Ecological site F130AY007PA
Fine To Loamy Mixed Metamorphic Floodplain

Accessed: 05/20/2024

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 Fine to Loamy Mixed Metamorphic Floodplain
ecological site occurs within both 66b, EPA Ecoregion IV – Northern Sedimentary and Metasedimentary Ridges, and in 66a - Northern
Igneous Ridges (Woods et. al., 1996).

Central Appalachian River Floodplain System - CES202.608

• *Liriodendron tulipifera* - *Platanus occidentalis* - *Betula lenta* / *Lindera benzoin* / *Circaea lutetiana* ssp. canadensis Forest Association –
CEGL006255

Central Appalachian Stream and Riparian System - CES202.609

• *Platanus occidentalis* - *Betula nigra* - Salix (caroliniana, nigra) Floodplain Forest Association - CEGL003896 (NatureServe 2017)

Ecological site concept

The Fine to Loamy Mixed Metamorphic Floodplains are located on stream terraces, floodplains, and alluvial fans, on the eastern and
western edges of the Northern Blue Ridge Region. The parent material is recent alluvium weathered from granite, gneiss, schist, phyllite,
sandstone, siltstone, shales or other mixed metamorphic and crystalline rocks. Soils are deep, mostly well drained, and are strongly to
slightly acidic. This ecological site occurs on active floodplains which differentiates it from similar bottomlands and footslope areas like the
Mixed Metamorphic-Metabasalt Footslopes and Terraces and the Quartzitic Footslopes and Terraces which generally do not flood.

The reference forest state is a combination of several vegetation communities within the Central Appalachian Stream and Riparian and
Central Appalachian River Floodplain Systems as defined by NatureServe (NatureServe 2009). These areas will have a mixture of oak and
hickory species characteristic of dry to mesic conditions, mesophytic (moisture loving) hardwood and hemlock forests, and typical floodplain
species like sycamore, maple, and ash. Some of the highly variable coarse to fine textured depositional bars will host an early successional
community of shrubs and woodlands and pockets of wetland plants. As a result of the somewhat gentler and flatter topography, the easier
accessibility, and the better fertility and moisture content of alluvial soils, much of these areas have been settled, logged, and cleared
relative to the steeper, drier, less fertile uplands. Therefore, mature forests may reflect the current naturalized, minimally managed post
disturbance state rather than the forest composition of historic pre-European settlement. Approximately 16 percent of this ecological site
has been converted to agricultural use, mainly pasture and hayland (Landfire 2013).

Associated sites

F130AY005PA	**Mixed Metamorphic - Metabasalt Footslopes And Terraces** The Mixed Metamorphic-Metabasalt Footslopes and Terraces are on nearby slopes.
F130AY006PA	**Quartzitic Footslopes And Terraces** The Quartzitic Footslopes and Terraces are on nearby slopes.
F130AY008PA	**Poorly To Somewhat Poorly Drained Floodplains And Toeslopes** The Poorly to Somewhat Poorly Drained Floodplains and Toeslopes ecological site is on depressions and seep areas in and around the floodplains.

Similar sites

F147XY009PA	**Loamy Mixed Floodplain** The Loamy Mixed Floodplain provisional ecological site of the adjacent Ridge and Valley major land resource area has similar soil textures, depth, and drainage, and a history of human disturbance. Future field work and analysis may result in these ecological sites being combined.

Table 1. Dominant plant species

Tree	(1) *Liriodendron tulipifera* (2) *Platanus occidentalis*
Shrub	(1) *Lindera benzoin*
Herbaceous	(1) *Circaea lutetiana*

Physiographic features

The Fine to Loamy Mixed Metamorphic Floodplain provisional ecological site occurs on floodplains, stream terraces, and alluvial fans, mostly on the eastern and western edges of the Northern Blue Ridge Major Land Resource Area where sediments are washed from mountainous uplands and deposited along streams in the foothills. The parent material is recent alluvium weathered from granite, gneiss, schist, phyllite, sandstone, siltstone, shales or other mixed metamorphic and crystalline rocks. Elevation is generally around 1000 feet (305m) but can range from 235 to 2100 feet (72 to 640m). Slopes range from level to 8 percent. Depth to bedrock is 80 inches or more (203cm). These areas are subject to brief (2 to 7 days) flooding, but no ponding. Flooding can be frequent - up to a 50 percent chance of flooding in any year (USDA 2016).

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Stream terrace (3) Alluvial fan
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to frequent
Ponding frequency	None
Elevation	72–640 m
Slope	0–8%
Water table depth	53–99 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 Shallow to Moderately Deep Mixed Metamorphic Granitic provisional ecological site is mapped throughout 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 from north to south or from east to west 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 (average)	169 days
Freeze-free period (average)	187 days
Precipitation total (average)	1,219 mm

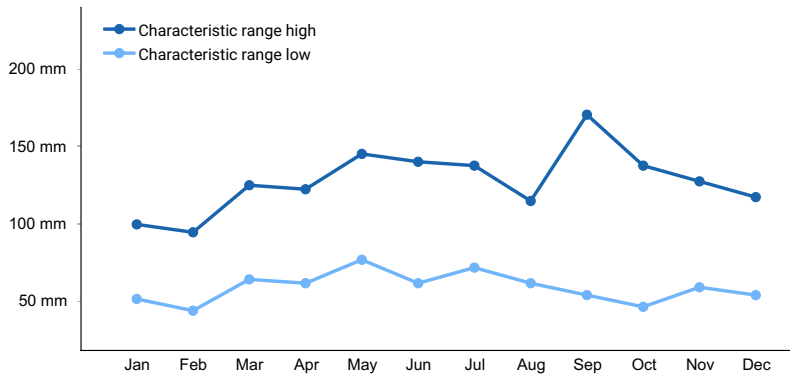

Figure 1. Monthly precipitation range

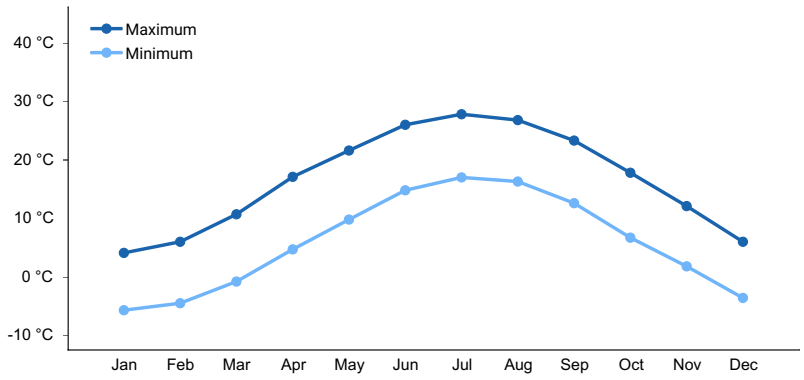

Figure 2. Monthly average minimum and maximum temperature

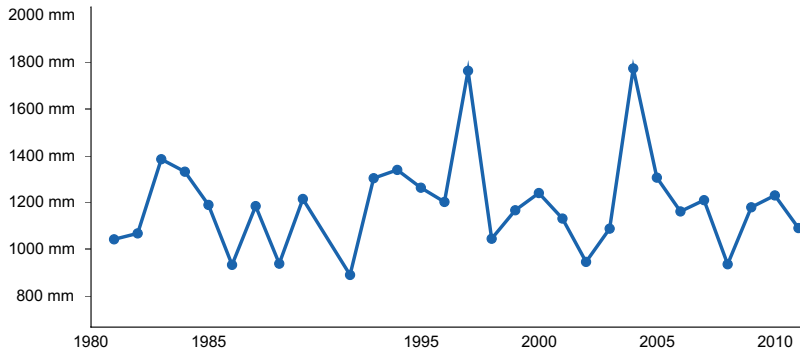

Figure 3. Annual precipitation pattern

Climate stations used

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

Influencing water features

This ecological site is subject to flooding.

Soil features

The soil series associated with this site are Suches, Deposit, Craigsville, Comus, and Combs. These soils formed from recent alluvium derived from a mixture of geologies including granite, gneiss, schist, phyllite, sandstone, siltstone, shales or other mixed metamorphic and crystalline rocks. They are on floodplains subject to frequent flooding. These soils are moderately to well drained with depth to high water table ranging from 20 to 40 inches (51 to 102cm). Permeability is moderate to rapid, and the soil is strongly to slightly acid with pH ranging from 5.0 to 6.5. Surface textures are fine sandy loam, loam, sandy loam, and silt loam. Subsurface texture tends to be sandy.

Table 4. Representative soil features

Parent material	(1) Alluvium–metasedimentary rock
Surface texture	(1) Cobbly silt loam (2) Very stony fine sandy loam (3) Sandy loam
Family particle size	(1) Sandy
Drainage class	Moderately well drained to well drained
Permeability class	Moderate to rapid
Soil depth	203 cm

Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	2%
Available water capacity (0-101.6cm)	7.11–16.51 cm
Soil reaction (1:1 water) (0-101.6cm)	5–6.5
Subsurface fragment volume <=3" (Depth not specified)	0–30%
Subsurface fragment volume >3" (Depth not specified)	0–65%

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 Central Appalachian Stream and Riparian Forest system is characteristic of this site (NatureServe 2009; Anderson et. al 2013). This forest occurs over a wide range of elevations and develops on floodplains and shores along river channels that lack a broad flat floodplain due to steeper sideslopes, higher gradient, or both (NatureServe 2009). It may include communities influenced by flooding, erosion or groundwater seepage. The vegetation is often a mosaic of forest, woodland, shrub land, and herbaceous communities. Common trees include *Betula nigra* (River birch), *Platanus occidentalis* (American sycamore), and *Acer negundo* (Box elder). Open, flood-scoured rivershore prairies feature *Panicum virgatum* (switchgrass) and *Andropogon gerardii* (Big bluestem). *Carex torta* (Twisted sedge) is typical of wetter areas near the channel.

The streams within the Northern Blue Ridge are small to medium in size and of medium to high gradient. They do not have large broad floodplains, the exception being the Shenandoah and Potomac Rivers which cut through the Northern Blue Ridge at Harpers Ferry, West Virginia. These larger floodplains host plant species that are part of the North Central Appalachian Large River Floodplain Forest system (Anderson et. al. 2013). Tree species may include *Acer saccharinum* (Silver maple) *Platanus occidentalis* (Sycamore), *Acer negundo* (box elder), and Populus deltoids (Cottonwood) and a highly variable mixture of plants that grow on depositional gravel and mud bars.

Disturbance agents in these forests include fire, wind throw, and ice damage. Gypsy moths can wreak havoc in the oak over story periodically. 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 maples, beeches, birches, tulip poplars, and black cherry (Brose et. al., 2008). Fire dynamics in these floodplains 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 in the floodplain areas 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.

Much of this ecological site has been subjected to human activity including logging, settlement, or other disturbance, therefore many of the forests are mid successional. These ruderal (growing where the natural vegetation has been disturbed by humans) forests and woodlands comprise about 22% of the area and are generally characterized by unnatural combinations of species (primarily native species, though they often contain slight or substantial numbers and amounts of species alien to the region as well). As much as 16 percent of this ecological site has been converted to agricultural use, mainly pasture and hayland (Landfire 2013).

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

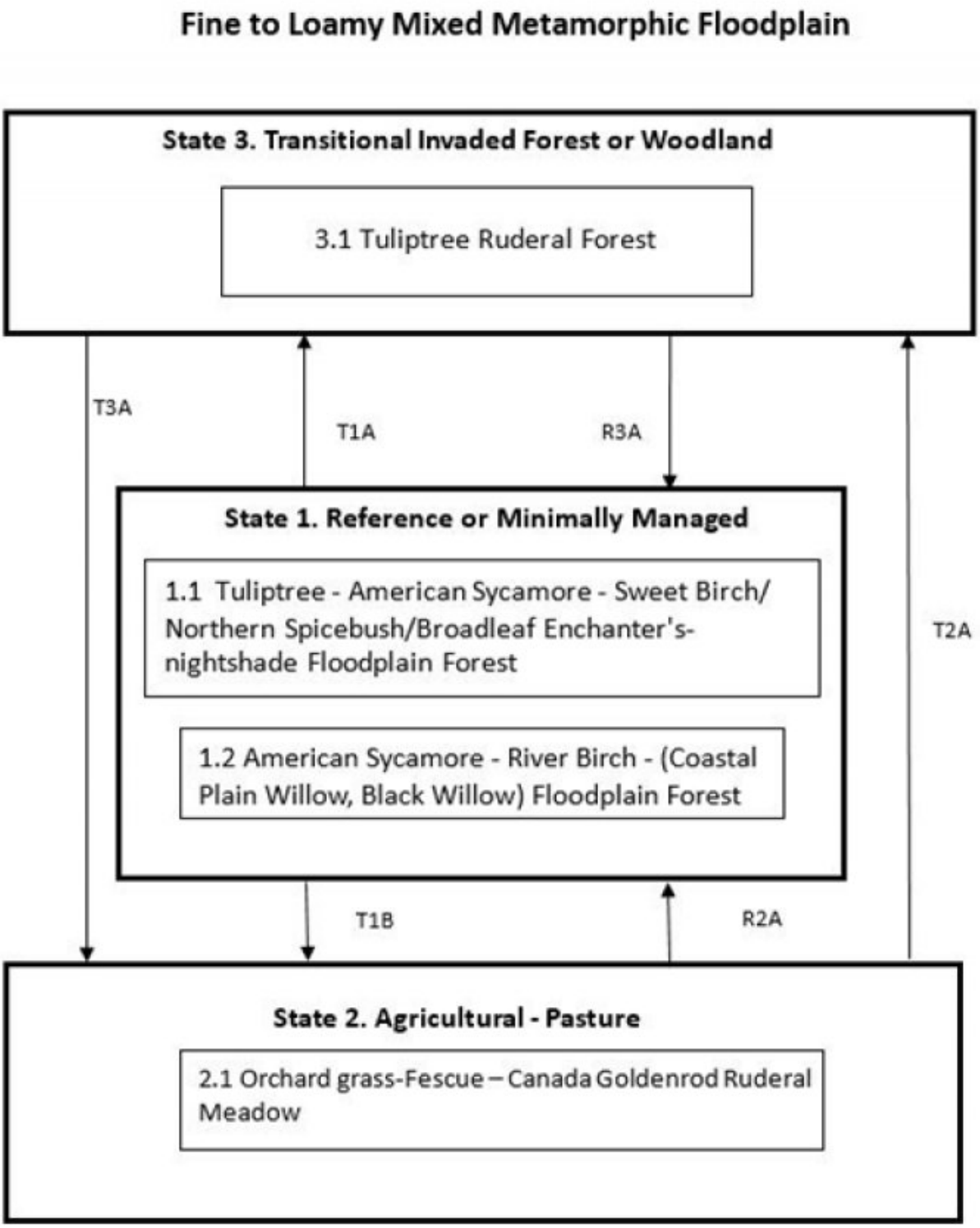

Figure 5. State and Transition Model

Code	Event/Activity
T1A	Logging followed by forest regrowth
T1B	Clearcutting, conversion to pasture, pasture seeding, grassland management with regular mowing.
T2A	Clearcutting, conversion to pasture, then successional forest regrowth.
R2A	Cease mowing and pasture management, exclude grazing, plant native seeds and seedlings, eliminate and manage nonnative species.
T3A	Clearcutting; conversion to pasture, pasture seeding; grassland management with regular mowing.
R3A	Understory removal of invasive and nonnative species, plant native seeds and seedlings if necessary.

Figure 6. Legend

State 1
Reference

The reference forest state is a combination of several vegetation communities within the Central Appalachian Stream and Riparian and Central Appalachian River Floodplain Systems as defined by NatureServe (NatureServe 2009). Due to the long history of human activity, the associations listed below may in reality reflect the current naturalized, minimally managed post disturbance state rather than the historic, pre-European settlement condition. These areas will have tuliptree as well as a mixture of oak and hickory species characteristic of dry to mesic conditions, mesophytic (moisture loving) hardwood and hemlock forests, and typical floodplain species like sycamore, maple, and ash. Some of the highly variable coarse to fine textured depositional bars will host an early successional community of shrubs and woodlands and pockets of wetland plants. The reference communities listed below have been documented on this ecological site and are associated with the Northern Blue Ridge. Due to the heterogeneity and the broadness of this provisional ecological unit, they are not intended to cover every situation nor the full range of conditions and species. There are no transition pathways designated between the two communities in the reference state because the differences in vegetation are more controlled by landscape position and flooding frequency than management or disturbance.

Community 1.1
Liriodendron tulipifera - Platanus occidentalis/Lindera benzoin/Circaea lutetiana Floodplain

Forest

The Tuliptree - American Sycamore - Sweet Birch / Northern Spicebush / Broadleaf Enchanter's-nightshade Floodplain Forest, also known as the Northern Blue Ridge Montane Alluvial Forest (CEGL006255; NatureServe 2017), occupies mountain alluvial floodplains along more-or-less high-gradient streams and small rivers at the foot of the Blue Ridge in Virginia and Maryland. It appears to be confined to floodplains with relatively fertile alluvial deposits derived from metabasalt (greenstone), pyroxene-rich granites, or metasiltstone/phyllite. These habitats are typically narrow, nearly flat, and have complex microtopography and in some places rocky streambeds. Soils are well-drained and moderately fertile. Many of these sites were probably cleared and/or subjected to multiple historical disturbances, including grazing and cultivation. This forest is composed primarily of mesophytic upland species with some admixture of species characteristic of alluvial and wetland habitats. Vegetation is generally species-rich and heterogeneous, with composition frequently shifting in association with microhabitat conditions and disturbance histories. The overstory typically contains many tree species. However, *Liriodendron tulipifera* (Tuliptree) is generally a constant codominant, while *Platanus occidentalis* (American sycamore) is usually scattered and occasionally abundant. Other species that are important in some stands include *Acer negundo* (Boxelder), *Acer rubrum* (Red maple), *Acer saccharum* (Sugarm maple), *Betula alleghaniensis* (Yellow birch), *Betula lenta* (Sweet birch), *Betula nigra*(River birch), *Carya cordiformis* (Bitternut hickory), *Carya ovata* (Shagbark hickory), *Fagus grandifolia* (American beech), *Fraxinus americana* (White ash), *Fraxinus pennsylvanica* (Green ash), *Juglans nigra* (Black walnut), *Nyssa sylvatica* (Sourgum), *Quercus alba* (White oak), Quercus prinus (Chestnut oak), *Quercus rubra* (Northern red oak), *Tilia americana* (American basswood), *Tsuga canadensis* (Eastern hemlock), *Ulmus americana* (American elm), and *Ulmus rubra* (Slippery elm). The understory contains saplings of the overstory species, along with *Asimina triloba* (Pawpaw), *Carpinus caroliniana* (American hornbeam), *Cornus florida* (Flowering dogwood), Corylus spp. (Hazelnut), *Hamamelis virginiana* (American witchhazel), *Lindera benzoin* (Spicebush), *Ostrya virginiana* (Hophornbeam), and *Viburnum prunifolium* (Blackhaw). The herb layer is very diverse and dominated by numerous upland mesophytic species. Wet microhabitats typically support *Impatiens capensis* (Jewelweed), *Carex intumescens* (Greater bladder sedge), *Carex tribuloides* (Blunt broom sedge), *Glyceria striata* (Fowl mannagrass), *Thalictrum pubescens* (King of the meadow), *Viola cucullata* (Marsh blue violet), and few other wetland plants.

Community 1.2
Platanus occidentalis - Betula nigra - Salix (caroliniana, nigra) Floodplain Forest

The American Sycamore - River Birch - (Coastal Plain Willow, Black Willow) Floodplain Forest, also known as the Piedmont-Central Appalachian Sycamore - River Birch Floodplain Forest (CEGL003896; NatureServe 2017) is an early-successional woodland community of coarse-textured (cobbly / bouldery) to fine-textured (silty or muddy) depositional bars and islands which occur along rivers and large streams in the High Allegheny Plateau, Central Appalachians, and Lower New England ecoregions. It is subject to relatively frequent and powerful flooding and ice-scouring and has a highly variable appearance. It is dominated by stunted, usually battered and flood-trained trees, varying from <16 to >33 feet tall (5 to 10 m) of *Platanus occidentalis* (American sycamore) and *Betula nigra* (River birch). *Salix caroliniana* (Coastal plain willow) and *Salix nigra* (Black willow) are dominant or codominant in a minority of stands. Other floodplain trees, particularly *Acer saccharinum* (Silver maple) and *Fraxinus pennsylvanica*, (Green ash) may occur as minor associates. Shrub associates include *Cornus amomum* (Silky dogwood), *Salix sericea* (Silky willow), *Alnus serrulata* (Hazel alder), and sometimes *Cephalanthus occidentalis* (Common buttonbush) or *Physocarpus opulifolius* (Common ninebark). The herbaceous layer ranges from sparse to moderately dense. Characteristic herbs include *Apocynum cannabinum* (Indianhemp), *Polygonum virginianum* (Jumpseed), *Polygonum hydropiper* (Marshpepper knotweed), *Polygonum pensylvanicum* (Pennsylvania smartweed), *Polygonum hydropiper*oides (Swamp smartweed), *Polygonum sagittatum* (Arrowleaf tearthumb), *Eupatorium serotinum* (Lateflowering thoroughwort), Asclepias incarnate (Swamp milkweed), *Pilea pumila* (Canadian clearweed), Hypericum spp. (St. Johnswort), Bidens spp. (Beggarticks), *Phalaris arundinacea* (Reed canarygrass), *Dichanthelium clandestinum* (Deertongue), *Leersia virginica* (Whitegrass), *Panicum virgatum* (Switchgrass), and *Justicia americana* (American water-willow). Vines such as *Vitis riparia* (Riverbank grape) and *Toxicodendron radicans* (Poison ivy) are often found throughout this association. Exotics such as *Lythrum salicaria* (Purple loosestrife), *Microstegium vimineum* (Nepalese browntop), *Polygonum cuspidatum* (Japanese knotweed), Coronilla varia (Crownvetch), and *Rosa multiflora* (Multiflora rose) are frequent invaders.

State 2
Agricultural – Pasture

Community 2.1
Dactylis glomerata - Festuca spp. - Solidago canadensis Ruderal Mesic Meadow Alliance

The Orchardgrass - Fescue species - Canada Goldenrod Ruderal Mesic Meadow Alliance (A1190, NatureServe 2017) is a broadly defined community which includes mesic abandoned pastures and agricultural fields and is largely composed of non-native cool-season grasses and herbs (generally of European origin) in the early stages of succession. Species composition varies from site to site, depending on land-use history and perhaps soil type, but in general this vegetation is quite wide-ranging in northeastern and midwestern states. Dominant grasses vary from site to site but generally include the exotic grasses *Agrostis stolonifera* (Creeping bentgrass), *Agrostis hyemalis* (Winter bentgrass), *Anthoxanthum odoratum*, (Sweet vernalgrass), *Bromus inermis* (Smooth Brome), *Bromus tectorum* (Cheatgrass), *Dactylis glomerata* (Orchardgrass), Schedonorus arundinaceum (Tall fescue), *Lolium perenne* (Perennial ryegrass), Phleum pretense (Timothy) as well as weedy natives such as *Elymus repens* (Quackgrass), *Poa pratensis* (Kentucky bluegrass), and, less commonly, *Schizachyrium scoparium* (Little bluestem). Herbaceous species may be minor or dominant and include various Solidago spp. (goldenrods), Sympyotrichum spp. (Asters), and other native and non-native species. At least 16% of the Fine to Loamy Mixed Metamorphic Floodplain provisional ecological site is in agricultural use, mostly pasture and hayland (Landfire 2013).

State 3
Transitional Invaded Forest or Woodland

Community 3.1
Liriodendron tulipifera Ruderal Forest

The Tuliptree Ruderal Forest (combination of several CEGL associations) is an early successional community that occurs on sites that are becoming reforested after having been cleared for agriculture or otherwise heavily modified in the past. It is assumed that a variation of this community exists on the Fine to Loamy Mixed Metamorphic Floodplain ecological site. Environmental setting varies, and physiognomy of this vegetation is highly variable, ranging from closed forest, open forest, tall dense shrubland, to more open tall shrubland. Early-successional woody species dominate the canopy in a widely variable mix, depending on geographic location. In the Central Appalachians and Mid-Atlantic Piedmont, many stands represent decadent forests that were once dominated by *Robinia pseudoacacia* (Black locust) but are now mixed with various mid-successional hardwoods; other stands in this region regenerated as mixed stands. Tree species often include some combination of *Prunus serotina* (Black cherry), *Liriodendron tulipifera* (Tuliptree), Fraxinus Americana (American ash), *Robinia pseudoacacia* (Black locust), and *Acer rubrum* (Red maple). Other associates can include *Juglans nigra* (Black walnut), *Sassafras albidum* (Sassafras), *Betula populifolia* (Gray birch) , *Juniperus virginiana* (Eastern redcedar), *Acer negundo* (Boxelder), *Acer saccharinum* (Silver maple), *Ailanthus altissima* (Tree of heave), Ulmus Americana (American elm), Quercus spp. (Oak), *Betula lenta* (Sweet birch), Amelanchier spp. (Serviceberry), *Pinus strobus* (Eastern white pine), and *Populus grandidentata* (Bigtooth aspen). Other woody species may contribute to the canopy or form a tall-shrub layer, including *Lindera benzoin* (Spicebush) and *Carpinus caroliniana* (American hornbeam). The low-shrub layer, if present, is usually characterized by the presence of Rubus spp. such as *Rubus flagellaris* (Northern dewberry), *Rubus allegheniensis* (Allegheny blackberry), *Rubus phoenicolasius* (Wine raspberry), or *Rubus hispidus* (Bristly dewberry). This layer is often dominated by exotic species such as *Lonicera tatarica* (Tatarian honeysuckle), *Lonicera morrowii* (Morrow's honeysuckle), *Rhamnus cathartica* (Common buckthorn), Crataegus spp. (Hawthorn), *Rosa multiflora* (Multiflora rose), and *Berberis thunbergii* (Japanese barberry). The herbaceous layer is variable, often containing grasses and forbs of both native and exotic origin. The invasive species Alliaria petiolate (Garlic mustard), *Microstegium vimineum* (Nepalese browntop), and Polygonum caespitosum (Oriental lady's thumb) can be abundant in this disturbed forest type. Common vines include *Parthenocissus quinquefolia* (Virginia creeper), *Toxicodendron radicans* (Poison ivy), *Vitis labrusca* (Foxgrape), and the invasive vines Celastrus orbiculata (Oriental bittersweet) and *Lonicera japonica* (Japanese honeysuckle). These forests are often young and resulted from the colonization of old agricultural fields by woody species. Recent disturbance or abundant invasive species give these forest stands a weedy character. It is unlikely that these stands will succeed to a natural plant community dominated by native species.

Transition T1B
State 1 to 2

Logging, clearing, and then planting of non-native pasture grass mixes, and grazing. Maintenance with periodic

mowing to prevent trees and shrubs from reestablishing.

Transition T1A
State 1 to 3

Logging, agricultural conversion, or other significant human disturbance. Natural regeneration is allowed to occur. Fire suppression and the inherent moisture in the landscape allows fire sensitive species like tuliptree, red maple, and birches to out compete oak seedlings in the understory.

Restoration pathway R2A
State 2 to 1

Return to the reference or post logged minimally managed state may require a very long term series of costly management options and stages. Many species may need to be planted or seeded to restore the system. If using acorns, direct seeding must be done fairly heavily. Herbivory can be a problem as well as competition from faster growing species. Depending on the existing seed bank and the proximity of a mature forest from which to recruit seeds, ruderal forests may regain a mixed forest stand. Nevertheless, sites that have been cleared and tilled have significant soil disturbance which may include compaction, erosion, loss of native soil structure, loss of soil organic matter, disruption of soil microorganisms, all which affect the soil's nutrient availability and water holding capacity (Duiker and Myers, 2005). These characteristics favor recolonization by plant species that have wind dispersed seeds (verses those that propagate through underground roots called rhizomes, or which have heavy seeds that stay near the parent tree), are shade intolerant, have rapid to moderate growth rates, and drought tolerance (Dyer, 2010). Aggressive control of nonnative species and invasives will be ongoing.

Transition T2A
State 2 to 3

Abandonment of pasture or old field. Discontinue mowing and do not allow grazing. Allow natural regeneration.

Restoration pathway R3A
State 3 to 1

Return to the reference or post logged minimally managed state may require a very long term series of costly management options and stages. Many species may need to be planted or seeded to restore the system. If using acorns, direct seeding must be done fairly heavily. Herbivory can be a problem as well as competition from faster growing species. Depending on the existing seed bank and the proximity of a mature forest from which to recruit seeds, ruderal forests may regain a mixed forest stand. Nevertheless, sites that have been cleared and tilled have significant soil disturbance which may include compaction, erosion, loss of native soil structure, loss of soil organic matter, disruption of soil microorganisms, all which affect the soil's nutrient availability and water holding capacity (Duiker and Myers, 2005). These characteristics favor recolonization by plant species that have wind dispersed seeds (verses those that propagate through underground roots called rhizomes, or which have heavy seeds that stay near the parent tree), are shade intolerant, have rapid to moderate growth rates, and drought tolerance (Dyer, 2010). Aggressive control of nonnative species and invasives will be ongoing.

Transition T3A
State 3 to 2

Logging, clearing, and then planting of non-native pasture grass mixes, and grazing. Maintenance with periodic mowing to prevent trees and shrubs from reestablishing.

Additional community tables

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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	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

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

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

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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):**

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

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

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:**

17. **Perennial plant reproductive capability:**