USDA Natural Resources Conservation Service

Ecological site F130AY006PA
Quartzitic Footslopes And Terraces

Accessed: 05/21/2024

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 Quartzitic Footslopes and Terraces ecological site occurs primarily within 66b of EPA Ecoregion IV – Northern Sedimentary and Metasedimentary Ridges (Woods et. al., 1996).
Central Appalachian Dry Oak-Pine Forest System - CES202.591
Quercus prinus - (*Quercus coccinea*, *Quercus rubra*) / *Kalmia latifolia* / *Vaccinium pallidum* Forest Association (CEGL006299)

Northeastern Interior Dry-Mesic Oak Forest System - CES202.592

Quercus prinus - *Quercus rubra* / *Hamamelis virginiana* Forest Association (CEGL006057)

(NatureServe 2017)

Ecological site concept

The Quartzitic Footslopes and Terraces are located in the Northern Blue Ridge region of the Appalachian Highlands, primarily on the western side where underlying geologies are mostly composed of quartzite, metaquartzite, phyllite, sandstone, and shale. This ecological site is found on lower mountain slopes, footslopes, toeslopes, coves, benches, drainageways, mountain valleys, stream terraces, and fans. Soils are deep, well drained and very strongly to moderately acidic. Low to mid slope areas generally have more moisture than ecological sites further upslope, however, these landscapes are dry due to the sandy soil textures and stoniness. This ecological site is drier, more acidic, and less fertile than the Mixed Metamorphic-Metabasalt Footslopes and Terraces ecological site which is on similar landscapes, but underlain by different geology: metabasalts, granitic rocks, granodiorite, gneiss, schists, and some phyllite.

Not much is known about this site, and future field work may result in it being combined with another coarse textured terrace or floodplain ecological site or combined with an upland site. Current field data from the Heritage Programs of Pennsylvania, Maryland, and Virginia suggest that this ecological site is very similar to the Quartzitic Uplands, however, much more ruderal forest exists on these lower slope areas than in the upper slopes and ridgetops, suggesting a more extensive history of logging, past farming and settlement. The reference state is a combination of several vegetation communities within the Central Appalachian Dry Oak-Pine Forest, and the Northeastern Interior Dry-Mesic Oak Forest as defined by NatureServe (NatureServe 2009). These forests are mostly closed-canopy but can include patches of more open woodlands and grasslands. The coarse, acidic, well drained soils, will host a variable mixture of dry-site oak and pine species. Heath shrubs are common in the understory.

Associated sites

F130AY004PA	**Quartzitic Upland** The Quartzitic Upland occurs on adjacent upper slopes.
F130AY007PA	**Fine To Loamy Mixed Metamorphic Floodplain** The Fine to Loamy Mixed Metamorphic Floodplain occurs along adjacent drainageways and streams.

Similar sites

F147XY007PA	**Loamy To Coarse Terrace** The Loamy to Coarse Terrace provisional ecological site of the Ridge and Valley major land resource area has similar soil textures, depth, and drainage. Future field work and analysis may result in these ecological sites being combined.
F130AY004PA	**Quartzitic Upland** The Quartzitic Upland provisional ecological site of the Northern Blue Ridge is similar but is generally drier with many more areas of shallow soils. More fieldwork is needed to see if these ecological sites should be combined.

Table 1. Dominant plant species

Tree	(1) *Quercus prinus* (2) *Quercus coccinea*
Shrub	(1) *Kalmia latifolia* (2) *Vaccinium pallidum*
Herbaceous	Not specified

Physiographic features

The Quartzitic Footslopes and Terraces provisional ecological site occurs on geologies of quartzite, metaquartzite, phyllite, sandstone, and shale. Typical landscapes are mountain and hillslopes, footslopes, toeslopes, benches,

coves, drainageways, and fans. Elevation is generally around 1380 feet (420m) but can range from 235 to 2000 feet (72 to 610m). Slopes range from nearly level to 60 percent. Depth to bedrock is greater than 70 inches (178cm). This ecological site is not subject to flooding nor ponding.

Table 2. Representative physiographic features

Landforms	(1) Cove (2) Terrace (3) Fan
Flooding frequency	None
Ponding frequency	None
Elevation	72–610 m
Slope	0–60%
Water table depth	145–175 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

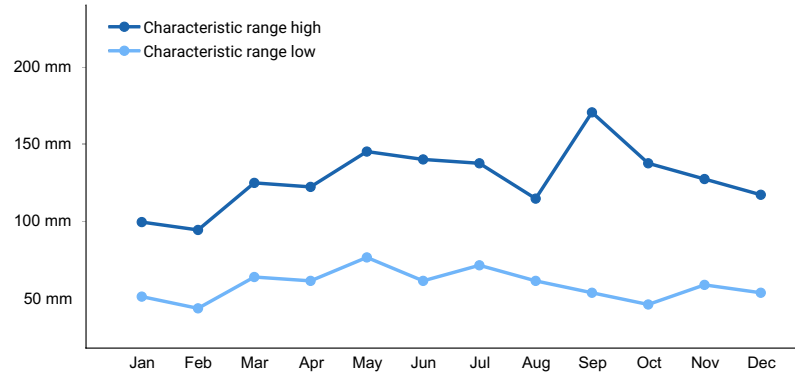

Figure 1. Monthly precipitation range

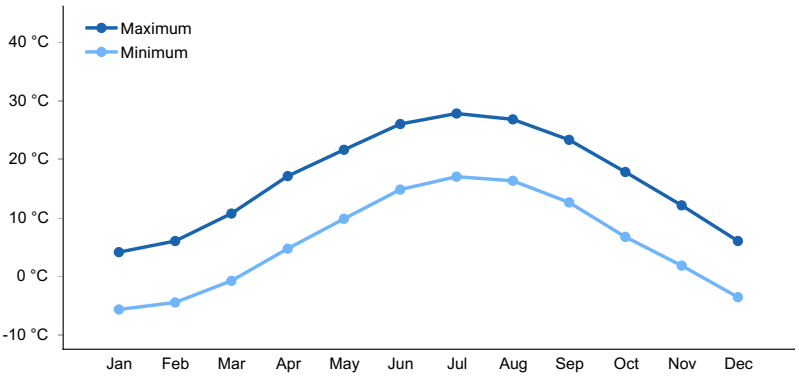

Figure 2. Monthly average minimum and maximum temperature

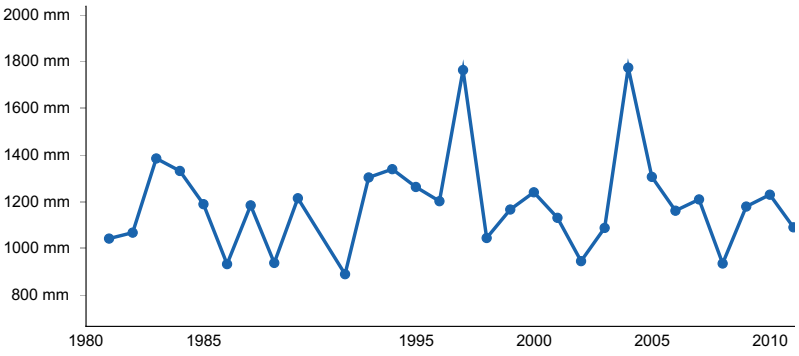

Figure 3. Annual precipitation pattern

Climate stations used

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

Influencing water features

This ecological site is not influenced by wetland or riparian water features.

Soil features

The soil series associated with this site are Sherando, Lostcove, Keener, Covegap, and Bagtown. These soils have weathered from geologies of metaquartzite, quartzite, metasedimentary rock, phyllite, sandstone, shale, and small areas of limestone. The soils are mostly derived from material that has moved from upper slopes to lower slope positions, called colluvium. Some of these soils have formed from alluvial sediments that were originally deposited along former floodplains which are now considered upland as the current floodplain has incised downward over geologic time.

Depth to bedrock is over 70 inches (178cm). The soils are moderately well to excessively well-drained with average water table depth ranging from 70 to 79 inches (178 to 201 cm). Soil permeability is moderately slow to rapid, and soil is very strongly to moderately acid with pH ranging from 4.8 to 5.8. Surface textures are fine sandy loam, loam, and sandy loam. Subsurface texture tends to be loamy. Soils data was obtained from the Natural Resources and Conservation Service (NRCS) National Soils Information System database (USDA 2015).

Table 4. Representative soil features

Parent material	(1) Colluvium–quartzite (2) Alluvium–metaquartzite
Surface texture	(1) Cobbly fine sandy loam (2) Extremely stony sandy loam (3) Very flaggy loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to somewhat excessively drained
Permeability class	Moderately slow to rapid
Soil depth	178–201 cm
Surface fragment cover <=3"	0–49%
Surface fragment cover >3"	1–49%
Available water capacity (0-101.6cm)	6.6–17.02 cm
Soil reaction (1:1 water) (0-101.6cm)	4.8–5.8
Subsurface fragment volume <=3" (Depth not specified)	0–30%
Subsurface fragment volume >3" (Depth not specified)	0–45%

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).

Not much is known about this site, and future field work may result with it being combined with another coarse textured terrace or floodplain or upland ecological description. The characteristic forest system is the Central Appalachian Dry Oak Forest (NatureServe 2009; Anderson et. al. 2013) composed of a variable mixture of dry-site oak and pine species, including Quercus prinus (Chestnut oak), *Pinus virginiana* (Virginia pine), and *Pinus strobus* (Eastern white pine). Heath shrubs such as *Vaccinium pallidum* (Blue Ridge blueberry), *Gaylussacia baccata* (Black huckleberry), and *Kalmia latifolia* (Mountain laurel) are common in the understory.

The Northeastern Interior Dry-Mesic Oak Forest System also occupies this ecological site, but not to the extent as the Dry Oak Forest (NatureServe 2009; Anderson et. al 2013). This is an oak-dominated, mostly closed canopy forest that occurs as a matrix (dominant) type through much of the Appalachians. It occurs at low to mid elevations on gently rolling to steep topography on planar, slightly concave, and slightly convex slopes. Oak species characteristic of dry to mesic conditions and hickories are dominant in mature stands. These include *Quercus rubra*, *Quercus alba*, *Quercus velutina*, and *Quercus coccinea* (red, white, black, and scarlet oaks) and Carya spp. (hickories). *Castanea dentata* (American chestnut) was a prominent tree before chestnut blight eradicated it as a canopy constituent.

The ecological site includes small areas of high gradient floodplains that are part of the Central Appalachian Floodplain Forest System, but are much more diverse and will be included in the Fine to Loamy Mixed Metamorphic Floodplain ecological site description.

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). Oak forest regeneration is also hindered by heavy deer browsing (Latham et. al. 2005). Deer will selectively consume many native species including oak seedlings and acorns over less palatable species like hay-scented fern and several non-native species including Japanese barberry, Eurasian species of honeysuckle, and garlic mustard.

Parts of this ecological site have been subjected to human activity including logging, settlement, or other disturbance, therefore some of the forests are mid successional, in which pines (typically Virginia or white) may be codominant or dominant. These ruderal (growing where the natural vegetation has been disturbed by humans) forests and woodlands comprise about 18% of the area and are generally characterized by unnatural combinations of species (primarily natives, though they often contain slight or substantial numbers and amounts of species alien to the region as well). Currently, little data has been documented about this post settlement successional state in this ecological site. There may be agricultural lands in the form of pasture and hayland present, but acreage is only about 2% due to the infertility, stoniness, and dryness of the soils and landscapes. Therefore, no agricultural alternative state is described.

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

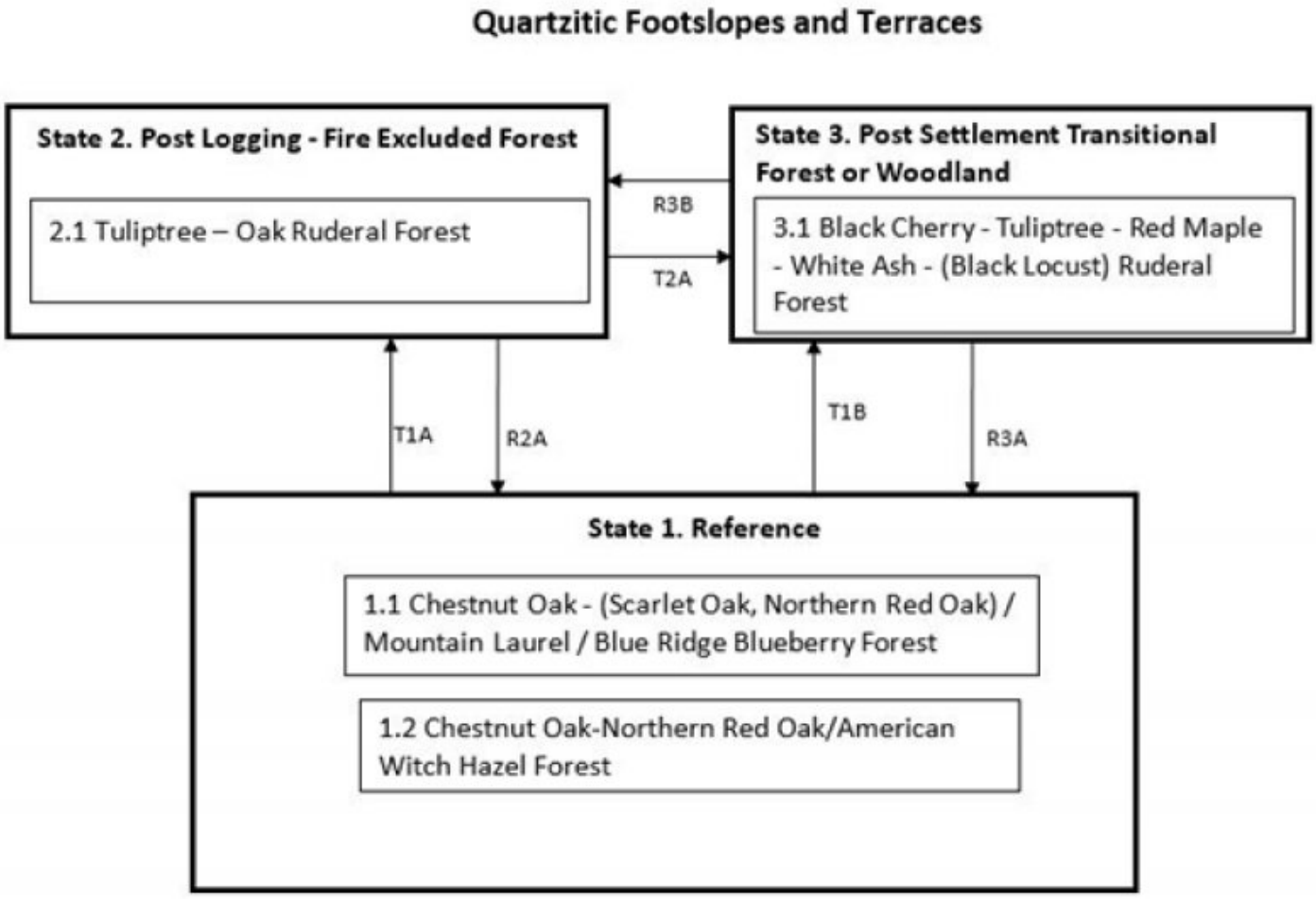

Figure 5. State and Transition Model

Code	Event/Activity
T1A	Logging and subsequent fire suppression, followed by forest regrowth
T1B	Clearcutting, conversion to pasture, then successional forest regrowth.
T2A	Clearcutting, conversion to pasture, then successional forest regrowth.
R2A	Understory removal to promote growth of oak seedlings; prescribed fire plan.
R3A	Remove understory, plant native seeds and seedlings, eliminate and manage nonnative species, implement a prescribed fire plan.
R3B	Remove understory, plant native seeds and seedlings, eliminate and manage nonnative species, implement a prescribed fire plan.

Figure 6. Legend

State 1
Reference

The reference state is a combination of several vegetation communities within the Central Appalachian Dry Oak-Pine Forest, and the Northeastern Interior Dry-Mesic Oak Forest as defined by NatureServe (NatureServe 2009). These forests are mostly closed-canopy but can include patches of more open woodlands and grasslands. The coarse, acidic, well drained soils, will host a variable mixture of dry-site oak and pine species. Heath shrubs are common in the understory. The reference communities listed below have been documented on this or similar ecological sites 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 or the full range of conditions and species for this site. 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 than management or disturbance.

Community 1.1
Quercus prinus - (Quercus coccinea, Quercus rubra) / Kalmia latifolia / Vaccinium pallidum Forest

The Chestnut Oak - (Scarlet Oak, Northern Red Oak) / Mountain Laurel / Blue Ridge Blueberry Forest, also known

as the Central Appalachian-Northern Piedmont Chestnut Oak Forest (CEGL006299; NatureServe 2017), occurs at relatively low elevations, mostly <2950 feet (900 m) in the Central Appalachians and adjacent areas (e.g., northern Piedmont and Ridge and Valley) and is documented on this landscape. This community can be readily identified by its dry, infertile, sandy loam soils, and quite species-poor vegetation overwhelmingly dominated by Quercus prinus (Chestnut oak) and *Kalmia latifolia* (Mountain laurel) often with *Vaccinium pallidum* (Blue Ridge blueberry). The canopy is strongly dominated by Quercus prinus. The most characteristic canopy associates are *Quercus coccinea* (Scarlet oak), which varies from sparse to codominant, and *Quercus rubra* (Northern red oak). Minor associates frequently include *Quercus velutina* (Black oak), *Quercus alba* (White oak), *Nyssa sylvatica* (Sourgum), *Sassafras albidum* (Sassafras), and/or *Robinia pseudoacacia* (Black locust). Root sprouts of *Castanea dentata* (American chestnut) are present in some areas. *Acer rubrum* (Red maple) and *Nyssa sylvatica* (Sourgum) are often abundant in the understory tree layers. Tall shrubs include *Kalmia latifolia* (Mountain laurel) (usually dominant), *Viburnum acerifolium* (Mapleleaf viburnum), and *Rhododendron periclymenoides* (Pink azalea). The short-shrub layer is well-developed and includes *Vaccinium pallidum* (Blue Ridge blueberry), *Vaccinium stamineum* (Deerberry), and *Gaylussacia baccata* (Black huckleberry), any one of which can exhibit patch-dominance. The herb layer generally has sparse cover but sometimes includes scattered individuals of *Aureolaria laevigata* (Entireleaf yellow false foxglove), Chimaphila maculate (Striped prince's pine), *Comandra umbellata* (Bastard toadflax), *Cypripedium acaule* (Moccasin flower), *Danthonia spicata* (Poverty oatgrass), *Epigaea repens* (Trailing arbutus), *Gaultheria procumbens* (Eastern teaberry), *Hieracium venosum* (Rattlesnake weed), *Lysimachia quadrifolia* (Whorled yellow loosestrife), *Medeola virginiana* (Indian cucumber), *Monotropa uniflora* (Indianpipe), *Pteridium aquilinum* (Western brackenfern), and/or *Uvularia puberula* (Mountain bellwort). This forest may currently exist in areas that were too dry and rocky to farm.

Community 1.2
Quercus prinus-Quercus rubra/Hamamelis virginiana Forest

The Chestnut Oak-Northern Red Oak/American Witch Hazel Forest, also known as the Central Appalachian Dry-Mesic Chestnut Oak - Northern Red Oak Forest (CEGL006057; NatureServe 2017), is a commonly and widely occurring vegetation community that has been well documented in the Northern Blue Ridge. This is a closed canopy forest of somewhat protected rocky slopes. Canopy dominants include Quercus prinus (Chestnut oak) and *Quercus rubra* (Northern Red oak). Associated canopy species include *Liriodendron tulipifera* (Tuliptree), *Acer rubrum* (Red maple), *Carya glabra* (Pignut hickory), *Carya ovalis* (Red hickory), Carya tomentosa (mockernut hickory), *Acer saccharum* (Sugar maple), Tilia Americana (American basswood), *Fagus grandifolia* (American beech), and *Betula lenta* (Sweet birch). The tall-shrub layer is most often characterized by *Hamamelis virginiana* (American witch hazel) and *Acer pensylvanicum* (Striped maple). The lower shrub layer is patchy and contains a mixture of scrambling vines, ericads, and non-ericaceous species. The herbaceous layer is usually sparse but may include *Dryopteris marginalis* (Marginal woodfern), *Dioscorea quaternata* (Four leaf yam), *Eurybia divaricata* (White wood aster), *Ageratina altissima* (White snakeroot), *Polygonatum biflorum* (Smooth solomons seal), *Solidago caesia* (Wreath goldenrod), *Festuca subverticillata* (Nodding fescue), *Thelypteris noveboracensis* (New York fern), Sanicula trifoliate (Largefruit blacksnake root), *Prenanthes altissima* (Tall rattlesnake root), *Polystichum acrostichoides* (Christmas fern), *Desmodium nudiflorum* (Nakedflower ticktrefoil), *Galium latifolium* (Purple bedstraw), *Houstonia purpurea* (Venus' pride), and *Maianthemum racemosum* (Feathery false lily of the valley).

State 2
Post Logging - Fire Excluded Forest

Community 2.1
Liriodendron tulipifera - Quercus spp. Ruderal Forest

The Tuliptree – Oak species Ruderal Forest (CEGL007221; NatureServe 2017) is a broadly defined successional community. This association is assumed to exist on this ecological site based on its slope position, known history of disturbance in the Northern Blue Ridge, and data from somewhat similar landscapes with acidic, soils. These successional forests often follow cropping, clearcut logging, or other severe disturbance, and are successional to mixed oak-hickory forests. Examples are common across large areas of the upland landscape which have previously been disturbed. Species found in stands attributable to this type may include a fairly diverse and varied composition. *Acer rubrum* (Red maple), Quercus spp. (Oaks), *Betula lenta* (Sweet birch), Oxydendrum arboretum (Sourwood), *Acer saccharum* (Sugar maple), and occasionally *Liquidambar styraciflua* (Sweetgum), *Ilex opaca* (American holly), or *Robinia pseudoacacia* (Black locust) may be common in stands of this type. Where oaks are

present, they are frequently multi-stemmed, resulting from coppicing. The conifer Tsuga Canadensis (Eastern hemlock) is abundant in the understories of some stands. Shrub composition is variable but may include *Sambucus nigra* ssp. Canadensis (American black elderberry), *Rhododendron maximum* (Great laurel), *Hamamelis virginiana* (American witchhazel), and *Vaccinium pallidum* (Blue Ridge blueberry). Herbs are likewise variable and may include *Dioscorea quaternata* (Four leaf yam), *Lysimachia quadrifolia* (Whorled yellow loosestrife), *Maianthemum racemosum* (Feathery false lily of the valley), *Solidago curtisii* (Mountain decumbent goldenrod), *Symphyotrichum prenanthoides* (Crookedstem aster), *Polystichum acrostichoides* (Christmas fern), *Dryopteris intermedia* (Intermediate woodfern), *Arisaema triphyllum* ssp. Triphyllum (Jack in the pulpit), *Packera aurea* (Golden ragwort), *Amphicarpaea bracteata* (American hogpeanut), *Thelypteris noveboracensis* (New York fern), *Lycopodium digitatum* (fan clubmoss), and *Geranium maculatum* (Spotted geranium). *Castanea dentata* (American chestnut) was formerly an important canopy species prior to chestnut blight. Historic logging has resulted in areas of even-aged tree stands.

State 3
Post Settlement Transitional Forest

Community 3.1
Prunus serotina - Liriodendron tulipifera - Acer rubrum - (Robinia pseudoacacia) Ruderal Forest

The Black Cherry - Tuliptree - Red Maple - White Ash - (Black Locust) Ruderal Forest (CEGL006599; NatureServe 2017) is an early-successional woody vegetation community of the northeastern United States that occurs on sites that are becoming reforested after having been cleared for agriculture or otherwise heavily modified in the past. At least 18 percent of this ecological site is covered by ruderal forest (Landfire 2013). Based on similar sites in the adjacent Ridge and Valley region, and the long history of settlement and logging in the Appalachians, it is assumed that some variation of this ruderal forest exists for this ecological site. Characteristics of this community are highly variable ranging from closed forest, to woodland, to open to dense shrub land. Tree species often include some combination of *Prunus serotina* (Black cherry), *Liriodendron tulipifera* (Tuliptree), Fraxinus Americana (White 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 heaven), Ulmus Americana (American elm), Quercus spp. (Oaks), *Betula lenta* (Sweet birch), Amelanchier spp. (Serviceberry), *Pinus strobus* (Eastern white pine), and *Populus grandidentata* (Bigtooth aspen). The low-shrub layer, if present, is usually characterized by the presence of Rubus spp. (Blackberry). 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. Common species include *Ageratina altissima* var. altissima (White snakeroot), *Polygonum persicaria* (Spotted ladysthumb), *Impatiens capensis* (Jewelweed), *Glechoma hederacea* (Ground ivy), *Polystichum acrostichoides* (Christmas fern), *Calystegia sepium* ssp. Sepium (Hedge false bindweed), *Galium aparine* (Stickywilly), *Oxalis stricta* (Common yellow oxalis), *Polygonum virginianum* (Jumpseed), *Dennstaedtia punctilobula* (Eastern hayscented fern), *Arisaema triphyllum* (Jack in the pulpit), *Allium vineale* (Wild garlic), and *Veronica officinalis* (Common gypsyweed), among many others. The invasive species *Alliaria petiolata* (Garlic mustard), *Microstegium vimineum* (Nepalese browntop), and Polygonum caespitosum (Oriental lady's thumb) can be abundant in this disturbed forest type. 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 T1A
State 1 to 2

Logging, but no agricultural conversion. Trees are allowed to stump sprout, soil is minimally disturbed, seed bank remains. Fire suppression allows fire sensitive species like tuliptree and red maple to out compete oak seedlings in the understory. Proximity to more highly disturbed areas provides source of nonnative invasive species to gain a foothold in the understory.

Transition T1B
State 1 to 3

Logging followed by agricultural or settlement conversion, followed by abandonment. Soil surface is disturbed by tillage or clearing of tree stumps and vegetation. Field is then abandoned. If surrounding forests are still intact, they can provide native seed sources. If surrounding areas are developed or in agriculture, then nonnative species may become dominant.

Restoration pathway R2A
State 2 to 1

Control of understory to allow oak seedling recruitment. Prescribed fire will further advance the growth of oaks over fire sensitive species. Control of nonnative invasive species to allow regrowth of native species.

Transition T2A
State 2 to 3

Logging followed by agricultural or settlement conversion, followed by abandonment. Soil surface is disturbed by tillage or clearing of tree stumps and vegetation. Field is then abandoned. If surrounding forests are still intact, they can provide native seed sources. If surrounding areas are developed or in agriculture, then nonnative species may become dominant.

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. These communities are distinctly different from the reference forest state (Dyer, 2010).

Restoration pathway R3B
State 3 to 2

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. These communities are distinctly different from the reference forest state (Dyer, 2010).

Additional community tables

Other references

References

Anderson, M.G. M. Clark, C.E. Ferree, A. Jospe, A. Olivero Sheldon and K.J. Weaver. 2013. Northeast Habitat Guides: A companion to the terrestrial and aquatic habitat maps. The Nature Conservancy, Eastern Conservation Science, Eastern Regional Office. Boston, MA. http://nature.ly/HabitatGuide.

Bailey, Robert G. 1995. Description of the ecoregions of the United States 2d ed. Rev. and expanded (1st ed. 1980). Misc. Publ. No. 1391 (rev.), Washington, DC: USDA Forest Service. 108p. with separate map at 1:7,500,000.

Barnes, John H. and W.D. Sevon, The Geological Story of Pennsylvania, Pennsylvania Geological Survey Fourth Series, Harrisburg, 2002.

Brose, P. H., K.W. Gottschalk, S. B. Horsley, P.D. Knopp, J. N. Kochenderfer, B. J. McGuinness, G.W. Miller, T.E. Ristau, S. H. Stoleson, and S.L. Stout. 2008. Prescribing regeneration treatments for mixed-oak forests in the Mid-Atlantic region. Gen. Tech. Rep. NRS-33. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 100 p.)

Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K., Snow, and J. Teague. 2003. Ecological Systems of the United States: A Working Classification of U.S. Terrestrial Systems. NatureServe, Arlington, Virginia.

Duiker, S. W. and J.C. Myers, 2005. Better Soils with the NoTill System, A Publication to Hellp Farmers Understand the Effect of No-Till Systems of the Soil. USDA Natural Resources Conservation Service.

Dyer, James, M. 2010. Land-use legacies in a central Appalachian forest differential response of trees and herbs to to historic agricultural practices. Applied Vegetation Science 13:195-206.

ESRI, arcgisonline.com/maps/World_Topo_Map, accessed April 3, 2017.

Fichter, Lynn S. and Steve J. Baedke, Structural Cross Section Through the Blue Ridge Province in Central Virginia, last modified September 13, 2000, http://csmres.jmu.edu/geollab/vageol/vahist/blurdgdiv.html.

Fleming, G.P., K.D. Patterson, K. Taverna, and P.P. Coulling. 2013. The natural communities of Virginia: classification of ecological community groups. Second approximation. Version 2.6. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA.

Harrison, J.W. 2004. Classification of vegetation communities of Maryland: First iteration. NatureServe and Maryland Natural Heritage Program, Wildlife and Heritage Service, Maryland Department of Natural Resources. Annapolis, MD.

Hayden, Bruce P. and Patrick J. Michaels, “Virginia’s Climate.” Accessed April 5, 2017, http://climate.virginia.edu/description.htm.

LANDFIRE: LANDFIRE Biophysical Settings. (2010, January 01 - last update). U.S. Department of Interior, Geological Survey. [Online]. Available: http://landfire.cr.usgs.gov/viewer/ [2015, June 5].

LANDFIRE: LANDFIRE Existing Vegetation Type Layer. (2013, June – last update). U.S. Department of Interior, Geological Survey. [Online]. Available: https://landfire.cr.usgs.gov/viewer/[2015, June 5].

Latham, R. E., J. Beyea, M. Benner, C. A. Dunn, M. A. Fajvan, R. R. Freed, M. Grund, S. B. Horsley, A. F. Rhoads and B. P. Shissler. 2005. Managing White-tailed Deer in Forest Habitat From an Ecosystem Perspective: Pennsylvania Case Study. Report by the Deer Management Forum for Audubon Pennsylvania and Pennsylvania Habitat Alliance, Harrisburg. xix + 340 pp.

NatureServe. 2009. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA, U.S.A. Data current as of 06 February 2009.

NatureServe 2017. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1.

NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Accessed: June 2017).

PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu, created February 26, 2013.

United States Department of Agriculture, Natural Resources Conservation Service, 2015. National Soils Information System.

United States Department of Agriculture, Natural Resources Conservation Service, National Water and Climate Center, http://www.wcc.nrcs.usda.gov, Accessed February 2015.

United States Department of Agriculture, Natural Resources Conservation Service, 2006. Land Resource Regions and Major land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296, 669p.

USDA, NRCS. 2017. The PLANTS Database (http://plants.usda.gov, 20 July 2017). National Plant Data Team, Greensboro, NC 27401-4901 USA.

United States Environmental Protection Agency, 2013, Level III ecoregions of the continental United States: Corvallis, Oregon, U.S. EPA National health and Environmental Effects Research Laboratory, map scale 1:7,500,000, http://www.epa.gov/wed/pages/ecoregions/level_iii_iv.htm.

Woods, A.J., J.O. Omernik, D.D. Brown, C.W. Kiilsgaard. 1996. Level IV Ecoregions of EPA Region 3. US Environmental Protection Agency National Health and Environmental Effects Research Laboratory, Corvallis, Oregon. Map scale 1:250,000.

WVDNR [West Virginia Division of Natural Resources]. 2014. Plots2-WV database of community ecology plots. West Virginia Natural Heritage Program, WVDNR, Elkins, WV.

Zimmerman, E., T. Davis, G. Podniesinski, M. Furedi, J. McPherson, S. Seymour, B. Eichelberger, N. Dewar, J. Wagner, and J. Fike (editors). 2012. Terrestrial and Palustrine Plant Communities of Pennsylvania, 2nd Edition. Pennsylvania Natural Heritage Program, Pennsylvania Department of Conservation and Natural Resources, Harrisburg, Pennsylvania.

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:**

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):**

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

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

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

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

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:

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:**