USDA Natural Resources Conservation Service

Ecological site F144AY021MA
Semi-Rich Dry Outwash

Last updated: 10/04/2024
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): 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

This site consists of very deep, excessively drained sandy and gravelly soils formed in stratified glacial drift and water sorted deposits. They are nearly level to very steep soils on terraces, outwash plains, kames, eskers and moraines. Semi-rich refers to the higher to circumneutral pH values. Representative soils are Groton.

Given the semi-rich nature of these sites, the representative plant communities are similar to Semi-Rich Till ecological sites typified by a Sugar Maple-Oak forest type but can range to more of an Oak-Hickory forest type.

Similar sites

F144AY022MA	**Dry Outwash**

Table 1. Dominant plant species

Tree	(1) *Acer saccharum* (2) *Quercus rubra*
Shrub	Not specified
Herbaceous	(1) *Hepatica nobilis*

Physiographic features

The site occurs on nearly level to very steep soils on terraces, outwash plains, kames, eskers and moraines. Slope range from 0 to 60 percent.

Table 2. Representative physiographic features

Landforms	(1) Outwash plain > Outwash terrace (2) Valley > Kame (3) Esker
Runoff class	Very low to low
Flooding frequency	None
Ponding frequency	None
Elevation	1–366 m
Slope	0–45%
Water table depth	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)	111-119 days

Freeze-free period (characteristic range)	134-146 days
Precipitation total (characteristic range)	1,118-1,219 mm
Frost-free period (actual range)	110-129 days
Freeze-free period (actual range)	132-148 days
Precipitation total (actual range)	1,041-1,219 mm
Frost-free period (average)	116 days
Freeze-free period (average)	140 days
Precipitation total (average)	1,168 mm

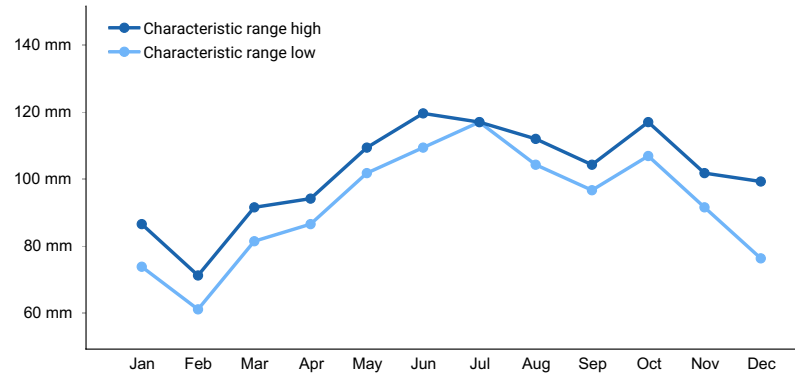


Figure 1. Monthly precipitation range

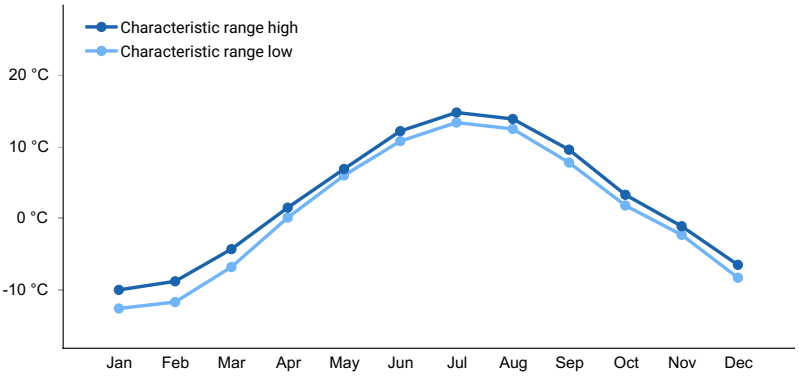


Figure 2. Monthly minimum temperature range

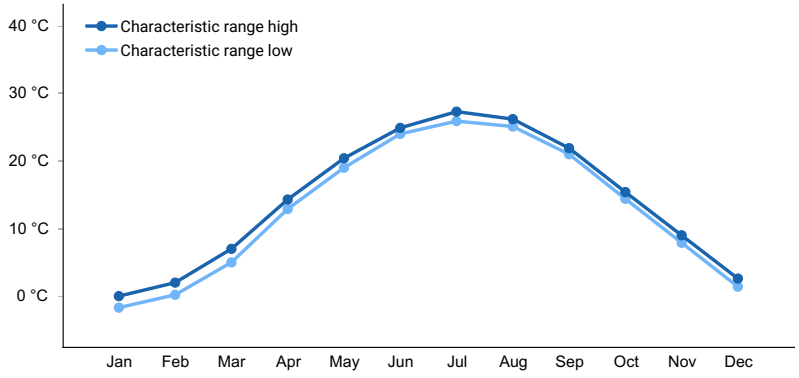


Figure 3. Monthly maximum temperature range

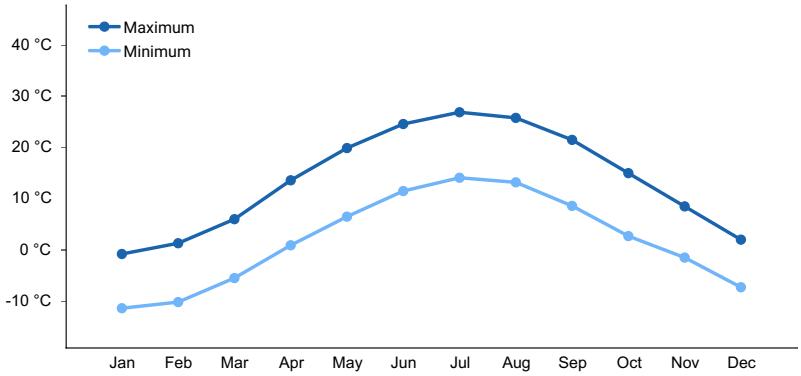


Figure 4. Monthly average minimum and maximum temperature

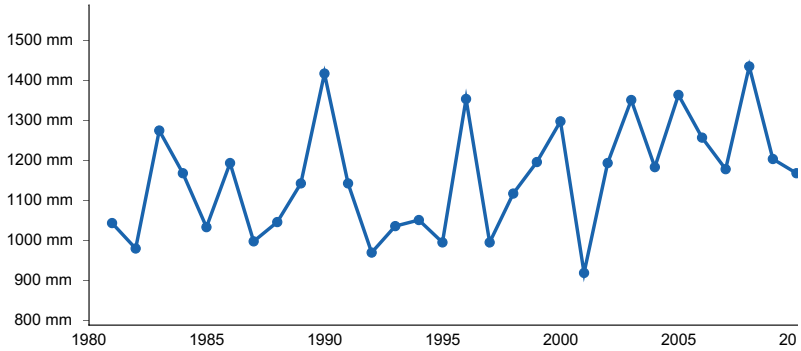


Figure 5. Annual precipitation pattern

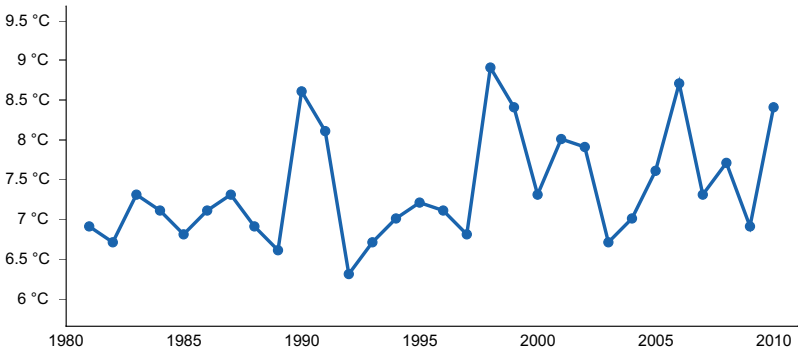


Figure 6. Annual average temperature pattern

Climate stations used

- (1) SUNDERLAND 2 [USC00438160], Arlington, VT
- (2) FALLS VILLAGE [USC00062658], Falls Village, CT
- (3) POWNAL 1 NE [USC00436500], Pownal, VT
- (4) GREAT BARRINGTON 2N [USC00193213], Great Barrington, MA
- (5) RUTLAND [USC00436995], Rutland, VT

Influencing water features

NONE

Wetland description

NONE

Soil features

The site consists of very deep, excessively drained sandy and gravelly soils formed in stratified glaciofluvial

deposits. Representative soil is Groton.

Table 4. Representative soil features

Parent material	(1) Glaciofluvial deposits–limestone (2) Eolian deposits–dolomite
Surface texture	(1) Gravelly sandy loam
Family particle size	(1) Sandy-skeletal
Drainage class	Excessively drained
Permeability class	Moderate
Depth to restrictive layer	183 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	5.08–7.62 cm
Soil reaction (1:1 water) (0-101.6cm)	5.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	22–60%
Subsurface fragment volume >3" (Depth not specified)	3–6%

Ecological dynamics

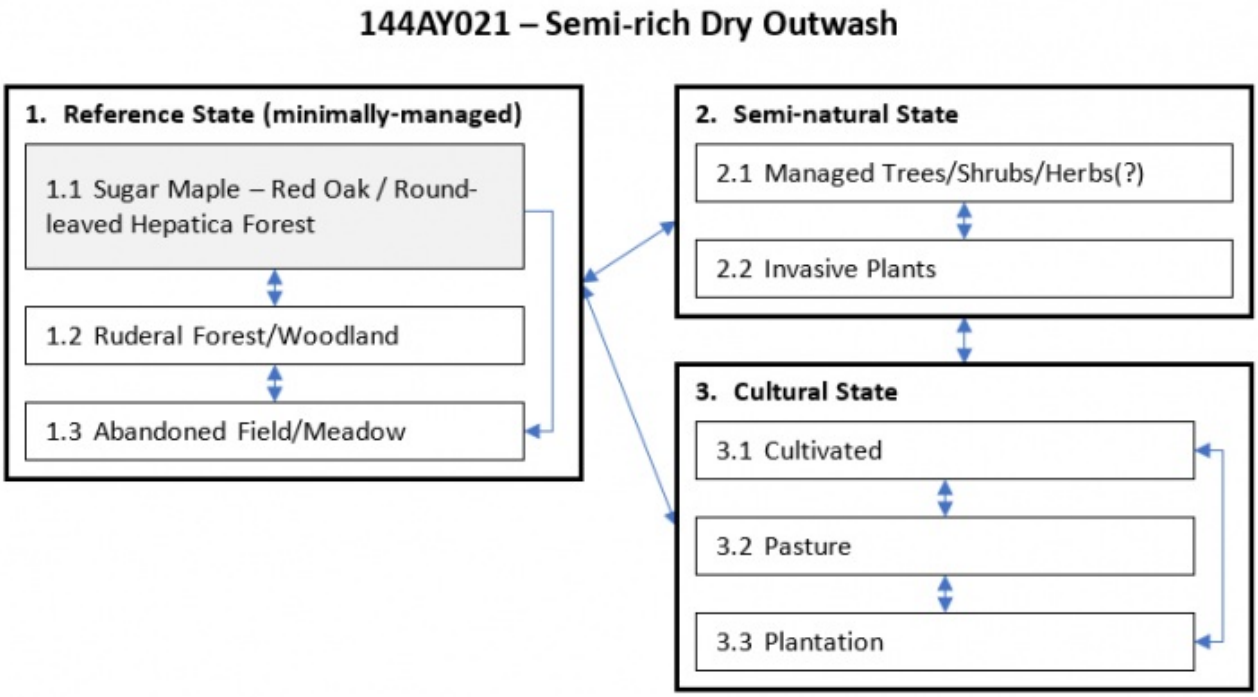
[Caveat: The vegetation information contained in this section and is only provisional, based on concepts, not yet validated with field work.*] The vegetation groupings described in this section are based on the terrestrial ecological system classification and vegetation associations developed by NatureServe (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. They are intended to provide a classification unit that is readily mappable, often from terrain and remote imagery, and readily identifiable by conservation and resource managers in the field. A 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, 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) and Massachusetts (Swain and Kearsley 2001), New Hampshire (Sperduto and Nichols, 2011), and New York (Edinger et al., 2014).

The Semi Rich Dry Outwash ecological site is characteristic of Appalachian (Hemlock)-Northern Hardwood Forest system (CES202.593) and the Central Appalachian Dry Oak-Pine Forest system (CES202.591). The vegetation of this ecosite is not well described. The reference community is typified by a Sugar Maple-Oak forest type but can range to more Oak-Hickory forest type. Given its semi-rich nature it has much in common with the semi-rich and mesic till sites. Invasive species include European buckthorn (*Rhamnus cathartica*), Canada bluegrass (*Poa compressa*), Japanese barberry (*Berberis thunbergii*), Morrow's shrubby honeysuckle (*Lonicera morrowii*), tree-of-heaven (*Ailanthus altissima*), and multiflora rose (*Rosa multiflora*). This forest occurs in uneven-aged stands with canopy gaps formed by storm extremes ranging from windthrows to downbursts to ice-storms. Fires are typically suppressed, and otherwise less common in these mesic lake plain environments compared to drier upland environments. Logging is a widespread management activity.

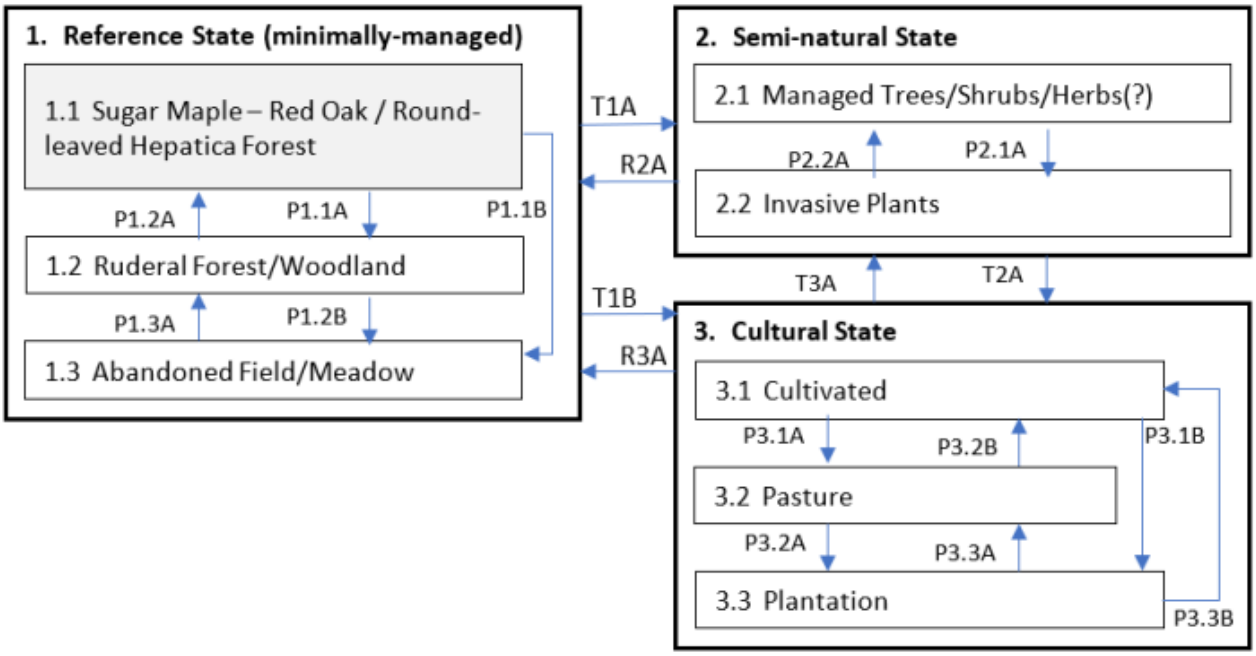
[*Caveat] The information presented is representative of very complex vegetation communities. Key indicator plants and ecological processes are described to help inform land management decisions. Plant communities will differ across the MLRA because of the naturally occurring variability in weather, 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



Transition	*Drivers/practices*
T1-2	Forest mgmt., Disturbance
T1-3, T2-3	Disturbance/cutting/clearing, Brush removal
R2-1, R3-1	Restoration & Mgmt, Forest Stand Improvement, Early Successional Habitat Development, Upland Wildlife Mgmt, Invasive spp. Control, Plant establishment
T3-2	Abandonment, Plant establishment, Forest mgmt.
CP2.1-2.2	Disturbance, Invasive species establishment
CP2.2-2.1	Invasive spp. Control, Forest mgmt..
CP1.3-1.2, CP1.2-1.1	Abandonment, succession
CP3.1-3.2/3.3, CP 3.2-3.1/3.3 3.3-3.1/3.2	Changing agricultural phases
CP1.1-1.2/1.3, CP1.2-1.3,	Disturbance, Early Successional Habitat Development

144AY021 – Semi-rich Dry Outwash



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 community type is characterized by: • Sugar Maple - Ash - Oak - Hickory Mesic Forest (CEGL006046) *Acer saccharum - Quercus rubra / Hepatica nobilis* var. obtusa Forest (Translated) Sugar Maple - Northern Red Oak / Round-lobe Liverleaf Forest Other vegetation types may include: • Red Oak - Transitional Northern Hardwood Forest (CEGL006635) *Quercus rubra - Acer saccharum / Viburnum acerifolium - Lindera benzoin* Forest (Translated) Northern Red Oak - Sugar Maple / Mapleleaf Viburnum - Northern Spicebush Forest • Sugar Maple - Chinquapin Oak / Sedge Forest (CEGL006162) *Acer saccharum - Quercus muehlenbergii / Carex platyphylla* Forest (Translated) Sugar Maple - Chinquapin Oak / Broadleaf Sedge Forest

Community 1.1
Sugar Maple - Northern Red Oak / Round-lobe Liverleaf Forest(CEGL006046)

Sugar Maple - Ash - Oak - Hickory Mesic Forest (CEGL006046) *Acer saccharum - Quercus rubra / Hepatica nobilis* var. obtusa Forest (Translated) Sugar Maple - Northern Red Oak / Round-lobe Liverleaf Forest Sugar maple (*Acer saccharum*) and white ash (*Fraxinus americana*) are common in the tree canopy, with red oak (*Quercus rubra*), black oak (*Quercus velutina*), shagbark hickory (*Carya ovata*), pignut hickory (*Carya glabra*) and white oak

(*Quercus alba*). American Basswood (*Tilia americana*) and sweet birch (*Betula lenta*) and eastern hemlock (*Tsuga canadensis*) can be occasional associates. Hop hornbeam (*Ostrya virginiana*) and American hornbeam (*Carpinus caroliniana* ssp. virginiana) can form a prominent subcanopy. The shrub layer includeswitch hazel (*Hamamelis virginiana*), mapleleaf viburnum (*Viburnum acerifolium*), northern arrowwood (*Viburnum dentatum* var. lucidum), flowering dogwood (*Cornus florida*), beaked hazelnut (*Corylus cornuta*), and northern spicebush (*Lindera benzoin*). The herb layer is often quite diverse with broadleaf sedge (*Carex platyphylla*), longstalk sedge (*Carex pedunculata*), eastern woodland sedge (*Carex blanda*), broad loose-flowered sedge (*Carex laxiflora*), red baneberry (*Actaea rubra*),hairy Solomon's seal (*Polygonatum pubescens*),broad beechfern (*Phegopteris hexagonoptera* [= Thelypteris hexagonoptera]), roundleaf violet (*Viola rotundifolia*), ealy meadow-rue (*Thalictrum dioicum*), roundlobe hepatica (*Hepatica nobilis* var. obtusa [= Hepatica americana]), rue anemone (*Thalictrum thalictroides* [= Anemonella thalictroides]), nodding fescue (*Festuca subverticillata*), white baneberry (*Actaea pachypoda*), common blue violet (*Viola sororia*), rockcress (Arabis spp)., roundleaf ragwort(*Packera obovata* (= Senecio obovatus]), and Jack-in-the-pulpit (*Arisaema triphyllum*). (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]). Cross-referenced plant community concepts (typically by political state): CT: Sugar Maple - Northern Red Oak / Round-lobe Hepatica Forest (Metzler and Barrett, 2006) MA: Dry, rich oak Forest/Woodland (Swain and Kearsley, 2001) NY: Appalachian oak-hickory Forest (Edinger et al., 2014)

Community 1.2
Ruderal Forest/Woodland

Community 1.3
Abandoned Field/Meadow

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

Abandonment, Sucession

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

Invasive species include European buckthorn (*Rhamnus cathartica*), Canada bluegrass (*Poa compressa*), Japnese barberry (*Berberis thunbergii*), Morrow's shrubby honeysuckle (*Lonicera morrowii*), tree-of-heaven (*Ailanthus altissima*), and multiflora rose (*Rosa multiflora*).

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

Different phase of intense land use - may be cultivated crops, pasture/hay, or plantations (including nursery crops)

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

Conservation practices

Brush Management
Land Clearing
Herbaceous Weed Control

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

Acknowledgments

Michael Margo and tech team provided earlier 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.

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:**

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:**
