USDA Natural Resources
Conservation Service

Ecological site F144BY210ME
Marsh Wetland Complex

Last updated: 9/27/2024
Accessed: 11/23/2024

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 flat, marshy areas characterized by herbaceous and/or shrubby vegetation with very few trees. The soils are very deep, very poorly-drained, and formed in well-decomposed organic deposits (muck), generally lacking rock and grit in the upper 40 inches of the profile.

The primary driver of plant community dynamics are hydrology and associated nutrient dynamics. This ecological site requires further study, particularly with regards to the influence of hydrology for distinguishing between the many distinct plant communities that occur on these open marshland soils. The primary disturbance on these sites is likely the construction of beaver dams or man-made structures which raise or lower the water table, thereby altering the nutrient dynamics that drive species composition and organic matter decomposition in the soil.

Similar sites

F144BY230ME	**Acidic Peat Wetland Complex** The Acidic Peat Wetland Complex is characterized by poorly-decomposed peat rather than highly decomposed muck. The soil oxygen and nutrient levels are much lower than in the Marsh site, and soil pH is less than 4.5, resulting in greater sphagnum moss, pitcher plants, and other acid bog vegetation.
F144BY220ME	**Semi-acidic Peat Wetland Complex** The Semi-acidic Peat Wetland Complex is characterized by poorly-decomposed peat rather than highly decomposed muck. The soil oxygen and nutrient levels are lower than in the Marsh site, resulting in greater sphagnum moss, heath shrubs, and other bog vegetation.

Table 1. Dominant plant species

Tree	(1) *Abies balsamea* (2) *Picea mariana*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs in flat, wet, low-lying areas where large amounts of water pass slowly through the soil. Water ponds on the surface each year for significant periods of time, however, the soil remains sufficiently oxygenated to allow organic deposits to decompose into muck rather than remain as peat.

Table 2. Representative physiographic features

Landforms	(1) Upland > Hill (2) Upland > Bog (3) Upland > Mountain (4) Upland > Swamp (5) Till plain > Depression (6) Plains > Marine terrace (7) Outwash plain > Bog (8) Till plain > Bog
Runoff class	Very low to negligible
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	None to rare
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	0–640 m
Slope	0–2%
Ponding depth	0–30 cm
Water table depth	0–8 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. Precipitation generally is evenly distributed throughout the year. Near the coast, it is slightly lower in summer. In inland areas, it is slightly higher in spring and fall. Rainfall occurs during high-intensity, convective thunderstorms in summer. In 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.

This major land resource area (MLRA) covers four 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)	117-140 days
Freeze-free period (characteristic range)	144-170 days
Precipitation total (characteristic range)	1,067-1,219 mm
Frost-free period (actual range)	98-146 days
Freeze-free period (actual range)	133-180 days
Precipitation total (actual range)	1,016-1,372 mm
Frost-free period (average)	126 days
Freeze-free period (average)	159 days
Precipitation total (average)	1,168 mm

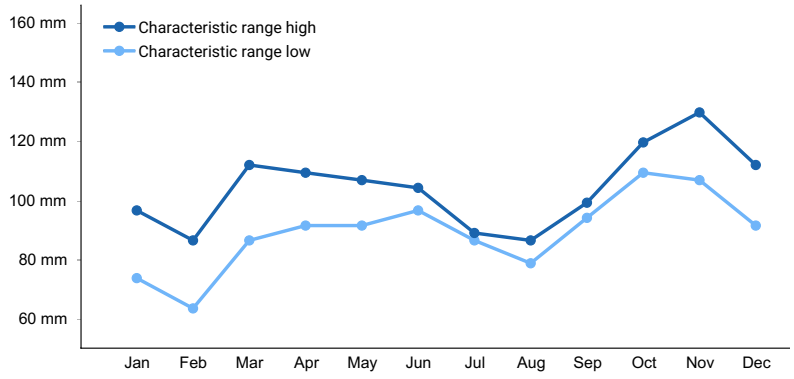


Figure 1. Monthly precipitation range

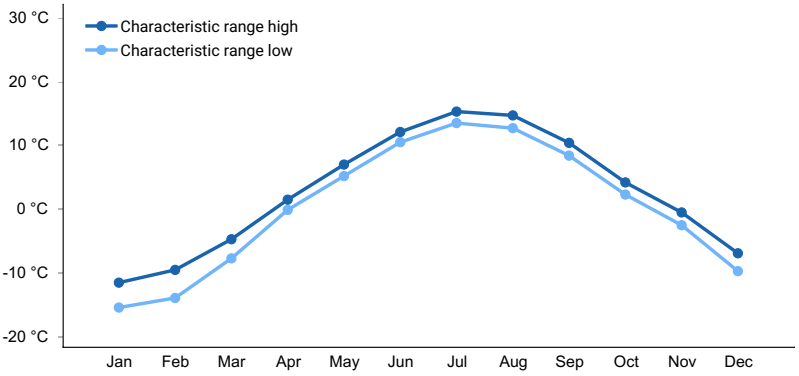


Figure 2. Monthly minimum temperature range

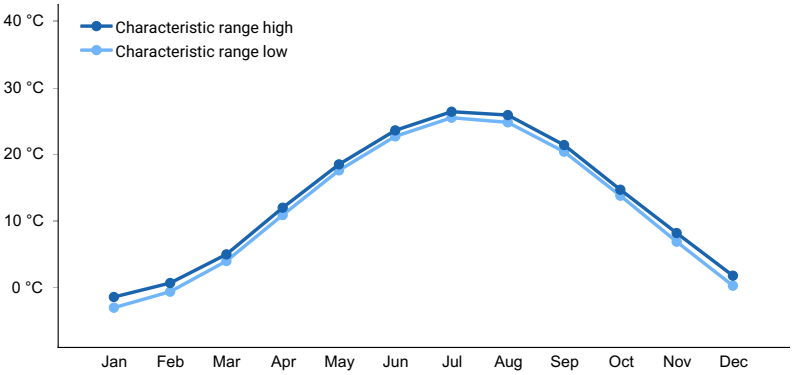


Figure 3. Monthly maximum temperature range

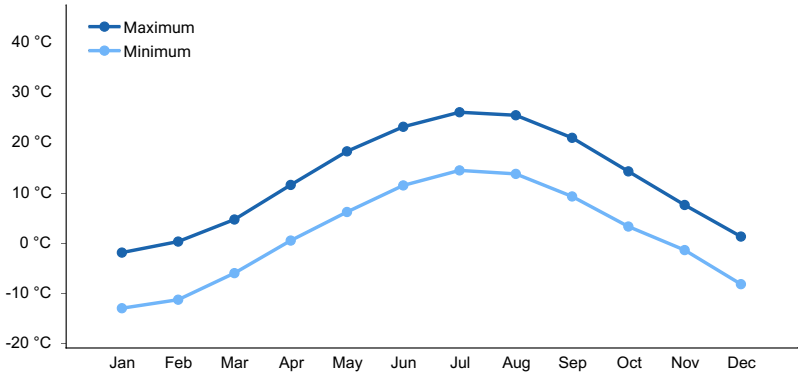


Figure 4. Monthly average minimum and maximum temperature

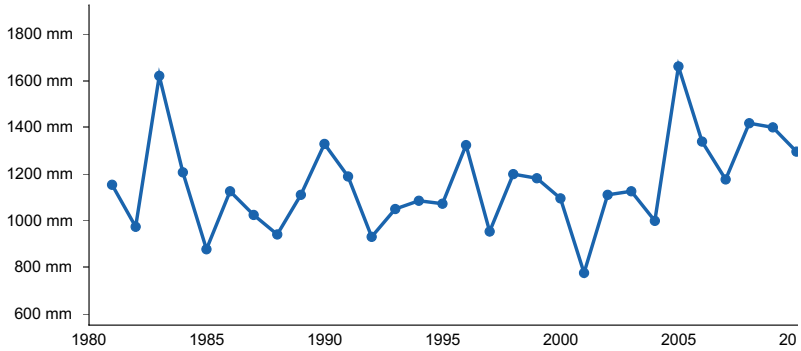


Figure 5. Annual precipitation pattern

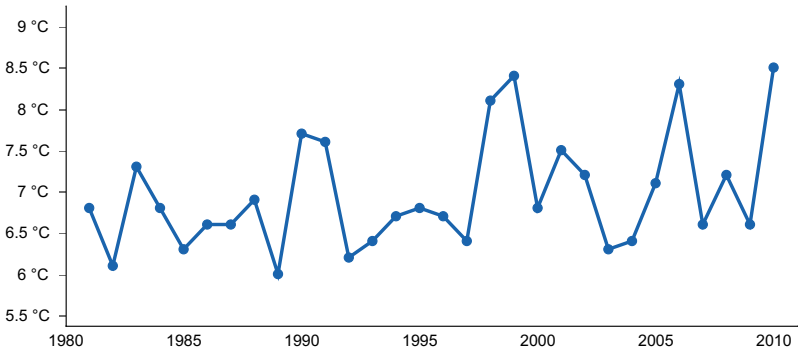


Figure 6. Annual average temperature pattern

Climate stations used

- (1) BELFAST [USC00170480], Belfast, ME
- (2) ACADIA NP [USC00170100], Bar Harbor, ME
- (3) CORINNA [USC00171628], Corinna, ME
- (4) DOVER-FOXCROFT WWTP [USC00171975], Dover Foxcroft, ME
- (5) FARMINGTON [USC00172765], Farmington, ME
- (6) GARDINER [USC00173046], Gardiner, ME
- (7) JONESBORO [USC00174183], Addison, ME
- (8) LEWISTON [USC00174566], Auburn, ME
- (9) MADISON [USC00174927], Anson, ME
- (10) NEWCASTLE [USC00175675], Newcastle, ME
- (11) ORONO [USC00176430], Old Town, ME
- (12) WATERVILLE TRTMT PLT [USC00179151], Waterville, ME
- (13) WEST ROCKPORT 1 NNW [USC00179593], Rockport, ME
- (14) AUGUSTA STATE AP [USW00014605], Augusta, ME
- (15) BANGOR INTL AP [USW00014606], Bangor, ME
- (16) PORTLAND INTL JETPORT [USW00014764], Portland, ME

Influencing water features

Large amounts of water saturate the soils of this site throughout much of the year, inhibiting tree growth and favoring herbaceous species.

Wetland description

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

Soil features

Soils of this site are very poorly-drained, mucky organic soils. These soils are very deep with at least 40 inches of organic deposits, often underlain by mineral soils with loamy to sandy textures. They have high water-holding capacity and include a broad pH range. The mucky nature of these soils are indicative of soil conditions favorable to microbial decomposition of organic deposits. Despite the saturated nature of these soils, there is sufficient oxygen and nutrients to support marsh species (such as grasses) rather than bog species (such as heath shrubs)..

Table 4. Representative soil features

Parent material	(1) Herbaceous organic material (2) Grassy organic material (3) Organic material (4) Glaciofluvial deposits (5) Glaciolacustrine deposits (6) Woody organic material
Surface texture	(1) Muck (2) Gravelly sand
Drainage class	Poorly drained to very poorly drained
Permeability class	Slow to moderate
Soil depth	0–152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (22.9-48.3cm)	20.07–59.94 cm
Soil reaction (1:1 water) (12.7-19.6cm)	4.3–7.3
Subsurface fragment volume <=3" (2.5-76.2cm)	0%
Subsurface fragment volume >3" (0-5.1cm)	0%

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 diverse graminoid, herb, and shrub species. Shrubs such as speckled alder tend to dominate the higher perimeter and mounds within the marsh site, while diverse sedges, bulrushes, grasses, and

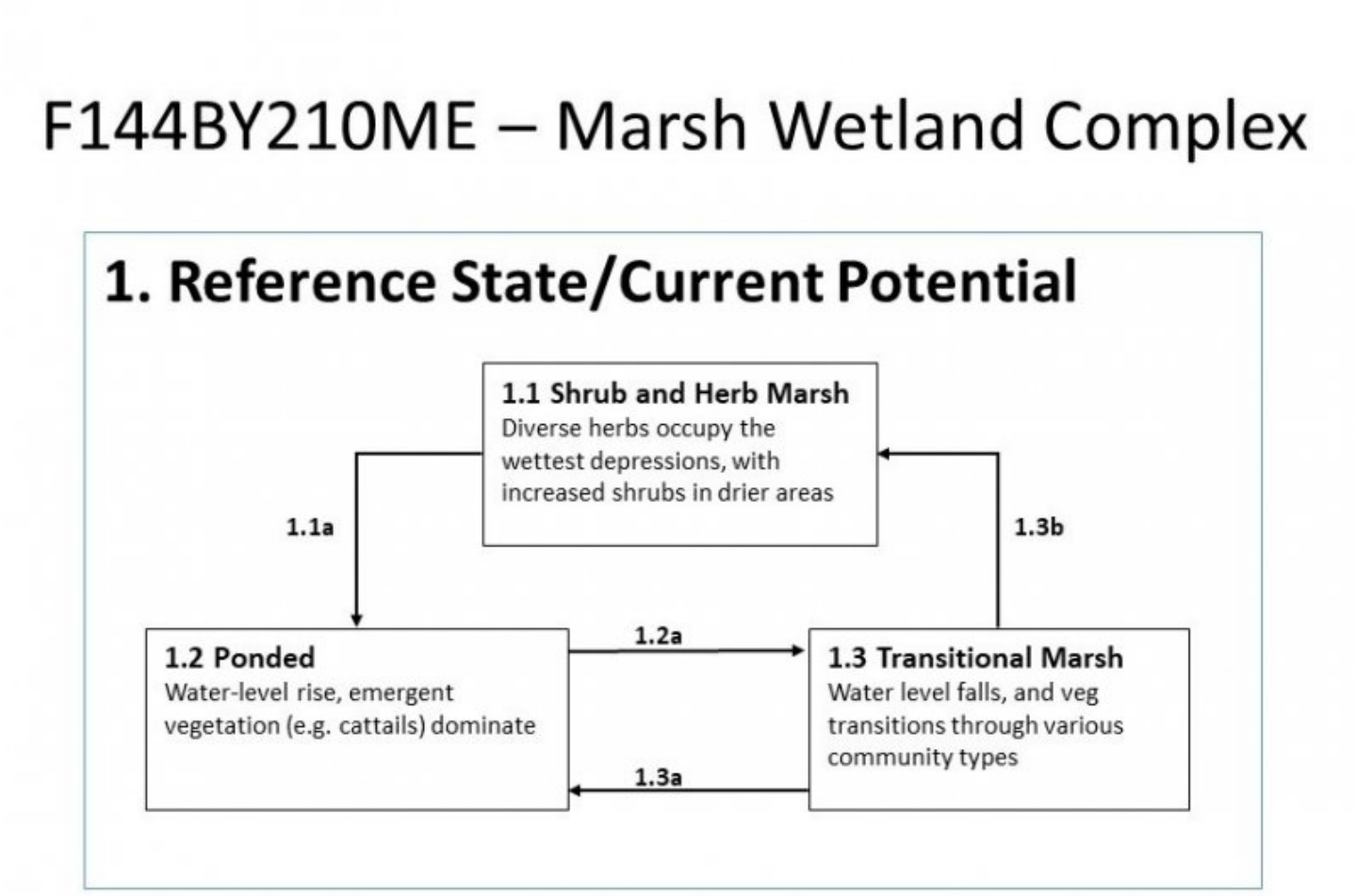
forbs dominate the wetter areas. Relatively small changes in soil wetness may alter the distribution of these species within the site, and further study is required to distinguish the relationship between hydrology and vegetation on this site.

Due to its low-lying position, this site is susceptible to altered hydrology from beaver dams and man-made structures (e.g. roads). Increased ponding depth and duration results in a ponded phase dominated by emergent vegetation such as cattails. As ponding depth and duration returns to the natural regime due to dam/road removal (or over long periods of time the infilling of pond with sediment and debris) this site will transition through many short-lived marsh communities before eventually returning to dominance by those of the reference community.

Artificial drainage of this site is yet to be observed.

Relationship to Other Classification Systems
This site includes the following state natural heritage program types:
• All Marsh community types (Sperduto and Nichols 2004)
• Circumneutral Fen (Gawler and Cutko 2010)
• Grassy Shrub Marsh (Gawler and Cutko 2010)
• Sedge meadow (Gawler and Cutko 2010)
• Sweetgale Fen (Gawler and Cutko 2010)
• Tall sedge Fen (Gawler and Cutko 2010)
• Tall shrub fen (Gawler and Cutko 2010)
• Shallow Emergent Marsh (Thompson and Sorenson 2000)
• Sedge meadow (Thompson and Sorenson 2000)

State and transition model



State 1
Reference State/Current Potential

Community 1.1
Shrub and Herb Marsh

Diverse herbs occupy the wettest depressions, with increased shrubs in the drier areas

Dominant resource concerns

- Organic matter depletion

Community 1.2
Ponded

surface water with emergent vegetation (e.g., cattails) predominant

Community 1.3
Transitional Marsh

water level falls, and vegetation transitions through various community types.

Pathway 1.1a
Community 1.1 to 1.2

Hydrology altered by structure (beaver dam or man-made), causing ponding year-round

Conservation practices

Wetland Wildlife Habitat Management
Wetland Enhancement

Pathway 1.3b
Community 1.1 to 1.3

Original hydrology restored, and/or infilling of ponded area over time

Conservation practices

Wetland Wildlife Habitat Management
Wetland Enhancement

Pathway 1.2a
Community 1.2 to 1.3

Original hydrology restored, and/or infilling of ponded area over time

Conservation practices

Surface Drain, Field Ditch
Wetland Wildlife Habitat Management
Wetland Enhancement

Pathway 1.3a
Community 1.3 to 1.1

Hydrology altered by structure (beaver dam or man-made), causing ponding year-round

Conservation practices

Dam, Diversion
Dike

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.

Other references

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Contributors

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Approval

Nels Barrett, 9/27/2024

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	Nels Barrett
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:**