USDA Natural Resources Conservation Service

Ecological site F145XY013CT
Well Drained Till Uplands

Last updated: 9/27/2024
Accessed: 05/10/2025

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): 145X–Connecticut Valley

The nearly level floor of the Connecticut River Valley makes up most of the area. Nearly level to sloping lowlands are at the outer edges of the river valley. These lowlands are broken by isolated, north- to south-trending trap-rock ridges that are hilly and steep. Elevation ranges from sea level to 330 feet in the lowlands and from 650 to 1,000 feet on ridges.

Recent alluvium has been deposited on the nearly level flood plain along the Connecticut River since the glacial retreat about 10,000 to 12,000 years ago. These deposits created some of the most productive agricultural soils in New England. Glacial lake deposits, outwash, and recent alluvial deposits dominate.

The area primarily supports central hardwoods. Habitat loss and fragmentation are widespread throughout the lower part of the Connecticut River Valley. The major tree species in the rest of the forested areas are sugar maple, birch,beech, oaks, and hickory. White pine and hemlock are the dominant conifers, but pitch pine and red pine are more common on sandy soils. Red maple grows on the wetter sites.

The most common understory plants are moosewood and hobblebush in the northern part of the area and dogwood in the southern part. Abandoned agricultural land is dominated by white pine and paper birch in the northern part and red cedar and gray birch in the southern part. The important upland habitats include trap-rock ridges and sand plains. Oak woodlands and cedar glades are common on the ridges. Black oak savannas mixed with pitch pine and varying amounts of little bluestem are common on the sand plains. Other habitats of significance include wetlands associated with the Connecticut River freshwater marshes, swamps, flood plains, and lowlands. The dominant trees on the flood plains are black willow, cottonwood, and sycamore.

Classification relationships

USDA-NRCS (USDA, 2006):
Land Resource Region (LRR): R – Northeastern Forage and Forest Region
Major Land Resource Area (MLRA): 145 – Connecticut Valley

USDA-FS (Cleland et al, 2007):
Province: 221 – Eastern Broadleaf Forest
Section: 221A – Lower New England
Subsection: 221Af –Lower Connecticut River Valley
Province: M211 – Adirondack New England Mixed Forest – Coniferous Forest – Alpine Meadow (in part)
Section: M211B– New England Piedmont (in part)
Subsection: 211Bb – Southern Piedmont (in part)

Ecological site concept

The Well-Drained Till Uplands ecological site consists of well drained, loamy soils formed in ablation till derived mostly from basalt and or sandstone and shale, but occasionally gneiss and schist. The soils are moderately deep and deep to bedrock. They are nearly level to moderately steep soils on hills and ridges. Representative soils are Cheshire and Yalesville, and may occasionally include Cardigan, Dutchess, Narragansett, Watchaug, and Wapping. Representative plant communities are typically dominated by an oak-hickory (Quercus spp. – Carya spp.) dominated forest.

Associated sites

F145XY011CT	**Well Drained Shallow Till Uplands**

Similar sites

F145XY012CT	**Well Drained Dense Till Uplands**
F145XY014CT	**Moist Dense Till Uplands**

Table 1. Dominant plant species

Tree	(1) *Quercus rubra* (2) *Carya ovata*
Shrub	(1) *Hamamelis virginiana* (2) *Viburnum acerifolium*
Herbaceous	(1) *Carex pensylvanica*

Physiographic features

The site occurs on flat to very steeply sloping bedrock controlled upland landforms, and is not subject to flooding or ponding.

Table 2. Representative physiographic features

Landforms	(1) Upland > Hill (2) Ridge (3) Ground moraine (4) Mountain (5) Till plain (6) Hillslope (7) Moraine
Runoff class	Low to very high
Flooding frequency	None
Ponding frequency	None
Elevation	3–3,477 ft
Slope	0–70%
Water table depth	24–72 in
Aspect	Aspect is not a significant factor

Climatic features

The regional climate of the Connecticut Valley transitions north to south, from humid-continental to humid temperate, respectively, with pronounced seasons and frequent storms. (Beck et al., 2018; Bailey, 2014).

Climate change is occurring, and the resiliency of any ecological site will depend upon the direct and indirect effects upon component species and shifting atmospheric and soil conditions. On these ecological sites, central hardwoods

– pine forests are at a low vulnerability risk to climate change with impacts considered both negative and positive. Warmer seasonal temperatures and a prolonged growing season will be beneficial for increasing productivity of central hardwoods, especially trees with southern affinities such as oaks, hickory, and tuliptree. However, climate extremes may introduce earlier leaf phenologies susceptible to frost damage and general plant weakening. Although central hardwoods – pine forests are adaptable to warmer climate shifts, fragmentation and invasive species can amplify any adverse effects of climate change. Several invasive species will continue to be a threat. (Janowiak et al, 2018).

Table 3. Representative climatic features

Frost-free period (characteristic range)	128-144 days
Freeze-free period (characteristic range)	163-187 days
Precipitation total (characteristic range)	46-52 in
Frost-free period (actual range)	114-147 days
Freeze-free period (actual range)	148-188 days
Precipitation total (actual range)	46-52 in
Frost-free period (average)	135 days
Freeze-free period (average)	173 days
Precipitation total (average)	49 in

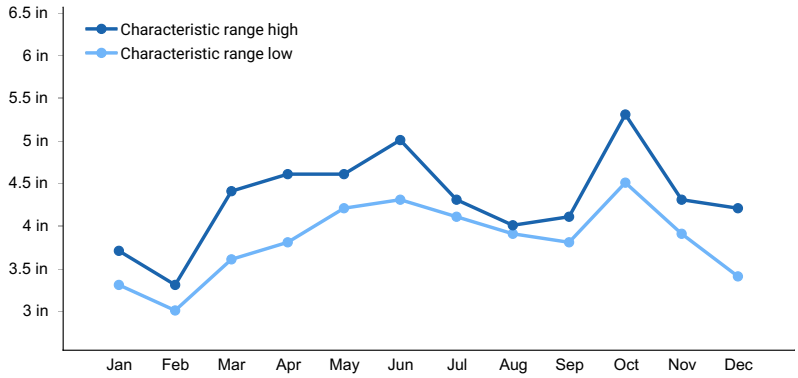


Figure 1. Monthly precipitation range

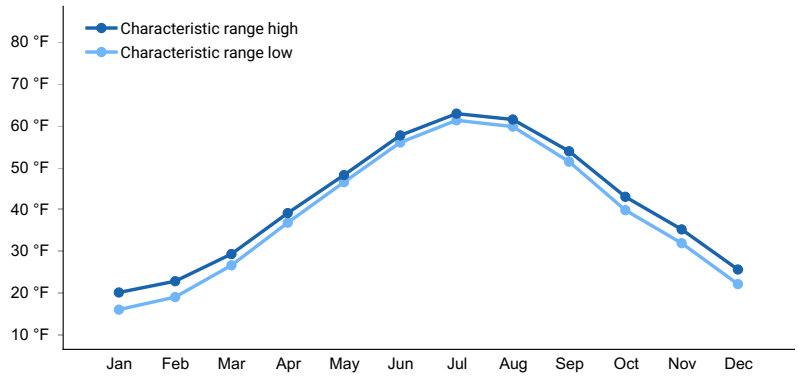


Figure 2. Monthly minimum temperature range

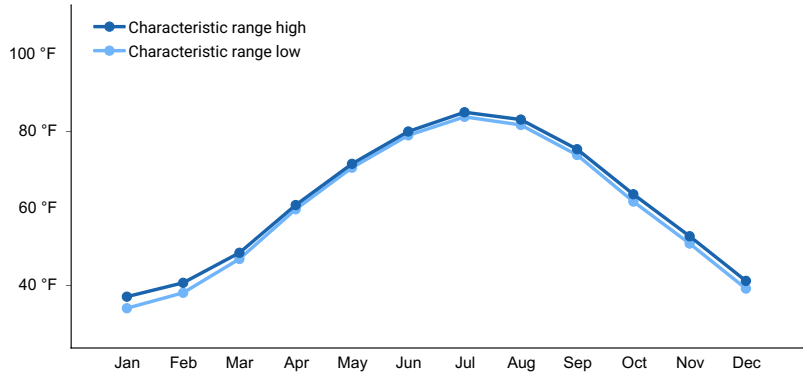


Figure 3. Monthly maximum temperature range

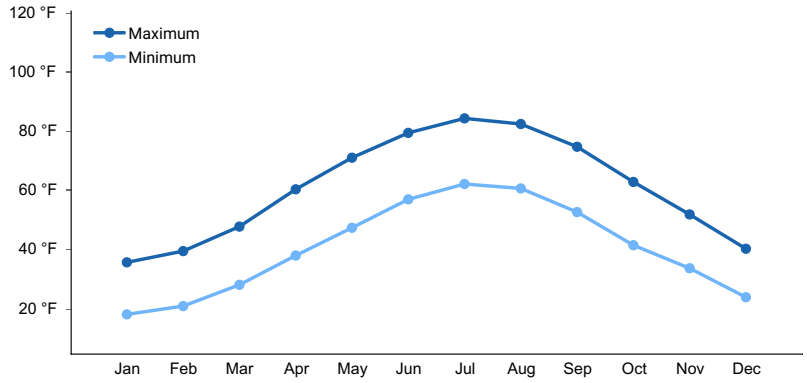


Figure 4. Monthly average minimum and maximum temperature

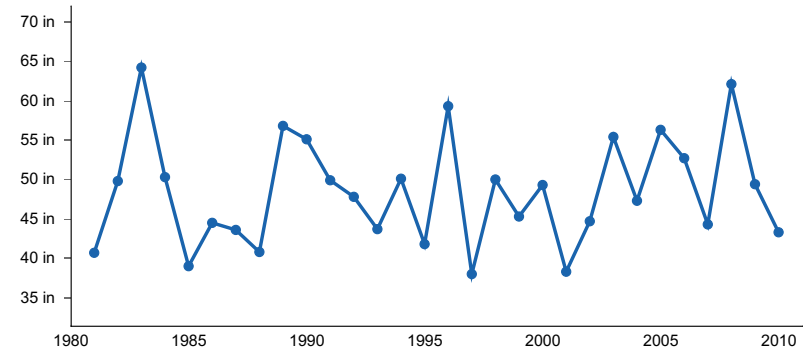


Figure 5. Annual precipitation pattern

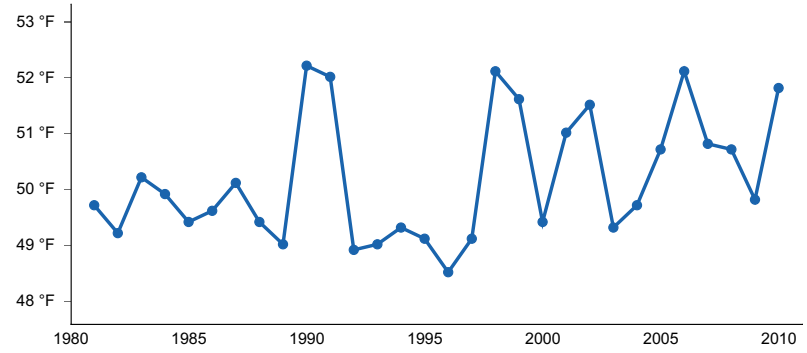


Figure 6. Annual average temperature pattern

Climate stations used

- (1) HARTFORD BRADLEY INTL AP [USW00014740], Suffield, CT
- (2) MIDDLETOWN 4 W [USC00064767], Middlefield, CT
- (3) MT CARMEL [USC00065077], Hamden, CT

- (4) AMHERST [USC00190120], Amherst, MA

Influencing water features

NONE

Wetland description

NONE

Soil features

The site consists of moderately well to somewhat excessively drained, moderately to very deep soils formed in wind, water, and glacially deposited parent materials. Representative soils are Cheshire and Yalesville, and may occasionally include Cardigan, Dutchess, Narragansett, Watchaug, and Wapping.

Table 4. Representative soil features

Parent material	(1) Till–sandstone and shale (2) Eolian deposits–basalt (3) Glaciofluvial deposits–granite and gneiss (4) Alluvium–schist (5) Metamorphic and sedimentary rock (6) Conglomerate
Surface texture	(1) Fine sandy loam (2) Silt loam (3) Stony silt loam (4) Sandy loam (5) Stony fine sandy loam (6) Very fine sandy loam
Family particle size	(1) Coarse-loamy (2) Coarse-loamy over sandy or sandy-skeletal (3) Loamy-skeletal (4) Sandy-skeletal
Drainage class	Moderately well drained to somewhat excessively drained
Permeability class	Very slow to rapid
Depth to restrictive layer	22–72 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0–9%
Available water capacity (0-40in)	3–6 in
Soil reaction (1:1 water) (0-40in)	3.2–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–45%
Subsurface fragment volume >3" (Depth not specified)	0–16%

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).

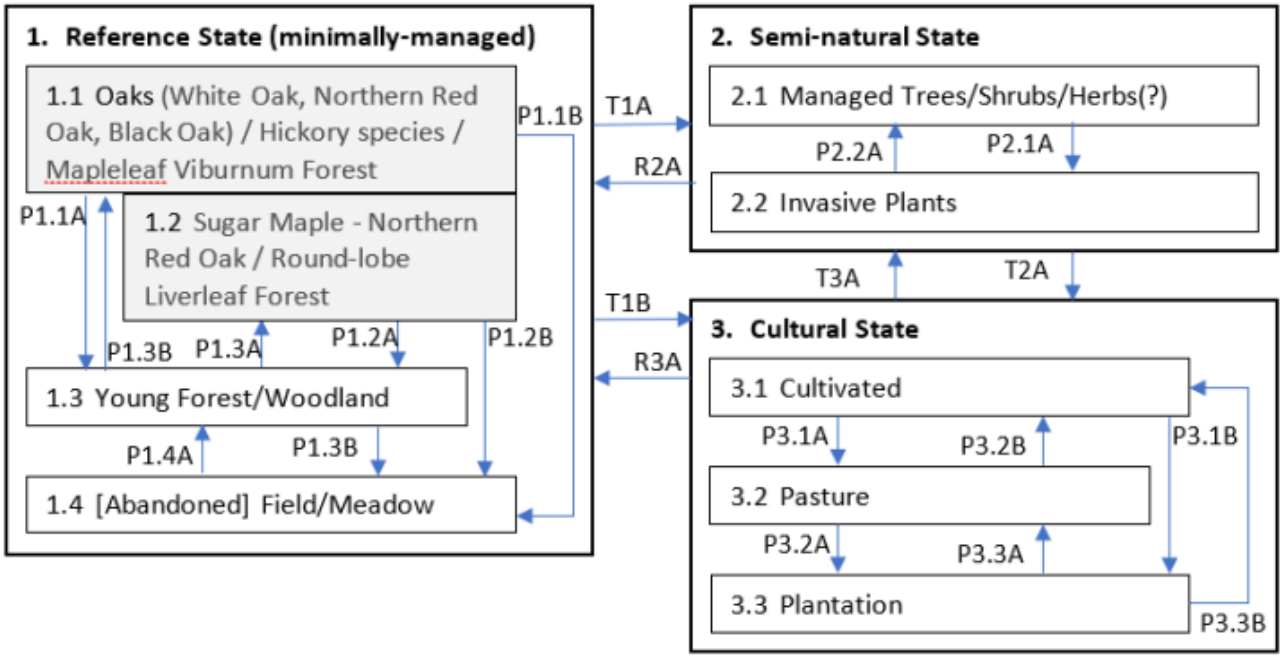
Additional and more localized vegetation information can be provided by the various State Heritage Programs. Additional insights to the vegetation were provided by: "The Vegetation of Connecticut: A Preliminary Classification" (Metzler and Barrett, 2006), "Classification of the Natural Communities of Massachusetts" (Swain and Kersley 2011), "Wetland, Woodland, Wildland" (Thompson and Sorenson 2000), and "Natural Communities of New Hampshire, 2nd Ed." (Spurduto and Nichols, 2011).

The Well-Drained Till Uplands ecological site is characteristic of the Northeastern Interior Dry-Mesic Oak Forest system (CES202.592) and the Appalachian (Hemlock)-Northern Hardwood Forest system (CES2.2593). The Representative plant communities are typically dominated by an oak-hickory (Quercus spp. – Carya spp.) forest. 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. Excessive deer browse may be an issue. Wildfires do happen but are largely suppressed. Other agents-of-change include land conversions and fragmentation by agricultural, development and logging. In disturbed sites, 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.).

Other ecological states, a Semi-natural State and a Cultural State are recognized. The Semi-natural State would expect plant communities where ecological processes primarily operate with some conditioning by land management, e.g., managed forests, or plant communities that are an artifact of land management e.g., predominately invasive plants. The Cultural State is a completely converted or transformed state heavily or completely conditioned by land management, e.g., cultivated lands, pasture/haylands, vineyards, and plantations, etc. Generally, the form of vegetation in the Semi-natural State or the Cultural State is not able to be specified until field work is conducted.

State and transition model

145XY012 – Well Drained 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..
P1.4A, P1.3A, 1.3B	Abandonment, succession
P1.1A, P1.1B, P1.2A, P1.2B, P1.3B	Disturbance, Early Successional Habitat Development
P3.1A, P3.2A, P3.3A, P3.1B, P3.2B, P3.3B	Changing Agricultural phases

State 1
Reference State (minimally-managed)

As a result of a long history of human activity, the plant associations listed below, may in reality, reflect the current naturalized, minimally-managed state rather than the historic, pre-European settlement condition. Notice transition pathways are not always designated between some of the communities in the reference state because the differences in vegetation are more controlled by landscape position, rather than disturbances or management, or that the relationships are not understood. In addition, undisclosed successional plant community-types following disturbance may be included as community phases.) The reference plant asociations can be varied. The reference plant community includes: • Quercus (alba, rubra, velutina) - Carya spp. / *Viburnum acerifolium* Forest (CEGL006336) Translated Name: Oaks (White Oak, Northern Red Oak, Black Oak) / Hickory species / Mapleleaf Viburnum Forest Common Name: Dry-mesic Oak - Hickory / Viburnum Forest (CEGL006336) Others plant communities can include: • *Quercus rubra* - Carya (glabra, ovata) / *Ostrya virginiana* / *Carex lucorum* Forest (CEGL006301) Translated Name: Northern Red Oak - (Pignut Hickory, Shagbark Hickory) / Hophornbeam / Blue

Ridge Sedge Forest Common Name: Oak - Hickory / Hophornbeam / Sedge Forest • Quercus (velutina, alba) / *Vaccinium pallidum* / *Pteridium aquilinum* Allegheny Plateau-Northeast Forest (CEGL006018) Translated Name: (Black Oak, White Oak) / Blue Ridge Blueberry / Western Brackenfern Allegheny Plateau-Northeast Forest Common Name: Allegheny Plateau-Northeast Oak Forest • *Quercus rubra* - *Acer saccharum* / *Viburnum acerifolium* - *Lindera benzoin* Forest (CEGL006635) Translated Name: Northern Red Oak - Sugar Maple / Mapleleaf Viburnum - Northern Spicebush Forest Common Name: Red Oak - Transitional Northern Hardwood Forest • *Quercus rubra* - *Liriodendron tulipifera* - *Betula lenta* Forest (CEGL008573) Translated Name: Northern Red Oak - Tuliptree - Sweet Birch Forest Common Name: Lower New England Oak - TulipTree Forest • *Tsuga canadensis* - *Acer saccharum* - *Fagus grandifolia* / *Dryopteris intermedia* Forest (CEGL006639) Translated Name: Eastern Hemlock - Sugar Maple - American Beech / Intermediate Woodfern Forest Common Name: Hemlock - Transitional Northern Hardwood Forest (Source: NaturesServe 2022)

Community 1.1
Oaks (White Oak, Northern Red Oak, Black Oak) / Hickory species / Mapleleaf Viburnum Forest

Quercus (alba, rubra, velutina) - Carya spp. / *Viburnum acerifolium* Forest (CEGL006336) Translated Name: Oaks (White Oak, Northern Red Oak, Black Oak) / Hickory species / Mapleleaf Viburnum Forest Common Name: Dry-mesic Oak - Hickory / Viburnum Forest 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 witchhazel (*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 2022 [accessed 2022], USNVC 2017 [accessed 2022]). 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)

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 forest/woodland [vegetation]

(to be developed)

Community 2.2

Invasive plants

(to be developed)

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 is a completely converted or transformed state, heavily or completely conditioned by land management, e.g., cultivated lands, pasture/haylands, vineyards, and plantations, etc.

Community 3.1
Cultivated

Community 3.2
Pasture

Community 3.3
Plantation

Transition T1A
State 1 to 2

Invasion, disturbance

Transition T1B
State 1 to 3

Disturbance/cutting/clearing, Brush removal

Restoration pathway R2A
State 2 to 1

Invasive species removal, native outplanting, restoration management

Transition T2A
State 2 to 3

Disturbance/cutting/clearing, Brush removal

Restoration pathway R3A
State 3 to 1

Restoration management

Transition T3A
State 3 to 2

Abandonment, Plant establishment, Forest mgmt.

Additional community tables

Inventory data references

Site Development and Testing Plan
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

Bailey, R. 2014. Ecoregions: the ecosystem geography of the oceans and continents. Second Edition. New York, NY: Springer-Verlag.

Beck, H.E., N.E. Zimmermann, T.R. McVicar, N. Vergopolan, A.Berg, E.F. Wood. 2018. Present and future Köppen-Geiger climate classification maps at 1-km resolution. Scientific Data 5(1):1-12.

Cleland, D.T., J.A. Freeouf, J.E. Keys, G.J. Nowacki, C.A. Carpenter, and W.H.McNab. 2007. Ecological Subregions: Sections and Subsections for the conterminous United States. [Map. presentation scale 1:3,500,000, colored; A.M. Sloan, cartographer] Gen. Tech. Report WO-76D. U.S. Department of Agriculture, Forest Service, Washington, DC. (https://www.fs.fed.us/research/publications/misc/73326-wo-gtr-76d-cleland2007.pdf)

Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K., Snow, and J.Teague. 2003. Ecological Systems of the United States: A Working Classification of U.S. Terrestrial Systems. NatureServe, Arlington, Virginia.

Cowardin, L.M. et. al. 1979. Classification of Wetlands and Deepwater habitats of the United States. FWS/OBS-79/31, U.S. Department of the Interior, Fish and Wildlife Service, Washington, DC.

Edinger, G.J., Evans, D.J., Gebauer, S., Howard, T.G., Hunt, D.M., and A.M. Olivero, A.M. (eds.). 2014. Ecological Communities of New York State, Second Edition: A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.

FGDC [Federal Geographic Data Committee]. 2008. National Vegetation Classification Standard, Version 2. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC..

Janowiak, M.K., A.W. D'Amato, C.W. Swanston, L. Iverson, F.R. Thompson, W.D Dijak, S. Matthews, M.P. Peters, A. Prasad, J.S. Fraser, J.S. L.A. Brandt, P. Butler-Leopold, S.D. Handler, P.D. Shannon, D. Burbank, J. Campbell, C. Cogbill, M.J. Duveneck, M.R. Emery, N. Fisichelli, J. Foster, J Hushaw, L. Kenefic, A. Mahaffey, T/L. Morelli, N.J. Reo, P.G. Schaberg, K R. Simmons, A. Weiskittel, S. Wilmot, D. Hollinger, E. Lane, L. Rustad, and P.H. Templer. 2018. New England and northern New York forest ecosystem vulnerability assessment and synthesis: a report from the New England Climate Change Response Framework project. General Technical Report NRS-173, US Department of Agriculture, Forest Service, Northern Research Station. Newtown Square, PA.

Marks, C.O., K.A. Lutz, A.P. Olivero-Sheldon. 2011. Ecologically important floodplain forests in the Connecticut River watershed. The Nature Conservancy, Connecticut River Program. 44pp.

Metzler, K.J. and Barrett, J.P., 2006. The Vegetation of Connecticut, a Preliminary Classification. Department of Environmental Protection, State Geological and Natural History Survey of Connecticut. Rpt of Investigations No. 12.

NatureServe. 2009. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA, U.S.A. Data current as of 06 February 2009.

NatureServe. 2022. NatureServe Network Biodiversity Location Data accessed through NatureServe Explorer [web application]. NatureServe, Arlington, Virginia. Available https://explorer.natureserve.org/. (Accessed: 2022).

PRISM Climate Group, Oregon State University. Available http://prism.oregonstate.edu, (created February 26, 2013).

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. Agricultural Handbook 296. (https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051845.pdf).

Sperduto, D.D., & Nichols, W.F. 2011. Natural Communities of New Hampshire, Second Ed. NH Natural Heritage Bureau, Concord, NH. Publ. UNH Cooperative Extension.

Swain, P.C. and Kearsley, J.B., 2001. Classification of the natural communities of Massachusetts. Natural Heritage & Endangered Species Program, Massachusetts Division of Fisheries and Wildlife.

Thompson, E.H. and Sorenson, E.R., 2000. Wetland, woodland, wildland. Vermont Department of Fish and Wildlife and The Nature Conservancy. Publ. University Press of New England.

USDA, NRCS. 2022. The PLANTS Database (http://plants.usda.gov, 10/03/2023). National Plant Data Team, Greensboro, NC USA.

USNVC [United States National Vegetation Classification]. 2017 (Date accessed). United States National Vegetation Classification Database V2.01. Federal Geographic Data Committee, Vegetation Subcomittee, Washington DC.

Contributors

Nels Barrett, Ph.D.

Approval

Nels Barrett, 9/27/2024

Acknowledgments

Michael Margo and tech team assisted w/drafts.

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	05/10/2025
Approved by	Nels Barrett
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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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:**
