APPENDIX C
INFORMATION ON SOILS IN FERN LAKE WATERSHED
CUMBERLAND GAP NATIONAL HISTORICAL PARK

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SOILS

The distribution of soil series within the petition area generally corresponds to the topography. Upland soils occur on the mountain slopes above Little Yellow Creek while alluvial soils are confined primarily to the valley floor. The upland soil series in the petition area consists of Bethesda, Muskingum, Hartsells, and Jefferson soil types. Alluvial soils within the petition area are of the Philo and Atkins series. These soils formed from sediments deposited along the floodplain of Little Yellow Creek. Information in this summary was obtained from OSM (1996), USDA (1949) and USDA/NRCS (2006).

1. Upland Soils

Table 1 provides information on the acreages and descriptive locations of upland soil series within the petition area. The following paragraphs describe in greater detail each of those upland soils.

TABLE 1. ACREAGE AND LOCATIONS OF UPLAND SOILS WITHIN THE FERN LAKE PETITION AREA (OSM 1996)

Soil Series	Acres	Percent of Petition Area (%)	Location
Bethesda	105	2.8	Two mountaintop removal areas: one on Mingo Mountain and one on Yellow Creek Ridge. Also two contour stripped areas: one below Yellow Creek Ridge and one below Nicholson Mountain.
Hartsells	40	1.05	Two areas near the upper reach of Fern Lake.
Jefferson	28	0.74	Located immediately above the headwaters of Little Yellow Creek and forms the drainage divide for the Fern Lake watershed.
Muskingum	3421	91	Occupies the south side of Mingo Mountain and the north side of Cumberland Mountain.
Total Upland Soils	3594	95.08 % of the petition area consists of upland soils.	

Bethesda Soil—The Bethesda soils within the petition area formed as a result of previous mining on the crest and along the upper slopes of the Mingo Mountains, including Yellow Creek Ridge and Nicholson Mountain. These past mining operations consisted of two mountaintop removals and two contour mines. The mountaintop removal areas have subsequently been reclaimed and presently support an effective vegetative cover. The contour mined areas were only partially reclaimed. Even though high walls and open pits still remain, volunteer re-vegetation has stabilized the sites.

Because the Bethesda soil series is recent in origin, it has not developed distinctive soil horizons. Thus, the series is unique among the upland soils within the petition area. This has resulted in an A horizon forming directly over C horizon material with many coarse fragments throughout both horizons. The properties of the Bethesda soil are not typical of upland soils within the petition area because the soil consists of mine spoil material whose properties are derived largely from how the spoils were handled and the time the materials have been exposed to weathering. If the spoil had a large percentage of clay and was heavily compacted, water movement within the resulting Bethesda soil may be very slow. On the other hand, if spoil was not heavily compacted and an abundance of coarse fragments and sand was present, water may drain rapidly through the subsequent soil materials. Another factor which has affected the soil development is the surface configuration of the spoil material. Highly compacted, smooth, and steep slopes tend to limit infiltration, promote runoff, and limit the rate of physical and chemical weathering.

Hartsells Soil—There are only two units of Hartsells soils which have been mapped within the petition area. Both are located near the upstream end of Fern Lake on steep knolls. The moderately deep, well drained and moderately permeable Hartsells soil formed in acid sandstones containing thin strata of shale or siltstone. The soil is highly weathered and generally acidic with low native fertility. This soil consists of a sandy loam, or loam, A horizon, and a well developed B horizon. In some locations there is a developed C horizon, but at other locations the B horizon is directly over bedrock.

Jefferson Soil—Located at the extreme headwaters of Little Yellow Creek and occupying the drainage divide between the watersheds of Fern Lake and Tackett Creek is the Jefferson soil series. This soil formed in colluvium materials transported from the surrounding mountains. Jefferson soil is deep and well-drained with moderately rapid permeability. The A horizon and upper part of the B horizon (upper 3 feet of soil) contain 5 to 35 percent coarse fragments. Below 3 feet, the coarse fragments range from 20 to 80 percent.

Muskingum Soil—The Muskingum soil series is located on the sides and crests of Mingo and Cumberland Mountains. This soil is the most abundant throughout the petition area. It is located on steep mountain slopes on both sides of the Little Yellow Creek valley. The moderately deep, well drained Muskingum soil formed in residuum, weathered from interbedded siltstone, sandstone, and shale. The soil is highly weathered but typically has many coarse fragments in the lower part of the soil profile. The soil is made up of A, B, and C horizons. The A horizon is silt loam or loam with about 10 percent coarse fragments. The B horizon is loam or silt loam with 10 to 30 percent coarse fragments. The C horizon is loam or silt loam with greater than 35 percent coarse fragments.

2. Alluvial Soils

The only alluvial soils within the petition area are the Atkins and Philo soil series. These soils formed on the floodplain and the former floodplain of Little Yellow Creek. These soils are briefly described and properties are summarized in table II-5.

Atkins Soil—The Atkins soil occupies approximately 14 acres, or 0.4 percent, of the petition area. Three acres of the Atkins soil is in a wetland. The wetland will be discussed in section O of this chapter. The other unit of Atkins soil occupies the area surrounding the headwaters of Little Yellow Creek.

Philo Soil—Philo soil occupies approximately 132 acres or 3.5 percent of the petition area. This soil consists of an A horizon overlying a C horizon. The soil developed in alluvium which becomes stratified into sand and gravel at depth. The sand and gravel may be at depths as shallow as 30 inches, but usually is 5 feet or more below the surface of the soil. Textures of all horizons are silt loam to sandy loam.

TABLE 2. SUMMARY OF SOIL PROPERTIES OF ALLUVIAL SOILS IN THE FERN LAKE PETITION AREA (OSM 1996)

Soil Series	Reaction	Soil Depth (inches)	Subsoil Permeability (in/hr)	Hydrologic Soil Group	Texture of Upper 3 feet	Drainage Class
Atkins	Strongly Acid (pH 4.5-5.5)	24-60 over bedrock	0.06-2.0	D	Silt Loam	Poorly Drained
Philo	Medium to Strongly Acid (pH 4.5-6.0)	20-40 over stratified sand and gravel	0.2-2.0 (moderately slow)	B	Silt Loam to Sandy Loam	Moderately Well Drained (subject to stream overflow)