Ecological site F088XY001MN
Floodplain Peatland

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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

MLRA 88- Northern Minnesota Glacial Lake Basins(USDA Agricultural Handbook 296, 2022) USFS / MN DNR Sub-regions: 212Mb Agassiz Lowlands, 212Ma Littlefork Vermillion, 212nd Tamarack Lowlands , and 212Nb St Luis Moraines (Cleland et al, 2007)

Ecological site concept

The Floodplain Peatland ecological site is a conifer-dominated swamp on very poorly drained peat soils. Soils are saturated, very deep, very poorly drained and flooding occurs rarely to frequently . No ponding occurs on this site. Typical site settings include margin of streams and river channels plus lake basins and margins of large peatlands. The canopy is often dominated by northern white cedar, black spruce, and balsam fir. The understory includes ericaceous shrubs, multiple species of sedge, and sphagnum. The plant community structure and composition will vary depending on microtopography and the depth and frequency of flooding.

Associated sites

F088XY003MN	**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.
F088XY002MN	**Marsh** Marsh occurs on level or slightly concave landscape positions in closed depressions, shallow wetland basins, drainage ways, and adjacent to open water. They are very poorly drained soils and are frequently inundated with water for long durations. Soil surface textures are typically muck or mucky-modified surface layers over variable parent materials.

F088XY004MN	**Acid Peatland** Acid Peatland occurs in shallow wetland basins, closed depressions, and along drainage ways. Soils and water content have lower pH than the open peatland sites, lending to different vegetation. 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.

Similar sites

F088XY002MN	**Marsh** Marsh occurs on level or slightly concave landscape positions in closed depressions, shallow wetland basins, drainage ways, and adjacent to open water. They are very poorly drained soils and are frequently inundated with water for long durations. Soil surface textures are typically muck or mucky-modified surface layers over variable parent materials.
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F088XY003MN	**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	(1) *Thuja occidentalis* (2) *Picea mariana*
Shrub	(1) *Ledum groenlandicum* (2) *Alnus incana ssp. rugosa*
Herbaceous	(1) *Carex* (2) *Sphagnum*

Physiographic features

This peatland site is characterized by rare to frequent flooding, and occurs in flood plains, depressions, bogs, and flats.

Table 2. Representative physiographic features

Slope shape across	(1) Linear
Slope shape up-down	(1) Concave

Landforms	(1) Flood plain (2) Depression (3) Flat (4) Bog
Runoff class	Very low
Flooding duration	Long (7 to 30 days) to very long (more than 30 days)
Flooding frequency	Occasional to very frequent
Ponding duration	Very brief (4 to 48 hours) to very long (more than 30 days)
Ponding frequency	None to frequent
Elevation	210 – 490 m
Slope	0 %
Ponding depth	0 – 30 cm
Water table depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation is 24 to 28 inches (610 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).

Table 3 Representative climatic features

Frost-free period (characteristic range)	90-110 days
Freeze-free period (characteristic range)	120-130 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) SANDY LAKE DAM LIBBY [USC00217460], McGregor, MN
- (2) FLOODWOOD 3 NE [USC00212842], Floodwood, MN
- (3) HIBBING CHISHOLM HIBBING AP [USW00094931], Hibbing, MN
- (4) EVELETH WWTP [USC00212645], Eveleth, MN
- (5) LEECH LAKE [USC00214652], Bena, MN
- (6) BIG FALLS [USC00210746], Big Falls, MN
- (7) RED LAKE INDIAN AGCY [USC00216795], Ponemah, MN
- (8) WASKISH 4NE [USC00218700], Big Falls, MN
- (9) CAMP NORRIS DNR [USC00211250], Beltrami Isl State for, MN
- (10) WARROAD [USC00218679], Warroad, MN
- (11) BAUDETTE INTL AP [USW00094961], Baudette, MN

Influencing water features

This site receives water through precipitation, runoff from uplands, and subsurface flow including direct flooding from riparian features. Flooding occurs rarely to frequently and variations in flooding regimes will directly affect the plant community composition.

Wetland description

Under the Cowardin System of Wetland Classification, or National
Wetlands Inventory (NWI), the wetlands can be classified as:
1) Palustrine, forested, needle-leaved evergreen, saturated, or
2) Palustrine, scrub-shrub, broad-leaved deciduous, saturated, or
3) Palustrine, scrub-shrub, broad-leaved evergreen, saturated, or
4) Palustrine, emergent, persistent, saturated
Under the Hydrogeomorphic Classification System (HGM), these sites could be classified as: Depressional, forested/organic or Depressional, scrub-shrub/organic.

Soil features

All soils in the Floodplain Peatland ecological site are Histosols. Soils for this site can be further described as Typic Borosaprists, Fluvaquentic Haplosaprists, and Typic Haplosaprists. The soil series included in the Floodplain Peatland ecological site include Borosaprists, Bowstring, and Seelyeville.

Floodplain Peatland soils developed as organic materials over alluvium. They are very poorly drained, deep, and have relatively high available water capacity (13.4 to 17.7).

Table 4. Representative soil features

Parent material	(1) Organic material (2) Alluvium

Surface texture	(1) Muck
Drainage class	Very poorly drained
Permeability class	Moderately rapid
Depth to restrictive layer	Not specified
Soil depth	150 – 200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	34.04 – 44.96 cm
Subsurface fragment volume <=3" (0-101.6cm)	Not specified
Subsurface fragment volume >3" (0-101.6cm)	Not specified

Ecological dynamics

This site is a wooded swamp on saturated, organic substrate of muck or mucky peat. This site is influenced by periodic flooding. Flooding intensity and frequency will result in variability in the plant community composition.

Historically, catastrophic disturbances were quite rare within this community. Stand replacing catastrophic storms occurred every 575 to 600 years. Catastrophic fires rarely occur, with an estimated occurrence every 920 years approximately (Minnesota Department of Natural Resources, 2005). Due to the saturated soils and shallow tree rooting systems, windthrow did cause smaller canopy-opening disturbances to occur at a shorter time interval. Hence, downed trees, displaced stumps, and sphagnum hummocks are characteristic for this site.

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 (%)

Table 10. Community 2.3 plant community composition

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

Inventory data references

This is a provisional ecological site, and as such no field plots were inventoried for this project. A review of the scientific literature and expert opinion was used to develop the plant communities and ecological dynamics contained within the state and transition model. Future field verification is needed to refine the plant communities and ecological dynamics described in this ecological site description.

References

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Other references

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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	08/12/2024
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:**
