

Ecological site F142XB007VT

Wet Clayplain Depression

Last updated: 10/03/2024
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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): 142X–St. Lawrence-Champlain Plain

The St. Lawrence-Champlain Plain MLRA is a glaciated area of low relief dominated by broad expanses of nearly level, sandy deltas and shallow lacustrine basins or plains punctuated by low hills of glacial till. Rivers and streams have cut relatively deep but narrow valleys across the plain. Elevation ranges from 80 to 1,000 feet (25 to 305 meters), increasing gradually from the St. Lawrence River southward and from Lake Champlain to the east and west. Local relief generally is less than 30 feet (10 meters), but glacial till ridges, till plains, and some outwash terraces rise 15 to 80 feet (5 to 25 meters) above the adjacent plains.

LRU notes

Land Resource Unit (LRU): Frigid Soil Temperature Regime The upper St. Lawrence and Champlain Valleys are characterized with soils in the frigid soil temperature regime (mean annual soil temperature greater than 32°F but less than 46°F and with a difference between mean summer and mean winter soil temperatures greater than 41°F at 20 inches below the surface or at a densic, lithic, or paralithic contact, whichever is shallower). The Frigid Soil Temperature Regime (STR) will have shorter growing season than the lower St. Lawrence and Champlain Valleys which are characterized with soils in the mesic STR. Species more tolerant of colder year round temperatures would also be evident in the Frigid LRU.

Classification relationships

USDA-NRCS LRR: D-Northeastern Forage and Forest Region MLRA: 142-St. Lawrence-Champlain Plain. LRU: TBD EPA (Ecoregions) Level III: 83-Eastern Great Lakes Lowlands Level IV: 83b-Champlain Lowlands USDA-USFS Province: Laurentian Mixed Forest Section: 212E--St. Lawrence and Champlain Valley Sub-section: 212Ec Champlain Glacial Lake and Marine Plains

Ecological site concept

Wet clayplain forests occur throughout the MLRA on poorly and very poorly drained glacial lake plains. Much of this Ecological Site has been cleared of forest vegetation and is currently used as hayfield and pasture. This Ecological Site is often adjacent to or embedded within Mesic Clayplain sites. These sites have poor surface drainage; creating shallow rooted trees that are often uprooted by heavy winds. The resultant microtopography of tip-up mounds and depressions is characteristic. Regularly occurring trees include green ash, Eastern hemlock, American elm, red maple, and on some sites, northern white cedar. Invasive shrubs are often common including bush honeysuckles, European buckthorn, common buckthorn, and Japanese barberry. Other shrubs and sapling trees such as arrowwood, American hornbeam, green ash and slippery elm also occur. Herbaceous cover can be variable in composition, reflecting the wetness of individual sites. These include sensitive fern, New York fern, graceful sedge, barren strawberry, white avens, jewelweed, and others.

Associated sites

RX142X00B005	Clayplain
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Similar sites

F142XB014NY	Rich Wet Till Depression
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Table 1. Dominant plant species

Tree	(1) <i>Fraxinus pennsylvanica</i> (2) <i>Tsuga canadensis</i>
Shrub	(1) <i>Viburnum dentatum</i>
Herbaceous	(1) <i>Onoclea sensibilis</i> (2) <i>Carex gracillima</i>

Physiographic features

The site occurs on level to gently sloping glacial lake plains, depressions, and terraces.

Figure 1. Wet Clayplain ES (Covington soils)

Table 2. Representative physiographic features

Landforms	(1) Lake plain > Depression (2) River valley > Lake terrace (3) Lake plain (4) Terrace (5) Flat (6) Flood plain
Runoff class	Negligible to very high
Flooding frequency	None to frequent
Ponding frequency	None to occasional
Elevation	20 – 530 m
Slope	0 – 10 %
Water table depth	0 – 40 cm
Aspect	Aspect is not a significant factor

Climatic features

The Lake Champlain Valley has a humid climate with cold winters and warm summers. The Koppen-Geiger climate classification of the area in which this MLRA occurs is Dfb, Warm-summer humid continental. Rainfall occurs as high-intensity, convective thunderstorms in the summer, and snowfall is heavy from late in Autumn to early Spring. The frost-free period in this area is longest in a narrow belt around Lake Champlain. The area falls within USDA Hardiness zones 5a (and to a small extent, 5b). The Lake influences the climate of the Valley by moderating temperatures enough with offshore winds to delay the onset of fall, and conversely, the advance of spring. Climate change scenarios for the Northeastern US predict an overall increase in temperature, particularly in the winter and predict a slight increase in annual precipitation.

Table 3 Representative climatic features

Frost-free period (characteristic range)	120-140 days
Freeze-free period (characteristic range)	150-170 days
Precipitation total (characteristic range)	910-1,040 mm
Frost-free period (actual range)	100-140 days
Freeze-free period (actual range)	130-180 days
Precipitation total (actual range)	860-1,070 mm
Frost-free period (average)	130 days
Freeze-free period (average)	160 days
Precipitation total (average)	970 mm

- (1) SOUTH HERO [USC00437607], South Hero, VT
- (2) BURLINGTON INTL AP [USW00014742], South Burlington, VT
- (3) WHITEHALL [USC00309389], Whitehall, NY
- (4) SALISBURY 2 N [USC00437098], Salisbury, VT

Influencing water features

Poorly drained

Water is removed so slowly that the soil is wet at shallow depths periodically during the growing season or remains wet for long periods. Internal free water occurrence is shallow or very shallow and common or persistent. Free water is commonly at or near the surface long enough during the growing season that most mesophytic crops cannot be grown, unless the soil is artificially drained. The soil, however, is not continuously wet directly below plow depth. Free water at shallow depth is common. The water table is commonly the result of low or very low saturated hydraulic conductivity, nearly continuous rainfall, or a combination of these.

Wetland description

Cowardin System of Wetland Classification:

Palustrine, Forested, Broad-Leaved Deciduous, Seasonally Saturated, Fresh, Circumneutral to Alkaline

Soil features

The site consists of very deep, poorly and very poorly drained soils that formed in calcareous glacio-lacustrine clays on glacial lake plains. Saturated hydraulic conductivity is low to moderately high in the mineral surface layer and the subsoil, and moderately low to very low in the substratum.

Soil pH increases with soil depth. The surface horizon is considered neutral while the substratum ranges from slightly alkaline to moderately alkaline. With the exception of phosphorous, soil macronutrients such as nitrogen, calcium, potassium, magnesium, and sulfur are increased in moderately alkaline soils, such as the Covington soil component. Other representative soils are Livingston, Madalin, Panton, Guffin, Binghamville, Wallington, Scantic, and Swanton.

Figure 8. Covington soil, Pedon 2015VT013001

Table 4. Representative soil features

Parent material	<ul style="list-style-type: none"> (1) Glaciolacustrine deposits – limestone (2) Glaciomarine deposits – igneous and sedimentary rock (3) Eolian deposits (4) Estuarine deposits
Surface texture	<ul style="list-style-type: none"> (1) Clay (2) Silty clay (3) Stony clay loam (4) Silty clay loam (5) Silt loam (6) Mucky silty clay (7) Mucky silty clay loam (8) Very stony clay loam (9) Stony silt loam (10) Stony very fine sandy loam (11) Very fine sandy loam (12) Fine sandy loam
Family particle size	<ul style="list-style-type: none"> (1) Coarse-silty (2) Coarse-loamy over clayey (3) Fine (4) Very-fine
Drainage class	Poorly drained to very poorly drained

Permeability class	Very slow to slow
Depth to restrictive layer	40 – 180 cm
Soil depth	180 cm
Surface fragment cover ≤3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	7.62 – 20.32 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 20 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (Depth not specified)	4.5 – 8.4
Subsurface fragment volume ≤3" (Depth not specified)	0 – 20 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

In the reference condition, this site is characterized by mature trees, well-developed strata, and relatively high species diversity owing to the high fertility of the soils. In spite of being wet, because soils are fertile, parts of this site has been drained and lost to agriculture. More research is needed to determine the extent in the nearby eastern Ontario plain and adjacent Canada. Drainage and complete removal of all vegetation and tilling of soils converts the site for agricultural crops, usually corn. Cessation of agriculture allows for the establishment of a sedge – bulrush wet meadow, characterized by sedges, bulrushes, and other graminoids and scattered forbs. Invasion by non-native grasses and forbs, as wells as scattered shrubs also occurs. If unmanaged, early successional native and non-native trees and shrubs become established. These are characterized by wind- or bird-dispersed seeds. If no active management is employed, the site converts

gradually to early successional forest comprising young trees, shrubs, and herbs in a patchy mosaic, and is highly variable among locations. If invasive species are present - and in most cases they are - only manual removal, followed by close monitoring for newly established invasive plants, and judicious planting of native trees and shrubs can convert the site to a semblance of the reference state.

State and transition model

Figure 9. 142XY002 - Wet Clayplain

Figure 10. 142XY002 - Weta Clayplain

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 6. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height M	Canopy Cover (%)	Diameter Cm	Basal Area (square M/hectare)
Tree							
red maple	ACRU	<i>Acer rubrum</i>	Native	10.1-20.1	10-25	–	–
green ash	FRPE	<i>Fraxinus pennsylvanica</i>	Native	10.1-25	10-25	–	–
arborvitae	THOC2	<i>Thuja occidentalis</i>	Native	10.1-20.1	0-25	–	–
eastern hemlock	TSCA	<i>Tsuga canadensis</i>	Native	10.1-20.1	5-10	–	–
American elm	ULAM	<i>Ulmus americana</i>	Native	10.1-20.1	5-10	–	–
American basswood	TIAM	<i>Tilia americana</i>	Native	10.1-20.1	2-5	–	–
eastern white pine	PIST	<i>Pinus strobus</i>	Native	10.1-20.1	2-5	–	–
American beech	FAGR	<i>Fagus grandifolia</i>	Native	10.1-20.1	2-5	–	–
hophornbeam	OSVI	<i>Ostrya virginiana</i>	Native	–	2-5	–	–
shagbark hickory	CAOV2	<i>Carya ovata</i>	Native	10.1-20.1	2-5	–	–
slippery elm	ULRU	<i>Ulmus rubra</i>	Native	10.1-20.1	2-5	–	–

Table 7. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
inland sedge	CAIN11	<i>Carex interior</i>	Native	0.1-0.5	2-5
graceful sedge	CAGR2	<i>Carex gracillima</i>	Native	0.1-0.5	2-5
New England sedge	CANO4	<i>Carex novae-angliae</i>	Native	0.1-0.5	1-2
whitegrass	LEVI2	<i>Leersia virginica</i>	Native	–	–
Forb/Herb					
jewelweed	IMCA	<i>Impatiens capensis</i>	Native	0.1-0.5	2-5
eastern poison ivy	TORA2	<i>Toxicodendron radicans</i>	Native	0.1-0.5	1-2
white avens	GECA7	<i>Geum canadense</i>	Native	0.1-0.5	1-2
Appalachian barren strawberry	WAFR	<i>Waldsteinia fragarioides</i>	Native	0.1-0.5	1-2
waxflower shinleaf	PYEL	<i>Pyrola elliptica</i>	Native	0.1-0.5	1-2
broadleaf enchanter's nightshade	CILUC	<i>Circaea lutetiana ssp. canadensis</i>	Native	0.1-0.5	0.5-1
Jack in the pulpit	ARTR	<i>Arisaema triphyllum</i>	Native	0.1-0.5	0.5-1
parasol whitetop	DOUM2	<i>Doellingeria umbellata</i>	Native	0.1-0.5	0.5-1
littleleaf buttercup	RAAB	<i>Ranunculus abortivus</i>	Native	0.1-0.5	0.5-1
calico aster	SYLA4	<i>Symphyotrichum lateriflorum</i>	Native	0.1-0.5	0.5-1
white trillium	TRGR4	<i>Trillium grandiflorum</i>	Native	0.1-0.5	0.5-1
alpine violet	VILA10	<i>Viola labradorica</i>	Native	0.1-0.5	0.5-1

blisterwort	RARE2	<i>Ranunculus recurvatus</i>	Native	-	-
wild sarsaparilla	ARNU2	<i>Aralia nudicaulis</i>	Native	-	-
wrinkleleaf goldenrod	SORU2	<i>Solidago rugosa</i>	Native	-	-
Fern/fern ally					
sensitive fern	ONSE	<i>Onoclea sensibilis</i>	Native	0.1-0.5	1-2
eastern marsh fern	THPA	<i>Thelypteris palustris</i>	Native	0.1-0.5	1-2
bulblet bladderfern	CYBU3	<i>Cystopteris bulbifera</i>	Native	0.1-0.5	1-2
New York fern	THNO	<i>Thelypteris noveboracensis</i>	Native	0.1-0.5	1-2
common ladyfern	ATFI	<i>Athyrium filix-femina</i>	Native	0.1-0.5	1-2
spinulose woodfern	DRCA11	<i>Dryopteris carthusiana</i>	Native	0.1-0.5	0.5-1
mountain woodfern	DRCA3	<i>Dryopteris campyloptera</i>	Native	-	-
Shrub/Subshrub					
Morrow's honeysuckle	LOMO2	<i>Lonicera morrowii</i>	Introduced	2-4.9	5-10
Tatarian honeysuckle	LOTA	<i>Lonicera tatarica</i>	Introduced	0.1-0.5	2-5
southern arrowwood	VIDE	<i>Viburnum dentatum</i>	Native	0.1-0.5	1-2
European cranberrybush	VIOP	<i>Viburnum opulus</i>	Native	0.1-0.5	0.5-1
common winterberry	ILVE	<i>Ilex verticillata</i>	Native	-	-
Tree					
American hornbeam	CACA18	<i>Carpinus caroliniana</i>	Native	2-4.9	10-25
green ash	FRPE	<i>Fraxinus pennsylvanica</i>	Native	2-4.9	2-5
eastern hemlock	TSCA	<i>Tsuga canadensis</i>	Native	2-4.9	1-2

Table 8. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 2.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
corn	ZEMA	<i>Zea mays</i>	Introduced	-	-

Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 3.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
rufous bulrush	SCPE4	<i>Scirpus pendulus</i>	Native	0.5-1.5	-
blackgirdle bulrush	SCAT4	<i>Scirpus atrocinctus</i>	Native	0.5-1.5	-
green bulrush	SCAT2	<i>Scirpus atrovirens</i>	Native	0.5-1.5	-
red clover	TRPR2	<i>Trifolium pratense</i>	Introduced	-	-
timothy	PHPR3	<i>Phleum pratense</i>	Introduced	0.5-1.5	-

Table 13. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 14. Community 4.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height M	Canopy Cover (%)	Diameter Cm	Basal Area (square M/hectare)
Tree							
green ash	FRPE	<i>Fraxinus pennsylvanica</i>	Native	10.1-15.2	20-40	–	–
slippery elm	ULRU	<i>Ulmus rubra</i>	Native	10.1-15.2	20-40	–	–

Table 15. Community 4.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
graceful sedge	CAGR2	<i>Carex gracillima</i>	Native	0.5-1	–
fox sedge	CAVU2	<i>Carex vulpinoidea</i>	Native	0.5-1	–
Forb/Herb					
Canada goldenrod	SOCA6	<i>Solidago canadensis</i>	Native	0.5-1	–
Canada goldenrod	SOAL6	<i>Solidago altissima</i>	Native	0.5-1	–
candle anemone	ANCY	<i>Anemone cylindrica</i>	–	0.5-1	–
broadleaf enchanter's nightshade	CILUC	<i>Circaea lutetiana ssp. canadensis</i>	Native	0.5-1	–
Shrub/Subshrub					
Morrow's honeysuckle	LOMO2	<i>Lonicera morrowii</i>	Introduced	1-3	–
European cranberrybush	VIOP	<i>Viburnum opulus</i>	Introduced	1-3	–
common buckthorn	RHCA3	<i>Rhamnus cathartica</i>	Introduced	1-3	–
Tree					
sugar maple	ACSA3	<i>Acer saccharum</i>	Native	1-3	–
arborvitae	THOC2	<i>Thuja occidentalis</i>	Native	1-3	–
eastern redcedar	JUVI	<i>Juniperus virginiana</i>	Native	1-3	–
Vine/Liana					
Virginia creeper	PAQU2	<i>Parthenocissus quinquefolia</i>	Native	0.5-1	–

Animal community

Source: Thompson and Sorenson 2000) Mammals characteristic of this site include gray squirrel, eastern chipmunk, raccoon, and white-tailed deer. Beaver also frequent this site where it is associated with standing water. Common birds include wood thrush, eastern wood peewee, ovenbird, northern oriole, and downy woodpecker. Amphibians associated with this site include blue-spotted salamander, American toad, wood frog, and green treefrog. Where vernal pools occur within this site, invertebrates such as caddis flies, predaceous diving beetles, and horsehair worms can be found. Animals associated with Kiviat and Stevens (2001) Wet Clay Meadow: included amphibians American toad and spotted salamander. Associated birds included Virginia rail, American woodcock, alder flycatcher, sedge wren, vesper sparrow, Henslow's sparrow, and orchard oriole. The Baltimore checkerspot is a potentially occurring butterfly.

Hydrological functions

The poorly drained soils cause surface water to pool in low-lying areas.

Recreational uses

This site has limited use for recreation other than occasional hiking.

Wood products

This site has limited use for wood products except as a by-product of clearing for agriculture.

Other products

This site has deep, fertile soils that are heavily used for agriculture.

Other information

Conservation Status of clayplain forest is high.

Inventory data references

The data contained in this document is derived from the analysis of field inventories (relevé plots and reconnaissance notes collected by NatureServe with the assistance of MLRA Soil Survey Office 12-TOL, 12-PAS, 12-AMH and the VT NRCS State Office. Five high intensity plots were conducted for the reference state. This information was supplemented by plot data from Vermont Natural Heritage Program.

Other references

REFERENCES

Kiviat, E. and G. Stevens. 2001. Biodiversity assessment manual for the Hudson River Estuary Corridor. Hudsonia Ltd. New York State Department of Environmental Conservation, Albany, New York. 508 pp.

Thompson, E. H., and E. R. Sorenson. 2000. Wetland, woodland, wildland: A guide to the natural communities of Vermont. The Nature Conservancy and the Vermont Department of Fish and Wildlife. University Press of New England, Hanover, NH. 456 pp.

Edinger, G.J., D.J. Evans, S. Gebauer, T.G. Howard, D.M. Hunt, and A.M. Olivero (editors). 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.

Contributors

Joshua Hibit

Approval

Greg Schmidt, 10/03/2024

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	07/11/2026
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:
