

Ecological site F145XY007MA

Well Drained Lake Plain

Last updated: 9/27/2024
Accessed: 08/27/2026

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

Major Land Resource Area (MLRA): 145 – Connecticut Valley (USDA-NRCS, 2006). The nearly level floor of the Connecticut 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 100 meters (330 feet) in the lowlands and from 50 to 100 meters (650 to 1,000 feet) on ridges. The geology of this rift valley is a late Triassic and early Jurassic sandstone, shale, and conglomerate sequence. Tilted basalt flows along rift zones form the trap rock ridges exhibiting the greatest landscape relief. Glaciation accounts for glacial lake deposits, outwash, and till. Following glacial retreat, wind-deposited loess caps some areas. Recent alluvium deposits form well-developed flood plain along the Connecticut River. These deposits created some of the most productive agricultural soils in New England. The dominant soils are entisols and inceptisols with a mesic temperature regime in combination with parent materials such as glacial lakebeds, glacial outwash, glacial till, and recent alluvium. From north-to-south within the Connecticut Valley, the climate transitions from humid-continental to humid temperate with pronounced seasons and frequent storms. The forests are predominately central hardwoods to the south and transition hardwoods to the north. Significant habitats include trap rock ridges, sandplains, and floodplains of the Connecticut River and major tributaries. Much of the area is currently in residential and urban development and agriculture. While much of the areas is also forested, habitat loss and fragmentation are widespread throughout the Connecticut Valley.

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 Lake Plain ecological site consists of deep, well drained soils that formed in silty lacustrine material. Representative soils are Hartland, Hitchcock, and Pollux.. This ecological site is restricted to the northern extremes of MLRA 145 in Northern New England. As such, the reference community trends toward a mixed northern/central hardwoods transition forest. This ecological site is not well known and not well described.

Associated sites

F145XY005MA	Moist Lake Plain
F145XY006CT	Semi-Rich Moist Lake Plain

Similar sites

F145XY003CT	Very Wet Inland Lake Plain
F145XY006CT	Semi-Rich Moist Lake Plain

Table 1. Dominant plant species

Tree	(1) <i>Quercus rubra</i> (2) <i>Acer saccharum</i>
Shrub	(1) <i>Viburnum acerifolium</i> (2) <i>Acer pensylvanicum</i>
Herbaceous	(1) <i>Dryopteris intermedia</i> (2) <i>Trientalis borealis</i>

Physiographic features

The site occur on lake plains and terraces with gentle sloping, and is not subject to flooding.

Table 2. Representative physiographic features

Landforms	(1) Lake plain > Escarpment (2) Plains > Lake terrace (3) Outwash plain (4) Plain (5) Terrace
Runoff class	Low to very high
Flooding frequency	None
Ponding frequency	None
Elevation	0 – 550 m
Slope	0 – 30 %
Water table depth	70 – 180 cm
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)	120-120 days
Freeze-free period (characteristic range)	150-160 days
Precipitation total (characteristic range)	990-1,040 mm
Frost-free period (actual range)	120-130 days
Freeze-free period (actual range)	140-170 days
Precipitation total (actual range)	970-1,040 mm
Frost-free period (average)	120 days
Freeze-free period (average)	160 days
Precipitation total (average)	1,020 mm

- (1) HANOVER [USC00273850], Hanover, NH
- (2) BELLOWS FALLS [USC00430499], Bellows Falls, VT
- (3) LEBANON MUNI AP [USW00094765], Lebanon, NH

Influencing water features

NONE

Wetland description

NONE

Soil features

The site consists of very deep, well drained soils that formed on eolian or sedimentary materials on glaciolacustrine landscapes. Representative soils are Hartland, Hitchcock, and Pollux.

Table 4. Representative soil features

Parent material	(1) Alluvium – granite and gneiss (2) Glaciolacustrine deposits (3) Glaciofluvial deposits
Surface texture	(1) Silt loam (2) Very fine sandy loam (3) Fine sandy loam
Family particle size	(1) Coarse-loamy (2) Coarse-silty
Drainage class	Well drained
Permeability class	Very slow to moderate
Depth to restrictive layer	180 cm
Surface fragment cover ≤3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (Depth not specified)	12.7 – 22.86 cm
Soil reaction (1:1 water) (0-101.6cm)	4.5 – 7.8
Subsurface fragment volume ≤3" (Depth not specified)	0 – 30 %
Subsurface fragment volume >3" (Depth not specified)	0 – 10 %

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 Lake Plain ecological site is restricted to the northern reaches of MLRA 145, hence, characteristic of the Laurentian-Acadian Northern Hardwood Forest system (CES201.564). The vegetation is often a mosaic of forest, woodland, shrub land, and herbaceous communities. The reference community can be variable, but commonly, is a deciduous to occasionally mixed northern/central hardwoods transition forest. This forest exhibits canopy gaps formed by storm extremes ranging from windthrows to downbursts to ice-storms. Excessive deer browse may be an issue. 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. In disturbed sites, invasive plants can include European buckthorn (*Rhamnus cathartica*), 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

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

Table 7. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

Table 8. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

Table 9. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

Table 10. Community 3.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

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 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://explorer.natureserve.org>. (Accessed: December 2015).

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.

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	08/27/2026
Approved by	
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:
-