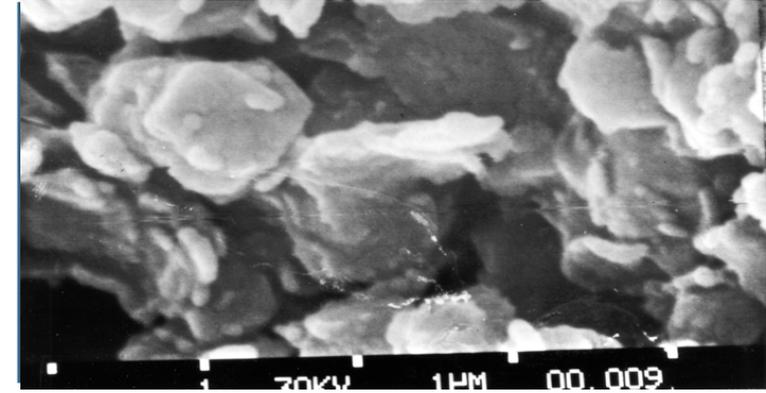
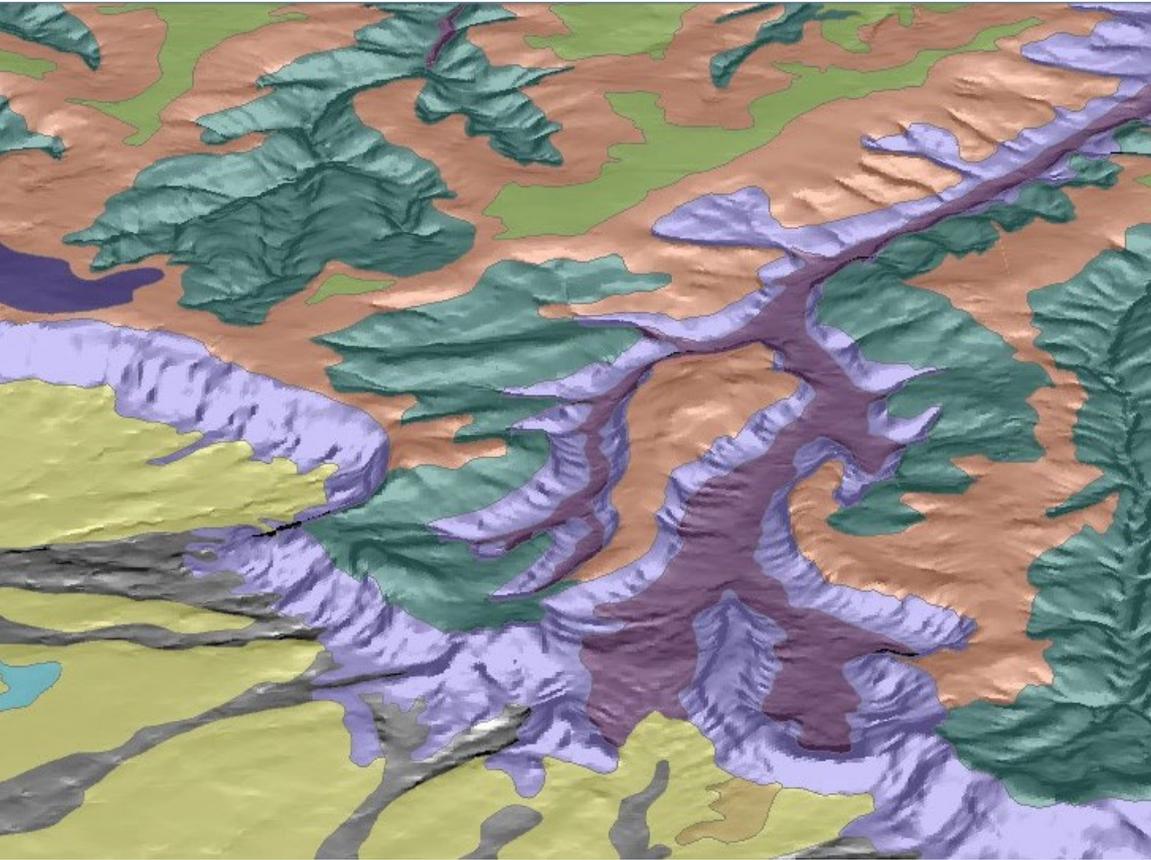




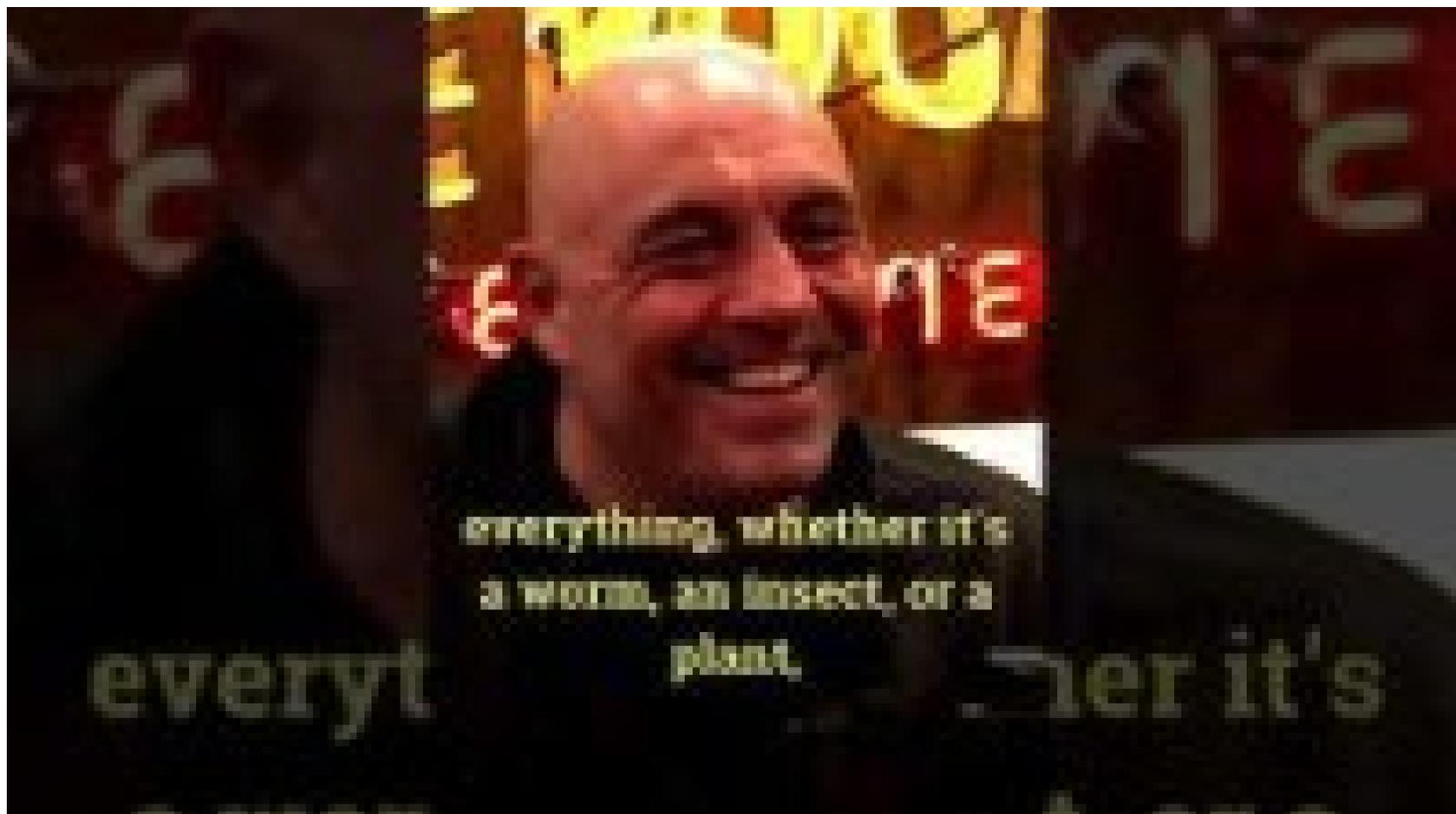
United States Department of Agriculture



Understanding Your Sites' Soils

November 1, 2022

FARM PRODUCTION AND CONSERVATION
FSA | NRCS | RMA | Business Center





Agenda

Introduction

Basic Soil Forming Factors

Soil Properties Affecting Accelerated Erosion

Soil Survey Data for Erosion Control

Summary

Q & A



Introduction

Jeff Goats (jeff.goats@usda.gov, 307-233-6768)

12/2019 to Present - State Soil Scientist, USDA-Natural Resources Conservation Service, Wyoming

2014 to 2019 – Resource Soil Scientist, USDA-NRCS, Pueblo, CO

2008 to 2014 – Soil Scientist, USDA-NRCS, Grants, NM

2003 to 2008 – Soil Scientist, USDA-NRCS, Victorville, CA

2001 to 2003 – Soil Laboratory Supervisor, Inter-Mountain Laboratories, Inc., Farmington, NM

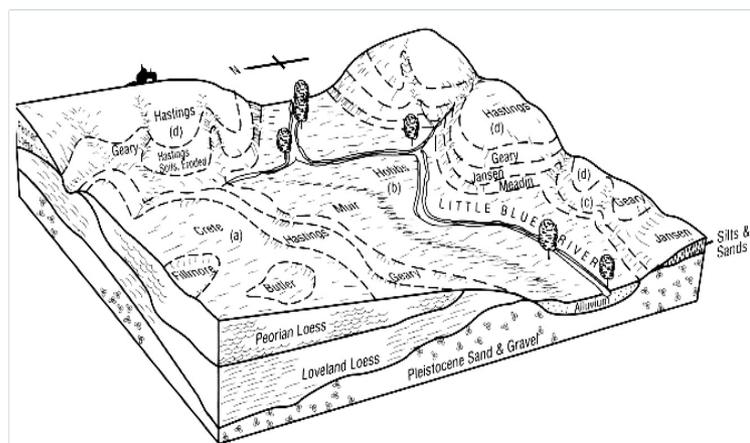
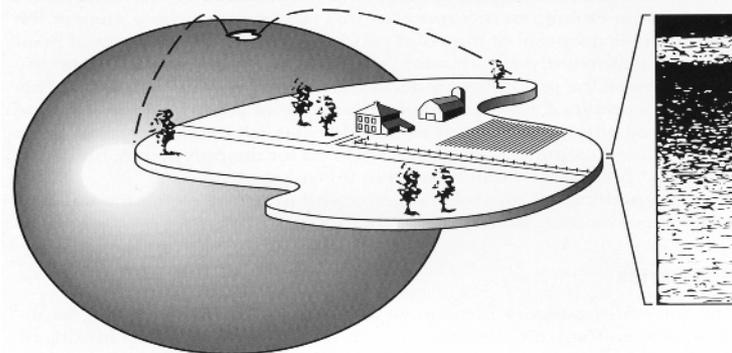
1998 to 2001 – Agronomist Assistant / Conservation Supervisor, Navajo Agricultural Products Industry (NAPI), Farmington, NM

Education: B.S., Agronomy, New Mexico State University, Las Cruces, NM, 1998

Basic Soil Forming Factors

Soil is "the collection of natural bodies in the earth's [sic] surface, in places modified or even made by man of earthy materials, containing living matter and supporting or capable of supporting plants out-of-doors.

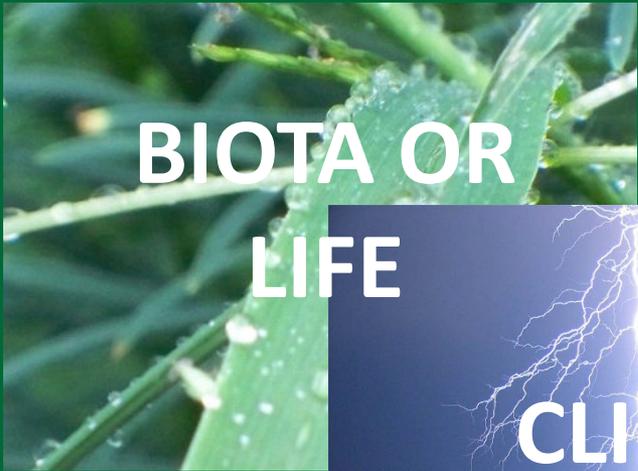
From Soil Survey Manual, USDA, 1993





United States Department of Agriculture

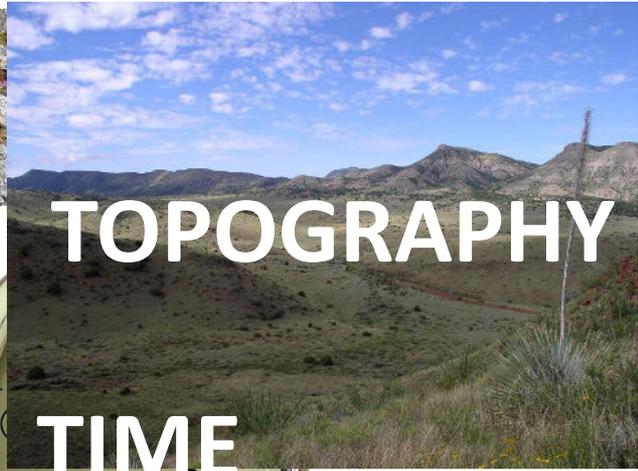
Basic Soil Forming Factors



BIOTA OR
LIFE



PARENT
MATERIAL



TOPOGRAPHY

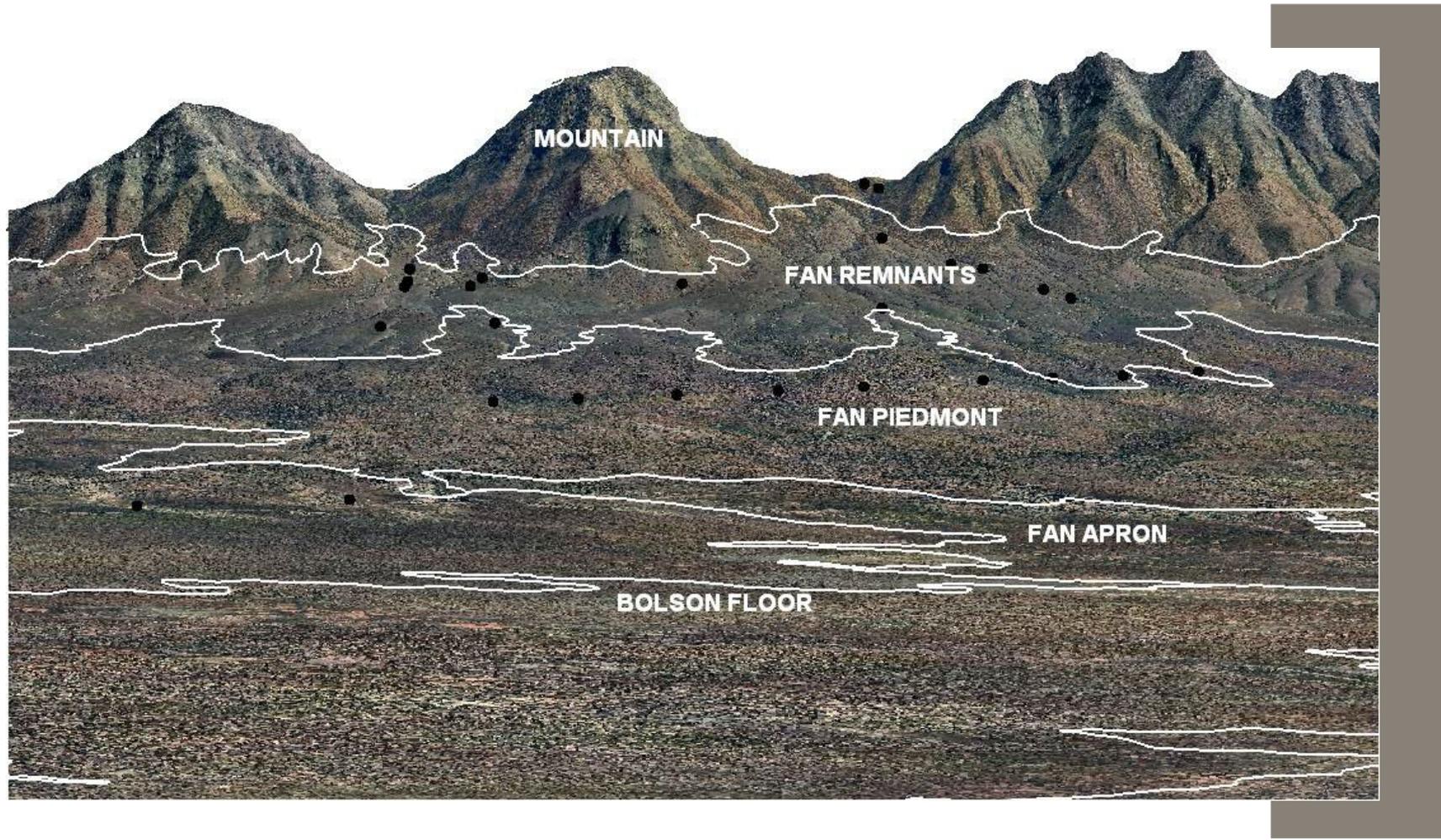


CLIMATE



TIME

FARM PRODUCTION AND CONSERVATION
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SOIL SURFACE

Crop residue, plant shoots, animals

Ap HORIZON

“Plow layer”, higher organic matter, darker color due to organic matter. Many roots & soil micro-organisms

AB HORIZON

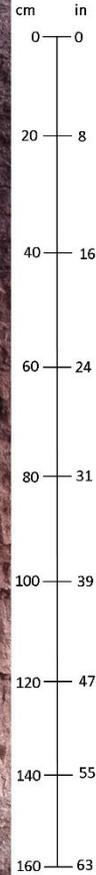
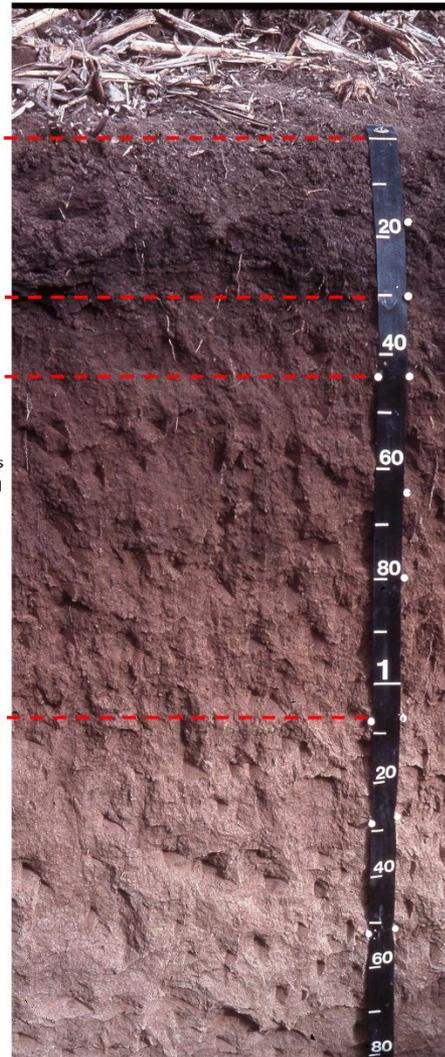
Transition between topsoil & subsoil

Bw HORIZON

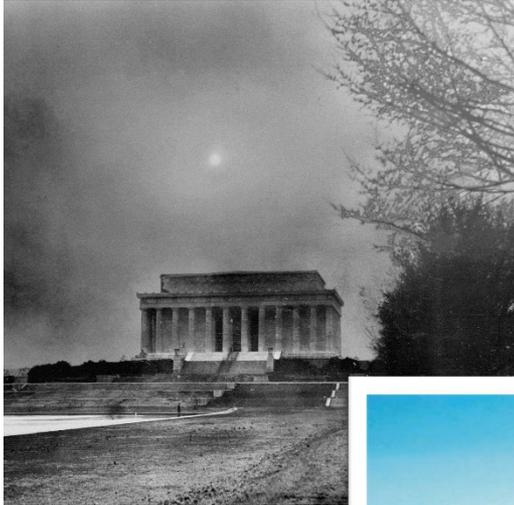
Sub-soil, fewer roots, much less biological activity. Extent of soil forming processes. This layer has great influence on the infiltration of water. May have higher clay content than overlying layers.

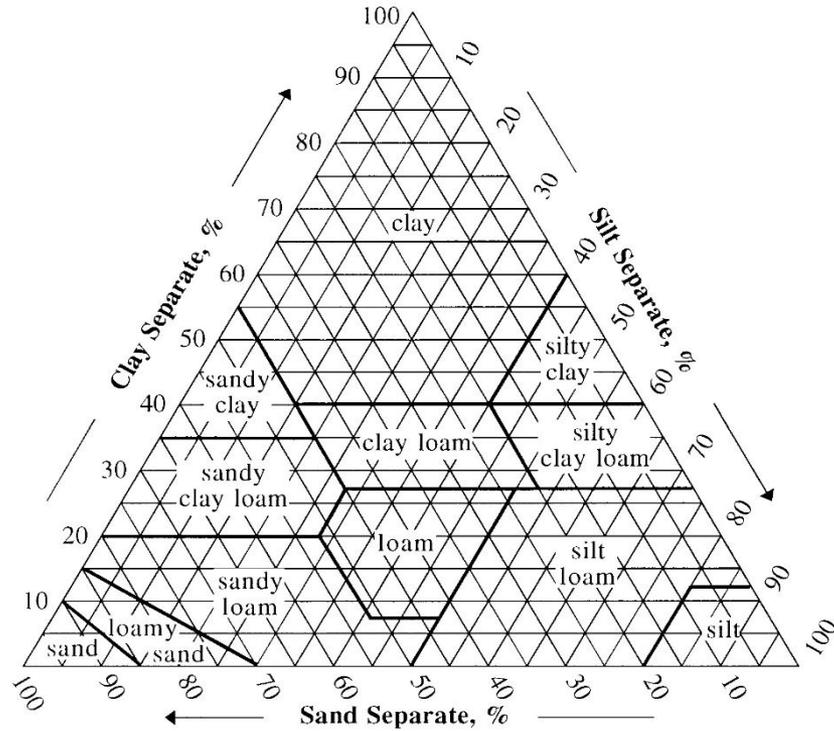
C HORIZON

Parent material. Very little soil formation occurring here. Roots are sparse and rare in this layer

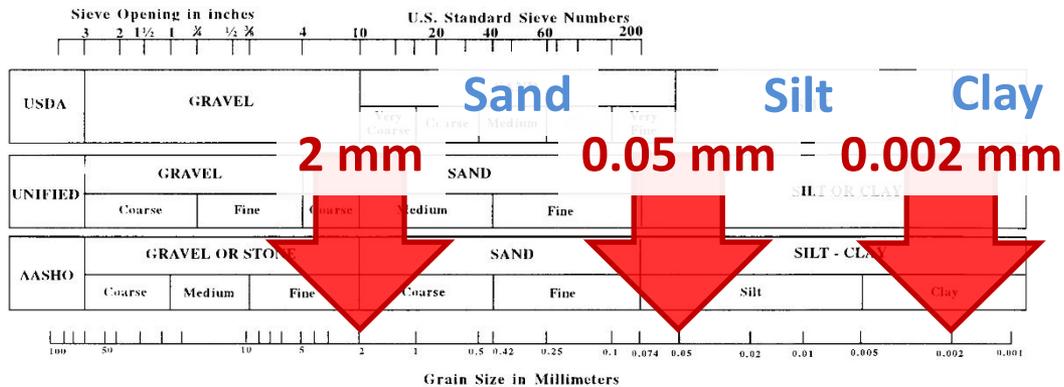


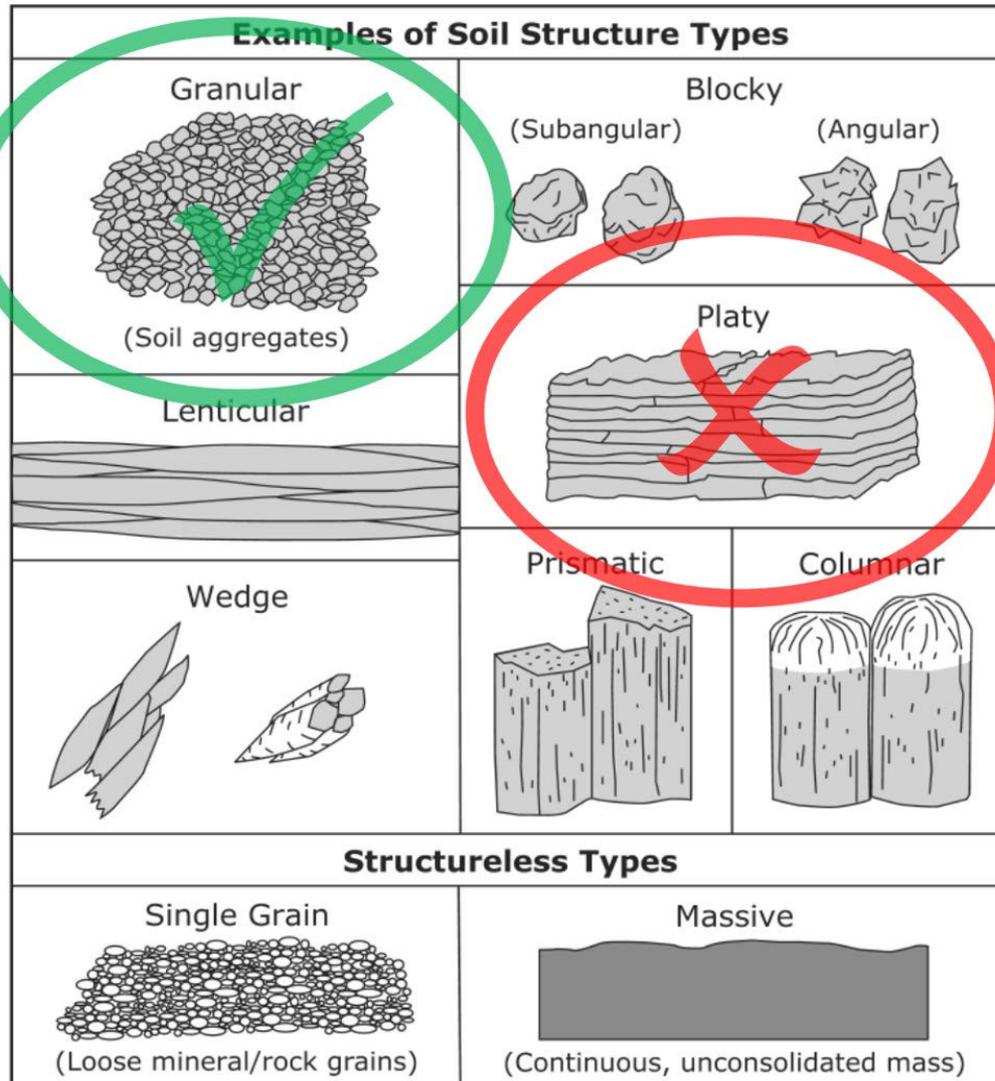
Accelerated Erosion: A National & International Menace





COMPARISON OF PARTICLE SIZE SCALES



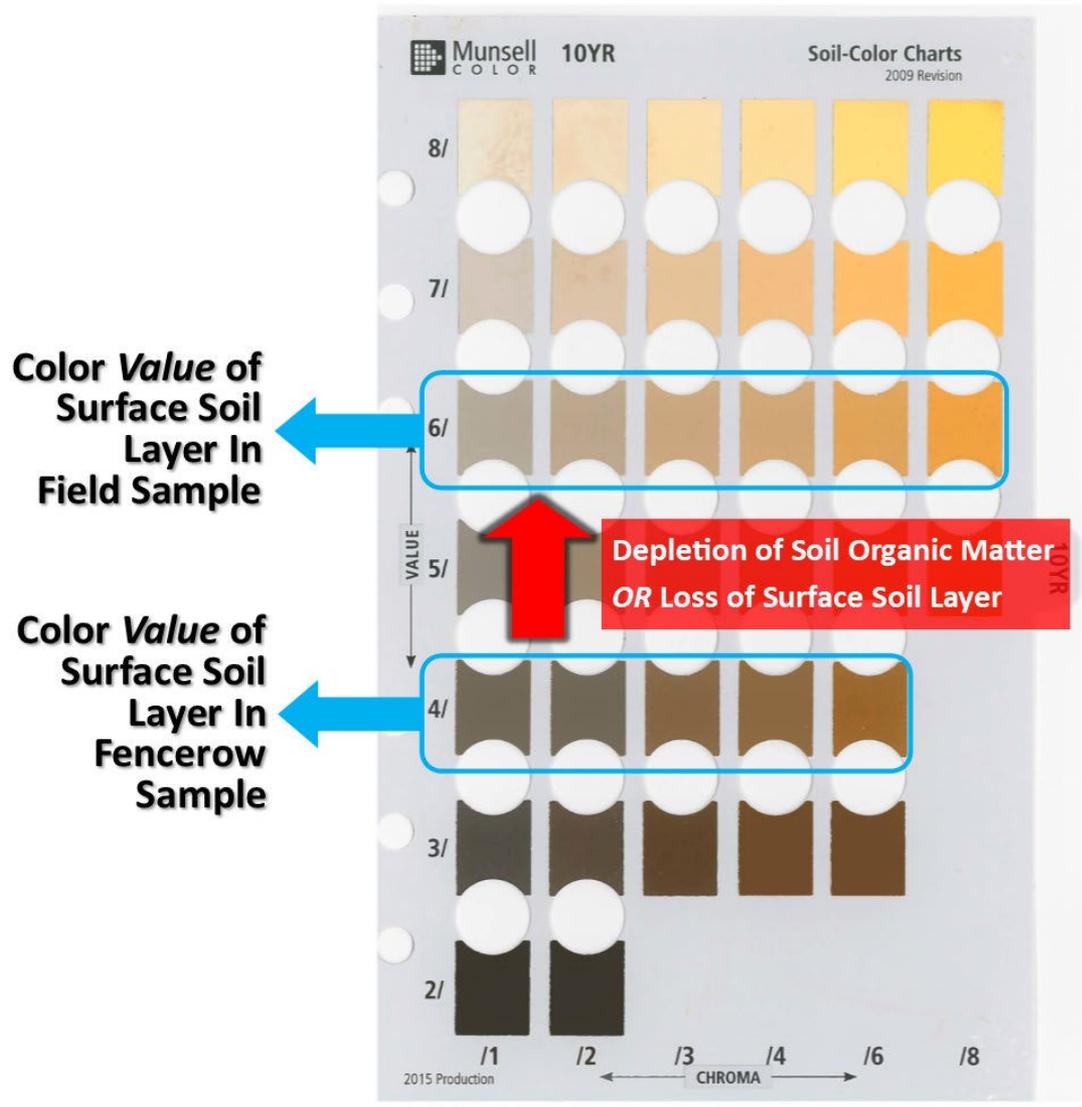


Wind Erodibility Prediction System (WEPS)

Table 5
List of intrinsic soil, layer and surface properties used by WEPS.

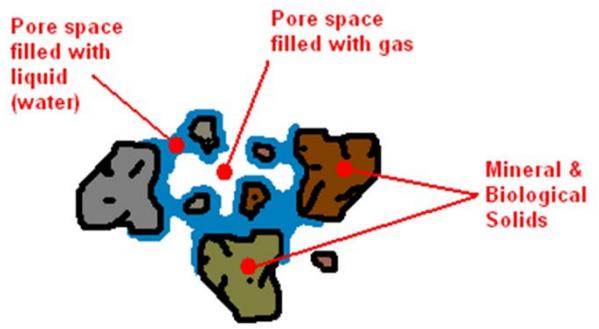
Property	Units	Can estimate through interfaces (Yes/No)
Slope	m m ⁻¹	No
Number of soil layers		No
Organic Matter	kg kg ⁻¹	No
Sand	kg kg ⁻¹	No
Silt	kg kg ⁻¹	Yes
Clay	kg kg ⁻¹	No
Rock Fragments	m ³ m ⁻³	Yes
Very coarse sand (fraction of total soil)	kg kg ⁻¹	Yes
Coarse sand (fraction of total soil)	kg kg ⁻¹	Yes
Medium sand (fraction of total soil)	kg kg ⁻¹	Yes
Fine sand (fraction of total soil)	kg kg ⁻¹	Yes
Very fine sand (fraction of total soil)	kg kg ⁻¹	No
CB (power of Cambell's model)		Yes
Air entry potential	J kg ⁻¹	Yes
Saturated hydraulic conductivity	m s ⁻¹	Yes
pH		Yes
CaCO ₃	kg kg ⁻¹	No
Cation exchange capacity	mcq (100 g) ⁻¹	Yes
Linear extensibility percent	(mm mm ⁻¹) 100	Yes

Table From: Wagner, Larry E., 2013. A history of Wind Erosion Prediction Models in the United States Department of Agriculture: The Wind Erosion Prediction System (WEPS). *Aeolian Research* 10 (2013) 9-24

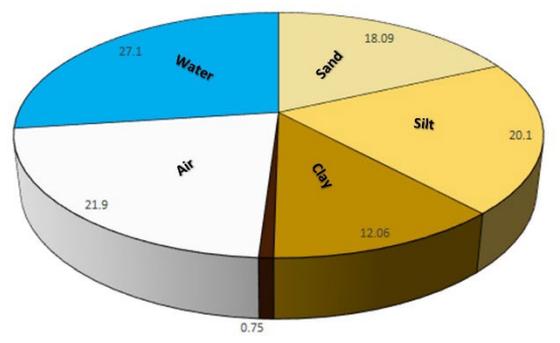


* Image used with permission by X-Rite/Pantone

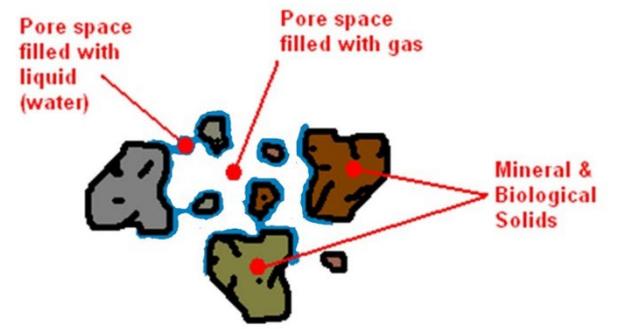




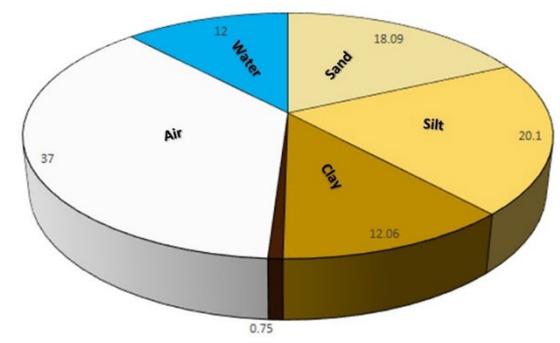
Forkwood Soil - A Horizon, Field Capacity



■ Sand ■ Silt ■ Clay ■ Biological Material ■ Air ■ Water



Forkwood Soil - A Horizon, Permanent Wilting Point



■ Sand ■ Silt ■ Clay ■ Biological Material ■ Air ■ Water



United States Department

Web Soil Survey

Web Soil Survey

<https://websoilsurvey.sc.egov.usda.gov/>

United States Department of Agriculture
Natural Resources Conservation Service

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You are here: [Web Soil Survey Home](#)

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- Archived Soil Surveys
- Status Maps
- Official Soil Series Descriptions (OSD)
- Series Extent Explorer
- Geospatial Data Gateway
- eFOTG
- National Soil Characterization Data
- Soil Health
- Soil Geography

➔

Welcome to Web Soil Survey (WSS)

Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS) and provides access to the largest natural resource information system in the world. NRCS has soil maps and data available online for more than 95 percent of the nation's counties and anticipates having 100 percent in the near future. The site is updated and maintained online as the single authoritative source of soil survey information.

Soil surveys can be used for general farm, local, and wider area planning. Onsite investigation is needed in some cases, such as soil quality assessments and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center at the following link: [USDA Service Center](#) or your NRCS State Soil Scientist at the following link: [NRCS State Soil Scientist](#).

Four Basic Steps

1 Define...

Area of Interest (AOI)

Use the Area of Interest tab

to define your area of interest.

Click or Press the Enter or Spacebar key to view

I Want To...

- Start Web Soil Survey (WSS)
- Know Web Soil Survey Requirements
- Know Web Soil Survey operation hours
- Find what areas of the U.S. have soil data
- Find information by topic
- Know how to hyperlink from other documents to Web Soil Survey
- Know the SSURGO data structure
- Use Web Soil Survey on a mobile device

Announcements/Events

- Web Soil Survey 3.4.0 has been released! [View Web Soil Survey release history](#)
- Sign up for e-mail updates via [GovDelivery](#)

I Want Help With...

- Getting Started

Area of Interest (AOI)

Soil Map

Soil Data Explorer

Download Soils Data

Shopping Cart (Free)

Search

Area of Interest

Import AOI

Quick Navigation

Address

State and County

Soil Survey Area

Latitude and Longitude or Current Location

PLSS (Section, Township, Range)

Bureau of Land Management

Department of Defense

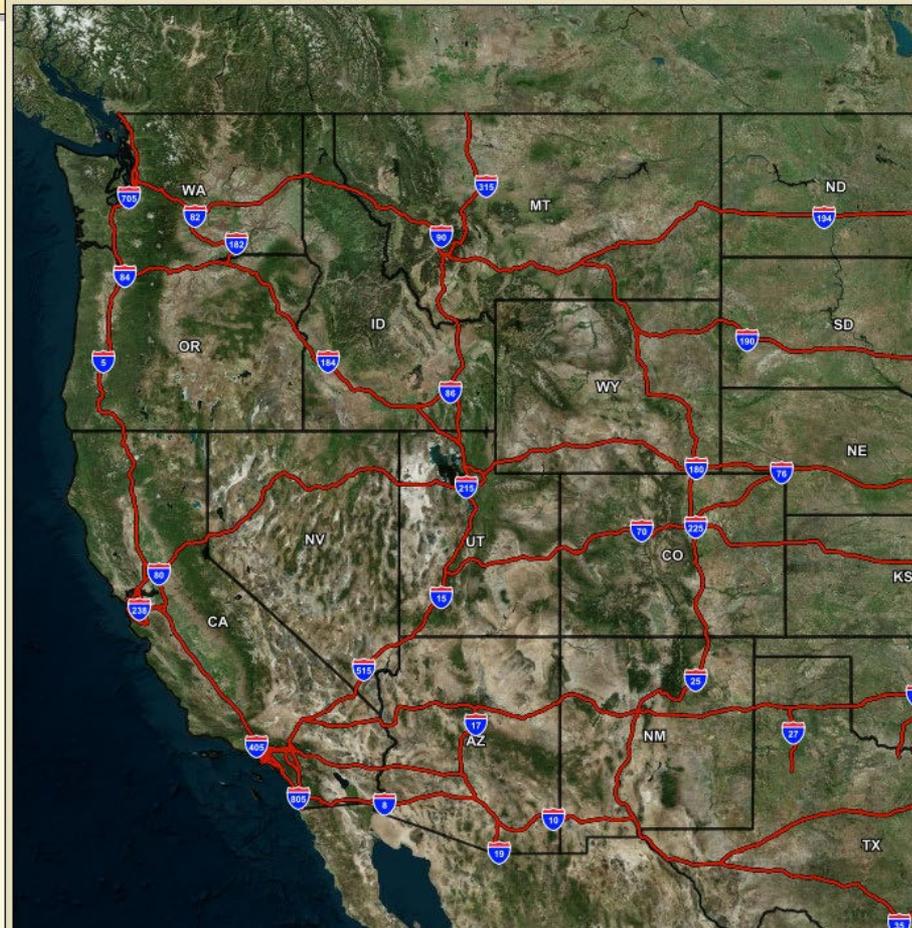
Forest Service

National Park Service

Hydrologic Unit

Area of Interest Interactive Map

Legend View Extent Contiguous U.S. Scale





Area of Interest (AOI)

Soil Map

Soil Data Explorer

Download Soils Data

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Search

Area of Interest

Open All | Close All

AOI Properties

Clear AOI ?

AOI Information

Name aoi_a_aoi

Map Unit Symbols
 Use Soil Survey Area Map Unit Symbols
 Use National Map Unit Symbols

Area (acres) 283.0

Soil Data Available from Web Soil Survey

Converse County, Wyoming, Southern Part (WY609)

Data Availability Tabular and Spatial, complete

Tabular Data Version 19, Sep 9, 2022

Spatial Data Version 12, Sep 13, 2021

Clear AOI

Import AOI

Create AOI from Shapefile

Create AOI from Zipped Shapefile

Export AOI

Quick Navigation

Address

State and County

Soil Survey Area

Latitude and Longitude or Current Location

PLSS (Section, Township, Range)

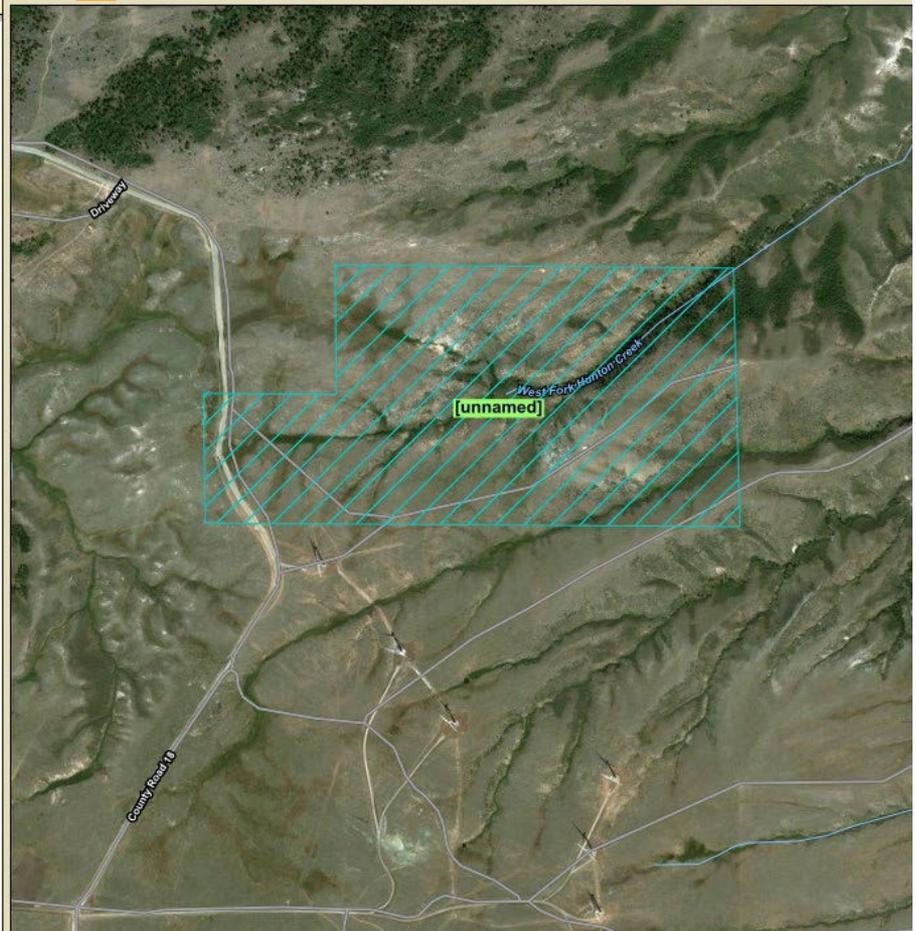
Bureau of Land Management

Department of Defense

Forest Service

Area of Interest Interactive Map

View Extent Contiguous U.S. Scale



USDA United States Department of Agriculture
Natural Resources Conservation
Map Unit Description
Printable Version

Area of Interest (AOI)

Search

Map Unit Legend

Converse County, Wyoming (WY609)

Converse County, Wyoming Part (WY609)

Map Unit Symbol	Map Unit Name
114	Boyle-Rock outcrop complex, 5 to 25 percent slopes
262	Ulrant loam, 3 to 15 percent slopes

Totals for Area of Interest

Report – Map Unit Description

Converse County, Wyoming, Southern Part

114—Boyle-Rock outcrop complex, 5 to 25 percent slopes

Map Unit Setting

National map unit symbol: 1t1f2
Elevation: 6,000 to 8,500 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 70 to 110 days
Farmland classification: Not prime farmland

Map Unit Composition

Boyle and similar soils: 50 percent
Rock outcrop: 30 percent
Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boyle Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Lower third of mountainflank
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium and/or residuum weathered from granite

Typical profile

A - 0 to 3 inches: gravelly sandy loam
Bt1 - 3 to 8 inches: gravelly sandy clay loam
Bt2 - 8 to 13 inches: very gravelly sandy clay loam
Cr - 13 to 60 inches: bedrock

Properties and qualities

Slope: 5 to 25 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.4 inches)

Interpretive groups

Land capability classification (irrigated): 7s

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Area of Interest (AOI) | Soil Map | **Soil Data Explorer** | Download Soils Data | Shopping Cart (Free)

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Search

Properties and Qualities Ratings

Open All | Close All

Soil Chemical Properties

Map — K Factor, Rock Free

Legend

Scale (not to scale)

Tables — K Factor, Rock Free — Summary By Map Unit

Summary by Map Unit — Converse County, Wyoming, Southern Part (WY609)

Summary by Map Unit — Converse County, Wyoming, Southern Part (WY609)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
114	Boyle-Rock outcrop complex, 5 to 25 percent slopes	.24	239.7	84.7%
262	Ulrant loam, 3 to 15 percent slopes	.28	43.3	15.3%
Totals for Area of Interest			283.0	100.0%

Rating Options Detailed Description

Advanced Options

Aggregation Method: Dominant Condition

Component Percent Cutoff:

Tie-break Rule: Lower Higher

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable) Depth Range (Weighted Average)

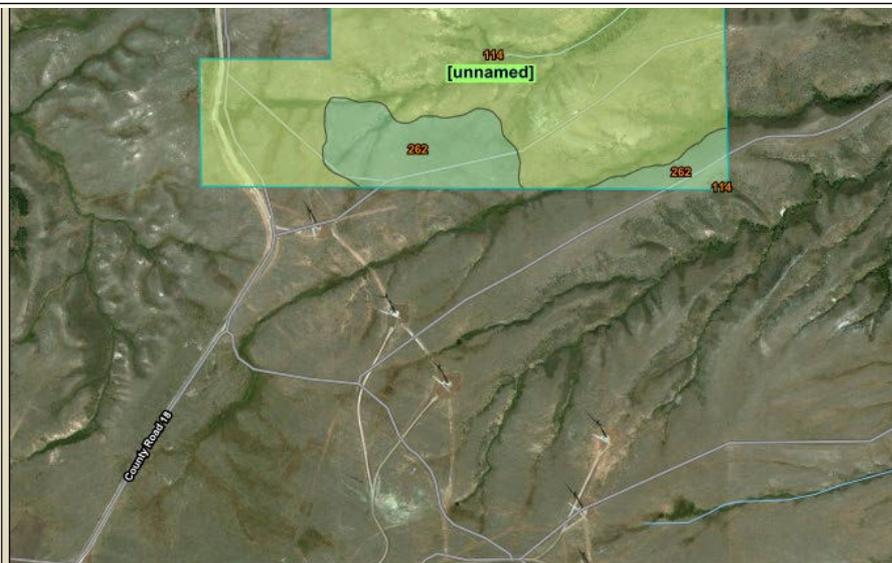
Top Depth:

Bottom Depth:

Inches Centimeters

All Layers (Weighted Average)

[View Description](#) [View Rating](#)





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Intro to Soils | Suitabilities and Limitations for Use | Soil Properties and Qualities | Ecological Sites | **Soil Reports**

Search | **Soil Map**

Report — Conservation Planning

Soil properties and interpretations for conservation planning. The surface mineral horizon properties are displayed. Organic surface horizons are not displayed.

Report — RUSLE2 Related Attributes

Soil properties and interpretations for erosion runoff calculations. The surface mineral horizon properties are displayed or the first mineral horizon below an organic surface horizon. Organic horizons are not displayed.

Converse County, Wyoming, Southern Part

Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value											
						% Sand	% Silt	% Clay									
114—Boyle-Rock outcrop complex, 5 to 25 percent slopes																	
Boyle	50	—	D	.24	2	70.0	15.0	15.0									
262—Ulrant loam, 3 to 15 percent slopes																	
Ulrant	85	—	B	.28	3	40.0	38.0	22.0									
to 15 percent slopes																	
Ulrant	85	9.0	—	Medium	3	48	6	—	Well drained	4e	B	0 - 9	.28	10	40	38	22

- Soil Health ?
- Soil Physical Properties ?
- Soil Qualities and Features ?
- Vegetative Productivity ?
- Waste Management ?
- Water Features ?
- Water Management ?



Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				135-585	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	90-225	-
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	90-225	-
	slimstem muhly	MUFI	<i>Muhlenbergia filiculmis</i>	45-135	-
2				225-405	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-45	-
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0-45	-
	threadleaf sedge	CAFI	<i>Carex fillifolia</i>	0-45	-
	Parry's oatgrass	DAPA2	<i>Danthonia parryi</i>	0-45	-
	onespike danthonia	DAUN	<i>Danthonia unispicata</i>	0-45	-
	Montana wheatgrass	ELAL7	<i>Elymus albicans</i>	0-45	-
	needle and thread	HECO26	<i>Hesperostipa comata</i>	0-45	-
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0-45	-
	mountain muhly	MUMO	<i>Muhlenbergia montana</i>	0-45	-
	mat muhly	MURI	<i>Muhlenbergia richardsonis</i>	0-45	-
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0-45	-
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0-45	-

Table - Ecologica

Converse Coun

Map unit symbol

114

262

Totals for Are

Shallo

HOME / ESC

General in

Physiogra

Climatic f

Water fea

Soil featu

Ecologica

Interreta



USC METRIC

Percent of AOI

84.7%

15.3%

100.0%



Report — Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Converse County, Wyoming, Southern Part

Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	
114—Boyle-Rock outcrop complex, 5 to 25 percent slopes														
Boyle	50	D	0-3	Gravelly sandy loam	SC-SM, SM	A-2-4	0- 0- 0	0- 2- 5	85-91-93	66-71-75	51-66-75	24-29-30	0-20-25	NP-3 -10
			3-8	Gravelly sandy clay loam	SC	A-2-6	0- 0- 0	0- 3- 5	76-82-90	47-58-70	45-56-70	30-32-35	30-33-35	10-13-15
			8-13	Very gravelly sandy clay loam	SC	A-2-6	0- 0- 0	0- 3- 5	71-75-83	29-34-45	27-33-45	18-19-23	30-33-35	10-13-15
			13-60	Bedrock	—	—	—	—	—	—	—	—	—	—
Rock outcrop	30		0-60	Bedrock	—	—	—	—	—	—	—	—	—	—
262—Ulrant loam, 3 to 15 percent slopes														
Ulrant	85	B	0-9	Loam	CL	A-6	0- 0- 0	0- 3- 5	95-98-100	80-85-90	60-68-75	50-58-65	25-30-35	10-13-15
			9-23	Gravelly clay loam, gravelly loam	SC	A-7, A-6	0- 0- 0	0- 3- 5	90-95-100	50-58-65	40-48-55	35-43-50	30-38-45	10-15-20
			23-54	Gravelly loam	SC	A-6	0- 0- 0	0- 3- 5	90-95-100	50-58-65	40-48-55	35-43-50	25-30-35	10-13-15
			54-60	Bedrock	—	—	—	—	—	—	—	—	—	—

Soil Quantities and Features

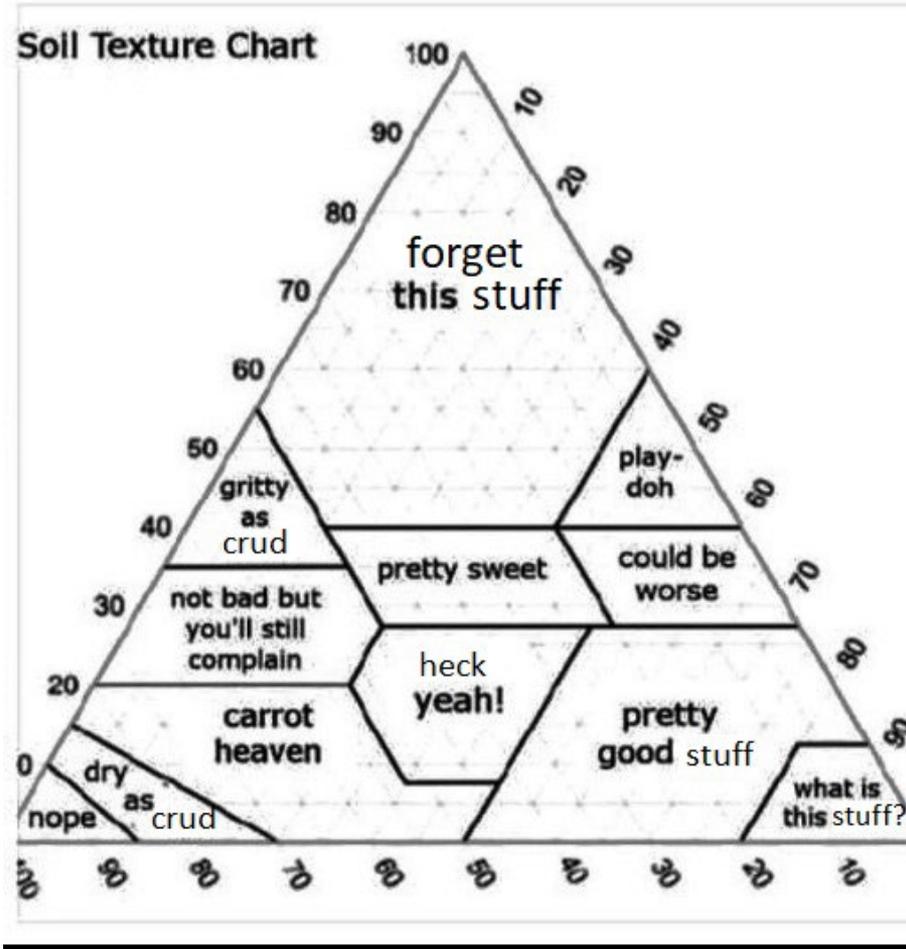
Vegetative Productivity





What Is Wyoming's State Soil?

Questions & Answers





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Office of the Assistant Secretary for Civil Rights
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Washington, D.C. 20250-9410;

(2) fax: (202) 690-7442; or

(3) email: program.intake@usda.gov.

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