USDA Natural Resources
Conservation Service

Ecological site F144BY220ME
Semi-acidic Peat Wetland Complex

Last updated: 5/13/2025
Accessed: 05/21/2025

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
Major Land Resource Area (MLRA): 144B–New England and Eastern New York Upland, Northern Part

Ecological site concept

This site occurs in flat, low-lying areas characterized by very poorly-drained, semi-acidic peat soils and bog vegetation. Soil pH is typically between 4.5 and 6.0 throughout, allowing for more overall species diversity than true acid bogs, but also lacking many true acid bog indicator species. It is dominated by sphagnum moss and heath shrubs, and supports other common bog species such as cotton grass in lower quantities. This site may also support low cover of black spruce and larch trees in some areas.

This ecological site is resistant to major disturbances except for small scale hydrologic alterations that may create small patches of drained or ponded peatland. This ecological resistance can be attributed to the ability of these bogs to respond to large fluctuations in water, as well as general resistance to fire, insects, disease, construction, land management, etc. Further study is needed to identify alternative states for this site.

Associated sites

F144BY230ME	**Acidic Peat Wetland Complex** The Semi-acidic Peat Wetland Complex may grade into the Acidic Peat Wetland Complex, usually with the latter being toward the center of the bog and grading outward to be less acidic toward the surrounding forest.

Similar sites

F144BY230ME	**Acidic Peat Wetland Complex** The Acidic Peat Wetland Complex has pH less than 4.5 throughout the profile, compared to pH greater than 4.5 in at least part of the profile for Semi-acidic Peat Wetlands. The lower pH results in the most acidic bog indicator plants, such as pitcher plants and sundews.
F144BY210ME	**Marsh Wetland Complex** The Marsh Wetland Complex occurs in a similar landscape position, but has more nutrient and oxygen-rich soil water conditions, resulting in the decomposition of organic matter into muck, rather than the peat accumulation characteristic of the Semi-acidic Peat Wetland Complex

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 collect throughout the growing season. Water ponds on the surface for significant periods of time, and the lack of soil oxygen and nutrients impede the decomposition of organic matter over time.

Table 2. Representative physiographic features

Landforms	(1) Bog (2) Lowland > Marsh (3) Swamp (4) Upland > Flood plain (5) Upland > Hill (6) Upland > Mountain
Runoff class	Very low
Flooding duration	Brief (2 to 7 days) to very brief (4 to 48 hours)
Flooding frequency	None to rare
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	0–2,100 ft
Slope	0–2%
Water table depth	0–6 in
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)	102-130 days
Freeze-free period (characteristic range)	136-156 days
Precipitation total (characteristic range)	41-52 in
Frost-free period (actual range)	79-137 days
Freeze-free period (actual range)	119-170 days
Precipitation total (actual range)	40-53 in
Frost-free period (average)	116 days
Freeze-free period (average)	146 days
Precipitation total (average)	47 in

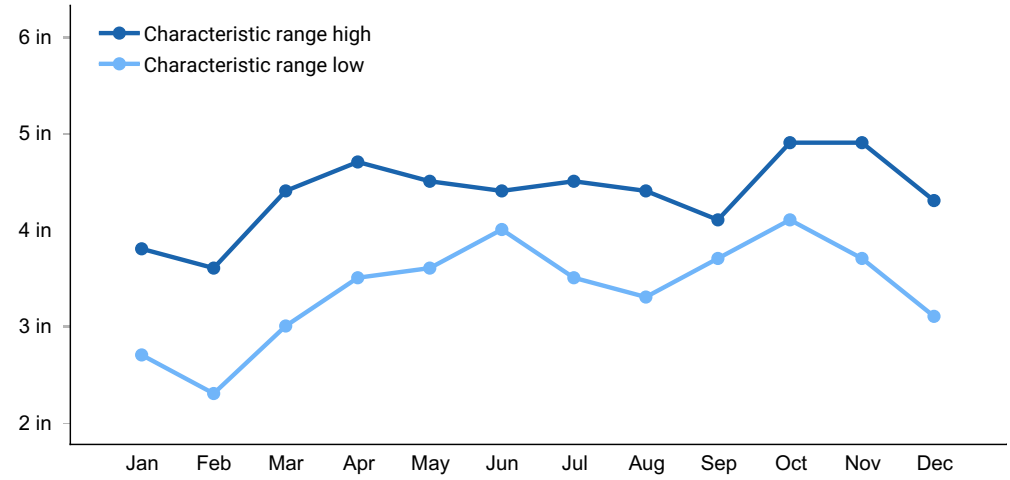


Figure 1. Monthly precipitation range

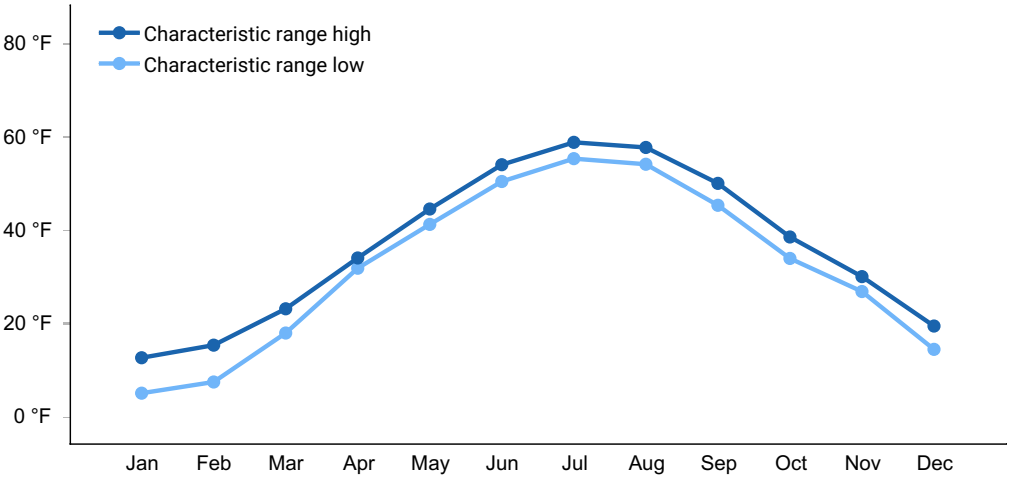


Figure 2. Monthly minimum temperature range

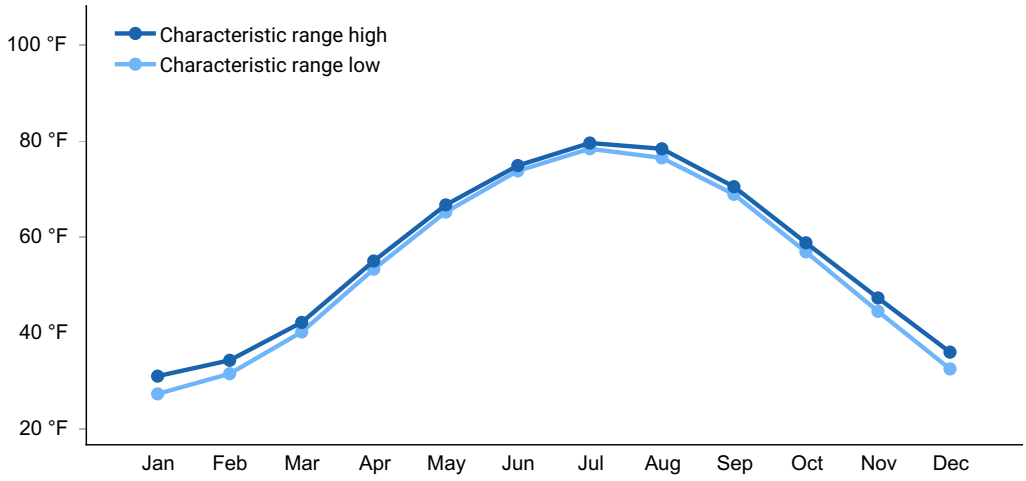


Figure 3. Monthly maximum temperature range

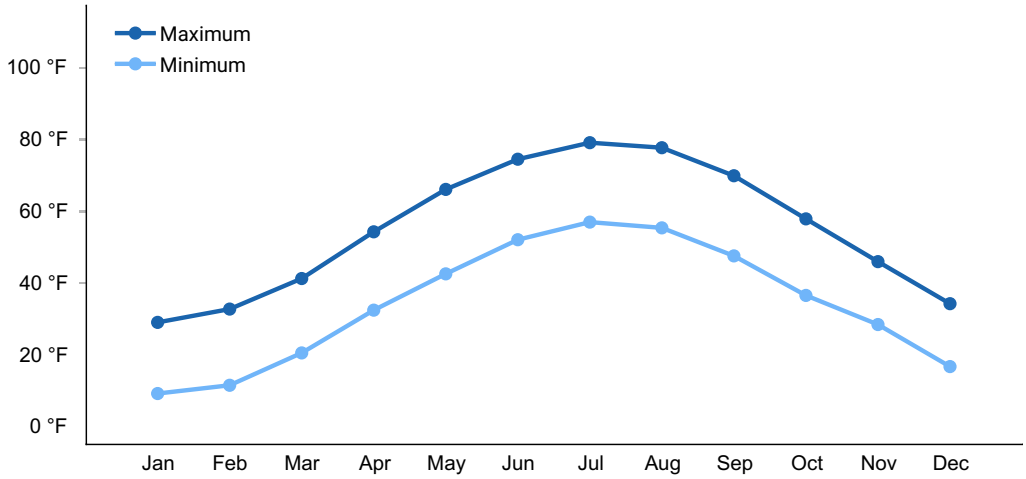


Figure 4. Monthly average minimum and maximum temperature

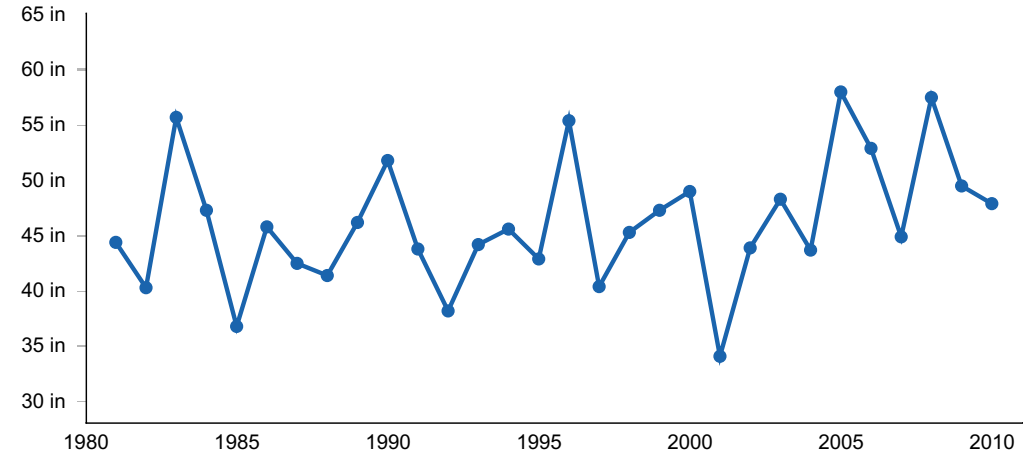


Figure 5. Annual precipitation pattern

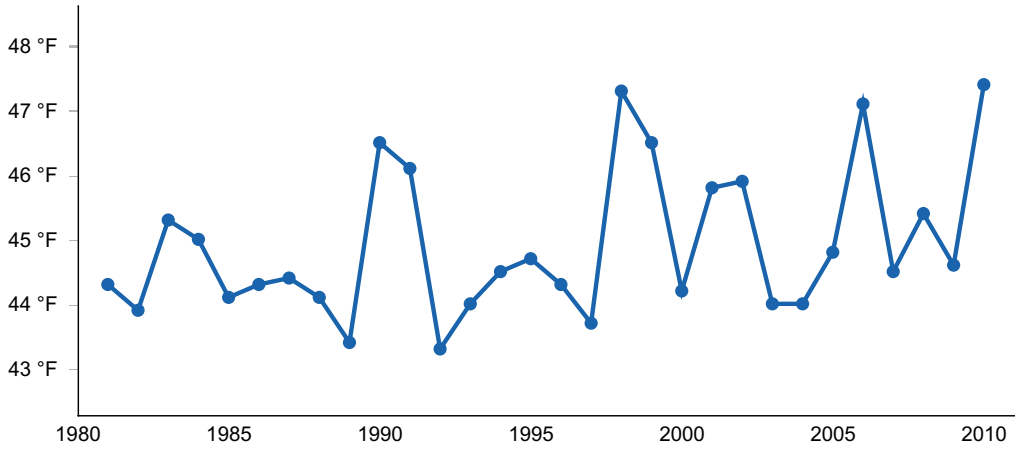


Figure 6. Annual average temperature pattern

Climate stations used

- (1) 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 much of the year, limiting tree growth and favoring sphagnum moss, heath shrubs, and other common bog vegetation.

Wetland description

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

Soil features

Soils of this site are very poorly-drained peat. These soils are very deep, usually with much greater than 40 inches of organic deposits over mineral soil. They act as a sponge with exceedingly high water-holding capacity. Soil pH is expected to be between 4.5 and 6.0, though these peat conditions may exist outside this range. The soils of this site are characterized by not only their semi-acidic pH, but also by the lack of dissolved oxygen in the water source, which inhibits organic matter decomposition, resulting in peat accumulation.

Table 4. Representative soil features

Parent material	(1) Organic material (2) Till
Surface texture	(1) Mucky peat (2) Loam
Drainage class	Very poorly drained to poorly drained
Permeability class	Slow
Soil depth	0–60 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (13-14in)	4.3–22.4 in
Soil reaction (1:1 water) (3.6-7.8in)	3.5–6.5
Subsurface fragment volume <=3" (0-10in)	0%
Subsurface fragment volume >3" (2in)	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).

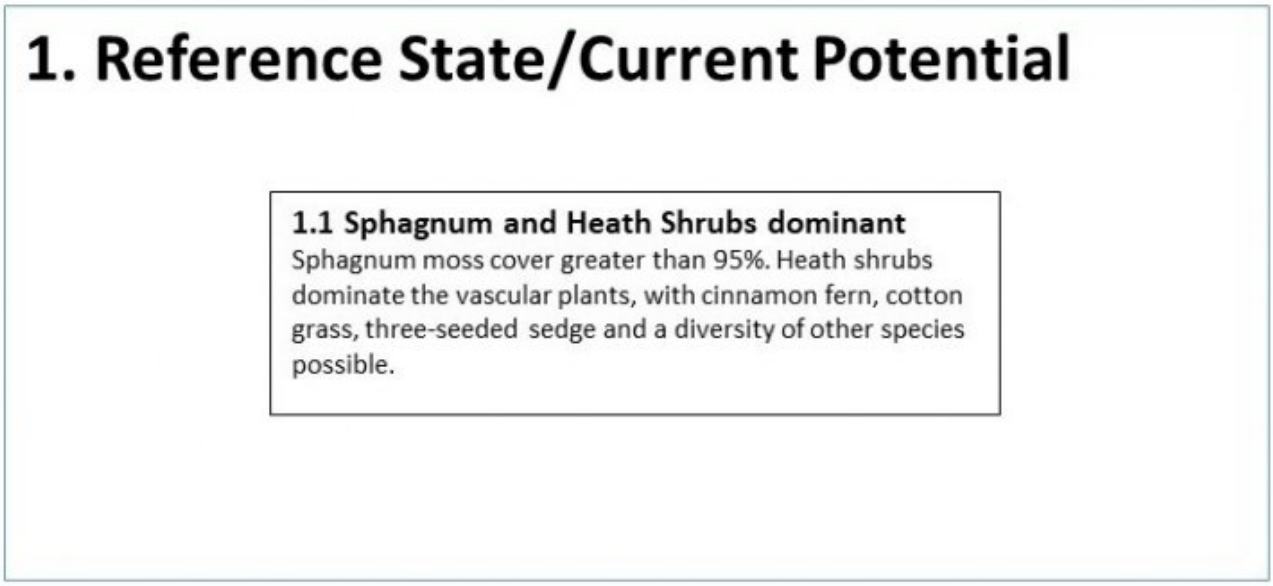
The vegetation of this site is dominated by sphagnum moss and heath shrubs. It also supports other common bog species such as cotton grass in lower quantities. This site may sometimes support low cover of black spruce and larch trees, though the reason for tree presence or absence is poorly-understood.

This ecological site is resistant to major disturbances except for small scale hydrologic alterations that may create small patches of drained or ponded peatland (such as near a culvert). This ecological resistance can be attributed to the ability of these bogs to respond to large fluctuations in water, as the peat acts like a sponge, expanding and contracting with the water supply. There is also a general resistance to fire, insects, disease, construction, land management, etc. due to the wet nature and particular species on the site. Further study is needed to identify alternative states for this site.

Relationship to Other Classification Systems
This site includes the following state natural heritage program types:
• Medium and Rich Fen community types (Sperduto and Nichols 2004)
• Low sedge Fen (Gawler and Cutko 2010)
• Sedge heath Fen (Gawler and Cutko 2010)
• Pocket Swamp (Gawler and Cutko 2010)
• Red Maple fen (Gawler and Cutko 2010)
• Intermediate Fen (Thompson and Sorenson 2000)
• Rich Fen (Thompson and Sorenson 2000)

State and transition model

F144BY220ME – Semi-acidic Peat Wetland Complex



State 1
Reference State/Current Potential

Community 1.1
Peatland with Shrubs

Sphagnum moss dominates and covers greater than 95%. Heath shrubs dominate the vascular plants, with occasional cinnamon fern, three-sided sedge and a diversity of other species.

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

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, 5/13/2025

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	Greg Schmidt
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:

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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:**
