Ecological site F088XY014MN
Clayey Upland Wet-Mesic Hardwood Forest

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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): 088X–Northern Minnesota Glacial Lake Basins

MLRA 88 consists of the lake beds of glacial Lakes Agassiz, Upham, and Aitkin. These vast glacial lake beds were formed by meltwaters associated with the last glaciation of the Wisconsin age. The large, flat, wet landscapes are filled with lacustrine lake sediments, wave-washed glacial till, and vast expanses of organic soils. This area is entirely in Minnesota and makes up about 11,590 square miles (30,019 square kilometers). The western boundary of MLRA 88 with MLRA 56B is gradual. MLRA 56B is a portion of the Red River Valley that was formed by glacial Lake Agassiz and is dominantly prairie. The southern boundary of MLRA 88 with MLRA 57 consists of distinct moraines that formed from the glacial drift sediments of Late Wisconsin age. The eastern and southeastern boundaries are with portions of MLRAs 90A and 93A. These MLRAs are in a distinct glaciated region of sediments of the Rainy and Superior Lobes, and much of MLRA 93A is bedrock controlled (USDA-Ag Handbook 296, 2022).

Classification relationships

Relationship to Other Established Classifications: MN DNR Native Plant Community (MN DNR, 2003); the reference community of this Provisional Ecological Site is most similar to: MHn47 Northern Rich Mesic Hardwood Forest MHc37 Central Mesic Hardwood Forest (Western) **Located in the Hardwood Hills subsection from Becker County north to Polk County in the northern tip of MIM – Naytahwaush & Mahkonce

Ecological site concept

Clayey Upland Wet-Mesic Hardwood Forest sites typically occur on summit, shoulders and backslope hillslope positions on moraines and till plains, and occasionally on gentle to steeper sloping areas of glacial lake plains. These sites typically exist on soils with fine textured clayey and silty textures of clay, silty clay, silty clay loam, silt loam, very fine sandy loam or loamy very fine sand within a depth of 50 centimeters.

Associated sites

F088XY008MN	**Wet Mixed Forest** These sites occur on footslope and toeslope hillslope positions, drainageways surrounded by uplands or on the edge of uplands grading to very poorly drained peatland soils. These sites typically exist on loamy and occasionally sandy moraines and till plains. Parent material is calcareous fine to loamy textured glacial till, stratified material and occasionally sandy.

Similar sites

F088XY015MN	**Loamy Upland Wet-Mesic Mixed Forest** These sites occur on summit, shoulders and backslope hillslope positions on moraines and till plains. These sites typically exist on soils with loamy textures of loam, sandy loam, sandy clay loam or fine sandy loam within a depth of 50 centimeters. The underlying parent material is generally medium textured till, sandy loam till or stratified materials with generally less than 35 percent rock fragments within a depth of 100 centimeters.

Table 1. Dominant plant species

Tree	(1) *Acer saccharum* (2) *Tilia americana*
Shrub	(1) *Prunus virginiana* (2) *Corylus cornuta*
Herbaceous	(1) *Athyrium* (2) *Aralia nudicaulis*

Physiographic features

Clayey Upland Wet-Mesic Hardwood Forest sites typically occur on summit, shoulders and backslope hillslope positions on flats, moraines, and till plains, and occasionally on gentle to steeper sloping areas of glacial lake plains.

Table 2. Representative physiographic features

Slope shape across	(1) Linear
Slope shape up-down	(1) Convex
Landforms	(1) Flat (2) Till plain (3) Moraine (4) Hillslope (5) Glacial lake
Runoff class	Medium to very high
Flooding frequency	None
Ponding frequency	None
Elevation	310 – 520 m

Slope	0 %
Ponding depth	0 cm
Water table depth	30 – 60 cm
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation is 25 to 28 inches (635 to 711 millimeters). Most of the rainfall comes from convective thunderstorms during the growing season. Snowfall generally occurs from October through April. The average annual temperature is 43 to 46 degrees F (6 to 8 degrees C). The mean frost free period ranges from 86 to 110 days, with the mean freeze-free period ranging from 119 to 136 days.

Table 3 Representative climatic features

Frost-free period (characteristic range)	90-110 days
Freeze-free period (characteristic range)	120-140 days
Precipitation total (characteristic range)	640-710 mm
Frost-free period (actual range)	80-110 days
Freeze-free period (actual range)	110-140 days
Precipitation total (actual range)	610-710 mm
Frost-free period (average)	100 days
Freeze-free period (average)	130 days
Precipitation total (average)	660 mm

- (1) INTL FALLS INTL AP [USW00014918], International Falls, MN
- (2) LITTLEFORK 10 SW [USC00214809], Big Falls, MN
- (3) BIG FALLS [USC00210746], Big Falls, MN
- (4) WASKISH 4NE [USC00218700], Big Falls, MN
- (5) RED LAKE INDIAN AGCY [USC00216795], Ponemah, MN
- (6) BAUDETTE INTL AP [USW00094961], Baudette, MN
- (7) CAMP NORRIS DNR [USC00211250], Beltrami Isl State for, MN
- (8) WARROAD [USC00218679], Warroad, MN
- (9) EVELETH WWTP [USC00212645], Eveleth, MN

- (10) FLOODWOOD 3 NE [USC00212842], Floodwood, MN
- (11) GRAND RPDS FOREST LAB [USC00213303], Grand Rapids, MN
- (12) POKEGAMA DAM [USC00216612], Cohasset, MN
- (13) LEECH LAKE [USC00214652], Bena, MN

Influencing water features

This site is not prone to ponding or flooding. Fine soils may perch water, leading to a water table within 30 inches of the surfaces.

Soil features

These sites typically exist on soils with fine textured clayey and silty textures of clay, silty clay, silty clay loam, silt loam, loam, fine sandy loam, loamy fine sand, very fine sandy loam or loamy very fine sand within a depth of 50 centimeters. The underlying parent material is generally fine or medium textured glacial till; or fine textured clayey or silty glacial lacustrine sediments with generally less than 5 percent rock fragments within a depth of 100 centimeters.

Soils in the Clayey Upland Wet-Mesic Hardwood Forest fall within the Alfisol and Mollisol orders. Soil series within this ecological site include Ashlake, Taylor, Alango, Suomi, Kooch, Grasston, Longsiding, Haystore, Morcom, Dalbo, Lahti, Mahkonce, and Thistledew.

Table 4. Representative soil features

Parent material	(1) Till (2) Glaciolacustrine deposits
Surface texture	(1) Loam (2) Silty clay (3) Silt loam (4) Fine sandy loam (5) Loamy fine sand (6) Very fine sandy loam (7) Clay (8) Silty clay loam (9) Loamy very fine sand
Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Very slow to moderately slow
Depth to restrictive layer	200 cm
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified

Available water capacity (0-101.6cm)	10.67 – 20.32 cm
Soil reaction (1:1 water) (0-25.4cm)	5.1 – 7.3
Subsurface fragment volume <=3" (0-203.2cm)	0 – 10 %
Subsurface fragment volume >3" (0-203.2cm)	Not specified

Ecological dynamics

Plant communities typically include sugar maple, basswood, and often yellow birch, also can include paper birch, ironwood, northern red oak, black ash, balsam fir, and white spruce. Understory typically includes sugar maple, basswood and ironwood saplings as well as beaked hazelnut, fly honeysuckle, mountain maple, and chokecherry; with the forb layer including lady fern, wild sarsaparilla, Clayton's sweet cicely and hairy solomon's seal to mention a few.

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 1.3 plant community composition

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

Table 8. Community 2.1 plant community composition

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

Table 9. Community 2.2 plant community composition

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

Inventory data references

Information presented was derived from Minnesota Department of Natural Resources Field Guide to the Native Plant Communities of Minnesota, USDA-NRCS soil survey information, and USDA Plants Database.

Other references

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Contributors

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Approval

Suzanne Mayne-Kinney, 8/12/2024

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	08/21/2026
Approved by	
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:**
