USDA Natural Resources
Conservation Service

Ecological site F144BY301ME
Loamy Till Swamp

Last updated: 9/27/2024
Accessed: 05/12/2025

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 144B–New England and Eastern New York Upland, Northern Part

This major land resource area (MLRA) is in Maine (56 percent), New Hampshire (22 percent), Vermont (14 percent), Massachusetts (6 percent), Connecticut (1 percent), and New York (1 percent). It makes up about 22,728 square miles (58,864 square kilometers). The MLRA consists of a relatively young landscape shaped by the Laurentide Ice Sheet, which covered the region from 35,000 to 10,000 years ago. Rolling hills of dense basal till converge on ridges of shallow bedrock that were scoured by glacial ice. River valleys that were flooded by melting glacial water or seawater house large expanses of glacial outwash and stratified drift in inland areas and, to a lesser extent, glaciomarine and glaciolacustrine sediment deposits in coastal areas. Organic bogs, ablation till, and alluvial flood plains make up the remaining portions of the MLRA.

The soils in this region are dominantly Entisols, Spodosols, and Inceptisols. They commonly have a fragipan. The dominant suborders are Ochrepts, Orthods, Aquepts, Fluvents, and Saprists. The soils in the region dominantly have a frigid soil temperature regime with some cryic areas at higher elevation, a udic soil moisture regime, and mixed mineralogy. Most of the land is forested, and 98 percent is privately owned. Significant amounts of forest products are produced including lumber, pulpwood, Christmas trees, and maple syrup. Principal agricultural crops include forage and grains for dairy cattle, potatoes, apples, and blueberries. Wildlife habitat and recreation are important land uses. Stoniness, steep slopes, and poor drainage limit the use of many of the soils.

Classification relationships

NRCS:
Land Resource Region: R—Northeastern Forage and Forest Region
MLRA: 144B—New England and Eastern New York Upland, Northern PartMLRA resources Major Land Resource Area (MLRA): 144B–New England and Eastern New York Upland, Northern Part

Ecological site concept

This site occurs on relatively flat to gentle slopes (0-8%) or on toeslopes where groundwater saturates the soil for much of the growing season and sometimes emerges at the surface. Small seepage rivulets are often evident. Soils formed in lodgment till and are poorly- to very poorly-drained. Soil textures are loamy with a mucky peat surface, and a densely compacted horizon within ~43 inches of the soil surface. The water table is usually within 12 inches of the soil surface in spring and fall, and may lower somewhat during dry summer periods. The soil surface is characterized by pit and mound topography, with ponding and thick organic matter accumulation in the pits, and drier soil conditions on the mounds where most trees are rooted.
The reference state is characterized by abundant Northern white cedar, or in southern areas by Atlantic white cedar. Further study is required to distinguish between northern and southern variants. Selective logging practices should be done when the ground is frozen to avoid churning the wet soils. Hydrologic changes due to beaver activity or man-made structure may cause year-round ponding, resulting in alternative states.

Associated sites

F144BY305ME	**Wet Loamy Flat** The Wet Loamy Flat site occurs on poorly-drained flats, which are somewhat drier and may occur upslope from the Loamy Till Swamp. Wet Flats support more spruce and less cedar.
F144BY502ME	**Loamy Till Toeslope** The Loamy Till Toeslope site often occurs upslope of the Loamy Till Swamp, where soils are somewhat poorly- and poorly-drained, rather than poorly- and very poorly-drained. The Loamy Till Toeslope supports hardwood-dominant mixedwood forests rather than cedar- dominanted forests.
F144BY302ME	**Mucky Swamp** The Mucky Peat Swamp often occurs downslope of the Loamy Till Swamp as all soils become very poorly drained and soil surface organic layer increases to greater than 16 inches.

Similar sites

F144BY302ME	**Mucky Swamp** Both the Mucky Peat Swamp and the Loamy Till Swamp are dominated by northern white cedar, but the Mucky Peat Swamp is wetter, has a thicker organic soil surface layer, and typically has a more open canopy, allowing more light to reach the forest floor. As a result, the understory is often more productive in the Mucky Peat Swamp.
F144BY303ME	**Acidic Swamp** The Acidic Swamp site has a similar complex of poorly- and very poorly-drained soils, but tends to be wetter, more acidic, and usually has coarser soil textures and weak or non-existent dense compacted layer compared to the Loamy Till Swamp site. The Acidic Swamp is dominated by black spruce rather than northern white cedar.

Table 1. Dominant plant species

Tree	(1) *Acer rubrum* (2) *Abies balsamea*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site typically occurs at the base of watersheds on relatively flat, wet, till landforms at elevations less than 2,500 feet. The water table is within 12 inches of the soil surface most of the year, but may drop to lower levels during June-September. Slopes are typically less than 3 percent, but may be as high as 8 percent if soils remain sufficiently wet.

This site is characterized by pit-and-mound surface topography resulting from centuries of tree blow-downs. Tipped up tree roots create a small pit, and deposit removed soil next to the pit as the exposed roots decay. The pits are very poorly-drained and typically ponded during wet periods, while the mounds are poorly-drained and do not experience ponding.

Table 2. Representative physiographic features

Landforms	(1) Till plain > Ground moraine (2) Upland > Till plain (3) Depression (4) Bog
Runoff class	Very low to high
Flooding frequency	None
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	0–3,559 ft

Slope	0–8%
Water table depth	0–9 in
Aspect	Aspect is not a significant factor

Climatic features

The climate is humid and temperate and is characterized by warm summers and cold winters. Precipitation generally is evenly distributed throughout the year. Near the coast, it is slightly lower in summer. In inland areas, it is slightly higher in spring and fall. Rainfall occurs during high-intensity, convective thunderstorms in summer. In winter, most of the precipitation occurs as moderate-intensity storms (northeasters) that produce large amounts of rain or snow. Heavy snowfalls commonly occur late in winter. Temperatures and the length of the freeze-free period increase from north to south and closer to the coast.

This major land resource area (MLRA) covers four states and may have substantial climate variability among locations: Maine (56 percent), New Hampshire (22 percent), Vermont (14 percent), Massachusetts (6 percent), Connecticut (1 percent), and New York (1 percent).

Table 3. Representative climatic features

Frost-free period (characteristic range)	117-140 days
Freeze-free period (characteristic range)	144-170 days
Precipitation total (characteristic range)	42-48 in
Frost-free period (actual range)	98-146 days
Freeze-free period (actual range)	133-180 days
Precipitation total (actual range)	40-54 in
Frost-free period (average)	126 days
Freeze-free period (average)	159 days
Precipitation total (average)	46 in

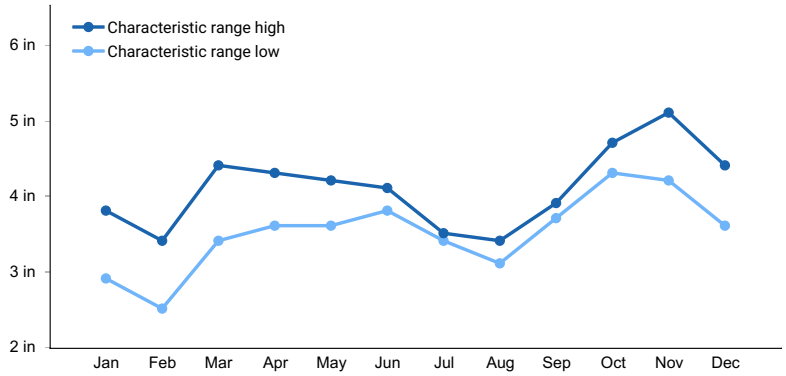


Figure 1. Monthly precipitation range

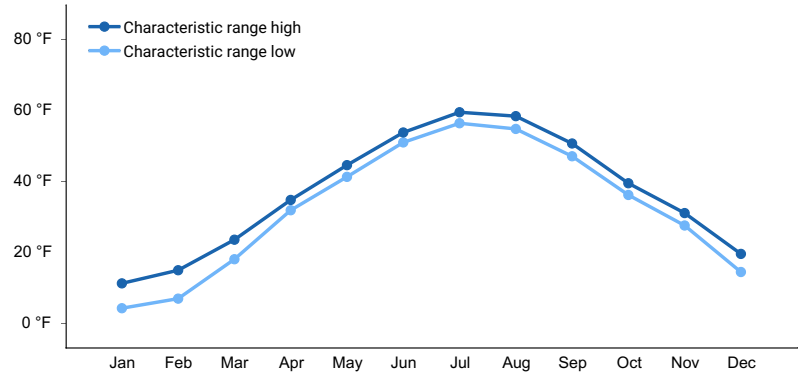


Figure 2. Monthly minimum temperature range

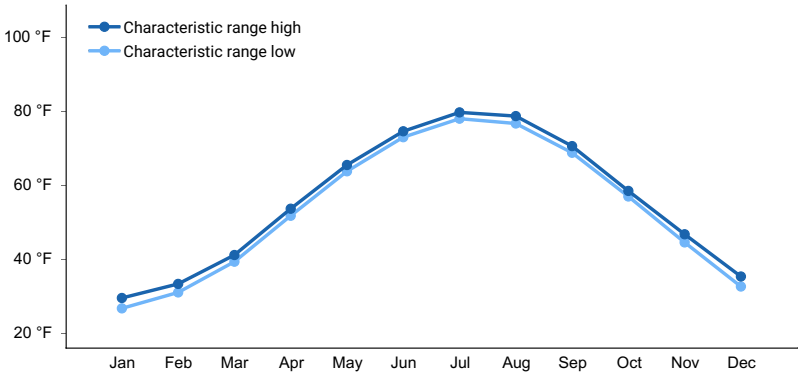


Figure 3. Monthly maximum temperature range

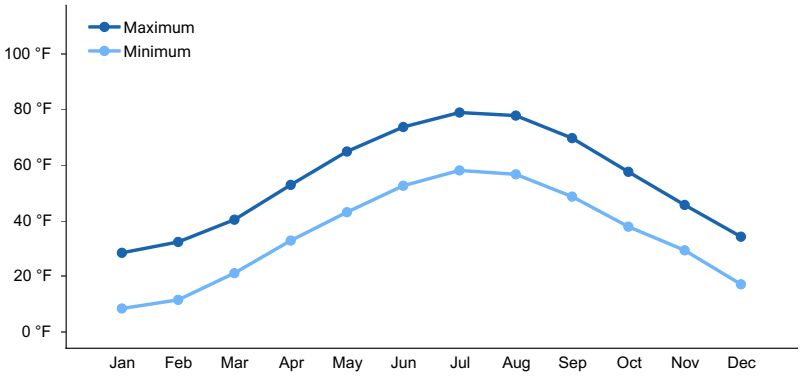


Figure 4. Monthly average minimum and maximum temperature

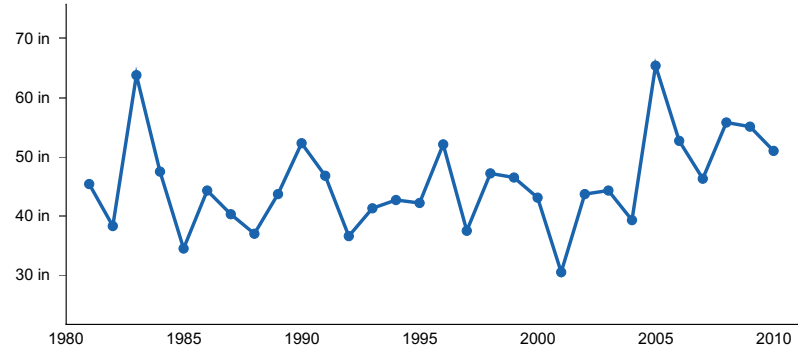


Figure 5. Annual precipitation pattern

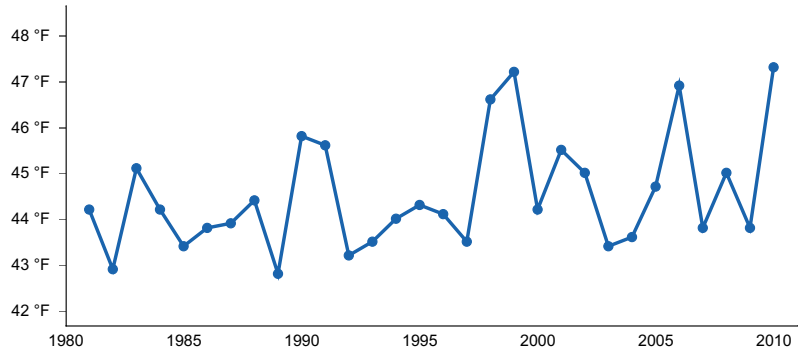


Figure 6. Annual average temperature pattern

Climate stations used

- (1) AUGUSTA STATE AP [USW00014605], Augusta, ME
- (2) BANGOR INTL AP [USW00014606], Bangor, ME
- (3) PORTLAND INTL JETPORT [USW00014764], Portland, ME
- (4) BELFAST [USC00170480], Belfast, ME
- (5) ACADIA NP [USC00170100], Bar Harbor, ME
- (6) CORINNA [USC00171628], Corinna, ME
- (7) DOVER-FOXCROFT WWTP [USC00171975], Dover Foxcroft, ME
- (8) FARMINGTON [USC00172765], Farmington, ME
- (9) GARDINER [USC00173046], Gardiner, ME
- (10) JONESBORO [USC00174183], Addison, ME
- (11) LEWISTON [USC00174566], Auburn, ME
- (12) MADISON [USC00174927], Anson, ME
- (13) NEWCASTLE [USC00175675], Newcastle, ME
- (14) ORONO [USC00176430], Old Town, ME
- (15) WATERVILLE TRTMT PLT [USC00179151], Waterville, ME
- (16) WEST ROCKPORT 1 NNW [USC00179593], Rockport, ME

Influencing water features

This site is a forested wetland, characterized by a dense, compacted till layer in the subsoil that perches water for much of the growing season. Additional water enters this site as run-in from the watershed above. Gentle slopes allow water to pass slowly through the soil and carry oxygen and nutrients through the plant rooting zone before exiting the site downslope to even wetter, flatter sites below.

Wetland description

Wetland Description: Cowardin
System: Palustrine
Subsystem: N/A
Class: Unknown

Soil features

The soils of this site are poorly- and very poorly-drained with a high water table in the spring and fall. They formed in lodgment till derived from granite, mica schist, phyllite and similar parent materials. This site may also occur over more calcareous bedrock types. They have a characteristic mucky-peat surface horizon, underlain by loamy till and a densely-compacted till layer 5-43 inches below the loamy till material. Soil textures are usually silt loam, fine sandy loam, or loam, with few rock fragments. The dense horizon is typically loamy in texture and may have up to 30% rock fragments by volume. This site occurs on soils with wide-ranging soil pH, but is most likely to occur where soil pH is between 5.0 and 6.5.

This site tends to occur on soil complexes in pit and mound topography, such as consisting of one poorly-drained

Monarda soils on the mounds and very poorly-drained Brayton soils in the pits. The soil surface organic matter is thicker in the pits than on the mounds.

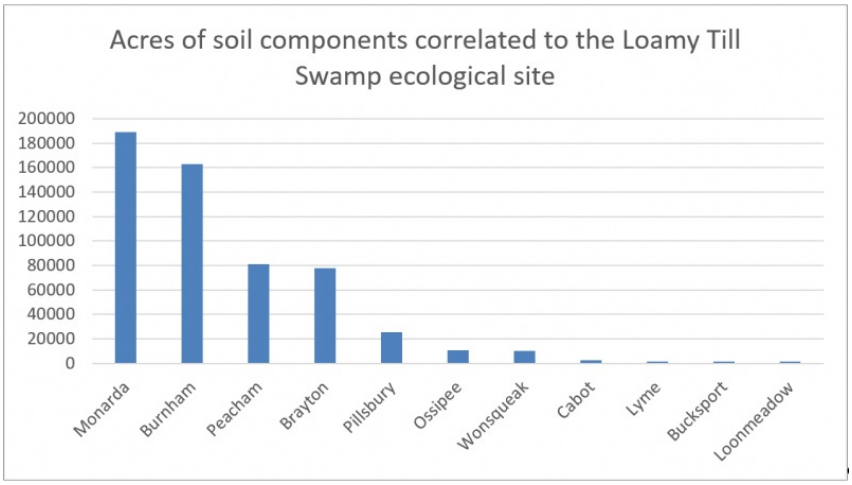


Figure 7.

Table 4. Representative soil features

Parent material	(1) Lodgment till–schist (2) Organic material (3) Herbaceous organic material
Surface texture	(1) Silt loam (2) Fine sandy loam (3) Loam
Drainage class	Poorly drained to very poorly drained
Permeability class	Very slow to slow
Soil depth	5–43 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	2–9%
Available water capacity (3-21in)	Not specified
Soil reaction (1:1 water) (3.6-7.3in)	Not specified
Subsurface fragment volume <=3" (9-52in)	Not specified
Subsurface fragment volume >3" (5-6in)	Not specified

Ecological dynamics

[Caveat: The vegetation information contained in this section and is only provisional, based on concepts, and future projects support validation through field work. *] The vegetation groupings described in this section are based on the terrestrial ecological system classification and vegetation associations developed by NatureServe (Comer et al., 2003) and localized associations provided by the New York Natural Heritage Program (Edinger et al., 2014), Maine Natural Areas Program (Gawler and Cutko, 2010), New Hampshire Natural Heritage Program (Sperduto and Nichols, 2011), and Massachusetts Division of Fisheries and Wildlife (Swain, 2020).

This site is characterized by groundwater saturation of mineral soils with a mucky surface layer, typically occurring at the base of slopes. The reference state is a mature coniferous forest primarily dominated by northern white cedar, or in southern areas by Atlantic white cedar. Further study is required to distinguish between northern and southern variants. Logging during the growing season can cause lasting damage by churning and rutting the wet soils. For this reason, this site is typically harvested when the ground is frozen. Harvests have often targeted spruce

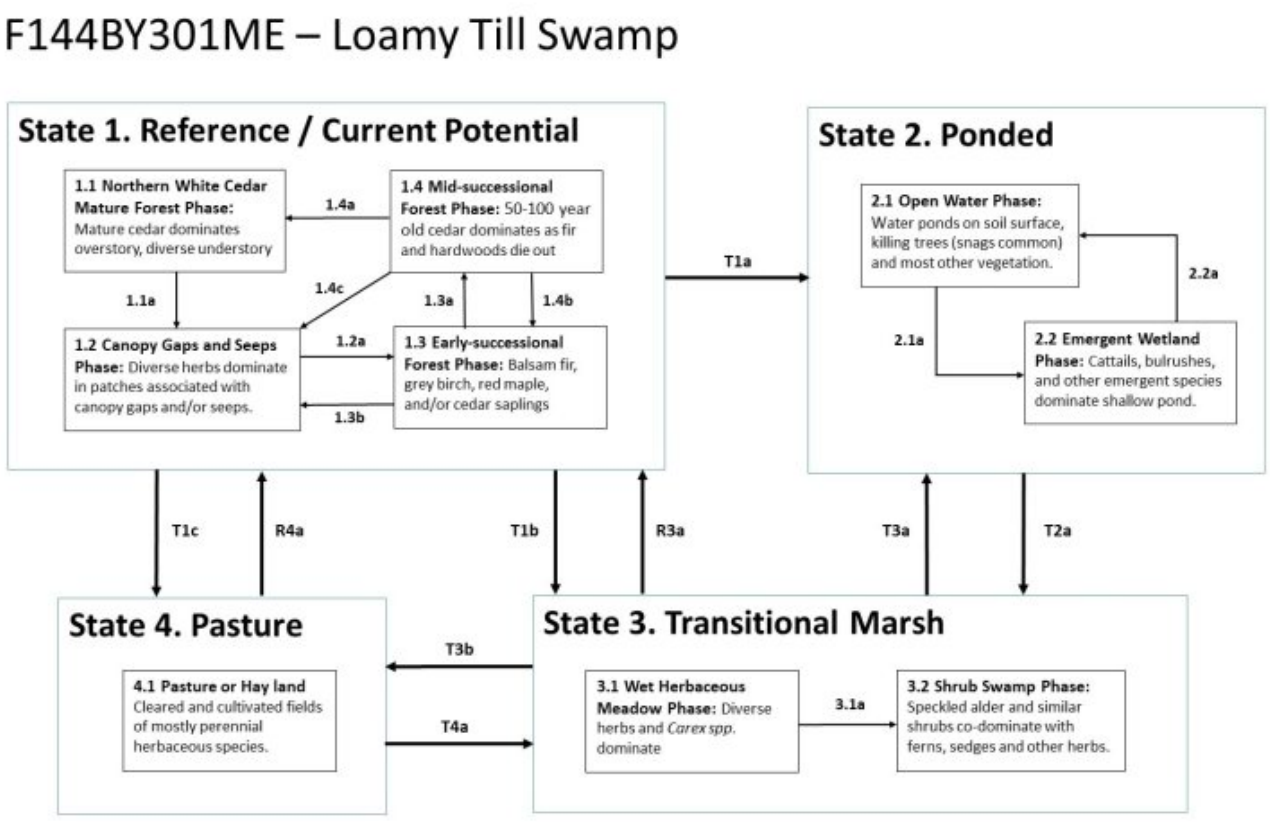
removal, though cedar is sometimes taken from these areas. Selective harvests do not generally convert the site to a different state.

Altered hydrology, in the form of ponding or draining, can greatly alter the ecological functioning of this site. Beaver dams, roads, or other structures can cause natural ponding that kills trees. Removal of dams and man-made structures that restores hydrologic function can lead to natural succession by emergent wetland plants, herbaceous plants, shrubs, and eventually cedar re-establishment. Draining and ditching along with tree cover removal, can convert the site to hayfield and pasture, with varying degrees of ponding, depending on the extent of hydrological alteration.

Other disturbances occurring on this site are of natural origin, including wind, ice, and snow damage. Natural canopy gaps form with individual tree fall, leading to greater sunlight exposure to the understory and an increase of shrub cover. Woodland seepage communities can occur in patches within this site, particularly in areas where emerging groundwater creates an unstable rooting substrate that does not support tall trees. These seepage communities may be shaded by adjacent trees rooted in less saturated conditions.

Relationship to Other Classification Systems
This site includes the following state natural heritage program types:
• Northern White Cedar Seepage Forest (Sperduto and Nichols 2004)
• Evergreen Seepage Forest (Gawler and Cutko 2010)
• Atlantic White Cedar Swamp (Gawler and Cutko 2010)
• Northern White Cedar Swamp (Gawler and Cutko 2010)
• Northern White Cedar Sloping Seepage Variant of Northern White Cedar Swamp (Thompson and Sorenson 2000)

State and transition model



State 1
Reference State/Current Potential

Community 1.1
Northern White Cedar Mature Forest Phase

Mature cedar dominates overstory, diverse understory

Community 1.2
Canopy Gaps and Seeps Phase

Diverse herbs dominate in patches associated with canopy gaps and/or seeps

Community 1.3
Early-successional Forest Phase

Balsam fir, grey birch, red maple, and/or cedar saplings

Community 1.4
Mid-successional Forest Phase

50-100 year old cedar dominates as fir and hardwoods die out

Pathway 1.1a
Community 1.1 to 1.2

Seep, patch cut, or blowdown that increase soil wetness and light availability

Conservation practices

Wetland Wildlife Habitat Management
Wetland Enhancement
Forest Land Management

Pathway 1.2a
Community 1.2 to 1.3

Time, vegetation development

Conservation practices

Wetland Wildlife Habitat Management
Forest Land Management

Pathway 13b
Community 1.3 to 1.2

Seep, patch cut, or blowdown that increase soil wetness and light availability

Conservation practices

Wetland Wildlife Habitat Management
Forest Land Management

Pathway 1.3a
Community 1.3 to 1.4

Time, vegetation development

Conservation practices

Wetland Wildlife Habitat Management
Forest Land Management

Pathway 1.4a
Community 1.4 to 1.1

Time, vegetation development

Conservation practices

Wetland Wildlife Habitat Management
Forest Land Management

Pathway 1.3b
Community 1.4 to 1.2

Seep, patch cut, or blowdown that increase soil wetness and light availability

Conservation practices

Wetland Wildlife Habitat Management
Forest Land Management

Pathway 1.4b
Community 1.4 to 1.3

selective tree harvest

Conservation practices

Forest Land Management

State 2
Ponded

Community 2.1
Open Water Phase

Water ponds on soil surface, killing trees (snags common) and most other vegetation

Community 2.2
Emergent Wetland Phase

Cattails, bulrushes, and other emergent species dominate shallow pond

Pathway 2.1a
Community 2.1 to 2.2

Sediment accretion and/or hydrologic change (due to removal of roads, dams, etc.) resulting in shallow enough ponding to support emergent vegetation.

Conservation practices

Wetland Wildlife Habitat Management

Wetland Enhancement

Pathway 2.2a
Community 2.2 to 2.1

Hydrologic change (due to beaver activity, roads, dams, etc.) raises water level, kills existing vegetation, and ponds water year-round.

Conservation practices

Dike
Wetland Wildlife Habitat Management

State 3
Transition Marsh

Community 3.1
Wet Herbaceous Meadow Phase

Diverse herbs and Carex spp. dominate

Community 3.2
Shrub Swamp Phase

Speckled alder and similar shrubs co-dominate with ferns, sedges and other herbs

Pathway 3.1a
Community 3.1 to 3.2

Time, vegetation development

State 4
Pasture

Community 4.1
Pasture or Hay land

Cleared and cultivated fields of mostly perennial herbaceous species

Transition T1a
State 1 to 2

Hydrologic change (due to beaver activity, roads, dams, etc.) raises water level, kills existing vegetation, and ponds water year-round.

Conservation practices

Dike
Wetland Wildlife Habitat Management
Wetland Enhancement

Transition T1b
State 1 to 3

Extensive harvest reduces canopy cover and water use by trees, increasing soil wetness and promoting herbs and

shrubs.

Conservation practices

Wetland Wildlife Habitat Management
Wetland Enhancement
Forest Land Management

Transition T1c
State 1 to 4

Pastureland creation

Conservation practices

Wetland Wildlife Habitat Management
Wetland Enhancement
Forest Land Management

Transition T2a
State 2 to 3

Hydrologic change (due to removal of roads, dams, etc.) and/or sediment accretion resulting in non-ponded conditions for most of the growing season

Conservation practices

Wetland Wildlife Habitat Management
Wetland Enhancement

Restoration pathway R3a
State 3 to 1

Time, vegetation development

Conservation practices

Wetland Wildlife Habitat Management
Wetland Enhancement

Restoration pathway T3a
State 3 to 2

Hydrologic change (due to beaver activity, roads, dams, etc.) raises water level, kills existing vegetation, and ponds water year-round.

Conservation practices

Wetland Wildlife Habitat Management
Wetland Enhancement

Transition T3b
State 3 to 4

convert to pastureland species

Conservation practices

Incorporate native grasses and/or legumes into 15% or more of the forage base

Restoration pathway R4a
State 4 to 1

Time, vegetation development

Conservation practices

Wetland Wildlife Habitat Management
Wetland Enhancement
Forest Land Management

Restoration pathway T4a
State 4 to 3

Abandonment

Conservation practices

Wetland Wildlife Habitat Management
Wetland Enhancement

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

Christopher Mann

Approval

Nels Barrett, 9/27/2024

Acknowledgments

Nels Barrett and Nick Butler provided considerable review of this ecological site concept.

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	06/29/2020
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:**

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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):**

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:**