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NEON Site-Level Plot Summary
Central Plains Experimental Range (CPER)

Document Information

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Site Background

The Central Plains Experimental Range (CPER) site is near Nunn, Colorado in the Pawnee National Grasslands. The site is in Major Land Resource Area (MLRA) 67B – Central High Plains, Southern Part. The site consists of 16,167 acres and is located in the dissected plains of the Colorado Piedmont.

Site Information

Elevation ranges from approximately 5,240 feet to 5,550 feet above sea level.

The parent materials at the CPER site are eolian deposits, residuum, and alluvium; with some areas of slope alluvium and eolian sand.

Land use is 100 percent rangeland.

Rangeland plant community is dominated by blue grama, plains prickly pear, sand dropseed, red three awn, western wheatgrass, and four-wing saltbush.

Major soil series on the site include Vona, Ascalon, Renohill, Terry, Haverson, Nunn, Cascajo, Avar, Olney, Tassel, Playas, Shingle, Manter, and Bankard.

Landforms that these soils occur on are interfluves, hillslopes, and terraces. To a lesser extent, alluvial fans and playas are also represented.

Analysis of Plots for Sampling

Soil map unit and landform were the two major features used for each plot during the pre-analysis; slope and geology were used to a lesser extent. Each plot was chosen based on best representation of the landform and potential to sample the representative series located on the site. Soil mapping consisted of 22 different map units, but the pre-selected sampling plots occurred in only 12 of the map units. The analysis resulted in 17 plots being selected for field description, field sampling, and lab characterization. The 17 plots not sampled either occurred in non-typical settings or were duplicates of one of the 17 chosen plots.

Sampled map units represent approximately 80 percent of the NEON site area (45% of the site's total map units):

Map unit symbol	Map Unit Name	% Total site area
4	Ascalon fine sandy loam, 0 to 6 percent slopes	17.4
9	Avar fine sandy loam	4.6
20	Cascajo gravelly sandy loam, 5 to 20 percent slopes	5.2
29	Haverson loam, 0 to 3 percent slopes	6.2
40	Nunn loam, 0 to 6 percent slopes	2.6
45	Olney fine sandy loam, 6 to 9 percent slopes	2.2
55	Renohill fine sandy loam, 0 to 6 percent slopes	2.7
57	Renohill-Shingle complex, 3 to 9 percent slopes	16.5
65	Terry sandy loam, 3 to 9 percent slopes	9.5
73	Vona sandy loam, 0 to 3 percent slopes	13.1
	Total	**80.0**

Roughly 20 percent of the NEON site area (55% of the site's total map units) at CPER consisted of map units that were not sampled. These include:

Map unit symbol	Map Unit Name	% Total site area
5	Ascalon sandy loam, 5 to 9 percent slopes	3.8
12	Bankard loamy fine sand, 0 to 3 percent slopes	1.7
34	Manter sandy loam, 0 to 6 percent slopes	0
41	Nunn clay loam, 0 to 6 percent slopes	2.9
56	Renohill fine sandy loam, 6 to 9 percent slopes	0.6
60	Shingle clay loam, 0 to 9 percent slopes	0.1
63	Tassel loamy fine sand, 5 to 20 percent slopes	0.2
64	Terry sandy loam, 0 to 3 percent slopes	0.1
71	Vona loamy sand, 0 to 3 percent slopes	0.3
72	Vona loamy sand, 3 to 9 percent slopes	1.3
74	Vona sandy loam, 3 to 9 percent slopes	8.9
86	Playas	0.2
	Total	**20.1**

The selected sample plots are representative of the map units in which they occur. Seventy-one percent of the sample plots occur in positions of minor components (more detail below) of those map units. The random plot selection method missed the representative landform positions within some map units. This method also missed fifty-five percent of the map units mapped on site. These areas are important for establishing the variability of the soils at the CPER location.

Plot Findings

The 17 pedons sampled represent 12 of the 22 total soil map units on site. The major components are Ascalon, Renohill, Haverson, Avar, and Cascajo. The minor components are Wapiti, Otero, Cushman, Olnest, Ulmet, and Haxtun.

Landforms—NEON Plots CPER_005, 016, 022, 023, 007, and 018 are found on interfluves. Plots CPER_030, 012, 019, 020, 002, and 008 are found on hillslopes, with varying two dimensional geomorphology (footslopes and backslopes) and three dimensional geomorphology (baseslopes and sideslopes). Plots CPER_013 and CPER_014 are found on the tread of terraces and plot CPER_001 is found on the tread of an old terrace. Plot CPER_015 is found on a dissected alluvial fan and plot CPER_017 is found on a playa slope.

Parent Materials—The CPER site is influenced by eolian deposits and residuum, with some alluvium and eolian sand deposits. The eolian deposits (9 plots) are the dominant parent materials, followed by slope alluvium (3 plots), alluvium (2 plots), residuum (2 plots), and eolian sand (1 plot). Plots CPER_005, 016, 022, 014, 017, 023, 019, 002, and 018 were formed from eolian deposits; this material was deposited over the top of some old alluvium and residuum in places. Plots CPER_001 and CPER_013 were formed from alluvium. Plots CPER_015, 030, and 020 were formed from slope alluvium. Plots CPER_012 and 008 were formed from residuum derived from shale. Plot CPER_007 was formed from eolian sand. Sampled plots were 53% eolian deposits, 18% slope alluvium, 12% alluvium, 12% residuum, and 5% eolian sand.

Summary of Soils

The intention was to sample the following series: Ascalon, Avar, Cascajo, Haverson, Nunn, Olney, Renohill, Shingle, Terry, and Vona. The most common soil series were the Ascalon (4 samples), Wapiti (2 samples), Otero (2 samples), and Renohill (2 samples) series. The Cushman series (1 sample), Haverson series (1 sample), Cascajo series (1 sample), Avar series (1 sample), Olnest series (1 sample), Ulmet series (1 sample), and the Haxtun series (1 sample) make up the remaining samples.

The Ascalon soils are located on interfluves and formed from eolian deposits (CPER_022, CPER_030, CPER_023, and CPER_002). These soils have a mollic epipedon and a well-developed subsoil that has a clay increase (i.e. an argillic horizon). They have a fine-loamy particle size class, with field estimates of clay ranging from 24 to 31 percent clay in the particle size control section. Of the four pedons sampled as Ascalon, only one (CPER_022) came from the Ascalon fine sandy loam, 0 to 6 percent slopes map unit. The other three pedons came from minor component positions in map units of Olney fine sandy loam, 6 to 9 percent slopes; Renohill fine sandy loam, 0 to 6 percent slopes; and Terry sandy loam, 3 to 9 percent slopes.

The Wapiti soils are located on the interfluves and formed from eolian deposits (CPER_017 and CPER_005). These soils have a mollic epipedon and have a well-developed subsoil that has a clay increase (i.e. an argillic horizon). These soils also contain a horizon with a large amount of calcium carbonates (i.e. a calcic horizon). They have a fine-loamy particle size control section, with field estimates of clay ranging from 31 to 33 percent clay in the particle size control section. Both of the pedons sampled as Wapiti are from minor component positions in map units of Ascalon fine sandy loam, 0 to 6 percent slopes and Nunn loam, 0 to 6 percent slopes.

The Otero soils are located on interfluves or on broad, flat alluvial plains (CPER_007 and CPER_014). They formed from eolian deposits and/or alluvium. These soils have an ochric epipedon and a subsoil that has little to no soil development. They have a coarse-loamy particle size class, with field estimates of clay at 8 percent in the particle size control section. Both of these samples came from a minor component position, one from the Vona sandy loam, 0 to 3 percent slopes map unit and the other from the Haverson loam, 0 to 3 percent slopes map unit.

The Renohill soils are located on the shoulders, backslopes, and sideslopes of hills and formed from residuum derived from shale (CPER_008 and CPER_019). These soils have an ochric epipedon and have a well-developed subsoil that has a clay increase (i.e. an argillic horizon). They have a fine particle size class, with field estimates of 38 to 46 percent clay in the particle size control section. They have weathered shale bedrock at greater than 100 centimeters. One sample was taken from the Renohill-Shingle complex, 3 to 9 percent slopes map unit, while the other was from a minor component position in the Terry sand loamy, 3 to 9 percent slopes map unit.

The Cushman soils are located on backslopes and sideslopes of hills and formed from residuum derived from shale (CPER_012). These soils have a mollic epipedon and a well-developed subsoil that has a clay increase (i.e. an argillic horizon). They have a fine-loamy particle size class, with a field estimate of 28 percent clay in the particle size control section. This sample came from a minor component position in the Renohill-Shingle complex, 3 to 9 percent slopes map unit.

The Haverson soils are located on the tread of terraces and formed from alluvium (CPER_013). These soils have an ochric epipedon and a slightly-developed subsoil. They have a fine-loamy particle size class and calcium carbonates throughout the profile. These soils classify as fine-loamy, mixed, superactive, calcareous, mesic Aridic Ustifluvents. This one sample of Haverson is outside the normal range of characteristics for the Haverson series, but is similar enough to be included within the map unit concept; this sample has a more developed subsoil than the Haverson series allows. However, this difference will not significantly impact the use and management, including productivity, of the soil. This sample was taken from a map unit of Haverson loam, 0 to 3 percent slopes.

The Cascajo soils are located on ridges or ridgetops and formed from old alluvium or outwash (CPER_015). These soils have an ochric epipedon and a subsoil with none to very little soil development. They have a sandy or sandy-skeletal particle size control section with a high amount of gravels and calcium carbonate accumulations. These soils classify as sandy-skeletal, mixed, mesic Ustic Haplocalcids. This pedon is outside the normal range of characteristics for the Cascajo series. This sample is located on an alluvial fan below the ridgetop and has a thick, dark surface horizon (greater than 50 centimeters). It also has less rock fragments and a more developed subsoil than the Cascajo series allows. This sample classifies as coarse-loamy, mixed superactive, mesic Pachic Haplustolls. The use and management, including productivity, of the soil will be different at this site due to the soil property differences and landform position; this site would be a more productive soil from a rangeland standpoint, as compared to the Cascajo soil. This sample was taken from a minor component position in the Cascajo gravelly sandy loam, 5 to 20 percent slopes map unit.

The Avar soils are located on the tread of terraces and formed from alluvium (CPER_001). These soils have a mollic epipedon and have a well-developed subsoil that has a clay increase

(i.e. an argillic horizon). They have a fine-loamy particle size class and have a horizon(s) of salt accumulations. These soils classify as fine-loamy, mixed, mesic Ustic Natrargids. This pedon is outside the normal range of characteristics for the Avar series; this pedon has a coarse-loamy particle size control section and does not have a natric horizon, but does have an accumulation of salt in lower part of the profile. This difference will not significantly impact the use and management, including productivity, of the soil. This sample classifies as coarse-loamy, mixed, superactive, mesic Aridic Argiustolls. This sample was taken from the Avar fine sandy loam map unit.

The Olnest soils are located on backslopes and sideslopes of hills or on interfluves. They formed from eolian deposits (CPER_016). These soils have a mollic epipedon and have a well-developed subsoil that has a clay increase (i.e. an argillic horizon). They have a fine-loamy particle size class, with a field estimate of 25 percent clay in the particle size control section. This sample was taken from a minor component position in the Ascalon fine sandy loam, 0 to 6 percent slopes map unit.

The Ulmet soils are located on plains or hills. They formed from slope alluvium derived from shale (CPER_020). These soils have an ochric epipedon and have a well-developed subsoil that has a clay increase (i.e. an argillic horizon). They have a fine particle size class, with a field estimate of 39 percent clay in the particle size control section. This sample was taken from a minor component position in the Renohill-Shingle complex, 3 to 9 percent slopes map unit.

The Haxtun soils are located on table lands or slightly depressed areas on plains. They formed from eolian deposits of two separate ages (CPER_018). These soils have a thick mollic epipedon (greater than 50 centimeters thick) and have a well-developed subsoil that has a clay increase (i.e. an argillic horizon). They have a fine-loamy particle size class, with a field estimate of 23 percent clay in the particle size control section. This sample was taken from a minor component position in the Vona sandy loam, 0 to 3 percent slopes map unit.