Ecological site F144BY302ME
Mucky Swamp

Last updated: 5/12/2025
Accessed: 08/29/2026

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): 144B–New England and Eastern New York Upland, Northern Part

This major land resource area (MLRA) is in Maine (56 percent), New Hampshire (22 percent), Vermont (14 percent), Massachusetts (6 percent), Connecticut (1 percent), and New York (1 percent). It makes up about 22,728 square miles (58,864 square kilometers). The MLRA consists of a relatively young landscape shaped by the Laurentide Ice Sheet, which covered the region from 35,000 to 10,000 years ago. Rolling hills of dense basal till converge on ridges of shallow bedrock that were scoured by glacial ice. River valleys that were flooded by melting glacial water or seawater house large expanses of glacial outwash and stratified drift in inland areas and, to a lesser extent, glaciomarine and glaciolacustrine sediment deposits in coastal areas. Organic bogs, ablation till, and alluvial flood plains make up the remaining portions of the MLRA. The soils in this region are dominantly Entisols, Spodosols, and Inceptisols. They commonly have a fragipan. The dominant suborders are Ochrepts, Orthods, Aquepts, Fluvents, and Saprists. The soils in the region dominantly have a frigid soil temperature regime with some cryic areas at higher elevation, a udic soil moisture regime, and mixed mineralogy. Most of the land is forested, and 98 percent is privately owned. Significant amounts of forest products are produced including lumber, pulpwood, Christmas trees, and maple syrup. Principal agricultural crops include forage and grains for dairy cattle, potatoes, apples, and blueberries. Wildlife habitat and recreation are important land uses. Stoniness, steep slopes, and poor drainage limit the use of many of the soils.

Classification relationships

NRCS: Land Resource Region: R—Northeastern Forage and Forest Region MLRA: 144B—New England and Eastern New York Upland, Northern PartMLRA resources Major Land Resource Area (MLRA): 144B–New England and Eastern New York Upland, Northern Part

Ecological site concept

This site occurs in relatively flat areas (0-2% slopes) near the bottom of watersheds where water saturates deep organic muck deposits for most of the growing season. These organic soils are very poorly-drained and often underlain by mineral deposits at depths greater than 16 inches. The water table is within a few inches of the surface. This site often has pit and mound topography, with ponding typical in the pits, and slightly drier soil conditions on the mounds where most trees are rooted. Northern white cedar is abundant, with balsam fir, black spruce, larch, and brown ash as common associates. In southern areas Atlantic white cedar may dominate instead of northern white cedar. Further study is required to distinguish between northern and southern variants. Diverse herbs, shrubs, and bryophytes dominate the understory. Treethrow and altered hydrology are common disturbances on this site. Small openings created by treethrow, which is very common on these unstable soils, are typically colonized by species already present in the community and may persist as canopy openings dominated by herbaceous species for a long time. 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 on this site and requires winter harvest methods when the ground is frozen. 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. This may take a very long time to occur.

Associated sites

F144BY301ME	**Loamy Till Swamp** The Mucky Peat Swamp often occurs downslope of the Loamy Till Swamp as all soils become very poorly drained and soil surface organic layer increases to greater than 16 inches.
F144BY304ME	**Wet Clay Flat** The Loamy Wet Flat site occurs on poorly-drained flats, which are drier than the Mucky Swamp. Wet Flats support more spruce and less cedar, as well as less understory productivity, particularly less moss.

Similar sites

F144BY301ME	**Loamy Till Swamp** Both the Mucky Peat Swamp and the Loamy Till Swamp are dominated by northern white cedar, but the Mucky Peat Swamp is wetter, has a thicker organic soil surface layer, and typically has a more open canopy, allowing more light to reach the forest floor. As a result, the understory is often more productive in the Mucky Peat Swamp.

Table 1. Dominant plant species

Tree	(1) *Thuja occidentalis* (2) *Chamaecyparis thyoides*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs in flat, low-lying areas between mineral soils (upslope) and open wetlands (downslope). This site often exhibits pit and mound topography, with most trees rooted on the mounds and water ponding in the pits.

Table 2. Representative physiographic features

Landforms	(1) Marsh (2) Swamp
Flooding frequency	None
Ponding duration	Long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	0 – 600 m
Slope	0 %

Water table depth	0 – 20 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate is humid and temperate and is characterized by warm summers and cold winters. In general, precipitation is evenly distributed throughout the year. Near the coast, precipitation is slightly lower in summer. Throughout inland areas, precipitation is slightly higher during spring and fall seasons. Rainfall occurs during high-intensity, convective thunderstorms in summer. During winter, most of the precipitation occurs as moderate- intensity storms (northeasters) that produce large amounts of rain or snow. Heavy snowfalls commonly occur late in winter. Temperatures and the length of the freeze-free period increase from north to south and closer to the coast.

MLRA 144B has coverage across six states and may have substantial climate variability among locations: Maine (56 percent), New Hampshire (22 percent), Vermont (14 percent), Massachusetts (6 percent), Connecticut (1 percent), and New York (1 percent).

Table 3 Representative climatic features

Frost-free period (characteristic range)	100-130 days
Freeze-free period (characteristic range)	140-160 days
Precipitation total (characteristic range)	1,040-1,320 mm
Frost-free period (actual range)	80-140 days
Freeze-free period (actual range)	120-170 days
Precipitation total (actual range)	1,020-1,350 mm
Frost-free period (average)	120 days
Freeze-free period (average)	150 days
Precipitation total (average)	1,190 mm

- (1) BANGOR INTL AP [USW00014606], Bangor, ME
- (2) ACADIA NP [USC00170100], Bar Harbor, ME
- (3) JONESBORO [USC00174183], Addison, ME
- (4) EAST HIRAM [USC00172238], Sebago, ME
- (5) MADISON [USC00174927], Anson, ME
- (6) BRUNSWICK NAS [USW00014611], Brunswick, ME
- (7) AUGUSTA STATE AP [USW00014605], Augusta, ME
- (8) SANFORD 2 NNW [USC00177479], Sanford, ME
- (9) SAINT JOHNSBURY [USW00054742], Saint Johnsbury, VT
- (10) WHITEFIELD MT WASHINGTON AP [USW00054728], Whitefield, NH
- (11) BETHLEHEM 2 [USC00270706], Bethlehem, NH

- (12) CHELSEA [USC00431360], Chelsea, VT
- (13) MT SUNAPEE [USC00275629], Newbury, NH
- (14) ASHBURNHAM NORTH [USC00190192], Ashburnham, MA
- (15) BIRCH HILL DAM [USC00190666], Royalston, MA
- (16) WORTHINGTON [USC00199972], Worthington, MA
- (17) BORDEN BROOK RSVR [USC00190759], Granville, MA
- (18) LANESBORO [USC00194075], Lanesboro, MA
- (19) PITTSFIELD MUNI AP [USW00014763], Pittsfield, MA
- (20) GRAFTON [USC00303360], Cropseyville, NY
- (21) NORFOLK 2 SW [USC00065445], Norfolk, CT

Influencing water features

Large amounts of water saturate the soils of this site throughout the year, resulting in fairly open cedar canopies and a lush herbaceous/sphagnum understory.

Wetland description

Wetland Description: Cowardin
System: Palustrine
Subsystem: N/A
Class: Unknown

Soil features

The soils of this site are very poorly-drained muck or mucky peat devoid of rock fragments, and sometimes underlain by a loamy mineral substrate (at least 16 inches below the surface). Soil pH typically ranges between 4.5-6.5 on this site, but may be somewhat more acidic in places.

Table 4. Representative soil features

Parent material	(1) Organic material
Surface texture	(1) Mucky
Drainage class	Very poorly drained
Soil depth	150 cm
Available water capacity (20.1-50cm)	Not specified
Soil reaction (1:1 water) (11.4-18.5cm)	Not specified
Subsurface fragment volume <=3" (Depth not specified)	Not specified

Subsurface fragment volume >3" (Depth not specified)	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 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).

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. In southern areas Atlantic white cedar may dominate instead of northern white cedar. Further study is required to distinguish between northern and southern variants. Most trees are rooted on mounds, with ponding common in soil depressions. The understory is diverse with sphagnum moss, creeping snowberry, and three-seed sedge common.

Treethrow and altered hydrology are common disturbances on this site. Small openings created by treethrow, which is very common on these unstable soils, are typically colonized by species already present in the community and may persist as canopy openings dominated by herbaceous species for a long time.

Relationship to Other Classification Systems
This site includes the following state natural heritage program types:
• Northern White Cedar-Balsam Fir Swamp (Sperduto and Nichols 2004)
• Acidic Northern White Cedar Swamp (Sperduto and Nichols 2004)
• Open Cedar Fen (Gawler and Cutko 2010)
• Atlantic White Cedar Bog (Gawler and Cutko 2010)
• Northern White Cedar Swamp (Gawler and Cutko 2010)
• Northern White Cedar Swamp (Thompson and Sorenson 2000)

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

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

Table 6. Community 1.2 plant community composition

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

Table 7. Community 1.3 plant community composition

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

Table 8. Community 1.4 plant community composition

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

Table 9. Community 2.1 plant community composition

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

Table 10. Community 2.2 plant community composition

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

Table 11. Community 3.1 plant community composition

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

Table 12. Community 3.2 plant community composition

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

Inventory data references

Future work is needed, as described in a future project plan, to validate the information presented in this provisional ecological site description. Future work includes field sampling, data collection and analysis by qualified vegetation ecologists and soil scientists. As warranted, annual reviews of the project plan can be conducted by the Ecological Site Technical Team. A final field review, peer review, quality control, and quality assurance reviews of the ESD are necessary to approve a final document.

Other references

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

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

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

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

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. Agricultural Handbook 296

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

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

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

Sperduto, D.D. and William F. Nichols. 2011. Natural Communities of New Hampshire. 2nd Ed. NH Natural Heritage Bureau, Concord, NH. Pub. UNH Cooperative Extension, Durham, NH.

Swain, P. C. 2020. Classification of the Natural Communities of Massachusetts. Massachusetts Division of Fisheries and Wildlife, Westborough, MA

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

Contributors

Christopher Mann

Approval

Greg Schmidt, 5/12/2025

Acknowledgments

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

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	06/29/2020
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:**
