# Ecological site F143XY701ME
# Shallow Till

Last updated: 10/07/2024
Accessed: 05/12/2025

## 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): 143X–Northeastern Mountains

MLRA 143, known as the Northeastern Mountains, covers approximately 23 million acres of mountains, hills, and valleys in northern Maine, New Hampshire, Vermont, New York, and Massachusetts. The area is sparsely populated, with less than five percent of the land area developed for agriculture, residential, and urban development. About 90 percent of the area is forested, most of which is actively managed for timber. Elevations are mostly between 1,000 to 4,000 feet, with a few isolated peaks more than 5,000 feet above sea level. The present day mountains are but remnants of a much larger ancient range that has been eroding for approximately 500 million years. Bedrock consists of mostly very old metamorphic rock (gneiss, schist, slate, marble, quartzite, etc.) with younger intrusions of igneous rock (e.g. granite and granodiorite) from the Triassic and Cretaceous periods. MLRA 143 differs somewhat geologically from its neighboring MLRAs (142, 144A, 144B, 145, and 146), which have greater amounts of nutrient-rich sedimentary rock. Compared to MLRA 143, they are all lower in elevation, with longer growing seasons large areas that were once submerged by the ocean following glaciation.

The characteristic landforms and soils of northern New England were derived from the massive continental ice sheet that engulfed the region during North America’s most recent glaciation. Mighty glaciers, embedded with sediment and rock fragments, scoured bedrock and compacted mineral beds in a steady march south and east toward the Atlantic Ocean. The softer sedimentary rocks were pulverized into fine silts and clays under the immense weight of ice a mile thick, while the more resistant igneous and metamorphic rocks were sculpted into steep mountains and hills or plucked and dragged along the base of the glacier. With a warming climate, the ice retreated northward, depositing a thin layer of unsorted glacial till sediment atop the newly-exposed bedrock and compacted mineral beds. Deeper mounds of unsorted till formed small hills, kames, moraines and drumlins. Enormous chunks of ice detached as the glacier retreated, melting slowly in place and forming many kettle lakes and basins where water and fine sediments collect. Raging torrents of glacial meltwater dissected much of the barren landscape, entraining coarse and fine sediments, carving river valleys, and leaving well-sorted deposits of mostly sand and gravel along the watercourse. By 10,000 years ago the ice sheet had fully receded from MLRA 143. Silty floodplains developed along perennial rivers, many of which occupy the same channels that once gushed with sediment-rich glacial meltwater. Over time, wet basins accumulated fine sediment, some dried out, and still others became acidified by organic matter inputs from colonizing vegetation.

In terms of climate, MLRA 143 is distinguished from neighboring MLRAs by a shorter growing season and the occurrence of cryic soil temperature regimes at high elevations. The majority of MLRA 143 averages 32 to 44 inches of precipitation annually with a five to six month growing season and frigid winter temperatures. However, the 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. 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.

## Classification relationships

This site occurs in Ecological Site Group 7 (Shallow Forests) 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 where soils are shallow over bedrock, usually on upper slopes and summit positions which shed water. Soils are well-drained to excessively-drained. Slopes can be gentle to very steep. The plant community is softwood-dominated, usually with sparse understory cover. Red spruce, balsam fir, red maple and/or white pine are often abundant in the overstory. Northern white cedar may be present in areas with calcareous bedrock. It is unclear whether a repeatable pattern exists between the distribution of white pine vs. red spruce on these shallow sites (e.g. white pine on summits, red pine on shoulders?). If such a pattern exists, there may need to be two distinct site concepts.

## Associated sites

| | |
|---|---|
| F143XY702ME | **Shallow And Moderately Deep Till**<br>The Shallow and Moderately-deep Till site is often downslope from the Shallow Till site in the watershed. The Shallow Till tends to occur near summits, while the Shallow and Moderately-deep Till site tends to occur on the shoulder positions. |
| F143XY704ME | **Shallow Organic Rock Pocket**<br>The Shallow Organic Rock Pocket site occurs in areas with large amounts of exposed bedrock where shallow organic soils develop. These organic rock pockets occasionally grade into shallow mineral soils of the Shallow Till site. |

## Similar sites

| | |
|---|---|
| F143XY704ME | **Shallow Organic Rock Pocket**<br>The Shallow Organic Rock Pocket site is comprised of organic soils which are more acidic than the mineral soils of the Shallow Till site. |
| F143XY702ME | **Shallow And Moderately Deep Till**<br>The Shallow and Moderately-deep Till site includes both shallow and moderately deep pockets of mineral soil (up to 48 inches) over bedrock, whereas the Shallow Till site includes only soils less than 24 inches over bedrock. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | Not specified |
| Herbaceous | Not specified |

## Physiographic features

This site typically occurs high in the watershed in areas with high runoff, such as hill and mountain summits and ridges. Slopes range from 0 to 60 percent, and elevations range from 200 to 3000 feet.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Hill<br>(2) Mountain<br>(3) Ridge |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 200–3,000 ft |
| Slope | 0–60% |
| Aspect | Aspect is not a significant factor |

## Climatic features

The climate of this site is typical of MLRA 143, with very cold snowy winters, warm rainy summers, and a relatively short growing season. Precipitation is fairly constant from month to month and averages about 48 inches annually. Growing degree days ranges from 110-130 days from June to September.

**Table 3. Representative climatic features**

| | |
|---|---|
| Frost-free period (average) | 110 days |
| Freeze-free period (average) | 130 days |
| Precipitation total (average) | 48 in |

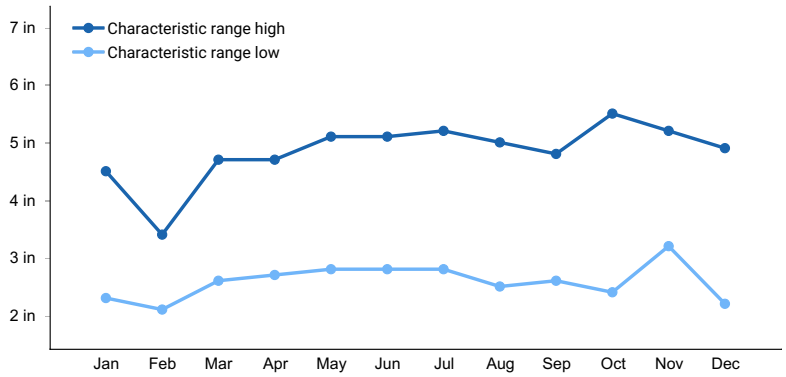


**Figure 1. Monthly precipitation range**

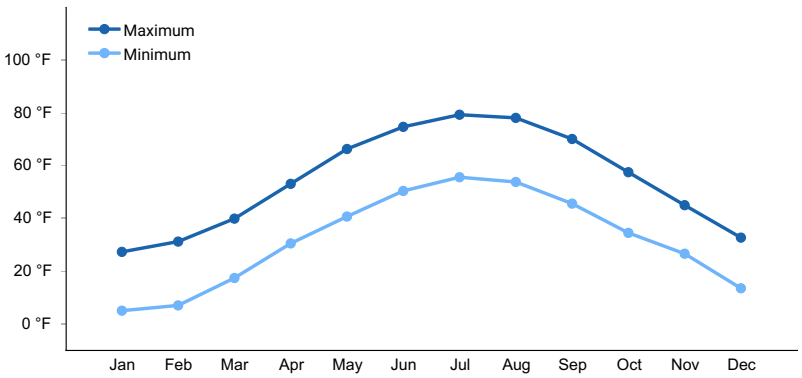


**Figure 2. Monthly average minimum and maximum temperature**

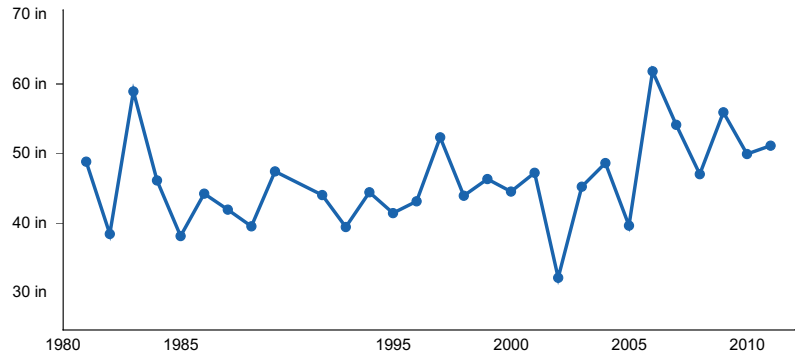


**Figure 3. Annual precipitation pattern**

## Climate stations used

- (1) ROCHESTER [USC00436893], Rochester, VT
- (2) CAVENDISH [USC00431243], Cavendish, VT
- (3) DANFORTH [USC00171833], Danforth, ME
- (4) SPRINGFIELD [USC00178353], Springfield, ME

## Influencing water features

This site is not influenced by streams or wetlands.

## Soil features

The soils of this site formed in shallow deposits of till (less than 24 inches) over bedrock. Soil textures range from silt loam to sandy loam and may or may not have many rock fragments throughout the profile. Drainage ranges from well- to excessively-drained.

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Subglacial till–granite<br>(2) Melt-out till–gneiss<br>(3) Till–phyllite |
| Surface texture | (1) Channery silt loam<br>(2) Fine sandy loam<br>(3) Silt loam |
| Family particle size | (1) Loamy |
| Drainage class | Well drained to excessively drained |
| Soil depth | 1–24 in |
| Surface fragment cover <=3" | 0% |
| Surface fragment cover >3" | 0–4% |
| Available water capacity (0-40in) | 1.7–6.9 in |
| Calcium carbonate equivalent (0-40in) | 0% |
| Electrical conductivity (0-40in) | 0 mmhos/cm |
| Sodium adsorption ratio (0-40in) | 0 |
| Soil reaction (1:1 water) (0-40in) | 3.5–6.5 |

| | |
|---|---|
| Subsurface fragment volume <=3" (Depth not specified) | 4–21% |
| Subsurface fragment volume >3" (Depth not specified) | 0–15% |

## Ecological dynamics

This site is dominated by softwood species, particularly red spruce. Balsam fir, white pine, and red maple are commonly found on the site, with lesser amounts of black spruce, white spruce, hemlock, yellow birch, beech, and sugar maple.

Disturbances include blowdowns, insect damage, logging, and occasional fire. Following disturbance, the site proceeds through successional phases before returning to the reference community. These shallow soils are not often cultivated. Productivity is expected to be low on these shallow sites, though further study is required to fully develop the plant community dynamics and state-and-transition model.

## State and transition model

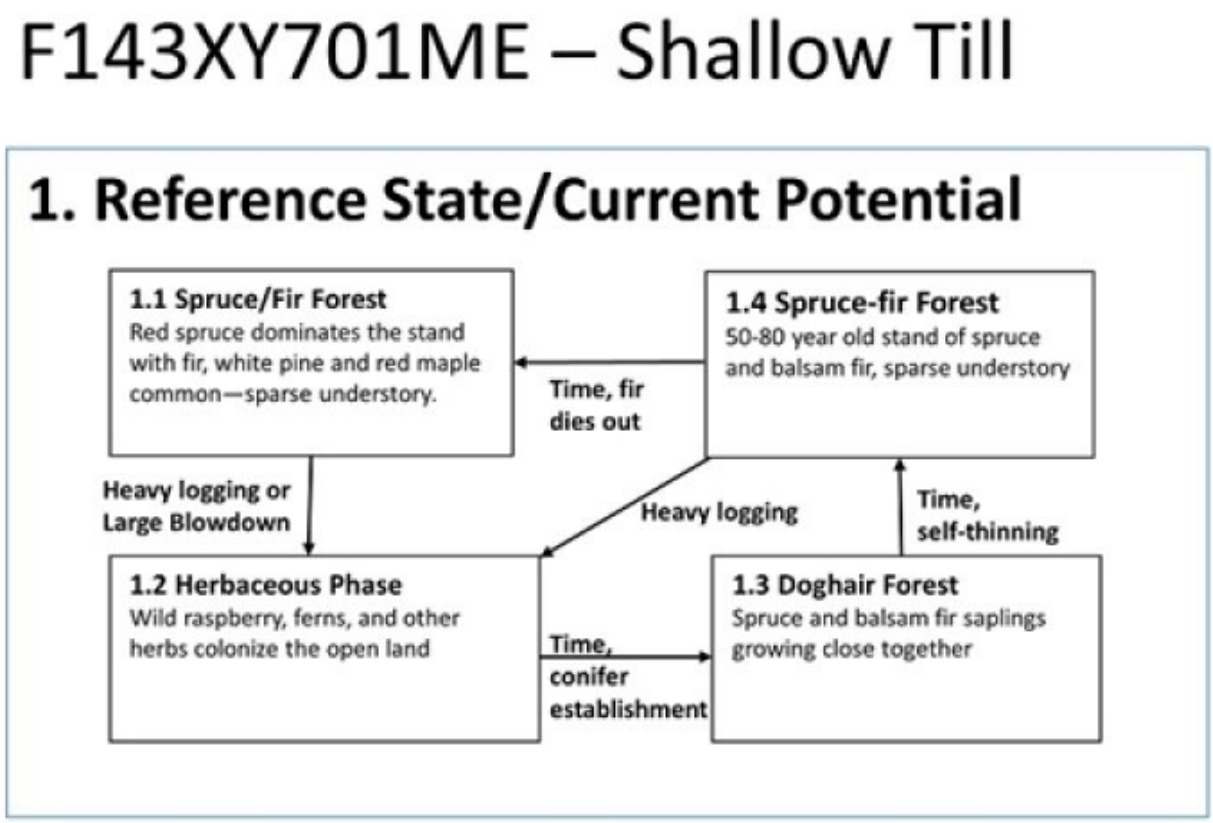


**Figure 5. STM**

## 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

Barton, A. M., A. S. White, and C. V. Cogbill. 2012. The Changing Nature of the Maine Woods. University Press of New England, Lebanon, NH.

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.

Johanson, J. K., Butler, N. R. and C. Bickford. 2016. Classifying Northern New England Landscapes for Improved Conservation. Rangelands 38:6.

Sperduto, D. and B. Kimball. 2011. The Nature of New Hampshire: Natural Communities of the Granite State. The Nature Conservancy and The New Hampshire Heritage Bureau. University Press of New England, Lebanon, NH.

Thompson, E. H. and E. R. Sorenson. 2000. Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont. The Nature Conservancy and the Vermont Department of Fish and Wildlife. University Press of New England, Hanover, NH.

USDA Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

## Contributors

Jamin Johanson
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## Approval

Greg Schmidt, 10/07/2024

## Acknowledgments

Nels Barrett

## 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 | 05/12/2025 |
| 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:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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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):**

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:**