Ecological site F140XY012PA
Organic Wetlands

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): 140X–Glaciated Allegheny Plateau and Catskill Mountains

This area is primarily in the Southern New York Section of the Appalachian Plateaus Province of the Appalachian Highlands. The top of the dissected plateau in this MLRA is broad and is nearly level to moderately sloping. The narrow valleys have steep walls and smooth floors. The Catskills in the east have steep slopes. Elevation is typically 650 to 1,000 feet on valley floors; 1,650 to 2,000 feet on the plateau surface; and 3,600 feet or more in parts of the Catskills.

The average annual precipitation in most of this area is 30 to 45 inches. Rainfall occurs as high-intensity, convective thunderstorms during the summer, but most of the precipitation in this area occurs as snow. The average annual temperature is 40 to 50 degrees F.

The dominant soil order in this MLRA is Inceptisols. The soils in the area dominantly have a mesic soil temperature regime, an aquic or udic soil moisture regime, and mixed mineralogy. Frigid soils are found within the higher elevations.

This area supports forest vegetation, particularly hardwood species. Beech-birch-maple and elm-ash-red maple are the potential forest types. The extent of oak species increases from east to west, particularly in areas of shallow and dry soils. In some areas conifers, such as white pine, are important. Aspen, hemlock, northern white-cedar, and black ash grow on the wetter soils. In some parts of the area, sugar maple has potential economic significance. Some of the major wildlife species in this area are white-tailed deer, cottontail, turkey, pheasant, and grouse.

Classification relationships

USDA NRCS:
LRR: R - Northeastern Forage and Forest Region
MLRA 140 - Glaciated Allegheny Plateau and Catskills Mountains

EPA Ecoregions:
Level III: 60 - Northern Allegheny Plateau and 58 - Northeastern Highlands
Level IV: 60a - Glaciated Low Allegheny Plateau, 60b - Delaware-Neversink Highlands, 60c - Catskills Transition, and 58y - Catskill High Peaks

USDA USFS:
200 Humid Temperate Domain
212 Laurentian Mixed Forest Province
M212 Adirondack - New England Mixed Forest - Coniferous Forest - Alpine Meadow Province

NY Natural Heritage Program Plant Community Classification:

PA Natural Heritage Program Plant Community Classification:
Hemlock – Mixed Hardwood Palustrine Forest
Highbush Blueberry – Sphagnum Wetland

International Vegetation Classification Associations:
Hemlock - Hardwood Swamp (CEGL006226)
Highbush Blueberry Bog Thicket (CEGL006190)
Highbush Blueberry Poor Fen (CEGL005085)

NatureServe Ecological Systems
North-Central Appalachian Acidic Swamp (CES202.604)
North-Central Interior and Appalachian Acidic Peatland (CES202.606)

Ecological site concept

Climate:
Mean annual precipitation is 46 inches and evenly distributed throughout the year. Most of the rainfall occurs as high intensity, convective thunderstorms during the summer. Snowfall is heavy from late in autumn to early spring. Average frost-free and freeze-free days are 98 and 132, respectively.

Landform/Landscape Position:
The site occurs in swamps on till plains, lake plains, outwash plains, and flood plains. Slopes range from 0 to 2 percent.

Soils:
The soils consists of moderately deep organic material over mineral soils. They are very poorly drained and ponded soils formed in organic material of highly decomposed woody plants in glacially blocked drainage patterns. Soil temperature regime is mesic. The reaction ranges from ultra acid to extremely acid throughout the organic layers and from extremely acid to strongly acid in the C horizon. Soil component is Paupack.

Vegetation:
The reference community is variable and is dependent on local hydrological conditions. Reference community can either be a a mixed conifer-hardwood peat swamp or a broadleaf palustrine shrubland. Characteristic vegetation includes:

Trees: hemlock (*Tsuga canadensis*), red maple ((*Acer rubrum*), gray birch (*Betula populifolia*), yellow birch (*Betula alleghaniensis*), and black ash (*Fraxinus nigra*), white pine (*Pinus strobus*), tamarack (*Larix laricina*), and black gum (*Nyssa sylvatica*).

Shrubs: highbush blueberry (*Vaccinium corymbosum*), swamp azalea (*Rhododendron viscosum*), leatherleaf (*Chamaedaphne calyculata*) witherrod (Viburnum cassinoides), winterberry (*Ilex verticillata*), witch-hazel (*Hamamelis virginiana*).

Herbaceous: cinnamon fern (*Osmunda cinnamomea*), marsh fern, (*Thelypteris palustris*), skunk-cabbage (*Symplocarpus foetidus*), purple-stem aster (*Symphyotrichum puniceum*), Three-seeded sedge (*Carex trisperma*).

Bryophytes: Sphagnum spp.

Table 1. Dominant plant species

Tree	(1) *Tsuga canadensis* (2) *Acer rubrum*
Shrub	(1) *Vaccinium corymbosum* (2) *Rhododendron viscosum*
Herbaceous	(1) *Osmunda cinnamomea* (2) *Symplocarpus foetidus*

Physiographic features

The site occurs in swamps on till plains, lake plains, outwash plains, and valleys. Slopes range from 0 to 2 percent.

Table 2. Representative physiographic features

Landforms	(1) Till plain > Swamp (2) Outwash plain > Swamp (3) Lake plain > Swamp
Runoff class	Negligible
Ponding frequency	Frequent
Elevation	244–610 m
Slope	0–2%

Climatic features

**Table 3. Representative climatic features**

|	
Frost-free period (characteristic range)	130-136 days
Freeze-free period (characteristic range)	151-171 days
Precipitation total (characteristic range)	1,067-1,245 mm
Frost-free period (actual range)	125-139 days
Freeze-free period (actual range)	146-181 days
Precipitation total (actual range)	991-1,270 mm
Frost-free period (average)	133 days
Freeze-free period (average)	163 days
Precipitation total (average)	1,143 mm
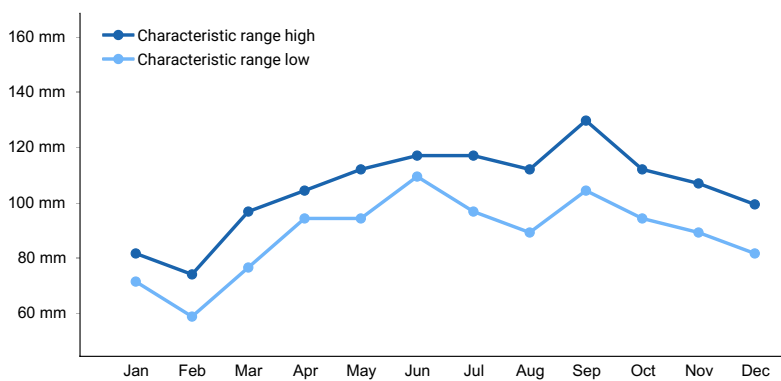
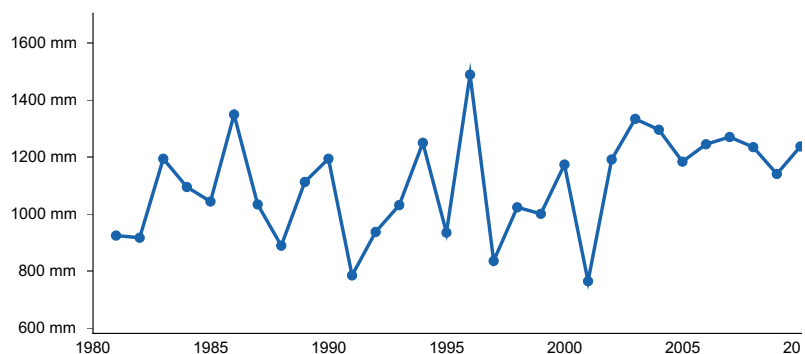**Figure 1. Monthly precipitation range**
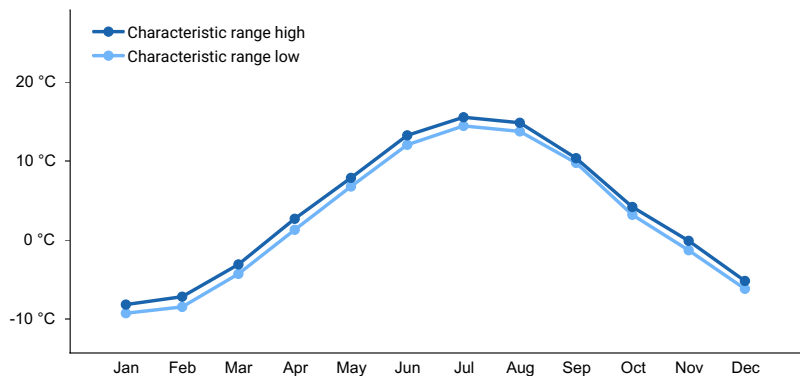
Figure 2. Monthly minimum temperature range
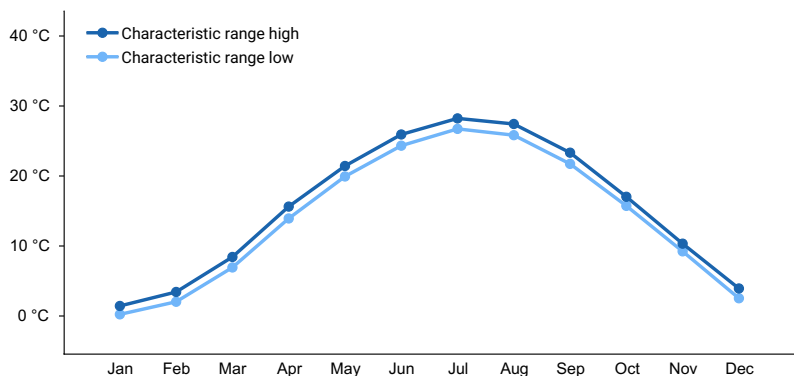
Figure 3. Monthly maximum temperature range
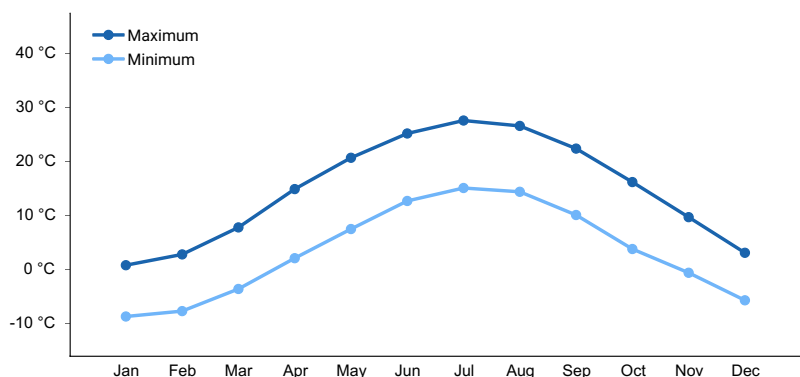
Figure 4. Monthly average minimum and maximum temperature

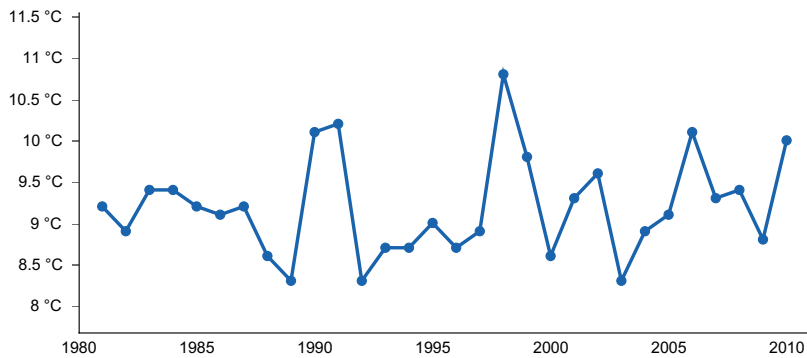**Figure 5. Annual precipitation pattern**

Figure 6. Annual average temperature pattern

Climate stations used

- (1) WILKES-BARRE INTL AP [USW00014777], Pittston, PA
- (2) HAWLEY 1 E [USC00363758], Hawley, PA
- (3) MATAMORAS [USC00365470], Matamoras, PA
- (4) MT POCONO MOUNTAINS AP [USW00054789], Tobyhanna, PA
- (5) STROUDSBURG [USC00368596], East Stroudsburg, PA

Influencing water features

Very poorly drained
Water is removed from the soil so slowly that free water remains at or very near the surface during much of the growing season. Internal free water occurrence is very shallow and persistent or permanent. Unless the soil is artificially drained, most mesophytic crops cannot be grown. The soils are commonly level or depressed and frequently ponded. In areas where rainfall is high or nearly continuous, slope gradients may be greater.

Soil features

The soils consists of moderately deep organic material over mineral soils. They are very poorly drained and ponded soils formed in organic material of highly decomposed woody plants in glacially blocked drainage patterns. Soil temperature regime is mesic. The reaction ranges from ultra acid to extremely acid throughout the organic layers and from extremely acid to strongly acid in the C horizon. Soil component is Paupack.

Table 4. Representative soil features

Parent material	(1) Herbaceous organic material (2) Woody organic material
Surface texture	(1) Mucky
Drainage class	Very poorly drained
Permeability class	Slow
Available water capacity (Depth not specified)	33.02–38.1 cm
Subsurface fragment volume <=3" (Depth not specified)	48%
Subsurface fragment volume >3" (Depth not specified)	40%

Ecological dynamics

The reference community is variable and is dependent on local hydrological conditions. Reference community can either be a a mixed conifer-hardwood peat swamp or a broadleaf palustrine shrubland. Characteristic vegetation includes:

Trees: hemlock (*Tsuga canadensis*), red maple ((*Acer rubrum*), gray birch (*Betula populifolia*), yellow birch (*Betula alleghaniensis*), and black ash (*Fraxinus nigra*), white pine (*Pinus strobus*), tamarack (*Larix laricina*), and black gum (*Nyssa sylvatica*).

Shrubs: highbush blueberry (*Vaccinium corymbosum*), swamp azalea (*Rhododendron viscosum*), leatherleaf (*Chamaedaphne calyculata*) witherrod (Viburnum cassinoides), winterberry (*Ilex verticillata*), witch-hazel (*Hamamelis virginiana*).

Herbaceous: cinnamon fern (*Osmunda cinnamomea*), marsh fern, (*Thelypteris palustris*), skunk-cabbage (*Symplocarpus foetidus*), purple-stem aster (*Symphyotrichum puniceum*), Three-seeded sedge (*Carex trisperma*).

Bryophytes: Sphagnum spp.

Dynamics/Threats From Pennsylvania Natural Heritage Program:

These wetlands are threatened by habitat alteration (e.g., conversion to agricultural land, logging in adjacent uplands), deposition (e.g., sedimentation, nutrient loading), and alterations to the hydrological regime (e.g., removal of beaver dams or other impoundments, lowering of the water table). This habitat type may be exposed to limited foot traffic disturbance due to recreational fruit harvesting. Invasive species such as reed canary-grass (*Phalaris arundinacea*) may alter the species composition of this community type.
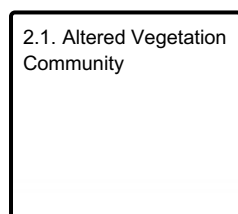
State and transition model

Ecosystem states
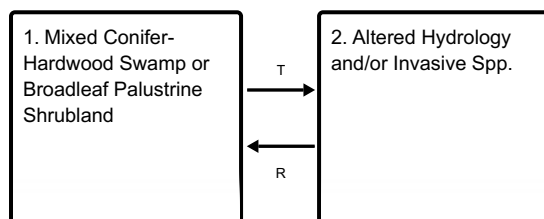
State 1 submodel, plant communities
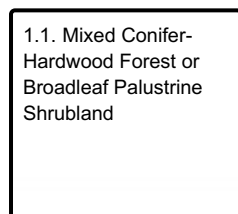
State 2 submodel, plant communities

State 1
Mixed Conifer-Hardwood Swamp or Broadleaf Palustrine Shrubland

Community 1.1
Mixed Conifer-Hardwood Forest or Broadleaf Palustrine Shrubland

Resilience management. From PA Natural Heritage Program: A natural buffer around the wetland should be maintained in order to minimize nutrient runoff, pollution, and sedimentation. The potential for soil erosion based on soil texture, condition of the adjacent vegetation (mature forests vs. clearcuts), and the topography of the surrounding area (e.g., degree of slope) should be considered when establishing buffers. The buffer size should be increased if soils are erodible, adjacent vegetation has been logged, and the topography is steep as such factors

could contribute to increased sedimentation and nutrient pollution. Direct impacts and habitat alteration should be avoided (e.g., roads, trails, filling of wetlands) and low impact alternatives (e.g., elevated footpaths, boardwalks, bridges) should be utilized in situations where accessing the wetland cannot be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland. Alterations to groundwater sources should be minimized.

State 2
Altered Hydrology and/or Invasive Spp.

Altered hydrology has impacted site conditions and species composition. Invasive species such as reed canary-grass (*Phalaris arundinacea*) may alter the species composition of this community type.

Community 2.1
Altered Vegetation Community

Transition T
State 1 to 2

Changes to hydrology (impoundments, blocked culverts, diversions, irrigation ditches, etc)

Restoration pathway R
State 2 to 1

Conservation practices

Restoration and Management of Natural Ecosystems

Additional community tables

Inventory data references

Site Development and Testing Plan:
Future work to validate the vegetation information in this provisional ecological site description is needed. This will include field activities to collect low and medium intensity sampling and analysis of that data. Field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final approved level document. Reviews of the project plan are to be conducted by the Ecological Site Technical Team.

Other references

Davis T. 2011. Pennsylvania Natural Heritage Program. Hemlock – Mixed Hardwood Palustrine Forest Factsheet. Available from: http://www.naturalheritage.state.pa.us/Community.aspx?=16029 Date Accessed: October 02, 2019

Furedi, M. 2011. Pennsylvania Natural Heritage Program. Highbush Blueberry – Sphagnum Wetland Factsheet. Available from: http://www.naturalheritage.state.pa.us/Community.aspx?=16035 Date Accessed: October 03, 2019

Approval

Nels Barrett, 5/20/2020

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	04/30/2024
Approved by	Nels Barrett
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:**