Ecological site RX143X00Y302
Mucky Swamp

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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): 143X–Northeastern Mountains

MLRA 143 is in Maine (51 percent), New York (27 percent), Vermont (13 percent), New Hampshire (7 percent), and Massachusetts (2 percent). It makes up about 34,409 square miles (89,118 square kilometers). The MLRA consists of rolling hills and mountains covered by Wisconsin till. It is in three parts separated by other MLRAs. The western part is in New York (primarily the Adirondack Mountains). The central part is mainly in the Green Mountains in Vermont and the Berkshires in Massachusetts. The eastern part is in New Hampshire and most of northern Maine. The MLRA is used mainly for forestry and recreational purposes. The western part of MLRA 143 in the Adirondack Mountains has a distinct boundary with the physiographical dissimilar Saint Lawrence-Champlain Plain. The middle part that encompasses the Green Mountains has a diffuse boundary as it blends into the northern part of the New England and Eastern New York Uplands on the foothills of the Green Mountains. The southern boundary of the easternmost part of MLRA 143 has the same diffuse boundary. The northern boundary of the MLRA is the Canadian border. The westernmost part of this MLRA is primarily in the Adirondack province of the Appalachian Highlands. A small area in the southern end of the western part is in the Mohawk section of the Appalachian Plateaus province of the same division. The easternmost part, primarily in northern Maine, is in the New England Upland section of the New England province of the Appalachian Highlands. The southwestern half of this part is in the White Mountain section of the same province and division, and the middle part of the MLRA is in the Green Mountain section. The mountains and foothills in this MLRA are commonly rounded. They are underlain by bedrock and typically covered with thin deposits of till. The more rugged mountain areas are separated by high-gradient streams coursing through steep areas of colluvium or talus-laden valleys. Many glacially broadened valleys are filled with glacial outwash and have numerous swamps and lakes. The mountains and foothills are moderately steep to very steep, and the valleys are nearly level to sloping. 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. The variability in microtopography on this site results in a patchy mosaic of plant communities. Silver maple is the most common overstory species, with diverse grasses and herbs indicating differences in soil wetness throughout the site due to slight variability in elevation above the water table. This site is subject to ice scour and flooding, but the most extensive disturbance is cultivation. These broad, flat landforms are nutrient rich with high water-holding capacity. These factors along with their adjacency to rivers made them ideal farming locations for early settlers, much of which continues today. The effects of altered flow regimes from modern dams may also be significant but require further study.

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 (0-2% slopes) near the bottom of watersheds where water saturates deep organic muck deposits for most of the growing season. These soils are very poorly-drained and will have at least 16 inches (40 centimeters), with often greater than 40 inches (100 centimeters) of organic material often underlain by mineral deposits. The water table is usually within 12 inches (30 centimeters) of the soil surface in spring, and lowers somewhat in late summer and fall. This site often has pit and mound topography, with ponding and thick organic matter accumulation in the pits, and drier soil conditions with thinner organic matter on the mounds where most trees are rooted. The reference state is characterized by abundant northern white cedar, with balsam fir, black spruce, larch, black ash, and grey birch as common associates. Diverse herbs, shrubs, and bryophytes dominate the understory. Canopy gaps and altered hydrology are common disturbances on this site. Altered hydrology is the primary driver of state change on this site, with beaver activity and man-made structures that impede drainage (such as roads, dams, etc.) often resulting in ponded or marshland states. This site is also logged in the winter when the ground is frozen. This site is unsuitable for pasture or cropland.

Associated sites

RX143X00Y301	**Loamy Till Swamp** The Loamy Till Swamp often grades into the Mucky Swamp site downslope as the site gets wetter and organic matter accumulates.
RX143X00Y210	**Marsh Wetland Complex** The Marsh Wetland Complex site often grades upslope into the Mucky Swamp as the depth to mineral soil contact decreases, likely due to increased soil oxygen levels which support cedar growth.

Similar sites

RX143X00Y301	**Loamy Till Swamp** The Loamy Till Swamp is similar in species composition to the Mucky Swamp, but mineral soils rather than organic soils support greater productivity and cover of cedar trees, often with overall understory production and sphagnum moss.

Table 1. Dominant plant species

Tree	(1) *Thuja occidentalis* (2) *Larix laricina*
Shrub	(1) *Alnus* (2) *Ilex*
Herbaceous	(1) *Sphagnum* (2) *Pleurozium schreberi*

Legacy ID

F143XY302ME

Physiographic features

This ecological site and its associated plant communities occur as freshwater swamps on footslopes and toeslopes of mountains, where large amounts of water pass through, creating hydric conditions and supporting organic matter accumulation. 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).

Under reference conditions this site is characterized by pit- and mound- topography resulting from tree blowdowns. Tipped up tree roots excavate a small pit and deposit the excavated soil next to the pit as the exposed roots decay.

Table 2. Representative physiographic features

Hillslope profile	(1) Footslope (2) Toeslope
Geomorphic position, flats	(1) Talf
Landforms	(1) Till plain > Bog (2) Till plain > Depression
Runoff class	High to very high
Flooding frequency	None
Ponding duration	Long (7 to 30 days) to very long (more than 30 days)
Ponding frequency	Frequent
Elevation	0 – 610 m
Slope	0 %
Ponding depth	10 – 20 cm
Water table depth	0 – 20 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Medium to very high
Flooding frequency	None
Ponding duration	Long (7 to 30 days) to very long (more than 30 days)
Ponding frequency	None to frequent
Elevation	0 – 610 m

Slope	0 – 10 %
Ponding depth	0 – 20 cm
Water table depth	0 – 30 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)	90-110 days
Freeze-free period (characteristic range)	130-130 days
Precipitation total (characteristic range)	1,070-1,170 mm
Frost-free period (actual range)	90-110 days
Freeze-free period (actual range)	130-140 days
Precipitation total (actual range)	1,040-1,170 mm
Frost-free period (average)	100 days
Freeze-free period (average)	130 days
Precipitation total (average)	1,120 mm

- (1) BARNARD [USC00170398], Brownville, ME
- (2) PITTSTON FARM [USC00176721], North Somerset County, ME
- (3) GRAND LAKE STREAM [USC00173261], Northern Washington Co, ME
- (4) JACKMAN [USC00174086], Jackman, ME

Influencing water features

This site is a forested wetland, characterized by a thick layer of organic soil at the surface and a high water table. Additional water enters this site as run-in from the watershed above. Ponding occurs in depressions, and the water table is within the plant rooting zone throughout the growing season.

Wetland description

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

Soil features

Soils are dominantly very poorly drained mucky organic soils over glacial till. Typical soils will be very deep with at least 16 inches (40 centimeters), but often greater than 40 inches (100 centimeters) of mucky organic deposits, often underlain by mineral soils with textures ranging from loamy to sandy. Fluctuations in seasonal inundation allow the soils to remain sufficiently oxygenated and decompose new inputs of organic deposits to support muck rather than peat.

Representative soils include the Wonsqueak (Terric Haplosaprists) and Bucksport (Typic Haplosaprists) series.

Table 5. Representative soil features

Parent material	(1) Organic material (2) Till
Surface texture	(1) Muck (2) Mucky loam
Family particle size	(1) Loamy
Drainage class	Very poorly drained
Permeability class	Moderate to moderately rapid
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	25.91 – 46.48 cm
Soil reaction (1:1 water) (0-101.6cm)	4.8 – 6.1
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 moderately rapid
Soil depth	150 – 200 cm
Surface fragment cover <=3"	0 %
Surface fragment cover >3"	0 %
Available water capacity (0-101.6cm)	7.62 – 50.8 cm
Soil reaction (1:1 water) (0-101.6cm)	3.5 – 6.5
Subsurface fragment volume <=3" (0-101.6cm)	0 – 10 %
Subsurface fragment volume >3" (0-101.6cm)	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 (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 mature coniferous forest primarily dominated by northern white cedar (Thuja occidentalis) at slope bases where large amounts of water accumulate in basins allowing for significant organic matter accumulation.

Logging is historically the greatest source of disturbance. These stands are relatively free of serious insect injury as well as being resistant to decay, making them high in value for wood products that comes in contact with water and soil, such as fence posts, shingles, and paneling. This wood has historically been popular for log cabins because of good insulation qualities. Due to the wet nature of these soils, this site is particularly vulnerable to lasting disturbance when logging practices during the growing season churn and rut the surface soils. For this reason, this site is typically harvested when the ground is frozen. Harvests have often targeted spruce removal, though northern white cedar is also often taken from these areas. Selective harvests do not generally convert the site to a different state but do result in a temporary increase in understory shrubs and herbs. Clearcutting and shelterwood strips are currently recommended for

harvesting mature stands of northern white cedar and reproducing new ones (Carey 1993). Difficulty has been identified in regenerating these species after harvesting due to its forage value to white tailed deer. Northern white cedar are slow growing species, and the seedlings (less than 7 ft tall) are often damaged by heavy browsing.

Natural disturbances will include wind, ice, and snow damage that create natural canopy gaps from individual or group tree fall, leading to greater sunlight exposure and temporary increase in shrub and forb cover.

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, representative of the Marsh Wetland Concept ecological site (F143XY210ME). Removal of dams and man-made structures that restores hydrologic function leads to natural succession by emergent wetland plants, herbaceous plants, shrubs, and eventually cedar 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.

Fire is typically not a dominant risk in these communities due to their inherent wetness, but they are highly susceptible due to their thin bark, shallow roots, and high oil content (Carey 1993, Curtis 1946). Cedar regeneration may become better established by seed on recently burned sites if a seed source is nearby and the exposed soil remains moist.

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 (%)

Table 8. Community 1.2 plant community composition

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

Table 9. Community 1.3 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 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
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Approval

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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):**

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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:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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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:**
