USDA Natural Resources Conservation Service

Ecological site F144AY023CT
Well Drained Outwash

Last updated: 2/10/2025
Accessed: 05/11/2025

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 mainly very deep, well drained sandy soils or, if shallow, cobbly-gravelly soils, formed in glaciofluvial materials. They are level to steep soils on outwash and other glaciofluvial landforms. Representative soils are Agawam, Hazen, Paulins Kill, Dunellen, Blasdell, Otisville, Riverhead, Haven, and Enfield.
The representative plant communities are varied but generally consist of pines: pitch pine (*Pinus rigida*), eastern white pine (*P. strobus*) and mixed with oaks: chestnut oaks (*Quercus montana*), black oak (*Q. velutina*), scarlet oak (Q. prinus) and, bear oak (*Q. ilicifolia*).

Associated sites

F144AY026CT	**Moist Silty Outwash**

Similar sites

F144AY017NH	**Well Drained Lake Plain**

Table 1. Dominant plant species

Tree	(1) *Pinus strobus* (2) *Quercus velutina*
Shrub	(1) *Gaylussacia baccata*
Herbaceous	(1) *Aralia nudicaulis*

Physiographic features

They are level to steep soils on outwash plains and terraces. Slope ranges from 0 to 60 percent.

Table 2. Representative physiographic features

Landforms	(1) Lake plain > Delta (2) Outwash plain > Alluvial fan (3) Valley > Terrace (4) Lakebed (5) Outwash delta (6) Outwash fan (7) Outwash plain (8) Outwash terrace (9) Plain
Runoff class	Very low to medium
Flooding frequency	None
Ponding frequency	None
Elevation	0–1,968 ft
Slope	0–60%
Water table depth	33–72 in
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)	135-162 days
Freeze-free period (characteristic range)	156-201 days
Precipitation total (characteristic range)	48-53 in
Frost-free period (actual range)	129-177 days
Freeze-free period (actual range)	155-212 days
Precipitation total (actual range)	44-54 in
Frost-free period (average)	148 days
Freeze-free period (average)	179 days
Precipitation total (average)	50 in

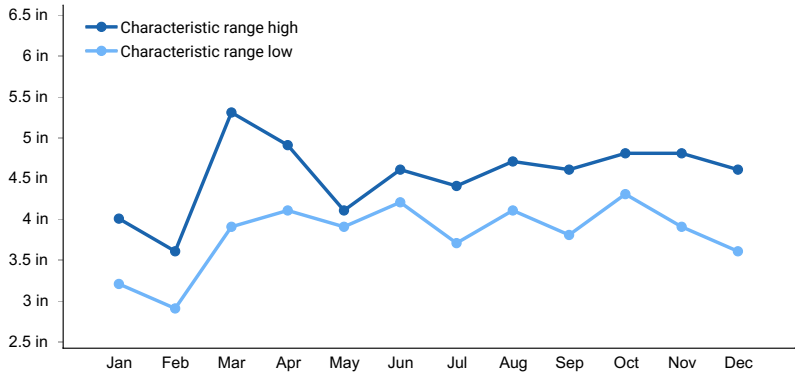


Figure 1. Monthly precipitation range

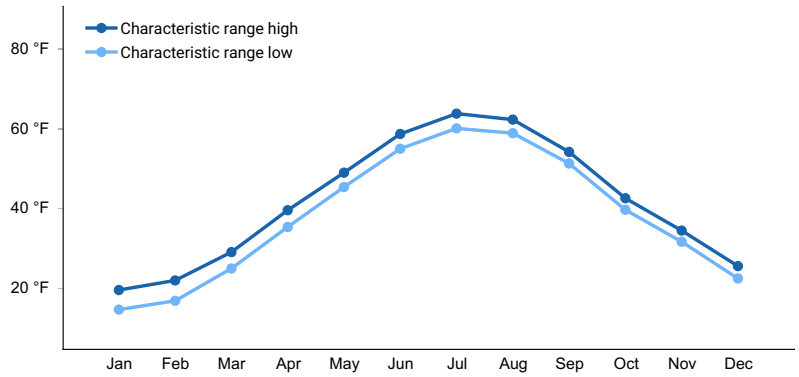


Figure 2. Monthly minimum temperature range

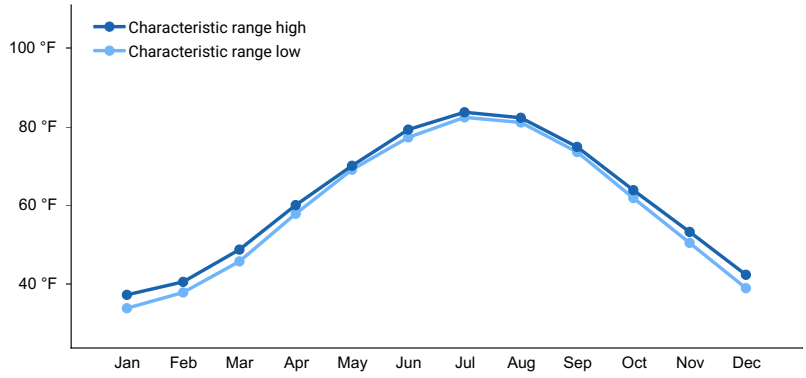


Figure 3. Monthly maximum temperature range

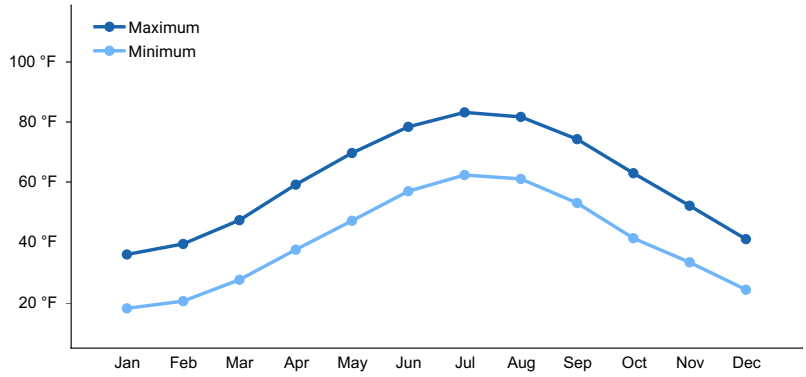


Figure 4. Monthly average minimum and maximum temperature

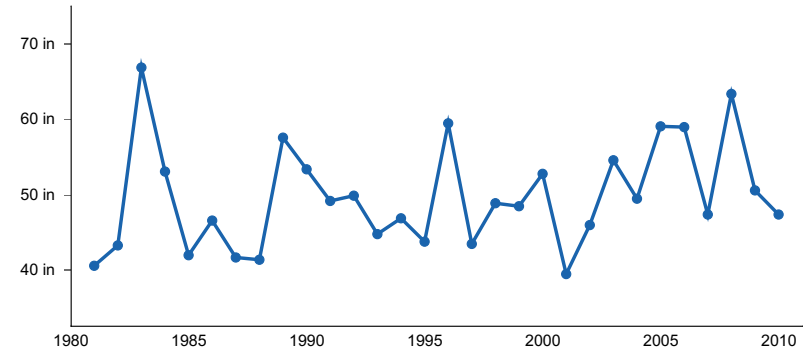


Figure 5. Annual precipitation pattern

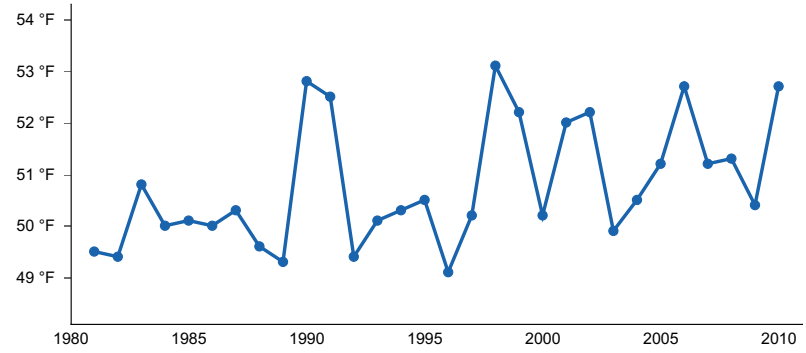


Figure 6. Annual average temperature pattern

Climate stations used

- (1) DANBURY [USC00061762], Bethel, CT
- (2) NASHUA 2 NNW [USC00275712], Merrimack, NH
- (3) KINGSTON [USC00374266], Kingston, RI

- (4) BRIDGEPORT SIKORSKY MEM AP [USW00094702], Stratford, CT
- (5) NORWICH PUB UTIL PLT [USC00065910], Norwich, CT
- (6) BELCHERTOWN [USC00190562], Belchertown, MA
- (7) WANAQUE RAYMOND DAM [USC00289187], Haskell, NJ

Influencing water features

NONE

Wetland description

NONE

Soil features

The site consists of very deep, well drained soils formed in coarse loamy glacial outwash.
Representative soils are Agawam, Hazen, Paulins Kill, Dunellen, Blasdell, Otisville, Riverhead, Haven, and Enfield.

Table 4. Representative soil features

Parent material	(1) Glaciofluvial deposits–sandstone and shale (2) Eolian deposits–granite and gneiss (3) Outwash–schist (4) Phyllite (5) Metamorphic rock
Surface texture	(1) Fine sandy loam (2) Channery silt loam (3) Channery loam (4) Loam (5) Sandy loam (6) Silt loam
Family particle size	(1) Coarse-loamy (2) Coarse-loamy over clayey (3) Coarse-loamy over sandy or sandy-skeletal (4) Coarse-silty over sandy or sandy-skeletal (5) Loamy-skeletal (6) Sandy-skeletal
Drainage class	Well drained to excessively drained
Permeability class	Slow to moderate
Depth to restrictive layer	23–72 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	2–6 in
Soil reaction (1:1 water) (0-40in)	3.5–7.8
Subsurface fragment volume <=3" (Depth not specified)	0–45%
Subsurface fragment volume >3" (Depth not specified)	0–40%

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).

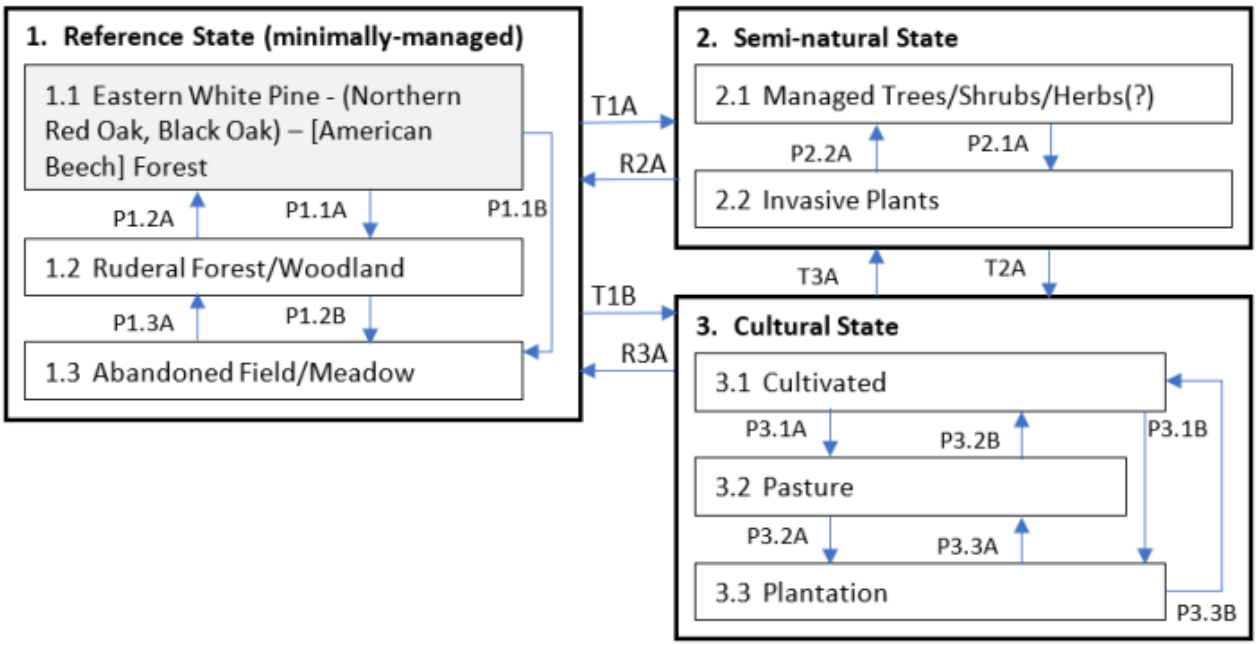
Additional and more localized vegetation information is provided by the State Natural Heritage Programs of Connecticut (Metzler and Barrett 2001), Massachusetts (Swain and Kearsley 2001), New Hampshire (Sperduto and Nichols, 2011), New York (Edinger et al., 2014), and Rhode Island (Enser and Lungren,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

The Dry Outwash ecological site is widely distributed and characteristic of the Central Appalachian Dry Oak-Pine Forest system (CES202.591), the Laurentian-Acadian Pine-Hemlock-Hardwood Forest system (CES201.563), the Northeastern Interior Pine Barrens system (CES202.590), and the Northern Atlantic Coastal Plain Pitch Pine Barrens system (CES203.269). The representative plant communities are varied but generally consist of pines (pitch pine (*Pinus rigida*), eastern white pine (*P. strobus*)) which may be also mixed with oaks (chestnut oaks (*Quercus montana*), black oak (*Q. velutina*), scarlet oak (Q. prinus) and , bear oak (*Q. ilicifolia*). Natural disturbances include climate extremes such as, excessive droughts, or storm activity ranging from windthrows to downbursts to ice-storms. Atmospheric deposition may effect trees at high elevations. Wildfires do happen but are largely suppressed. Other agents-of-change include land conversions and fragmentation by agricultural cropping, development, tree harvests, and disease whit pine blister rust (Cronartium ribicola) and southern pine bark beetle (Dendrocdenus frontalis). Non-native pines include the Austrian pine (*Pinus nigra*), Japanese black pine (Pinus thunbergia), mugo pine (*Pinus mugo*), and Scotch pine (*Pinus sylvestris*) Austrian pine.

[*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

144AY023 – Well-Drained 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 state is varied depending on landscape position and proximity to the coast. Two model communities are highlighted and others follow: • *Pinus strobus* - Quercus (rubra, velutina) - *Fagus grandifolia* Forest Translated Name: Eastern White Pine - (Northern Red Oak, Black Oak) - American Beech Forest Common Name: Northeastern White Pine - Oak Forest (CEGL006293) Other communities include: • *Quercus montana* - Quercus (rubra, velutina) / Vaccinium (angustifolium, pallidum) Forest Translated Name: Chestnut Oak - (Northern Red Oak, Black Oak) / (Lowbush Blueberry, Blue Ridge Blueberry) Forest Common Name: Lower New England High Slope Chestnut Oak Forest (CEGL006282) • *Pinus rigida* - Quercus (velutina, montana) Forest Translated Name: Pitch Pine - (Black Oak, Chestnut Oak) Forest Common Name: Inland Pitch Pine - Oak Forest (CEGL006290) • *Pinus rigida* - *Quercus coccinea* / *Vaccinium pallidum* - (*Morella pensylvanica*) Woodland Translated Name: Pitch Pine - Scarlet Oak / Blue Ridge Blueberry - (Northern Bayberry) Woodland Common Name: Pitch Pine - Scarlet Oak Woodland (CEGL006381) • *Pinus strobus* - *Pinus resinosa* - *Pinus rigida* Forest Translated Name: Eastern White Pine - Red Pine - Pitch Pine Forest Common Name: Northeastern Dry Pine Forest (CEGL006259) • *Pinus rigida* / *Quercus ilicifolia* / *Morella pensylvanica* Woodland Translated Name: Pitch Pine / Bear Oak / Northern Bayberry

Woodland Common Name: Coastal Pitch Pine / Bear Oak Barrens (CEGL006315) • *Juniperus virginiana* / *Morella pensylvanica* Woodland Translated Name: Eastern Red-cedar / Northern Bayberry Woodland Common Name: Maritime Red-cedar Woodland (CEGL6212) Other plant communities with more open cover include barrens, heathlands and grasslands, e.g., “scrub oak barrens” (Metzler and Barrett 2006, Swain and Kearsley 2001, (bearberry – low bush blueberry barrens” (Metzler and Barrett 2006), “sandplain heathlands” (Swain and Kearsley 2001), “little bluestem – poverty grass grasslands” (Metzler and Barrett 2006), “sandplain grasslands” (Swain and Kearsley 2001), and “inland sandbarrens” (Enser et al 2011).

Community 1.1
Eastern White Pine - (Northern Red Oak, Black Oak) – [American Beech] Forest (CEGL006293)

Pinus strobus - Quercus (rubra, velutina) - *Fagus grandifolia* Forest Translated Name: Eastern White Pine - (Northern Red Oak, Black Oak) – [American Beech] Forest Common Name: Northeastern White Pine - Oak Forest (CEGL006293) The tree canopy is dominated by a mixture of white pine (*Pinus strobus*)and oaks, including black oak (*Quercus velutina*), red oak (*Quercus rubra*), white oak (*Quercus alba*), chestnut oak (*Quercus montana*), and scarlet oak (*Quercus coccinea*). American beech (*Fagus grandifolia*) is sometimes diagnostic but not always present. Other less frequent canopy associates may include red maple (*Acer rubrum*), sweet birch (*Betula lenta*), mockernut hickory (*Carya tomentosa*), quaking aspen (*Populus tremuloides*), white ash (*Fraxinus americana*), and possibly eastern hemlock (*Tsuga canadensis*), paper birch (*Betula papyrifera*) and bigtooth aspen (*Populus grandidentata*). The subcanopy is highly variable and may include witchhazel (*Hamamelis virginiana*) or black cherry (*Prunus serotina*); and possibly flowering dogwood (*Cornus florida*), and blckgum (*Nyssa sylvatica*). Ericaceous shrubs are typically well-developed including black huckleberry (*Gaylussacia baccata*), mountain laurel (*Kalmia latifolia*), hillside blueberry (*Vaccinium pallidum*) and lowbush blueberry (*Vaccinium angustifolium*), and sometimes sheep laurel (*Kalmia angustifolia*), as well as blackberries (Rubus spp.), American hazelnut(*Corylus americana*), eastern teaberry (*Gaultheria procumbens*), sassafras (*Sassafras albidum*). The herb layer ranges from sparse to moderately dense cover, with species including sarsparilla (*Aralia nudicaulis*), fibrous root sedge (*Carex communis*), Pennsylvania sedge (*Carex pensylvanica*), Blue Ridge sedge (*Carex lucorum*), striped wintergreen (*Chimaphila maculata*), naked tick-trefoil (Hylodesmun nudiflorum [=*Desmodium nudiflorum*]), downy rattlesnake plantain (*Goodyera pubescens*), rattlesnake hawkweed (*Hieracium venosum*), large bluet (*Houstonia purpurea*), feathery false Solomon’s seal (*Maianthemum racemosum* [=Smilicina racemosa]), Canada mayflower (*Maianthemum canadense*), Indian cucumber (*Medeola virginiana*), narrowleaf cowwheat (*Melampyrum lineare*), partridgeberry (*Mitchella repens*), Indian pipes (*Monotropa uniflora*), wavy hairgrass (Deschampsi flexuosa), sweet fern (*Comptonia peregrina*), Christmas fern (*Polystichum acrostichoides*), braken fern (*Pteridium aquilinum*. (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]). Cross-referenced plant community concepts (typically by political state): CT: Undisclosed (Metzler and Barret, 2006) MA: White Pine - Oak Forest (Swain and Kearsley, 2001) ME: Oak-Pine Forest (Grawler and Cutko, 2010) NH: Dry red oak - white pine forest (Sperduto and Nichols, 2011) NY: Appalachian oak-pine forest (Edinger et al., 2014) RI: Mixed Pine-Oak Forest (Enser and Lundgren, 2006)

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

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

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

Nels Barrett, Ph.D. (vegetation)

Approval

Nels Barrett, 2/10/2025

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	02/10/2025
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):**

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:**

17. **Perennial plant reproductive capability:**