Ecological site F130AY008PA
Poorly To Somewhat Poorly Drained Floodplains And Toeslopes

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 130A–Northern Blue Ridge

Major Land Resource Area 130A is in the Northern Section of the Blue Ridge Province of the Appalachian Highlands. The region is characterized by rugged mountains with steep slopes, sharp crests, and narrow valleys. The mountain range forms a narrow band that runs north to south between the Piedmont Upland Section to the east, the Ridge and Valley section to the west, and the Southern Section of the Blue Ridge to the south. Stream dissection is deep and intricate. Major streams and their tributaries flow through gorges and gaps. Elevation ranges from about 820 feet (250 meters) in the lower valleys and on footslopes along the Potomac River just east of Harpers Ferry, where West Virginia joins Maryland and Virginia, to more than 4,200 feet (1,280 meters) along the Appalachian Trail in Bedford County, Virginia. Apple Orchard Mountain, the highest peak, is at an elevation of 4,225 feet (1,288 meters) (USDA 2006). The backbone of the northern Blue Ridge is an anticline composed of rocks that can be can be divided into geological groupings based on age. In general, the oldest rocks are the furthest east, and become younger towards the west (Fichter and Baedke, 2000; Barnes and Sevon, 2002). The first group are plutonic rocks that formed when liquid molten rock, called magma, solidified deep within the earth’s crust over a billion years ago. Collectively referred to as the Grenville rocks, they make up much of the eastern half of the mountains and are composed of granites, gneisses, and granulites. The second group, characterized by the Catoctin greenstone formation, is slightly younger, and is made up of metabasalts and metarhyolites, types of igneous rocks that have been metamorphosed by heat and pressure. The third group was formed during the Cambrian period about 500 million years ago and are represented by the Harpers, Antiedam, Weverton, and Loudoun formations which comprise the Chilhowee group. These rocks are primariliy quartzites, phyllites, and meta-sandstones, and form the western flank of the Blue Ridge. Preliminary ecological site differentiation is based on these three main age groups and geologies. The variable characteristics of the underlying rocks give rise to different soil physical and chemical properties and exert control on the landscape, slope shape, aspect, and elevation, all of which affect vegetation.

Classification relationships

This ecological site is found in Major Land Resource Area 130A – the Northern Blue Ridge. MLRA 130A is located within Land Resource Region N – East and Central Farming and Forest Region (USDA 2006), and in United States Forest Service ecoregion M221D – Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province, Blue Ridge Mountain Province (Bailey, 1995).In addition, MLRA 130A falls within area #66 of EPA Ecoregion Level III – the Blue Ridge (US EPA 2013). The Poorly to Somewhat Poorly Drained Mixed Metamorphic Floodplain and Toeslope ecological site occurs within both 66b, EPA Ecoregion IV – Northern Sedimentary and Metasedimentary Ridges, and in 66a - Northern Igneous Ridges (Woods et. al., 1996). North-Central Interior and Appalachian Rich Swamp System - CES202.605 and Central Appalachian Stream and Riparian System - CES202.609 Acer rubrum - Fraxinus nigra - Betula alleghaniensis / Veratrum viride - Carex bromoides Seep Forest association - CEGL008416 Acer rubrum - Nyssa sylvatica / Ilex verticillata - Vaccinium fuscatum / Osmunda cinnamomea Forest association - CEGL007853

Ecological site concept

The Poorly to Somewhat Poorly Drained Floodplains and Toeslopes ecological site of the Northern Blue Ridge region is located on footslopes of mountains and hills, depressions, drainageways, swales, and floodplains. This ecological site contains both colluvial (material that has moved from higher slopes to lower ones) and alluvial material (sediments transported by water and deposited along floodplains). The main characteristic of these landscapes is that they are usually in lower slope positions and many contain wetlands. The colluvial and alluvial materials are derived from a mixture of geologies including granite, gneiss, metabasalt, phyllite, quartzite, schist, sandstone, siltstone, and shale. The reference forest state is a combination of several vegetation communities within the North-Central Interior and Appalachian Rich Swamp, the North-Central Appalachian Acidic Swamp, and the Central Appalachian Stream and Riparian Systems as defined by NatureServe (NatureServe 2009; Anderson et. al. 2013). Tree species may include hemlock, red maple, and sourgum where the underlying soil is acidic, or red maple and black ash where soil pH is closer to neutral. Drier areas may have hemlock and northern hardwood species such as sugar maple, yellow birch, and American beech. Disturbance agents in these forests include

wind throw and ice damage. Despite the poor drainage, at least 15 percent of this ecological site has been cleared for agricultural use, primarily pasture and hayland. Other human activity including logging and early settlement have resulted in at least 27% of the forests becoming mid successional. The composition of the pre-settlement forest is not certain.

Associated sites

F130AY005PA	**Mixed Metamorphic - Metabasalt Footslopes And Terraces** The Mixed Metamorphic-Metabasalt Footslopes and Terraces are on nearby slopes.
F130AY007PA	**Fine To Loamy Mixed Metamorphic Floodplain** The Fine to Loamy Mixed Metamorphic Floodplain occurs along nearby drainageways and streams.

Table 1. Dominant plant species

Tree	(1) *Acer rubrum* (2) *Fraxinus nigra*
Shrub	(1) *Veratrum viride*
Herbaceous	(1) *Carex bromoides*

Physiographic features

The Poorly to Somewhat Poorly Drained Floodplains and Toeslopes provisional ecological site occurs on mountain slopes, hill slopes, depressions, drainageways, swales, and floodplains. This ecological site contains both colluvial (material that has moved from higher slopes to lower ones) and alluvial material (sediments transported by water and deposited along floodplains). The main characteristic of these landscapes is that they are usually in lower slope positions and many contain wetlands. The colluvial and alluvial materials are derived from a mixture of geologies including granite, gneiss, metabasalt, phyllite, quartzite, schist, sandstone, siltstone, and shales. Elevation is generally around 1000 feet (305m) but can range from 235 to 2000 feet (72 to 610m). Slopes range from level to 25 percent. Depth to bedrock is 80 inches or more (203cm), but a dense subsurface layer called a fragipan within 22 inches (56 cm) of the soil surface can restrict root growth and the downward flow of water in some areas. This ecological site can be subject to frequent and brief flooding (2 to 7 days). Frequent flooding is defined as having up to a 50 percent chance of flooding in any year (USDA 2016). Ponding can also occur in the wettest areas and last from 2 to 30 days. Some Urban lands are also included in this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Mountain slope (3) Depression
Runoff class	Low to very high
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to frequent

Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	40 – 490 m
Slope	0 – 30 %
Ponding depth	0 – 40 cm
Water table depth	10 – 80 cm
Aspect	Aspect is not a significant factor

Climatic features

The Northern Blue Ridge, Major Land Resource Area (MLRA) 130A, appears to have three somewhat distinct sections based on PRISM data for average annual precipitation and minimum average annual temperature (PRISM 2013). The northernmost section that runs from Adams County, Pennsylvania south through Washington County, Maryland has an average annual average precipitation of 38 inches (97cm) in the lower elevations up to 50 inches (127 cm) in the higher elevations - about 2000 feet (610m). The average annual minimum temperature is 40 to 44°F (4.4 to 6.7°C). From Washington County, Maryland south to the northern tip of Rappahannock County, Virginia, the average annual precipitation is less variable, ranging from approximately 38 to 42 inches (97 to 107cm). The average annual minimum temperature remains about the same as to the north, 40 to 44°F (4.4 to 6.7°C). The lower third of MLRA 130A starting from northern Rappahannock County down through Bedford County, Virginia receives more moisture and is colder, with average annual precipitation that ranges from 40 (107cm) to greater than 50 inches (127cm) at elevations higher than 2000 feet (610m) which is a significant part of this section of the MLRA. Average minimum temperatures range from 34°F (1.1°C) at elevation greater than 3000 feet (914m) to 38°F (3.3°C) at the lowest elevations, less than 1000 feet (305m).

These three climate regions seem to correspond to differences in elevation and relief. Most of the Blue Ridge ranging from Adams County, Pennsylvania through Maryland to Rappahannock County, Virginia rises no higher than 2000 feet (610m). Much of the Blue Ridge south of and including Rappahannock County rises above 2000 feet up to 4000 feet (610 to 1219m).

The higher elevations interact with moist air that flows inland from the Atlantic Ocean. Along the east coast of the United States, winter storms moving across the continent encounter the warm Gulf Stream waters and begin to track northeastward paralleling the coast. As the moisture-laden air from the storms crosses Virginia, the eastern slopes and foothills of the Blue Ridge receive much of this precipitation (Hayden and Michaels 2017). In addition, the high relief of the mountains intercepts much of any moisture moving inland from the east coast. The Shenandoah Valley which lies just to the west of the Blue Ridge is one of the driest parts of the state of Virginia. Where the Blue Ridge elevation is greater than 2000 feet (610m), the east-facing slopes appear to receive over 50 inches (127cm) of annual rainfall on average while the Valley to the west of the mountains receives less than 38 inches (97 cm), and the mountains' western footslopes receive 2 to 4 inches (5 to 10cm) less of precipitation than the eastern ones (PRISM). This rain shadow effect is not as pronounced where the ridges are below 1640 ft (500m) of elevation.

Currently, the Poorly to Somewhat Poorly Drained Floodplains and Toeslopes provisional ecological site is mapped primarily in the northern half of the MLRA. Field work is needed to determine if the precipitation and annual average temperature differences are significant enough to cause major shifts in ecological sites within this area necessitating the further subdivision of broadly mapped PES into more refined climatic groupings.
Data for mean annual precipitation, frost-free and freeze-free periods and monthly precipitation for this ecological site are shown below. The original data used in developing the tables was obtained from the USDA-NRCS National Water & Climate Center (2015) climate information database for 4 weather stations throughout MLRA 130A in proximity to this ecological site. All climate station monthly averages for maximum and minimum temperature and precipitation were then added together and averaged to make this table.

Table 3 Representative climatic features

Frost-free period (characteristic range)	130-160 days
Freeze-free period (characteristic range)	170-190 days
Precipitation total (characteristic range)	1,090-1,270 mm
Frost-free period (actual range)	120-160 days
Freeze-free period (actual range)	160-190 days
Precipitation total (actual range)	1,070-1,350 mm
Frost-free period (average)	140 days
Freeze-free period (average)	180 days
Precipitation total (average)	1,190 mm

- (1) BIG MEADOWS [USC00440720], Syria, VA
- (2) MT WEATHER [USC00445851], Paris, VA
- (3) CATOCTIN MTN PARK [USC00181530], Sabillasville, MD
- (4) LURAY 5 E [USC00445096], Luray, VA

Influencing water features

The Poorly to Somewhat Poorly Drained Floodplains and Toeslopes ecological site includes wetlands. Wetlands are areas that support plants which are able to grow in water saturated conditions (called hydrophytes), have a predominance of undrained (hydric) soils, and are periodically saturated or covered by shallow water at some time during the growing season (Cowardin 1979). Wetlands are important habitats for many species of wildlife and perform flood protection, pollution control, and a variety of other important functions. Because of the importance of wetlands, the U.S. Fish and Wildlife Service developed a National Wetlands Inventory (NWI) to provide reliable information on the status and extent of wetland resources (Cowardin 1979). Within the NWI, these wetlands fall within the Palustrine system which includes all nontidal wetlands dominated by trees, shrubs, and persistent emergent plants in freshwater environments. This ecological site classifies as a Palustrine Broad-leaved Deciduous seasonally saturated Forested wetland (Cowardin 1979).

The hydrogeomorphic (HGM) wetland classification system was developed as a way to group wetlands that function similarly (Smith 1995) based on the landscape and hydrology. This is in contrast to the Cowardin system that groups wetlands in broad systems and vegetatively. The Poorly to Somewhat Poorly Drained Floodplains and Toeslopes encompass several different hydrogeomorphic classifications. Specific areas would need an onsite assessment to determine the actual group. These alluvial and colluvial landscapes fall within both Riverine and Depression HGM classes: Riverine (nonperennial) – a wetland associated with an intermittent or ephemeral stream; Riverine (upper perennial) – a wetland associated with a 1st or 2nd order perennial stream; Depression (Open, Ground Water); and Depression (Open Surface Water). Brooks further refined the HGM classification for wetlands occurring in the Mid-Atlantic region (Brooks et. al. 2013). Under their system, this ecological site would classify as a Riverine Floodplain complex (R2c): wetlands that are part of a mosaic dominated by floodplain features (former channels, depressions) that may include slope wetlands supported by ground water.

Soil features

The representative soil series associated with this site are Swampoodle, Scattersville, Rohrersville, Lantz, Hatboro, Foxville, and Airmont. These soils formed from alluvium and colluvium derived from a mixture of geologies including granite, gneiss, metabasalt, phyllite,

quartzite, schist, sandstone, siltstone, and shales. They are on floodplains and toeslopes and can experience flooding and ponding. These soils are very poorly to somewhat poorly drained. In the wet areas, the water table can be within 3 inches (7.6cm) of the surface. Water table is within 30 inches (76cm) of the surface on drier convex spots. Permeability is slow to moderately rapid and soil is strongly to slightly acid with pH ranging from 5.0 to 6.1. Some soils may have a dense subsoil layer which restricts the downward flow of water and growth of roots within 22 inches (56cm) of the surface. Surface textures are loam and silt loam. Subsurface texture tends to be loamy.

Table 4. Representative soil features

Parent material	(1) Alluvium – metasedimentary rock (2) Colluvium – greenstone
Surface texture	(1) Cobbly silt loam (2) Extremely stony loam (3) Very cobbly
Family particle size	(1) Loamy
Drainage class	Very poorly drained to somewhat poorly drained
Permeability class	Slow to moderately rapid
Soil depth	60 – 200 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	8.38 – 19.05 cm
Soil reaction (1:1 water) (0-101.6cm)	10 – 6.1
Subsurface fragment volume <=3" (Depth not specified)	0 – 20 %
Subsurface fragment volume >3" (Depth not specified)	0 – 50 %

Ecological dynamics

The vegetation groupings described in this section are based on the terrestrial ecological system classification and vegetation associations developed by NatureServe (Comer 2003) and the Natural Heritage Programs of Pennsylvania (Zimmerman et al. 2012), Virginia (Fleming et al. 2013), West Virginia (WVDNR 2014), and Maryland (Harrison 2004). Terrestrial ecological systems are specifically defined as a group of plant community types (associations) that tend to co-occur within landscapes with similar ecological processes, substrates, and/or environmental gradients. They are intended to provide a classification unit that is readily mappable, often from remote imagery, and readily identifiable by conservation and resource managers in the field. A given system will typically manifest itself in a landscape at intermediate geographic scales of tens to thousands of hectares and will persist for 50 or more years. A vegetation association is a plant community that is much more specific to a given soil, geology, landform, climate, hydrology, and disturbance history. It is the basic unit for vegetation classification. Each association will be named by the dominant species that occupy the different strata (tree, sapling, shrub, and herb). Within the NatureServe database, individual vegetation associations are assigned an identification number called a Community Element Global Code (CEGL). Most of the Information contained in this section was adapted from several sources, including the Nature Conservancy's Northeast Terrestrial and Aquatic Habitat map (Anderson et al., 2013), NatureServe's Ecological Systems of the United States (Comer 2003; NatureServe 2009), and Landfire's Biophysical Settings and Existing Vegetation Type layers (Landfire 2010; Landfire 2013). The USDA Plants database was used to verify species' scientific and common names (USDA, NRCS. 2017).

The reference forest state is a combination of several vegetation communities within the North-Central Interior and Appalachian Rich Swamp, the North-Central Appalachian Acidic Swamp, and the Central Appalachian Stream and Riparian Systems as defined by NatureServe (NatureServe 2009; Anderson et. al. 2013). Tree species may include Tsuga Canadensis (Eastern hemlock), Acer rubrum (red maple), and Nyssa sylvatica (blackgum) where the underlying soil is acidic, or Acer rubrum (Red maple), and Fraxinus nigra (Black ash) where soil pH is closer to neutral. Drier areas may have Tsuga Canadensis (Eastern hemlock) and northern hardwood species such as Acer saccharum (Sugar maple), Betula alleghaniensis (Yellow birch), and Fagus grandifolia (American beech). As a result of the somewhat gentler topography, the easier accessibility, and the better fertility and moisture content of alluvial soils, much of this ecological site has been settled, logged, and cleared relative to the steeper, drier, less fertile uplands. Currently, at least 27 percent is classified as Ruderal forest (Landfire 2013). Therefore, mature forests may reflect the current naturalized, minimally managed post disturbance state rather than the forest composition of historic pre-European settlement. Approximately 15 percent of this ecological site has been converted to agricultural use, mainly pasture and hayland (Landfire 2013).

Disturbance agents in these forests include wind throw and ice damage. Nearby oak forests historically have been maintained by periodic fire. Fire suppression since the early 20th century in the eastern United States is believed to be leading to the overall replacement of oaks with fire-sensitive, non-oak species like maple, beech, birch, tuliptree, and black cherry (Brose et. al., 2008). Fire dynamics in bottomlands are not well-known, and probably only occurred in years that were extremely dry, since these areas naturally hold more moisture than upper slopes and ridge tops. Since most of the component species are among the less fire-tolerant, perhaps it can be assumed that fire historically has had only a limited effect on these particular landscapes. Hemlock has been greatly reduced by recent outbreaks of the hemlock woolly adelgid and may be restricted to the understory.

The information presented is representative of very complex vegetation communities. Key indicator plants and ecological processes are described to help inform land management decisions. Plant communities will differ across the major land resource region because of the naturally occurring variability in weather, soils, and aspect. The reference plant community is not necessarily the management goal. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

State and transition model

Figure 7. State and Transition Model

Figure 8. Legend

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Inventory data references

Site Development and Testing Plan Future work is needed, as described in a future project plan, to validate the information presented in this provisional ecological site description. Future work includes field sampling, data collection and analysis by qualified vegetation ecologists and soil scientists. As warranted, annual reviews of the project plan can be conducted by the Ecological Site Technical Team. A final field review, peer review, quality control, and quality assurance reviews of the ESD are necessary to approve a final document.

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Contributors

Regional Soil Survey Staff

Approval

Greg Schmidt, 9/27/2024

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	09/17/2026
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

   _____

2. **Presence of water flow patterns:**

   _____

3. **Number and height of erosional pedestals or terracettes:**

   _____

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

   _____

5. **Number of gullies and erosion associated with gullies:**

   _____

6. **Extent of wind scoured, blowouts and/or depositional areas:**

   _____

7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**
