Ecological site F127XY010WV
Cold Uplands

Last updated: 9/27/2024
Accessed: 10/12/2024

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): 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 (USDA2 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

This site crosswalks to Landfire biophysical setting (BpS) Appalachian (Hemlock-)Northern Hardwood Forest

NatureServe (2007) describes this as Appalachian (Hemlock)-Northern Hardwood Forest (CES202.593)

Component Associations

Association Unique ID Association Name
CEGL003819 Rhododendron maximum Upland Shrubland
CEGL005005 *Acer saccharum* - *Pinus strobus* / *Acer pensylvanicum* Forest
CEGL005043 *Tsuga canadensis* - *Fagus grandifolia* - *Acer saccharum* / (*Hamamelis virginiana*, *Kalmia latifolia*) Forest
CEGL006019 *Pinus strobus* - *Tsuga canadensis* / *Acer pensylvanicum* / Polystichum acrostichoides Forest
CEGL006029 Picea rubens - *Tsuga canadensis* - *Fagus grandifolia* / *Dryopteris intermedia* Forest
CEGL006045 *Acer saccharum* - *Betula alleghaniensis* - *Prunus serotina* Forest
CEGL006046 *Acer saccharum* - *Quercus rubra* / Hepatica nobilis var. obtusa Forest
CEGL006088 *Tsuga canadensis* - *Fagus grandifolia* - *Quercus rubra* Forest
CEGL006125 *Quercus rubra* - *Acer saccharum* - *Liriodendron tulipifera* Forest
CEGL006193 Chrysosplenium americanum Herbaceous Vegetation
CEGL006206 *Tsuga canadensis* - *Betula alleghaniensis* - *Prunus serotina* / Rhododendron maximum Forest
CEGL006211 *Acer saccharum* - (*Fraxinus americana*) / Arisaema triphyllum Forest
CEGL006241 Quercus bicolor / Vaccinium corymbosum / Carex stipata Forest
CEGL006296 *Fagus grandifolia* - *Betula lenta* - *Liriodendron tulipifera* - *Acer saccharum* Forest
CEGL006328 *Pinus strobus* - *Tsuga canadensis* Lower New England / Northern Piedmont Forest
CEGL006454 Quercus (rubra, velutina, alba) - *Betula lenta* - (*Pinus strobus*) Forest
CEGL006474 *Tsuga canadensis* - *Fagus grandifolia* - Quercus (prinus, alba) Forest
CEGL006566 *Quercus rubra* - *Tsuga canadensis* - *Liriodendron tulipifera* / *Hamamelis virginiana* Forest
CEGL006577 *Acer saccharum* - *Fraxinus americana* - Juglans cinerea / Staphylea trifolia / Adlumia fungosa Forest
CEGL006597 Carex scabrata - Viola cucullata / Plagiomnium ciliare Herbaceous Vegetation
CEGL006631 *Acer saccharum* - *Betula alleghaniensis* - *Fagus grandifolia* / Viburnum lantanoides Forest
CEGL006632 *Acer saccharum* - *Fagus grandifolia* - *Fraxinus americana* / Arisaema triphyllum Forest
CEGL006633 *Quercus rubra* - *Acer saccharum* - *Fagus grandifolia* / *Viburnum acerifolium* Forest
CEGL006635 *Quercus rubra* - *Acer saccharum* / *Viburnum acerifolium* - Lindera benzoin Forest
CEGL006638 *Tsuga canadensis* - *Betula alleghaniensis* - *Acer saccharum* / *Dryopteris intermedia* Forest
CEGL006639 *Tsuga canadensis* - *Acer saccharum* - *Fagus grandifolia* / *Dryopteris intermedia* Forest
CEGL007861 *Betula alleghaniensis* - (*Tsuga canadensis*) / Rhododendron maximum / (Leucothoe fontanesiana) Forest
CEGL008426 Thuja occidentalis - *Pinus strobus* - *Tsuga canadensis* / Carex eburnea Woodland
CEGL008502 *Betula alleghaniensis* - *Quercus rubra* / Acer (pensylvanicum, spicatum) / *Dryopteris intermedia* - Oclemena acuminata Forest
CEGL008504 *Betula alleghaniensis* / Sorbus americana - Acer spicatum / Polypodium appalachianum Forest
CEGL008513 *Tsuga canadensis* - (*Betula alleghaniensis*, *Quercus rubra*) / Ilex montana / Rhododendron catawbiense Forest
CEGL008533 *Tsuga canadensis* - *Betula alleghaniensis* / Veratrum viride - Carex scabrata - Oclemena acuminata Forest

Ecological site concept

The Cold Uplands ecological sites are frigid sites that occur mainly in the northern section of MLRA in the unglaciated Allegheny High Plateau (Pennsylvania). The vegetation system coincides with the Appalachian (Hemlock)-Northern Hardwood Forest (CES202.593) (NatureServe 2007).

Associated sites

F127XY013WV	**Divergent Uplands** Divergent Uplands

Similar sites

F127XY011WV	**Frigid High Elevation Uplands** Frigid High Uplands

Table 1. Dominant plant species

Tree	(1) *Fagus grandifolia* (2) *Acer saccharum*
Shrub	(1) *Betula alleghaniensis*
Herbaceous	Not specified

Physiographic features

list of unique landform positions:Backslope, Footslope, Shoulder, Summit, Toeslope

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mountain slope (3) Plateau
Runoff class	Low to very high
Elevation	152–884 m
Slope	0–65%
Water table depth	30–99 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)	66-90 days
Freeze-free period (characteristic range)	106-125 days
Precipitation total (characteristic range)	1,168-1,245 mm
Frost-free period (actual range)	64-91 days
Freeze-free period (actual range)	99-133 days
Precipitation total (actual range)	1,143-1,295 mm
Frost-free period (average)	78 days
Freeze-free period (average)	116 days
Precipitation total (average)	1,194 mm

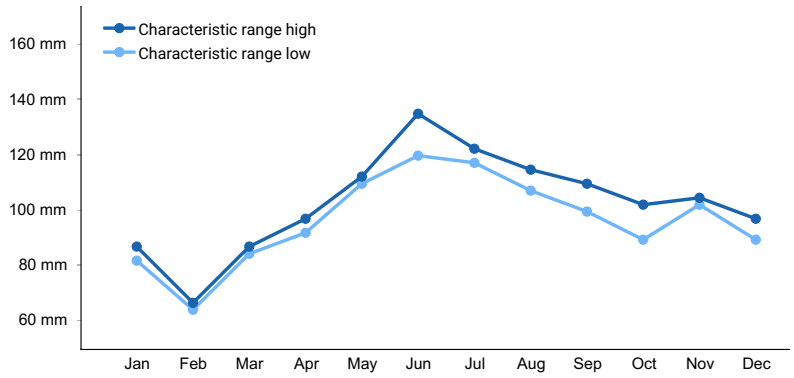

Figure 1. Monthly precipitation range

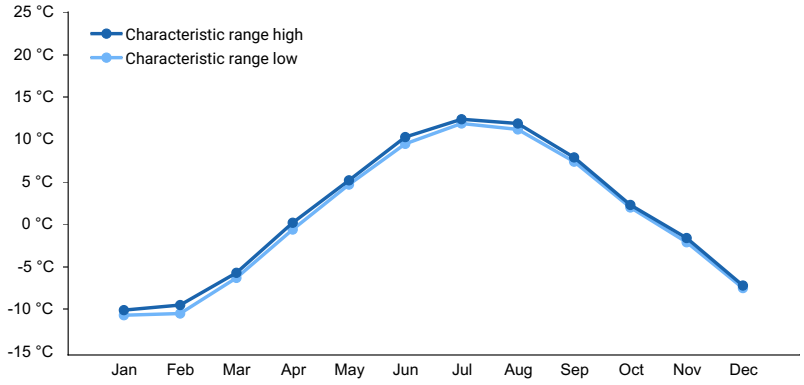

Figure 2. Monthly minimum temperature range

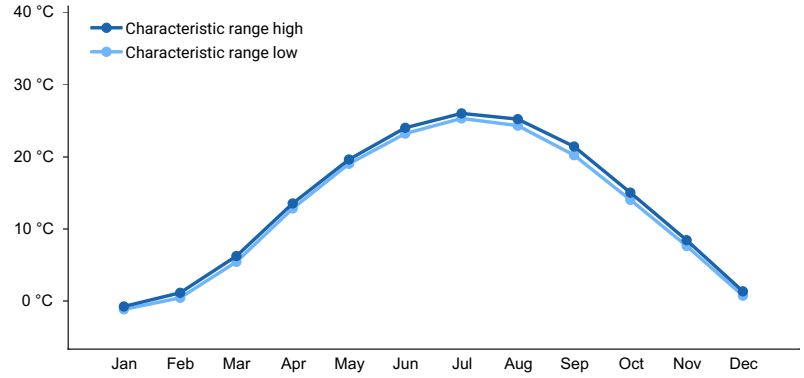

Figure 3. Monthly maximum temperature range

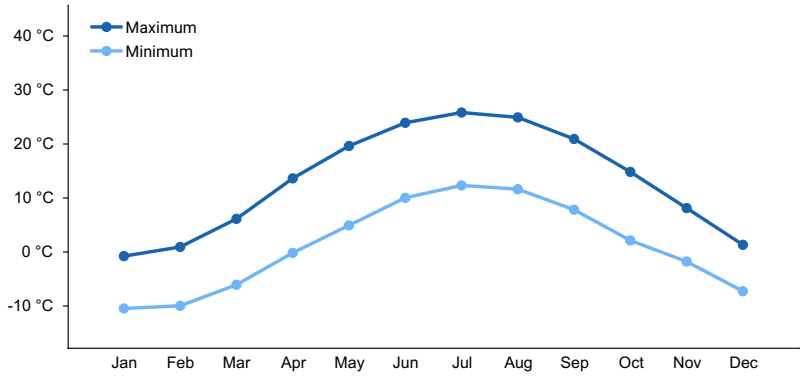

Figure 4. Monthly average minimum and maximum temperature

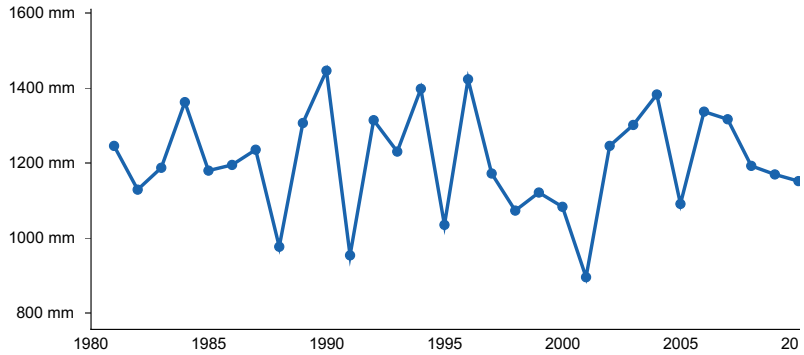

Figure 5. Annual precipitation pattern

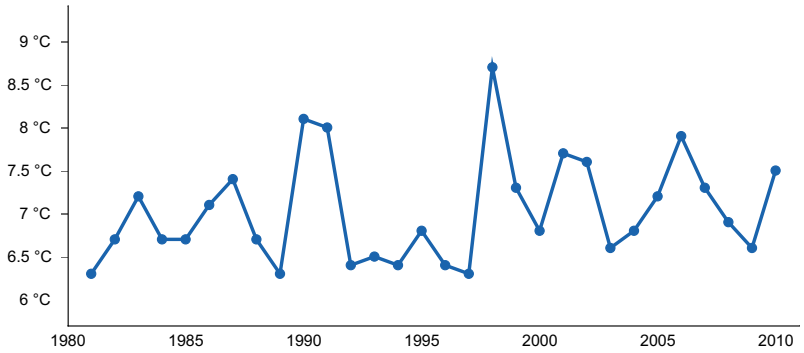

Figure 6. Annual average temperature pattern

Climate stations used

- (1) BRADFORD 4SW RES 5 [USC00360868], Bradford, PA
- (2) BRADFORD RGNL AP [USW00004751], Lewis Run, PA
- (3) CLERMONT 8 SW [USC00361534], Mount Jewett, PA
- (4) CLERMONT 1 NW [USC00361526], Kane, PA
- (5) KANE 1NNE [USC00364432], Kane, PA
- (6) GLEN HAZEL 2 NE DAM [USC00363311], Wilcox, PA

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: Blandburg, Carrollton, Ceres, Clymer, Eldred, Elko, Flatiron, Frewsburg, Hartleton, Hazleton, Kedron, Kinzua, Knapp Creek, Laidig, Madsheep, Mandy, Meckesville, Onoville, Shinglehouse, Shongo, Varilla. They are Moderately deep to very deep, somewhat poorly drained to somewhat excessively drained, and Slow to Moderate permeable soils, with very acidic to moderately acidic soil reaction, that formed in Colluvium, Residuum, Clayey shale, Noncalcareous sandstone, Sandstone, Sandstone and shale, Sedimentary rock, Shale, Shale and siltstone.

Table 4. Representative soil features

Parent material	(1) Colluvium–sandstone and shale (2) Residuum–shale and siltstone
Surface texture	(1) Channery loam (2) Very channery silt loam (3) Sandy loam
Family particle size	(1) Loamy
Drainage class	Somewhat poorly drained to somewhat excessively drained
Permeability class	Slow to moderate
Soil depth	51–152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0–10%
Available water capacity (Depth not specified)	5.08–15.24 cm
Soil reaction (1:1 water) (Depth not specified)	3.5–6
Subsurface fragment volume <=3" (Depth not specified)	10–45%

Subsurface fragment volume >3" (Depth not specified)	1–40%

Ecological dynamics

From http://explorer.natureserve.org/servlet/NatureServe?searchSystemUid=ELEMENT_GLOBAL.2.723013

The vegetation system coincides with the Appalachian (Hemlock)-Northern Hardwood Forest (CES202.593) (NatureServe 2007).

This forested system of the eastern U.S. ranges from central New England west to Lake Erie and south to the higher elevations of Virginia and West Virginia. It is one of the matrix forest types in the northern part of the Central Interior and Appalachian Division. Northern hardwoods such as *Acer saccharum*, *Betula alleghaniensis*, and *Fagus grandifolia* are characteristic, either forming a deciduous canopy or mixed with *Tsuga canadensis* (or in some cases *Pinus strobus*). Other common and sometimes dominant trees include Quercus spp. (most commonly *Quercus rubra*), *Liriodendron tulipifera*, *Prunus serotina*, *Acer rubrum*, and *Betula lenta*. It is of more limited extent and more ecologically constrained in the southern part of its range in northern parts of Virginia and West Virginia.

From Landfire http://www.landfire.gov/index.php:
Vegetation Description:
In the northern part of the range, dominant overstory species include eastern hemlock (*Tsuga canadensis*), American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*) and yellow birch (Betula allegheniensis). While this community as a whole occurs across a wide range of topographic conditions, the species mix can vary considerably. Hemlock will dominate the overstory on cool/moist sites at higher elevations and in shaded coves, valley bottoms and riparian areas. Moist bottomlands and footslopes may also contain a larger component of yellow birch, white ash (*Fraxinus americana*) and sycamore (*Platanus occidentalis*) (Whitney 1990). Locally, on slopes, sugar maple becomes more abundant, resulting in a beech-hemlock-sugar maple complex (Braun 2001). Other common associates include red maple (*Acer rubrum*), black cherry (*Prunus serotina*), black birch (*Betula nigra*), basswood (*Tilia americana*) and cucumber magnolia (*Magnolia acuminata*). The understory and mid-story are usually well developed and include hobblebush (Viburnum alnifolium), mapleleaf viburnum (*Viburnum acerifolium*), witch hazel (*Hamamelis virginiana*) , serviceberry (*Amelanchier alnifolia*), pin cherry (*Prunus pensylvanica*), large-leaved holly (Ilex monticola), and alternative-leaved dogwood (*Cornus alternifolia*). Common herbaceous species include wild lily of the valley (*Maianthemum canadense*), sensitive fern (*Onoclea sensibilis*), shining clubmoss (Lycopodium lucidulum), Dryopteris spinulosa (Dryopteris spinulosa), mountain woodsorrel (*Oxalis montana*) and partridgeberry (*Mitchella repens*) (Lutz 1930, Braun 2001).

In the southern part of the range, dominant vegetation is generally in two to three layers. The canopy in well developed late seral conditions is composed of eastern hemlock (*Tsuga canadensis*) (most common) and or white pine (*Pinus strobus*) mixed with various hardwoods including tulip poplar (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), black and white oaks (*Quercus velutina*, *Q. alba*), black birch (*Betula lenta*), bigleaf and umbrella magnolias (*Magnolia macrophylla*, *M. tripetala*). In the southern Appalachians, Fraser magnolia (*M. fraseri*) and silverbell (*Halesia carolina*) may also be found. There may be gaps with a younger cohort of the same set of species. A dense, low to high shrub layer of great laurel (Rhododendron maxima) and sometimes mountain laurel (*Kalmia latifolia*) is often present. Yellowroot (Xanthorhiza simplissima) may occur immediately adjacent to streams in sandy/silty alluvial deposits in gaps. Few if any herbs are found and bryophyte and hepatophyte cover is generally restricted to downed wood, tree/shrub boles, and rocks/boulders.

BpS Dominant and Indicator Species
Symbol Scientific Name Common Name
FAGR *Fagus grandifolia* American beech
TSCA *Tsuga canadensis* Eastern hemlock
ACSA3 *Acer saccharum* Sugar maple
BEAL2 *Betula alleghaniensis* Yellow birch
TIAM *Tilia americana* American basswood
LITU *Liriodendron tulipifera* Tuliptree
PIST *Pinus strobus* Eastern white pine
QUVE *Quercus velutina* Black oak

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).

State and transition model

Ecosystem states

1. Reference State (minimally-managed)

State 1 submodel, plant communities

1.1. Tsuga canadensis - Acer saccharum - Fagus grandifolia / Dryopteris intermedia Forest

State 1
Reference State (minimally-managed)

From: From Landfire http://www.landfire.gov/index.php: Structural Information Upper Layer Lifeform: Tree Upper Layer Canopy Cover: 71 - 100% Upper Layer Canopy Height: Tree 25.1m - Tree 50m Tree Size Class: Very Large >33"DBH Indicator Species Symbol Scientific Name Common Name Canopy Position TSCA *Tsuga canadensis* Eastern hemlock All FAGR *Fagus grandifolia* American beech All ACSA3 *Acer saccharum* Sugar maple All LITU *Liriodendron tulipifera* Tuliptree Upper Description Class D (age = 200yrs+) is characterized by an un-even age, closed-canopy structure with beech, hemlock, and sugar maple occurring in all size classes. The overstory is characterized by large-diameter beech, hemlock, sugar maple, and tulip poplar, with white pine in the southern parts. In hemlock-dominated stands, the shrub layer consists almost exclusively of shade-tolerant shrub species, with a less well developed herbaceous layer; in hardwood-hemlock mixes a well-developed shrub and rich herbaceous layer is often present. Great and/or mountain laurel may still be present in mixed stands. Oldest trees are 200 – 350yrs old, and somethimes over 400yrs old. Fuel Model 10 may occur where windthrow has created large quantities of natural slash. To distinguish D from B for mapping purposes: canopy surface texture in the oldest age classes (D) is more complex, includes more canopy shading, and the pixel-to-pixel variance should be greater than in class B (see Tom Spies's work in the Pacific Northwest relating to how to classify middle-aged from old-growth conifer stands). Disturbances were modeled as follows: 1.Replacement fire (every 1000yrs) and wind/weather/stress (every 1000yrs) result in a transition to class A. 2.Mixed fire (every 1000yrs) and wind/weather/stress (every 150yrs) result in a transition to class C (more open). A representative plant community is *Tsuga canadensis* - *Acer saccharum* - *Fagus grandifolia* / *Dryopteris intermedia* Forest (CEGL006639).

Community 1.1
Tsuga canadensis - Acer saccharum - Fagus grandifolia / Dryopteris intermedia Forest

Tsuga canadensis is dominant and forms at least 50% of the canopy, at least prior to impacts from the exotic insect pest hemlock woolly adelgid (Adelges tsugae). *Fagus grandifolia* and *Acer saccharum* are common and sometimes *Betula alleghaniensis* is uncommon or replaced by *Betula lenta*, and at the southern end of the range (in Virginia and Maryland), *Liriodendron tulipifera* may be an important overstory associate. The shrub layer may be dense to fairly open and often includes *Viburnum acerifolium* and *Acer pensylvanicum* in addition to *Tsuga canadensis* regeneration. Herbs may be sparse, particularly in dense shade, but often include *Dryopteris intermedia*, *Medeola virginiana*, *Oxalis montana*, *Mitchella repens*, *Maianthemum canadense*, *Trientalis borealis*, *Huperzia lucidula* (= Lycopodium lucidulum), *Eurybia divaricata* (= Aster divaricatus), and *Thelypteris noveboracensis*. Nonvascular plants may be well-developed, often characterized by the liverwort *Bazzania trilobata*. Diagnostic characteristics of this forest are the dominance of *Tsuga canadensis*, presence of *Acer saccharum* and *Fagus grandifolia*, low abundance of either *Betula alleghaniensis* or *Betula lenta* and a lack of abundant Quercus spp. or *Pinus strobus*. (Source: NatureServe, 2007).

Dominant plant species

- red maple (*Acer rubrum*), tree
- American beech (*Fagus grandifolia*), tree
- black cherry (*Prunus serotina*), tree
- eastern hemlock (*Tsuga canadensis*), tree
- northern red oak (*Quercus rubra*), tree
- sugar maple (*Acer saccharum*), tree
- shining clubmoss (*Huperzia lucidula*), tree
- hophornbeam (*Ostrya virginiana*), tree
- striped maple (*Acer pensylvanicum*), tree
- rare clubmoss (*Lycopodium obscurum*), other herbaceous

Additional community tables

Table 5. Community 1.1 forest overstory composition

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

Table 6. Community 1.1 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

Landfire http://www.landfire.gov/index.php

NatureServe. 2007. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA, U.S.A. Data current as of 15 April 2007.

NatureServe. 2015. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA, U.S.A. Data current as of 15 August 2015.

Contributors

Jason Teets

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	10/12/2024
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):

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

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

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

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

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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

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

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

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

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17. **Perennial plant reproductive capability:**