD 2, VR 2, MI 2, KK 1, CA 1	10.0	0.4	3.1	VFS	6	GS 88, QZ 6, BT 4, FD 1, HN tr, PR tr, KK tr, QC tr, TM tr, OP tr, FP tr					
26-30	A/2C2	VR 2, FD 2, MI 1, KK 1, QZ 1	16.0	6.9	1.5	VFS	20	GS 68, QZ 19, BT 5, FD 5, QC1, PR 1, HN 1, AR tr, KK tr, AM tr, CA tr, FP tr, GC tr, PO tr					

Note: (m) = main part of 9-26 in. horizon; (p) = pockets within the main body of soil.

SOIL CHARACTERIZATION DATA														
Pedon No. 111	Map Unit 111	Soil Classification sandy-skeletal, mixed Typic Cryorthent				Location: Rock Creek canyon NE 1/4, NE 1/4, S 25, T 5 S, R 29 E, MDM Lat./Long. 37-29-06 / 118-44-14				NCSS Sample No. S90CA-027-009		Date Sampled 07/13/89		
Elev. (ft) 10,800	Slope (%) 27	Aspect ESE	Parent Material glacial moraine, granodiorits		Vegetation Series lodgepole pine- whitebark pine		Soil Temp (F) 44	Litter Layer tr. needles	Remarks: Surface layer of loose decomposing granitic rock. Rodents active in soil.					
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)			Hydrophobicity	Roots	Boundary			
		Dry	Moist			V. Fine	Fine	Med.						
0-4	A	10YR 6/1	10YR 3/2	vgr lcos	sg	35, 0, 0, 0				1vf	cs			
4-16	AC	10YR 5/3	10YR 3/3	vcob sl	1vfgr	15, 15, 2, 0				2vf, 1f, 1m, 1c	gs			
16-40	C	2.5Y 6/2	2.5Y 4/4	xcob lcos	m	40, 35, 10, 0				1vf				
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse			
0-4	A	2.9	33.5	63.6	3.9	29.6	13.6	17.4	14.4	11.8	6.4	2.0	0.69	
4-16	AC	2.6	12.7	84.7	6.6	6.1	10.5	18.4	16.6	17.2	22.0	2.7	1.04	
16-40	C	3.3	15.4	81.3	7.6	7.8	11.1	19.9	17.2	17.1	16.0	2.3	0.70	
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay		
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al	
0-4	A	1.22	0.6	tr	—	0.1	0.7	4.8	0.6	5.5	4.2	1.3	1.45	
4-16	AC	0.54	0.8	0.1	—	0.2	1.1	5.0		6.1	3.5		1.35	
16-40	C	0.42	0.6	0.1	tr	0.2	0.9	3.3	0.3	4.2	3.3	1.2	1.00	
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)	
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al			
0-4	A	46	13	17		4.6	5.2						1.2	
4-16	AC		18	31		5.2	5.7							
16-40	C	25	21	27		5.0	5.5						0.2	

Note: 0.3 % carbonates in the clay fraction of the 0-4 inch horizon.

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification				Location: Table Mountain				NCSS Sample No.	Date Sampled		
132	136	loamy-skeletal, mixed Entic Cryumbrept				NE 1/4, NE 1/4, S 9, T 8 S, R 31 E, MDM				S90CA-027-010	07/25/87		
Elev. (ft)	Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks: Surface erosion common. 0-1 in. is erosional deposition.						
10,920	7	WNW	granodiorite till (?)	perennial grass	46	none							
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-1	A1	10YR 5/2	10YR 3/3	vg ls	sg	55, 5, 0, 0		1vf	aw				
1-10	A2	10YR 5/3	10YR 3/3	cob sl	2vfgr	5, 15, 10, 5		2vf, 2f, 1m	cw				
10-15	A3	10YR 3/3	10YR 2/2	gr sl	2mgr	15, 15, 10, 5		1vf, 1f	aw				
15-25	C1	7.5YR 5/6	7.5YR 3/4	xgr sl	m, 1vfgr	45, 30, 0, 0		—	aw				
25-31	C2	10YR 7/2	10YR 5/3	gr ls	m	25, 0, 0, 0		—	aw				
31-38	C3	10YR 7/1	2.5Y 4/4	gr sl	m	25, 0, 0, 0		—					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
1-10	A2	2.1	38.6	59.3	23.7	14.9	13.3	13.1	10.7	10.1	12.2	1.2	0.57
10-15	A3	6.9	35.6	57.5	26.2	9.4	10.1	11.0	8.2	9.6	18.6	4.7	0.68
15-25	C1	5.5	28.0	66.5	17.1	10.3	8.8	13.3	12.8	14.7	16.9	6.0	1.09
31-38	C3	3.4	11.0	85.5	5.8	5.3	7.8	15.5	16.3	18.7	27.2	3.2	0.94
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
1-10	A2	0.06	2.6	0.3	0.1	0.1	3.1	0.9		4.0	2.9		1.38
10-15	A3	0.40	7.2	1.0	tr	0.1	8.3	6.5	1.1	14.8	12.6	9.4	1.83
15-25	C1	2.49	1.7	0.1	tr	0.1	1.9	16.0	1.4	17.9	10.8	3.3	1.96
31-38	C3	0.27	1.9	0.2	—	0.1	2.2	4.7	0.3	6.9	4.6	2.5	1.35
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
1-10	A2		77	100		5.4	6.1						
10-15	A3	12	56	66		4.5	5.2						1.4
15-25	C1	42	11	18		4.7	5.5						0.0
31-38	C3	12	32	48		4.8	5.6						0.0

SOIL CHARACTERIZATION DATA													
Pedon No. 140	Map Unit 148	Soil Classification loamy-skeletal, mixed Typic Cryumbrept			Location: Lundy Canyon SE 1/4, NW 1/4, S 24, T 2 S, R 24 E, MDM Lat./Long. 38-00-36 / 119-16-45				NCSS Sample No. S90CA-051-011		Date Sampled 07/27/89		
Elev. (ft) 9160	Slope (%) 60	Aspect NNW	Parent Material colluvium-hornfels		Vegetation Series mtn hemlock		Soil Temp (F) 50	Litter Layer Oi: 2-1 in. Oa: 1-0 in.	Remarks: Pistol butts on trees (snow & soil creep). Discontinuous ashy material in 0-10 in., slightly smeary.				
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist										
0-10	A	10YR 5/3	10YR 2/2	vg l	2vfgr	30, 15, 0, 0			slight	1vf, 2f, 1m	aw		
10-22	Bw	7.5YR 5/4	7.5YR 3/4	vg sl	2fgr	35, 15, 0, 0			slight	1vf, 2f, 2m, 1c	cw		
22-30	BC	10YR 5/6	10YR 4/6	vg sl	2fgr	40, 15, 5, 0			slight	1vf, 2f, 1m, 1c	cs		
30-41	C	10YR 6/6	10YR 4/6	xg sl	1vfgr	55, 15, 0, 0				1f, 1m			
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)				-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse			V Coarse
0-10	A	2.9	44.5	52.6	22.7	21.8	29.9	12.9	4.0	2.9	2.9	6.4	2.21
10-22	Bw	5.7	51.9	42.4	31.4	20.5	15.5	9.2	5.7	5.9	6.1	7.6	1.33
22-30	BC	4.8	51.4	43.8	30.1	21.3	11.5	8.7	7.4	7.8	8.4	6.6	1.38
30-41	C	3.4	50.4	46.2	26.6	23.8	10.7	7.4	6.6	8.6	12.9	4.9	1.44
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)						CEC (meq/100 g)				CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-10	A	2.83	5.0	0.4	—	0.4	5.8	17.4	0.6	23.2	15.7	6.4	5.41
10-22	Bw	1.97	1.7	0.1	—	0.4	2.2	21.8	1.7	24.0	17.6	3.9	3.09
22-30	BC	1.51	1.1	0.1	—	0.3	1.5	15.7	2.6	17.2	16.0	4.1	3.33
30-41	C	1.29	1.8	0.2	—	0.3	2.3	11.2	1.1	13.5	12.0	3.4	3.53
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-10	A	9	25	37		4.9	5.5						14.1
10-22	Bw	44	9	13		4.7	5.2						7.2
22-30	BC	63	9	9		4.5	4.8						2.1
30-41	C	32	17	19		4.6	5.1						3.6

SOIL CHARACTERIZATION DATA													
Pedon No. 150	Map Unit 106	Soil Classification loamy-skeletal, mixed Typic Cryorthent				Location: near Gilbert Lake, south of Kearsarge Pk. NE 1/4, NW 1/4, S 35, T 13 S, R 33 E, MDM Lat./Long. 36-46-04 / 118-16-16				NCSS Sample No. S90CA-027-012	Date Sampled 08/14/89		
Elev. (ft) 10400	Slope (%) 45	Aspect NNW	Parent Material qtz. monz.-colluvium		Vegetation Series limber pine		Soil Temp (F) 53	Litter Layer Oi: 1/2 in.	Remarks:				
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist										
0-5	A	10YR 4/2	10YR 2/2	vg cosl	lvfgr	30, 5, 0, 0			moderate	2vf, 1f	aw		
5-17	AC	10YR 6/3	10YR 3/3	vg sl	lvfgr	45, 10, 0, 0			moderate	lvf, 2f, 1m, 1c	cw		
17-39	C	10YR 7/2	10YR 5/3	vg sl	m	40, 20, 2, 0			none	lvf, 1m			
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-5	A	2.3	11.0	86.7	4.3	6.7	8.4	13.3	14.2	21.4	29.4	2.2	0.96
5-17	AC	2.9	16.1	81.0	7.7	8.4	8.8	11.3	12.7	18.9	29.3	2.6	0.90
17-39	C	2.4	29.0	68.6	14.3	14.7	11.7	14.1	13.0	13.9	15.9	1.9	0.79
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)						CEC (meq/100 g)				CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-5	A	1.06	2.2	0.3	—	0.2	2.7	4.5	0.4	7.2	5.2	3.1	2.26
5-17	AC	0.47	1.4	0.2	0.2	0.1	1.9	4.8	0.7	6.7	4.9	2.6	1.69
17-39	C	0.26	0.8	0.2	0.2	tr	1.2	2.7	0.7	3.9	3.3	1.9	1.38
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-5	A	13	37	52		5.0	5.6						3.1
5-17	AC	27	28	39		4.8	5.4						1.4
17-39	C	37	31	36		4.9	5.5						0.2

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location:			NCSS Sample No.	Date Sampled				
152	145	loamy-skeletal, mixed Typic Cryoboroll			Shepherd Pass trail NE 1/4, NW 1/4, S 20, T 14 S, R 34 E, MDM Lat./Long. 36-42-27 / 118-18-05			S90CA-027-013	08/13/89				
Elev. (ft)	Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks:						
9400	55	ESE	qtz. monz. - colluvium	curl leaf mountain mahogany	59	Oi: 1/2-0 in.	Apparent saprolite 36-44 in.						
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-9	A	10YR 4/2	10YR 2/2	xg ls	sg	30, 25, 10, 0	extreme	2vf					
9-20	AC	10YR 5/3	10YR 3/3	xg cosl	lvfgr	30, 25, 10, 0	moderate	lvf, lf, lm					
20-36	CA	10YR 6/3	10YR 4/3	xg cosl	lvfgr	35, 30, 5, 0	none	lvf, lf, lm					
36-44	C	7.5YR 6/2	7.5YR 5/2	xg sl	m	65, 0, 0, 0	none	lvf, lf, lm, lc					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)				-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse			V Coarse
0-9	A	2.8	9.0	88.2	3.1	5.9	9.4	20.9	19.5	20.8	17.6	4.0	1.43
9-20	AC	3.9	9.2	86.9	.34	5.8	11.7	23.5	19.7	16.7	15.3	2.9	0.74
20-36	CA	6.9	29.5	63.6	18.0	11.5	15.7	18.3	14.7	10.5	4.4	5.8	0.84
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)					
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	CEC/Clay
0-9	A	2.09	10.4	0.5	0.1	0.2	11.2	3.8		15.0	10.5		3.75
9-20	AC	0.33	4.8	0.3	0.1	0.2	5.4	2.1		7.5	5.1		1.31
20-36	CA	0.62	9.6	1.4	0.2	0.2	11.4	2.3		13.7	10.9		1.58
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-9	A		75	100		6.2	6.8						
9-20	AC		72	100		6.2	6.8						
20-36	CA		83	100		6.3	6.7						

SOIL CHARACTERIZATION DATA													
Pedon No. 155	Map Unit 145	Soil Classification loamy-skeletal, mixed Typic Cryochrept			Location: Shepherd Creek SW 1/4, NE 1/4, S 20, T 14 S, R 34 E, MDM Lat./Long. 36-42-20 / 118-17-49				NCSS Sample No. S90CA-027-014		Date Sampled 08/13/89		
Elev. (ft) 8800	Slope (%) 55	Aspect N	Parent Material granodiorite colluvium	Vegetation Series limber pine	Soil Temp (F) 49	Litter Layer tr. needles	Remarks: Rock fragments in 10-28 in. are soft and easily crushed.						
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-4	A	10YR 4/3	10YR 3/2	vg cosl	1vfgr	45, 5, 5, 0	—	2vf, 1c	aw				
4-10	BA	10YR 6/3	10YR 3/3	xg cosl	1vfgr	60, 5, 5, 0	extreme	3vf, 1f, 1m, 1c	cw				
10-28	Bw	7.5YR 6/4	7.5YR 3/4	xg sl	1fsbk	60, 0, 0, 0	—	1vf, 1f, 1c	gw				
28-40	Cr	10YR 7/3	10YR 5/3				—	1vf, 1f, 1c					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-4	A	3.2	10.1	86.7	4.1	6.0	10.3	21.7	18.2	18.1	18.4	4.0	1.25
4-10	BA	3.4	10.5	86.1	5.0	5.5	10.4	20.9	18.1	18.7	18.0	3.0	0.88
10-28	Bw	4.9	30.7	64.4	19.6	11.1	12.2	15.6	13.7	12.2	10.7	5.6	1.14
28-40	Cr	3.6	11.7	84.7	7.7	4.0	9.9	19.3	18.5	19.3	17.7	3.8	1.06
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-4	A	1.90	5.9	0.7	0.1	0.3	7.0	6.4		13.4	8.8		2.75
4-10	BA	0.21	4.5	0.3	0.1	0.2	5.1	1.4		6.5	5.4		1.59
10-28	Bw	0.58	9.7	0.7	0.1	0.3	10.8	3.8		14.6	9.0		1.84
28-40	Cr	0.57	5.3	0.6	0.1	0.2	6.2	3.9		10.1	7.7		2.14
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-4	A		52	80		5.1	5.8						
4-10	BA		78	94		6.1	6.5						
10-28	Bw		74	100		5.3	5.9						
28-40	Cr		61	81		5.3	5.8						

SOIL CHARACTERIZATION DATA													
Pedon No. 162	Map Unit 111	Soil Classification loamy-skeletal, mixed Vitrandic Cryochrept			Location: Bloody Canyon, near Sardine Lake NW 1/4, SW 1/4, S 14, T 1 S, R 25 E, MDM Lat./Long. 37-51-30 / 119-11-45				NCSS Sample No. S90CA-051-101		Date Sampled 08/19/89		
Elev. (ft) 9900	Slope (%) 30	Aspect NNE	Parent Material metavolcanics, glacial	Vegetation Series lodgepole pine	Soil Temp (F) 47	Litter Layer Oi: 1/2-0	Remarks: Protective layer of gravel and cobbles on surface. 0-10 in. contains tephra. Distinct layer of light colored, clean granitic sands between 15-15.5 in. Charcoal mixed in 15.5-20 in.						
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist										
0-10	A	10YR 8/1	10YR 5/2	sl	1vfgr	0, 2, 0, 0				1vf, 1f, 2m, 2c	cs		
10-15	Bw1	10YR 7/1	10YR 6/3	sil	1fsbk	—				1vf, 1f, 1m, 1c	as		
15-20	Bw2	10YR 7/3	10YR 5/4	sil	1fsbk	2, 0, 0, 0				1vf, 2f, 2m, 2c	as		
20-37	CB	10YR 6/4	10YR 3/3	xcob sl	1vfgr	4, 80, 0, 0				1vf, 1f, 1m, 1c	aw		
37-40	C	10YR 6/4	10YR 4/3	xcob sl	1vfgr	3, 80, 0, 0				1vf, 1f			
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)				-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse			V Coarse
0-10	A	—	10.9	89.1	3.5	7.4	15.6	25.7	33.9	11.2	2.7	2.1	
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)					
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	CEC/Clay
0-10	A	0.43	0.5	0.2		tr	0.7	1.7	0.1	2.4	1.7	0.8	
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-10	A	12	29	41	8.5	4.4	4.7	0.04	0.06	tr	0.04	8	0.4
Depth (in)	Horizon	Clay Fraction X-Ray Minerals	Clay Fraction Oxides (%)			Silt and Sand (%)							
			Al ₂ O ₃	Fe ₂ O ₃	K ₂ O	Fraction	Tot Re	Grain Count (%)					
0-10	A						VFS	8	GS 90, QZ 8, FD 1, AR 1, PO tr, BT tr, HN tr, PR tr, OP tr, FP tr				

SOIL CHARACTERIZATION DATA														
Pedon No.	Map Unit	Soil Classification			Location: lower Bloody Canyon				NCSS Sample No.	Date Sampled				
163	111	sandy, mixed Dystric Cryochrept			SE 1/4, SE 1/4, S 11, T 1 S, R 25 E, MDM				S90CA-051-015	08/21/89				
Elev. (ft)		Slope (%)		Aspect	Parent Material		Vegetation Series		Soil Temp (F)		Litter Layer		Remarks: Volcanic ash in upper 10 in. Good regeneration of trees. Cobbles tend to be flat. Flat, hard rock slab at 34 in.	
8500		30		E	glacial qtz monzonite, granodiorite		red fir		49		Oi: 2.5-2 Oe: 2-0			
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.)			Hydrophobicity	Roots	Boundary			
		Dry	Moist			(gvl., cob., st., bldr.)								
0-5	A	10YR 5/2	10YR 3/2	sl	2vfgr	2, 2, 0, 0			extreme	1vf, 1f, 1m				
5-10	AB	10YR 6/3	10YR 4/2	sl	1vfgr	4, 2, 0, 0			slight	2vf, 1f, 1m, 1c				
10-19	Bw1	10YR 5/4	10YR 3/3	cob sl	1fgr	5, 15, 0, 0			—	1vf, 2f, 2m, 2c				
19-34	Bw2	10YR 5/6	7.5YR 4/4	cob sl	1vfgr	10, 10, 0, 0			—	1vf, 2f, 2m, 1c				
34	R													
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar	-15 Bar/	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse	Water %	Clay	
0-5	A	2.0	19.6	78.4	9.0	10.6	20.8	26.6	16.3	8.8	5.9	3.4	1.70	
5-10	AB	1.9	20.2	77.9	9.2	11.0	15.9	24.5	20.4	11.2	5.9	3.4	1.79	
10-19	Bw1	2.4	21.5	76.1	11.4	10.1	17.1	21.6	17.4	11.2	8.8	4.0	1.67	
19-34	Bw2	2.8	20.2	77.0	12.9	7.3	11.2	18.4	20.4	16.4	10.6	7.1	2.54	
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/Clay		
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al	
0-5	A	1.35	3.0	0.2	0.1	0.3	3.6	6.0	9.6	5.1	2.55			
5-10	AB	0.90	1.0	0.1	0.1	0.1	1.3	6.0	0.7	7.3	3.8	2.0	2.00	
10-19	Bw1	0.97	0.6	0.1	0.1	0.1	0.9	9.1	0.9	10.0	5.3	1.8	2.21	
19-34	Bw2	1.85	1.6	0.2	0.2	0.1	2.1	19.9	22.0	11.1	3.96			
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)	
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al			
0-5	A		37	71		5.3	5.9							
5-10	AB	35	18	34		5.0	5.4						1.0	
10-19	Bw1	50	9	17		4.9	5.4						1.4	
19-34	Bw2		10	19		5.1	5.7							

SOIL CHARACTERIZATION DATA													
Pedon No. 175	Map Unit 115	Soil Classification sandy-skeletal, mixed, frigid Typic Xerorthent				Location: Tuttle Creek SW 1/4, SW 1/4, S 8, T 16 S, R 35 E, MDM Lat./Long. 36-32-20 / 118-11-40				NCSS Sample No. S90CA-027-100		Date Sampled 08/13/89	
Elev. (ft) 8000	Slope (%) 56	Aspect S	Parent Material colluvium (gravelly talus)-porphyritic qtz monz.		Vegetation Series pinon pine		Soil Temp (F) 67	Litter Layer	Remarks: Live oak present. Approx. 35-40 percent bare ground in the area. Active surface movement.				
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist										
0-6	A	10YR 4/2	10YR 3/1	vg s	sg	35, 0, 0, 0			extreme	2vf			
6-22	Bw	2.5Y 7/4	7.5YR 5/4	vg lcos	2fgr	45, 10, 0, 0			none	1vf, 1f, 1m, 1c			
22-31	C	10YR 7/3	10YR 6/3	xg lcos	m, 1vfgr	45, 30, 0, 0			none	1f, 1m			
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)			-15 Bar Water %	-15 Bar/ Clay		
					Fine	Coarse	V. Fine	Fine	Med.			Coarse	V Coarse
0-6	A	1.5	6.2	92.3	2.2	4.0	3.8	13.1	20.3	27.4	27.7	4.0	2.67
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)					
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	CEC/Clay
0-6	A	2.80	9.7	1.6	tr	0.6	11.9	1.6		13.5	9.1		6.07
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-6	A		88	100	7.8	6.3	6.8	0.09	0.26	0.01	0.04	4	

SOIL CHARACTERIZATION DATA													
Pedon No. 178	Map Unit 114	Soil Classification sandy-skeletal, mixed Typic Cryumbrept				Location: East Warren Canyon SW 1/4, NW 1/4, S 4, T 1 N, R 25 E, MDM Lat./Long. 37-58-13 /119-13-45				NCSS Sample No. S90CA-051-016	Date Sampled 08/27/89		
Elev. (ft) 10320	Slope (%) 15	Aspect S	Parent Material mixed glacial granitic and volcanic		Vegetation Series whitebark pine	Soil Temp (F) 48	Litter Layer tr. needles	Remarks: Volcanic ash in 0-9 in. Sand grains in 24-42 in. are soft, easily crushed.					
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-9	A	10YR 5/3	10YR 3/2	sl	lvfgr	3, 10, 0, 0	extreme	2vf	cw				
9-24	Bw	10YR 6/4	10YR 4/4	vcob sl	lvfgr	25, 30, 0, 0	none	lvf, 2f, 2m, 2c	as				
24-42	C	2.5Y 7/4	2.5Y 5/4	cost	m	45, 2, 0, 0	none	lf, 1m, 1c					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)				-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse			V Coarse
0-9	A	2.7	11.3	86.0	6.7	4.6	15.4	31.6	11.6	10.4	17.0	2.8	1.04
9-24	Bw	5.9	18.5	75.6	12.0	6.5	9.2	17.4	15.0	15.2	18.8	5.2	0.88
24-42	C	5.6	12.5	81.9	7.1	5.4	12.0	20.7	18.0	17.8	13.4	4.1	0.73
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)						CEC (meq/100 g)				CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-9	A	1.90	0.4	—	0.1	0.1	0.6	5.3	0.6	5.9	5.7	1.2	2.11
9-24	Bw	0.34	0.4	0.1	0.1	0.1	0.7	6.0	0.7	6.7	5.3	1.4	0.90
24-42	C	0.10	1.0	0.3	0.2	0.1	1.6	3.6	0.7	5.2	5.4	2.3	0.96
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-9	A	50	10	11		4.9	5.1						1.1
9-24	Bw	50	10	13		4.9	5.6						0.8
24-42	C	30	31	30		4.9	5.9						0.4

SOIL CHARACTERIZATION DATA													
Pedon No. 179	Map Unit 148	Soil Classification loamy-skeletal, mixed Dystric Cryochrept				Location: East Warren Canyon NW 1/4, NW 1/4, S 4, T 1 N, R 25 E, MDM Lat./Long. 37-58-51 / 119-13-38				NCSS Sample No. S90CA-051-017		Date Sampled 08/27/89	
Elev. (ft) 11360	Slope (%) 25	Aspect S	Parent Material diorite colluvium		Vegetation Series whitebark pine		Soil Temp (F) 42	Litter Layer Oe: 0-1 in.	Remarks: Volcanic ash in 0-7 in. Gravel and cobbles throughout are hard and unweathered.				
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist										
0-7	A	10YR 8/2	10YR 5/3	xcob sl	m	10, 65, 5, 0				2vf, 2f	cs		
7-15	Bw1	10YR 6/4	10YR 4/6	vcob sl	2vfgr	15, 30, 0, 0				2vf, 2f, 2m, 2c	cw		
15-25	Bw2	2.5Y 6/4	2.5Y 4/4	xcob sl	2vfgr	20, 45, 0, 0				1vf, 2f, 2m	cw		
25-32	BC	2.5Y 6/4	2.5Y 4/4	xcob cosl	m, 1fsbk	45, 45, 0, 0				1f, 1m	cw		
32-40	C	10YR 7/2	2.5Y 4/4	xcob cosl	m	20, 30, 25, 0				1f, 1m			
Note: Rock fragment percentages appear over estimated probably by about 10 to 20 percent.													
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-7	A	3.3	29.1	67.6	18.8	10.3	17.9	31.1	10.5	4.6	3.5	3.7	1.12
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)						CEC (meq/100 g)				
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	CEC/ Clay
0-7	A	1.17	0.3	—	0.1	0.1	0.5	5.6	0.8	6.1	3.6	1.3	1.09
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-7	A	62	8	14			4.6	4.9					1.0

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: Crown Pass area				NCSS Sample No.	Date Sampled			
189	147	sandy-skeletal, mixed Entic Cryumbrept			NW 1/4, NW 1/4, S 30, T 10 S, R 29 E, MDM				S90CA-019-020	07/07/87			
Elev. (ft)		Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks: Litter layer discontinuous. Upper 2 in. of R is weathered.					
10400		15	SSW	granodiorite	lodgepole pine	46	Oi: 1/4-0						
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-2	A1	10YR 5/2	10YR 3/1	g cosl	m	15, 0, 0, 0	yes	2vf	as				
2-8	A2	10YR 5/3	10YR 3/2	vst cosl	m	10, 20, 15, 0		2f, 2m	cw				
8-19	C1	10YR 6/4	10YR 4/4	vst lcos	m	20, 20, 20, 0		1f, 2m, 1c	cw				
19-24	C2	10YR 7/2	10YR 5/6	xst lcos	m	25, 20, 20, 0		1f	aw				
	R												
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)				-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse			V Coarse
0-2	A1	1.5	17.5	81.0	7.4	10.1	10.6	16.9	14.5	15.9	23.1	3.3	2.20
2-8	A2	0.9	20.0	79.1	8.6	11.4	11.5	16.8	13.7	16.0	21.1	2.9	
8-19	C1	1.0	12.9	86.1	5.5	7.4	9.2	18.6	18.8	20.5	19.0	2.3	2.30
19-24	C2	1.7	13.0	85.3	5.0	8.0	9.7	21.0	19.8	18.3	16.5	2.1	1.24
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-2	A1	5.65	1.9	0.1	—	0.1	2.1	10.3	1.2	12.4	12.7	3.3	8.47
2-8	A2	2.16	0.9	0.2	tr	0.1	1.2	6.0	0.8	7.2	7.8	2.0	
8-19	C1	0.54	0.9	0.2	—	tr	1.1	4.5	0.6	5.6	4.2	1.7	4.20
19-24	C2	0.24	0.5	0.1	tr	—	0.6	3.3	0.2	3.9	3.1	0.8	1.82
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-2	A1	36	17	17	8.2	4.1	4.5	0.15	0.33	0.01	0.20	23	4.6
2-8	A2	40	17	15	9.9	4.7	5.0	0.09	0.25	0.05	0.32	23	1.5
8-19	C1	35	20	26	10.1	4.9	5.1	0.05	0.16	0.09	0.36	31	0.6
19-24	C2	25	15	19	9.8	5.0	5.2	0.05	0.27	0.08	0.31	26	0.3

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification				Location:				NCSS Sample No.	Date Sampled		
190	109	loamy-skeletal, mixed Dystric Cryochrept				Big Maxon Meadow NE 1/4, NE 1/4, S 7, T 10 S, R 29 E, MDM Lat./Long. 37-04-22 / 118-50-41				S90CA-019-021	07/08/87		
Elev. (ft)	Slope (%)	Aspect	Parent Material		Vegetation Series		Soil Temp (F)	Litter Layer	Remarks:				
8320	40	S	granodiorite		lodgepole pine		50	Oi: 1-0 in.					
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist			(gvl., cob., st., bldr.)							
0-6	A1	10YR 5/2	10YR 3/2	vb cosl	1vfgr	15, 10, 15, 10				1vf, 1f, 1m, 2c	cw		
6-11	A2	10YR 5/4	10YR 3/4	vst cosl	1mgr	10, 20, 20, 0				2f, 2m, 2c	cw		
11-21	Bw1	10YR 6/6	10YR 4/6	vst cosl	1fsbk	15, 25, 20, 0				1f, 2m, 1c	cw		
21-29	Bw2	10YR 6/6	10YR 4/6	vst cosl	1fsbk	20, 20, 15, 0				1f, 1m, 1c	cw		
29-36	C	10YR 7/3	10YR 4/6	xst cosl	m	25, 25, 20, 0				1f, 1m	aw		
	R												
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-6	A1	3.4	12.4	84.2	7.6	4.8	9.5	15.6	17.6	19.9	21.6	3.8	1.12
6-11	A2	5.1	14.9	80.0	12.6	2.3	12.8	19.6	18.5	17.4	11.7	3.2	0.63
11-21	Bw1	5.8	13.8	80.4	6.9	6.9	9.1	18.4	20.7	18.8	13.4	2.5	0.43
21-29	Bw2	3.0	16.8	80.2	7.1	9.7	8.0	19.7	21.8	18.1	12.6	1.8	0.60
29-36	C	1.9	19.0	79.1	10.7	8.3	11.7	20.0	22.2	17.3	7.9	1.6	0.84
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)						CEC (meq/100 g)				CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-6	A1	2.26	5.5	0.6	0.1	0.2	6.4	5.7	0.3	12.1	10.0	6.7	2.94
6-11	A2	1.80	4.5	0.5	0.1	0.1	5.2	6.8	0.5	12.0	9.0	5.7	1.76
11-21	Bw1	0.70	2.4	0.3	tr	0.1	2.8	3.8	0.4	6.6	5.3	3.2	0.91
21-29	Bw2	0.40	1.4	0.3	tr	tr	1.7	2.5	0.2	4.2	3.1	1.9	1.03
29-36	C	0.39	1.4	0.1	tr	tr	1.5	3.2	0.2	4.7	3.3	1.7	1.74
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-6	A1	4	53	64	8.8	5.0	5.4	0.10	0.15	0.02	0.14	23	2.6
6-11	A2	9	43	58	9.0	4.9	5.3	0.09	0.20	0.02	0.17	26	2.0
11-21	Bw1	13	42	53	9.0	4.9	5.2	0.04	0.14	0.02	0.11	21	1.0
21-29	Bw2	11	40	55	9.1	4.9	5.4	0.03	0.09	0.02	0.07	15	0.2
29-36	C	12	32	45	9.1	4.9	5.4	0.06	0.26	0.03	0.13	15	0.1

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: Hobler Lake				NCSS Sample No.	Date Sampled			
191	140	sandy-skeletal, mixed Typic Cryorthent			NE 1/4, NE 1/4, S 20, T 9 S, R 28 E, MDM				S90CA-019-022	07/09/87			
Elev. (ft)		Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks: Usually little or no litter layer in this area.					
9000		20	s	granitic till	lodgpole pine	53	Oi: 1-0 in.						
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-5	A	10YR 4/1	10YR 3/1	vb ls	1vfgr	10, 10, 20, 20	slight	1vf, 1f	aw				
5-18	C1	10YR 6/4	10YR 3/3	xb ls	m	15, 20, 20, 15	slight	1f, 1m, 1c	gw				
18-26	C2	10YR 6/4	10YR 4/4	xst ls	m	15, 20, 30, 5		1m, 1c	cw				
26-32	C3	10YR 7/2	10YR 5/3	xst ls	sg	25, 20, 30		1f, 1m					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-5	A	2.6	17.0	80.4	6.5	10.5	15.2	21.4	14.8	14.4	14.6	4.9	1.88
5-18	C1	1.1	18.1	80.8	6.3	11.8	18.9	24.7	14.9	11.6	10.7	1.7	1.55
18-26	C2	0.9	17.8	81.3	4.4	13.4	20.8	28.0	16.6	9.9	6.0	1.6	
26-32	C3	0.6	18.5	80.9	4.1	14.4	24.4	25.0	13.0	10.0	8.5	1.1	
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-5	A	3.02	4.5	0.3	tr	0.1	4.9	7.0	0.3	11.9	10.6	5.2	4.08
5-18	C1	0.97	1.3	0.1	—	tr	1.4	5.2	0.4	6.6	4.8	1.8	4.36
18-26	C2	0.77	0.8	0.2	tr	tr	1.0	5.2	0.1	6.2	4.0	1.1	
26-32	C3	0.35	0.6	0.2	0.1	tr	0.9	3.2		4.1	1.9		
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-5	A	6	41	46	8.5	4.5	5.0	0.10	0.21	0.05	0.13	12	2.4
5-18	C1	22	21	29	9.8	4.6	4.8	0.10	0.16	0.07	0.19	15	0.3
18-26	C2	9	16	25	10.3	4.8	5.1	0.07	0.11	0.13	0.41	21	0.2
26-32	C3		22	47	10.0	5.1	5.2	0.04	0.08	0.10	0.23	15	

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: Volcanic Cone				NCSS Sample No.	Date Sampled			
192	112	sandy-skeletal, mixed Entic Cryumbrept			NE 1/4, NW 1/4, S 17, T 11 S, R 29 E, MDM				S90CA-019-023	07/06/87			
Elev. (ft)	Slope (%)	Aspect	Parent Material		Vegetation Series		Soil Temp (F)	Litter Layer	Remarks:				
8920	20	WSW	granitic moraine		red fir		43	Oi: 1.5-0 in					
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist			(gvl., cob., st., bldr.)							
0-8	A	10YR 5/3	10YR 3/2	co sl	m	5, 5, 0, 0			yes	3vf, 1f, 1m	cs		
8-17	C1	10YR 6/4	10YR 4/4	vst lcos	m	15, 15, 15, 0				1f, 3m, 2c	gs		
17-40	C2	10YR 7/3	10YR 5/4	vcob lcos	m	20, 30, 5, 0				1f, 2m, 2c			
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)				-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse			V Coarse
0-8	A	1.7	15.6	82.7	7.4	8.2	11.7	18.4	17.8	18.0	16.8	4.1	2.41
8-17	C1	2.2	15.0	82.8	5.8	9.2	11.6	21.2	19.7	17.3	13.0	2.5	1.14
17-40	C2	2.1	10.5	87.4	4.7	5.8	10.6	19.4	20.6	19.6	17.2	2.1	1.00
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-8	A	2.02	3.1	0.1	0.2	0.1	3.5	6.2	0.3	9.7	9.7	3.8	5.71
8-17	C1	0.57	1.2	0.3	0.2	tr	1.7	3.6	0.1	5.3	4.5	1.8	2.05
17-40	C2	0.23	0.9	0.2	0.2	tr	1.3	2.0		3.3	2.9		1.38
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-8	A	8	36	36	9.9	4.8	5.2	0.11	0.24	0.07	0.27	21	3.6
8-17	C1	6	32	38	9.6	5.0	5.3	0.06	0.22	0.10	0.30	23	0.3
17-40	C2		39	45	9.3	5.1	5.4	0.03	0.07	0.07	0.20	18	

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: North Fork Kings River				NCSS Sample No.	Date Sampled			
193	149	loamy-skeletal, mixed Entic Cryumbrept			NE 1/4, NE 1/4, S 2, T 10 S, R 28 E, MDM				S90CA-019-024	07/08/87			
Elev. (ft)	Slope (%)	Aspect	Parent Material		Vegetation Series		Soil Temp (F)	Litter Layer	Remarks: Soil is pockets of glacial till between rock outcrop.				
8320	40	W	granitic till		lodgepole pine		56	Oi: 2-0 in.					
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist			(gvl., cob., st., bldr.)							
0-5	A1	10YR 5/2	10YR 3/1	vcob cosl	lvfgr	10, 20, 5, 0			slight	2vf, 2f, 1m	cs		
5-11	A2	10YR 5/3	10YR 3/2	vst cosl	lvfgr	15, 25, 15, 0			slight	2f, 2m, 2c	gs		
11-26	C1	10YR 5/3	10YR 3/2	vcob cosl	m	20, 25, 10, 0				1f, 2m, 2c	gs		
26-36	C2	10YR 6/4	10YR 4/3	vcob ls	m	25, 30, 10, 0				1f, 1m			
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)				-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse			V Coarse
0-5	A1	1.5	14.2	84.3	5.9	8.3	13.8	22.5	19.2	18.1	10.7	4.6	3.07
5-11	A2	1.4	17.5	81.1	7.7	9.9	14.9	22.6	18.6	14.9	10.1	3.9	2.79
11-26	C1	1.0	17.5	81.5	6.6	10.9	11.0	23.5	23.5	16.0	7.5	3.9	3.90
26-36	C2	1.2	17.4	81.4	7.5	9.9	14.6	21.7	21.5	15.8	7.8	3.0	2.50
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)					CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-5	A1	3.61	2.2	0.2	0.2	tr	2.6	7.3	0.5	9.9	11.1	3.1	7.40
5-11	A2	2.16	1.0	0.2	0.2	—	1.4	8.3	0.5	9.7	7.1	1.9	5.07
11-26	C1	1.95	0.8	0.2	0.2	tr	1.2	8.8	0.5	10.0	7.3	1.7	7.30
26-36	C2	1.29	0.5	0.2	0.2	—	0.9	6.9	0.3	7.8	3.2	1.2	2.67
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-5	A1	16	26	23	9.4	4.5	4.9	0.23	0.09	0.04	0.25	23	1.0
5-11	A2	26	14	20	10.7	4.7	4.9	0.18	0.10	0.12	0.46	28	0.4
11-26	C1	29	12	16	11.0	4.8	5.0	0.16	0.09	0.17	0.59	37	0.0
26-36	C2	25	12	28	10.9	15.0	5.0	0.12	0.07	0.26	0.69	31	0.0

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: Post Corral Meadow				NCSS Sample No.	Date Sampled			
194	140	loamy-skeletal, mixed Entic Cryumbrept			SW 1/4, NW 1/4, S 26, T 9 S, R 28 E, MDM				S90CA-019-025	07/08/87			
Elev. (ft)	Slope (%)	Aspect	Parent Material		Vegetation Series		Soil Temp (F)	Litter Layer	Remarks: 0-4 in. strongly matted by grass roots. Many small ephemeral drainages running through from sideslope to creek.				
8200	3	SW	granitic alluvium		lodgepole pine		54	none					
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.)		Hydrophobicity	Roots	Boundary			
		Dry	Moist			(gvl., cob., st., bldr.)							
0-4	A1	10YR 5/3	10YR 3/2	g l	lfgr	10, 2, 2, 4		slight	3vf	as			
4-14	A2	10YR 4/3	10YR 2/2	l	lfgr	5, 5, 0, 0			3vf, 2f, 1m, 1c	cs			
14-24	C1	10YR 5/3	10YR 3/3	cob sl	m	10, 15, 0, 0			1f, 1m, 1c	cs			
24-36	C2	10YR 6/4	10YR 4/3	cob vfl	m	15, 20, 0, 0			1f, 1m	as			
36-40	C3	10YR 7/2	10YR 4/2	xcob cosl	sg	40, 40, 0, 0			1f				
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-4	A1	2.5	36.0	61.5	17.2	18.8	19.1	20.1	9.2	7.4	5.7	4.0	1.60
4-14	A2	1.1	29.9	69.0	14.6	15.3	16.0	17.0	13.5	13.6	8.9	4.2	3.82
14-24	C1	1.2	30.1	68.7	13.2	16.9	11.2	17.7	14.5	12.7	12.6	3.2	2.67
24-36	C2	2.7	34.7	62.6	19.6	15.1	14.4	15.9	15.0	11.1	6.2	3.7	1.37
36-40	C3	2.9	23.0	74.1	13.1	9.9	7.7	13.0	17.3	20.2	15.9	2.5	1.21
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)					CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-4	A1	2.85	0.9	0.2	0.2	0.1	1.4	8.6	0.9	10.0	9.1	2.3	3.64
4-14	A2	2.62	0.5	0.1	0.2	tr	0.8	12.7	1.3	13.5	11.0	2.1	10.00
14-24	C1	1.39	0.6	0.1	0.2	tr	0.9	9.9	0.5	10.8	6.8	1.4	5.67
24-36	C2	0.89	0.5	0.2	0.2	—	0.9	8.6	0.3	9.5	5.1	1.2	1.89
36-40	C3	0.68	0.5	0.1	0.2	—	0.8	5.4	0.3	6.2	3.5	1.1	1.21
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-4	A1	39	14	15	10.0	4.6	4.8	0.15	0.20	0.07	0.28	28	2.2
4-14	A2	62	6	7	11.1	4.7	4.8	0.40	0.25	0.12	0.75	37	0.3
14-24	C1	36	8	13	11.0	4.9	5.1	0.19	0.21	0.24	0.85	40	0.0
24-36	C2	25	9	18	10.9	5.1	5.2	0.11	0.11	0.30	0.82	49	0.1
36-40	C3	27	13	23	10.6	5.0	5.1	0.07	0.14	0.19	0.54	28	0.0

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: Scepter Lake			NCSS Sample No.	Date Sampled				
196	138	coarse-loamy, mixed Humic Cryaquept			SW 1/4, NE 1/4, S 29, T 10 S, R 29 E, MDM			S90CA-019-026	07/07/87				
Elev. (ft)		Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks: Water table 39 in. Volcanic ash lens 8-10 in. Iron mottles: 13-25 in. 15 % 7.5YR 5/6,4/6; 25--28 in. 75 %; 28-32 in. 15 %, with volcanic ash.					
9640		2	S	granitic alluvium	perennial grass	48	none						
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-6	A1	10YR 5/3	10YR 2/2	l	m	5, 0, 0, 0	none noted	3vf, 3f	cs				
6-13	A2	10YR 6/2	10YR 3/2	l	m	10, 0, 0, 0		3vf, 3f	cs				
13-25	A3	10YR 6/2	10YR 3/3	g sl	m	15, 0, 0, 0		3vf, 3f	as				
25-28	C1	10YR 6/4	10YR 3/4	g cosl	m	25, 0, 0, 0		3vf, 3f	as				
28-32	Ab1	10YR 6/2	10YR 3/2	sil	m	5, 0, 0, 0		3vf, 3f	as				
32-40	Cb1	10YR6/3	10YR 3/3	vg lcos	m	35, 0, 0, 0		3vf, 3f					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-6	A1	2.8	25.7	71.5	14.5	11.2	12.4	15.2	12.4	16.8	14.7	8.7	3.11
6-13	A2	1.9	28.1	70.0	12.2	15.9	13.0	16.7	10.6	13.2	16.5	6.2	3.26
13-25	A3	1.5	18.4	80.1	10.3	8.1	15.9	18.9	11.1	15.0	19.2	4.3	2.87
25-28	C1	0.2	10.3	89.5	5.5	4.8	9.3	20.2	15.0	16.1	28.9	2.3	
28-32	Ab1	2.3	29.2	68.5	15.7	13.5	20.0	21.8	11.5	7.4	7.8	5.8	2.52
32-40	Cb1	tr	7.8	92.2	3.6	4.2	6.6	19.8	22.0	24.3	19.5	1.7	
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)					CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-6	A1	5.43	0.8	0.2	0.2	0.2	1.4	15.6	2.7	17.0	11.9	4.1	4.25
6-13	A2	2.62	0.5	0.2	0.2	tr	0.9	9.3	0.9	10.2	7.4	1.8	3.89
13-25	A3	2.49	0.5	0.2	0.2	tr	0.9	9.3	1.0	10.2	6.9	1.9	4.60
25-28	C1	1.26	0.5	0.1	0.2	—	0.8	3.4	0.4	4.2	4.1	1.2	
28-32	Ab1	3.80	0.4	0.3	0.1	0.1	0.9	13.4	1.5	14.3	11.4	2.4	4.96
32-40	Cb1	0.58	0.2	0.3	0.1	tr	0.6	5.1	0.6	5.7	5.6	1.2	
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-6	A1	66	8	12	9.7	4.3	4.6	0.14	0.09	0.05	0.21	28	0.0
6-13	A2	50	9	12	10.6	4.7	4.9	0.12	0.19	0.10	0.40	39	0.0
13-25	A3	53	9	13	10.5	4.6	4.8	0.10	0.16	0.10	0.40	40	0.0
25-28	C1	33	19	20	10.0	4.7	4.9	0.07	0.44	0.4	0.16	21	0.1
28-32	Ab1	63	6	8	10.4	4.6	4.8	0.17	0.46	0.10	0.47	50	0.0
32-40	Cb1	50	11	11	9.8	4.6	4.9	0.05	0.13	0.03	0.10	15	0.1

SOIL CHARACTERIZATION DATA													
Pedon No. 197	Map Unit 140	Soil Classification coarse-loamy, mixed Typic Cryumbrept			Location: Post Corral Meadow SE 1/4, NW 1/4, S 22, T 9 S, R 28 E, MDM Lat./Long. 37-07-59 / 118-54-23				NCSS Sample No. S90CA-019-027		Date Sampled 07/09/87		
Elev. (ft) 8400	Slope (%) 5	Aspect NE	Parent Material granitic till	Vegetation Series lodgepole pine	Soil Temp (F) 45	Litter Layer Oi: 1-0 in.	Remarks: Trail through this soil usually is wet.						
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-6	A	10YR 5/3	10YR 2/2	l	1fgr	10, 0, 0, 0	none noted	2vf, 2f, 2m, 1c	cs				
6-11	AB	10YR 5/3	10YR 3/3	sl	1msbk	10, 0, 0, 0		1vf, 1f, 1m, 2c	cs				
11-21	Bw	10YR 5/4	10YR 3/4	g sl	1csbk	15, 0, 0, 0		1f, 1m, 1c	gs				
21-37	BC	10YR 6/6	10YR 4/6	vst sl	m	15, 10, 15, 0		1f, 1m					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-6	A	2.7	22.9	74.4	12.6	10.3	14.9	19.9	16.0	13.6	10.0	5.1	1.89
6-11	AB	1.3	17.5	81.2	8.8	8.7	11.1	18.0	16.3	16.9	18.9	3.2	2.46
11-21	Bw	1.6	19.9	78.5	11.0	8.9	12.9	19.3	16.6	15.7	14.0	3.5	2.19
21-37	BC	0.8	27.4	71.8	11.2	16.2	11.5	18.0	16.5	14.1	11.7	3.5	
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)						CEC (meq/100 g)				CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-6	A	3.17	1.9	0.4	0.2	0.1	2.6	11.3	1.3	13.9	11.2	3.9	4.15
6-11	AB	1.71	1.0	0.5	0.1	0.1	1.7	7.7	0.7	9.4	7.8	2.4	6.00
11-21	Bw	1.33	0.9	0.4	0.2	0.1	1.6	7.6	0.6	9.2	6.4	2.2	4.00
21-37	BC	0.69	0.7	0.4	0.1	tr	1.2	6.8	0.5	8.0	3.7	1.7	
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-6	A	33	19	23	9.6	4.5	4.9	0.21	0.43	0.04	0.30	31	2.4
6-11	AB	29	18	22	10.1	4.7	5.0	0.11	0.47	0.10	0.33	26	0.1
11-21	Bw	27	17	25	10.3	4.7	5.0	0.10	0.52	0.14	0.38	33	0.0
21-37	BC	29	15	32	10.4	5.0	5.3	0.06	0.45	0.20	0.49	33	0.0

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: Woodchuck Country				NCSS Sample No.	Date Sampled			
199	139	sandy-skeletal, mixed Typic Cryorthent			NE 1/4, SW 1/4, S 27, T 10 S, R 28 E, MDM				S90CA-019-028	07/16/90			
Elev. (ft)	Slope (%)	Aspect	Parent Material		Vegetation Series	Soil Temp (F)	Litter Layer	Remarks: Coarse roots concentrated horizontally at 7 in. Colors equally mixed in 28-38 in.					
9000	5	E	glaciated shoulder, hb granodiorite		lodgepole pine	64	none						
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-7	A	10YR 6/2	10YR 4/2	g lcos	1mgr	15, 0, 0, 0	moderate	2vf, 2f, 2m	cw				
7-28	CA	10YR 6/4	10YR 4/3	vcob lcos	1fgr	15, 30, 15, 0	slight	1vf, 1f, 2m, 2c	gw				
28-38	C	2.5Y 5/4, 5Y 6/2	5Y 4/2	vcob lcos	1fgr	15, 30, 15, 0	none	1f, 2m	cw				
38-46	Cr	2.5Y 7/4	10YR 6/4	xcob cos	sg	30, 25, 20, 0	none	1f, 2m					
	R (?)												
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-7	A	1.1	18.0	80.9	9.5	8.5	13.2	19.8	18.5	17.6	11.8	2.4	2.18
7-28	CA	1.1	22.7	76.2	12.0	10.7	12.9	18.8	18.0	16.7	9.8	3.1	2.82
28-38	C	2.5	23.6	73.9	13.2	10.4	13.0	19.9	19.0	14.8	7.2	2.5	1.00
38-46	Cr	2.5	19.8	77.7	10.8	9.0	8.9	16.6	19.2	20.4	12.6	3.2	1.28
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-7	A	1.63	0.5	0.4	0.1	0.1	1.1	5.4	0.5	6.5	5.4	1.6	4.91
7-28	CA	1.20	0.5	0.4	0.1	tr	1.0	7.3		8.3	5.2		4.73
28-38	C	0.57	0.5	0.1	0.1	tr	0.7	5.0		5.7	3.2		1.28
38-46	Cr	0.42	0.6	0.1	0.1	0.1	0.9	5.9	0.9	6.8	5.1	1.8	2.04
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-7	A	31	17	20	10.5	4.8	4.8	0.10	0.13	0.11	0.35	21	0.4
7-28	CA		12	19	10.8	5.1	5.2	0.07	0.10	0.20	0.50	39	
28-38	C		12	22	10.6	5.1	5.3	0.04	0.16	0.11	0.41	28	
38-46	Cr	50	13	18	10.5	4.7	5.2	0.04	0.05	0.07	0.34	33	0.2

SOIL CHARACTERIZATION DATA													
Pedon No. 202	Map Unit 138	Soil Classification sandy-skeletal, mixed Dystric Cryochrept			Location: Chimney Lake, Woodchuck Country NW 1/4, NE 1/4, S 35, T 10 S, R 28 E, MDM Lat./Long. 37-01-17 / 118-53-12				NCSS Sample No. S90CA-019-029		Date Sampled 07/17/90		
Elev. (ft) 9720	Slope (%) 23	Aspect N	Parent Material basaltic		Vegetation Series lodgepole pine		Soil Temp (F) 53	Litter Layer Oi: 0.5-0 in	Remarks: Granitic sands or pumice in 3-10 in. Reddish colors probably due to volcanic rock. Horizontal roots at 3 in.				
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist										
0-3	A	7.5YR 5/2	7.5YR 3/2	g cosl	1msbk, 1fsbk	20, 0, 0, 0			slight	1f, 2m, 2c	aw		
3-10	Bw1	7.5YR 5/4	7.5YR 3/4	g cosl	1fsbk	20, 5, 0, 0			none	1f, 2m, 2c	cw		
10-16	Bw2	7.5YR 5/4	5YR 3/4	cob cosl	1msbk	20, 20, 0, 0			none	1f, 2m, 2c	cw		
16-25	2C	7.5YR 5/4	5YR 3/4	cob lcos	1mgr	25, 35, 0, 0			none	1f, 1m, 1c	aw		
25-30	Cr1	5YR 4/3	5YR 3/3	xcob lcos	m	25, 50, 0, 0			none	1f, 2m	cw		
30-48	Cr2	2.5YR 5/4	2.5YR 3/4	xcob lcos	m	25, 50, 0, 0			none	1m			
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-3	A	3.5	37.0	59.5	18.1	18.9	16.1	17.6	11.8	8.2	5.8	7.2	2.06
3-10	Bw1	3.6	35.8	60.7	18.8	16.9	12.7	15.4	14.4	11.4	6.8	7.7	2.14
10-16	Bw2	3.1	31.8	65.1	17.3	14.5	12.9	16.8	16.4	12.0	7.0	8.7	2.81
16-25	2C	2.8	33.4	63.8	16.0	17.4	8.6	16.1	16.2	13.3	9.6	9.3	3.32
25-30	Cr1	11.6	28.0	60.4	19.4	8.6	11.7	17.5	16.2	10.4	4.6	18.6	1.60
30-48	Cr2	13.8	28.4	57.8	21.3	7.1	7.6	11.9	13.1	14.6	10.6	19.0	1.38
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)						CEC (meq/100 g)				CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-3	A	4.77	2.9	0.2	0.2	0.3	3.6	13.3	1.2	16.9	18.3	4.8	5.23
3-10	Bw1	1.19	1.0	0.2	0.2	0.2	1.6	13.1	0.6	14.7	11.6	2.2	3.22
10-16	Bw2	0.78	1.5	0.4	0.2	0.4	2.5	14.0	1.0	16.5	13.7	3.5	4.42
16-25	2C	0.51	1.8	0.3	0.2	0.6	2.9	13.6	0.8	16.5	14.8	3.7	5.29
25-30	Cr1	0.36	5.7	2.6	0.3	1.4	10.0	11.6	1.0	21.6	20.1	11.0	1.73
30-48	Cr2	0.41	5.9	3.0	0.3	1.5	10.7	11.5	0.9	22.2	19.9	11.6	1.44
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-3	A	25	21	20	10.4	4.8	5.0	0.25	1.15	0.24	0.94	53	2.1
3-10	Bw1	27	11	14	10.6	5.0	5.4	0.15	1.82	0.44	1.31	76	1.3
10-16	Bw2	29	15	18	10.5	5.0	5.6	0.15	2.16	0.56	1.27	81	0.9
16-25	2C	22	18	20	10.5	5.0	5.6	0.14	2.44	0.64	1.29	83	0.6
25-30	Cr1	9	46	50	10.2	5.0	5.6	0.13	1.31	0.20	0.61	65	0.8
30-48	Cr2	8	48	54	10.2	5.0	5.7	0.11	1.39	0.20	0.53	61	0.8

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: Woodchuck Lake				NCSS Sample No.	Date Sampled			
203	114	sandy, mixed Entic Cryumbrept			NE 1/4, SE 1/4, S 23, T 10 S, R 28 E, MDM				S90CA-019-030	07/17/90			
Elev. (ft)	Slope (%)	Aspect	Parent Material		Vegetation Series		Soil Temp (F)	Litter Layer	Remarks:				
9950	18	S	granitic		lodgepole pine		50	1/4 in.					
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gyl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-7	A	7.5YR 5/2	7.5YR 3/2	g lcos	1fgr	15, 0, 0, 0	slight	1vf, 1f, 2m	cw				
7-12	Bw	10YR 6/3	10YR 4/3	g lcos	1mgr	15, 0, 0, 0	slight	1f, 1m, 1c	cw				
12-19	C1	10YR 6/4	10YR 4/4	cob lcos	sg	20, 20, 0, 0	none	1f, 1m, 1c	cw				
19-30	C2	10YR 7/3	10YR 5/3	vg cos	m	45, 10, 0, 0	none	1f, 1m					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)				-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse			V Coarse
0-7	A	1.5	18.4	80.1	8.7	9.7	11.1	18.9	16.6	15.8	17.7	5.6	3.73
7-12	Bw	0.4	19.6	80.0	10.6	9.0	14.0	19.8	16.9	15.8	13.5	3.2	
12-19	C1	0.5	20.1	79.4	10.6	9.5	12.2	18.6	18.1	16.5	14.0	2.6	
19-30	C2	1.2	20.2	78.6	10.4	9.8	13.0	19.5	18.3	16.5	11.3	2.0	1.67
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-7	A	3.15	1.4	0.1	0.1	0.2	1.8	10.6	0.8	12.4	10.6	2.6	7.07
7-12	Bw	1.30	0.8	0.1	0.2	0.1	1.2	7.0	0.2	8.2	5.4	1.4	
12-19	C1	0.55	0.6	tr	0.1	0.1	0.8	5.3	0.1	6.1	3.9	0.9	
19-30	C2	0.33	0.6	tr	0.1	tr	0.7	3.9		4.6	3.0		2.50
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-7	A	31	15	17	10.2	4.5	4.7	0.17	0.34	0.02	0.33	35	1.1
7-12	Bw	14	15	22	10.6	4.9	5.2	0.08	0.42	0.09	0.44	35	0.5
12-19	C1	11	13	21	10.4	5.0	5.3	0.05	0.34	0.11	0.47	31	0.1
19-30	C2		15	23	10.4	5.1	5.4	0.03	0.19	0.09	0.34	28	

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location:			NCSS Sample No.	Date Sampled				
204	108	sandy-skeletal, mixed Typic Cryorthent			above Big Maxon Meadow SE 1/4, NW 1/4, S 17, T 10 S, R 29 E, MDM Lat./Long. 37-03-46 / 118-50-16			S90CA-019-031	07/19/90				
Elev. (ft)	Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks:						
8480	35	NE	granitic till (moraine)	lodgepole pine	50	Oi: 3-1.5 in Oe: 1.5-0 in	Smeary consistence in Bw & C1 suggests volcanic ash. Soil may be Vitrandic. Mixed colors due to differential weathering. Water table at 39 in.						
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-3	A	10YR 6/2	10YR 3/3	sl	lvfgr	5, 5, 5, 0	moderate	lvf, 2f, 2m, 1c	ai				
3-17	Bw	10YR 5/2	10YR 3/4	xst lcos	2mgr, 1fsbk	15, 35, 20, 0	slight	lvf, 1f, 1m, 1c	aw				
17-27	C1	10YR 6/6	10YR 4/6	xst lcos	m, 1fgr	25, 35, 20, 0	none	1f, 2m, 1c	cs				
27-44	C2	10YR 5/6	5YR 4/4, 7.5YR 4/6	xst lcos	sg	30, 35, 20, 0	none	1f, 1m					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-3	A	1.3	39.5	59.2	20.4	19.1	15.8	19.6	9.2	8.3	6.3	4.3	3.31
3-17	Bw	3.2	26.9	69.9	14.9	12.0	12.7	19.7	16.6	12.9	8.0	3.5	1.09
17-27	C1	3.1	18.0	78.9	8.8	9.2	13.8	17.7	18.5	17.2	11.7	3.3	1.06
27-44	C2	1.5	16.1	82.4	7.5	8.6	13.1	17.8	18.4	18.0	15.1	5.9	3.93
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)						CEC (meq/100 g)				CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-3	A	1.92	2.1	0.2	0.2	0.4	2.9	3.5	—	6.4	7.9		6.08
3-17	Bw	1.39	1.0	0.1	0.2	0.1	1.4	7.9	0.6	9.3	7.4	2.0	2.31
17-27	C1	0.85	0.7	tr	0.2	0.1	1.0	6.4	tr	7.4	4.8		1.55
27-44	C2	1.93	1.0	0.2	0.2	0.1	1.5	5.6	0.2	6.8	8.4	1.7	5.60
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-3	A		45	37	10.2	4.8	5.3	0.08	0.28	0.03	0.24	28	1.3
3-17	Bw	30	15	19	10.3	4.6	5.0	0.13	0.38	0.02	0.30	35	0.2
17-27	C1		14	21	10.3	4.7	5.0	0.10	0.60	0.03	0.32	35	0.1
27-44	C2	12	22	18	10.7	4.8	5.3	0.29	1.81	0.13	0.86	71	0.8

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification				Location: above Big Maxon Meadow				NCSS Sample No.	Date Sampled		
205	108	sandy-skeletal, mixed Vitrandic Cryorthent				SW 1/4, NW 1/4, S 17, T 10 S, R 29 E, MDM				S90CA-019-032	07/19/90		
Elev. (ft)	Slope (%)	Aspect	Parent Material		Vegetation Series		Soil Temp (F)	Litter Layer	Remarks: Soil creep evident. Discontinuous ash layer at 4 in. Charcoal in 0-13 in. Smearly 0-4 in.				
8800	45	NE	granitic till (moraine)		lodgepole pine		55	1/2-0					
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist			(gvl., cob., st., bldr.)							
0-4	A	10YR 6/3	10YR 3/2	g lcos	1fsbk, 2fgr	20, 0, 0, 0			slight	2vf, 1f, 1m	cw		
4-13	Bw1	2.5Y 6/4	10YR 5/4	g lcos	2mgr, 1fgr	25, 8, 0, 0			none	1vf, 2f, 2m, 1c	cs		
13-21	Bw2	2.5Y 6/4	2.5Y 5/4	vg lcos	2mgr, 1fgr	30, 12, 0, 0			none	1f, 2m, 1c	cs		
21-33	Bw3	2.5Y 6/4	2.5Y 5/4	vg lcos	1fgr	35, 12, 0, 0			none	1f, 1m, 1c	as		
33-45	C	2.5Y 7/2	5Y 5/3	xg lcos	1vfgr	45, 25, 0, 0			none	1f			
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-4	A	1.8	28.5	69.7	14.7	13.8	14.4	16.9	13.7	13.7	11.0	2.4	1.33
4-13	Bw1	2.0	25.3	72.7	11.7	13.6	11.5	19.6	16.9	15.4	9.3	2.3	1.15
13-21	Bw2	1.7	22.4	75.9	11.2	11.2	13.6	17.9	17.3	15.1	12.0	2.1	1.24
21-33	Bw3	1.2	25.5	73.3	11.6	13.9	13.4	16.6	16.5	15.2	11.6	1.6	1.33
33-45	C	0.6	29.3	70.1	15.9	13.4	12.9	17.4	17.0	15.2	7.6	1.6	
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)					CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-4	A	1.88	3.3	0.2	0.2	0.1	3.8	6.1	0.5	9.9	7.3	4.3	4.06
4-13	Bw1	0.50	1.2	0.2	0.1	0.1	1.6	4.1	0.4	5.7	4.3	2.0	2.15
13-21	Bw2	0.43	0.8	0.1	0.2	tr	1.1	3.7	0.6	4.8	4.3	1.7	2.53
21-33	Bw3	0.27	0.8	tr	0.2	tr	1.0	2.8	0.5	3.8	3.0	1.5	2.50
33-45	C	0.22	0.9	0.2	0.2	—	1.3	2.6	0.4	3.9	3.1	1.7	
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-4	A	12	38	52	10.0	4.9	5.2	0.10	0.26	0.02	0.26	23	
4-13	Bw1	20	28	37	10.1	4.9	5.4	0.05	0.26	0.05	0.27	23	
13-21	Bw2	35	23	26	10.2	4.9	5.2	0.05	0.21	0.04	0.22	21	
21-33	Bw3	33	26	33	10.1	5.0	5.2	0.04	0.19	0.05	0.21	21	
33-45	C	24	33	42	10.2	5.0	5.3	0.04	0.20	0.06	0.20	23	
Depth (in)	Horizon	Silt and Sand (%)			Grain Count (%)								
		Fraction	Tot Re										
0-4	A	VFS	35		GS 44, QZ 34, FD 15, BT 5, KK 1, MS 1, TM tr, PR tr, OP tr, HN tr, FP tr, AR tr								
4-13	Bw1	VFS	50		QZ 47, GS 21, FD 14, BT 10, HN 3, OP 2, FP 1, AR 1, KK 1, PR tr, QC tr, AM tr, TM tr								
13-21	Bw2	VFS	44		QZ 41, FD 29, BT 13, GS 8, HN 2, OP 1, FP 1, PR 1, KK 2, CA 1, TM tr, CZ tr, OV tr, GN tr								
21-33	Bw3	VFS	58		QZ 52, FD 20, BT 18, KK 2, OP 2, GS 2, FP 1, HN 1, PR 1, RA 1, TM 1, ZR tr, CA tr, EP tr								
33-45	C	VFS	58		QZ 54, FD 19, BT 16, KK 3, HN 2, FP 2, OP 1, GS 1, PR 1, CA tr, MZ tr, DL tr, ZR tr								

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification				Location: near Horse Creek				NCSS Sample No.	Date Sampled		
207	138	loamy-skeletal, mixed Humic Xeric Vitricryand				SE 1/4, SW 1/4, S 5, T 11 S, R 29 E, MDM				S90CA-019-033	07/21/90		
Elev. (ft)		Slope (%)		Aspect	Parent Material		Vegetation Series		Soil Temp (F)	Litter Layer	Remarks: Evidence of past gully erosion. A few granitic glacial erratics present. Slight clay increase below 31 in.; no evidence of illuviation.		
9200		28		NNE	basaltic colluvium		lodgepole pine		52	Oi: 1.5-0 in.			
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.)		Hydrophobicity	Roots	Boundary			
		Dry	Moist			(gvl., cob., st., bldr.)							
0-5	A	10YR 5/3	7.5YR 3/2	b sl	1fsbk, 1msbk	8, 10, 10, 20		moderate	1vf, 1f, 2m, 1c	cw			
5-16	Bw1	10YR 5/4	7.5YR 4/4	b sl	1vfsbk, 1fsbk	15, 20, 10, 20		slight	1vf, 2f, 2m, 2c	gw			
16-31	Bw2	10YR 6/4	10YR 4/4	cob sl	1vfgr, 1fgr	17, 20, 20, 10		none	2f, 2m, 2c	cw			
31-42	C	10YR 7/2	10YR 4/2	cob fsl	1vfgr	10, 20, 10, 10		none	1f, 2m, 1c				
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)				-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse			V Coarse
0-5	A	3.6	37.5	58.9	21.9	15.6	13.4	16.0	10.8	9.1	9.6	9.5	2.64
5-16	Bw1	3.5	33.6	62.9	21.7	11.9	12.2	14.2	12.8	11.5	12.2	6.0	1.71
16-31	Bw2	2.7	32.7	64.6	20.8	11.9	10.8	14.3	13.3	12.2	14.0	5.6	2.07
31-42	C	4.4	50.5	45.1	32.3	18.2	12.7	13.4	10.7	6.5	1.8	7.9	1.80
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-5	A	5.40	3.2	0.3	0.1	0.3	3.9	13.8	1.6	17.7	20.1	5.5	5.58
5-16	Bw1	1.42	0.9	0.2	0.1	0.1	1.3	10.2	1.3	11.5	11.2	2.6	3.20
16-31	Bw2	0.59	0.8	0.8	0.1	0.1	1.8	8.3	1.1	10.1	8.2	2.9	3.04
31-42	C	0.66	2.2	2.2	0.1	0.2	4.7	9.0	1.3	13.7	10.5	6.0	2.39
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-5	A	29	22	19	10.1	4.6	5.2	0.23	1.03	0.13	0.66	44	
5-16	Bw1	50	11	12	10.4	4.7	5.1	0.16	1.82	0.23	0.72	60	
16-31	Bw2	38	18	22	10.2	4.7	5.1	0.14	2.62	0.38	0.67	49	
31-42	C	22	34	45	9.9	4.6	5.3	0.13	1.97	0.29	0.35	44	
Depth (in)	Horizon	Clay Fraction X-Ray Minerals	Clay Fraction Oxides (%)			Silt and Sand (%)							
			Al ₂ O ₃	Fe ₂ O ₃	K ₂ O	Fraction	Tot Re	Grain Count (%)					
0-5	A						VFS	27	GS 54, QZ 26, PR 8, FD 5, BT 2, HN 2, OP 1, GC 1, EP tr, FP tr				
5-16	Bw1						VFS	43	QZ 41, GS 29, PR 12, FD 10, BT 5, OP 1, HN 1, KK 1, AR tr				
16-31	Bw2						VFS	54	QZ 49, PR 24, FD 13, GS 7, QC 4, BT 2, OP 1, KK tr, HN tr, EP tr, AR tr, FP tr, MS tr				
31-42	C						VFS	47	PR 33, QZ 30, QC 14, FD 8, GS 5, BT 4, AR 4, OP 2, EP 1, HN 1, KK 1, ZR tr				

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: Post Corral Creek				NCSS Sample No.	Date Sampled			
208	112	sandy-skeletal, mixed Entic Cryumbrept			SE 1/4, NE 1/4, S 15, T 9 S, R 28 E, MDM				S90CA-019-034	08/01/90			
Elev. (ft)		Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks: Glacially scoured site.					
8800		3	E	granodiorite till	lodgepole pine	64	—						
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-2	A1	10YR 5/2	10YR 2/2	g lcos	sg	20, 0, 0, 0	extreme	2vf, 2f, 1m	cw				
2-14	A2	10YR 5/2	10YR 2/2	cob lcos	1vfgr	10, 10, 0, 0	none	3vf, 3f, 2m, 1c	cw				
14-24	Bw	10YR 4/3	7.5YR 3/2	vcob lcos	1fgr	10, 20, 20, 0	none	1vf, 2f, 1m	aw				
24-26	Cr	10YR 5/4	7.5YR 3/4		sg	20, >50	none	none					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)				-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse			V Coarse
0-2	A1	1.7	15.1	83.2	5.6	9.5	10.7	23.3	17.2	16.5	15.5	3.4	2.00
2-14	A2	0.8	16.8	82.4	7.8	9.0	14.6	23.5	17.8	15.5	11.0	3.7	
14-24	Bw	1.6	23.4	75.0	13.1	10.3	15.5	26.6	15.8	11.1	6.0	7.0	4.38
24-26	Cr	0.5	18.8	80.7	9.1	9.7	17.3	23.6	16.4	13.5	9.9	4.1	
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-2	A1	2.20	1.1	1.1	0.1	0.2	2.5	4.1	0.7	6.6	6.1	3.2	3.59
2-14	A2	2.40	1.2	1.2	0.1	tr	2.5	9.6	1.0	12.1	6.6	3.5	
14-24	Bw	3.23	0.7	0.7	0.1	tr	1.5	19.5	1.1	21.0	6.4	2.6	4.00
24-26	Cr	1.53	0.5	0.5	0.1	—	1.1	12.8	0.4	13.9	9.1	1.5	
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-2	A1	22	38	41	9.6	4.5	5.0	0.08	0.25	tr	0.13	12	
2-14	A2	29	21	38	10.6	4.7	5.4	0.16	0.20	0.03	0.29	31	
14-24	Bw	42	7	23	11.3	4.6	5.1	0.50	0.30	0.16	1.09	67	
24-26	Cr	27	8	12	11.2	4.9	5.3	0.25	0.18	0.25	0.96	54	

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: Post Corral Creek				NCSS Sample No.	Date Sampled			
209	112	sandy, mixed Entic Cryumbrept			SE 1/4, SE 1/4, S 15, T 9 S, R 28 E, MDM				S90CA-019-035	08/02/90			
Elev. (ft)		Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks: 0-2 in. layer is erosional deposition from upslope.					
8400		6	SW	granitic till & alluvium	lodgepole pine	52	Oi: 1-0 in.						
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-2	A1	10YR 5/2	10YR 2/1	g lcos	sg	15, 0, 0, 0	extreme	3vf, 2f, 1m	as				
2-11	A2	10YR 5/2	10YR 3/2	lcos	lfgr, lmgr	8, 0, 0, 0	extreme	2vf, 2f, 2m, 1c	cs				
11-27	A3	10YR 5/2	10YR 3/2	lcos	lfgr	8, 0, 0, 0	slight	1vf, 1f, 2m, 1c	cs				
27-35	C1	2.5Y 5/2	10YR 4/2	lcos	m, lvfgr	5, 0, 0, 0	none	1vf, 1f, 1m, 1c	gs				
35-57	C2	2.5Y 6/2	2.5Y 5/2	lcos	m, lvfgr	2, 0, 0, 0	none	1f, 1m, 1c	cs				
57-64	C3	2.5Y 6/4	2.5Y 4/2	sl	lvfgr	20, 5, 0, 0	none	1m					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-2	A1	1.1	15.4	83.5	6.5	8.9	17.3	26.2	19.0	14.0	7.0	5.8	5.27
2-11	A2	1.2	15.3	83.5	6.4	8.9	14.0	23.8	18.0	14.9	12.8	3.3	2.75
11-27	A3	0.7	14.2	85.1	6.1	8.1	13.4	24.3	19.1	15.2	13.1	3.0	
27-35	C1	1.2	14.7	84.1	5.9	8.8	16.8	26.3	19.2	13.2	8.6	2.7	2.25
35-57	C2	0.8	15.3	83.9	6.4	8.9	14.9	25.1	21.2	15.1	7.6	2.7	
57-64	C3	0.7	15.9	83.4	6.2	9.7	14.7	25.8	20.7	15.2	7.0	7.4	
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)					CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-2	A1	6.65	2.4	2.4	0.1	0.1	5.0	13.2	1.0	18.2	16.3	6.0	14.82
2-11	A2	2.16	0.8	0.8	0.1	—	1.7	8.0	0.9	9.7	8.2	2.6	6.83
11-27	A3	1.48	0.4	0.4	0.2	—	1.0	7.7	0.6	8.7	5.2	1.6	
27-35	C1	1.19	0.5	0.5	0.1	—	1.1	6.5	0.1	7.6	4.8	1.2	4.00
35-57	C2	0.81	0.5	0.5	0.1	—	1.1	5.7		6.8	3.7		
57-64	C3	0.70	0.5	0.5	0.1	—	1.1	6.1		7.2	3.9		
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-2	A1	17	27	31	8.3	4.0	4.6	0.15	0.21	0.01	0.23	21	
2-11	A2	35	18	21	10.7	4.7	5.0	0.12	0.18	0.08	0.44	33	
11-27	A3	38	11	19	10.8	5.0	5.2	0.10	0.13	0.15	0.57	35	
27-35	C1	8	14	23	10.9	5.0	5.3	0.07	0.11	0.16	0.53	37	
35-57	C2		16	30	10.7	5.2	5.5	0.06	0.12	0.22	0.61	35	
57-64	C3		15	28	10.7	5.2	5.5	0.05	0.15	0.24	0.65	37	

Note: Identical data for Ca and Mg appear to be in error. Ca data probably are correct.

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: Post Corral Meadow				NCSS Sample No.	Date Sampled			
210	140	Typic Cryaquept			SW 1/4, NE 1/4, S 22, T 9 S, R 28 E, MDM				S90CA-019-036	08/02/90			
Elev. (ft)		Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks: Moist meadow. Soil is mottled throughout, and also is mixed between 23-43 in. Soil is wettable throughout.					
8340		1	S	granitic alluvium	perennial grass	59	1/4 in.						
Depth (in)	Horizon	Color			Texture	Structure	Rock Fragments (% vol)			Roots	Boundary		
		Dry	Moist				(gvl., cob., st., bldr.)						
0-3	A	10YR 5/2, 5YR 5/8	10YR 3/2, 10YR 3/1, 10YR 5/8		sl	1vfgr	35, 0, 0, 0			2vf, 1f	as		
3-6	2C		10YR 3/3, 10YR 5/8		vg s	sg	—			2vf, 1f	as		
6-8	3A	10YR 6/2, 5YR 5/6	10YR 3/1, 10YR 2/1, 10YR 5/8				—			2vf, 1f	as		
8-11	4C		10YR 3/2, 10YR 5/8				—			1vf, 1f	as		
11-14	4C/5A		10YR 2/1, 2.5Y 3/2, 10YR 4/6		sl		—			1vf, 1f	as		
14-23	5A		10YR 2/1, 10YR 4/6		sil		—			1vf, 1f	as		
23-30			10yr 3/1, 10yr 4/2, 10yr 4/6, 10yr 2/1				—			1vf, 1f	as		
30-34			10yr 3/2, 10yr 6/3, 10yr 4/6, 10yr 2/1				—			1vf, 1f	as		
34-43			10yr 3/2, 10yr 4/6				—			1vf, 1f	as		
43-46			10yr 2/1, 10yr 3/2, 10yr 4/6				—			—			
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-3	A	1.2	18.5	80.3	6.1	12.4	27.3	42.5	8.9	0.9	0.7	6.4	5.33
6-8	3A	1.3	21.9	76.8	9.3	12.6	30.6	28.1	5.2	7.0	5.9	5.3	4.08
14-23	5A	2.4	33.9	63.8	14.2	19.6	30.9	22.4	5.3	3.3	1.9	10.3	4.29
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-3	A	3.25	1.6	1.6	0.2	0.2	3.6	10.4	0.7	14.0	8.4	4.3	7.00
6-8	3A	2.98	1.1	1.1	0.2	—	2.4	11.1	1.6	13.5	8.5	4.0	6.54
14-23	5A	4.41	2.7	2.7	0.2	0.1	5.7	16.9	1.9	22.6	14.7	7.6	6.13
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-3	A	16	26	43	9.6	4.7	5.3	0.14	0.63	0.03	0.23	31	
6-8	3A	40	18	28	10.4	4.5	4.6	0.16	0.20	0.06	0.43	33	
14-23	5A	25	25	39	10.3	4.4	4.8	0.19	0.36	0.05	0.43	47	

Note: Identical data for Ca and Mg appear to be in error. Ca data probably are correct.

SOIL CHARACTERIZATION DATA													
Pedon No. 211	Map Unit 109	Soil Classification coarse-loamy, mixed Dystric Cryochrept				Location: near Fleming Lake NE 1/4, NW 1/4, S 19, T 9 S, R 29 E, MDM Lat./Long. 37-08-29 / 118-50-57				NCSS Sample No. S90CA-019-037		Date Sampled 08/03/90	
Elev. (ft) 9680	Slope (%) 23	Aspect SE	Parent Material granitic till		Vegetation Series lodgepole pine		Soil Temp (F) 52	Litter Layer 1/4 in	Remarks: Sand-size mineral pseudomorphs in 37-47 in. break down with rubbing.				
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist										
0-1	A	2.5Y 5/2	10YR 3/2	g ls	sg, 1vfgr	20, 0, 0, 0			extreme	2vf, 1f	as		
1-5	AB	2.5Y 5/2	10YR 3/3	sl	1fgr, 1mgr	5, 0, 0, 0			slight	2vf, 2f, 1m	cw		
5-14	Bw1	2.5Y 6/2	10YR 4/3	sl	1fsbk, 1fgr	5, 0, 0, 0			none	1vf, 2f, 2m, 1c	gw		
14-28	Bw2	2.5Y 6/2	2.5Y 4/4	sl	1fsbk, 2fgr	10, 2, 0, 0			none	1vf, 1f, 2m	ci		
28-37	Bw2/C	2.5Y 6/2, 5Y 7/1	2.5Y 4/4, 5Y 5/2	g sl	1fsbk, 2fgr	15, 8, 0, 0			none	1f, 1m	ai		
37-47	C	5Y 7/1	5Y 5/2	g lcos	m	20, 10, 0, 0			none	1m			
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-1	A	2.0	24.5	73.5	10.8	13.7	14.5	22.4	15.1	12.0	9.5	5.6	2.80
1-5	AB	2.8	29.1	68.1	15.0	14.1	16.8	20.2	12.9	9.4	8.8	6.2	2.21
5-14	Bw1	1.7	25.7	72.6	17.7	8.0	17.2	21.9	14.4	11.8	7.3	5.0	2.94
14-28	Bw2	1.7	31.2	68.1	14.6	15.6	14.9	20.0	15.1	11.2	6.9	3.9	2.29
28-37	Bw2/C	1.9	31.2	66.9	13.9	17.3	11.2	19.6	16.2	11.2	8.7	4.1	2.16
37-47	C	2.4	30.6	67.0	13.9	16.7	17.2	18.2	14.0	10.9	6.7	3.5	1.46
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)						CEC (meq/100 g)				CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-1	A	5.13	1.6	1.6	0.2	0.1	3.5	9.4	1.1	12.9	12.8	4.6	6.40
1-5	AB	3.78	1.0	0.4	0.2	0.2	1.8	12.8	1.4	14.6	10.9	3.2	3.89
5-14	Bw1	1.93	0.6	0.6	0.2	tr	1.4	7.7	0.7	9.1	8.2	2.1	4.82
14-28	Bw2	1.21	0.5	0.5	0.1	0.1	1.2	7.9		9.1	5.4		3.18
28-37	Bw2/C	1.11	0.6	0.6	0.2	—	1.4	7.5		8.9	5.0		2.63
37-47	C	0.39	0.6	0.6	0.2	0.1	1.5	4.8		6.3	3.1		1.29
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-1	A	24	27	27	9.6	4.4	4.7	0.12	0.45	0.03	0.26	21	
1-5	AB	44	12	17	10.7	4.6	5.6	0.16	0.34	0.08	0.50	42	
5-14	Bw1	33	15	17	10.7	4.9	5.8	0.12	0.42	0.15	0.56	39	
14-28	Bw2		13	22	10.8	5.1	5.2	0.08	0.33	0.26	0.78	40	
28-37	Bw2/C		16	28	10.8	5.1	5.4	0.08	0.23	0.25	0.72	37	
37-47	C		24	48	10.6	5.1	5.5	0.05	0.21	0.16	0.47	33	

Note: Identical data for Ca and Mg appear to be in error. Ca data probably are correct.

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: Burnt Corral meadow area				NCSS Sample No.	Date Sampled			
215	140	loamy-skeletal, mixed Humic Xeric Vitricryand			SE 1/4, SW 1/4, S 4, T 9 S, R 28 E, MDM				S90CA-019-038	08/06/90			
Elev. (ft)	Slope (%)	Aspect	Parent Material		Vegetation Series		Soil Temp (F)	Litter Layer	Remarks:				
9260	1	S	granitic till		lodgepole pine		52	1/2 in.					
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-3	A1	10YR 3/2	10YR 2/2	ls	1vfgr	3, 0, 0, 0	slight	3vf, 2f	as				
3-5	A2	10YR 6/2	10YR 2/2	ls	1vfgr	3, 0, 0, 0	—	3vf, 2f, 2m	as				
5-8	A3	10YR 5/3	10YR 2/2	sl	1vfgr	5, 5, 0, 0	—	2vf, 2f, 2m, 1c	as				
8-23	Bw1	10YR 5/6	10YR 3/4	vcob sl	1fgr	15, 25, 0, 0	—	2vf, 1f, 2m, 1c	cs				
23-33	Bw2	2.5Y 5/6	10YR 4/4	vcob sl	1vfbk, 2fgr	18, 25, 0, 0	—	1vf, 1f, 1m, 1c	gw				
33-39	B/C	10YR 7/6, 5Y 6/2	2.5Y 4/4	xg lcos	m	45, 20, 0, 0	—	1m, 1c (dead)	aw				
39-42	Cr	10YR 7/6, 5Y 6/2	10YR 5/4		m		—	1m, 1c (dead)					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-3	A1	3.5	42.2	54.3	21.7	20.5	16.3	16.6	9.3	6.3	5.8	7.4	2.11
3-5	A2	0.2	46.6	53.2	26.5	20.1	13.3	21.8	9.8	4.5	3.8	5.8	
5-8	A3	1.4	24.8	73.8	11.2	13.6	14.9	24.3	15.2	11.5	7.9	4.9	3.50
8-23	Bw1	1.0	23.2	75.8	12.4	10.8	13.3	18.8	15.8	14.0	13.9	6.9	6.90
23-33	Bw2	0.8	25.2	74.0	11.1	14.1	16.5	22.1	18.9	11.0	5.5	5.1	
33-39	B/C	0.2	16.8	83.0	7.4	9.4	13.8	24.7	21.5	15.4	7.6	3.0	
39-42	Cr	1.2	20.2	78.6	8.8	11.4	10.5	21.8	21.1	15.3	9.9	4.7	3.92
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)						CEC (meq/100 g)				CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-3	A1	5.97	1.5	1.5	0.1	0.3	3.4	15.7	1.9	19.1	14.4	5.3	4.11
3-5	A2	2.53	0.6	0.6	0.2	0.1	1.5	14.2	1.0	15.7	7.1	2.5	
5-8	A3	2.52	0.6	0.6	0.2	tr	1.4	11.2	1.0	12.6	10.4	2.4	7.43
8-23	Bw1	2.03	0.7	0.1	0.1	0.4	1.3	14.7	0.5	16.0	10.7	1.8	10.70
23-33	Bw2	0.94	0.6	0.1	0.1	0.3	1.1	8.7		9.8	5.0		
33-39	B/C	0.42	0.6	0.3	tr	0.3	1.2	4.7		5.9	2.9		
39-42	Cr	0.84	0.5	0.2	tr	0.3	1.0	8.2		9.2	5.2		4.33

Note: Identical data for Ca and Mg between 0-8 inches appear to be in error. Ca data probably are correct. Table continued next page.

Pedon No. 215 continued.													
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-3	A1	36	18	24	10.3	4.5	5.0	0.25	0.42	0.03	0.43	40	
3-5	A2	40	10	21	10.8	4.7	5.1	0.21	0.41	0.03	0.43	40	
5-8	A3	42	11	13	10.8	4.7	4.9	0.25	0.46	0.06	0.52	42	
8-23	Bw1	28	8	12	11.1	4.9	5.4	0.28	0.85	0.27	1.15	63	
23-33	Bw2		11	22	10.9	5.5	5.8	0.11	0.64	0.39	1.13	59	
33-39	B/C		20	41	10.6	5.3	5.5	0.06	0.40	0.22	0.59	33	
39-42	Cr		11	19	10.8	5.2	5.5	0.11	0.50	0.26	0.78	49	
Depth (in)	Horizon	Silt and Sand (%)											
		Fraction	Tot Re	Grain Count (%)									
0-3	A1	VFS	35	GS 51, QZ 32, FD 7, BT 3, TM 1, HN 1, FP 1, CA 1, AR 1, KK 1, OP 1, GC 1, PR tr, QC tr, AM tr, MZ tr, DL tr									
3-5	A2	FS	34	GS 47, QZ 28, GC 14, QC 6, BT 4, HN 1, TM tr, OP tr, FD tr, FP tr, AM tr									
5-8	A3	VFS	35	GS 45, QZ 32, FD 9, HN 5, BT 3, PR 1, FP 1, OP 1, AR 1, TM 1, QC 1, KK tr, ZR tr, CA tr, MZ tr, GN tr									
8-23	Bw1	VFS	58	QZ 51, GS 16, FD 10, AR 8, BT 6, QC 6, HN 2, TM 1, PR tr, KK tr, FP tr, MS tr, SO tr, EN tr, CA tr, ZR tr, MZ tr									
23-33	Bw2	VFS	76	QZ 67, FD 10, HN 5, QC 5, BT 4, TM 3, AR 2, PR 1, KK 1, FP 1, OP tr, GS tr, MZ tr, CA tr, ZR tr									
33-39	B/C	VFS	72	QZ 67, FD 14, HN 9, TM 2, QC 2, AR 2, BT 1, OP 1, CA 1, PR 1, FP tr, GS tr, MZ tr									
39-42	Cr	VFS	72	QZ 65, FD 12, HN 7, QC 5, AR 3, GS 2, FP 2, BT 1, KK 1, OP 1, PR 1, TM tr, ZR tr, CA tr, MZ tr, GN tr									

SOIL CHARACTERIZATION DATA													
Pedon No. 218	Map Unit 128	Soil Classification sandy-skeletal, mixed, mesic Entic Haploxeroll				Location: Wormhole Canyon SE 1/4, NW 1/4, S 33, T 17 S, R 36 E, MDM Lat./Long. 36-24-49 / 118-05-08				NCSS Sample No. S91CA-002-100	Date Sampled 07/04/91		
Elev. (ft) 7000	Slope (%) 64	Aspect NNW	Parent Material granitic colluvium		Vegetation Series single leaf pinon		Soil Temp (F) 61	Litter Layer 1/2 in	Remarks: Temp. at 1/4 in. = 101F, at 1 in. = 84F. Increased soil hardness beginning at 6 in. C horiz. is described between weathered boulders.				
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist										
0-6	A1	10YR 5/2	10YR 3/2	vg s	lvfgr	30, 5, 0, 0			moderate	lvf, lf, 1m	aw		
6-17	A2	10YR 5/3	7.5YR 3/3	xg lcos	m, lvfgr	50, 10, 0, 0			moderate	lvf, lf, 2m, 1c	cw		
17-35	C	2.5Y 5/4	2.5Y 4/2	vb lcos	m, 1fgr	15, 0, 0, 50			moderate	lf, 1m			
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-6	A1	4.3	5.9	89.8	1.7	4.2	9.4	25.3	22.4	20.2	12.5	5.1	1.19
6-17	A2	4.5	7.9	87.6	1.6	6.3	12.2	32.8	21.2	13.6	7.8	3.0	0.67
17-35	C	4.2	6.6	89.2	2.1	4.5	12.2	23.6	24.0	16.9	12.5	3.2	0.76
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-6	A1	2.61	9.3	1.6	—	0.3	11.2	3.0		14.2	10.3		2.40
6-17	A2	0.90	6.4	1.2	—	0.4	8.0	1.8		9.8	8.0		1.78
17-35	C	0.46	6.5	1.2	—	0.1	7.8	1.5		9.3	7.9		1.88
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-6	A1		79	100		5.6	6.1	0.15	0.46	tr	0.12	13	
6-17	A2		82	100		6.1	6.7	0.07	0.65	—	0.10	19	
17-35	C		84	99		6.2	6.8	0.03	0.31	—	0.10	13	
Depth (in)	Horizon	Clay Fraction X-Ray Minerals	Clay Fraction Oxides (%)			Silt and Sand (%)							
			Al ₂ O ₃	Fe ₂ O ₃	K ₂ O	Fraction	Tot Re	Grain Count (%)					
6-17	A2						FS			OT 99, GS tr			
17-35	C						FS			OT 99, GS tr			

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location:				NCSS Sample No.	Date Sampled			
221	131	mixed, thermic Typic Torripsamment			north of Ash Creek SE 1/4, SW 1/4, S 2, T 18 S, R 36 E, MDM Lat./Long. 36-23-40 / 118-02-49				S91CA-027-101	07/06/91			
Elev. (ft)	Slope (%)	Aspect	Parent Material		Vegetation Series		Soil Temp (F)	Litter Layer	Remarks: 0-1/2 in. is desert pavement, w/ dense layer of fine angular gravel at surface. Temp. at 1/2 in. = 116F.				
4800	36	ESE	granitic (qtz. monz.) eolian/colluvium		desert shrub		83	none					
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist			(gvl., cob., st., bldr.)							
0-1/2	A1	10YR 7/3	10YR 6/4	s	m	12, 0, 0, 0			none	none	as		
1/2-3	A2	10YR 7/2	10YR 6/4	s	sg	5, 0, 0, 0			none	1vf, 1f	aw		
3-12	C1	10YR 6/3	10YR 5/4	ls	m	5, 0, 0, 0			none	1f, 1m	aw		
12-20	C2	10YR 6/4	10YR 5/4	ls	m	8, 0, 0, 0			none	1f, 1m, 1c	cw		
20-47	C3	10YR 7/6	10YR 6/6	ls	m	10, 0, 0, 0			none	1f			
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-1/2	A1	0.4	5.3	94.3	1.7	3.6	7.2	14.8	24.4	29.5	18.4	1.8	
1/2-3	A2	3.4	3.3	93.3	0.2	3.1	7.1	17.1	22.9	28.4	17.8	1.9	0.56
3-12	C1	5.6	4.8	89.6	0.9	3.9	10.1	26.4	25.1	20.3	7.7	2.2	0.39
12-20	C2	8.9	5.0	86.1	1.0	4.0	14.6	21.1	22.7	17.8	9.9	2.9	0.33
20-40	C3	8.4	6.1	85.5	1.3	4.8	12.1	25.9	22.1	17.3	8.1	3.3	0.39
40-47	C3	7.0	5.4	87.6	1.5	3.9	8.7	22.0	23.4	22.6	10.9	3.2	0.46
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)						CEC (meq/100 g)				CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-1/2	A1	0.38	2.1	0.3	—	tr	2.4	0.5		2.9	2.2		
1/2-3	A2	0.33	1.7	0.4	—	0.1	2.2	0.6		2.8	1.8		0.53
3-12	C1	0.15	3.0	0.7	—	tr	3.7	0.7		4.4	3.6		0.64
12-20	C2	0.46	3.5	1.1	0.1	0.1	4.8	1.2		6.0	4.5		0.51
20-40	C3	0.07	3.8	1.4	0.1	—	5.3	0.3		5.6	5.2		0.62
40-47	C3	0.07	4.7	1.3	0.1	—	6.1	0.6		6.7	5.4		0.77
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-1/2	A1		83	100		6.4	6.8	0.03	0.25	—	0.04	22	
1/2-3	A2		79	100		6.5	7.2	0.02	0.27	—	0.04	13	
3-12	C1		84	100		6.5	7.3	0.02	0.24	—	0.06	13	
12-20	C2		80	100		6.3	7.0	0.02	0.31	—	0.06	13	
20-40	C3		95	100		6.1	6.9	0.03	0.30	—	0.06	9	
40-47	C3		91	100		6.3	7.1	0.02	0.20	0.07	0.06	9	

Note: C horizon split 20-40 in. and 40-47 in. for laboratory sampling.

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification				Location:				NCSS Sample No.	Date Sampled		
223	132	mixed, mesic Typic Torripsamment				Cartago Creek NW 1/4, NW 1/4, S 2, T 19 S, R 36 E, MDM Lat./Long. 36-18-56 / 118-03-05				S91CA-027-102	07/08/91		
Elev. (ft)	Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks:						
5200	40	SE	granitic colluvium	desert shrub	78	none							
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-6	A	10YR 6.5/3.5	10YR 5/4	s	sg	6, 0, 0, 0	none	lvf, f	aw				
6-12	C1	10YR 6.5/4	10YR 5/4	s	m	8, 0, 0, 0	none	lvf, lf, lm	cw				
12-38	C2	10YR 6/4	10YR 6/4	s	m	8, 0, 0, 0	none	lf, lm, lc	gs				
38-47	C3	10YR 6/4	10YR 6/4	g s	m	15, 0, 0, 0	none	lf					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-6	A	1.0	3.4	95.6	1.0	2.4	5.5	24.5	32.8	25.0	7.8	1.6	1.60
6-12	C1	1.1	3.8	95.1	1.4	2.4	7.7	28.6	30.8	21.6	6.4	1.5	1.36
12-38	C2	1.5	3.7	94.8	1.9	1.9	3.5	19.1	27.1	28.1	17.0	1.8	1.20
38-47	C3	4.4	2.5	93.1	0.1	2.4	5.9	24.8	30.3	23.3	8.8	1.6	0.36
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-6	A	0.10	1.3	0.3	—	tr	1.6	—		1.6	1.6		1.60
6-12	C1	0.08	1.2	0.3	—	—	1.5	0.9		2.4	1.6		1.45
12-38	C2	0.08	1.2	0.3	tr	—	1.5	—		1.5	1.7		1.13
38-47	C3	0.03	1.4	0.3	tr	—	1.7	0.7		2.4	1.7		0.39
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-6	A		100	100		6.0	6.6	0.04	0.52	0.01	0.02	5	
6-12	C1		62	94		6.0	6.7	0.04	0.66	0.01	0.02	9	
12-38	C2		100	88		5.9	6.7	0.02	0.27	tr	0.02	9	
38-47	C3		71	100		5.7	6.5	0.04	0.62	0.01	0.03	5	

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location:			NCSS Sample No.	Date Sampled				
224	130	sandy-skeletal, mixed, frigid Typic Xerorthent			Little Cottonwood SW 1/4, SW 1/4, S 7, T 17 S, R 36 E, MDM Lat./Long. 36-28-03 / 118-07-29			S91CA-027-103	07/18/91				
Elev. (ft)	Slope (%)	Aspect	Parent Material		Vegetation Series	Soil Temp (F)	Litter Layer	Remarks: Soil is material filled in around boulders.					
9200	63	E	granitic colluvium (porph. qtz. monz.)		single leaf pinon	69	none						
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-3	A	10YR 6/2	10YR 4/1	vg cos	sg	*35, 20, 0, 30,	none	2vf, 1f, 1m	aw				
3-11	AC	10YR 6/2	10YR 4/2	g cos	sg	*25, 20, 0, 30	none	2vf, 1f, 2m	cw				
11-23	C1	10YR 7/2	10YR 5/2	vg cos	m	*45, 20, 0, 30	none	1vf, 2f, 2m, 1c	cw				
23-36	C2	10YR 7/3	10YR 4/3	vg cos	m	*45, 20, 0, 25	none	1vf, 1f					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-3	A	3.9	4.2	91.9	0.9	3.3	6.0	20.3	22.5	24.5	18.6	2.2	0.56
3-11	AC	4.3	6.1	89.6	2.2	3.9	10.1	22.3	24.5	19.8	12.9	2.4	0.56
11-23	C1	4.4	8.5	87.1	2.8	5.7	10.2	20.5	21.5	20.2	14.7	2.4	0.55
23-36	C2	3.8	4.6	91.6	0.9	3.7	5.8	14.7	21.2	27.6	22.3	2.5	0.66
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-3	A	1.45	3.6	0.4	0.1	tr	4.1	3.3		7.4	5.0		1.28
3-11	AC	0.81	4.1	0.3	—	tr	4.4	1.9		6.3	4.5		1.05
11-23	C1	0.34	3.7	0.5	tr	—	4.2	—		4.2	4.8		1.09
23-36	C2	0.07	3.6	0.9	tr	—	4.5	0.9		5.4	4.7		1.24
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-3	A		55	82		5.2	5.8	0.05	0.42	0.02	0.06	19	
3-11	AC		70	98		5.9	6.5	0.05	0.52	0.03	0.09	19	
11-23	C1		100	88		5.8	6.4	0.02	0.32	0.03	0.05	19	
23-36	C2		83	96		5.5	6.1	0.02	0.15	0.02	0.03	13	

Note: * Estimated gravel percentage is based on material between boulders.

SOIL CHARACTERIZATION DATA													
Pedon No. 225	Map Unit 115	Soil Classification sandy-skeletal, mixed Typic Cryorthent			Location: above Horseshoe Meadow SW 1/4, SW 1/4, S 14, T 17 S, R 35 E, MDM Lat./Long. 36-26-29 / 118-09-37				NCSS Sample No. S91CA-027-104		Date Sampled 07/18/91		
Elev. (ft) 10100	Slope (%) 49	Aspect WNW	Parent Material colluvium/glacial granitic & metamorphic		Vegetation Series lodgepole pine		Soil Temp (F) 57	Litter Layer scattered needles	Remarks:				
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist										
0-3	A	10YR 3/2	10YR 2/1	vg lcos	sg, 1vfgr	35, 3, 0, 0			slight	2vf, 1f	as		
3-17	CA	10YR 6/4	10YR 4/4	vg lcos	1fgr	30, 10, 0, 0			none	2vf, 2f, 2m, 1c	cs		
17-23	C1	10YR 7/4	10YR 5/4	vg lcos	sg	30, 5, 0, 0			none	2vf, 1f	cw		
23-34	C2	10YR 7/4	10YR 6/4	vg s	m	40, 5, 0, 0			none	2f	cs		
34-47	C3	10YR 7/4	10YR 6/4	vg cos	m	40, 15, 0, 0			none				
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-3	A	3.5	7.1	89.4	1.8	5.3	5.7	10.2	14.4	24.7	34.4	3.8	1.09
3-17	CA	3.0	14.7	82.3	5.6	9.1	11.5	16.7	17.7	19.9	16.5	2.8	0.93
17-23	C1	2.5	8.4	89.1	2.9	5.5	7.6	15.9	17.7	23.4	24.5	2.4	0.96
23-34	C2	2.2	6.1	91.7	2.0	4.1	8.2	21.5	22.2	21.4	18.4	1.8	0.82
34-47	C3	1.6	13.2	85.2	7.1	6.1	9.8	15.6	17.7	20.1	22.0	1.9	1.19
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)					CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-3	A	3.51	3.2	0.3	0.1	0.1	3.7	6.5	0.5	10.2	10.8	4.2	3.09
3-17	CA	0.54	2.2	0.2	0.1	—	2.5	6.6	—	9.1	5.1	—	1.70
17-23	C1	0.15	1.1	0.2	—	tr	1.3	2.9	—	4.2	2.9	—	1.16
23-34	C2	0.09	0.7	0.1	tr	0.1	0.9	3.3	—	4.2	2.1	—	0.95
34-47	C3	0.09	1.6	0.4	tr	0.1	2.1	1.2	0.1	3.3	13.2	2.2	8.25
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-3	A	12	36	34		4.6	5.3	0.07	0.30	0.02	0.12	13	
3-17	CA		27	49		5.2	5.8	0.05	0.59	0.03	0.10	19	
17-23	C1		31	45		5.1	5.8	0.02	0.25	0.03	0.06	19	
23-34	C2		21	43		5.2	5.8	0.03	0.38	0.03	0.09	19	
34-47	C3	5	64	16		5.0	5.7	0.03	0.42	0.02	0.05	13	

SOIL CHARACTERIZATION DATA													
Pedon No. 227	Map Unit 114	Soil Classification coarse-loamy, mixed Andic Cryumbrept			Location: Whitney Portal SW 1/4, NW 1/4, S 2, T 16 S, R 35 E, MDM Lat./Long. 36-34-23 / 118-15-06				NCSS Sample No. S91CA-027-105		Date Sampled 07/20/91		
Elev. (ft) 10320	Slope (%) 17	Aspect NE	Parent Material granitic till		Vegetation Series lodgepole pine		Soil Temp (F) 50	Litter Layer 1/2 in	Remarks: Ashy material throughout pedon. 20-36 in. is mixed w/ krotovinas; dominant characteristics are reported.				
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist										
0-1	A1	10YR 5/2	10YR 2/2	fsl	1vfgr	3, 0, 0, 0			moderate	2vf, 1f, 1m	as		
1-7	A2	10YR 5/2	10YR 3/2	sl	1vf sbk, 1vfgr	8, 0, 0, 0			slight	2vf, 1f, 2m, 1c	as		
7-20	Bw1	10YR 6/4	10YR 4/4	fsl	m	0, 0, 0, 0			slight	1vf, 1f, 2m, 1c	cw		
20-36	Bw2	7.5YR 5/4	7.5YR 4/4	g ls	1msbk	20, 5, 0, 0			slight	1vf, 1f, 1m, 1c	as		
36	R												
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)				-15 Bar Water %	-15 Bar/ Clay	
					Fine	Coarse	V. Fine	Fine	Med.	Coarse			V Coarse
0-1	A1	3.6	22.8	73.6	10.9	11.9	22.7	32.5	12.3	5.0	1.1	10.6	2.94
1-7	A2	3.5	20.4	76.1	10.2	10.2	23.3	34.6	11.5	5.1	1.6	5.5	1.57
7-20	Bw1	5.2	33.1	61.7	19.9	13.2	21.9	29.8	6.9	2.1	1.0	8.1	1.56
20-36	Bw2	2.7	18.8	78.5	8.2	10.6	17.5	23.6	18.7	13.4	5.3	6.7	2.48
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)					CEC/ Clay
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC	Bases plus Al	
0-1	A1	9.42	10.2	0.4	0.1	0.4	11.1	22.4	1.0	33.5	35.7	12.1	9.92
1-7	A2	1.56	1.7	tr	0.1	0.2	2.0	10.8	1.3	12.8	10.2	3.3	2.91
7-20	Bw1	2.74	2.5	tr	0.2	0.2	2.9	25.8	3.0	28.7	18.5	5.9	3.56
20-36	Bw2	1.95	1.4	0.1	0.1	0.1	1.7	16.2	1.4	17.9	10.6	3.1	3.93
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-1	A1	8	33	31		4.6	5.2	0.21	0.31	0.68	0.47	45	
1-7	A2	39	16	20		4.5	5.0	0.10	0.47	0.64	0.68	36	
7-20	Bw1	51	10	16		4.4	5.0	0.23	0.57	0.49	1.05	77	
20-36	Bw2	45	9	16		4.5	5.0	0.27	0.42	0.24	0.74	54	

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification				Location: Mammoth Creek				NCSS Sample No.	Date Sampled		
229	102	ashy over sandy-skeletal, mixed Xeric Vitricryand				NE 1/4, SW 1/4, S 22, T 4 S, R 27 E, MDM				S91CA-051-106			
Elev. (ft)	Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks: Pumice on surface. Volcanic ash mixed in soil. Most roots are horizontal.						
9760	13	NNE	mixed till-granitic gneiss, metavolcanics,	lodgepole pine	47	1/2 in							
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist			(gvl., cob., st., bldr.)							
0-4	A	10YR 5/2	10YR 3/2	cos	1vfgr	10, 0, 0, 0			slight	1vf, 1f, 1m	as		
4-8	Bw1	10YR 8/1	10YR 5/3	ls	m	3, 0, 0, 0			moderate	1vf, 1f, 2m, 2c	aw		
8-17	Bw2	10YR 6/3	10YR 4/3	cos	1fgr	5, 0, 0, 0			slight	1vf, 1f, 2m, 1c	cw		
17-38	Bw3	10YR 6/4	10YR 5/4	vcob ls	1fsbk	0, 60, 0, 0			slight	1f, 1m	cw		
38-45	C	2.5Y 6/2	10YR 5/3	xcob ls	sg	30, 45, 0, 0			slight	—			
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-4	A	1.8	20.0	78.2	8.9	11.1	12.9	15.1	20.0	22.0	8.2	5.6	3.11
4-8	Bw1	2.2	29.7	68.1	12.1	17.7	24.6	20.1	15.0	6.6	1.8	3.3	1.50
8-17	Bw2	1.5	28.4	70.1	13.3	15.1	18.2	22.6	15.4	10.7	3.2	2.8	1.87
17-38	Bw3	2.2	29.4	68.4	18.3	11.1	9.7	15.9	18.7	14.6	9.5	4.3	1.95
38-45	C	1.7	29.4	68.9	16.9	12.5	8.0	14.2	19.8	19.2	7.7	2.3	1.35
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-4	A	3.16	1.4	0.2	tr	0.2	1.8	9.3	0.9	11.1	9.0	2.7	5.00
4-8	Bw1	1.11	0.1	0.1	—	0.1	0.3	4.5	0.7	4.8	4.6	1.0	2.09
8-17	Bw2	0.48	tr	0.1	0.1	0.1	0.3	5.0		5.3	13.0		8.67
17-38	Bw3	0.48	0.2	—	0.1	tr	0.3	8.6		8.9	14.9		6.77
38-45	C	0.20	0.3	tr	tr	tr	0.3	4.7		5.0	12.8		7.53
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-4	A	33	16	20		4.2	4.8	0.07	0.20	0.02	0.13	22	
4-8	Bw1	70	6	7		4.3	4.6	0.03	0.14	0.03	0.13	22	
8-17	Bw2		6	2		5.2	5.3	0.03	0.27	0.17	0.49	34	
17-38	Bw3		3	2		5.5	5.4	0.04	0.25	0.47	1.16	63	
38-45	C		6	2		5.3	5.3	0.02	0.13	0.19	0.50	34	
Depth (in)	Horizon	Clay Fraction X-Ray Minerals	Clay Fraction Oxides (%)			Silt and Sand (%)							
			Al ₂ O ₃	Fe ₂ O ₃	K ₂ O	Fraction	Tot Re	Grain Count (%)					
8-17	Bw2						FS			GS 66, OT 30, GA 3, GC tr			
17-38	Bw3						FS			OT 82, GS 18			

SOIL CHARACTERIZATION DATA													
Pedon No. 230	Map Unit 105	Soil Classification sandy-skeletal, mixed Typic Cryorthent				Location: Dana Plateau SE 1/4, NW 1/4, S 28, T N, R 25 E, MDM Lat./Long.				NCSS Sample No. S91CA-051-107		Date Sampled 07/22/91	
Elev. (ft) 11400	Slope (%) 5	Aspect SW	Parent Material biotite diorite		Vegetation Series alpine dwarf scrub		Soil Temp (F) 48	Litter Layer none	Remarks: 1/4 in. clean coarse sands on surface.				
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)			Hydrophobicity	Roots	Boundary		
		Dry	Moist										
0-4	A	10YR 4/2	10YR 3/1	xg ls	lvfgr	60, 3, 0, 0			slighy	2f, 2vf	aw		
4-15	C1	10YR 6/6	10YR 5/6	xg lcos	lvfgr	60, 5, 0, 0			none	1f, 2vf	as		
15-31	C2	10YR 6/4	10YR 5/6	xg cos	lfgr	80, 2, 0, 0			none	—			
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-4	A	3.6	16.5	79.9	8.1	8.4	10.2	18.9	16.4	17.4	17.0	6.7	1.86
4-15	C1	1.5	11.3	87.2	4.2	7.1	9.3	18.7	20.4	21.8	17.0	4.1	2.73
15-31	C2	2.1	10.6	87.3	6.1	4.5	3.4	7.9	16.9	28.2	30.9	2.4	1.14
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-4	A	3.26	4.4	0.6	0.1	0.2	5.3	9.6	0.1	14.9	19.4	5.4	5.39
4-15	C1	0.71	0.8	0.2	0.1	0.2	1.3	7.1	0.3	8.4	14.9	1.6	9.93
15-31	C2	0.37	0.6	tr	—	0.1	0.7	5.1	0.2	5.8	3.4	0.9	1.62
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-4	A	2	36	27		4.9	5.5	0.05	0.23	0.03	0.19	22	
4-15	C1	19	15	9		4.9	5.5	0.04	0.18	0.07	0.26	34	
15-31	C2	22	12	21		4.9	5.5	0.03	0.17	0.09	0.28	30	
Depth (in)	Horizon	Clay Fraction X-Ray Minerals	Clay Fraction Oxides (%)			Silt and Sand (%)							
			Al ₂ O ₃	Fe ₂ O ₃	K ₂ O	Fraction	Tot Re	Grain Count (%)					
4-15	C1						FS		OT 99, GS 1				
15-31	C2						FS		OT 98, GS2				

SOIL CHARACTERIZATION DATA													
Pedon No.	Map Unit	Soil Classification			Location: Dana Plateau				NCSS Sample No.	Date Sampled			
231	105	sandy-skeletal, mixed Typic Cryorthent			SE 1/4, SE 1/4, S 28, T 1 N, R 25 E, MDM				S91CA-051-108	07/22/91			
Elev. (ft)	Slope (%)	Aspect	Parent Material	Vegetation Series	Soil Temp (F)	Litter Layer	Remarks: Sloifluction common. Soil described between small stone stripes. 13-23 in. diffusely mixed and slightly smeary.						
11680	15	NNW	biotite diorite	dwarf alpine scrub	38	none							
Depth (in)	Horizon	Color		Texture	Structure	Rock Fragments (% vol.) (gvl., cob., st., bldr.)	Hydrophobicity	Roots	Boundary				
		Dry	Moist										
0-4	A1	10YR 4/3	10YR 3/3	sl	2fgr	8, 0, 0, 0	slight	2vf, 2f	aw				
4-13	A2	10YR 6/4	10YR 3/6	xg sl	2fgr	70, 4, 0, 0	none	3vf, 3f	as				
13-23	C1	10YR 5/4	10YR 4/6	xg sl	1fsbk	60, 4, 0, 0	none	2vf, 2f	gw				
23-40	C2	10YR 5/4	10YR 4/6	xg sl	1fgr	60, 4, 0, 0	none	1vf					
Depth (in)	Horizon	% Clay	% Silt	% Sand	Silt (%)		Sand (%)					-15 Bar Water %	-15 Bar/ Clay
					Fine	Coarse	V. Fine	Fine	Med.	Coarse	V Coarse		
0-4	A1	4.4	14.3	81.3	5.9	8.4	12.4	22.7	24.4	13.6	8.2	13.2	3.00
4-13	A2	*13.2	17.9	68.9	8.8	9.1	10.5	21.3	18.9	12.0	6.2	10.1	0.77
13-23	C1	5.7	19.9	74.4	8.0	11.9	13.7	25.3	20.5	10.2	4.7	4.2	0.74
23-40	C2	5.8	13.7	80.5	4.8	8.9	13.5	24.1	24.7	12.7	5.5	4.1	0.71
Depth (in)	Horizon	Organic C (%)	Cations (meq/100 g)					CEC (meq/100 g)				CEC/ Clay	
			Ca	Mg	Na	K	Sum Bases	Acidity	Extract. Al	Sum. Cats.	NH ₄ OAC		Bases plus Al
0-4	A1	7.09	3.1	0.6	0.1	0.3	4.1	18.0	1.0	22.1	24.3	5.1	5.52
4-13	A2	2.84	1.5	0.4	0.2	0.3	2.4	17.2	2.6	19.6	12.3	5.0	0.93
13-23	C1	0.68	0.7	0.2	0.1	0.1	1.1	6.8	1.3	7.9	5.2	2.4	0.91
23-40	C2	0.53	0.8	0.2	0.1	0.1	1.2	6.2	0.9	7.4	14.9	2.1	2.57
Depth (in)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Optical Density	Acid Oxalate Extraction (%)			P Reten. (%)	KCl-Mn (ppm)
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O		Fe	Si	Al		
0-4	A1	20	19	17		4.4	5.0	0.07	0.23	0.03	0.25	38	
4-13	A2	52	12	20		4.2	4.8	0.10	0.44	0.05	0.34	47	
13-23	C1	54	14	21		4.2	4.8	0.03	0.25	0.04	0.17	27	
23-40	C2	43	16	8		4.2	4.8	0.03	0.29	0.04	0.17	34	
Depth (in)	Horizon	Clay Fraction X-Ray Minerals	Clay Fraction Oxides (%)			Silt and Sand (%)							
			Al ₂ O ₃	Fe ₂ O ₃	K ₂ O	Fraction	Tot Re	Grain Count (%)					
13-23	C1						FS		OT 55, GS 45				
23-40	C2						FS		OT 71, GS 29				

Note: *Clay increase from A1 to A2 horizon as shown in laboratory data was not detectable in the field. These data may be in error.

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