NEON Site-Level Plot Summary Smithsonian Conservation Biology Institute (SCBI)

Document Information

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Site Background

The Smithsonian Conservation Biology Institute (SCBI) site is near Front Royal, Virginia. The site is in Major Land Resource Area (MLRA) 130A–Northern Blue Ridge, near the boundary of MLRA 147–Northern Appalachian Ridges and Valleys. The site consists of 2,966 acres and is in the foothills of the Blue Ridge Mountains.

Site Information

Elevation ranges from approximately 800 to 2,000 feet above sea level.

The parent materials at the SCBI site are residuum, colluvium, and local alluvium derived from Cambrian age crystalline rocks, including meta-basalt, greenstone, and gabbro.

Land use is dominated by forest land. A few areas are cleared for pasture, hay, or other agricultural or general use.

Plant communities are dominated by oak-hickory forest. Several plots contained Japanese stilt grass.

Major soil series on the site include Hawksbill, Lew, Montalto, Myersville, Catoctin, and Thurmont soils.

These soils are on the following landforms: residual ridgetops, shoulder slopes, and back slopes; colluvial foot slopes, fans, and benches; and low stream terraces.

Analysis of Plots for Sampling

Four features identified for each plot during the pre-analysis: soil map unit, geology, landform, and major vegetative communities. Each unique combination of these four features was labeled as a landform setting. The landforms identified on the SCBI site were residual ridgetops, shoulder slopes, and back slopes; colluvial foot slopes, fans, and benches; and low stream terraces. Soil mapping consisted of 19 different map units (including water), but the pre-selected sampling plots occurred in only 10 of the map units. The analysis resulted in 18 plots being

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selected for field description, field sampling, and lab characterization. The 16 plots not sampled either occurred in non-typical settings or were duplicates of one of the 18 chosen plots.

Roughly 9 percent of the NEON site area (47% of the site's total map units) at SCBI consisted of map units that were not sampled. These include:

Map unit symbol	Map Unit Name	% Total site area
11E	Chester-Manor complex, 25 to 60 percent slopes, very stony	0.23
20B	Hawksbill very cobbly loam, 2 to 7 percent slopes, occasionally flooded	0.22
31C	Myersville-Catoctin silt loams, 7 to 15 percent slopes, very stony	0.44
31E	Myersville-Catoctin silt loams, 25 to 65 percent slopes, very stony	5.79
37D	Rigley-Weikert-Berks complex, 15 to 25 percent slopes, very stony	1.08
3C	Buchanan fine sandy loam, 7 to 15 percent slopes	0.17
8D	Cataska channery silt loam, 15 to 25 percent slopes	0.46
8E	Cataska channery silt loam, 25 to 65 percent slopes	0.06
W	Water	0.08
	Total	**8.53**

Sampled map units represent approximately 91 percent of the NEON site area (53% of the site's total map units):

Map unit symbol	Map Unit Name	% Total site area
32C	Myersville and Montalto soils, 7 to 15 percent slopes, very stony	2.78
32D	Myersville and Montalto soils, 15 to 25 percent slopes, very stony	11.69
32E	Myersville and Montalto soils, 25 to 65 percent slopes, very stony	18.55
31D	Myersville-Catoctin silt loams, 15 to 25 percent slopes, very stony	8.39
21D	Lew channery loam, 7 to 25 percent slopes	1.87
22E	Lew loam, 25 to 65 percent slopes, very stony	20.48
29C	Montalto loam, 7 to 15 percent slopes	6.50
30C	Myersville silt loam, 7 to 15 percent slopes	8.67
30D	Myersville silt loam, 15 to 25 percent slopes	7.70
19B	Hawksbill cobbly loam, 2 to 7 percent slopes, occasionally flooded	4.83
	Total	**91.47**

The selected sample plots are representative of the map units in which they occur. They fall within the Range in Characteristics (RIC) of the individual major component, except for a few outliers (noted below). The random plot selection method missed several landform positions within map units and missed much of the colluvium and alluvium on the site. Although these

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areas are of minor extent to the overall site, they are important for establishing the variability of the soils at the SCBI location.

Plot Findings

The 18 pedons sampled represent 10 soil map units. The major components are Montalto, Myersville, Lew, Catoctin, and Hawksbill soils. Most of the plots sampled were forested (73%). Secondary land use was pasture or grassland (27%).

Landforms—NEON Plots SCBI_004, 005, 006, 011, 013, 014, 017, 019, 021, 034, 035, and 037 consist of soil formed in residuum. Plots SCBI_002, 008, 010, 022, and 043 formed in colluvium. Plots SCBI_007 formed in alluvium over colluvium. Sampled plots were 67% residuum, 28% colluvium, and 5% alluvium.

Summary of Soils

The soils sampled under forest cover generally had very thin organic horizons. These horizons ranged from 1 to 5 cm in thickness. The multiple O horizons found in many of the pedons are not accounted for in the aggregated NASIS horizon data. Where surface stoniness was low enough to allow, the O horizons were sampled for organic matter and bulk density determination following normal protocols.

Sampled soils were dominantly Myersville soil (10 samples) on the residual ridgetops and side slopes (SCBI_006, 011, 013, 014, 017, 019, 021, 022, 034, and 035). These soils developed in residuum and are 1 to 1.5 meters deep over bedrock. These soils have an increase in clay content in the subsoil (i.e., an argillic horizon) and are fine-loamy. Field-estimated clay content ranged from about 24 to 39 percent. Of the pedons sampled as Myersville, two stand out as being outside the normal range in characteristics of the series. SCBI_019 is moderately well drained instead of well drained. SCBI_014 is a taxadjunct to the series (classifies differently) because it contains more rock fragments than is normal for Myersville soil. Additionally, one of the samples of Myersville soil came from a position as a minor component in a Lew map unit (SCBI_022).

The second most common soil series was Lew soil (5 samples) on colluvial side slopes (SCBI_005, 007, 008, 010, 043). These soils developed in colluvium and are greater than 1.5 meters deep over bedrock. Lew soils have an increase in clay content in the subsoil and are loamy-skeletal (rock fragments generally comprise more than 35 % of the subsoil). Field-estimated clay content ranges from 17 to 30% in the subsoil, and the volume of rock fragments increases with depth. Two of the Lew samples came from map units that did not have Lew as a major component. One came from an area of Myersville–Catoctin complex (SCBI_005) and one came from an area of Hawksbill cobbly loam (SCBI_007).

Plot SCBI_007 has a lithologic discontinuity; there is a significant color change between the Bt1 and 2Bt2 horizons. This color change could indicate older parent material in the C horizon. This discontinuity does not affect the use and management of the soil. SCBI_008 has a lithologic discontinuity; there is a distinct increase in volume and size of rock fragments in the C horizon. This discontinuity does not affect the use and management of the soil. SCBI_005 has a lithologic discontinuity; there is an increase in clay content from 23% to 38% in the 2Bt horizon. The argillic horizon in this pedon begins at greater depth than is typical in Lew soils. The lower clay

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content of the upper horizons of SCBI_005 impacts water holding capacity, available water, and fertility of the soil. Lithologic discontinuities are somewhat common in soils forming from colluvium in this area.

Two samples of Montalto were collected on residual ridgetops and side slopes (SCBI_004, 007). These soils develop in residuum and are greater than 1.5 meters deep over bedrock. These soils have an increase in clay content in the subsoil and are fine-textured. Field-estimated clay content ranges from 35 to 43 percent in the subsoil. SCBI_037 has an increase in rock fragments that is higher than the normal range for Montalto soils. SCBI_004 falls within the RIC for the Montalto soil series.

One of the plots (SCBI_007) was within an area delineated as Hawksbill cobbly loam, 2 to 7 percent slopes, occasionally flooded, but was identified as a Lew soil. Lew soils are deeper and more acidic than Hawksbill soils. Lew soils form mainly in colluvium weathered from greenstone. Hawksbill soils form mainly in colluvium or alluvium weathered from greenstone, sandstone, and phyllite.

One plot (SCBI_002) was located in an area of Lew loam, 25 to 65 percent slopes, very stony, but was identified as a Thurmont soil. Thurmont soils are very deep, well drained, and fine-loamy. Thurmont soils form in alluvium and colluvium from mixed metamorphic rocks. Depth to bedrock is greater than 1.5 meters. Field-estimated clay content increased with depth, ranging from 20% in the surface horizon to 30% in the Bt2 horizon. Redoximorphic features were in the Bt horizon due to prolonged saturation in the profile. This pedon is a good representation of Thurmont soils and falls within the RIC of the series.

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