Ecological site F090BY012WI
Moist Clayey Lowland

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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): 090B–Central Wisconsin Thin Loess Dissected Till Plain

The Wisconsin and Minnesota Thin Loess MLRA, Northern and Southern Parts (90A and 90B) correspond closely to the North Central Forest and the Forest Transition Ecological Landscapes, respectively. Some of the following brief overview is borrowed from the Wisconsin Department of Natural Resources ecological landscape publications (2015). The Wisconsin and Minnesota Thin Loess MLRA, Northern and Southern Parts (90A and 90B) is an extensive glacial landscape that comprised of over 11.1 million acres (17,370 sq mi) throughout central and northern Wisconsin – about 27% of the total land area in the state. This glacial landscape is comprised of a heterogenous mix of loess-capped ground moraines, end moraines with eskers and ice-walled lake plains, and pitted, unpitted, and collapsed outwash plains sometimes interspersed with drumlins from the Illinoian and Pre-Illinoian glaciations. The entire area has been glaciated and nearly all of it is underlain by dense glacial till that impedes drainage. An extensive morainal system – the Perkinstown end moraine – spans most of the width of northern Wisconsin and divides the Northern and Southern Parts of this large landscape. This moraine, which has been sliced by outwash in many places, marks the southernmost extent of the Wisconsin glaciation (Wisconsin's most recent glacial advance). North of the Perkinstown morainal system is a loess plain, with a loess mantle 6-24 inches thick. The northernmost edge of this landscape is an undulating till and outwash plain with materials deposited by the Chippewa Lobe. Drumlins are common in the northern and northeastern portions. The drumlins are oriented towards the southwest and formed during a glacial episode prior to the most recent glacial advance. Some are covered with glacial till. Pitted, unpitted, and collapsed outwash plains fill the spaces between drumlins. Detached from the major land mass to the northeast is the hummocky Hayward collapsed end moraines, where swamps, ice-walled lake plains, and eskers are common. Most of the MLRA to the south of the Perkinstown morainal system is an extensive ground moraine with some proglacial stream features including pitted outwash plains, terraces, and fans. A layer of loess 6 -47 inches thick covers much of the area. Like the Northern Part, all areas of the Southern Part of this MLRA were glaciated, although the southcentral portion is a relatively older till plain with materials from the Illinoian and pre-Illinoian glaciations, not the most recent Wisconsin glaciation. The landforms in the southcentral portion are highly variable. Much of the area topography is controlled by underlying bedrock. Sandstone outcrops and pediments can be found here. Some of the most southern portions of the MLRA are mixed glacial deposits and residuum. The land surface of the southeastern portion was formed by many small glacial advances and retreats. Morainal ridges protrude through an erosional, pitted outwash-mantled surface. These parallel ridges run in a northeast to southwest orientation and are dissected by many steams. The continental climate of this MLRA is typical of northcentral Wisconsin, with cold winters and warm summers. The southern boundary of this MLRA straddles Wisconsin's Tension Zone, a zone of transition between Wisconsin's northern and southern ecological landscapes. Historically, the mesic forests were dominated by eastern hemlock (Tsuga canadensis), sugar maple (Acer saccharum), and yellow birch (Betula alleghaniensis).

Classification relationships

Major Land Resource Area (MLRA): Wisconsin and Minnesota Thin Loess and Till (Northern and Southern Parts - 90A and 90B) USFS Subregions: Rib Mountain Rolling Ridges (212Qd) Small sections occur in Mille Lacs Uplands (212Kb), Bayfield Sand Plains (212Ka), St. Croix Moraine (212Qa) Wisconsin DNR Ecological Landscapes: Forest Transition, North Central Forest, Northwest Lowlands, Northwest Sands

Ecological site concept

The Moist Clayey Lowland ecological site is found primarily in two small areas on the southern and west borders of MLRAs 90A and 90B, located on lake plains. These sites are characterized by very deep, somewhat poorly drained soils that formed in lacustrine deposits. Precipitation, runoff from adjacent upland, and groundwater discharge are the primary sources of water. Soils range from very strongly acid to moderately alkaline. Moist Clayey Lowland is distinguished from other ecological sites based on its clayey texture and somewhat poor drainage. Other somewhat poorly drained sites have sandy or loamy deposits. The clayey materials often have higher pH and available water capacity than coarser materials. The somewhat poor drainage differentiates this site from other clayey sites.

Associated sites

F090BY007WI	**Wet Clayey Lowland** Wet Clayey Lowland form in deep, loamy to clayey deposits derived from a mixture of alluvium, residuum, till, or lacustrine sources. These sites have a seasonally high water table at the surface, and some are subject to occasional ponding. Sustained saturation is enough for hydric conditions to occur. They are wetter and occur lower on the drainage sequence than Moist Clayey Lowland.
F090BY017WI	**Clayey Upland** Clayey Upland consist of loamy to clayey residuum or lacustrine deposits overlain by loess or sandy outwash. Bedrock contact may occur within two meters of the surface. These sites have a seasonally high water table within one meter of the surface, though they are not saturated for sustained periods. They are drier and occur higher on the drainage sequence than Moist Clayey Lowland.

Similar sites

F090BY011WI	**Moist Loamy Lowland** Moist Loamy Lowland consist of deep sandy and loamy deposits derived from a mixture of alluvium, residuum, till, or lacustrine sources. The finer textures allow the soil to stay moist - but not saturated - for sustained periods during the growing season. They are found in similar landscape positions with the same drainage class as Moist Clayey Lowland, but with finer particle sizes.
F090BY010WI	**Moist Loamy Lowland with Carbonates** Moist Loamy Lowland with Carbonates consists of deep loamy till, sometimes with a loess mantle. Carbonates are present in these soils. The finer textures allow the soil to stay moist - but not saturated - for sustained periods during the growing season. They are found in similar landscape positions with the same drainage class as Moist Clayey Lowland, but with finer particle sizes.
F090BY008WI	**Moist Sandy Bedrock Upland** Moist Sandy Bedrock Upland sites consist of sandy to clayey alluvium, till, or eolian deposits over residuum weathered from bedrock. Bedrock contact occurs within two meters of the surface. Sites have seasonally high water table within a meter of the surface. Perching of the water table may occur as a result of bedrock contact. They are found in similar landscape positions with the same drainage class as Moist Clayey Lowland, often with finer particle sizes.

Table 1. Dominant plant species

Tree	(1) *Acer rubrum* (2) *Acer saccharum*
Shrub	(1) *Ribes*
Herbaceous	(1) *Parthenocissus quinquefolia* (2) *Geranium maculatum*

Physiographic features

This site occurs on lake plains. Slopes range from 0 to 3 percent.

These sites are not subject to ponding or flooding. Soils have a perched seasonally high water table (episaturation) at depths of 6 to 12 inches but can drop below 80 inches during dry conditions. Runoff is low medium.

Table 2. Representative physiographic features

Hillslope profile	(1) Summit (2) Backslope (3) Footslope (4) Shoulder
Slope shape across	(1) Concave (2) Convex
Slope shape up-down	(1) Linear
Landforms	(1) Lake plain
Runoff class	Low to medium
Flooding frequency	None
Ponding frequency	None
Elevation	220 – 260 m
Slope	0 %
Water table depth	20 – 30 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate of the expansive Wisconsin and Minnesota Thin Loess and Till Plain is highly variable. The eco-climatic zone (the “Tension Zone”) that runs southeast-northwest across the state splits the MLRA. In general, the MLRA has cold winters and warm summers with an adequate amount of precipitation. Near Lake Superior, precipitation and temperature tend to increase. The far western section of the MLRA, known as the western prairie ecological landscape by the Wisconsin DNR, has warmer temperatures compared to the rest of the MLRA because it falls below the eco-climatic zone. The soil moisture regime of MLRA is udic (humid climate). The soil temperature regime is frigid and cryic.

The average annual precipitation for this ecological site is 31 inches. The average annual snowfall is 52 inches. The annual average maximum and minimum temperatures are 54°F and 34°F, respectively.

Table 3 Representative climatic features

Frost-free period (characteristic range)	80-110 days
Freeze-free period (characteristic range)	120-140 days
Precipitation total (characteristic range)	740-810 mm
Frost-free period (actual range)	40-120 days
Freeze-free period (actual range)	90-150 days
Precipitation total (actual range)	710-890 mm
Frost-free period (average)	90 days
Freeze-free period (average)	120 days
Precipitation total (average)	790 mm

- (1) HOLCOMBE [USC00473698], Holcombe, WI
- (2) ROSHOLT 9 NNE [USC00477349], Wittenberg, WI
- (3) LAONA 6 SW [USC00474582], Laona, WI
- (4) STAMBAUGH 2SSE [USC00207812], Iron River, MI
- (5) PARK FALLS DNR HQ [USC00476398], Park Falls, WI
- (6) BIG FALLS HYDRO [USC00470773], Glen Flora, WI
- (7) COUDERAY 7 W [USC00471847], Stone Lake, WI
- (8) ISLE 12N [USC00214103], Isle, MN
- (9) MOOSE LAKE 1 SSE [USC00215598], Moose Lake, MN
- (10) MILACA [USC00215392], Milaca, MN

Influencing water features

Water is received through precipitation, runoff from adjacent uplands, and groundwater discharge. Water levels are greatly influenced by precipitation rates and runoff from upland sites. Water leaves the site primarily through runoff, evapotranspiration, and groundwater recharge.

Wetland description

Permeability of these sites is very low.
Hydrologic Group: D, C/D
Hydrogeomorphic Wetland Classification: None
Cowardin Wetland Classification: None

Soil features

These sites are represented by the Alango and Siren soil series, classified as Chromic Vertic Epiaqualfs and Aquic Glossudalfs, respectively.

These soils formed in lacustrine deposits. Soils are very deep and somewhat poorly drained. They do not meet hydric requirements.

The surface textures of these sites is clay loam or loam. Subsurface textures include clay, sandy loam, and sandy clay loam. Soil pH ranges from very strongly acid to moderately alkaline with values of 4.8 to 8.3. Carbonates are present up to 25 percent beginning at 28 inches.

Table 4. Representative soil features

Parent material	(1) Lacustrine deposits
Surface texture	(1) Loam (2) Clay loam
Drainage class	Somewhat poorly drained
Permeability class	Very slow
Soil depth	200 – 250 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-154.9cm)	7.14 – 8.64 cm
Calcium carbonate equivalent (0-100.1cm)	0 – 30 %
Soil reaction (1:1 water) (0-100.1cm)	4.8 – 8.3
Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

Mature forests on this ecological site were likely composed of a mixture of Sugar maple, Red maple, Basswood, Ashes, and Yellow birch. Several other associates including elms, oaks, and White birch may occur as well. White pine may be present in some stands as well. Shrub layers are usually poorly developed or altogether absent on this ES and may only contain gooseberries. Ground flora is likely to consist of ferns, jewelweed, hog peanut, wild geranium, virginia creeper, and sweet cicely.

While these sites at present are wetter than may be optimal for Sugar maple, once established in full succession canopy trees are likely to “dry” the site due to increased evapotranspiration allowing Sugar maple to become a dominant canopy member on these sites. The opposite condition of “swamping” has been noted on these sites, where heavy cutting on these sites leads to an elevated water table. Due to their connection to water table elevation, soil wetness, and evapotranspiration of a full canopy these sites have a variety of species mixtures at present. Additionally many soils in this ES may experience infrequent flooding that could affect species composition. Greater soil wetness may tilt this site towards species such as Black ash rather than Sugar maple.

Current stands on this Ecological Site can represent a broad array of species composition and all potential successional stages, however, the Advanced Successional stage of the Reference State is uncommon and instead the Deciduous Forest State (Aspen – Red maple) is likely to be the most common state that one finds.

While this ES is similar to Moist Loamy Lowland it is distinctly more nutrient rich and often wetter leading to an increased abundance of Black ash. Due to increased wetness from the fine textured soils of this ES there is often decreased productivity in spite of the richness of the soils in this ES.

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 1.2 plant community composition

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

Table 7. Community 2.1 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 (%)

Inventory data references

Plot and other supporting inventory data for site identification and community phases is located on a NRCS North Central Region shared and one drive folder. University Wisconsin-Stevens Point described soils, took photographs, and inventoried vegetation data at community phases within the reference state. The data sources include WI ESD Plot Data Collection Form - Tier 2, Releve Method, NASIS pedon description, NRCS SOI 036, photographs, and Kotar Habitat Types. Habitat Types of N. Wisconsin (Kotar, 2002): The sites of this ES keyed out to one habitat type: Acer saccharum/Sanguinaria-Impatiens (ASaI) Biophysical Settings (Landfire, 2014): This ES is largely mapped as Laurentian-Acadian Northern Hardwoods Forest, Eastern Cool Temperate Row Crop, Eastern Cool Temperate Close Grown Crop, and Eastern Cool Temperate Pasture and Hayland WDNR Natural Communities (WDNR, 2015):

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Approval

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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	08/29/2026
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):**

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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:**
