

Ecological site RX143X00Y303

Acidic Swamp

Last updated: 5/20/2025
Accessed: 09/30/2026

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): 143X–Northeastern Mountains

MLRA 143, known as the Northeastern Mountains, covers approximately 23 million acres of mountains, hills, and valleys in northern Maine, New Hampshire, Vermont, New York, and Massachusetts. The area is sparsely populated, with less than five percent of the land area developed for agriculture, residential, and urban development. About 90 percent of the area is forested, most of which is actively managed for timber. Elevations are mostly between 1,000 to 4,000 feet, with a few isolated peaks more than 5,000 feet above sea level. The present day mountains are but remnants of a much larger ancient range that has been eroding for approximately 500 million years. Bedrock consists of mostly very old metamorphic rock (gneiss, schist, slate, marble, quartzite, etc.) with younger intrusions of igneous rock (e.g. granite and granodiorite) from the Triassic and Cretaceous periods. MLRA 143 differs somewhat geologically from its neighboring MLRAs (142, 144A, 144B, 145, and 146), which have greater amounts of nutrient-rich sedimentary rock. Compared to MLRA 143, they are all lower in elevation, with longer growing seasons large areas that were once submerged by the ocean following glaciation. The characteristic landforms and soils of northern New England were derived from the massive continental ice sheet that engulfed the region during North America's most recent glaciation. Mighty glaciers, embedded with sediment and rock fragments, scoured bedrock and compacted mineral beds in a steady march south and east toward the Atlantic Ocean. The softer sedimentary rocks were pulverized into fine silts and clays under the immense weight of ice a mile thick, while the more resistant igneous and metamorphic rocks were sculpted into steep mountains and hills or plucked and dragged along the base of the glacier. With a warming climate, the ice retreated northward, depositing a thin layer of unsorted glacial till sediment atop the newly-exposed bedrock and compacted mineral beds. Deeper mounds of unsorted till formed small hills, kames, moraines and drumlins. Enormous chunks of ice detached as the glacier retreated, melting slowly in place and forming many kettle lakes and basins where water and fine sediments collect. Raging torrents of glacial meltwater dissected much of the barren landscape, entraining coarse and fine sediments, carving river valleys, and leaving well-sorted deposits of mostly sand and gravel along the watercourse. By 10,000 years ago the ice sheet had fully receded from MLRA 143. Silty floodplains developed along perennial rivers, many of which occupy the same channels that once gushed with sediment-rich glacial meltwater. Over time, wet basins accumulated fine sediment, some dried out, and still others became acidified by organic matter inputs from colonizing vegetation. In terms of climate, MLRA 143 is distinguished from neighboring MLRAs by a shorter growing season and the occurrence of cryic soil temperature regimes at high elevations. The majority of MLRA 143 averages 32 to 44 inches of precipitation annually with a five to six month growing season and frigid winter temperatures. However, the higher elevations may receive up to double the annual precipitation of the lower elevations, and have a three to four month growing season with extremely cold winters. As the northernmost MLRA in the region with the coldest temperatures and shortest growing season, the Northeastern Mountains have less overall tree diversity, fewer pine and oak trees, and more abundant spruce and fir trees than neighboring MLRAs.

Classification relationships

This site occurs in Ecological Site Group 3 (Wooded Wetlands) of MLRA 143 (The Northeastern Mountains), in the Northeastern Forage and Forest Region (Land Resource Region R). The Northeastern Forage and Forest LRR includes all of Maine, New Hampshire, Vermont, Rhode Island, and Connecticut, as well as large portions of Massachusetts, New York, New Jersey, Pennsylvania, and Ohio. Its southern boundary marks the extent of the Wisconsin ice sheet, which engulfed the entire LRR as recently as 10,000 to 15,000 years ago. Erosional and depositional processes associated with glaciation created many of the topographic patterns that distinguish MLRAs within the Northeastern region. Harder granitic and metamorphic bedrock to the north were more resistant to glacial erosion, resulting in the relatively nutrient poor mountains of MLRA 143; whereas nutrient-rich sedimentary bedrock of MLRAs 139, 140, and 146 resulted in relatively flat, fertile landscapes ideal for cultivation. Other areas were depressed below sea-level by the sheer mass of the glacier, resulting in pockets of marine sediments which distinguish MLRAs 142, 144A, 144B, and 145. Precipitation is sufficient to support productive forestland throughout the Northeastern region. Still, a latitudinal temperature gradient from mesic to frigid soil temperatures results in a general transition from central hardwoods and pine in the southern MLRAs to northern hardwoods and spruce-fir forests farther north (no true boreal forests exist in the region). Elevations are generally low throughout the Northeastern region, with the exception of MLRA 143 which has many high mountain ecosystems with cryic temperature regimes and alpine vegetation above the tree

line.

Ecological site concept

This site occurs in relatively flat areas (0-5% 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 [45 centimeters] 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. The reference state is characterized by black spruce in the overstory with minor inclusions of tamarack, balsam fir, black ash, and grey birch as common associates. Diverse herbs, shrubs, and bryophytes dominate the understory. Logging and altered hydrology are the primary drivers of state change on this site.

Associated sites

RX143X00Y220	Semi-Acidic Peat Wetland Complex The Semi-Acidic Peat Wetland Complex site may occur downslope of the Acidic Swamp site, where water stagnates and lack of available soil oxygen and/or nutrients limits tree growth to less than 20% cover.
RX143X00Y230	Acidic Peat Wetland Complex The Acidic Peat Wetland Complex site may occur downslope of the Acidic Swamp site, where water stagnates and lack of available soil oxygen and/or nutrients limits tree growth to less than 20% cover.

Similar sites

RX143X00Y304	Wet Flat The Wet Flat site occurs in flat areas and is drier than the Acidic Swamp site, with all soils poorly-drained rather than poorly- to very-poorly drained. As a result Wet Flat is characterized by more red spruce, rather than black spruce dominance.
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Table 1. Dominant plant species

Tree	(1) <i>Picea mariana</i> (2) <i>Larix laricina</i>
Shrub	(1) <i>Rhododendron canadense</i> (2) <i>Ledum groenlandicum</i>
Herbaceous	(1) <i>Sphagnum</i> (2) <i>Pleurozium schreberi</i>

Legacy ID

F143XY303ME

Physiographic features

This ecological site and its associated plant communities occur as freshwater swamps on toeslopes of mountains, where large amounts of water pass through, creating hydric conditions and supporting organic matter accumulation over mineral soils. Slope shape will often range from concave to linear, depending on localized landform, all sites reflecting a seasonal high-water table of 0 to 6 inches (0 to 15 centimeters) during wet periods and up to 24 inches (60 centimeters) during dry periods. This site often exhibits pit and mound topography, a result of years of individual tree tip ups.

Table 2. Representative physiographic features

Hillslope profile	(1) Toeslope
Landforms	(1) Swamp (2) Outwash terrace
Runoff class	Very low to medium
Flooding frequency	None
Ponding duration	Brief (2 to 7 days) to very long (more than 30 days)
Ponding frequency	Occasional to frequent
Elevation	0 – 850 m
Slope	0 %
Ponding depth	0 – 20 cm
Water table depth	0 – 20 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Very low to high
Flooding frequency	None
Ponding duration	Very brief (4 to 48 hours) to very long (more than 30 days)
Ponding frequency	None to frequent
Elevation	Not specified
Slope	0 – 10 %

Ponding depth	0 – 40 cm
Water table depth	0 – 60 cm

Climatic features

As the northernmost MLRA in the region, this site experiences frigid and snowy winters, warm rainy summers, and a relatively short five to six month growing season. Precipitation is considerably constant from month to month; however, areas of higher elevations may receive up to double the annual precipitation of the lower elevations and have a three to four month growing season with extremely cold winters.

Table 4 Representative climatic features

Frost-free period (characteristic range)	80-90 days
Freeze-free period (characteristic range)	120-130 days
Precipitation total (characteristic range)	1,040-1,090 mm
Frost-free period (actual range)	80-100 days
Freeze-free period (actual range)	120-130 days
Precipitation total (actual range)	1,020-1,120 mm
Frost-free period (average)	90 days
Freeze-free period (average)	120 days
Precipitation total (average)	1,070 mm

- (1) LAKE PLACID 2 S [USC00304555], Lake Placid, NY
- (2) NEWCOMB [USC00305714], Newcomb, NY
- (3) EUSTIS [USC00172700], Eustis, ME
- (4) PLYMOUTH [USC00276945], Campton, NH
- (5) MORRISVILLE 4 SSW [USC00435376], Morrisville, VT

Influencing water features

Large amounts of water enter this site as run-on from the watershed above. Gentle slopes allow water to pass laterally through the soil on this site before exiting downslope to even wetter, flatter sites below. Despite the sandy soils through which water flows freely, water saturates this site for much of the year. However, due to the porous nature of the substrate, the water table can fluctuate greatly during the growing season, permitting soil aeration needed to sustain its characteristic plant community.

Wetland description

Classification System: Cowardin
System: Palustrine
Subsystem: NA
Class: Forested Wetlands
Subclass: Needle-leaved Evergreen

Soil features

Soils are dominantly very poorly drained with some areas poorly drained. These soils form in coarse outwash or till that was re-worked by glacial meltwaters. Typical soils will have 2 to 10 inches (5 to 25 centimeters) of organic mucky or peat over sandy or coarse-loamy mineral deposits. A densely compacted horizon is typically absent from these soils. These soils may or may not have large amounts of rock in the surface or subsurface horizons.

Representative soils include the Tahawus (Histic Humaquepts) and Searsport (Histic Humaquepts) series. Other soils such as the Kinsman (Typic Endoaquods), Naumburg (Typic Endoaquods), and Tughill (Typic Endoaquepts) series may be locally representative in some cases.

Table 5. Representative soil features

Parent material	(1) Glaciolacustrine deposits (2) Glaciofluvial deposits (3) Outwash (4) Till – granite and gneiss
Surface texture	(1) Mucky, peaty sand
Family particle size	(1) Sandy
Drainage class	Very poorly drained
Permeability class	Slow to moderate
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	9.4 – 17.78 cm
Soil reaction (1:1 water) (0-101.6cm)	4.6 – 6.8

Subsurface fragment volume <=3" (0-101.6cm)	0 – 10 %
Subsurface fragment volume >3" (0-101.6cm)	Not specified

Table 6. Representative soil features (actual values)

Drainage class	Very poorly drained to poorly drained
Permeability class	Very slow to moderate
Soil depth	200 cm
Surface fragment cover <=3"	0 %
Surface fragment cover >3"	0 %
Available water capacity (0-101.6cm)	5.08 – 17.78 cm
Soil reaction (1:1 water) (0-101.6cm)	3.5 – 10
Subsurface fragment volume <=3" (0-101.6cm)	0 – 30 %
Subsurface fragment volume >3" (0-101.6cm)	0 – 20 %

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 et al., 2003) and localized associations provided by the New York Natural Heritage Program (Edinger et al., 2014), Maine Natural Areas Program (Gawler and Cutko, 2010), New Hampshire Natural Heritage Program (Sperduto and Nichols, 2011), and Massachusetts Division of Fisheries and Wildlife (Swain, 2020).

The reference state is a boreal softwood dominated forest where black spruce (*Picea mariana*) often makes up a dominant component in the canopy. Other trees may include tamarack, balsam fir, red maple, and / or white pine, but will often only be present in small amounts. The understory is diverse with sphagnum moss, creeping snowberry, and three-seed sedge common. These swamps are characterized by acidic, waterlogged conditions, with trees rooted primarily in the poorly drained soil mounds than the very poorly drained depressions.

Altered hydrology, in the form of ponding or draining, can greatly alter the ecological functioning of this site. While these trees can tolerate high seasonal high-water tables, higher than normal water levels will reduce growth and eventually kill trees. This is often seen through beaver damming and road construction and may transition the reference forested condition through a variety of communities including open marsh grasses and emergent vegetation. Removal of dams and man-made structures that restores hydrologic function leads to natural succession by emergent wetland plants, herbaceous plants, shrubs, and eventually spruce re-establishment. Draining and ditching along with tree cover removal can convert the site to hayfield and pasture with varying degrees of ponding, depending on the extent of hydrological alteration.

Large scale logging is typically not common due to the poor productivity and wetness of this site, limiting small scale harvesting to very dry years or during the winter months where soil and ground disturbances may be minimized. Logging operations can significantly alter the structure and function of these swamps, causing shifts in vegetative composition, hydrologic function, and ecosystem services. Selective harvesting, thinning, and shelterwood cuts will not generally shift the site to a different state but may help promote forest regeneration and result in a temporary increase in understory shrubs and herbs. Clear cutting may have the largest impact on these communities, with potential disruption of water retention, soil surface cover and altered groundwater flow. In some cases, clearcutting can be used as a surrogate to fire, promoting rapid growth of seedlings after the disturbance.

Fire is typically not a dominant risk in these communities due to their inherent wetness and general lack of ladder fuels, however fire of any severity will generally kill black spruce due to the arrangement of cones and branches promoting easy ignition. Black spruce regeneration and establishment occurs within 5 years post fire, with more favorable seedbeds including mineral and organic soil where the moss and lichen layers have burned off (Freyer 2014).

State and transition model

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 1.4 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 13. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 14. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 15. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 16. Community 4.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Animal community

****DRAFT**** The following information is provided from University of New Hampshire's "Dirt to Trees to Wildlife". Asterisks denotes Species of Greatest Conservation Need and hyperlinks will take you to recommendations specific to those species. Common animals found in Spruce-Fir Forest Types at ANY elevation may include: Snowshoe hare (*Lepus americanus*), Red squirrel (*Sciurus vulgaris*), Southern red-backed vole (*Myodes gapperi*), Long-tailed shrew (*Sorex dispar*)*, American marten (*Martes americana*)*, Boreal chickadee (*Poecile hudsonicus*), Dark-eyed junco (*Junco hyemalis*), Pine siskin (*Spinus pinus*), Spruce grouse (*Canachites canadensis*)*, and Red-breasted nuthatch (*Sitta canadensis*). Common animals found in Spruce-Fir Forest Types at low-elevation (generally below 2,500 feet) only may include Northern flying squirrel (*Glaucomys sabrinus*), Deer mouse (*Peromyscus maniculatus*), Hoary bat (*Lasiurus cinereus*)*, Tri-colored bat (*Perimyotis subflavus*)*, Little brown bat (*Myotis lucifugus*)*, Silver-haired bat (*Lasionycteris noctivagans*)*, Northern long-eared bat (*Myotis septentrionalis*)*, Indiana bat (*Myotis sodalis*)*, Red bat (*Lasiurus borealis*)*, Red fox (*Vulpes vulpes*), Bobcat (*Lynx rufus*)*, Moose (*Alces alces*)*, Bay-breasted warbler (*Setophaga castanea*)*, Blackburnian warbler (*Setophaga fusca*), Cape May warbler (*Setophaga tigrina*)*, Common goldeneye (*Bucephala clangula*), Magnolia warbler (*Setophaga magnolia*), Olive-sided flycatcher (*Contopus cooperi*)*, Purple finch (*Haemorhous purpureus*)*, Rusty blackbird (*Euphagus carolinus*)*, Sharp-shinned hawk (*Accipiter striatus*)*, Swainsons thrush (*Catharus ustulatus*), Three-toed woodpecker (*Picoides dorsalis*)*, Yellow-bellied flycatcher (*Empidonax flaviventris*), Blackpoll warbler (*Setophaga striata*), Blue-headed vireo (*Vireo solitarius*), Northern parula (*Setophaga americana*), evening grosbeak (*Coccothraustes vespertinus*), Northern saw-whet owl (*Aegolius acadicus*), Hermit thrush (*Catharus guttatus*), Merlin (*Falco columbarius*), and the Nashville warbler (*Leiothlypis ruficapilla*). Silvicultural recommendations for managing wildlife habitat: -Use uneven-aged management - group selection with group sizes of less than 1 acre. -Rotation age - 120 years -Entry cycle every 15 to 20 years - Avoid entry during nesting season (April to June) -Whole-tree harvest or cut-to-length is preferred.

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 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

Jack Ferrara, Revisions 2025

Christopher Mann, Revisions 2022

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Approval

Greg Schmidt, 5/20/2025

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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	04/21/2025
Approved by	
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:
