Ecological site R057XY001MN
Marsh

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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): 057X–Northern Minnesota Gray Drift

The Northern Minnesota Gray Drift (57) is located within the Northern Lakes Forest and Forage Region. This area is entirely in north-central Minnesota and makes up about 9,785 square miles (Figure 1). The entire area is covered by Wisconsin-age glacial drift. The glacial deposits are from four major ice lobes-Des Moines, Rainy, Superior, and Wadena. The landscape developed through a series of glaciations and the subsequent retreating and wasting of the ice sheets, which resulted in a complex pattern of moraines, outwash plains, drumlins, lake plains and drainages. Lakes, ponds and marshes are common. The thickness of the glacial till ranges from 90 to 185 meters. Some areas of these deposits are overlain by outwash or lacustrine sediments. Some depressional areas have an accumulation of organic matter. The organic deposits are more than 2.5meters thick in some areas. Elevation ranges from 300 to 500 meters across the area. (USDA-NRCS 2006) Prior to settlement, the vegetation in this area was mainly a mixture of deciduous trees and conifers. White Pine and red pine grew on moraines. Jack pine was dominant on outwash plains and sandy lake plains. Red oak, sugar maple, and basswood grew in sheltered areas close to lakes. Forested lowlands were dominated by black spruce, tamarack, white cedar, and black ash. Wetlands that were not forested were dominated by sedge meadow communities. The western part of the area was dominated by tall prairie grasses. Most of this area is still forested today, aspen as become the most common species both in pure stands and mixed stands with birch, maple, oak, white spruce, and red pine. (USDA-NRCS 2006) The dominant soil orders in this MLRA are Alfisols, Entisols, and Histisols. Some Mollisols are in the westernmost part of the area. The soils in the area have a frigid soil temperature regime; aquic or udic soil moisture regime, and mixed mineralogy. Their natural drainage class is related to landscape position. In general, the Alfisols formed in till on moraines, Entisols formed in outwash on moraines and outwash plains, and Histosols formed in organic material over outwash or till on moraines or outwash plains. (USDA-NRCS 2006)

Classification relationships

Major Land Resource Area (MLRA): Northern Minnesota Gray Drift (57) (USDA Handbook 296, 2006) USFS Subregions: Northern Minnesota Drift & Lake Plain Section (212N); Chippewa Plains Subsection (212Na), Pine Moraines & Outwash Plains Subsections (212Nc), St. Louis Moraines Subsection (212Nb); Minnesota & NE Iowa Morainal Section (222M); Hardwood Hills Subsection (222Ma); Northern Superior Uplands Section (212L); Nashwauk Uplands Subsection (212Lc); Northern Minnesota & Ontario Peatlands Section (212M); Littlefork-Vermillion Uplands Subsection (212Ma) (Cleland et al. 2007). US EPA Level IV Ecoregion: Itasca and St. Louis Moraines (50q); Chippewa Plains (50r); Nashwauk/Marcell Moraines and Uplands (50s); Alexandria Moraines and Detroit Lakes Outwash Plain (51j); McGrath Till Plain and Drumlins (51k); Wadena/Todd Drumlins and Osakis Till Plain (51l)(U.S. Environmental Protection Agency, 2013)

Ecological site concept

Marsh sites typically occurs on slightly concave landscape positions in closed depressions, shallow wetland basins, drainage ways; and adjacent to open water along lakeshore, ponds, and near streams. Soil surface textures are typically muck or mucky-modified surface layers over variable parent materials. Soils are typically saturated on all horizons, frequently ponded, and inundated with water for very long duration, at least 7 out of 12 months.

Associated sites

F057XY002MN	**Wet Depressional Forest** Wet Depressional Forest occurs in shallow wetland basins, closed depressions, and generally in narrow transition zones between mineral uplands and peatlands. Soil surface layers are typically mucky-modified surface textures or muck less than 8” thick over variable parent materials.
F057XY003MN	**Peatland** Peatland occurs in shallow wetland basins, closed depressions, and along drainage ways. Soils are occasionally ponded with standing water in spring but tend to recede by late summer. Soil surface layers are typically muck 8 to 16” thick over variable parent materials.
R057XY005MN	**Open Peatland** Open Peatland occurs on level to gently sloping surfaces. Soils have greater than 16” of organic material and soil pH values are greater than 4.5. This site has a high water table that remain near the surface throughout the growing season, preventing the establishment of significant tree cover.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Typha latifolia* (2) *Calamagrostis canadensis*

Physiographic features

This site occurs in depressions adjacent to open water along lakeshore, ponds, and near streams. These sites are subject to very long to frequent ponding throughout the year. The ponding duration is very long with possible depths over 150 cm above the surface. These sites have have a stable water level and do not change seasonally, but the water table may drop during dry conditions or changes in drainage conditions. Runoff is negligible.

This MLRA is in the Western Lake Section of the Central Lowland Province of the Interior Plains. The landscape developed through a series of glaciations and subsequent retreating and wasting of the ice sheets. A complex pattern of moraines, outwash plains, drumlins, lake plains, and drainages characterizes the area. The rest of the area is drained by the Mississippi River, southward into the Gulf of Mexico. The headwaters of the Mississippi River are in the northern part of the area. The Mississippi River and its tributaries drain most of the area.

Table 2. Representative physiographic features

Slope shape across	(1) Concave (2) Linear
Slope shape up-down	(1) Concave (2) Linear
Landforms	(1) Depression

Runoff class	Very low
Flooding frequency	None
Ponding duration	Long (7 to 30 days) to very long (more than 30 days)
Ponding frequency	Frequent
Elevation	180 – 650 m
Slope	0 %
Ponding depth	30 – 60 cm
Water table depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

In general, MLRA 57 has cold winters and warm summers. About 65 percent of the annual precipitation falls as rain during the 5-month growing season (May through September), and an additional 18 percent falls as snow.

Table 3 Representative climatic features

Frost-free period (characteristic range)	100-110 days
Freeze-free period (characteristic range)	130-140 days
Precipitation total (characteristic range)	690-740 mm
Frost-free period (actual range)	80-130 days
Freeze-free period (actual range)	120-150 days
Precipitation total (actual range)	660-760 mm
Frost-free period (average)	110 days
Freeze-free period (average)	140 days

Precipitation total (average)	710 mm

- (1) COLLEGEVILLE ST JOHN [USC00211691], Avon, MN
- (2) LONG PRAIRIE [USC00214861], Long Prairie, MN
- (3) NEW YORK MILLS [USC00215902], New York Mills, MN
- (4) TAMARAC WILDLIFE REF [USC00218191], Rochert, MN
- (5) GRAND RPDS FOREST LAB [USC00213303], Grand Rapids, MN
- (6) DEEP PORTAGE [USC00212050], Backus, MN
- (7) WALKER AH GWAH CHING [USC00218618], Walker, MN
- (8) CASS LAKE [USC00211374], Cass Lake, MN
- (9) BEMIDJI [USC00210643], Bemidji, MN
- (10) BLACKDUCK [USC00210809], Blackduck, MN
- (11) MARCELL 5NE [USC00215175], Bigfork, MN

Influencing water features

Water is received through precipitation, runoff from adjacent uplands, and groundwater. Water levels are greatly influenced by ground water, precipitation rates and runoff from upland sites. Water leaves the site primarily through evapotranspiration and groundwater recharge. These sites are wetlands. The hydrology of Marsh sites significantly impacts their ecological development.

Wetland description

Under the Cowardin System of Wetland Classification, or National Wetlands Inventory (NWI), the wetlands can be classified as:
1) Palustrine, emergent, persistent, saturated or

Under the Hydrogeomorphic Classification System (HGM), the wetlands can be classified as:
1) Depressional, forested/organic, or

Permeability of the soil is very slow.
Hydrologic Group: A/D, B/D, C/D
Hydrogeomorphic Wetland Classification: Depressional, forested/organic, or
Cowardin Wetland Classification: PEM1B

Soil features

The Marsh ecological site typically occurs in a basin or closed depression, and receives water directly from precipitation and groundwater discharge. Soils are very poorly drained and formed in organic material. Permeability is very slow and the site will be ponded most of the year. The central concept soil series is Seelyeville, Cathro, Rifle and Haslie, but other series are included. Ponded water conditions and very slow permeability strongly influences the soil-water-plant relationship.

Table 4. Representative soil features

Parent material	(1) Organic material
Surface texture	(1) Muck
Drainage class	Very poorly drained
Permeability class	Slow to moderately slow
Soil depth	200 cm

Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-152.4cm)	31.75 – 44.96 cm
Soil reaction (1:1 water) (0-101.6cm)	5.1 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

Marsh sites typically occurs on level or slightly concave landscape positions in closed depressions, shallow wetland basins, drainage ways; and adjacent to open water along lakeshore, ponds, and near streams. Soils are typically endosaturated, frequently ponded, and inundated with water for very long duration, at least 7 out of 12 months. Vegetation can be found rooting on floating mats (MNDNR 2003). Water sources include precipitation, surface flow, lateral flow, and groundwater discharge. The fluctuation of water levels on site are fairly stable (due to groundwater influences) and do not change seasonally, but can vary with drought or changes to drainage across the watershed.

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 1.3 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
bluejoint	CACA4	*Calamagrostis canadensis*	–	–	25-
rice cutgrass	LEOR	*Leersia oryzoides*	–	–	25-
Forb/Herb					
water knotweed	POAM8	*Polygonum amphibium*	–	–	25-
broadleaf cattail	TYLA	*Typha latifolia*	–	–	25-

bulblet-bearing water hemlock	CIBU	*Cicuta bulbifera*	–	–	25-

Table 9. Community 2.1 plant community composition

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

Table 10. Community 2.2 plant community composition

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

Table 11. Community 2.3 plant community composition

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

Table 12. Community 3.1 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. 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: MRn83 Northern Mixed Cattail Marsh MRn93 Northern Bulrush-Spikerush Marsh Cowardin: Palustrine, Emergent Wetland Persistent (PEMC) United States Army Corps of Engineers (USACE) Wetland Plant Community: G; Shallow Marshes Hydrogeomorphic System (USDA, 2008): DEPRESSION (discharge)

Other references

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Approval

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Acknowledgments

MLRA 57 technical team completed in 2022.

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	09/19/2026
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):**

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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:**
