USDA Natural Resources Conservation Service

Ecological site F144BY502ME
Loamy Till Toeslope

Last updated: 6/29/2020
Accessed: 05/18/2024

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

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This major land resource area (MLRA) is characterized by plateaus, plains, and mountains. The climate is generally cool and humid with an average annual precipitation of 34 to 62 inches (865 to 1,575 millimeters). The average annual air temperature is typically 40 to 48 degrees F (4 to 9 degrees C). The freeze-free period generally is 130 to 200 days, but it ranges from 110 days in the higher mountains to 240 days in some areas along the Atlantic coast. 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 on gentle foot and toe slopes (0-15%) at the base of watersheds where water and nutrients accumulate near slope breaks. Soils are underlain by a densely compacted till layer within 27 inches of the soil surface, which perches water and nutrients in the plant rooting zone. Occasionally groundwater seeps out at the surface, leaving rivulets as useful site indicators. The resulting plant community is highly-productive and most commonly dominated by northern hardwoods, though red spruce and balsam fir are often abundant, particularly in flatter areas. Abundant yellow birch is a good indicator of this site.

Relationship to Other Classification Systems
This site includes the following state natural heritage program types:
• Semi-rich Mesic Sugar Maple Forest (Sperduto and Nichols 2004)
• Sugar Maple – Beech – Yellow birch Forest (Sperduto and Nichols 2004)
• Hardwood Seepage Forest (Gawler and Cutko 2010)
• Spruce-Northern Hardwoods Forest (Gawler and Cutko 2010)
• Sugar maple-beech-yellow birch forest (Thompson and Sorenson 2000)
• Semi-rich Mesic Sugar Maple Forest (Thompson and Sorenson 2000)

Associated sites

F144BY301ME	**Loamy Till Swamp** The Loamy Till Swamp site occurs lower in the watershed than the Loamy Till Toeslope site. The two sites occur together along a soil drainage gradient from somewhat poorly to poorly- and very poorly-drained.
F144BY501ME	**Loamy Slope (Northern Hardwoods)** The somewhat poorly- and poorly-drained Loamy Till Toeslope site often occurs downslope of the moderately well- and well-drained Loamy Slope site
F144BY504ME	**Enriched Loamy Cove** The Enriched Loamy Cove site is richer than the Loamy Till Toeslope and occurs in areas where the most amount of nutrients accumulate, such as small drainageways

Similar sites

F144BY507ME	**Semi-rich Till Toeslope** The Semi-rich Till Toeslope site has similar soil texture and wetness, but is distinguished by higher soil nutrients derived from calcareous parent material (such as limestone), as evidenced by high soil pH and rich site indicator species (particularly basswood).
F144BY501ME	**Loamy Slope (Northern Hardwoods)** The Loamy Slopes site is predominantly well and moderately well-drained soils (sometimes with somewhat poorly-drained inclusions) that produce mostly northern hardwoods, whereas the Loamy Till Toeslopes site consists of somewhat poorly- to poorly drained soils and can produce more mixedwood stands.
F144BY402ME	**Clay Hills** While these two sites produce similar forests, Clay Hills occur on better-drained, finer-textured soils, usually of glaciomarine or glaciolacustrine origin, while the Loamy Till Toeslope site occurs on till soils that are typically coarser in texture and poorly- to somewhat-poorly drained. The Loamy Till Toeslope site is thought to be more productive than the Clay Hills site (not confirmed).
F144BY504ME	**Enriched Loamy Cove** The Enriched Loamy Cove site occurs along drainageways, produces hardwood forests (typically with white ash, yellow birch, sugar maple, and/or beech), has a thick dark soil surface horizon, and has rich site indicators. By contrast, the Loamy Till Toeslope occurs at the base of slopes and produces semirich hardwood or mixedwood stands.
F144BY503ME	**Loamy Flat** The Loamy Flat site and Loamy Till Toeslopes site share many of the same soils, but Loamy Flats occur on flatter areas grading into wetlands and produce spruce-fir forests, whereas the Loamy Till Toeslope occurs at the base of slopes and produces semi-rich mixedwood forests.

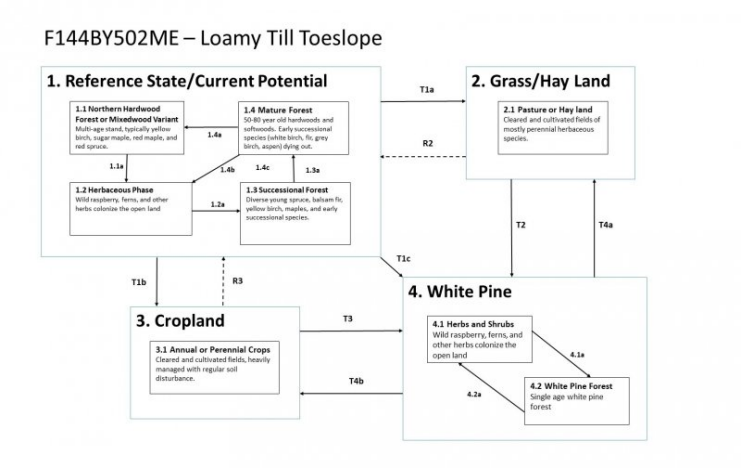

Figure 1.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site is found at the base of long slopes, typically on toeslopes of hills as they transition to till plains. Slopes are mostly 0-15%, sometimes up to 25%. A seasonally-high water table can be found between 6 and 20 inches below the soil surface from November to May. This site has sufficient water and nutrients in the soil to be highly productive. It occurs from sea level to 2660 feet in elevation.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Drumlin (3) Till plain
Flooding frequency	None
Ponding frequency	None
Elevation	0–811 m
Slope	0–15%
Water table depth	15–107 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate is humid and temperate. It is characterized by warm summers and cold winters. The average first frost around October 1st and the last freeze of the season occurs around April 23rd. Temperature extremes in the summer can reach as high as 100 degrees F and as low as -33 degrees F in the winter. The average relative humidity is 71 percent. The sun shines on average 57 percent of the time. Bad storm events can come in from the northeast, thus the term “nor’easter”. Winter blizzards can result in several feet of snow, while summer hurricane events can produce 2-3 inches of rain per hour. Annual rainfall occurs quite evenly over the entire year with August being the driest month during the growing season from April through September. Rainfall during this period generally falls during thunderstorms, and fairly large amounts of rain may fall in a short time. Eighty-eight percent of the snowfall occurs from December through March and average total snowfall is 64 inches per year. This makes for a “mud season” from March through April where runoff is high and ponding may occur because surface water runoff is very slow. The original data used in developing the table below was obtained from the USDA-NRCS National Water & Climate Center climate information database. All the climate station monthly averages for maximum and minimum temperature and precipitation were then added together and averaged to make this table. The precipitation and temperature data come from the years 1981 through 2010.

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

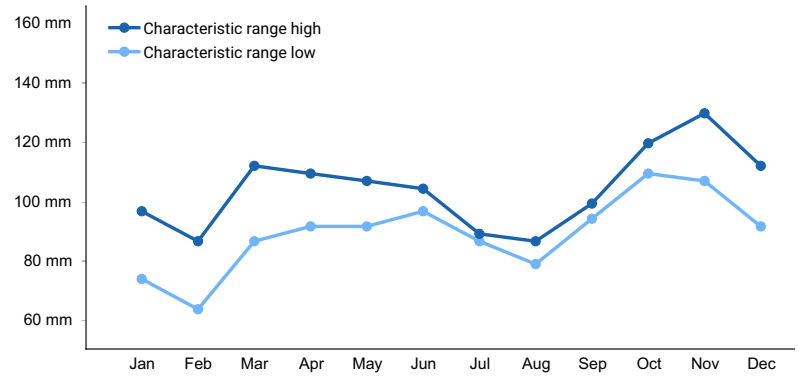

Figure 2. Monthly precipitation range

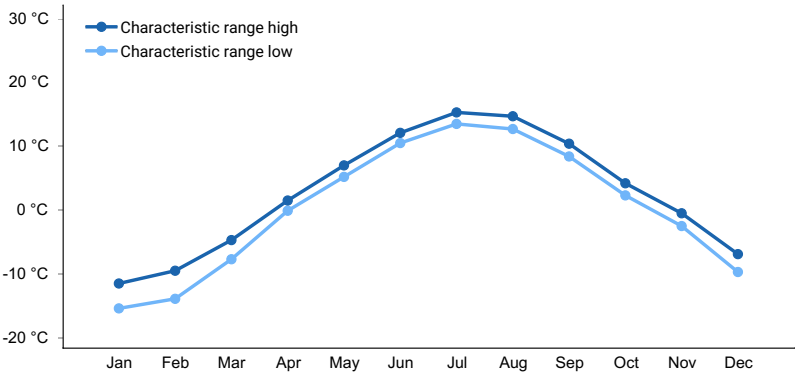

Figure 3. Monthly minimum temperature range

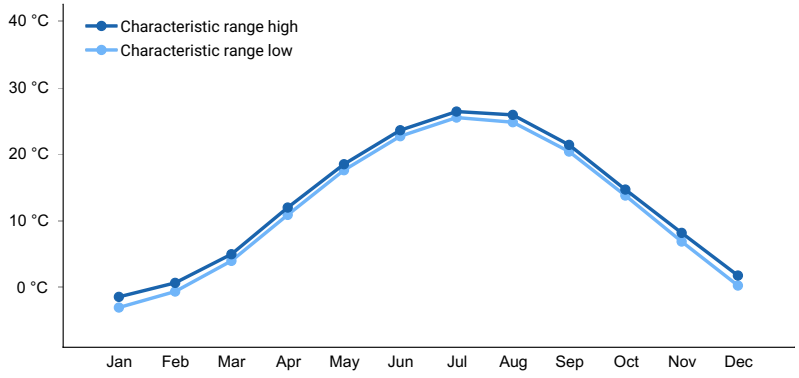

Figure 4. Monthly maximum temperature range

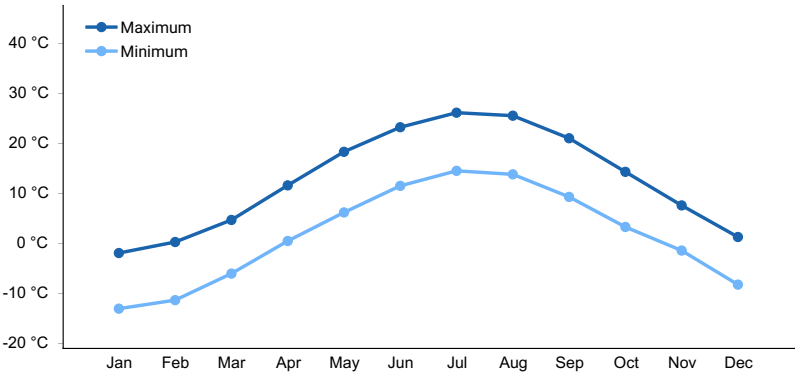

Figure 5. Monthly average minimum and maximum temperature

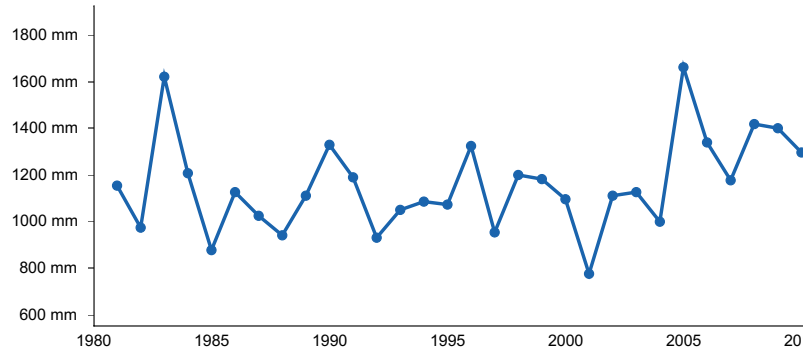

Figure 6. Annual precipitation pattern

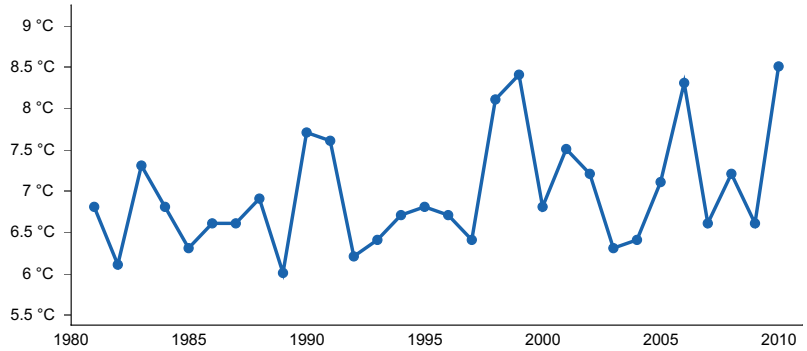

Figure 7. Annual average temperature pattern

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

This site is not typically influenced by streams or wetlands.

Soil features

The soils of this site are typically an association of poorly- and somewhat poorly-drained lodgment till. They are characterized by a densely-compacted layer within 10 to 27 inches (sometimes up to 50 inches) of the soil surface. Textures range from silt loam to fine sandy loam to silt loam on the surface, with muck at the surface in wet depressions.

The soil surface is typically pit-and-mound formed by tree roots excavating small depressions in the soil when trees tip over, depositing a mound of soil next to the pit. Often the pits are poorly-drained with gleyed grey colors near the soil surface, while the mounds are somewhat poorly-drained with redoximorphic features above the dense layer.

Soil pH is typically 4.5 to 6.0, and 3.2 to 6.5 at the extremes.

Table 4. Representative soil features

Parent material	(1) Till–metamorphic and sedimentary rock (2) Lodgment till
Surface texture	(1) Silt loam (2) Fine sandy loam
Drainage class	Very poorly drained to poorly drained
Soil depth	0–51 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0–2%
Available water capacity (Depth not specified)	10.92–22.61 cm
Calcium carbonate equivalent (Depth not specified)	0%
Electrical conductivity (Depth not specified)	0 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0
Soil reaction (1:1 water) (Depth not specified)	3.2–6.5
Subsurface fragment volume <=3" (Depth not specified)	4–9%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

This site is dominated by northern hardwoods and can be co-dominant with conifers, particularly red spruce. Yellow birch is a good site indicator, and red and sugar maples are often dominant.
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 but require soil amendments due to acidity and lack of soil nutrients. When cropland or pastureland management ceases, the site either returns to northern hardwoods 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.

Relationship to Other Classification Systems
This site includes the following state natural heritage program types:
• Semi-rich Mesic Sugar Maple Forest (Sperduto and Nichols 2004)
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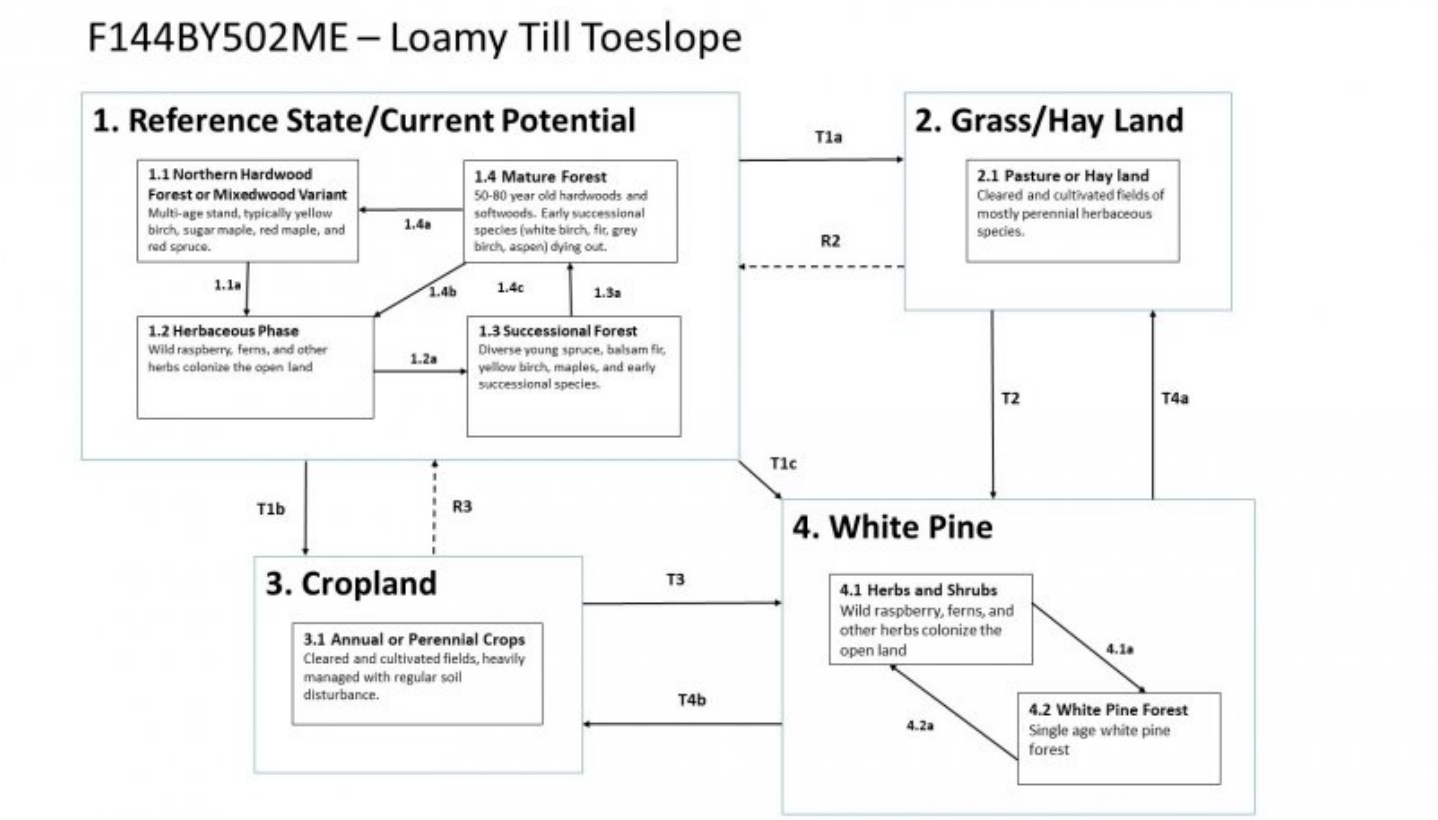
State and transition model



State 1
Reference State / Current Potential

Community 1.1
Northern Hardwood Forest

Multi-age stand dominated by white ash, yellow birch, sugar maple, and/or beech.

Community 1.2
Herbaceous Phase

Wild raspberry, ferns, and other herbs colonize the open land

Community 1.3
Successional Forest

Diverse young hardwoods, including species not dominant in the reference community

Community 1.4
Mature Forest 50-80 yr

50-80 year old hardwoods. Early successional species (white birch, fir, grey birch, aspen) dying out.

Pathway P1.1-1.2
Community 1.1 to 1.2

windthrow, blowdown, fire

Pathway P1.2-1.3
Community 1.2 to 1.3

vegetation development (succession)

Pathway P1.3-1.4
Community 1.3 to 1.4

vegetation development (succession)

Pathway P1.4-1.1
Community 1.4 to 1.1

windthrow, blowdown, fire

Pathway P1.4-1.2
Community 1.4 to 1.2

windtrhrow, blowdown, fire

State 2
Grassland / Hay land

Community 2.1
Pasture or Hay Land

Cleared and planted fields of mostly perennial herbaceous species.

State 3
Crop Land

Community 3.1
Annual or Perennial Crops

Cleared and cultivated fields, heavily managed with regular soil disturbance.

State 4
White Pine

Community 4.1
Herbs and Shrubs

Wild raspberry, ferns, and other herbs colonize the open land

Community 4.2
White Pine Forest

Single age white pine forest.

Pathway P4.1-4.2
Community 4.1 to 4.2

Vegetation development (succession)

Pathway P4.2-4.1

Community 4.2 to 4.1

harvest, logging

Conservation practices

Forest Stand Improvement
Forest Land Management

Transition T1-2
State 1 to 2

tree removal, pasture or hayfield establishment

Conservation practices

Clearing and Snagging
Land Clearing
Invasive Plant Species Control
Managed Haying/Grazing

Transition T1-3
State 1 to 3

Tree clearing, crop establishment

Conservation practices

Clearing and Snagging
Cover Crop
Land Clearing

Transition T1-4
State 1 to 4

selective harvest

Conservation practices

Forest Stand Improvement
Forest Land Management

Transition R2-1
State 2 to 1

abandonment, vegetation development (succession), planting

Conservation practices

Tree/Shrub Site Preparation
Tree/Shrub Establishment
Upland Wildlife Habitat Management
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management

Invasive Plant Species Control
Managed Haying/Grazing

Transition T2-4
State 2 to 4

tree establishment

Conservation practices

Tree/Shrub Site Preparation
Tree/Shrub Establishment
Invasive Plant Species Control

Restoration pathway R3-1
State 3 to 1

abandonment, vegetation development (succession), tree planting

Conservation practices

Tree/Shrub Establishment
Upland Wildlife Habitat Management
Tree/Shrub Pruning
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management
Invasive Plant Species Control

Transition T3-4
State 3 to 4

tree planting

Conservation practices

Tree/Shrub Site Preparation
Tree/Shrub Establishment
Invasive Plant Species Control

Restoration pathway R4-1
State 4 to 1

abandonment, vegetation development (succession), plantings

Conservation practices

Tree/Shrub Site Preparation
Tree/Shrub Establishment
Upland Wildlife Habitat Management
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management

Invasive Plant Species Control

Restoration pathway T4-2
State 4 to 2

Tree removal, pasture or hay land establishment

Conservation practices

Clearing and Snagging
Land Clearing

Transition T4-3
State 4 to 3

tree removal, cropland establishment

Conservation practices

Clearing and Snagging
Cover Crop
Land Clearing

Additional community tables

Inventory data references

Site Development and Testing Plan
Future work is needed, as described in a 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

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, ME.

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

Sperduto, D.D. and W.F. Nichols. 2004. Natural Communities of New Hampshire. New Hampshire Natural Heritage Bureau and The Nature Conservancy.

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. 456 pp.

USDA NRCS 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. USDA Handbook 296.

Contributors

Jamin Johanson
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Approval

Nels Barrett, 6/29/2020

Acknowledgments

Nels Barrett, Ph.D.

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	05/18/2024
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):**

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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):**

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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:**
