USDA Natural Resources Conservation Service

Ecological site F144AY037MA
Moist Dense Till Uplands

Last updated: 10/04/2024
Accessed: 05/13/2025

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): 144A–New England and Eastern New York Upland, Southern Part

MLRA 144A: New England and Eastern New York Upland, Southern Part
The eastern half of the eastern part of this MLRA is in the Seaboard Lowland Section of the New England Province of the Appalachian Highlands. The western half of the eastern part and the southeastern half of the western part are in the New England Upland Section of the same province and division. The northwestern half of the western part is in the Hudson Valley Section of the Valley and Ridge Province of the Appalachian Highlands. This MLRA is a very scenic area of rolling to hilly uplands that are broken by many gently sloping to level valleys that terminate in coastal lowlands. Elevation ranges from sea level to 1,000 feet (0 to 305 meters) in much of the area, but it is 2,000 feet (610 meters) on some hills. Relief is mostly about 6 to 65 feet (2 to 20 meters) in the valleys and about 80 to 330 feet (25 to 100 meters) in the uplands.
This area has been glaciated and consists almost entirely of till hills, drumlins, and bedrock-controlled uplands with a mantle of till. It is dissected by narrow glacio-fluvial valleys. The southernmost boundary of the area marks the farthest southward extent of Wisconsinian glaciation on the eastern seaboard. The river valleys and coastal plains are filled with glacial lake sediments, marine sediments, and glacial outwash. The bedrock in the eastern half of the area consists primarily of igneous and metamorphic rocks of early Paleozoic age. Granite is the most common igneous rock, and gneiss, schist, and slate are the most common metamorphic rocks. In the parts of the MLRA in eastern and southeastern New York, Devonian- to Pennsylvanian-age sandstone, shale, and limestone are dominant. Carbonate rocks, primarily dolomite and limestone, are the dominant kinds of bedrock in the part of this MLRA in northwestern Connecticut.

Classification relationships

USDA-NRCS (USDA 2006):
Land Resource Region (LRR): N—East and Central Farming and Forest Region
Major Land Resource Area (MLRA): 144A— New England and Eastern New York Upland, Southern Part.

USDA-FS (Cleland et al. 2007)
Province: 221 - Eastern Broadleaf Province
Section: 221A - Lower New England
Subsection: 221Aa – Boston Basin
221Ac – Narragansett-Bristol Lowland and Islands
221Ad – Southern New England Coastal Lowland
221Ae – Hudson Highlands
221Ag - Southeast New England Coastal Hills and Plains
221Ah - Worcester-Monadnock Plateau
221Ai – Gulf of Maine Coastal Plain
221Ak - Gulf of Maine Coastal Lowland
Section: 221B – Hudson Valley
Subsection: 221Ba – Hudson Limestone Valley

221Bb - Miami – Taconic Foothills
221Bc – Hudson Glacial Lake Plains

Ecological site concept

The Moist Dense Till Uplands ecological site consists of moderately well drained soils formed in coarse-loamy lodgment till. They are very deep to bedrock and moderately deep to a densic contact. They are nearly level to strongly sloping soils on till plains, hills, and drumlins. Representative soils are Birchwood, Bomoseen, Boonton, Erie, Haledon, Pittstown, Punsit, Rainbow, Scituate, and Woodbridge.The reference plant community is an upland/wetland transition forest typically dominated by oaks (Quercus spp.), birches (Betula spp.) and maples (Acer spp.).

The site is very similar to the Moist Dense Till Uplands within MLRA 145, however the growing season is longer within MLRA 145 relative to the surrounding MLRA 144A. Additionally, the unique red soil mineralogy which characteristic of the Connecticut River Valley (MLRA 145) provides a relatively richer substrate for vegetative growth.

Associated sites

F144AY017NH	**Well Drained Lake Plain**

Similar sites

R144AY045RI	**Subaqueous Freshwater Mineral Deposits**

Table 1. Dominant plant species

Tree	(1) *Quercus rubra* (2) *Betula alleghaniensis*
Shrub	(1) *Lindera benzoin*
Herbaceous	(1) *Osmundastrum cinnamomeum*

Physiographic features

This site occurs on a wide range of landforms and is not subject to flooding.

Table 2. Representative physiographic features

Landforms	(1) Hills > Hill (2) Hills > Drumlin (3) Upland > Depression (4) Hillslope (5) Ground moraine (6) Moraine (7) Ridge (8) Drumlinoid ridge (9) Swale (10) Terminal moraine
Runoff class	Very low to very high
Flooding frequency	None
Ponding frequency	None
Elevation	0–575 m
Slope	0–25%
Water table depth	20–183 cm
Aspect	Aspect is not a significant factor

Climatic features

The Koppen-Geiger climate classification of the area in which this MLRA occurs varies between Dfb (Warm-summer humid continental) in the North, and Dfa (Hot-summer humid continental) in the southern portion of the MLRA. Precipitation is usually uniformly distributed throughout the year. Near the coast, however, it is slightly lower in summer. Precipitation is slightly higher in spring and fall in inland areas. Rainfall occurs as high-intensity, convective thunderstorms during the summer. During the winter, most of the precipitation occurs as moderate-intensity storms (northeasters) that produce large amounts of rain or snow. The freeze-free period increases in length to the south.

Table 3. Representative climatic features

Frost-free period (characteristic range)	132-152 days
Freeze-free period (characteristic range)	160-188 days
Precipitation total (characteristic range)	1,194-1,295 mm
Frost-free period (actual range)	127-159 days
Freeze-free period (actual range)	146-198 days
Precipitation total (actual range)	1,092-1,321 mm
Frost-free period (average)	142 days
Freeze-free period (average)	174 days
Precipitation total (average)	1,245 mm

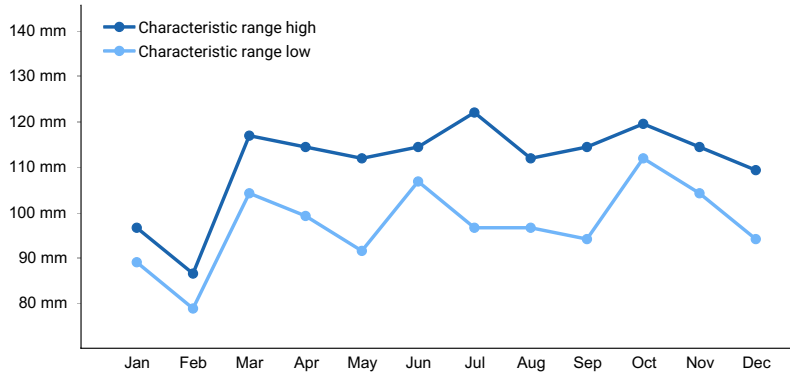


Figure 1. Monthly precipitation range

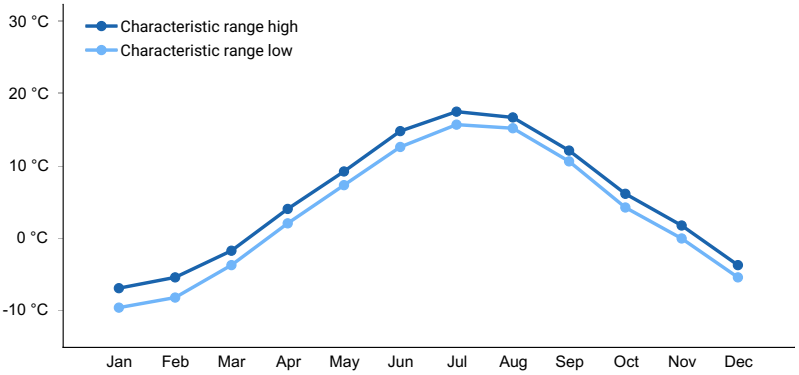


Figure 2. Monthly minimum temperature range

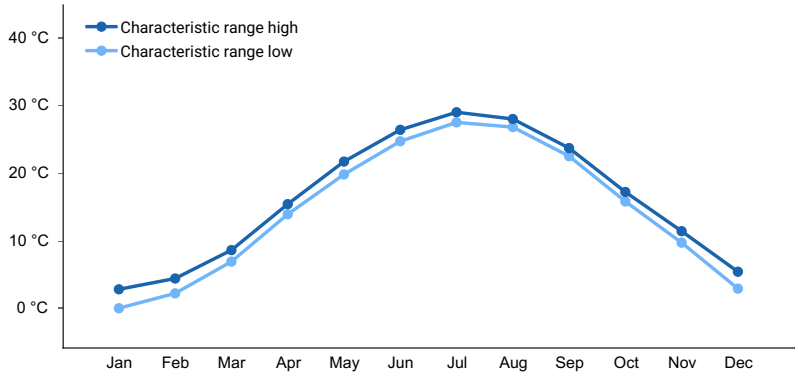


Figure 3. Monthly maximum temperature range

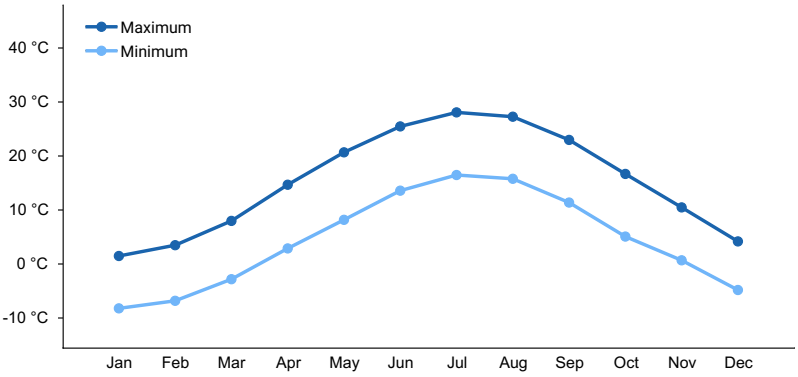


Figure 4. Monthly average minimum and maximum temperature

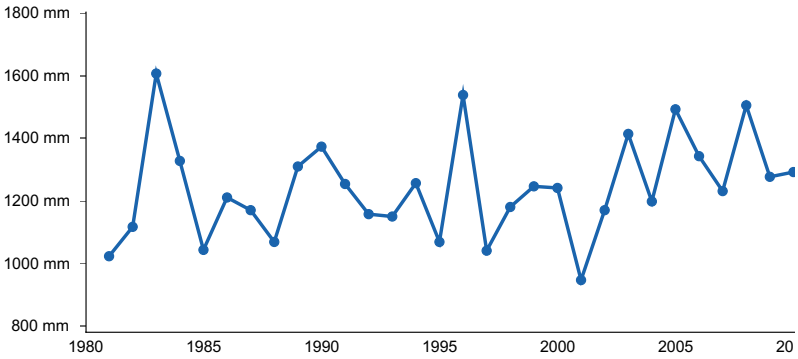


Figure 5. Annual precipitation pattern

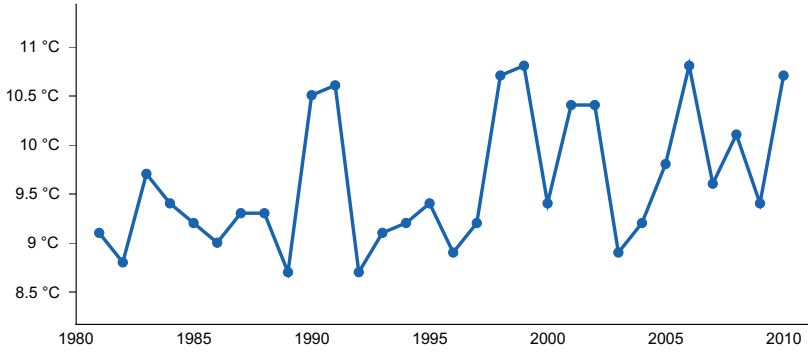


Figure 6. Annual average temperature pattern

Climate stations used

- (1) CRANFORD [USC00282023], Westfield, NJ
- (2) YORKTOWN HEIGHTS 1W [USC00309670], Yorktown Heights, NY
- (3) STORRS [USC00068138], Storrs Mansfield, CT

- (4) WORCESTER RGNL AP [USW00094746], Leicester, MA
- (5) DANBURY [USC00061762], Bethel, CT
- (6) BROCKTON [USC00190860], Brockton, MA
- (7) ROCHESTER [USC00196938], Lakeville, MA
- (8) TULLY LAKE [USC00198573], Athol, MA
- (9) NASHUA [USC00275702], Hudson, NH
- (10) TROY L&D [USC00308600], Troy, NY

Influencing water features

NONE

Wetland description

NONE

Soil features

The site consists of shallow to deep, somewhat poorly to well drained soils formed in glacially deposited parent materials. Representative soils are Birchwood, Bomoseen, Boonton, Erie, Haledon, Pittstown, Punsit, Rainbow, Scituate, and Woodbridge.

Table 4. Representative soil features

Parent material	(1) Till–granite and gneiss (2) Eolian deposits–phyllite (3) Glaciofluvial deposits–schist (4) Basalt (5) Sandstone and shale (6) Metamorphic and sedimentary rock (7) Siltstone (8) Slate
Surface texture	(1) Fine sandy loam (2) Sandy loam (3) Sand (4) Loam (5) Gravelly loam (6) Silt loam (7) Very stony silt loam (8) Gravelly sandy loam (9) Stony fine sandy loam
Family particle size	(1) Coarse-loamy (2) Fine-loamy (3) Sandy over loamy
Drainage class	Somewhat poorly drained to well drained
Permeability class	Very slow to moderately slow
Depth to restrictive layer	43–102 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0–10%
Available water capacity (Depth not specified)	5.08–15.24 cm
Soil reaction (1:1 water) (0-101.6cm)	3.5–8.4
Subsurface fragment volume <=3" (Depth not specified)	5–25%

Subsurface fragment volume >3" (Depth not specified)	0–13%

Ecological dynamics

[Caveat: The vegetation information contained in this section and is only provisional, based on concepts, not yet validated with field work.*]

The vegetation groupings described in this section are based on the terrestrial ecological system classification and vegetation associations developed by NatureServe (Comer 2003). Terrestrial ecological SYSTEMS are specifically defined as a group of plant community-types called ASSOCIATIONS that tend to [co-]occur within landscapes with similar ecological processes, substrates, and/or environmental gradients. Any given system will typically manifest itself in a landscape at intermediate geographic scales of tens-to-thousands of hectares and will persist for 50 or more years. A vegetation association is a plant community that is much more specific to a given soil, geology, landform, climate, hydrology, and disturbance history. It is the basic unit for vegetation classification and recognized by the US National Vegetation Classification (US FDGC 2008). Each association will be named by the diagnostic and often dominant species that occupy the different height strata (tree, sapling, shrub, and herb). Within the NatureServe Explorer database (NatureServe, 2015), ecological systems are numbered by a Community Ecological System Code (CES) and individual vegetation associations are assigned an identification number called a Community Element Global Code (CEGL).

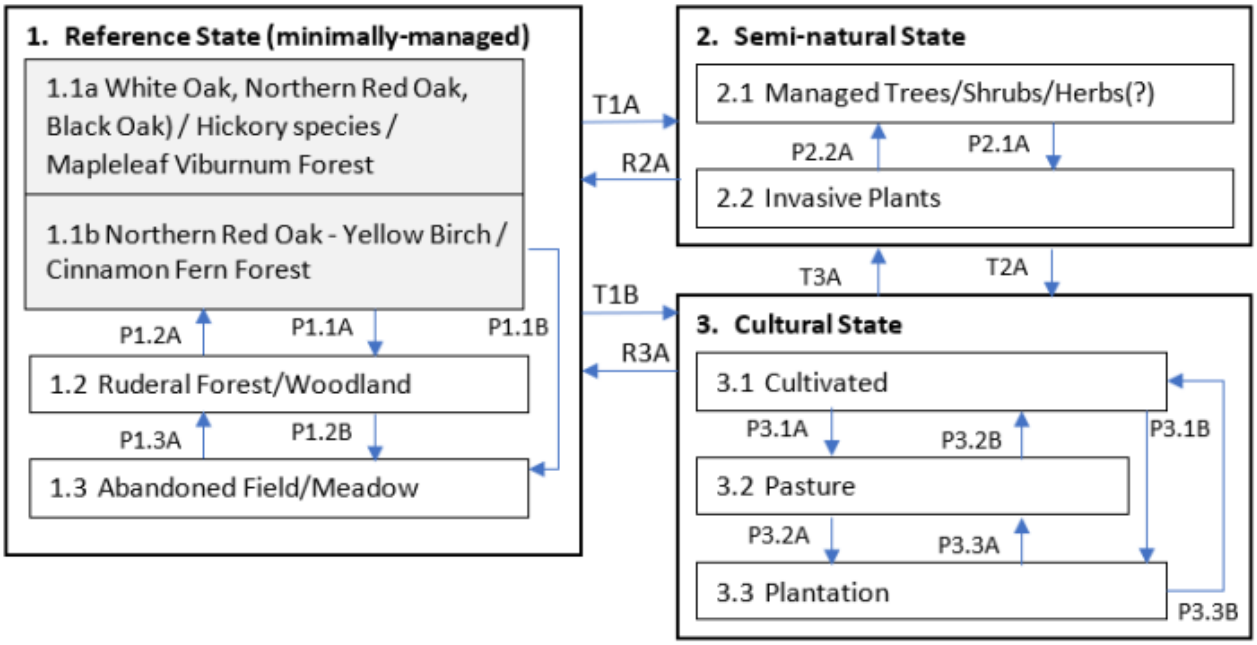
Additional and more localized vegetation information is provided by the State Natural Heritage Programs of Connecticut (Metzler and Barrett 2001), Massachusetts (Swain and Kearsley 2001), New Hampshire (Sperduto and Nichols, 2011), New York (Edinger et al., 2014), and Rhode Island (Enser and Lungren, 2006).

The Moist Dense Till Uplands ecological site is characteristic of Appalachian (Hemlock)-Northern Hardwood Forest system (CES202.593) and the North-Central Interior and Appalachian Rich Swamp system (CES202.605). The vegetation of these moist upland/wetland transitions is not well described. The reference community is varied but typified by mixed maple-oak-hemlock forest often with a rich fern understory.
This forest occurs in uneven-aged stands with canopy gaps formed by storm extremes ranging from windthrows to downbursts to ice-storms. Excessive deer browse may be an issue. Other agents-of-change include land conversions and fragmentation by agricultural, development, drainage, and logging. Invasive species are many including winged euonymus (euonymus alatus), barberry (*Berberis thunbergii*), shrubby honeysuckles (Lonicera spp.), multiflora rose (*Rosa multiflora*) and Japanese knotweed (Fallopia japonica).

[*Caveat] The information presented is representative of very complex vegetation communities. Key indicator plants and ecological processes are described to help inform land management decisions. Plant communities will differ across the MLRA because of the naturally occurring variability in weather, soils, and geography. The reference plant community is not necessarily the management goal. The drafts of species lists are merely representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

State and transition model

144AY037 – Moist Dense Till Uplands



Transition	*Drivers/practices*
T1A	Forest mgmt., Disturbance
T1B, T2A	Disturbance/cutting/clearing, Brush removal
R2A, R2B	Restoration & Mgmt, Forest Stand Improvement, Early Successional Habitat Development, Upland Wildlife Mgmt, Invasive spp. Control, Plant establishment
T3A	Abandonment, Plant establishment, Forest mgmt.
P2.1A	Disturbance, Invasive species establishment
P2.2A	Invasive spp. Control, Forest mgmt..
P1.3A, P1.2A	Abandonment, succession
P3.1A, P3.2A, P3.3A, P3.1B, P3.2B, P3.3B	Changing agricultural phases
P1.1A, P1.1B, P1.2B	Disturbance, Early Successional Habitat Development

State 1
Reference State (minimally-managed)

The reference plant communities are varied but typically include on a upland/wetland transition: • Quercus (alba, rubra, velutina) - Carya spp. / *Viburnum acerifolium* Forest Translated Name: (White Oak, Northern Red Oak, Black Oak) / Hickory species / Mapleleaf Viburnum Forest Common Name: Dry-mesic Oak - Hickory / Viburnum Forest (CEGL006336) • *Quercus rubra* - *Betula alleghaniensis* / *Osmunda cinnamomea* Forest Translated Name: Northern Red Oak - Yellow Birch / Cinnamon Fern Forest Common Name: Upland/Wetland Transitional Forest (CEGL006000) Other plant communities includes: • *Quercus rubra* - *Acer saccharum* / *Viburnum acerifolium* - *Lindera benzoin* Forest Translated Name: Northern Red Oak - Sugar Maple / Mapleleaf Viburnum - Northern Spicebush Forest Common Name: Red Oak - Transitional Northern Hardwood Forest (CEGL006635) • *Betula alleghaniensis* - *Acer rubrum* - (*Tsuga canadensis*, *Abies balsamea*) / *Osmunda cinnamomea* Swamp Forest Translated Name: Yellow Birch - Red Maple - (Eastern Hemlock, Balsam Fir) / Cinnamon Fern Swamp Forest Common Name: Hardwood - Conifer Seepage Forest (CEGL006380)

Community 1.1
1.1a. Oaks (White, Northern Red, Black) - [Hickories] / Mapleleaf Viburnum Forest (CEGL006336) in transition to 1.1b. Northern Red Oak - Yellow Birch / Cinnamon Fern Forest (CEGL006000)

1.1a. Quercus (alba, rubra, velutina) - Carya spp. / *Viburnum acerifolium* Forest Translated Name: White Oak, Northern Red Oak, Black Oak / Hickory species / Mapleleaf Viburnum Forest Common Name: Dry-mesic Oak - Hickory / Viburnum Forest (CEGL006336) This vegetation is ecologically transitional between dry-rich oak-hickory forests of relatively high diversity and dry, acidic oak-species-poor forests. Red oak (*Quercus rubra*), white oak (*Quercus alba*), and black oak (*Quercus velutina*) prominent in association with pignut hickory (*Carya glabra*), shagbark hickory (*Carya ovata*), mockernut hickory (*Carya tomentosa*), red maple (*Acer rubrum*), chestnut oak (*Quercus montana*), sassafras (*Sassafras albidum*), and downy shadbush (*Amelanchier arborea*). White pine (*Pinus strobus*), eastern hemlock (*Tsuga canadensis*), and sweet birch (*Betula lenta*) may also occur as minor associates. Flowering dogwood (*Cornus florida*) occurs in more southerly locales. The shrub layer can be sparse and characterized by mapleleaf viburnum (*Viburnum acerifolium*) with other frequent associates including witrchhazel (*Hamamelis virginiana*), highbush blueberry (*Vaccinium corymbosum*), mountain laurel (*Kalmia latifolia*), beaked hazelnut (*Corylus cornuta*), and American hazelnut(*Corylus americana*). Short shrubs include- Hillside blueberry (*Vaccinium pallidum*) and black huckleberry (*Gaylussacia baccata*), with common lowbush blueberry (*Vaccinium angustifolium*). The herbaceous layer is characterized by Pennsylvania sedge (*Carex pensylvanica*), false Solomon's seal (*Maianthemum racemosum* [= Smilacina racemose]), marginal wood fern (*Dryopteris marginalis*), wild sarsaparilla (*Aralia nudicaulis*), rattlesnake hawkweed (*Hieracium venosum*), white goldenrod (*Solidago bicolor*), pointed leaved tick-trefoil (Hylodesmun glutinosum [=*Desmodium glutinosum*[), panicled tick-trefoil (*Desmodium paniculatum*), cow wheat (*Melampyrum lineare*), striped wintergreen (Chimaphila maculate), white sood aster (*Eurybia divaricata* [= Aster divaricatus]), hayscented fern (*Dennstaedtia punctilobula*). Under less mesic conditions, herbs include poverty oatgrass (*Danthonia spicata*), wavy hairgrass (*Deschampsia flexuosa*), fern-leaved false foxglove (Aureolaria spp.), sweetfern (*Pteridium aquilinum*), and Canada frostweed (Crocanthemum canadense [= *Helianthemum canadense*). invasive plants can include tree-of-heaven (*Ailanthus altissima*), European buckthorn (*Rhamnus cathartica*), winged euonymus (*Euonymus alatus*) multiflora rose (*Rosa multiflora*), Japanese barberry (*Berberis thunbergii*) and shrub honeysuckles (Lonicera sp.). (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]). Cross-referenced plant community concepts (typically by political State): CT: Red oak / mapleleaf viburnum Forest (Metzler and Barrett, 2006) MA: Oak-Hickory Forest (Swain and Kearsley, 2001) NH: Mesic Appalachian oak - hickory forest (Sperduto and Nichols, 2011) NY: Appalachian oak-hickory forest (Edinger et al., 2014) RI: undisclosed (Enser and Lundgren, 2006) 1.1b. - *Quercus rubra* - *Betula alleghaniensis* / *Osmunda cinnamomea* Forest Translated Name: Northern Red Oak - Yellow Birch / Cinnamon Fern Forest Common Name: Upland/Wetland Transitional Forest (CEGL006000) Dominant canopy species include red maple (*Acer rubrum*), yellow birch (*Betula alleghaniensis*), northern red oak (*Quercus rubra*), and black oak (*Quercus velutina*). Occasionally white oak (*Quercus alba*), pin oak (*Quercus palustris*), American beech (*Fagus grandifolia*), and eastern hemlock (*Tsuga canadensis*) may occur. Tuliptree (*Liriodendron tulipifera*) is a common associate in the southern portion of the range. Shrubs include witchhazel (*Hamamelis virginiana*), highbush blueberry (*Vaccinium corymbosum*), sweet pepperbush (*Clethra alnifolia*), mountain laurel (*Kalmia latifolia*), and northern spicebush (*Lindera benzoin*). The herbaceous layer cover is nearly continuous and dominated by cinnamon fern (*Osmunda cinnamomea*), New York fern (Parathelypteris noveboracensis [= *Thelypteris noveboracensis*), Jack-in-the-pulpit (*Arisaema triphyllum*), and sessile-leaved bellwort (*Uvularia sessilifolia*). Jewelweed (*Impatiens capensis*), false hellbore (*Veratrum viride*, and skunk cabbage (*Symplocarpus foetidus*) may also occur where this vegetation grades into a wetland forest. (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]). Cross-referenced plant community concepts (typically by political State): CT: Northern red oak – yellow birch / cinnamon fern Forest (Metzler and Barrett, 2006) MA: Red Maple Swamp (Swain and Kearsley, 2001) NH: Red maple - red oak - cinnamon fern forest (Sperduto and Nichols, 2011) NY: Red maple-hardwood swamp (Edinger et al., 2014)

Community 1.2
Ruderal Forest/Woodland

Community 1.3
Abandoned Field/Meadow

Disturbance

Pathway P1.1A
Community 1.1 to 1.2

Disturbance

Pathway P1.1B
Community 1.1 to 1.3

Disturbance

Pathway P1.2A
Community 1.2 to 1.1

Succession

Pathway P1.2B
Community 1.2 to 1.3

Disturbance

Pathway P1.3A
Community 1.3 to 1.2

Abandonment, Succession

State 2
Semi-natural State

The Semi-natural State would expect plant communities where ecological processes are primarily operating with some land conditioning in the past or present, e.g., managed forests, or plant communities that are an artifact of land management e.g., predominately invasive plants.

Community 2.1
Managed Trees/Shrubs/Herbs(?)

Community 2.2
Invasive Plants

Pathway P2.1A
Community 2.1 to 2.2

Disturbance, Invasive species establishment

Pathway P2.2A
Community 2.2 to 2.1

Invasive spp. Control, Forest mgmt.

State 3
Cultural State

The Cultural State would expect the ecological site to be very strongly conditioned by land management conversion, by transformation to Cultivated/Pasture/Plantation.

Community 3.1

Cultivated

Community 3.2
Pasture

Community 3.3
Plantation

Pathway P3.1A
Community 3.1 to 3.2

Changing agricultural phases

Pathway P3.1B
Community 3.1 to 3.3

Changing agricultural phases

Pathway P3.2A
Community 3.2 to 3.1

Changing agricultural phases

Pathway P3.2B
Community 3.2 to 3.3

Changing agricultural phases

Pathway P3.3A
Community 3.3 to 3.1

Changing agricultural phases

Pathway P3.3B
Community 3.3 to 3.2

Changing agricultural phases

Transition T1A
State 1 to 2

altered by human- induced Disturbance or Management

Conservation practices

Tree/Shrub Establishment
Forest Land Management
Forest stand improvement for habitat and soil quality

Transition T1B
State 1 to 3

Disturbance, clearing, cutting

Restoration pathway R2A

State 2 to 1

Plant removals, plantings, Invasive plant control, successional mgmt., forestry practices Restoration & Mgmt, Forest Stand Improvement, Early Successional Habitat Development, Upland Wildlife Mgmt, Invasive spp. Control, Plant establishment

Conservation practices

Brush Management
Tree/Shrub Establishment
Early Successional Habitat Development/Management
Forest Stand Improvement
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management
Forest Land Management
Invasive Plant Species Control

Transition T2A
State 2 to 3

Land clearing, cutting

Conservation practices

Brush Management
Land Clearing
Herbaceous Weed Control

Restoration pathway R3A
State 3 to 1

Plant removals, plantings, Invasive plant control, successional mgmt., forestry practices Restoration & Mgmt, Forest Stand Improvement, Early Successional Habitat Development, Upland Wildlife Mgmt, Invasive spp. Control, Plant establishment

Conservation practices

Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management

Transition T3A
State 3 to 2

Abandonment. Plant establishment, Forest mgmt.

Conservation practices

Tree/Shrub Establishment
Forest Stand Improvement
Forest Land Management

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

Greg Schmidt, 10/04/2024

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Michael Margo and tech team assisted w/drafts. Josh Hibit made compliance updates w/ 2021 Checklist V.2

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.

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Approved by	Greg Schmidt
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:**

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:

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17. **Perennial plant reproductive capability:**
