USDA Natural Resources
Conservation Service

Ecological site RX141X230
Acidic Peat Wetland Complex

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 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 flat, low-lying areas characterized by very poorly-drained acidic peat soils and acid bog vegetation. Soil pH is generally below 4.5 throughout (usually below 4.0). Typical soils are medihemists.

The vegetation of this site is dominated by sphagnum moss and heath shrubs, along with other common bog species such as pitcher plant, cotton grass, sundews, etc. in lower quantities. This site may sometimes support stunted black spruce and larch trees, not more than a few feet tall.

This site is resistant to major disturbances except for small scale hydrologic alterations that may create small patches of drained or ponded peatland (such as near a culvert). This ecological resistance can be attributed to the ability of these bogs to respond to large fluctuations in water, as the peat acts like a sponge, expanding and contracting with the water supply. There is also a general resistance to fire, insects, disease, construction, land management, etc. due to the wet nature and particular species on the site. Further study is needed to identify alternative states for this site.

Associated sites

RX141X110	**Floodplain Riparian Complex** Floodplain Riparian complex may be located adjacent to or surrounding Acidic Peat Wetland Complex.
RX141X210	**Marsh Wetland Complex** Marsh Wetland Complex may be located adjacent to or surrounding Acidic Peat Wetland Complex.

RX141X220	**Semi-acidic Peat Wetland Complex** Semi-acidic Peat Wetland Complex may be located adjacent to, surrounding, or transition into Acidic Peat Wetland Complex.

Similar sites

RX141X220	**Semi-acidic Peat Wetland Complex** The Semi-acidic Peat Wetland Complex ecological site is similar in soil properties, vegetation composition, and physiography to Acidic Peat Wetland Complex ecological sites. PH levels are < 4.5 in Acidic Peat Wetland Complex while PH levels in Semi-acidic Peat Wetland Complex are between 4.5-6.

Table 1. Dominant plant species

Tree	(1) *Picea mariana* (2) *Larix laricina*
Shrub	(1) *Chamaedaphne calyculata* (2) *Kalmia angustifolia*
Herbaceous	(1) *Carex trisperma* (2) *Vaccinium corymbosum*

Legacy ID

F141XY230NY

Physiographic features

Table 2. Representative physiographic features

Landforms	(1) Depression
Ponding frequency	Occasional to frequent
Elevation	75–605 m
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

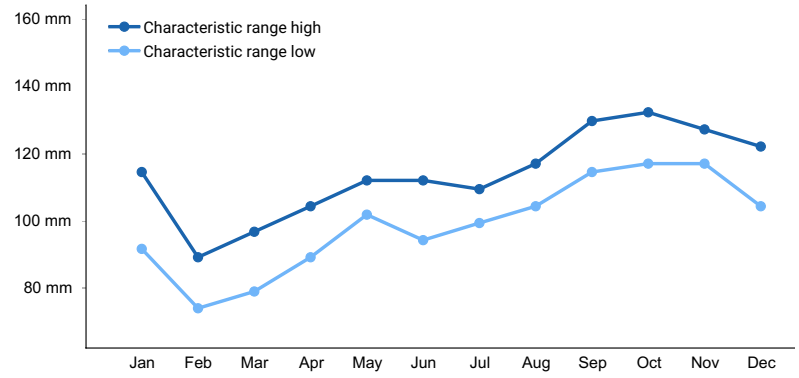


Figure 1. Monthly precipitation range

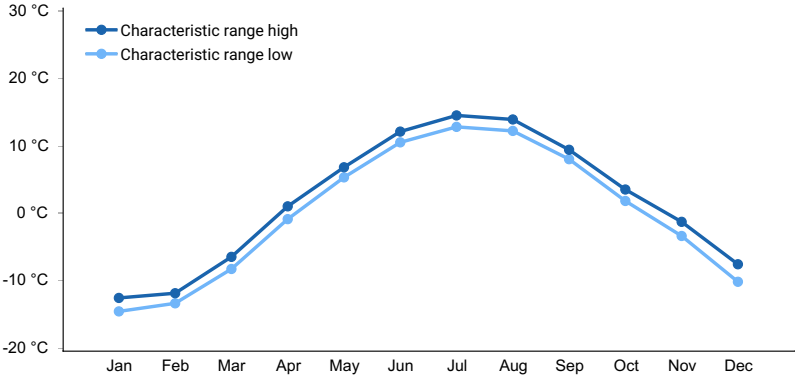


Figure 2. Monthly minimum temperature range

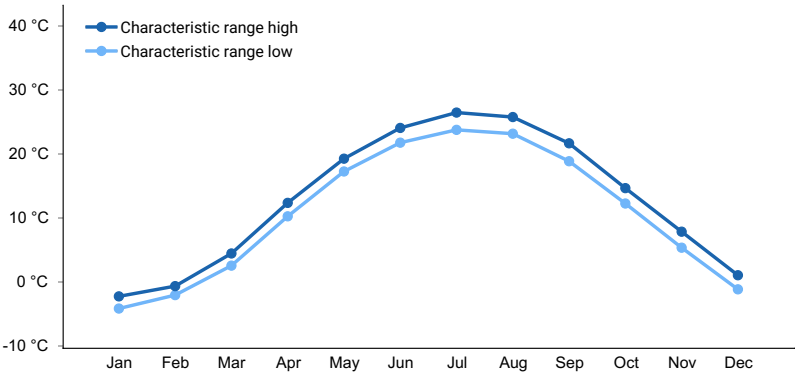


Figure 3. Monthly maximum temperature range

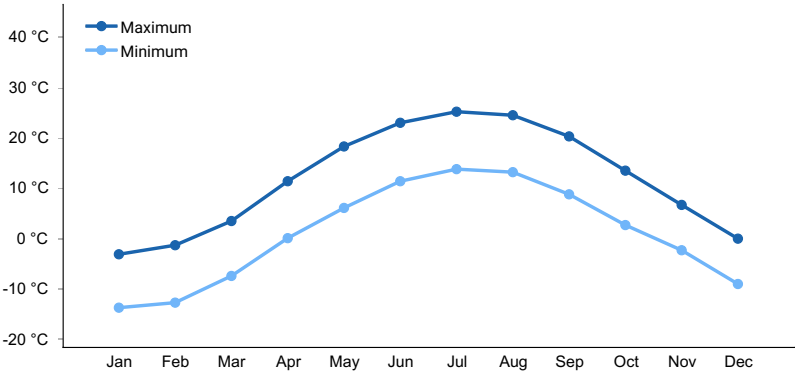


Figure 4. Monthly average minimum and maximum temperature

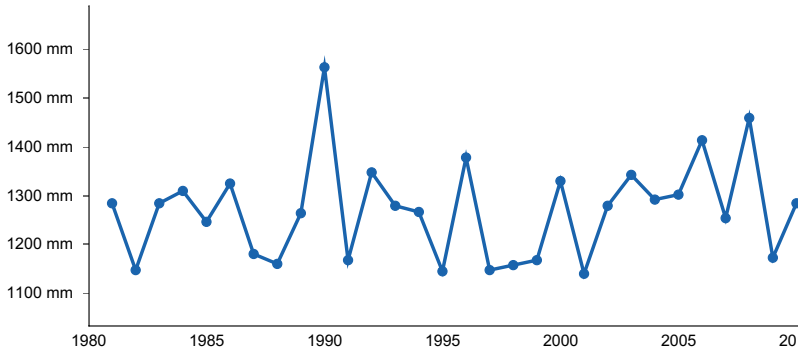


Figure 5. Annual precipitation pattern

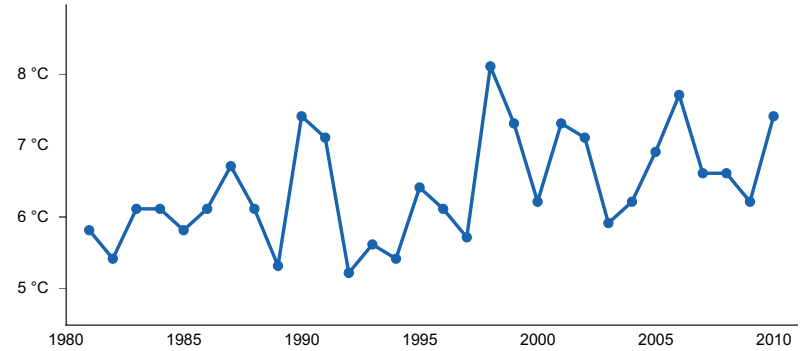


Figure 6. Annual average temperature pattern

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

Soil features

Table 4. Representative soil features

Parent material	(1) Organic material
Surface texture	(1) Peaty loam
Drainage class	Very poorly drained
Permeability class	Very slow to moderately slow
Soil depth	183 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (35.6-50.8cm)	Not specified
Soil reaction (1:1 water) (0cm)	Not specified
Subsurface fragment volume <=3" (0cm)	Not specified
Subsurface fragment volume >3" (0cm)	Not specified

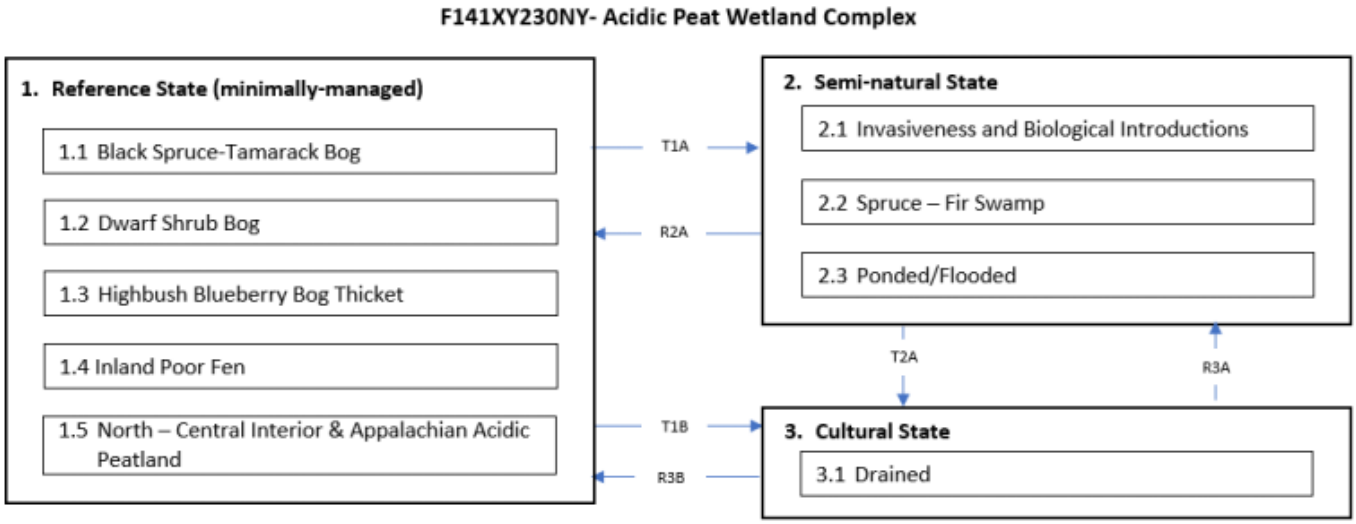
Ecological dynamics

[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).

The vegetation of this site is dominated by sphagnum moss and heath shrubs, along with other common bog species such as pitcher plant, cotton grass, sundews, etc. in lower quantities. This site may sometimes support stunted black spruce and larch trees, not more than a few feet tall.

This ecological site is resistant to major disturbances except for small scale hydrologic alterations that may create small patches of drained or ponded peatland (such as near a culvert). This ecological resistance can be attributed to the ability of these bogs to respond to large fluctuations in water, as the peat acts like a sponge, expanding and contracting with the water supply. There is also a general resistance to fire, insects, disease, construction, land management, etc. due to the wet nature and particular species on the site. Further study is needed to identify alternative states for this site.

State and transition model



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
T1B, T2A	hydrologic alteration (barrier, obstruction, dam, diversion), landscape alteration, mechanical soil disturbance, landscape development
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 flat, low-lying areas characterized by very poorly-drained acidic peat soils and acid bog vegetation. Soil pH is generally below 4.5 throughout (usually below 4.0) The vegetation of this site is dominated by sphagnum moss and heath shrubs, along with other common bog species such as pitcher plant, cotton grass, sundews, etc. in lower quantities. This site may sometimes support stunted black spruce and larch trees, not more than a few feet tall.

Resilience management. This site is resistant to major disturbances except for small scale hydrologic alterations that may create small patches of drained or ponded peatland (such as near a culvert). This ecological resistance can be attributed to the ability of these bogs to respond to large fluctuations in water, as the peat acts like a sponge, expanding and contracting with the water supply. There is also a general resistance to fire, insects, disease, construction, land management, etc. due to the wet nature and particular species on the site. Further study is needed to identify alternative states for this site.

Dominant resource concerns

- Ponding and flooding
- Seasonal high water table
- Ground water depletion
- Naturally available moisture use
- 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 1.1
Black Spruce - Tamarack Bog

This site is a conifer forest or woodland that occurs on acidic peatlands in cool, poorly drained depressions. The characteristic trees are black spruce (*Picea mariana*) and tamarack (*Larix laricina*); in any one stand, either tree may be dominant, or they may be codominant. Canopy cover is quite variable, ranging from open canopy woodlands with as little as 20% cover of evenly spaced canopy trees to closed canopy forests with 80 to 90% cover. In the more open canopy stands there is usually a well-developed shrub layer characterized by several shrubs typical of bogs: leatherleaf (*Chamaedaphne calyculata*), sheep laurel (*Kalmia angustifolia*), highbush blueberry (*Vaccinium corymbosum*), Labrador tea (Rhododendron groenlandicum), mountain holly (Nemopanthus mucronatus), and wild raisin (*Viburnum nudum* var. cassinoides). In closed canopy stands the shrub layer is usually sparse; however the species composition is similar. The dominant groundcover consists of several peat mosses, including *Sphagnum fimbriatum*, *S. girgensohnii*, and *S. magellanicum*, with scattered sedges and forbs. Characteristic herbs are the sedge *Carex trisperma*, cotton grass (Eriophorum spp.), pitcher plant (*Sarracenia purpurea*), bunchberry (*Cornus canadensis*), and cinnamon fern (*Osmunda cinnamomea*). In shady areas where the canopy is dense, goldthread (*Coptis trifolia*) and creeping snowberry (*Gaultheria hispidula*) may be found. Vascular plant diversity is usually low in these forested peatlands; however the bryophyte and epiphytic lichen flora may be relatively diverse. (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. A black spruce-tamarack bog may grade into and form a mosaic with dwarf shrub bog, inland poor fen, and spruce-fir swamp. As the peat substrate thins and the wetland transitions to terrestrial communities, the black spruce-tamarack bog may grade into spruce flats.

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
- 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
Dwarf Shrub Bog

This site is an ombrotrophic or weakly minerotrophic peatland dominated by low-growing, evergreen, ericaceous shrubs and peat mosses (Sphagnum spp.). The surface of the peatland is typically a mosaic of hummock/hollow microtopography. The hummocks tend to have a higher abundance of shrubs than the hollows; these bogs have more than 50% cover of low-growing shrubs. Water is usually nutrient-poor and acidic. A dwarf shrub bog may form a floating mat around a bog lake or along the banks of an acidic stream; it may also occur as a large or small mat completely filling a basin. A dwarf shrub bog may grade into a highbush blueberry bog thicket, inland poor fen, or a black spruce-tamarack bog. The dominant shrub is often leatherleaf (*Chamaedaphne calyculata*), which may have more than 50% cover. Shrubs are typically taller than the herb layer which is usually graminoid, and generally the shrub heights are 1 m or less. Other prominent shrubs and herbs are sheep laurel (*Kalmia angustifolia*), bog laurel (*K. polifolia*), Labrador tea (Rhododendron groenlandicum), cranberries (*Vaccinium oxycoccos*, *V. macrocarpon*), the sedge *Carex trisperma*, and tawny cottongrass (*Eriophorum virginicum*). Other characteristic but less abundant plants are round-leaf sundew (*Drosera rotundifolia*), pitcher plant (*Sarracenia purpurea*), bog rosemary (*Andromeda polifolia* var. glaucophylla), huckleberry (*Gaylussacia baccata*), black chokeberry (*Aronia melanocarpa*), highbush blueberry (*Vaccinium corymbosum*), water-willow (*Decodon verticillatus*), meadow-sweet (*Spiraea alba* var. latifolia), hardhack (*Spiraea tomentosa*), marsh St. John's-wort (*Triadenum virginicum*), sedges (*Carex canescens*, *C. pauciflora*), Virginia chain fern (*Woodwardia virginica*), and white beakrush (*Rhynchospora alba*). Scattered stunted trees may be present, including black spruce (*Picea mariana*), tamarack (*Larix laricina*), and red maple (*Acer rubrum*). Characteristic peat mosses that form a nearly continuous carpet under the shrubs include *Sphagnum magellanicum*, *S. rubellum*, *S. fallax*, *S. fuscum*, *S. papillosum*, and *S. angustifolium*. (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.

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
- 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
Highbush Blueberry Bog Thicket

This site is ombrotrophic or weakly minerotrophic peatland dominated by tall, deciduous, ericaceous shrubs and peat mosses (Sphagnum spp.); the water is typically nutrient-poor and acidic. The dominant shrub is usually highbush blueberry (*Vaccinium corymbosum*). At least three regional variants are recognized in New York. The first is found throughout central and western New York and is calcareous to circuneutral, the second is primarily a northern variant, and the third is a southern variant with more coastal plain species. Species characteristic of all three varieties, and typical of the central and western New York examples, include highbush blueberry (*Vaccinium corymbosum*), winterberry (*Ilex verticillata*), cinnamon fern (*Osmunda cinnamomea*), marsh fern (*Thelypteris*

palustris), and peat mosses (Sphagnum spp.). Stunted trees may be present at a low density and with less than 50% cover; red maple (*Acer rubrum*) occurs in many bog thickets as stunted individuals in small clusters or as dead snags. Other characteristic shrubs and herbs include black huckleberry (*Gaylussacia baccata*), false Solomon's-seal (*Maianthemum trifolium*), and pitcher plant (*Sarracenia purpurea*). Additional characteristic species in northern examples include mountain holly (Nemopanthus mucronatus) which may be codominant, sedge (*Carex trisperma*), and wild calla (*Calla palustris*). Scattered small trees include tamarack (*Larix laricina*), black spruce (*Picea mariana*), and white pine (*Pinus strobus*). Characteristic peat mosses for all variants include *Sphagnum magellanicum*, *S. centrale*, *S. capillifolium*, and *S. fimbriatum*. Characteristic fauna include common yellowthroat (Geothlypis trichas), swamp sparrow (Melospiza georgiana), song sparrow (Melospiza melodia), meadow jumping mouse (Zapus hudsonius), masked shrew (Sorex cinereus), southern red-backed vole (Clethrionomys gapperi), and green frog (Rana clamitans). (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.

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
- 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 1.4
Inland Poor Fen

Depending on the pH values this site may fall under Acidic Peat Wetland Complex or the Semi-acidic Peat Wetland Complex ecological sites. This site is a weakly minerotrophic, flat peatland that occurs inland from the coastal plain in which the substrate is peat composed primarily of peat mosses (Sphagnum spp.) with admixtures of graminoid or woody peat. The dominant plants are peat mosses (Sphagnum spp.), with scattered sedges, shrubs, and stunted trees. Poor fens are fed by waters that are weakly mineralized, and have low pH values, generally between 3.5 and 5.0. This community typically develops where water moves through the peat mat, thus it often forms linear patches closely associated with open water. Characteristic peat mosses include *Sphagnum angustifolium*, *S. cuspidatum*, *S. fallax*, *S. fuscum*, *S. magellanicum*, *S. papillosum*, *S. rubellum*, and S.russowii. Characteristic herbs include sedges (*Carex oligosperma*, *C. exilis*, *C. limosa*, *C. trisperma*, *C. utriculata*, C. paupercula, *C. canescens*, *C. michauxiana*, C. parviflora), white beakrush (*Rhynchospora alba*), cottongrasses (*Eriophorum vaginatum*, *E. virginicum*), round-leaf sundew (*Drosera rotundifolia*), rose pogonia (*Pogonia ophioglossoides*), grass pink (*Calopogon tuberosus*), and pitcher-plant (*Sarracenia purpurea*). *Carex lasiocarpa* may be present, but not dominant as in medium fens. A rare orchid of some inland poor fens is dragon's mouth (*Arethusa bulbosa*). Shrubs and dwarf shrubs are patchy and usually have less than 50% cover (i.e., not dominated by shrubs as in dwarf shrub bog). The taller sedges often overtop the short shrubs. Cranberries (*Vaccinium oxycoccos*, *V. macrocarpon*) are often dominant. Other characteristic shrubs include bog laurel (*Kalmia polifolia*), sheep laurel (*K. angustifolia*), sweet-gale (*Myrica gale*), black chokeberry (*Aronia melanocarpa*), leatherleaf (*Chamaedaphne calyculata*), bog rosemary (*Andromeda polifolia* var. glaucophylla), and Labrador tea (Rhododendron groenlandicum). Scattered stunted trees such as tamarack (*Larix laricina*), black spruce (*Picea mariana*), and red maple (*Acer rubrum*) may be present. Many of our "kettlehole bogs" are inland poor fens, according to this classification, since they are weakly minerotrophic. Poor fens often include hummocks that are essentially ombrotrophic islands within a weakly minerotrophic peatland. This community shares many characteristics and species with coastal plain poor fen, but can be distinguished by its geographic location off the coastal plain along with having more northern or boreal indicator species (e.g., *Kalmia polifolia*, *Andromeda polifolia* var. glaucophylla, Rhododendron groenlandicum, *Larix laricina*, *Picea mariana*).

(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.

Community 1.5
North-Central Interior and Appalachian Acidic Peatland

These Sphagnum and shrub peatlands occur in basins south of the Laurentian-Acadian region down to near the glacial boundary in the northeastern and north-central U.S. Unlike the true raised bogs of boreal regions, the vegetation is not raised above the groundwater level. They are found in colder regions, mostly in areas where glacial stagnation left coarse deposits and glacial depressions (many are "kettleholes"). The basins are generally closed, i.e., without inlets or outlets of surface water, and typically small in area. The nutrient-poor substrate and the reduced throughflow of water create oligotrophic conditions fostering the development of Sphagnum peat and the growth of peatland vegetation. In deeper basins, the vascular vegetation grows on a Sphagnum mat over water, with no mineral soil development. Ericaceous shrubs and dwarf-shrubs (e.g., *Chamaedaphne calyculata*) dominate, with patches of graminoid dominance. Some peatlands may have a sparse tree layer. Although these are often called bogs, in most cases they are technically fens (albeit nutrient-poor ones), as the vegetation remains in contact with the surface water. Trees include *Acer rubrum*, *Picea mariana*, and *Pinus rigida*. Shrubs may include *Alnus incana*, *Chamaedaphne calyculata*, *Decodon verticillatus*, *Gaylussacia baccata*, *Gaylussacia dumosa*, *Ilex verticillata*, *Larix laricina*, *Myrica gale*, *Aronia melanocarpa* (= Photinia melanocarpa), *Spiraea tomentosa*, *Vaccinium corymbosum*, *Vaccinium macrocarpon*, *Vaccinium myrtilloides*, *Vaccinium oxycoccos*, and *Viburnum nudum*. Forbs and graminoids may include *Calla palustris*, *Carex lasiocarpa*, *Carex oligosperma*, *Carex pauciflora*, *Carex utriculata*, *Dulichium arundinaceum*, *Eriophorum vaginatum*, *Eriophorum virginicum*, *Lysimachia terrestris*, *Osmunda regalis*, *Triadenum virginicum*, Utricularia sp., and *Woodwardia virginica*. These peatlands occur in kettle depressions on pitted outwash and moraines and in flat areas and shallow depressions on glacial outwash and glacial lakeplain. Groundwater and surface water feed these temperate peatlands. It is not strongly calcareous and may be acidic in some places but not as much as boreal sites. These peatlands occurred in landscapes dominated by either forest or grassland/savanna. The fire regime is not well known but periodic surface fires likely helped limit the cover by trees. The basins in which these occur tend to be small and, where open water is still present, these peatlands form where wave energy is low. These peatlands are characterized by organic soils composed of saturated peat that contains partially decomposed sphagnum mosses and frequently fragments of sedges and wood. The peat soils are acidic, cool, and characterized by low nutrient availability and oxygen levels. The water-retaining capacity of sphagnum peat is tremendous and as a result these are saturated, anoxic systems with water tables near the surface. NatureServe Element Code: CES202.606 (NatureServe, 2022)

Resilience management. The cool, nutrient-poor water which feeds into this system favors peat development. This water can come from surface runoff or groundwater. Basins in which these peatlands occur are small, which limits the amount of nutrients that can be brought in by surface water. Groundwater sources flow through nutrient-poor, neutral to somewhat acidic substrates. Once peat begins to develop, it tends to create conditions favorable for continued peat development by contributing to the acidic, anoxic character of the water. Alterations in wetland hydrology and agricultural development can threaten examples of this system. These can occur due to ditching, road construction, quarrying/mining, or development of crop fields or pastures 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 lead to increased fertility as peat decomposes; this allows species typical of richer swamps or uplands to colonize. Increased surface waterflow can flood the peatland and transform it to an inundated wetland rather than a saturated peatland and can transport sediment and higher nutrient loads. Periodic fires infrequently help keep woody plants in check, and a reduction in this frequency will result in increased growth by these species. However, fires that occur when the peat has dried out (due to prolonged drought or a reduction in water input) can burn the peat and create mineral soil wetlands. Invasive species tend to increase after perturbations to other processes that maintain peatlands but can invade without changes, as well. Particularly aggressive invasive species that may threaten the diversity and vegetative structure of this peatland system include *Frangula alnus* (= Rhamnus frangula), *Phalaris arundinacea*, *Phragmites australis*, *Typha angustifolia*, and Typha x glauca. Disturbance near this system, whether crop fields, road building, urban development, or other activities, can serve as seed sources for invasive species. NatureServe Element Code: CES202.606 (NatureServe, 2022)

Dominant resource concerns

- Ponding and flooding

- Seasonal high water table
- 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

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

- Ponding and flooding
- 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 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

- 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
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
- 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
- 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 2.3
Ponded/Flooded

During periods of heavy precipitation and seasonal high water tables, sites may become flooded and ponded.

Dominant resource concerns

- Ponding and flooding
- 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

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
- 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 3.1
Drained

Hydrological alteration is implemented and site is drained

Dominant resource concerns

- Surface water depletion
- Ground water depletion
- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- 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

Dam, Diversion
Diversion
Dam

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
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
Precision Pest Control Application
Extending riparian forest buffers for water quality protection and wildlife habitat
Extending existing riparian herbaceous cover for water quality protection and wildlife habitat
Shallow water habitat
Non-forested riparian zone enhancement for fish and wildlife
Riparian forest buffer, terrestrial and aquatic wildlife habitat
Multi-species Native Perennials for Biomass/Wildlife Habitat
Establish pollinator habitat
Monitoring and Evaluation
Herbaceous Weed Control
Riparian buffer, terrestrial and aquatic wildlife habitat

Transition T2A
State 2 to 3

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

Conservation practices

Dam, Diversion
Diversion
Dam
Subsurface Drain
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
Upland Wildlife Habitat Management
Shallow Water Development and Management
Early Successional Habitat Development/Management
Constructed Wetland
Wetland Restoration
Wetland Creation
Wetland Enhancement
Surface Flooding of Organic Soils
Riparian Buffers - Vegetative
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management
Restoration of Compacted Soils
Extending riparian forest buffers for water quality protection and wildlife habitat
Extending existing riparian herbaceous cover for water quality protection and wildlife habitat
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
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

Riparian Herbaceous Cover
Riparian Forest Buffer
Aquatic Organism Passage

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
Riparian Buffers - Vegetative
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management
Restoration of Compacted Soils
Shallow water habitat
Non-forested riparian zone enhancement for fish and wildlife
Riparian forest buffer, terrestrial and aquatic wildlife habitat
Establish pollinator 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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Contributors

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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	11/24/2024
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):

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

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17. **Perennial plant reproductive capability:**
