USDA Natural Resources Conservation Service

Ecological site RX141X301
Semi-rich Loamy Swamp

Last updated: 10/03/2024
Accessed: 05/13/2025

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 (0-8% slopes) near the bottom of watersheds where water saturates lodgment till soils for most of the growing season. Soils are poorly- to very poorly-drained with loamy textures, a mucky peat surface, and a compacted (densic) horizon within ~35 inches of the soil surface. Representative soils include Ilion and Sun. The water table is seasonally high (within 6 inches of the surface) and typically lowers somewhat in late summer and fall. This site often has pit and mound topography, with ponding and organic matter accumulation in the pits, and drier soil conditions on the mounds where most trees are rooted.

Northern white cedar is abundant, often with small amounts of balsam fir, black ash, red maple, white pine, black spruce, and/or yellow birch. Diverse herbs and bryophytes dominate the understory.

Associated sites

RX141X110	**Floodplain Riparian Complex** Floodplain Riparian Complex may be adjacent to or surround Semi-rich Loamy Swamp ecological sites.
RX141X210	**Marsh Wetland Complex** Marsh Wetland Complex may be adjacent to or surround Semi-rich Loamy Swamp ecological sites.
RX141X302	**Mucky Swamp** Mucky Swamp may be adjacent to or surround Semi-rich Loamy Swamp ecological sites.

Similar sites

RX141X302	**Mucky Swamp** Mucky Swamp has similar vegetative properties to Semi-rich Loamy Swamp ecological sites

Table 1. Dominant plant species

Tree	(1) *Thuja occidentalis* (2) *Acer rubrum*
Shrub	(1) *Alnus incana ssp. rugosa* (2) *Cornus sericea*
Herbaceous	(1) *Carex trisperma* (2) *Equisetum scirpoides*

Legacy ID

F141XY301NY

Physiographic features

This site occurs mainly in depressions. It is characterized by pit and mound* topography, with frequent ponding of water in the pits and drier conditions on the mounds. The water table is at or near the surface during the growing season.

*Pit and mound topography is formed by the natural process of falling trees, which removes soil from the pit as they are uprooted, and deposit the soil in a mound next to the pit as the tree decays. When pit and mound topography is eliminated by land-leveling practices, it can take decades or centuries to develop naturally on this site. Much of the species diversity of this site results from the high variability in soil and plant growing conditions associated with pit and mound topography.

Table 2. Representative physiographic features

Landforms	(1) Depression
Runoff class	Medium
Flooding frequency	None
Ponding frequency	Occasional to frequent
Elevation	75–549 m
Slope	0–8%
Water table depth	0 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

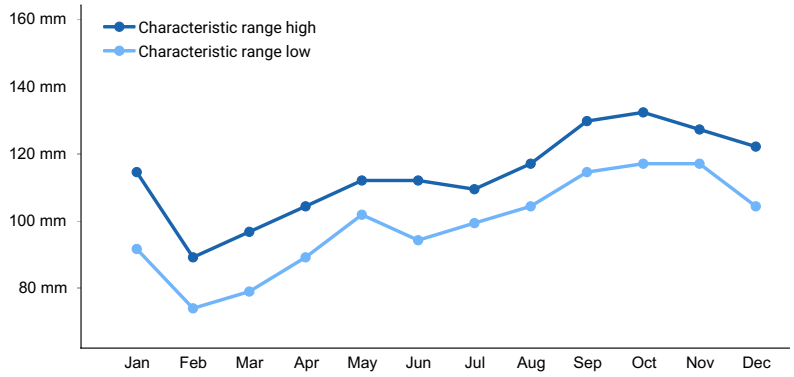


Figure 1. Monthly precipitation range

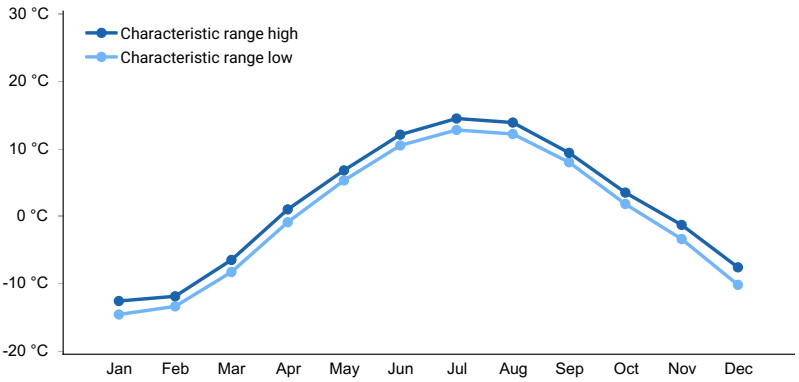


Figure 2. Monthly minimum temperature range

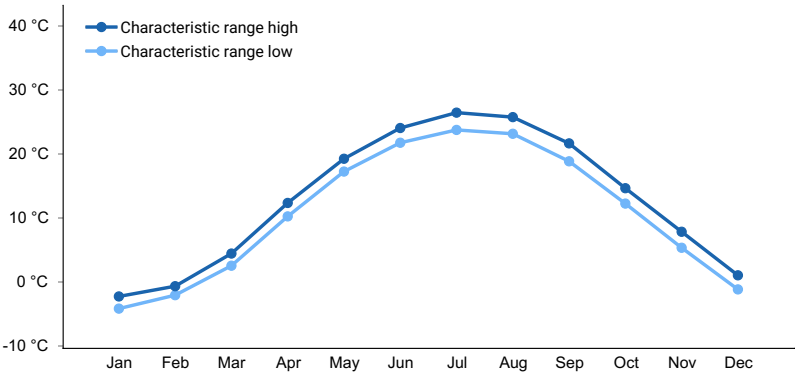


Figure 3. Monthly maximum temperature range

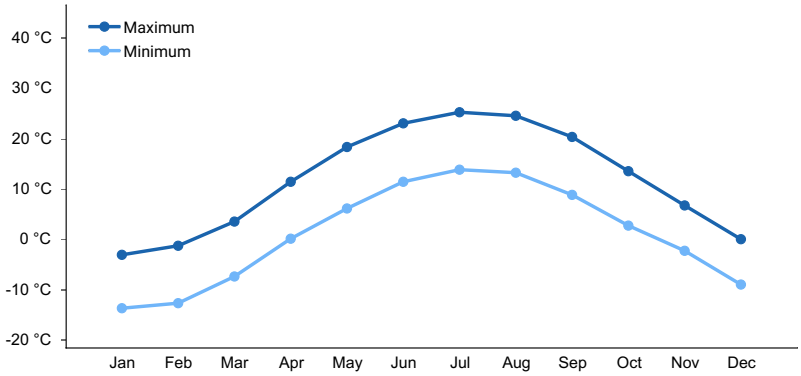


Figure 4. Monthly average minimum and maximum temperature

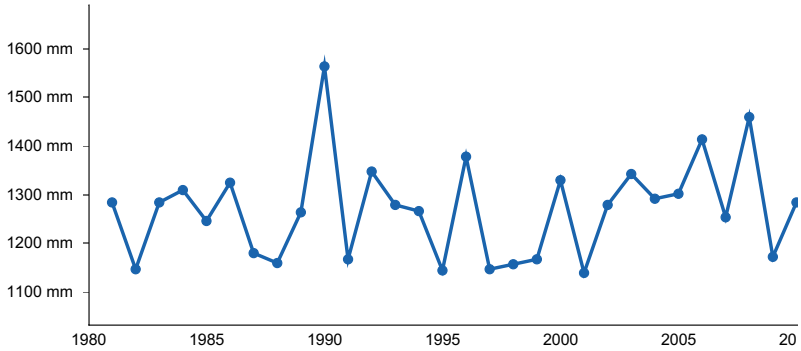


Figure 5. Annual precipitation pattern

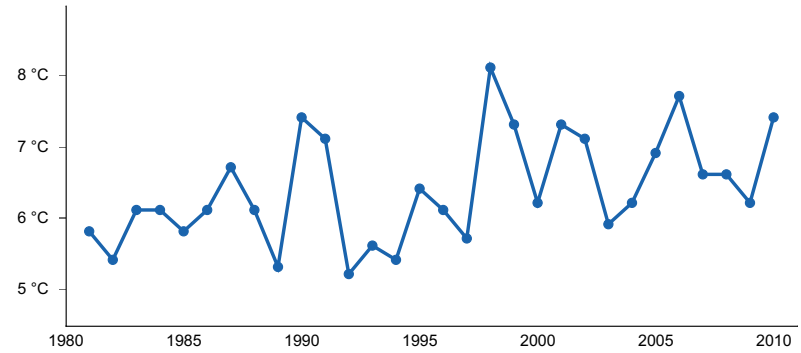


Figure 6. Annual average temperature pattern

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

Water can come from nutrient-rich groundwater or surface runoff. Sites are basins or low areas in floodplains, usually near the edge of the floodplain in a localized basin or at the base of a bluff where groundwater emerges. Soils are muck or fine-textured mineral. Small hummocks and depressions, created from tree tip-ups, sluggish streams, or tree root build up, create drier and wetter microsites within the system. Sites are usually flooded in the spring, and low areas may remain wet for all or most of the growing season, but if stands remain under water for multiple years, the trees die. The microsite differences allow a mixture of wet-mesic upland species and wetland species to exist in the herbaceous layer of this system. (NatureServe, 2022)

Wetland description

The hydrologic regime is critical to maintenance of this system. Sites must be wet or flooded for part of the growing season but not completely saturated or under water for too long over a large portion of the site. Periodic sustained floods or droughts can kill canopy trees and allow the mostly shade-intolerant canopy trees to regenerate. (NatureServe, 2022)

Soil features

Representative soils include Ilion and Sun.

Table 4. Representative soil features

Parent material	(1) Till–calcareous shale (2) Till–limestone and sandstone
Surface texture	(1) Loam
Drainage class	Very poorly drained to poorly drained
Permeability class	Very slow
Soil depth	183 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	2%
Available water capacity (Depth not specified)	12.7–15.24 cm
Soil reaction (1:1 water) (Depth not specified)	5.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	13–16%
Subsurface fragment volume >3" (Depth not specified)	3–5%

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).

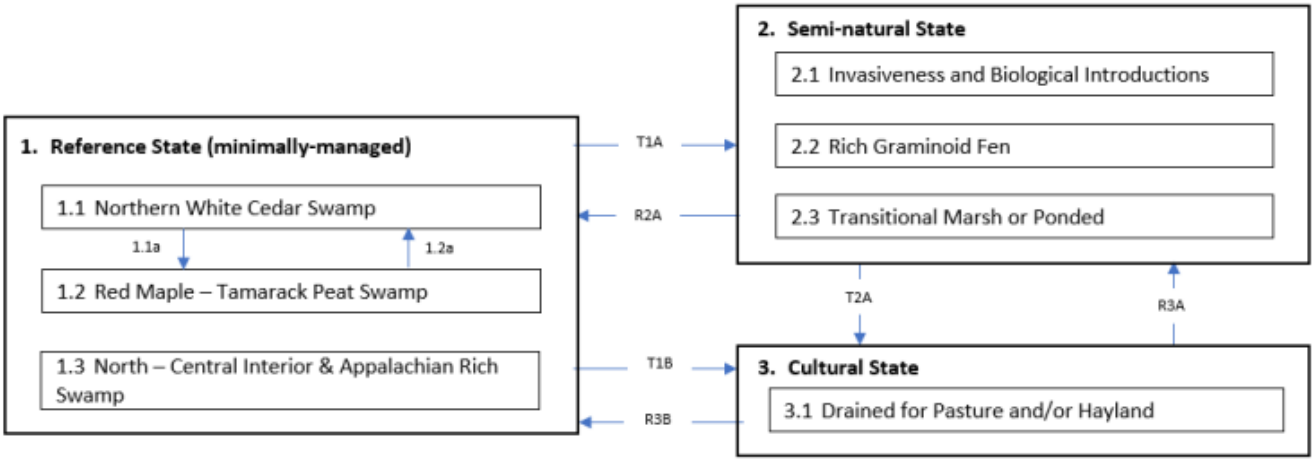
This site is dominated by northern white cedar, often with black spruce, balsam fir, red maple, yellow birch, white pine, and/or brown ash present in small amounts. Most trees are rooted in the poorly-drained soil mounds rather than the very poorly-drained soil depressions. The understory is diverse 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 cedar 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 cedar dominance.

Logging is limited to very dry years or winter harvest methods due to the wetness of this site. Cedar removal may result in an early seral phase dominated by balsam fir, grey birch, red maple, and other colonizers before eventually reverting to cedar dominance. In some areas, this site has been logged and converted to perennial grass hay land.

State and transition model

F141XY301NY- Semi-rich Loamy Swamp



Transition	*Drivers/practices*
1.1a, 1.2a	The presence or absence (removal or loss) of *Thuja occidentalis* as the dominant tree will result in shifts between sites
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
T1B, T2A	hydrologic alteration (barrier, obstruction, dam, diversion), landscape alteration, mechanical soil disturbance, landscape development, planting, seeding
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)

Community 1.1
Northern White Cedar Swamp

This site is a conifer or mixed swamp that occurs on organic soils in cool, poorly drained depressions in central and northern New York, and along lakes and streams in the northern half of the state. These swamps are often spring fed or enriched by seepage of cold, minerotrophic groundwater, resulting in a stable water table and continually saturated soils. Soils are often rich in calcium. At some sites these soils have developed above a marl substrate. The dominant tree is northern white cedar (*Thuja occidentalis*), which makes up more than 30% of the canopy cover. Thuja may form nearly pure stands, or it may be mixed with other conifers and hardwoods, including red maple (*Acer rubrum*), eastern hemlock (*Tsuga canadensis*), balsam fir (*Abies balsamea*), tamarack (*Larix laricina*), yellow birch (*Betula alleghaniensis*), white pine (*Pinus strobus*), spruces (*Picea mariana*, *P. rubens*, *P. glauca*), and black ash (*Fraxinus nigra*) which is a good indicator for this community when present. The shrub layer is usually sparse; characteristic species are northern white cedar (*Thuja occidentalis*), dwarf raspberry (*Rubus pubescens*), red osier dogwood (*Cornus sericea*), swamp fly honeysuckle (*Lonicera oblongifolia*), speckled alder (*Alnus incana* ssp. rugosa), and highbush blueberry (*Vaccinium corymbosum*). The groundlayer is typically diverse, with many bryophytes and boreal herbs. There are typically many hummocks formed by decaying downed trees or tip-up mounds. Characteristic herbs on the hummocks include sedges (*Carex leptalea*, *C. eburnea*), oak fern (*Gymnocarpium dryopteris*), goldthread (*Coptis trifolia*), starflower (*Trientalis borealis*), bunchberry (*Cornus canadensis*), miterwort (*Mitella nuda*), Canada mayflower (*Maianthemum canadense*), blue bead lily (*Clintonia borealis*), snowberry (*Gaultheria hispidula*), partridge berry (*Mitchella repens*), and dwarf scouring rush (*Equisetum scirpoides*) which is a good indicator for this community when present. Characteristic herbs of hollows between the hummocks are the sedge *Carex intumescens*, sensitive fern (*Onoclea sensibilis*), marsh fern (*Thelypteris palustris*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*O. regalis*), crested wood fern (*Dryopteris cristata*), showy lady's-slipper (*Cypripedium reginae*), yellow lady's-slipper (*Cypripedium parviflorum* var. pubescens), and golden

ragwort (*Packera aurea*). Characteristic bryophytes are several peat mosses (Sphagnum spp.), feather mosses such as stair-step moss (*Hylocomium splendens*) and knight's plume moss (*Ptilium crista-castrensis*), and leafy liverworts such as *Bazzania trilobata* and *Trichocolea tomentella*. (Edinger et al. 2014)

Resilience management. New York Natural Heritage Program State Rank: S2/S3 S2- Typically 6 to 20 occurrences, few remaining individuals (for species), acres, or miles of stream, or factors demonstrably making it very vulnerable in New York State. S3- Typically 21 to 100 occurrences, limited acreage, or miles of stream in New York State. Flooding by beaver is common and the community may oscillate between a tall shrubland and forest over long cycles of beaver flooding and abandonment

Dominant resource concerns

- Ponding and flooding
- Seasonal high water table
- Surface water depletion
- 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
- 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 - Tamarack Peat Swamp

This site is a mixed swamp that occurs on organic soils (peat or muck) in poorly drained depressions. These swamps are often spring fed or enriched by seepage of minerotrophic groundwater resulting in a stable water table and continually saturated soil. Soils are often rich in calcium. The dominant trees are red maple (*Acer rubrum*) and tamarack (*Larix laricina*). These species usually form an open canopy (50 to 70% cover) with numerous small openings dominated by shrubs or sedges. Other less frequently occurring trees include black spruce (*Picea mariana*), white pine (*Pinus strobus*), black ash (*Fraxinus nigra*), American hornbeam (*Carpinus caroliniana*), and northern white cedar (*Thuja occidentalis*). Characteristic shrubs are alders (*Alnus incana* ssp. rugosa, *A. serrulata*), winterberry (*Ilex verticillata*), various shrubby dogwoods, especially red osier dogwood (*Cornus sericea*), willows (Salix spp.), highbush blueberry (*Vaccinium corymbosum*), dwarf raspberry (*Rubus pubescens*), along with many rich shrub fen species such as swamp birch (*Betula pumila*), alder-leaf buckthorn (*Rhamnus alnifolia*), poison sumac (*Toxicodendron vernix*), swamp fly honeysuckle (*Lonicera oblongifolia*), and shrubby cinquefoil (*Dasiphora fruticosa* ssp. floribunda). Other less frequently occurring shrubs include black chokeberry (*Aronia melanocarpa*) and mountain holly (Nemopanthus mucronatus). The herb layer is often very diverse and usually includes calcium-rich indicator species. Characteristic herbs include sedges (*Carex trisperma*, *C. interior*, *C. stricta*, *C. lacustris*, *C. leptalea*), royal fern (*Osmunda regalis*), cinnamon fern (*O. cinnamomea*), marsh fern (*Thelypteris palustris*), crested wood fern (*Dryopteris cristata*), skunk cabbage (*Symplocarpus foetidus*), purple avens (*Geum rivale*), marsh marigold (*Caltha palustris*), and water horehound (*Lycopus uniflorus*). Other less frequently occurring herbs include cattail (*Typha latifolia*), goldthread (*Coptis trifolia*), flat-topped white aster (*Doellingeria umbellata* var. umbellata), fowl manna grass (*Glyceria striata*), water horsetail (*Equisetum fluviatile*), buckbean (*Menyanthes trifoliata*), starflower (*Trientalis borealis*), goldenrods (*Solidago patula*, *S. uliginosa*), golden ragwort (*Packera aurea*), and marsh cinquefoil (*Comarum palustre*). The bryophyte layer is dominated by several peat mosses, including *Sphagnum magellanicum*, *S. angustifolium*, and *S. subtile*. (Edinger et al. 2014)

Resilience management. New York Natural Heritage Program State Rank: S2/S3 S2- Typically 6 to 20 occurrences, few remaining individuals (for species), acres, or miles of stream, or factors demonstrably making it very vulnerable in New York State. S3- Typically 21 to 100 occurrences, limited acreage, or miles of stream in New York State. These swamps are closely related to and often grade into rich shrub fens and rich graminoid fens.

Dominant resource concerns

- Ponding and flooding
- Surface water depletion
- Ground water depletion
- 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 1.3
North - Central Interior and Appalachian Rich Swamp

These forested wetlands are scattered throughout the north-central Midwest (south of the Laurentian region), the north-central Appalachians and southern New England at low to mid elevations. They are found in basins where higher pH and/or nutrient levels are associated with a rich flora. Species include *Acer rubrum*, *Fraxinus nigra*, as well as calciphilic herbs. Conifers include *Larix laricina*, but typically not *Thuja occidentalis*, which is characteristic of more northern wetland systems. There may be shrubby or herbaceous openings within the primarily wooded cover. The substrate is primarily mineral soil, but there may be some peat development. Water can come from nutrient-rich groundwater or surface runoff. Sites are basins or low areas in floodplains, usually near the edge of the floodplain in a localized basin or at the base of a bluff where groundwater emerges. Soils are muck or fine-textured mineral. Small hummocks and depressions, created from tree tip-ups, sluggish streams, or tree root build up, create drier and wetter microsites within the system. Sites are usually flooded in the spring, and low areas may remain wet for all or most of the growing season, but if stands remain under water for multiple years, the trees die (Kost et al. 2007). The microsite differences allow a mixture of wet-mesic upland species and wetland species to exist in the herbaceous layer of this system (WDNR 2015). The hydrologic regime is critical to maintenance of this system. Sites must be wet or flooded for part of the growing season but not completely saturated or under water for too long over a large portion of the site. Periodic sustained floods or droughts can kill canopy trees and allow the mostly shade-intolerant canopy trees (*Fraxinus nigra*, *Fraxinus pennsylvanica*, *Larix laricina*) to regenerate. Trees are shallowly rooted in this system so wind can blow canopy trees over relatively easily. This creates gaps in the canopy and allows smaller trees enough light to reach the canopy. Windthrow contributes to hummock-and-hollow microtopography, which generates small-scale gradients in soil moisture and chemistry, contributing to floristic diversity. NatureServe Element Code: CES202.605 (NatureServe, 2022)

Resilience management. Alterations in wetland hydrology, logging, invasive plants, and emerald ash borer (Agrilus planipennis) are the prime threats to this system. Hydrologic alterations can occur due to ditching, road construction, or quarrying/mining that affect groundwater or surface waterflows into sites. Both reductions and increases in groundwater or surface water input can negatively affect this system. Partial drainage of a site can allow upland species to colonize. Increased surface waterflow can flood these swamps, changing both the hydrologic regime and water chemistry. This would likely lead to tree death and the development of a herbaceous marsh or shrub swamp. Increased flooding can also transport sediment and higher nutrient loads. Logging can negatively impact this system through removal of trees, compaction of the soil, and creation of ruts. A serious threat to stands of this system that contain Fraxinus spp. is emerald ash borer (Agrilus planipennis). Invasive plant species that can reduce diversity and alter community structure of this system include *Elaeagnus umbellata*, *Frangula alnus* (= Rhamnus frangula), *Lythrum salicaria*, *Phalaris arundinacea*, *Phragmites australis*, *Rosa multiflora*, *Typha angustifolia*, and Typha x glauca. *Frangula alnus* is especially problematic because it is capable of completely dominating the shrub and ground layers and altering a sites hydrology and soil nutrient characteristics. NatureServe Element Code: CES202.605 (NatureServe, 2022)

Dominant resource concerns

- Ponding and flooding
- Surface water depletion

- Ground water depletion
- 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

Pathway 1.1a
Community 1.1 to 1.2

The absence (removal or loss) of *Thuja occidentalis* as the dominant tree will result in shifts between sites

Pathway 1.2a
Community 1.2 to 1.1

The presence or addition of *Thuja occidentalis* as the dominant tree will result in shifts between sites

State 2
Semi-natural State

Shifts in ecological site composition, functionality, and dynamics driven by natural disturbances, processes, and pressures (may have some anthropogenic influences). More research is needed to determine the extent of 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 2.1
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
Rich Graminoid Fen

This site is a strongly minerotrophic peatland in which the substrate is a predominantly graminoid peat that may or may not be underlain by marl. Rich fens are fed by waters that have high concentrations of minerals and high pH values, generally from 6.0 to 7.8. Rich graminoid fens are usually fed by water from highly calcareous springs or seepage. The dominant species in rich graminoid fens are sedges, although grasses and rushes may be common. Shrubs may be present, but collectively they have less than 50% cover. Peat mosses (Sphagnum spp.) are either absent or a minor component, with only the most minerotrophic species present. Other mosses, especially those requiring highly minerotrophic conditions, may be common. Characteristic herbs include spike muhly (*Muhlenbergia glomerata*), swamp goldenrod (*Solidago uliginosa*), sedges (*Carex flava*, *C. lasiocarpa*, *C. sterilis*, *C. aquatilis*, *C. prairea*, *C. hystericina*), bog-rush (*Cladium mariscoides*), grass-of-parnassus (*Parnassia glauca*), sundew (*Drosera rotundifolia*), marsh fern (*Thelypteris palustris*), white beakrush (*Rhynchospora alba*), common cat-tail (*Typha latifolia*), spikerush (*Eleocharis rostellata*), royal fern (*Osmunda regalis*), blue flag (*Iris versicolor*), and hard-stem bulrush (*Schoenoplectus acutus*). Other herbs found in rich graminoid fens include alpine bulrush (*Trichophorum alpinum*), flat-topped white aster (*Doellingeria umbellata* var. umbellata), cotton-grass (Eriophorum viridi-carinatum), boneset (*Eupatorium perfoliatum*), spotted joe-pye-weed (*Eutrochium maculatum*), buckbean (*Menyanthes trifoliata*), Ohio goldenrod (*Oligoneuron ohioense*), sedges (*Carex stricta*, *C. buxbaumii*, *C. pellita*, *C. leptalea*), spreading goldenrod (*Solidago patula*), fringed brome (*Bromus ciliatus*), marsh St. John's-wort (*Triadenum virginicum*), common horsetail (*Equisetum arvense*), marsh cinquefoil (*Comarum palustre*), field mint (*Mentha arvensis*), arrow-grasses (Triglochin maritimum, T. palustre), milfoil bladderwort (*Utricularia intermedia*), grass pink (*Calopogon tuberosus*), water-horehound (*Lycopus uniflorus*), rose pogonia (*Pogonia ophioglossoides*), golden ragwort (*Packera aurea*), fringed gentian (*Gentianopsis crinita*), and Kalm's lobelia (*Lobelia kalmii*). Characteristic shrubs include shrubby cinquefoil (*Dasiphora fruticosa* ssp. floribunda), bayberry (Myrica pensylvanica), speckled alder (*Alnus incana* ssp. rugosa), poison sumac (*Toxicodendron vernix*), red maple (*Acer rubrum*), alder-leaf buckthorn (*Rhamnus alnifolia*), red osier dogwood (*Cornus sericea*), and hoary willow (*Salix candida*). Other shrubs found in rich graminoid fens include northern white cedar (*Thuja occidentalis*), dwarf raspberry (*Rubus pubescens*), tamarack (*Larix laricina*), sweet-gale (*Myrica gale*), and swamp fly honeysuckle (*Lonicera oblongifolia*). Mosses that can become characteristically abundant in rich graminoid fens are *Campylium stellatum* and the rare scorpion feather moss (*Scorpidium scorpioides*). Other characteristic nonvascular species include the peat moss *Sphagnum centrale*, and the leafy liverworts *Calypogeia sphagnicola*, *Lepidozia reptans*, *Mylia anomala*, and *Plagiochila porelloides*. Additional rich graminoid fen bryophytes common to other rich fen types include the mosses *Aulacomnium palustre*, *Bryum pseudotriquetrum*, *Calliergonella cuspidata*, *Cratoneuron filicinum*, *Fissidens adianthoides*, Scorpidium revolvens, the peat moss *Sphagnum warnstorfii*, the rare golden moss (*Tomentypnum nitens*), and the thalloid liverwort *Aneura pinguis*. Sooty cupola moss (*Cinclidium stygium*) and pipe-cleaner moss (*Paludella squarrosa*) are two additional rare mosses that have only been found in rich graminoid fens in New York. (Edinger et al. 2014)

Resilience management. New York Natural Heritage Program State Rank: S1/S2 S1- Typically 5 or fewer occurrences, very few remaining individuals (for species), acres, or miles of stream, or some factor of its biology and/or ecology making it especially vulnerable in New York State. S2- Typically 6 to 20 occurrences, few remaining individuals (for species), acres, or miles of stream, or factors demonstrably making it very vulnerable in New York State.

Community 2.3
Transitional Marsh or Ponded

Dominant resource concerns

- Ponding and flooding
- Surface water depletion
- Ground water depletion
- 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
- 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 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 influences). More research is needed to determine the extent of the cultural state associated with this ecological site.

Dominant resource concerns

- Compaction
- Organic matter depletion
- Surface water depletion
- Ground water depletion
- 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
- 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 for Pasture and/or Hayland

Hydrological alteration is implemented and site is drained for pasture or hay cultivation.

Dominant resource concerns

- Compaction
- Organic matter depletion
- 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 development

Conservation practices

Cover Crop
Land Clearing
Precision Land Forming
Irrigation Land Leveling
Land Smoothing

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

Restoration and Management of Rare and Declining Habitats
Wetland Wildlife Habitat Management
Upland 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
Pathogen Management
Invasive Plant Species Control
Pathogen Management
Invasive Species Pest Management
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
Habitat Development for Beneficial Insects for Pest Management
Monitoring and Evaluation
Herbaceous Weed Control

Transition T2A
State 2 to 3

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

Conservation practices

Cover Crop
Dam, Diversion

Diversion
Dam
Waste Management System
Defer crop production on temporary and seasonal wetlands
Extending riparian forest buffers for water quality protection and wildlife habitat
Extending existing riparian herbaceous cover for water quality protection and wildlife habitat
Improve the plant diversity and structure of non-cropped areas for wildlife food and habitat
Grazing management to improve wildlife habitat
Harvest hay in a manner that allows wildlife to flush and escape
Continuous cover crops
Conversion of cropped land to grass-based agriculture
Monitoring and Evaluation

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

Obstruction Removal
Vegetated Treatment Area
Restoration and Management of Rare and Declining Habitats
Wetland Wildlife Habitat Management
Upland Wildlife Habitat Management
Shallow Water Development and Management
Early Successional Habitat Development/Management
Constructed Wetland
Wetland Restoration
Wetland Creation
Wetland Enhancement
Restoration of Compacted Soils
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
Habitat Development for Beneficial Insects for Pest Management
Monitoring and Evaluation
Aquatic Organism Passage Barrier Removal

Restoration pathway R3A

State 3 to 2

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

Conservation practices

Obstruction Removal
Restoration and Management of Rare and Declining Habitats
Wetland Wildlife Habitat Management
Upland 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
Monitoring and Evaluation
Aquatic Organism Passage Barrier Removal

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.

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Approval

Greg Schmidt, 10/03/2024

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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:**

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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:**