USDA Natural Resources Conservation Service

Ecological site F127XY007WV
Wet Uplands

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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): 127X–Eastern Allegheny Plateau and Mountains

This ecosite is found in mountains, plateau in MLRA 127: Eastern Allegheny Plateau and Mountains. This site occupies the Allegheny Mountain Section of the Appalachian Highlands of the Appalachian Plateau Province. The deeply dissected plateau in this area terminates in a high escarpment, the Allegheny Front, in the eastern part of the area. Steep slopes are dominant, but level to gently rolling plateau remnants are conspicuous in the northern part of the area. The area is dominantly forest, containing large blocks of state forest, game lands, and national forest. Less than one-tenth of the MLRA consists of urban areas.

Classification relationships

USDA-NRCS (USDA, 2006):
Land Resource Region (LRR): N—East and Central Farming and Forest Region
Major Land Resource Area (MLRA): 127—Eastern Allegheny Plateau and Mountains
USDA-FS (Cleland et al., 2007)
Province: 211 – Northeastern Mixed Forest Province (in Part)
Section: 211G - Northern Unglaciated Allegheny Plateau
Subsection: 211Ga – Allegheny High Plateau
211Gb – Allegheny Deep Valleys
Province: 221 - Eastern Broadleaf Province (in part)
Section: 221E - Southern Unglaciated Allegheny Plateau (in part)
Subsection: 221Ea - Pittsburgh Low Plateau
Province: M221 – Central Appalachian Broadleaf Forest – Coniferous Forest - Meadow Province (in part)
Section: M221B - Allegheny Mountains
Subsection: M221Ba – Northern High Allegheny Mountains
M221Bb – Western Allegheny Mountains
M221Bc – Southern High Allegheny Mountains
M221Bd – Eastern Allegheny Mountain and Valley
M221Be – Western Allegheny Mountain and Valley
M221Bf – Allegheny Mountain Plateau
Section: M221C - Northern Cumberland Mountains
Subsection: M221Ca – Western Coal Fields

These wetland ecological sites coincide with High Allegheny Wetland (CES202.069) and North-Central Appalachian Acidic Swamp (CES202.604). Not all of the component associations are applicable to MLRA127.

High Allegheny Wetland (CES202.069)
CEGL006592. Abies balsamea - *Picea rubens* / Danthonia compressa - Lycopodium spp. / Sphagnum spp. Swamp

Forest
CEGL006591. Abies balsamea - *Picea rubens* / *Ilex verticillata* / Sphagnum spp. Swamp Forest
CEGL006132. *Acer rubrum* - *Nyssa sylvatica* High Allegheny Plateau-Central Appalachian Seep Forest
CEGL007163. *Alnus incana* - Cornus sericea Midwest Shrub Swamp
CEGL006839. *Alnus incana* Shrub Swamp
CEGL006546. *Alnus incana* - Viburnum recognitum / Calamagrostis canadensis Shrub Swamp
CEGL006589. (Andromeda polifolia var. glaucophylla) / Polytrichum strictum - Cladonia spp. - Sphagnum spp. Acidic Peatland
CEGL006545. Aronia arbutifolia - *Ilex verticillata* - *Ilex mucronata* / *Osmunda cinnamomea* Acidic Peatland
CEGL005449. Calamagrostis canadensis North-Central Wet Meadow
CEGL006549. Carex canescens - *Eriophorum virginicum* / Sphagnum spp. Fen
CEGL008534. Carex echinata - *Solidago uliginosa* / Sphagnum spp. Seepage Meadow
CEGL007771. *Carex gynandra* - *Scirpus cyperinus* - *Eriophorum virginicum* - *Osmunda cinnamomea* Herbaceous Seep
CEGL002256. Carex lacustris Midwest Wet Meadow
CEGL006412. Carex stricta - Carex vesicaria Wet Meadow
CEGL002257. Carex utriculata - Carex stricta - Carex lacustris - Carex vesicaria Wet Meadow
CEGL006193. Chrysosplenium americanum Seepage Meadow
CEGL006552. Dulichium arundinaceum - *Carex folliculata* - Juncus spp. Seepage Meadow
CEGL006570. *Eriophorum virginicum* - (*Carex folliculata*) / Sphagnum spp. - Polytrichum spp. Fen
CEGL006003. *Fraxinus nigra* - Abies balsamea / Rhamnus alnifolia Swamp Forest
CEGL006464. *Hypericum densiflorum* / *Rubus hispidus* Scrub
CEGL002472. *Larix laricina* / Aronia melanocarpa / Sphagnum spp. Swamp Forest
CEGL006461. *Leersia oryzoides* - Sagittaria latifolia Wet Meadow
CEGL006556. *Picea rubens* - *Acer rubrum* / *Ilex verticillata* Swamp Forest
CEGL006590. *Picea rubens* / *Carex trisperma* / Sphagnum spp. - Polytrichum spp. Swamp Forest
CEGL006588. *Picea rubens* / *Rhododendron maximum* - Kalmia latifolia / *Eriophorum virginicum* / Sphagnum spp. Swamp Forest
CEGL006277. *Picea rubens* - (*Tsuga canadensis*) / *Rhododendron maximum* Swamp Forest
CEGL006593. *Picea rubens* / Vaccinium erythrocarpum / Sphagnum spp. - Bazzania trilobata Swamp Forest
CEGL006594. Populus tremuloides / *Vaccinium myrtilloides* / *Solidago uliginosa* Swamp Forest
CEGL006305. Salix sericea Shrub Swamp
CEGL006275. Schoenoplectus (tabernaemontani, acutus) Eastern Marsh
CEGL006349. *Scirpus cyperinus* Wet Meadow
CEGL006568. *Solidago rugosa* - Euthamia graminifolia Wet Meadow
CEGL004510. Sparganium americanum - (Sparganium erectum ssp. stoloniferum) - Epilobium leptophyllum Seep
CEGL006595. Spiraea alba Wet Shrubland
CEGL006571. Spiraea tomentosa - Rubus spp. / Phalaris arundinacea Ruderal Wet Shrubland
CEGL006596. *Vaccinium myrtilloides* / Pteridium aquilinum / Polytrichum spp. Acidic Peatland
CEGL007856. Vaccinium oxycoccos - (Vaccinium macrocarpon) / Rhynchospora alba - Drosera rotundifolia / Sphagnum spp. Fen

North-Central Appalachian Acidic Swamp (CES202.604).
CEGL006105. *Acer rubrum* / Carex lacustris Wet Woodland
CEGL006119. *Acer rubrum* / Carex stricta - *Onoclea sensibilis* Wet Woodland
CEGL006406. *Acer rubrum* - Fraxinus (pennsylvanica, americana) / *Lindera benzoin* / *Symplocarpus foetidus* Swamp Forest
CEGL006220. *Acer rubrum* / *Ilex mucronata* - *Vaccinium corymbosum* Swamp Forest
CEGL006014. *Acer rubrum* - *Nyssa sylvatica* - *Betula alleghaniensis* / Sphagnum spp. Swamp Forest
CEGL006132. *Acer rubrum* - *Nyssa sylvatica* High Allegheny Plateau-Central Appalachian Seep Forest
CEGL007853. *Acer rubrum* - *Nyssa sylvatica* / *Ilex verticillata* - Vaccinium fuscatum / *Osmunda cinnamomea* Seep Forest
CEGL006156. *Acer rubrum* / *Rhododendron viscosum* - Clethra alnifolia Swamp Forest
CEGL006380. *Betula alleghaniensis* - *Acer rubrum* - (*Tsuga canadensis*, Abies balsamea) / *Osmunda cinnamomea* Swamp Forest
CEGL006588. *Picea rubens* / *Rhododendron maximum* - Kalmia latifolia / *Eriophorum virginicum* / Sphagnum spp. Swamp Forest
CEGL006277. *Picea rubens* - (*Tsuga canadensis*) / *Rhododendron maximum* Swamp Forest

CEGL006226. *Tsuga canadensis* - *Betula alleghaniensis* / *Ilex verticillata* / Sphagnum spp. Swamp Forest
CEGL008533. *Tsuga canadensis* - *Betula alleghaniensis* / *Veratrum viride* - Carex scabrata - Oclemena acuminata Swamp Forest
CEGL006279. *Tsuga canadensis* / *Rhododendron maximum* / Sphagnum spp. Swamp Forest

Ecological site concept

The vegetation groupings described in this section are based on the terrestrial ecological system classification and vegetation associations developed by NatureServe (Comer 2003) and Landfire. The wet uplands occur as extensive, wet lowland sites in depressions, backwaters, and other wetland conditions including the presence of a fragipan. These wetland ecological sites coincide with two ecological systems: High Allegheny Wetland (CES202.069) and North-Central Appalachian Acidic Swamp (CES202.604).

From NatureServe (2007): High Allegheny Wetland (CES202.069)
This system occurs along the high plateau of the Allegheny Mountains, immediately west of the Allegheny Front at elevations between 730 and 1430 m. Wetlands in this system are drained by low-gradient, meandering, intermittent to small headwater streams. Drainage is impounded in high, flat-lying basins by natural dams or "knickpoints" of resistant sandstone. In addition to poor moisture drainage, cold air drains from the surrounding uplands to pool in the flat basins, which function as frost pockets. Rainfall is plentiful, averaging about 1300 mm/year. Communities in this system may have substrates of shallow to deep peat or, less commonly, mineral soil. Soils are acidic to circumneutral. These high Allegheny wetlands form complex mosaics ranging in size from a few hectares to 6000 hectares. Forested swamps occupy the less disturbed margins or slightly higher "islands." This system has a distinctly northern character in its resemblance to bogs and swamps of New England. However, the striking absence of Chamaedaphne calyculata and Picea mariana, two abundant and common species of northern bogs and swamps, as well as the presence of species characteristic of the Southern Appalachians, such as *Hypericum densiflorum*, Vaccinium erythrocarpum, and *Rhododendron maximum*, distinguishes this system from its northern counterpart.

From NatureServe (2007): North-Central Appalachian Acidic Swamp (CES202.604). These swamps are distributed from central New England through the Central Appalachians south to Virginia and west to Ohio. They are found at low to mid elevations (generally <700 m) in basins or on gently sloping seepage lowlands. The acidic substrate is mineral soil, often with a component of organic muck; if peat is present, it usually forms an organic epipedon over the mineral soil rather than a true peat substrate (although peat layers up to 1 m deep have been found in some of these swamps). *Tsuga canadensis* is usually present and may be dominant. It is often mixed with deciduous wetland trees such as *Acer rubrum* or *Nyssa sylvatica*. Sphagnum is an important component of the bryoid layer. Basin swamps tend to be more nutrient-poor and less species-rich than seepage swamps; in some settings, the two occur adjacent to each other with the basin swamp vegetation surrounded by seepage swamp vegetation on its upland periphery.

Associated sites

F127XY013WV	**Divergent Uplands** Divergent Uplands

Table 1. Dominant plant species

Tree	(1) *Acer rubrum* (2) *Tsuga canadensis*
Shrub	(1) *Ilex verticillata* (2) *Rhododendron maximum*
Herbaceous	Not specified

Physiographic features

This ecological site exists in unique landform positions: footslope, summit, and toeslope

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mountain (3) Plateau
Runoff class	Very high
Flooding frequency	None
Ponding duration	Brief (2 to 7 days) to very long (more than 30 days)
Ponding frequency	None to frequent
Elevation	305–945 m
Slope	0–8%
Ponding depth	0–38 cm
Water table depth	0–38 cm
Aspect	N, S

Climatic features

The climate is characteristic of of other ecological sites of high elevation areas in the Eastern Allegheny Plateau and Mountains with a warm to hot, humid summers climate with cold winters and moderate snowfall. Rainfall occurs mostly as high intensity convective thunderstorms.

Table 3. Representative climatic features

Frost-free period (characteristic range)	85-125 days
Freeze-free period (characteristic range)	123-156 days
Precipitation total (characteristic range)	1,168-1,473 mm
Frost-free period (actual range)	69-134 days
Freeze-free period (actual range)	115-169 days
Precipitation total (actual range)	1,143-1,549 mm
Frost-free period (average)	104 days
Freeze-free period (average)	140 days
Precipitation total (average)	1,295 mm

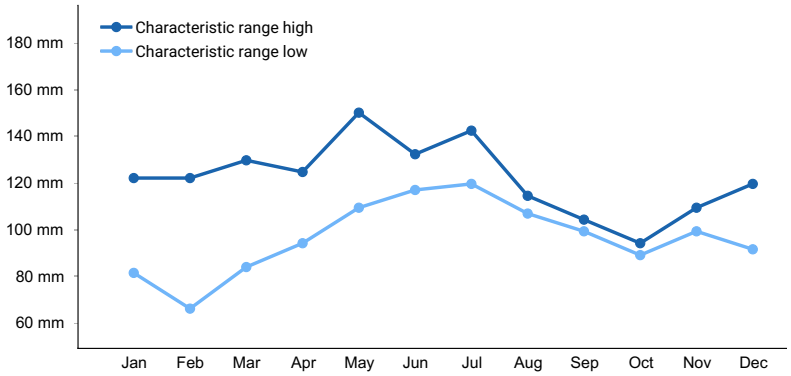

Figure 1. Monthly precipitation range

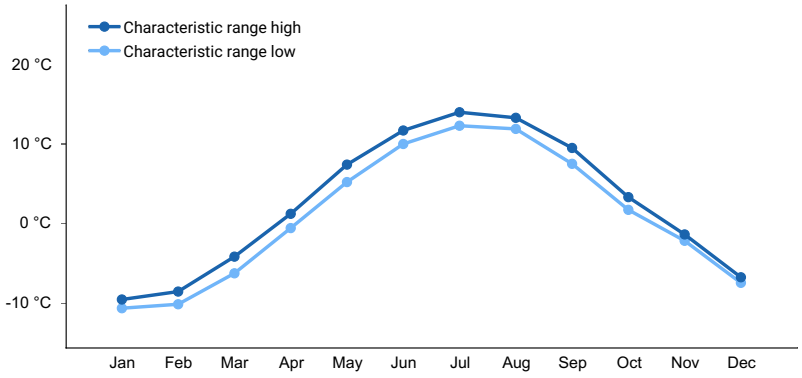

Figure 2. Monthly minimum temperature range

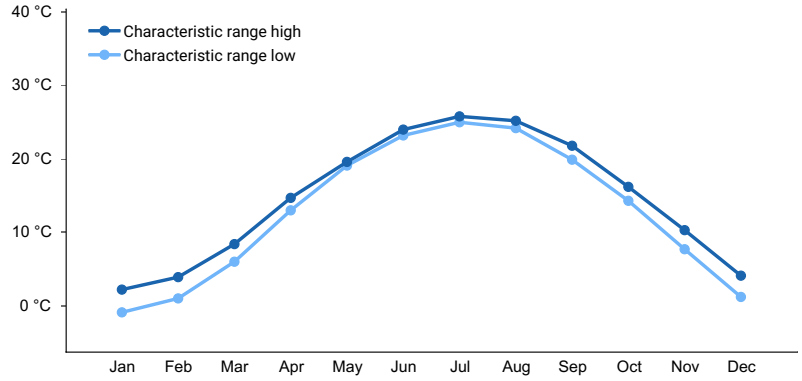

Figure 3. Monthly maximum temperature range

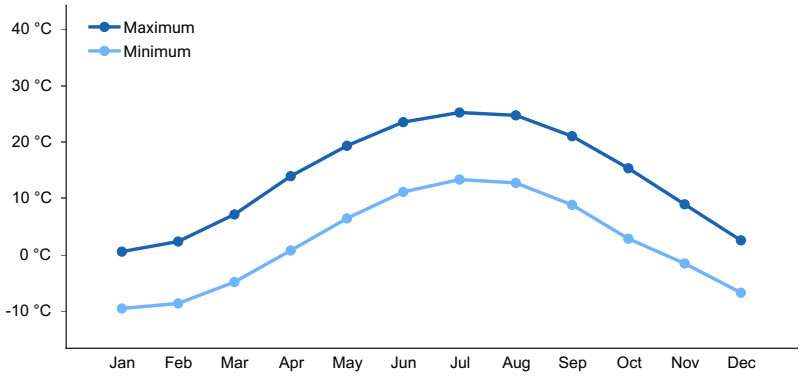

Figure 4. Monthly average minimum and maximum temperature

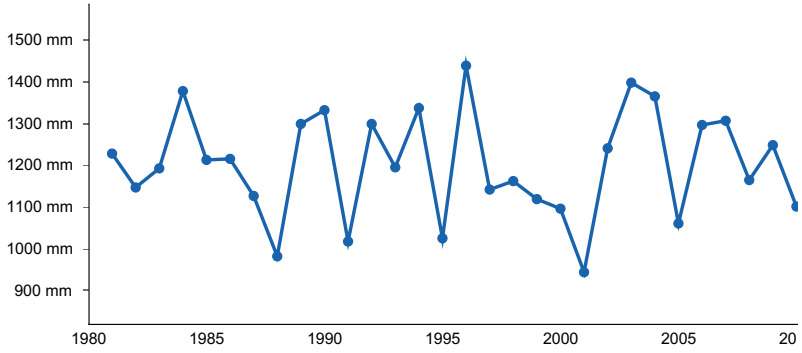

Figure 5. Annual precipitation pattern

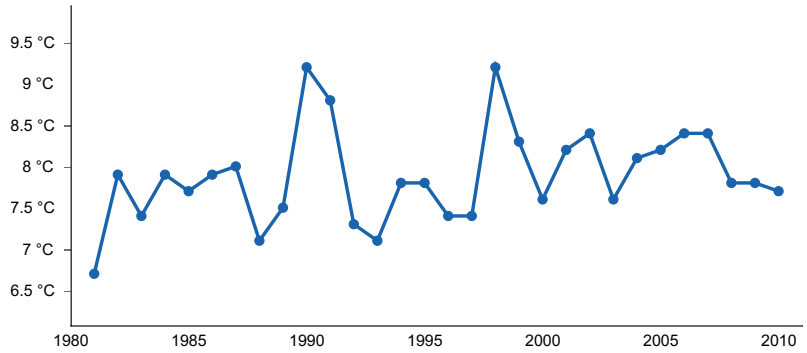

Figure 6. Annual average temperature pattern

Climate stations used

- (1) DAVIS 3SE [USC00462211], Davis, WV
- (2) GLADY 1 N [USC00463464], Glady, WV
- (3) KUMBRABOW [USC00464971], Huttonsville, WV
- (4) FLAT TOP [USC00463072], Flat Top, WV
- (5) KANE 1NNE [USC00364432], Kane, PA
- (6) GLEN HAZEL 2 NE DAM [USC00363311], Wilcox, PA
- (7) CLERMONT 1 NW [USC00361526], Kane, PA

Influencing water features

These soils are hydric.

Soil features

The soil series associated with this site are: Palms, Nolo, Lickdale, Freetown, Brinkerton, Armagh. They are Moderately deep to very deep, very poorly drained to poorly drained, with very acidic to strongly acidic soil reaction, that formed in colluvium, herbaceous organic material, residuum, slope alluvium, and woody organic material from clayey shale, sandstone, sandstone and shale, shale, shale and siltstone.

Table 4. Representative soil features

Parent material	(1) Residuum–sandstone and shale (2) Colluvium–siltstone
Surface texture	(1) Mucky loam (2) Silt loam
Family particle size	(1) Loamy
Drainage class	Very poorly drained to poorly drained
Permeability class	Slow to rapid
Soil depth	53–231 cm
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	2–10%
Available water capacity (0-101.6cm)	10.92–39.88 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0

Soil reaction (1:1 water) (0-101.6cm)	4.3–5.3
Subsurface fragment volume <=3" (Depth not specified)	0–12%
Subsurface fragment volume >3" (Depth not specified)	0–7%

Ecological dynamics

Ecological Dynamics: Information contained in this section was adapted from several sources. The information presented is representative of very complex vegetation communities. Key indicator plants, animals and ecological processes are described to help inform land management decisions. Plant communities will differ across the MLRA 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 Correlation: This site will be correlated in: PA,WV

The vegetation groupings described in this section are based on the terrestrial ecological system classification and vegetation associations developed by NatureServe (Comer 2003) and Landfire (2009). The wet uplands occur as extensive, wet lowland sites in depressions, backwaters, and other wetland conditions including the presence of a fragipan. These wetland ecological sites coincide with two ecological systems:High Allegheny Wetland (CES202.069) and North-Central Appalachian Acidic Swamp (CES202.604).

High Allegheny Wetland (CES202.069) (from Landfire, 2009):
The more central, flood- or beaver-influenced portions contain shrub swamps, sedge fens, wet meadows, and open marshes. Forested swamps are dominated by *Picea rubens*, with varying cover by *Acer rubrum*, *Tsuga canadensis*, and *Betula alleghaniensis* var. alleghaniensis. Where limestone or calcareous shale influences seepage water, Abies balsamea and *Fraxinus nigra* are typical canopy dominants. Common shrub species are *Viburnum nudum* var. cassinoides, *Rhododendron maximum*, *Vaccinium myrtilloides*, *Alnus incana* ssp. rugosa, *Hypericum densiflorum*, *Ilex verticillata*, and Photinia melanocarpa. Herbaceous species frequently include *Rubus hispidus*, *Solidago uliginosa*, *Juncus effusus*, *Eriophorum virginicum*, *Osmunda cinnamomea* var. cinnamomea, *Polygonum sagittatum*, *Carex folliculata*, *Carex gynandra*, *Leersia oryzoides*, *Galium tinctorium*, *Solidago rugosa*, *Symplocarpus foetidus*, *Lycopus uniflorus* var. uniflorus, *Scirpus cyperinus*, *Carex scoparia* var. scoparia, and *Carex trisperma* var. trisperma. Sphagnum spp. and Polytrichum spp. dominate the bryophyte layer. This system is maintained by a spatially complex mix of seepage, low-energy flooding, beaver activity, and rainfall. Beaver activity encourages the cycling of early- to mid-successional types. In the rare ombrotrophic bogs, rainfall is the only source of moisture. Many of the forested swamps in this system were logged during 1880-1920, and some were subsequently burned and/or heavily grazed. Undisturbed examples exist (e.g., Cranberry Glades), where old-growth swamp buffers the central peatlands, which have been dated to 10,000 years.
A representative Plant community is *Picea rubens* - *Acer rubrum* / *Ilex verticillata* Forest, (Red Spruce - Red Maple / Winterberry Swamp Forest).

North-Central Appalachian Acidic Swamp (CES202.604) (from LandFire 2009).
These swamps are distributed from central New England through the Central Appalachians south to Virginia and west to Ohio. They are found at low to mid elevations (generally <700 m) in basins or on gently sloping seepage lowlands. The acidic substrate is mineral soil, often with a component of organic muck; if peat is present, it usually forms an organic epipedon over the mineral soil rather than a true peat substrate (although peat layers up to 1 m deep have been found in some of these swamps). *Tsuga canadensis* is usually present and may be dominant. It is often mixed with deciduous wetland trees such as *Acer rubrum* or *Nyssa sylvatica*. Sphagnum is an important component of the bryoid layer. Basin swamps tend to be more nutrient-poor and less species-rich than seepage swamps; in some settings, the two occur adjacent to each other with the basin swamp vegetation surrounded by seepage swamp vegetation on its upland periphery.

State and transition model

Ecosystem states

1. Reference State (minimally-managed)

State 1 submodel, plant communities

1.1. Picea rubens - Acer rubrum / Ilex verticillata Swamp Forest

1.2. Tsuga canadensis / Rhododendron maximum / Sphagnum spp. Swamp Forest

State 1
Reference State (minimally-managed)

From: http://www.naturalheritage.state.pa.us/Community.aspx?=16029 This describes a group of wetland forests that are dominated by a mixture of conifers and hardwood species. The substrate is usually mineral soil or muck over mineral soil. There is generally some groundwater enrichment in these systems. Eastern hemlock (*Tsuga canadensis*) contributes between 25% to 75% of the canopy. Other conifer species that may occur with hemlock include eastern white pine (*Pinus strobus*), red spruce (*Picea rubens*), and tamarack (*Larix laricina*). The most common hardwood species are yellow birch (*Betula alleghaniensis*), red maple (*Acer rubrum*), black ash (*Fraxinus nigra*), blackgum (*Nyssa sylvatica*), and gray birch (*Betula populifolia*). Rosebay (*Rhododendron maximum*) often forms a dense understory; other shrubs include highbush blueberry (*Vaccinium corymbosum*), winterberry (*Ilex verticillata*), swamp azalea (*Rhododendron viscosum*), and witherod (Viburnum cassinoides). Herbaceous species include cinnamon fern (*Osmunda cinnamomea*), sedges (e.g., *Carex trisperma*, *Carex prasina*, *Carex leptalea*), violets (Viola spp.), skunk-cabbage (*Symplocarpus foetidus*), false hellebore (*Veratrum viride*), sensitive fern (*Onoclea sensibilis*), partridge-berry (*Mitchella repens*), gold-thread (*Coptis trifolia*), Canada mayflower (*Maianthemum canadense*), crested wood fern (*Dryopteris cristata*), and purple-stemmed aster (*Symphyotrichum puniceum*). The bryophyte layer is usually well developed and may be dominated by sphagnum. Disturbance Description Non-Fire Disturbance: This system is dominated by long-lived, mesic species that form multi-layered uneven-aged forests over time. Canopy dynamics are dominated by single and multiple disturbances encouraging gap phase regeneration (Abrams and Orwig 1996). Larger disturbances include windthrow, insect attack and ice storms. Although stand-replacing wind events are rare, small to medium blowdown events are more common and occur at greater frequency on the plateau and exposed side slopes (Ruffner and Abrams 2003). Localized insect and disease outbreaks can create small to medium canopy gaps. Running the VDDT model resulted in 0.9% disturbance (fire and/or wind, weather, stress) annually, consistent with disturbance rates documented by Runkle (1981, 1985) and others. Wind, weather, stress alone resulted in 0.7% disturbance annually. Fire Regime Description: Historically, this system was probably only subject to occasional fires. Fires that did occur may have been catastrophic and may have lead to even-aged stands of pine and hemlock (NatureServe 2007). Due to the predominance of cool, moist site conditions, surface and replacement fires are extremely rare, occurring at 700-1000yr intervals. Most protected sites are essentially fire free. The principal cause of fuel formation leading to fire in northern hardwood ecosystems is broad-scale, storm-driven windthrow of catastrophic proportions (Hough 1963, Runkle 1982). The reference state is a combination of several vegetation associations of the following systems as described by NatureServe (2007): • High Allegheny Wetland (CES202.069) represented by *Picea rubens* - *Acer rubrum* / *Ilex verticillata* Swamp Forest (CEGL006556). • North-central Appalachian Acidic Swamp (CES202.604) represented by *Tsuga canadensis* / *Rhododendron maximum* / Sphagnum spp. Swamp Forest. Due to the heterogeneity and the broadness of this provisional ecological site, the plant communities listed are not intended to cover every situation nor the full range of conditions and species. There are no transition pathways designated between the communities in the reference state because the differences in vegetation are more controlled by landscape position or inherent soil fertility than management or disturbance.

Community 1.1
Picea rubens - Acer rubrum / Ilex verticillata Swamp Forest

This mixed woodland or forested swamp occurs in higher elevation (260-1220 m) valleys, basins, floodplains, and seepage areas along streams and wetland margins in the Central Appalachians. It is a small-patch community maintained by seepage, rainfall, and occasional low-energy overflow from streams. Slopes are gentle (0-5°). The canopy is closed or occasionally open and dominated by *Picea rubens*, *Acer rubrum*, *Tsuga canadensis*, and *Betula alleghaniensis* var. alleghaniensis, with associates *Pinus strobus*, *Nyssa sylvatica*, and *Fraxinus nigra*. The shrub layer is variable and may include *Ilex verticillata*, *Alnus incana* ssp. rugosa, *Rhododendron maximum*, *Vaccinium angustifolium*, *Vaccinium corymbosum*, and *Viburnum nudum* var. cassinoides. The herbaceous layer is diverse and variable, typically including *Glyceria melicaria*, *Carex trisperma*, *Glyceria striata*, *Osmunda cinnamomea*, *Carex leptalea*, *Impatiens capensis*, *Chelone glabra*, and *Caltha palustris*. Well-drained hummocks may support mesophytes such as *Maianthemum canadense*, *Dryopteris intermedia*, and *Oxalis montana*. Sphagnum spp. and other mosses are abundant in the mucky hollows and blanket the irregular hummocks between braided seepage rills or streamlets. (Source: NatureServe, 2007)

Community 1.2
Tsuga canadensis / Rhododendron maximum / Sphagnum spp. Swamp Forest

The tree canopy is closed or nearly closed (given healthy tress) and is dominated by *Tsuga canadensis* with associates including *Acer rubrum*, *Nyssa sylvatica*, *Pinus strobus*, and *Betula alleghaniensis*. (Actual foliar cover in stands where hemlocks are becoming defoliated due to hemlock woolly adelgid is much lower.) A subcanopy of *Tsuga canadensis* and *Acer rubrum* may be present. Mounds and depressions caused by uprooted trees are typical. The well-developed shrub layer is strongly dominated by *Rhododendron maximum*. Other shrubs may include *Ilex verticillata*, *Rhododendron viscosum*, *Hamamelis virginiana*, *Vaccinium corymbosum*, *Lindera benzoin*, and (in the northern part of the types range) *Ilex mucronata* (= Nemopanthus mucronatus). Herb cover varies from sparse to well-developed according to canopy closure and includes a variety of sedges such as *Carex folliculata*, *Carex trisperma*, *Carex disperma*, *Carex intumescens*, as well as ferns and forbs such as *Osmunda cinnamomea*, *Osmunda regalis*, *Thelypteris palustris*, *Onoclea sensibilis*, *Maianthemum canadense*, *Lycopus uniflorus*, *Cornus canadensis*, *Coptis trifolia*, *Symplocarpus foetidus*, *Trientalis borealis*, and *Calla palustris*. The bryophyte layer is well-developed and strongly dominated by Sphagnum mosses. Other mosses may include *Aulacomnium palustre*, *Hypnum imponens*, and *Leucobryum glaucum* on drier hummocks. (Source: NatureServe 2007).

Dominant plant species

- eastern hemlock (*Tsuga canadensis*), tree

Additional community tables

Table 5. Community 1.2 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)

Table 6. Community 1.2 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy 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.

Other references

Cleland, D.T., J.A. Freeouf, J.E. Keys, G.J. Nowacki, C.A. Carpenter, and W.H.McNab. 2007. Ecological Subregions: Sections and Subsections for the conterminous United States. [Map. presentation scale 1:3,500,000, colored; A.M. Sloan, cartographer] Gen. Tech. Report WO-76D. U.S. Department of Agriculture, Forest Service,

Washington, DC. (https://www.fs.fed.us/research/publications/misc/73326-wo-gtr-76d-cleland2007.pdf)

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.
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Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. Agricultural Handbook 296. (https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051845.pdf).

Hemlock – Mixed Hardwood Palustrine Forest http://www.naturalheritage.state.pa.us/Community.aspx?=16029

Contributors

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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	05/13/2025
Approved by	Greg Schmidt
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:**

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17. **Perennial plant reproductive capability:**
