

Ecological site F146XY031ME

Mucky Peat Bottom

Last updated: 5/20/2025

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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): 146X–Aroostook Area

This area is entirely in Maine and it makes up about 1,275 square miles (3,305 square kilometers). Presque Isle is the largest city in the area. Interstate 95 ends in the town of Houlton, at the border with New Brunswick, Canada. Aroostook State Park, Fort Kent Historic Site, and Loring Commerce Center are in this area. The Big Rock ski area is in the middle of this MLRA and is on the highest point, which is Mars Hill Mountain.

Ecological site concept

This site typically occurs on relatively-flat areas where water saturates organic peat and muck deposits for most of the growing season. The surface soil surface consists of poorly-drained hummocks and very poorly-drained depressions. The above watershed provides significant water to this soil, often ponding within depressions. The plant community is characterized by an overstory of Northern white cedar and small diameter mixed hardwoods and softwoods, with a productive herbaceous understory. Trees grow mostly on the hummocks, and diverse understory species occupy various niches associated with the complex microtopography.

Associated sites

F146XY032ME	Loamy Till Bottom The Loamy Till Bottom site grades into the Mucky Peat Bottom as the depth of organic peat and muck increases.
F146XY021ME	Marsh The Marsh ecological site often grades into the Mucky Peat Bottom as wetness decreases. Both sites are very wet, but Marsh is too wet for tree persistence.

Similar sites

F146XY032ME	Loamy Till Bottom The Loamy Till Bottom always has mineral soil within 16 inches of the organic soil surface, while the Mucky Peat Bottom has greater than 16 inches of organic material. The Loamy Till Bottom is overall drier than the Mucky Peat Bottom.
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Table 1. Dominant plant species

Tree	(1) <i>Thuja Occidentalis</i> (2) <i>Acer rubrum</i>
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Shrub	(1) <i>Alnus incana</i> (2) <i>Ilex verticillata</i>
Herbaceous	(1) <i>Osmunda cinnamomea</i> (2) <i>Carex trisperma</i>

Physiographic features

This ecological site occurs primarily in swamps on glaciated uplands and lowlands, however they can occur on floodplains. This site is characterized by pit and mound topography, resulting in frequent ponding of water in the pits and drier conditions on the mounds. Pit and mound topography is formed by the natural process of uprooted trees. As trees fall and are uprooted, soil attached to the roots is removed from the ground creating a pit. As the tree decays over time, the soil is slowly redeposited onto the ground creating a mound. This results in increased species diversity from the high variability in soil and plant growing conditions associated with this ecological process.

In the pits, the water table is typically near the soil surface (or above when ponded), while on the mounds, the water table may be a foot or more below the soil surface. Slopes are typically less than 1 percent for this site and can be as high as 2 percent.

Table 2. Representative physiographic features

Landforms	(1) Swamp (2) Marsh
Runoff class	Negligible to low
Flooding frequency	None
Ponding duration	Long (7 to 30 days)
Ponding frequency	Frequent
Elevation	0 – 640 m
Slope	0 %
Water table depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate of this site is characterized by cold, snowy winters, and cool summers. Precipitation is nearly equally distributed throughout the year, with slightly more moisture falling in June-October. During winter months, and sometimes fall and spring, cold winds from the north bring severe weather events. The effects of a relatively short growing season are somewhat mitigated by long summer days associated with the high latitudes of the region. Occasionally high winds, microbursts, or freezing rain events damage vegetation over small portions of the landscape.

Table 3 Representative climatic features

Frost-free period (characteristic range)	80-90 days
Freeze-free period (characteristic range)	130-130 days
Precipitation total (characteristic range)	940-1,070 mm
Frost-free period (actual range)	60-110 days
Freeze-free period (actual range)	100-140 days
Precipitation total (actual range)	910-1,070 mm
Frost-free period (average)	90 days
Freeze-free period (average)	130 days
Precipitation total (average)	990 mm

- (1) BRIDGEWATER [USC00170833], Bridgewater, ME
- (2) FT KENT [USC00172878], Fort Kent, ME
- (3) HOULTON 5N [USC00173944], Houlton, ME
- (4) PRESQUE ISLE [USC00176937], Presque Isle, ME
- (5) HOULTON INTL AP [USW00014609], Houlton, ME
- (6) ALLAGASH [USC00170200], Saint Francis, ME
- (7) CARIBOU MUNI AP [USW00014607], Caribou, ME

Influencing water features

This site receives extra moisture from neighboring watersheds which causes soil saturation for much of the growing season. The water table fluctuates throughout the year, often with ponding in depressions following spring runoff or large storm events. During dry periods, the water table may drop up to about 1 foot beneath the soil surface.

Soil features

Mucky peat bottom consists of very deep, very poorly-drained soils that formed in a mantle of well-decomposed organic soil material over loamy mineral deposits. Most often the muck layer is between 16 and 60 inches thick, and is often associated with even thicker patches of organic soil material. There are typically no rock fragments on the soil surface and throughout the muck layer. Soil pH ranges from strongly to slightly acidic, and water holding capacity is very high. The soil moisture regime is Aquic, and the soil temperature regime is Frigid.

Table 4. Representative soil features

Parent material	(1) Organic material
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Surface texture	(1) Muck (2) Loam
Family particle size	(1) Loamy
Drainage class	Very poorly drained
Permeability class	Slow
Soil depth	170 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	17.27 – 40.61 cm
Calcium carbonate equivalent (0-101.6cm)	Not specified
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	4.5 – 10
Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	0 – 10 %

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, 2018 and localized associations provided by the Maine Natural Areas Program (Gawler and Cutko, 2010).

The mucky peat bottom site is dominated by Northern white cedar, with small-diameter softwood and hardwood species often present, including balsam fir, brown ash, yellow birch, and red maple. Wind often blows down small patches or individual trees. Beaver activity or man-made structures (e.g. roads, dams) may inundate this site temporarily or permanently, killing trees and forming an open water pond. Following inundation, this site may succeed through a series of open marsh types before eventually returning to Northern White Cedar dominance. Beaver activity is expected to be limited by proximity to areas where poplar or aspen species are present. When these species are not present on or near this site, beavers are not expected to induce ponding.

This site is resistant to most other disturbances, including fire and insect damage. Drainage and cultivation are not typically present on this wet, mucky soil. However, winter logging is possible on these otherwise inaccessible stands, and can reduce tree density and increase herbaceous production. The cedar is resilient and expected to eventually recover dominance of the site following timber harvest.

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 (%)
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Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 1.4 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 13. Community 3.2 plant community composition

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

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Contributors

Christopher Mann
Jamin Johanson

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	05/06/2025
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:
