

# Ecological site F143XY702ME

## Shallow And Moderately Deep Till

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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, 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 is a transition zone between Northern Hardwoods (deep soils) and Shallow Till (softwoods). It typically occurs where soils grade from moderately deep to shallow over bedrock, usually on upper slopes and shoulder positions. Soils are well-drained to excessively-drained. Slopes can be gentle to very steep. The mixedwood community is diverse, usually with beech, eastern hemlock, red spruce, sugar maple, balsam fir, red maple and/or yellow birch, along with a number of other tree species abundant in the overstory. There are versions of this site that are dominated by either hardwoods or softwoods, in which case they could be treated as similar to Northern Hardwoods or Shallow Till, respectively.

### Associated sites

F143XY501ME	<b>Loamy Slope</b> The Loamy Slopes site often occurs downslope of the Shallow and Moderately-deep Site.
F143XY701ME	<b>Shallow Till</b> The Shallow Till site often occurs upslope of the Shallow and Moderately-deep Till site.

### Similar sites

F143XY501ME	<b>Loamy Slope</b> The Loamy Slopes site may include moderately-deep soils interspersed with deep soils (greater than 60 inches deep), whereas the Shallow and Moderately-deep site does not include deep soils.
F143XY703ME	<b>Shallow And Moderately Deep Humic Till</b> The Shallow and Moderately-deep Humic Till site has higher darker soil colors due to higher organic matter accumulation in the soil compared to the Shallow and Moderatel-deep Till site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

### Physiographic features

This site typically occurs in higher areas in the watershed such as upper slopes and shoulders on hills and mountains. Slopes range from 0 to 60 percent and elevations range from sea level to 2600 feet.

**Table 2. Representative physiographic features**

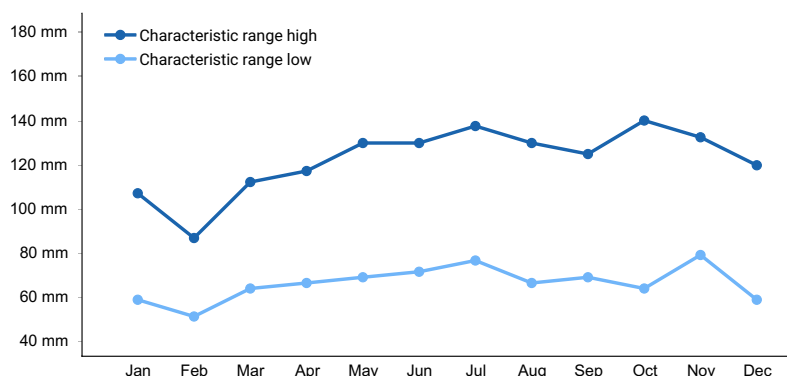
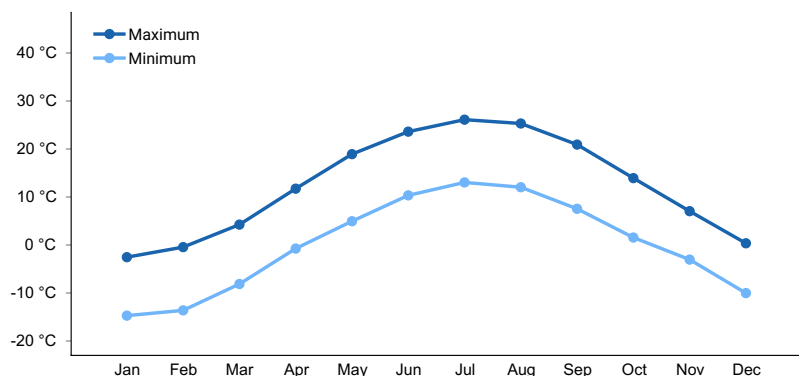
Landforms	(1) Hill (2) Mountain (3) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	0–792 m
Slope	0–60%
Aspect	Aspect is not a significant factor

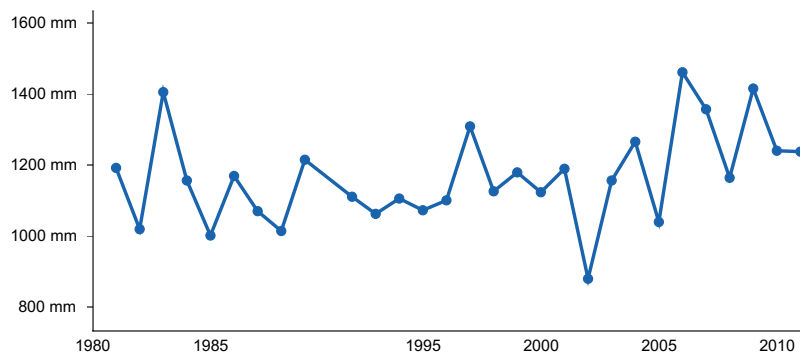
## Climatic features

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 109-131 days from June to September.

**Table 3. Representative climatic features**

Frost-free period (average)	109 days
Freeze-free period (average)	131 days
Precipitation total (average)	1,219 mm

**Figure 1. Monthly precipitation range****Figure 2. Monthly average minimum and maximum temperature**



**Figure 3. Annual precipitation pattern**

### Climate stations used

- (1) SPRINGFIELD [USC00178353], Springfield, ME
- (2) READSBORO 1 SE [USC00436761], Readsboro, VT
- (3) ROCHESTER [USC00436893], Rochester, VT
- (4) MORRISVILLE 4 SSW [USC00435376], Morrisville, VT
- (5) WANAKENA RNGR SCHOOL [USC00308944], Colton, NY
- (6) CAVENDISH [USC00431243], Cavendish, VT
- (7) DANFORTH [USC00171833], Danforth, ME

### Influencing water features

This site is not influenced by streams or wetlands.

### Soil features

The soils of this site are 10-48 deep over bedrock. They formed in till deposits derived primarily from granite, gneiss, phyllite, and/or mica schist. Soil textures range from sandy loams to silt loams and may or may not have rock fragments throughout the profile. these soils are well- to excessively-drained.

**Table 4. Representative soil features**

Parent material	(1) Supraglacial meltout till–granite (2) Subglacial till–gneiss (3) Till–phyllite
Surface texture	(1) Fine sandy loam (2) Silt loam (3) Channery loam
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Soil depth	25–122 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0–2%
Available water capacity (0-101.6cm)	4.06–23.11 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0

Soil reaction (1:1 water) (0-101.6cm)	3.4–6.5
Subsurface fragment volume <=3" (Depth not specified)	1–11%
Subsurface fragment volume >3" (Depth not specified)	0–5%

## Ecological dynamics

This site produces mixedwood forests, particularly red spruce, white pine, red maple, beech, hemlock and yellow birch.

Treethrow and logging are the most common disturbances on this site. The site is resilient following these disturbances and succeeds through an herbaceous and shrubby phase prior to tree establishment and eventual return to the reference community. The young forest stands include several species not typically dominant in the reference community, including grey and white birch, aspen, balsam fir, etc. After about 80-100 years these species die out and the reference community species retain dominance.

This site may be cultivated for crop or pasture. When cropland or pastureland management ceases, the site either returns to mixedwood forest or may transition to a white pine forest. Once white pine is established, it tends to form a single age stand with low diversity and little understory.

Further study is required to understand the long-term dynamics of the white pine state and other states occurring on shallow and moderately-deep tills.

## State and transition model

### F143XY702ME – Shallow and Moderately-deep Till

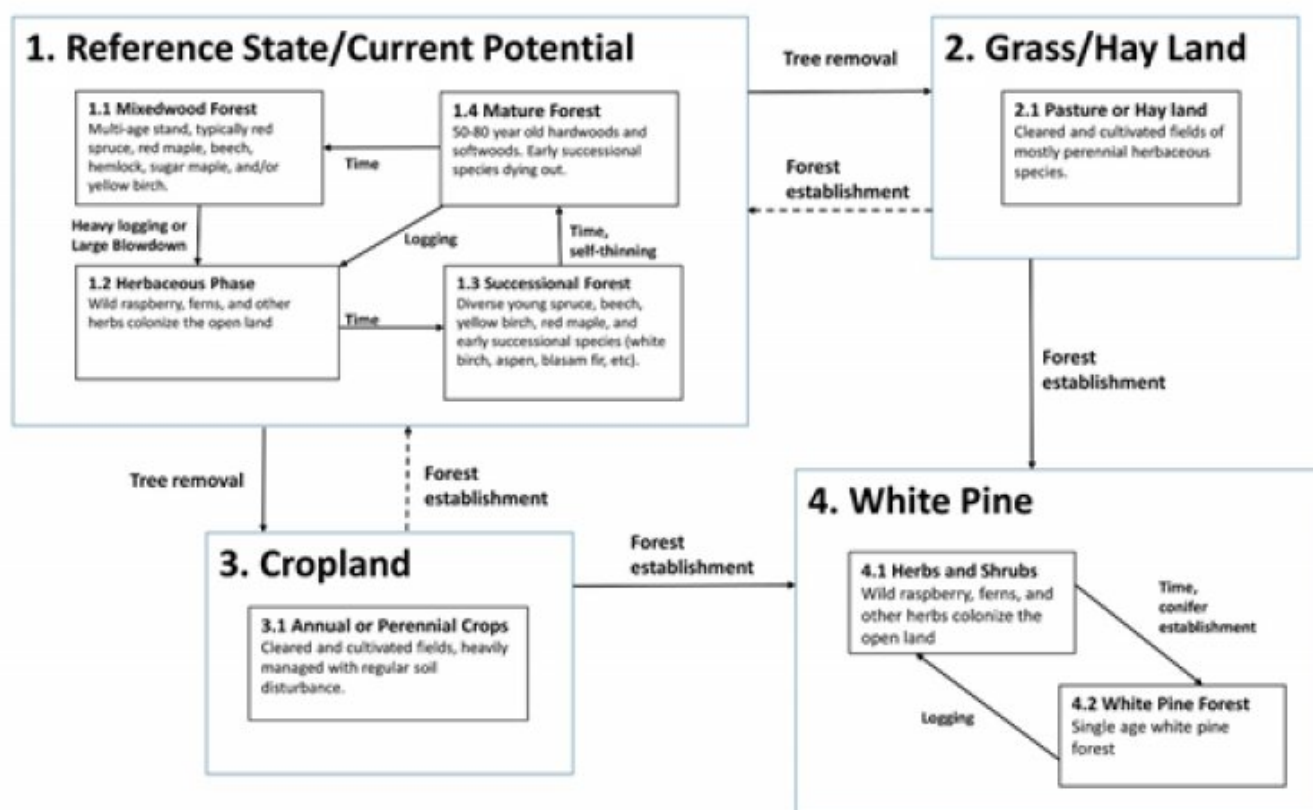


Figure 5. STM

## Other references

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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

## 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	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

### 1. Number and extent of rills:

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### 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):**

- 
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):**

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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:**
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