USDA Natural Resources Conservation Service

Ecological site F057XY016MN
Flood Plain Forest

Last updated: 10/03/2023
Accessed: 05/20/2024

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)

The dominant soil orders in this MLRA are Alfisols, Entisols, and Histisols, with some Mollisols 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

Flood Plain Forest are widespread throughout MLRA 57, and are present on occasionally or annually flooded sites on terraces and floodplains of streams and rivers. Soils consist of stratified alluvium which vary widely from silty to fine sandy soils on the occasionally flooded river terraces to coarser textured alluvium on the active floodplain sites.

Associated sites

F057XY015MN	**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.
F057XY002MN	**Wet Depressional Forest** These sites occur in shallow wetland basins, closed depressions and along drainage ways, and are 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.

Table 1. Dominant plant species

Tree	(1) *Fraxinus nigra* (2) *Acer saccharinum*
Shrub	(1) *Prunus virginiana* (2) *Viburnum lentago*
Herbaceous	(1) *Laportea canadensis* (2) *Matteuccia*

Physiographic features

Flood Plain Forest are widespread throughout MLRA 57 but do not account for much area, and are present on occasionally or annually flooded sites on terraces and floodplains of streams and rivers.

Table 2. Representative physiographic features

Landforms	(1) Terrace (2) Flood plain
Runoff class	Negligible to low
Flooding duration	Brief (2 to 7 days) to very long (more than 30 days)
Flooding frequency	Rare to frequent
Elevation	207–518 m
Slope	0–2%
Water table depth	30 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)	99-112 days
Freeze-free period (characteristic range)	129-136 days
Precipitation total (characteristic range)	635-686 mm
Frost-free period (actual range)	98-123 days
Freeze-free period (actual range)	126-139 days
Precipitation total (actual range)	635-711 mm
Frost-free period (average)	107 days
Freeze-free period (average)	133 days
Precipitation total (average)	660 mm

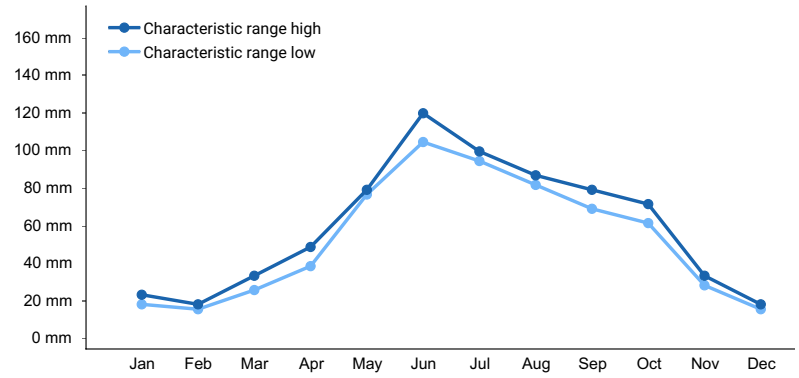


Figure 1. Monthly precipitation range

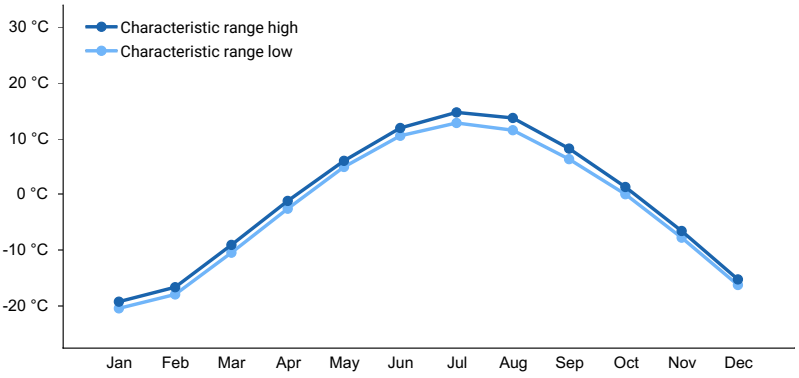


Figure 2. Monthly minimum temperature range

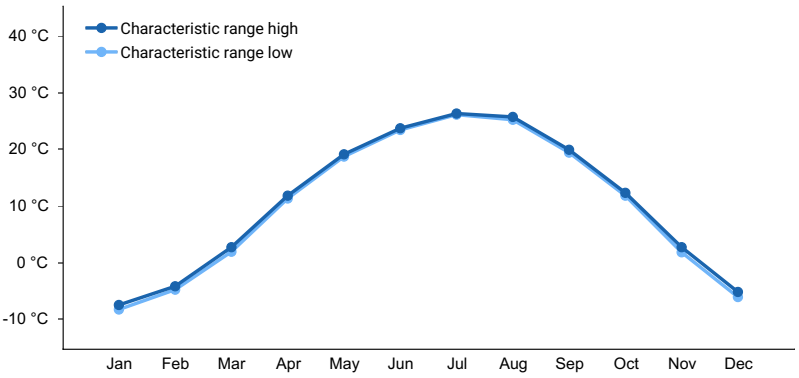


Figure 3. Monthly maximum temperature range

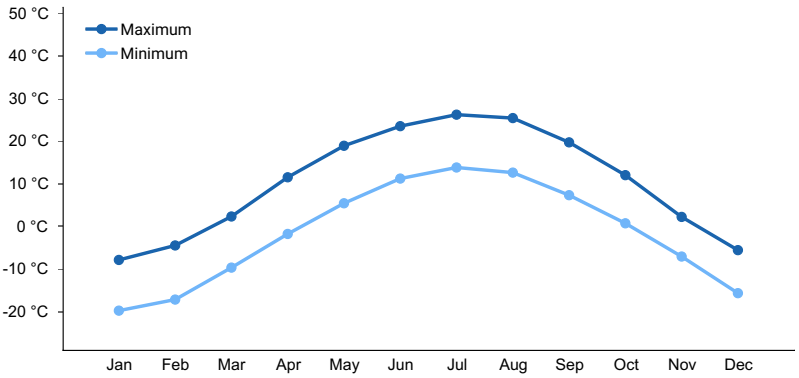


Figure 4. Monthly average minimum and maximum temperature

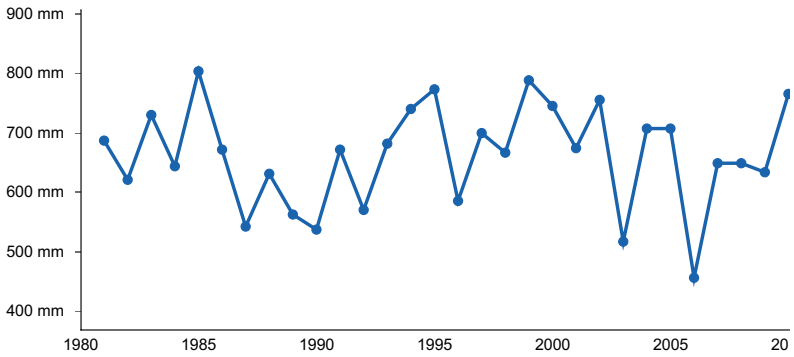


Figure 5. Annual precipitation pattern

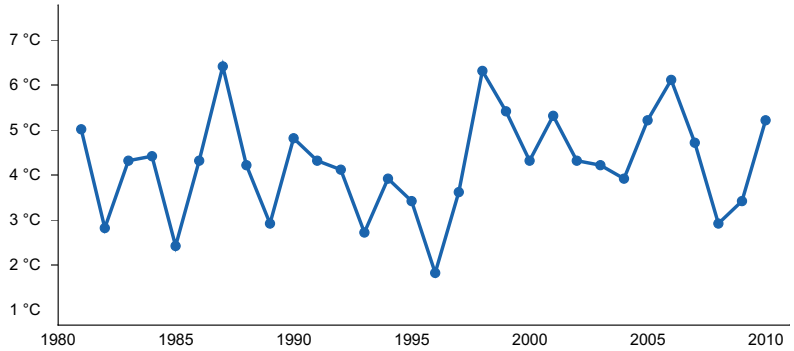


Figure 6. Annual average temperature pattern

Climate stations used

- (1) ITASCA UNIV OF MINN [USC00214106], Park Rapids, MN
- (2) RED LAKE INDIAN AGCY [USC00216795], Ponemah, MN
- (3) FOSSTON 1 E [USC00212916], Fosston, MN
- (4) GULL LAKE DAM [USC00213411], Brainerd, MN

Influencing water features

Annual or periodic flooding occurs on this site and is the main driver for the plant species found here. The floodplain positions are annually flooded, while the terraces receive only occasional flooding.

Wetland description

Although these sites can be inundated by water for periods of 30 or more days, these sites are not considered wetlands due to the periodic and/or unpredictable nature of the wet and dry cycles and resulting vegetation.

Soil features

The central concept soil series are Fairdale, Fordum and Pengilly, but other series are included as well. Soils consist of stratified alluvium which vary widely from silty to fine sandy soils on the occasionally flooded river terraces to coarser textured alluvium on the active floodplain sites. Soils on the active floodplain positions are annually flooded, somewhat poorly to poorly drained soils with grey soil color or grey-mottles shallow within the soil profile indicative of high local water tables, and are subject to scouring and deposition from floodwater.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silt loam (2) Loam
Drainage class	Very poorly drained to moderately well drained

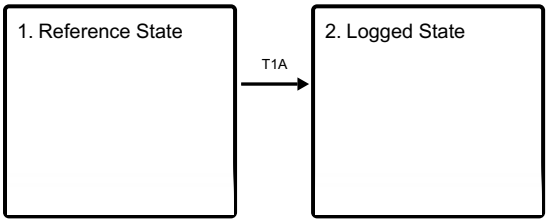
Permeability class	Moderate to moderately rapid
Soil depth	203 cm
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–3%
Available water capacity (0-152.4cm)	8.13–11.43 cm
Calcium carbonate equivalent (0-101.6cm)	0–10%
Soil reaction (1:1 water) (0-101.6cm)	5.6–8.4
Subsurface fragment volume <=3" (0-101.6cm)	0–15%
Subsurface fragment volume >3" (0-101.6cm)	0–3%

Ecological dynamics

These communities are driven by the periodic or frequent flooding regimes of these lowland areas. Plant communities often differ between the terraces and the floodplains, with the terraces sometimes appearing with more upland plant communities. The canopy of the terrace community often has abundant black ash, basswood, green ash, bur oak, or American elm in addition to silver maple, while the lowland floodplains tend to be strongly dominated by silver maple with other trees only of minor importance.

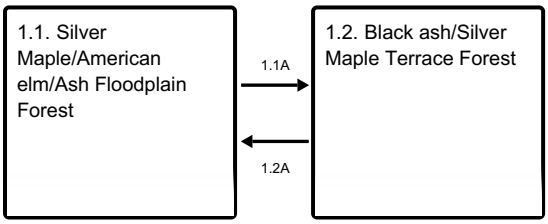
State and transition model

Ecosystem states

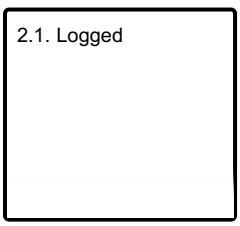


T1A - Mechanical removing of timber.

State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Reference State

The reference state of this site is characterized by annual or periodic flooding resulting in two communities, a true floodplain forest, and a more upland terrace forest.

Community 1.1
Silver Maple/American elm/Ash Floodplain Forest

Ground cover is patchy (25–50% cover) and characterized by annual or flood tolerant perennial species. Wood nettle (*Laportea canadensis*), Virginia wild rye (*Elymus virginicus*), and Tuckerman's sedge (*Carex tuckermanii*) are often abundant. Shrub layer is sparse. Canopy is 50-100% covered and strongly dominated by silver maple, with occasional green ash, black ash, or American elm. Historically, the Ash and Elm components of this plant community were thought to have had a stronger presence.

Dominant plant species

- silver maple (*Acer saccharinum*), tree
- green ash (*Fraxinus pennsylvanica*), tree
- black ash (*Fraxinus nigra*), tree
- American elm (*Ulmus americana*), tree
- Canadian woodnettle (*Laportea canadensis*), other herbaceous
- Virginia wildrye (*Elymus submuticus*), other herbaceous
- Tuckerman's sedge (*Carex tuckermanii*), other herbaceous

Community 1.2
Black ash/Silver Maple Terrace Forest

Canopy is interrupted to continuous (50–100% cover), with black ash and silver maple often abundant, mixed with basswood, green ash, bur oak, or American elm. Shrubs are sparse. Ground cover is variable, ranging from sparse to continuous (5–100%), often with abundant wood nettle (*Laportea canadensis*) and ostrich fern (*Matteuccia struthiopteris*).

Dominant plant species

- black ash (*Fraxinus nigra*), tree
- silver maple (*Acer saccharinum*), tree
- basswood (*Tilia*), tree
- green ash (*Fraxinus pennsylvanica*), tree
- bur oak (*Quercus macrocarpa*), tree
- American elm (*Ulmus americana*), tree

Pathway 1.1A
Community 1.1 to 1.2

Prolonged drought and infrequent flooding.

Pathway 1.2A
Community 1.2 to 1.1

Excessive flooding or extreme weather events lower terraces leading to more floodplain sites.

State 2
Logged State

Mechanical removal of tree species for timber.

Community 2.1
Logged

Understory vegetation remains but is disturbed.

Transition T1A
State 1 to 2

Mechanical removal of timber.

Additional community tables

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:
FFn57 Northern Terrace Forest
FFn67 Northern Floodplain Forest

Other references

Cleland, D.T.; Freeouf, J.A.; Keys, J.E., Jr.; Nowacki, G.J.; Carpenter, C; McNab, W.H. 2007. Ecological Subregions: Sections and Subsections of the Conterminous United States.[1:3,500,000], Sloan, A.M., cartog. Gen. Tech. Report WO-76. Washington, DC: U.S. Department of Agriculture, Forest Service.

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USDA, NRCS. 2018. The PLANTS Database (http://plants.usda.gov, 27 March 2018). National Plant Data Team, Greensboro, NC 27401-4901 USA.

U.S. Environmental Protection Agency. 2013. Level III and IV ecoregions of the continental
United States: Corvallis, Oregon, U.S. EPA, National Health and Environmental Effects Research Laboratory, map scale 1:3,000,000, https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states.

Contributors

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Approval

Suzanne Mayne-Kinney, 10/03/2023

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	05/20/2024
Approved by	Suzanne Mayne-Kinney
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):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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:

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:**