



NEON Site-Level Plot Summary Soaproot Saddle (SOAP)

Document Information

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Site Background

The Soaproot Saddle (SOAP) site is about 35 miles northeast of Fresno, California in the Sierra National Forest. The SOAP site consists of 1438.5 acres and is about 6 miles south of Shaver Lake between Bretz Mill and Rush Creek. This area is in Major Land Resource Area (MLRA) 22A – Sierra Nevada Mountains. As defined by the EPA, SOAP is within the Southern Sierra Lower Montane Forest ecoregion.

Site Information

Climatic information about the site was obtained from PRISM (Parameter-elevation Regressions on Independent Slopes Model) Prism Climate Group (2004). Data that fed the chosen model were collected 1981 to 2010. Elevation and slope were derived using a 10 meter DEM (Digital Elevation Model) obtained from the Natural Resources Conservation Service’s Geospatial Data Gateway 2017.

Summary statistics for the climatic and topographic properties listed below were derived from raster data extracted from fixed-density sampling of the SOAP project area (5 points per acre)(Table 1).

Annual air temperature (degrees C)	Annual precipitation (mm)	Effective precipitation (mm)	Frost-free days	Growing degree days (degrees C)	Elevation (m)	Slope gradient (%)
13.15	889	152.37	212	2036	1188	20

Table 1. Median physical and climatological data for the NEON SOAP site. Effective precipitation= relative quantity of precipitation stored in the soil.

Elevation: 1000 to 1380 meters (3281 to 4528 ft)

Parent Materials: Colluvium, residuum, and slope alluvium derived from Permian to Tertiary aged intrusive igneous rocks, most of which is granodiorite.

Land Use: Used for timber production, livestock grazing, and outdoor recreation.

Vegetation: Evergreen forest and shrub/scrub are dominant land cover types. Tree species include *Pinus ponderosa*, *Calocedrus decurrens*, *Pinus lambertiana*, *Quercus wislizeni*, *Quercus chrysolepis*, and *Quercus kelloggii*. Shrub species include *Arctostaphylos spp.*, *Cercocarpus sp.*, and *Chamaebatia foliolosa*.

Landforms: Steep mountain slopes dissected by drainageways and streams. Several ridges and saddles occupy the interfluvial areas in upper portions of the landscape.

Soils: Major soil series that are mapped at the SOAP site in the Soil Survey of Sierra National Forest Area, California (Giger and Schmitt, 1983) are Holland (Fine-loamy, mixed, semiactive, mesic Ultic Haploxeralfs), Chaix (Coarse-loamy, mixed, superactive, mesic Typic Dystrochrepts), Chawanakee (Loamy, mixed, active, mesic, shallow Typic Dystrochrepts), and Tollhouse (Loamy, mixed, superactive, mesic, shallow Entic Haploxerolls) (Table 2).

Sierra National Forest Area Parts of Fresno, California (CA750)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
136	Holland family, 5 to 35 percent slopes	235.3	16.4%
137	Holland family, 35 to 65 percent slopes	909.6	63.2%
138	Holland-Chaix families complex, 5 to 35 percent slopes	3.4	0.2%
139	Holland-Chaix families complex, 35 to 65 percent slopes	83.6	5.8%
140	Holland-Chawanakee families complex, 35 to 65 percent slopes	8.3	0.6%
147	Rock outcrop	126.2	8.8%
166	Tollhouse family-Rock outcrop complex, 30 to 60 percent slopes	72.2	5.0%
Totals for Area of Interest		1,438.5	100.0%

Table 2. Soil map units and acreage on the NEON SOAP site. AOI = area of interest.

Analysis of Plots for Sampling

Prior to sampling, an analysis of the site was undertaken in order to select NEON plots for sampling. Criteria used include: representation of each map unit; sampling both evergreen forest and shrub-scrub cover types; and covering the range in variation according to hillslope profile position, slope gradient and slope aspect. The dominant hillslope profile positions identified at SOAP are shoulders, backslopes, and footslopes. Based on this analysis, 12 plots (of 34 total) were selected for field description, field sampling, and lab characterization. Table 3 lists the 12 selected plots with their NASIS user site ID, map unit symbol as is found on Web Soil Survey (Soil Survey Staff, 2019), soil classification according to lab characterization, and physical characteristics about each plot. The 22 plots not sampled either occurred in non-typical settings or had similar characteristics to one of the chosen plots.

NRCS site ID	Plot ID	Soil series or subgroup classification	Hillslope position	Slope (%)	Aspect (°)	Vegetation	Map unit
S2018CA019002	SOAP_002	Cumulic Humixerepts	footslope	2	124	Evergreen Forest	147
S2018CA019004	SOAP_004	Holland	backslope	30	30	Evergreen Forest	137
S2018CA019005	SOAP_005	Holland	backslope	15	55	Evergreen Forest	137
S2018CA019008	SOAP_008	Holland	backslope	12	270	Evergreen Forest	147
S2018CA019010	SOAP_010	Lithic Xerorthents	shoulder	30	340	Shrub/Scrub	137
S2018CA019012	SOAP_012	Holland	backslope	22	237	Evergreen Forest	137
S2018CA019015	SOAP_015	Dystric Xeropsamment	backslope	46	40	Evergreen Forest	137
S2018CA019016	SOAP_016	Musick	shoulder	17	19	Evergreen Forest	136
S2018CA019019	SOAP_019	Typic Humixerept	backslope	25	257	Evergreen Forest	137
S2018CA019025	SOAP_025	Lithic Humixerepts	backslope	45	310	Shrub/Scrub	137
S2018CA019026	SOAP_026	Lithic Humixerepts	backslope	17	78	Shrub/Scrub	166
S2018CA019028	SOAP_028	Holland	shoulder	22	44	Shrub/Scrub	139

Table 3. NEON plots sampled, soil classification, and plot characteristics.

Plot Findings

Map unit 137 (Holland family, 35 to 65 percent slopes)

This map unit comprises 63 percent of the SOAP site and 7 of the 12 sampled plots (SOAP_004, SOAP_005, SOAP_010, SOAP_012, SOAP_015, SOAP_019 and SOAP_025). All plots except for SOAP_010 were on backslopes with slope gradient at the sample locations within these plots ranging from 15 to 46 degrees. Plots identified as having an evergreen forest vegetation type were found to have well drained soils that are at least 100 cm deep. Particle size control sections for pedons on these plots include sandy (SOAP_015), loamy skeletal (SOAP_019) and fine loamy (SOAP_004, SOAP_005 and SOAP_012). Ponderosa pine densities were found to increase with finer particle size in the control section, which results in an increase in plant available water. Two of the plots chosen within this map unit were identified as having a shrub/scrub vegetative type: SOAP_010 (shoulder hillslope position) and SOAP_025 (backslope hillslope position). Both plots were found to have somewhat excessively drained, very shallow soils (16 and 12 cm depth respectively). Bedrock under these pedons was found to be a very “strongly cemented” granodiorite with fractures from 50cm to greater than 2 meters apart.

Map unit 136 (Holland family, 5 to 35 percent slopes)

This map unit comprises 16 percent of the SOAP site. One plot was sampled within this unit (SOAP_016). Both the map unit and the plot are described as being located on the upper third, or shoulder, of mountain slopes. Slope gradient within this plot averages 17 percent and the vegetation type is evergreen forest. The soil is well drained and deeper than 100 cm. Dry hues of 5YR and clay contents between 35 and 40 percent in the B horizons indicate a well-developed soil on a relatively stable landform position. Plant available water is high, which enables incense cedar (*Calocedrus decurrens*) as well as ponderosa pine (*Pinus ponderosa*) to thrive.

Map unit 147 (Rock outcrop)

This map unit comprises 9 percent of the SOAP site. According to the soil survey this map unit is ninety percent rock outcrop or soil less than 10 cm deep. The other ten percent of the unit is a shallow (less than 50 cm deep) unnamed soil that does not have soils information associated with it. Vegetation patterns on the aerial imagery and pre-determined plot locations revealed evergreen forest vegetation types within the unit. Two evergreen plots were sampled (SOAP_002 and 008) and both were found to have soils that are deeper than 100cm. Plot SOAP_002, although having a particle size control section that is coarser in texture than SOAP_008 (sandy verses fine loamy) and being somewhat excessively well drained, still manages to support incense cedar and ample forbs due to slope position (footslope) and a seasonally high water table below 100 cm. Plot SOAP_008 is a good representation of the Holland series (fine-loamy, mixed, active, mesic Ultic Haploxeralf) that is common to the area.

Map unit 139 (Holland-Chaix families complex, 35 to 65 percent slopes)

This map unit comprises 6 percent of the SOAP site. One plot was chosen within this unit (SOAP_028). The soil map unit components are on the upper third of the mountain flank. The soil pit within this plot occurred on a shoulder hillslope position with a slope gradient of 22 percent, and had a shrub/scrub vegetation type. The soil was found to be greater than 100 cm in depth, was well drained, and although it has a fine-loamy particle size control section, the slope shape is convex/convex. The erosional hillslope position and slope shape are likely influencing soil moisture and water availability; this may be the reason this very deep soil is supporting only shrubs and not evergreen tree species.

Map unit 166 (Tollhouse family-Rock outcrop complex, 30 to 60 percent slopes)

This map unit comprises 5 percent of the SOAP site. One plot was chosen within this unit (SOAP_026). The Tollhouse component within this map unit is on backslopes of mountain flanks. The plot is on the upper third of a mountain flank on a 17 percent slope. The soil pedon sampled within the plot is similar to Tollhouse in that it is shallow to bedrock and has a very dark surface. It differs from Tollhouse in rock fragment content (Tollhouse has under 35 percent rock fragments in the particle size control section and this pedon averages 41 percent) and in the hardness of the bedrock contact. This pedon has a very strongly cemented lithic contact at the soil/bedrock interface, while Tollhouse is over a paralithic (soft) contact. The low plant available water in this pedon is sufficient to support shrub/scrub vegetation, but not evergreens.

Map unit 138 (Holland-Chaix families complex, 5 to 35 percent slopes) and Map unit 140 (Holland-Chawanakee families complex, 35 to 65 percent slopes)

These map units were 0.2 percent and 0.6 percent of the SOAP site, respectively, and do not currently have any distributed plots located within them. Given their small areal extent these map units do not significantly contribute to the overall site-level soil properties.

References

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