

Ecological site F103XY031MN

Sandy Floodplains

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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): 103X–Central Iowa and Minnesota Till Prairies

MLRA 103 is in Minnesota (56 percent) and Iowa (44 percent) and consists of approximately 18 million acres. It is in the Western Lake Section of the Central Lowland Province of the Interior Plains in an area known as the "Des Moines Lobe" of the Wisconsin-age ice sheet. The MLRA is mostly on a young, nearly level to gently rolling, glaciated till plain that has moraines and glacial lake plains in some areas. The plain is covered with glacial till, outwash, and glacial lake deposits. Recent alluvium consisting of clay, silt, sand, and gravel fill the bottoms of most of the major river valleys. Paleozoic bedrock sediments, primarily shale and limestone, underlie the glacial deposits in most of the area. The annual precipitation increases from northwest to southeast. Most of the rainfall occurs as high-intensity, convective thunderstorms during the summer. Two-thirds or more of the precipitation falls during the freeze-free period. Snowfall is common in winter. Ground water supplies are adequate for the domestic, livestock, municipal, and industrial needs. Nearly all of this area is farmland, and about four-fifths is cropland.

Classification relationships

Major Land Resource Area (MLRA): Central Iowa and Minnesota Till Prairies (103) (USDA Handbook 296, 2006) USFS Subregions: North Central Glaciated Plains Section (251B); Upper Minnesota River-Des Moines Lobe (251BA) and Southern Des Moines Lobe (251Be) Subsections (Cleland et al. 2007) International Vegetation Classification Hierarchy Class: 1. Forest & Woodland Subclass: 1.B. Temperate & Boreal Forest & Woodland Formation: 1.B.3. Temperate Flooded & Swamp Forest Division: 1.B.3.Na. Eastern North American-Great Plains Flooded & Swamp Forest The reference state shares similarities to Minnesota Department of Natural Resources FFs59 Southern Terrace Forest

Ecological site concept

The Sandy Floodplains ecological site is predominantly located on floodplains of larger rivers throughout MLRA 103. The site is influenced by the hydrologic interaction with the adjacent river which influences the depth to soil saturation. This ecological site may exhibit various plant community composition depending on flooding.

Associated sites

F103XY032MN	Loamy Floodplains The Loamy Floodplains ecological site is located on medium textured alluvium throughout MLRA 103. Soil textures include loam, silt loam, sandy loam, and fine sandy loam. Soils are somewhat poorly drained to moderately well drained. Some areas within this ecological site will exhibit long-term flooding (7-30 days).
R103XY003MN	Sandy Upland Prairies The Sandy Upland Prairie ecological site is located on uplands including outwash plains and valley trains along modern river valleys. Soils are formed from sandy and course loamy outwash and loamy-mantled outwash. Sites do not flood or pond.

F103XY033MN	Wet Floodplains The Wet Floodplains ecological site occurs in both floodplains and depressions and is extensive throughout MLRA 103. Soils include both Mollisols and Entisols, and soil drainage class is very poorly drained to poorly drained. Areas within this site flood frequently, and some areas may incur very long periods of flooding (over 30 days).
R103XY006MN	Bedrock Controlled Upland Prairies The Bedrock Controlled Upland Prairies ecological site is characterized by shallow to moderately deep soils that are influenced by bedrock and have a low available water capacity.

Similar sites

F103XY032MN	Loamy Floodplains The Loamy Floodplains ecological site is located on medium textured alluvium throughout MLRA 103. Soil textures include loam, silt loam, sandy loam, and fine sandy loam. Some areas within this ecological site will exhibit long-term flooding (7-30 days).
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Table 1. Dominant plant species

Tree	(1) <i>Ulmus americana</i> (2) <i>Fraxinus</i>
Shrub	Not specified
Herbaceous	(1) <i>Laportea canadensis</i>

Physiographic features

The Sandy Floodplains ecological site is located on floodplains of larger rivers in both Minnesota and Iowa portions of MLRA 103. The site is influenced by a hydrologic relationship with the adjacent river, as soil saturation depth fluctuates depending on river water levels. Due to human influences, current flooding regimes are generally reduced from historic levels. Today, areas within this ecological site do not regularly flood, while some sites still flooding. Plant community differences on this site will occur due in response to differences in the frequency, duration, and depth of flooding.

Figure 1. Block diagrams of the representative Sandy Floodplains and associated ecological sites.

Figure 2. Distribution of the Sandy Floodplains ecological site within MLRA 103. In many cases, the data set is not spatially consistent across political boundaries due to the method by which soils were mapped; e.g. due to county subsets.

Table 2. Representative physiographic features

Hillslope profile	(1) Backslope (2) Summit (3) Shoulder
Landforms	(1) Flood plain

Runoff class	Negligible to medium
Flooding frequency	None to frequent
Ponding duration	Brief (2 to 7 days)
Elevation	210 – 560 m
Slope	0 – 10 %
Water table depth	20 – 200 cm
Aspect	Aspect is not a significant factor

Climatic features

The soil temperature regime of MLRA 103 is classified as “mesic” (i.e., mean annual soil temperature between 46 and 59°F). The average freeze-free period of this site is 156 days, while the frost-free period is 127 days. The average mean annual precipitation is 36 inches, which includes rainfall plus the water equivalent from snowfall. Cold air drainage and the fact that wet soils are generally colder than dry soils make this site colder than adjacent, upslope ecological sites. As a result, snow and frost remain longer in the spring, thus resulting in shorter growing seasons than the adjacent uplands.

Table 3 Representative climatic features

Frost-free period (characteristic range)	130-130 days
Freeze-free period (characteristic range)	150-160 days
Precipitation total (characteristic range)	890-940 mm
Frost-free period (actual range)	130-130 days
Freeze-free period (actual range)	150-160 days
Precipitation total (actual range)	860-970 mm
Frost-free period (average)	130 days
Freeze-free period (average)	160 days
Precipitation total (average)	910 mm

- (1) OWATONNA [USC00216287], Owatonna, MN
- (2) BOONE [USC00130807], Boone, IA

Influencing water features

The important water feature of the Sandy Floodplains ecological site is the hydrological relationship this site has with the adjacent river or stream. Soils are classified as endosaturated. The water table can be as high as 6 inches from the surface during wetter periods, but is typically at or below 40 inches. During the wet months, areas within this ecological site may flood or pond.

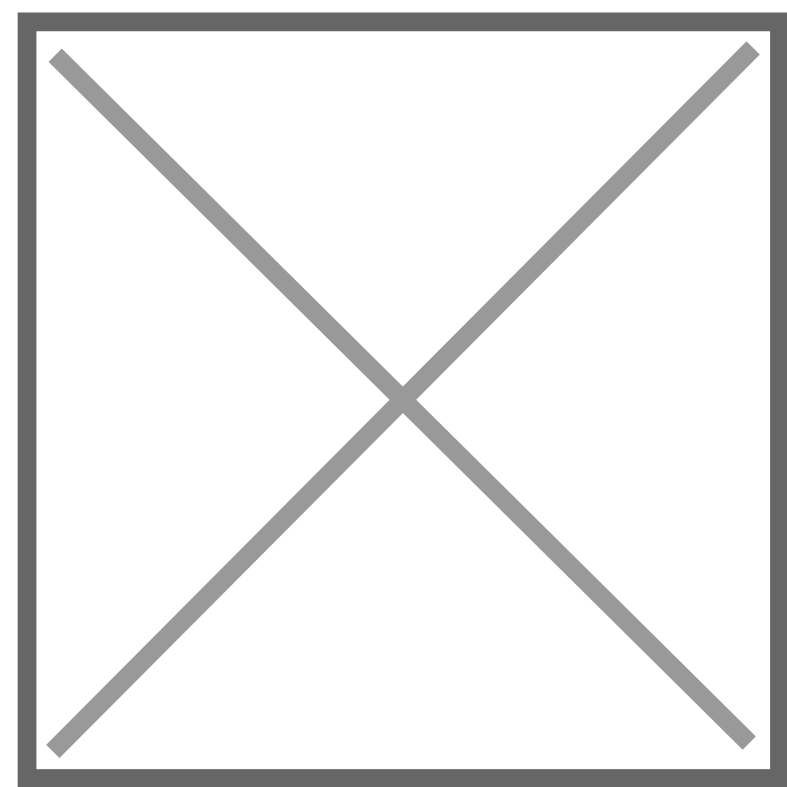


Figure 9. Representation of hydrologic factors in a typical area of Sandy Floodplains and associated ecological sites on the Des Moines Lobe (MLRA 103).

Soil features

The Sandy Floodplains ecological site is located predominately on Buckney, Flagler, Minneopa and Zumbro soil series. The soil parent material is alluvium. The surface texture is fine sandy loam, sandy loam, loamy fine sand, or loamy sand. Fine sandy loam is the dominant surface texture. Soils are classified as Mollisols since they have a thick, dark layer. This dark layer is due to slope wash and alluvial deposition rather than development under prairie vegetation. The soil drainage class can be moderately well drained, well drained, somewhat excessively drained, or excessively drained. Available water capacity is 3-6 inches.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Fine sandy loam (2) Sandy loam (3) Loamy fine sand (4) Loamy sand

Family particle size	(1) Coarse-loamy (2) Sandy
Drainage class	Moderately well drained to excessively drained
Permeability class	Moderately rapid to very rapid
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-152.4cm)	7.62 – 15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 30 %
Soil reaction (1:1 water) (0-101.6cm)	5.1 – 8.4
Subsurface fragment volume <=3" (0-101.6cm)	0 – 30 %
Subsurface fragment volume >3" (0-101.6cm)	Not specified

Ecological dynamics

The Sandy Floodplains ecological site is influenced by fluctuating river and stream levels. Some areas within this ecological site incur flooding and ponding. Historically, this site was a mature, hardwood forest community that was compositionally and structurally diverse due to variations in the natural flooding regime. The typical vegetation community was a deciduous riverine forest in various stages of successional development.

The Sandy Floodplains ecological site has three states: the Reference State, the Disturbed Forest State, and the Tillage State. The Reference State is a mature deciduous forest with multiple canopy species and a diverse herbaceous ground layer. This ecological site can be affected by multiple natural triggers (disturbance processes) including flooding, fire, insects, and windstorms. The Tillage State is characterized by tillage and agricultural production. The two communities under this state are the Row Crop Community and the Seeded Grassland Community. Management inputs include preparing the site, seeding, fertilizing, controlling weeds and brush, and harvesting. The Disturbed Forest State is a wooded site that has undergone plant community changes due to human disturbance. Triggers include hydrological modifications, logging/clearing, invasive plants, and unmanaged grazing.

Today, most areas of this ecological site have been cleared and converted to agriculture. Site hydrology has been altered through ditching, tiling, site clearing, industrial and residential water use, and/or installation of flood control structures within the watershed. Sites that remain wooded have usually been disturbed through logging, previous clearing, or introduction of non-native plants. Once a high-quality reference state has been transitioned to a tillage field, the reversibility class is considered irreversible.

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 (%)
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Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 3.1 plant community composition

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

No field plots were available for this site. A review of the scientific literature and professional experience were used to approximate the plant communities for this provisional ecological site. Information for the state-and-transition model was obtained from the same sources. All community phases are considered provisional based on these plots and the sources identified in ecological site description.

Other references

Cleland, D.T., J.A. Freeouf, J.E. Keys, G.J. Nowacki, C. Carpenter, and W.H. McNab. 2007. Ecological Subregions: Sections and Subsections of the Conterminous United States. USDA Forest Service, General Technical Report WO-76. Washington, DC.

Minnesota Department of Natural Resources. 2005. Field Guide to the Native Plant Communities of Minnesota: the Prairie Parkland and Tallgrass Aspen Parklands Provinces. Ecological Land Classification Program, Minnesota County Biological Survey, and Natural Heritage and Nongame Research Program. St. Paul, Minnesota.

Ojakangas, R.W. and C.L. Matsch. 1982. Minnesota's Geology. University of Minnesota Press. Minneapolis, MN.

USDA-NRCS. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean and the Pacific Basin. United States Department of Agriculture Handbook 296.

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Approval

Suzanne Mayne-Kinney, 10/04/2023

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:

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:
