

# Ecological site RX141X303

## Acidic Swamp

Last updated: 10/03/2024  
 Accessed: 11/21/2024

---

### 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): 141X–Tug Hill Plateau

MLRA 141 is entirely in New York and makes up about 1,173 square kilometers (3,037 square kilometers). It consists of a relatively small but unique upland that lies just off the eastern end of Lake Ontario and west of the Black River Valley and Adirondack Mountain region. It is essentially a north- and east-facing glaciated cuesta scarp and is underlain by thick Wisconsin till and small areas of outwash. Most of the plateau is woodland, so forestry and recreation are the primary uses, but small isolated dairy operations and hobby farms are located around the perimeter.

The area is bordered on the east by the Black River Valley, on the north by the St. Lawrence Lowland, on the west by the Ontario Lowland, and on the south by the Upper Mohawk Valley. The northern and eastern boundaries of MLRA 141 are distinct where they contact the physiographically dissimilar southwestern part of MLRA 142 (St. Lawrence-Champlain Plain). The western and southern boundaries are also distinct where they contact the physiographically dissimilar MLRA 101 (Ontario-Erie Plain and Finger Lakes Region)

### Ecological site concept

This site occurs in relatively flat areas (0-4% slopes) near the bottom of watersheds where water saturates both organic soils and coarse-textured mineral soils for most of the year. Soils are deep, poorly- to very poorly-drained and relatively more acidic than other wooded wetlands. The water table is seasonally high (within 18 inches of the surface) and typically dries out in late summer and fall. This site may have pit and mound topography, with ponding and organic matter accumulation in the low areas, and drier soil conditions on the mounds where most trees and shrubs are rooted. Black spruce, rhodora, Labrador tea, and other heath shrubs are abundant, with balsam fir, larch, black ash, and grey birch as common associates. Diverse herbs, shrubs, and bryophytes dominate the understory.

### Associated sites

RX141X110	<b>Floodplain Riparian Complex</b> Floodplain Riparian Complex may be adjacently located to or surround Acidic Swamp ecological sites.
RX141X210	<b>Marsh Wetland Complex</b> Marsh Wetland Complex may be adjacently located to or surround Acidic Swamp ecological sites.

### Similar sites

RX141X210	<b>Marsh Wetland Complex</b> An Acidic Swamp ecological site may transition into a Marsh Wetland Complex under certain environmental conditions and constraints.
-----------	---

Table 1. Dominant plant species

Tree	(1) <i>Acer rubrum</i> (2) <i>Tsuga canadensis</i>
Shrub	(1) <i>Alnus incana ssp. rugosa</i> (2) <i>Vaccinium corymbosum</i>
Herbaceous	(1) <i>Osmunda cinnamomea</i> (2) <i>Coptis trifolia</i>

## Legacy ID

F141XY303NY

## Physiographic features

**Table 2. Representative physiographic features**

Landforms	(1) Depression (2) Delta (3) Outwash plain (4) Terrace
Elevation	61–549 m
Water table depth	0–15 cm
Aspect	Aspect is not a significant factor

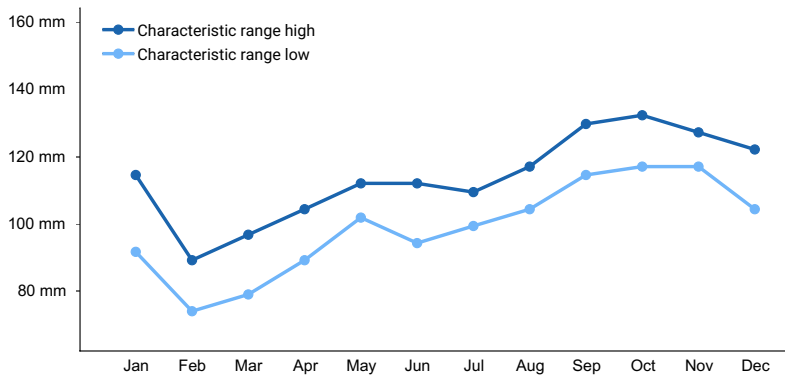
## Climatic features

Throughout the year precipitation is evenly distributed around most of this area with slightly less rainfall occurring around the lower margins of the plateau. Rainfall occurs as high-intensity, convective thunderstorms during the summer. Lake-effect snowfall is heavy from late autumn to early spring with the summit of the plateau having the lowest temperatures and the shortest freeze-free periods.

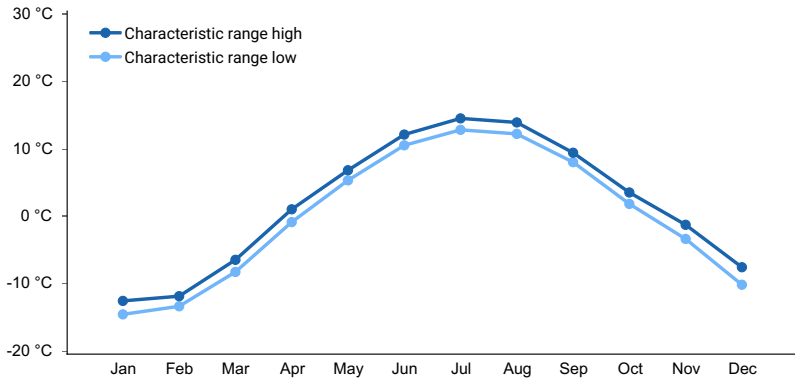
Climate stations Watertown and Old Forge are adjacent to the MLRA and were used to tabulate additional representative climate data.

**Table 3. Representative climatic features**

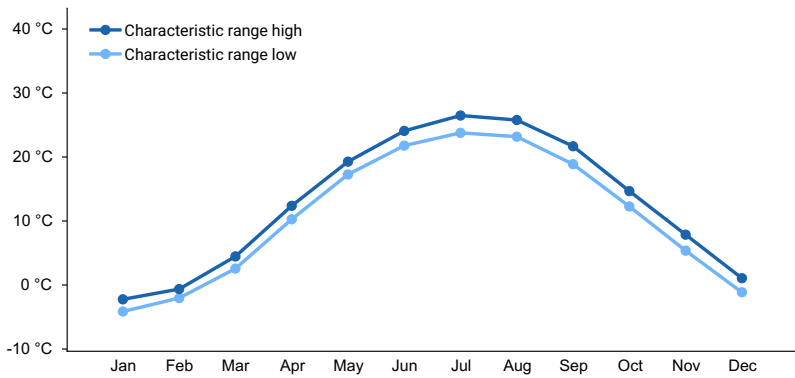
Frost-free period (characteristic range)	92-124 days
Freeze-free period (characteristic range)	129-159 days
Precipitation total (characteristic range)	1,194-1,346 mm
Frost-free period (actual range)	86-131 days
Freeze-free period (actual range)	119-164 days
Precipitation total (actual range)	1,118-1,448 mm
Frost-free period (average)	108 days
Freeze-free period (average)	143 days
Precipitation total (average)	1,270 mm



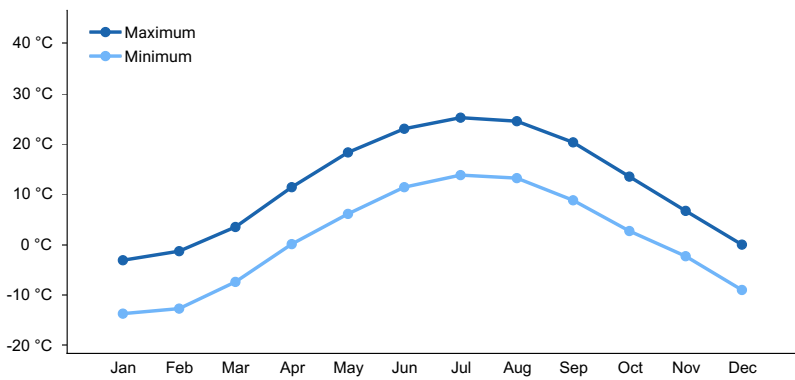
**Figure 1. Monthly precipitation range**



**Figure 2. Monthly minimum temperature range**



**Figure 3. Monthly maximum temperature range**



**Figure 4. Monthly average minimum and maximum temperature**

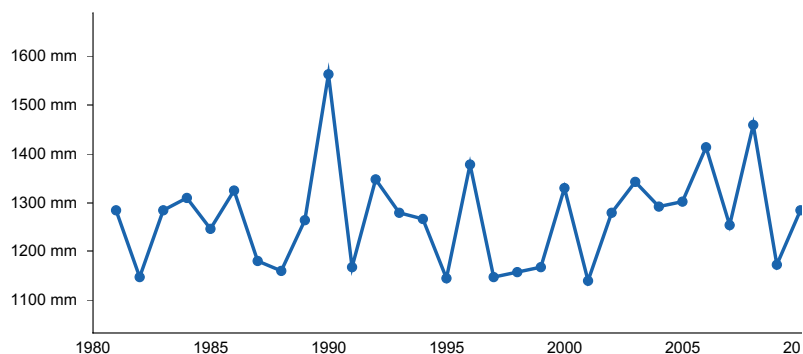


Figure 5. Annual precipitation pattern

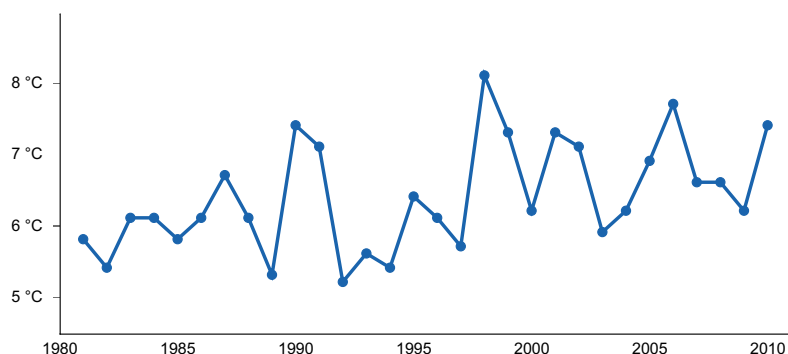


Figure 6. Annual average temperature pattern

### Climate stations used

- (1) BOONVILLE 4 SSW [USC00300785], Boonville, NY
- (2) CAMDEN [USC00301110], Camden, NY
- (3) WATERTOWN [USC00309000], Watertown, NY
- (4) OLD FORGE [USC00306184], Eagle Bay, NY

### Influencing water features

#### Wetland description

These basin wetlands remain saturated for all or nearly all of the growing season, and may have standing water seasonally. There may be some seepage influence, especially near the periphery.

#### Soil features

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.

Table 4. Representative soil features

Parent material	(1) Glaciofluvial deposits (2) Glaciofluvial deposits–sandstone (3) Glaciolacustrine deposits
Surface texture	(1) Gravelly loam (2) Sand (3) Sand
Drainage class	Very poorly drained to poorly drained
Permeability class	Moderately slow to moderately rapid
Soil depth	183 cm

Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (7.6cm)	Not specified
Soil reaction (1:1 water) (9.1-21.3cm)	Not specified
Subsurface fragment volume <=3" (0-101.6cm)	Not specified
Subsurface fragment volume >3" (0-12.7cm)	Not specified

## Ecological dynamics

[Caveat: The vegetation information contained in this section and is only provisional, based on concepts, and future projects support validation through field work. \*] The vegetation groupings described in this section are based on the terrestrial ecological system classification and vegetation associations developed by NatureServe (Comer 2003) and localized associations provided by the New York Natural Heritage Program (Edinger et al. 2014).

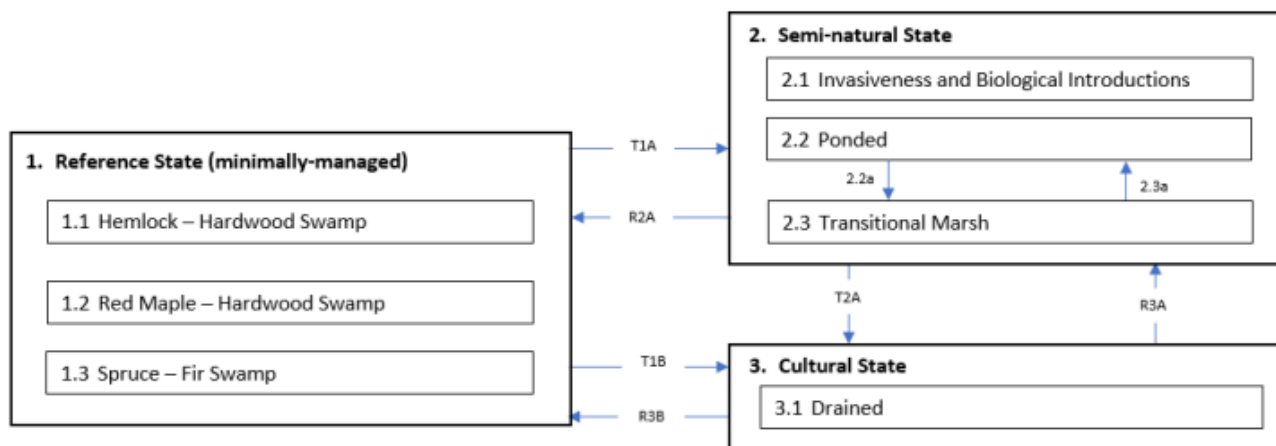
This site is dominated by black spruce, often with larch, balsam fir, red maple, and white pine present in small amounts. Most trees are rooted in the poorly-drained soil mounds rather than the very poorly-drained soil depressions. The understory is diverse with sphagnum moss, creeping snowberry, and three-seed sedge common.

Treethrow, altered hydrology, and logging are common disturbances on this site. Small openings created by treethrow are typically colonized by species already present in the community and eventually return to black spruce dominance. Persistent ponding caused by beavers, man-made structures (such as roads, dams, etc.), or increased runoff in the watershed above can cause water levels to rise and kill cedar trees, resulting in an open ponded or marsh condition. If hydrology is restored to reference conditions, the site is likely to transition through a marsh and/or early seral forest phase before eventually returning to black spruce dominance.

Logging is not common due to the poor productivity of this site, and is limited to very dry years or winter harvest methods due to the wetness of this site. Tree removal may result in an early seral phase dominated by balsam fir, grey birch, red maple, and other colonizers before eventually reverting to black spruce dominance. In some areas, this site has been logged and converted to perennial grass hay land.

## State and transition model

F141XY303NY- Acidic Swamp



Transition	Drivers/practices
T1A	climate change, hydrological alteration, increased nutrients or chemicals (pesticide, herbicide, fertilizer) transported to surface water, significant increase in flooding events and annual precipitation, introduction of invasive species, pests, and pathogens
R2A	remediation of hydrologic alteration, management of invasive species, pests, and pathogens, restoration of key native plant species, restoration of terrestrial and aquatic habitat
2.2a, 2.3a	Remediation of hydrological alteration, decreased annual/decadal precipitation or flooding events; hydrological alteration (beaver or debris), increased annual/decadal precipitation or flooding events
T1B, T2A	hydrologic alteration (barrier, obstruction, dam, diversion), landscape alteration, mechanical soil disturbance, landscape alteration
R3A, R3B	remediation of hydrologic alteration, seeding, planting, significant flooding events and increase in annual precipitation, compacted soil, establishment of key native plant species

**State 1 Reference State (minimally-managed)**

This site occurs in relatively flat areas (0-4% slopes) near the bottom of watersheds where water saturates both organic soils and coarse-textured mineral soils for most of the year. Soils are deep, poorly- to very poorly-drained and relatively more acidic than other wooded wetlands. The water table is seasonally high (within 18 inches of the surface) and typically dries out in late summer and fall. This site may have pit and mound topography, with ponding and organic matter accumulation in the low areas, and drier soil conditions on the mounds where most trees and shrubs are rooted. Black spruce, rhodora, Labrador tea, and other heath shrubs are abundant, with balsam fir, larch, black ash, and grey birch as common associates. Diverse herbs, shrubs, and bryophytes dominate the understory.

**Resilience management.** Treethrow, altered hydrology, and logging are common disturbances on this site. Small openings created by treethrow are typically colonized by species already present in the community and eventually return to black spruce dominance. Persistent ponding caused by beavers, man-made structures (such as roads, dams, etc.), or increased runoff in the watershed above can cause water levels to rise and kill cedar trees, resulting in an open ponded or marsh condition. If hydrology is restored to reference conditions, the site is likely to transition through a marsh and/or early seral forest phase before eventually returning to black spruce dominance. Logging is not common due to the poor productivity of this site, and is limited to very dry years or winter harvest methods due to the wetness of this site. Tree removal may result in an early seral phase dominated by balsam fir, grey birch, red maple, and other colonizers before eventually reverting to black spruce dominance. In some areas, this site has been logged and converted to perennial grass hay land.

**Dominant resource concerns**

- Ponding and flooding
- Seasonal high water table
- Elevated water temperature

- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates
- Aquatic habitat for fish and other organisms

## Community 1.1

### Hemlock - Hardwood Swamp

This site is a mixed swamp that occurs on mineral soils and deep muck in depressions which receive groundwater discharge, typically in areas with acidic substrate. These swamps usually have a fairly closed canopy (70 to 90% cover), sparse shrub layer, and low species diversity. The tree canopy is typically dominated by eastern hemlock (*Tsuga canadensis*), and co-dominated by yellow birch (*Betula alleghaniensis*) and red maple (*Acer rubrum*). Other less frequently occurring trees include white pine (*Pinus strobus*), blackgum (*Nyssa sylvatica*), and green ash (*Fraxinus pennsylvanica*). Characteristic shrubs include saplings of canopy trees plus highbush blueberry (*Vaccinium corymbosum*) often dominant, with great rhododendron (*Rhododendron maximum*) and sweet pepperbush (*Clethra alnifolia*) becoming more common in Lower Hudson Valley examples. Other less frequently occurring shrubs include various viburnums (*Viburnum nudum* var. *cassinoides*, *V. lentago*, and *V. lantanoides*), winterberry (*Ilex verticillata*), and mountain holly (*Nemopanthus mucronatus*). Characteristic herbs are cinnamon fern (*Osmunda cinnamomea*) and sensitive fern (*Onoclea sensibilis*). Groundcover may also be fairly sparse. Other less frequently occurring herbs include sedges (*Carex trisperma*, *C. folliculata*, and *C. bromoides*), goldthread (*Coptis trifolia*), Canada mayflower (*Maianthemum canadense*), common wood-sorrel (*Oxalis montana*), foamflower (*Tiarella cordifolia*), and wild sarsaparilla (*Aralia nudicaulis*). Peat mosses (*Sphagnum* spp.) may be dominant or characteristic bryophyte forming a thin carpet over muck, but typically not developing deep peat. (Edinger et al. 2014)

**Resilience management.** New York Natural Heritage Program State Rank: S4- Apparently secure in New York State. Some occurrences are very small (1 to 2 acres or 0.4 to 0.8 ha). Water levels in these swamps typically fluctuate seasonally; they may be flooded in spring and relatively dry by late summer.

#### Dominant resource concerns

- Ponding and flooding
- Seasonal high water table
- Elevated water temperature
- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates
- Aquatic habitat for fish and other organisms

## Community 1.2

### Red Maple - Hardwood Swamp

A hardwood swamp that occurs in poorly drained depressions or basins, usually on inorganic soil, but occasionally on muck or shallow peat, that is typically acidic to circumneutral. This is a broadly defined community with several regional and edaphic variants. The hydrology varies from permanently saturated to the surface to seasonally flooded/wet with hummocks and hollows. In any one stand red maple (*Acer rubrum*) is either the only canopy dominant, or it is codominant with one or more hardwoods including ashes (*Fraxinus pennsylvanica*, *F. nigra*, and *F. americana*), elms (*Ulmus americana* and *U. rubra*), and yellow birch (*Betula alleghaniensis*). Other trees with low percent cover include butternut (*Juglans cinerea*), bitternut hickory (*Carya cordiformis*), blackgum (*Nyssa sylvatica*), American hornbeam (*Carpinus caroliniana*), swamp white oak (*Quercus bicolor*), and white pine (*Pinus strobus*). The trunks of maples are typically single-trunked unlike those of floodplain forests with multiple trunks. The shrub layer is usually well-developed and may be quite dense. Characteristic shrubs are winterberry (*Ilex verticillata*), spicebush (*Lindera benzoin*), alders (*Alnus incana* ssp. *rugosa* and *A. serrulata*), viburnums (*Viburnum dentatum* var. *lucidum*, *V. nudum* var. *cassinoides*), highbush blueberry (*Vaccinium corymbosum*), common elderberry (*Sambucus nigra* ssp. *canadensis*), and various shrubby dogwoods (*Cornus sericea*, *C. racemosa*, and *C. amomum*). Swamp azalea (*Rhododendron viscosum*) is more common in southern examples, and poison sumac

(*Toxicodendron vernix*) and black ash are more common in mineral-rich examples with slightly higher pH. The herbaceous layer may be quite diverse and is often dominated by ferns, including sensitive fern (*Onoclea sensibilis*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*O. regalis*), and marsh fern (*Thelypteris palustris*), with much lesser amounts of crested wood fern (*Dryopteris cristata*), and spinulose wood fern (*Dryopteris carthusiana*). Characteristic herbs include skunk cabbage (*Symplocarpus foetidus*), white hellebore (*Veratrum viride*), sedges (*Carex stricta*, *C. lacustris*, and *C. intumescens*), jewelweed (*Impatiens capensis*), false nettle (*Boehmeria cylindrica*), arrow arum (*Peltandra virginica*), tall meadow rue (*Thalictrum pubescens*), and marsh marigold (*Caltha palustris*). Open patches within the swamp may contain other herbs characteristic of shallow emergent marsh. (Edinger et al. 2014)

**Resilience management.** More data are needed on reported variants of this community, such as forested seeps, successional hardwood swamp, red maple-white pine swamp on sandy soils, and red maple-tussock sedge swamp with shallow peat. New York Natural Heritage Program State Rank: S4/S5 S4: Apparently secure in New York State. S5: Demonstrably secure in New York State.

#### **Dominant resource concerns**

- Ponding and flooding
- Seasonal high water table
- Elevated water temperature
- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates
- Aquatic habitat for fish and other organisms

### **Community 1.3**

#### **Spruce-fir Swamp**

This site is a conifer or sometimes mixed swamp that occurs on acidic muck to shallow peat. This community typically occurs in a drainage basin, in some cases filling the basin, but also can occur at the edge of a lake or pond, or along gentle slopes of islands where there is some nutrient input from groundwater discharge or subsurface flow. In the Adirondacks and the Tug Hill these swamps are often found in drainage basins occasionally flooded by beaver (*Castor canadensis*). These swamps are usually dense, with a fairly closed canopy (80 to 90% cover). The dominant trees are usually red spruce (*Picea rubens*) and balsam fir (*Abies balsamea*); either one may be dominant in a stand or they may be codominant. In the Catskills, balsam fir may be absent with red maple (*Acer rubrum*) becoming codominant. In the Adirondacks, black spruce (*Picea mariana*) or white spruce (*P. glauca*) may replace red spruce as a dominant tree. Other trees with low percent cover include yellow birch (*Betula alleghaniensis*), white pine (*Pinus strobus*), black ash (*Fraxinus nigra*), tamarack (*Larix laricina*), northern white cedar (*Thuja occidentalis*), and eastern hemlock (*Tsuga canadensis*). The shrub layer is often sparse; characteristic and dominant shrubs include mountain holly (*Nemopanthus mucronatus*) along with sapling canopy trees. Other less frequently occurring shrubs include alders (*Alnus viridis* ssp. *crispa*, *A. incana* ssp. *rugosa*), blueberries (*Vaccinium corymbosum*, *V. myrtilloides*), wild raisin (*Viburnum nudum* var. *cassinoides*), mountain ash (*Sorbus americana*), and winterberry (*Ilex verticillata*). Characteristic herbs are cinnamon fern (*Osmunda cinnamomea*), sedges (*Carex trisperma*, *C. folliculata*), goldthread (*Coptis trifolia*), bunchberry (*Cornus canadensis*), starflower (*Trientalis borealis*), common wood-sorrel (*Oxalis montana*), creeping snowberry (*Gaultheria hispidula*), and dewdrop (*Dalibarda repens*). The nonvascular layer is often dominated by peat mosses, including *Sphagnum girgensohnii*, *S. centrale*, and *S. angustifolium*. Other characteristic bryophytes include the leafy liverwort *Bazzania trilobata* and big red stem moss (*Pleurozium schreberi*). Spruce-fir swamps occur in lowlands where they may grade into either spruce flats or balsam flats (upland forests). A spruce-fir swamp is distinguished from spruce flats by the lower elevation of the swamp, wetland soils, presence in the swamp of patches of peat mosses (*Sphagnum* spp.), and the absence of black cherry (*Prunus serotina*), a characteristic species of spruce flats and balsam flats. (Edinger et al. 2014)

**Resilience management.** New York Natural Heritage Program State Rank: S3- Typically 21 to 100 occurrences, limited acreage, or miles of stream in New York State. Additional data on characteristic fauna is needed.

#### **Dominant resource concerns**



- Ponding and flooding
- Seasonal high water table
- Elevated water temperature
- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates
- Aquatic habitat for fish and other organisms

## **State 2**

### **Semi-natural State**

Shifts in ecological site composition, functionality, and dynamics driven by natural disturbances, processes, and pressures (may have some anthropogenic drivers). More research is needed to determine the extent of the Semi-natural state associated with this ecological site.

#### **Dominant resource concerns**

- Ponding and flooding
- Seasonal high water table
- Nutrients transported to surface water
- Pesticides transported to surface water
- Pathogens and chemicals from manure, biosolids, or compost applications transported to surface water
- Petroleum, heavy metals, and other pollutants transported to surface water
- Sediment transported to surface water
- Elevated water temperature
- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates
- Aquatic habitat for fish and other organisms

## **Community 2.1**

### **Invasiveness and Biological Introductions**

Introduction of invasive species, pathogens, and/or pests resulting in shifts in ecological site composition, functionality, and dynamics. More research is needed to determine the extent of these effects on the semi-natural state associated with this ecological site.

#### **Dominant resource concerns**

- Elevated water temperature
- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates
- Aquatic habitat for fish and other organisms

## **Community 2.2**

### **Ponded**

#### **Dominant resource concerns**

- Ponding and flooding
- Seasonal high water table

## **Community 2.3**

### **Transitional Marsh**

### **Dominant resource concerns**

- Ponding and flooding
- Seasonal high water table
- Plant productivity and health
- Plant structure and composition
- Plant pest pressure

### **Pathway 2.2a**

#### **Community 2.2 to 2.3**

Remediation of hydrological alteration, decreased annual/decadal precipitation or flooding events

### **Pathway 2.3a**

#### **Community 2.3 to 2.2**

hydrological alteration (beaver or debris), increased annual/decadal precipitation or flooding events

## **State 3**

### **Cultural State**

Shifts in ecological site composition, functionality, and dynamics that are primary driven by anthropogenic disturbances and pressures (may have some associated natural drivers). More research is needed to determine the extent of the cultural state associated with this ecological site.

### **Dominant resource concerns**

- Surface water depletion
- Ground water depletion
- Elevated water temperature
- Plant productivity and health
- Plant structure and composition
- Terrestrial habitat for wildlife and invertebrates
- Aquatic habitat for fish and other organisms

## **Community 3.1**

### **Drained**

### **Dominant resource concerns**

- Surface water depletion
- Ground water depletion
- Plant productivity and health
- Plant structure and composition
- Terrestrial habitat for wildlife and invertebrates
- Aquatic habitat for fish and other organisms

## **Transition T1A**

### **State 1 to 2**

climate change, hydrological alteration, increased nutrients or chemicals (pesticide, herbicide, fertilizer) transported to surface water, significant increase in flooding events and annual precipitation, introduction of invasive species, pests, and pathogens

### **Conservation practices**

Monitoring and Evaluation
---------------------------

## Transition T1B

### State 1 to 3

hydrologic alteration (barrier, obstruction, dam, diversion), landscape alteration, mechanical soil disturbance, landscape alteration

#### Conservation practices

Land Clearing
Precision Land Forming
Irrigation Land Leveling
Land Smoothing
Drainage Water Management

## Restoration pathway R2A

### State 2 to 1

remediation of hydrologic alteration, management of invasive species, pests, and pathogens, restoration of key native plant species, restoration of terrestrial and aquatic habitat

#### Conservation practices

Aquatic Organism Passage
Restoration and Management of Rare and Declining Habitats
Wetland Wildlife Habitat Management
Shallow Water Development and Management
Early Successional Habitat Development/Management
Wetland Restoration
Wetland Enhancement
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management
Invasive Plant Species Control
Pathogen Management
Shallow water habitat
Non-forested riparian zone enhancement for fish and wildlife
Riparian forest buffer, terrestrial and aquatic wildlife habitat
Restoration and Management of Rare or Declining Habitats
Multi-species Native Perennials for Biomass/Wildlife Habitat
Establish pollinator habitat
Biological suppression and other non-chemical techniques to manage brush, weeds and invasive species
Biological suppression and other non-chemical techniques to manage herbaceous weeds invasive species
High level Integrated Pest Management to reduce pesticide environmental risk
Monitoring and Evaluation
Herbaceous Weed Control
Herbicide resistant weed management

## Transition T2A

## State 2 to 3

hydrologic alteration (barrier, obstruction, dam, diversion), landscape alteration, mechanical soil disturbance, landscape alteration

### Conservation practices

Drainage Water Management
---------------------------

## Restoration pathway R3B

### State 3 to 1

remediation of hydrologic alteration, seeding, planting, significant flooding events and increase in annual precipitation, compacted soil, establishment of key native plant species

### Conservation practices

Aquatic Organism Passage
Obstruction Removal
Restoration and Management of Rare and Declining Habitats
Wetland Wildlife Habitat Management
Shallow Water Development and Management
Early Successional Habitat Development/Management
Constructed Wetland
Wetland Restoration
Wetland Creation
Wetland Enhancement
Riparian forest buffer, terrestrial and aquatic wildlife habitat
Forest stand improvement for habitat and soil quality
Restoration and Management of Rare or Declining Habitats
Multi-species Native Perennials for Biomass/Wildlife Habitat
Establish pollinator habitat
Habitat Development for Beneficial Insects for Pest Management
Monitoring and Evaluation

## Restoration pathway R3A

### State 3 to 2

### Conservation practices

Restoration and Management of Rare and Declining Habitats
Wetland Wildlife Habitat Management
Shallow Water Development and Management
Early Successional Habitat Development/Management
Constructed Wetland
Wetland Restoration
Wetland Creation
Wetland Enhancement
Restoration and Management of Natural Ecosystems

Native Plant Community Restoration and Management
Shallow water habitat
Non-forested riparian zone enhancement for fish and wildlife
Riparian forest buffer, terrestrial and aquatic wildlife habitat
Restoration and Management of Rare or Declining Habitats
Multi-species Native Perennials for Biomass/Wildlife Habitat
Establish pollinator habitat
Monitoring and Evaluation

## Additional community tables

### Inventory data references

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

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

Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. *Ecological Communities of New York State. Second Edition*. A revised and expanded edition of Carol Reschke's *Ecological Communities of New York State*. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.

Gawler, S. and A. Cutko. 2010. *Natural Landscapes of Maine: A Guide to Natural Communities and Ecosystems*. Maine Natural Areas Program, Maine Department of Conservation, Augusta, Maine.

NatureServe. 2021. *NatureServe Explorer: An online encyclopedia of life* [web application]. NatureServe, Arlington, Virginia. <https://explorer.natureserve.org/>. (accessed 10 July. 2021).

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

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. *Official Soil Series Descriptions*. Available online. (accessed 11 Aug. 2021).

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. *Soil Climate Research Station Data*. Available online. (accessed 23 June. 2021).

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. *Soil Survey Geographic (SSURGO) Database for [MLRA 141, Maine]*. Available online. (accessed 14 Oct. 2021).

USNVC [United States National Vegetation Classification]. 2017. *United States National Vegetation Classification Database V2.01*. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC. Available The U.S. National Vegetation Classification ([usnvc.org](http://usnvc.org)) (accessed 2 July. 2021).

### Contributors

## Approval

Greg Schmidt, 10/03/2024

## Acknowledgments

Nels Barrett and Nick Butler provided considerable review of this ecological site concept.

## 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	11/21/2024
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):**
- 
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:**
-