

Ecological site R107XB019MO

Wet Floodplain Prairie

Last updated: 5/21/2020
Accessed: 10/29/2026

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): 107X—Iowa and Missouri Deep Loess Hills

The Iowa and Missouri Deep Loess Hills (MLRA 107B) includes the Missouri Alluvial Plain, Loess Hills, Southern Iowa Drift Plain, and Central Dissected Till Plains landform regions (Prior 1991; Nigh and Schroeder 2002). It spans four states (Iowa, 53 percent; Missouri, 32 percent; Nebraska, 12 percent; and Kansas 3 percent), encompassing over 14,000 square miles (Figure 1). The elevation ranges from approximately 1,565 feet above sea level (ASL) on the highest ridges to about 600 feet ASL along the Missouri River near Glasgow in central Missouri. Local relief varies from 10 to 20 feet in the major river floodplains, to 50 to 100 feet in the dissected uplands, and loess bluffs of 200 to 300 feet along the Missouri River. Loess deposits cover most of the area, with deposits reaching a thickness of 65 to 200 feet in the Loess Hills and grading to about 20 feet in the eastern extent of the region. Pre-Illinoian till, deposited more than 500,000 years ago, lies beneath the loess and has experienced extensive erosion and dissection. Pennsylvanian and Cretaceous bedrock, comprised of shale, mudstones, and sandstones, lie beneath the glacial material (USDA-NRCS 2006). The vegetation in the MLRA has undergone drastic changes over time. Spruce forests dominated the landscape 30,000 to 21,500 years ago. As the last glacial maximum peaked 21,500 to 16,000 years ago, they were replaced with open tundras and parklands. The end of the Pleistocene Epoch saw a warming climate that initially prompted the return of spruce forests, but as the warming continued, spruce trees were replaced by deciduous trees (Baker et al. 1990). Not until approximately 9,000 years ago did the vegetation transition to prairies as climatic conditions continued to warm and subsequently dry. Between 4,000 and 3,000 years ago, oak savannas began intermingling within the prairie landscape, while the more wooded and forested areas maintained a foothold in sheltered areas. This prairie-forest transition ecosystem formed the dominant landscapes until the arrival of European settlers (Baker et al. 1992).

Classification relationships

Major Land Resource Area (MLRA): Iowa and Missouri Deep Loess Hills (107B) (USDA-NRCS 2006) USFS Subregions: Central Dissected Till Plains Section (251C), Deep Loess Hills (251Ca), Loess Hills (251Cb), Missouri River Alluvial Plain (251Cg); Nebraska Rolling Hills Section (251H), Yankton Hills and Valleys (251Ha), Pawnee City-Seneca Rolling Hills (251Hd) (Cleland et al. 2007) U.S. EPA Level IV Ecoregion: Missouri Alluvial Plain (47d), Steeply Rolling Loess Prairies (47e), Rolling Loess Prairies (47f), Nebraska/Kansas Loess Hills (47h), Western Loess Hills (47m) (USEPA 2013) Biophysical Setting (LANDFIRE 2009): Eastern Great Plains Wet Meadow-Prairie-Marsh (4214880) Ecological Systems (National Vegetation Classification System, Nature Serve 2015): Eastern Great Plains Wet Meadow, Prairie and Marsh (CES205.687) Eilers and Roosa (1994): Missouri River Alluvium Region - Oxbows Iowa Department of Natural Resources (INAI nd): Sedge Meadow, Southern Missouri Natural Heritage Program (Nelson 2010): Wet Bottomland Prairie Nebraska Game and Parks Commission (Steinauer and Rolfsmeier 2010): Eastern Sedge Wet Prairie Plant Associations (National Vegetation Classification System, Nature Serve 2015): *Carex* spp. – (*Carex pellita*, *Carex vulpinoidea*) Wet Meadow (CEGL005272)

Ecological site concept

Wet Floodplain Prairies are located within the green areas on the map (Figure 1). They occur on floodplains, and the soils are Entisols and Mollisols that are poorly-drained and very deep, formed from alluvium. The site experiences seasonal flooding, resulting in a plant community dominated by hydrophytic and mesophytic herbaceous vegetation. The historic pre-European settlement vegetation on this site was dominated by a moderate diversity of grasses, sedges, and forbs. Common buttonbush (*Cephalanthus occidentalis* L.) is a characteristic shrub component, while fox sedge (*Carex vulpinoidea* Michx.) and American water horehound (*Lycopus americanus* Muhl. ex W.P.C. Barton) are diagnostic components of the herbaceous layer. Bluejoint (*Calamagrostis canadensis* (Michx.) P.Beauv.), prairie cordgrass (*Spartina pectinata* Bosc ex Link), common spikerush (*Eleocharis palustris* (L.) Roem. & Schult.), and rice cutgrass (*Leersia oryzoides* (L.) Sw.) are other frequent grass and grass-like associates. Herbaceous species typical of an undisturbed plant community associated with this ecological site include hairy sedge (*Carex lacustris* Willd.), hemlock waterparsnip (*Sium suave* Walter), and bluebill (*Clematis pitcheri* Torr. & A. Gray) (Drobney et al. 2001; Ladd and Thomas 2015). Historically, seasonal flooding was the primary

disturbance factor, while fire and animal predation were secondary factors (LANDFIRE 2009; Nelson 2010). Relative to other floodplain prairie ecological sites in the MLRA, the Wet Floodplain Prairies occur lower on the landscape, away from the stream channel. They experience flooding, but no ponding. The clayey soils allow less drainage than other floodplain prairies, and the resulting vegetation is a moderate mix of upland and lowland species adapted to seasonal high water tables.

Associated sites

F107XB016MO	<p>Loamy Floodplain Forest</p> <p>Silty alluvium soils on floodplains near stream channel including Blake, Danbury, Floris, Gilliam, Grable, Grable variant, Haynie, Haynie variant, Kenridge, Landes, Lossing, McPaul, Modale, Modale variant, Moniteau, Morconick, Motark, Merville, Nodaway, Omadi, Paxico, Ray, Rodney, Scroll, Ticonic, Udifluvents, Udorthents, and Waubonsie</p>
R107XB025IA	<p>Loamy Floodplain Prairie</p> <p>Loamy alluvium soils on floodplains including Blyburg, Kennebec, Kezan, Vore, and Wilsey</p>

Similar sites

R107XB018MO	<p>Ponded Floodplain Marsh</p> <p>Ponded Floodplain Marshes can experience flooding and ponding</p>
R107XB025IA	<p>Loamy Floodplain Prairie</p> <p>Loamy Floodplain Prairies have moderately well to well-drained soils</p>
R107XB023IA	<p>Natric Floodplain Prairie</p> <p>Natric Floodplain Prairies have a significant component of salt/gypsum in the soils</p>

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Cephalanthus occidentalis</i>
Herbaceous	(1) <i>Carex vulpinoidea</i> (2) <i>Lycopus americanus</i>

Physiographic features

Wet Floodplain Prairies occur on floodplains associated with large riverine systems (Figure 2). They are situated on elevations ranging from approximately 400 to 2,700 feet ASL on slopes that are generally less than two percent. These sites are subject to seasonal flooding following high stream flows or heavy rain events.

Figure 1. Figure 1. Location of Wet Floodplain Prairie ecological site within MLRA 107B.

Figure 2. Figure 2. Representative block diagram of Wet Floodplain Prairie and associated ecological sites.

Table 2. Representative physiographic features

Hillslope profile	(1) Toeslope
Slope shape across	(1) Linear
Slope shape up-down	(1) Linear
Landforms	(1) Flood plain (2) Flood-plain step
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Rare to frequent
Ponding frequency	None to rare
Elevation	120 – 840 m
Slope	0 %
Water table depth	0 – 200 cm
Aspect	Aspect is not a significant factor

Climatic features

The Iowa and Missouri Deep Loess Hills falls into two Köppen-Geiger climate classifications (Peel et al. 2007): hot humid continental climate (Dfa) dominates the majority of the MLRA with small portions in the south falling into the humid subtropical climate (Cfa). In winter, dry, cold air masses periodically shift south from Canada. As these air masses collide with humid air, snowfall and rainfall result. In summer, moist, warm air masses from the Gulf of Mexico migrate north, producing significant frontal or convective rains (Decker 2017). Occasionally, high pressure will stagnate over the region, creating extended droughty periods. These periods of drought have historically occurred on 22-year cycles (Stockton and Meko 1983).

The soil temperature regime of MLRA 107B is classified as mesic, where the mean annual soil temperature is between 46 and 59°F (USDA-NRCS 2006). Temperature and precipitation occur along a north-south gradient, where temperature and precipitation increase the further south one travels. The average freeze-free period of this ecological site is about 188 days, while the frost-free period is about 165 days (Table 2). The majority of the precipitation occurs as rainfall in the form of convective thunderstorms during the growing season. Average annual precipitation is 36 inches, which includes rainfall plus the water equivalent from snowfall (Table 3). The average annual low and high temperatures are 41 and 63°F, respectively.

Climate data and analyses are derived from 30-year average gathered from five National Oceanic and Atmospheric Administration (NOAA) weather stations contained within the range of this ecological site (Table 4).

Table 3 Representative climatic features

Frost-free period (characteristic range)	130-160 days
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Freeze-free period (characteristic range)	160-190 days
Precipitation total (characteristic range)	790-970 mm
Frost-free period (actual range)	130-160 days
Freeze-free period (actual range)	160-190 days
Precipitation total (actual range)	790-1,040 mm
Frost-free period (average)	150 days
Freeze-free period (average)	180 days
Precipitation total (average)	890 mm

- (1) ATCHISON [USC00140405], Atchison, KS
- (2) LEXINGTON 3E [USC00234904], Lexington, MO
- (3) BLAIR [USC00250930], Blair, NE
- (4) ONAWA 3NW [USC00136243], Onawa, IA
- (5) OREGON [USC00236357], Oregon, MO

Influencing water features

Wet Floodplain Prairies are classified as a RIVERINE wetland under the Hydrogeomorphic (HGM) classification system (Smith et al. 1995; USDA-NRCS 2008) and as an Emergent Palustrine Temporarily to Seasonally Flooded wetland under the National Wetlands Inventory (FGDC 2013). Overbank flow or subsurface hydraulic connections with the adjacent stream channel are the main sources of water for this ecological site, while precipitation replenishes and/or maintains levels (Smith et al. 1995; Nelson 2010). Infiltration is slow (Hydrologic Group C) for undrained soils, and surface runoff is low. Flooding generally occurs in winter and spring as well as during heavy rains.

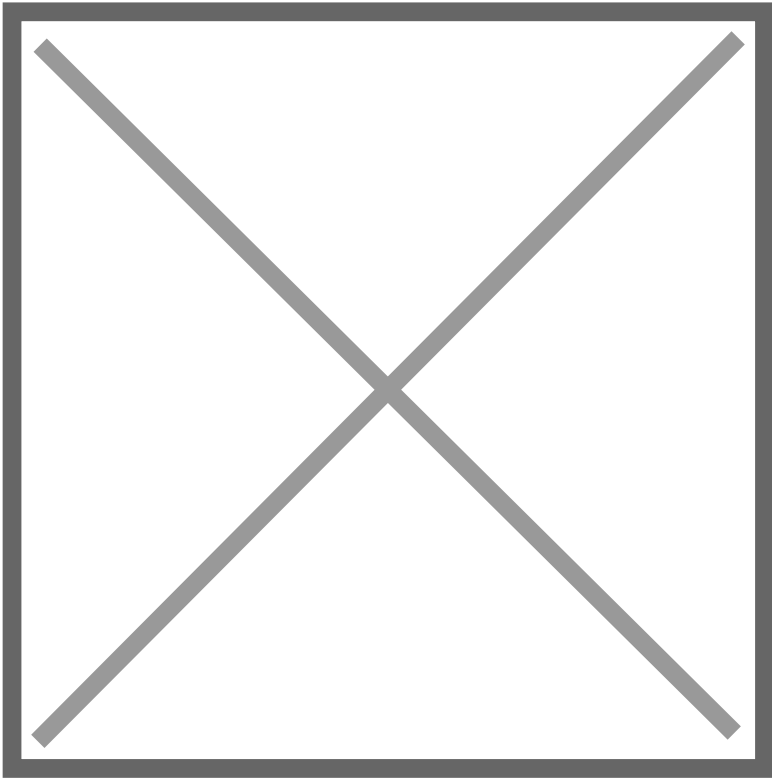


Figure 9. Figure 5. Hydrologic cycling in Wet Floodplain prairie ecological site.

Soil features

Soils of Wet Floodplain Prairies are in the Entisol and Mollisol orders, further classified as Aeric Fluvaquents, Mollic Fluvaquents, Typic Udorthents, Aquertic Hapludolls, Aquic Hapludolls, Cumulic Endoaquolls, Cumulic Haplaquolls, Cumulic Vertic Endoaquolls, Fluvaquentic Hapludolls, Typic Argiaquolls, Vertic Endoaquolls, Vertic Epiaquolls, and Vertic Haplaquolls with impermeable to slow infiltration and low to high runoff potential. The soil series associated with this site includes Ackmore, Aquents, Bremer, Calco, Colo, Cooper, Fluvaquents, Fluvaquents-sandy, Fluvaquents-silty, Forney, Grantcenter, Holly Springs, Kean, Lakeport, Larpenteur, Mt. Sterling, Nishna, Orthents, Solomon, Tieville, Udorthents, Uturin, Vesser, Wabash, Woodbury, and Zook. The soils were formed under herbaceous vegetation and have a dark, organic-rich surface horizon. The parent material is alluvium, and the soils are poorly-drained and very deep with seasonal high water tables. Soil pH classes are slightly acid to moderately alkaline. No rooting restrictions are noted for the soils of this ecological site.

Figure 10. Figure 6. Profile sketches of soil series associated with Wet Floodplain Prairie.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silty clay (2) Silt loam
Family particle size	(1) Fine-silty
Drainage class	Very poorly drained to poorly drained
Permeability class	Very slow

Soil depth	200 cm
Available water capacity (0-101.6cm)	12.7 – 20.32 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 30 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	6.1 – 8.4

Ecological dynamics

The Loess Hills region lies within the transition zone between the eastern deciduous forests and the Great Plains, with the Missouri River flowing through the middle. The heterogeneous topography of the area results in variable microclimates and fuel matrices that in turn are able to support prairies, savannas, woodlands, and forests (Novacek et al. 1985; Nelson 2010). Wet Floodplain Prairies form an aspect of this vegetative continuum. This ecological site occurs on floodplains on poorly-drained clayey soils. Species characteristic of this ecological site consist of hydrophytic and mesophytic herbaceous vegetation.

Flooding is the dominant disturbance factor in Wet Floodplain Prairies. Seasonal flooding occurs in winter and spring but can also follow heavy rains (Nelson 2010). Periodic, hot replacement fires every two to five years helped to reduce the build-up of heavy thatch as well as keep the site free of encroaching woody vegetation (LANDFIRE 2009). Animal herbivory is a secondary disturbance factor that can impact plant composition, diversity, and cover. Historically, occasional browsing by large ungulates, such as bison, prairie elk, and white-tailed deer, might have prevented the invasion of woody species into this bottomland prairie (Nelson 2010).

Today, many original Wet Floodplain Prairies have been reduced as a result of drainage and conversion to agriculture. Sites have also been degraded by stream channelization, wetland drainage, and excessive siltation, which have altered hydrologic flood cycles. Fire suppression has allowed woody vegetation to invade and overtake the native prairie. Invasive, non-native species, such as purple loosestrife (*Lythrum salicaria* L.), reed canarygrass (*Phalaris arundinacea* L.), redtop (*Agrostis gigantea* Roth), creeping jenny (*Lysimachia nummularia* L.), and common reed (*Phragmites australis* (Cav.) Trin. ex Steud.) have also been invading this site and reducing native species diversity (Nelson 2010; Steinauer and Rolfsmeier 2010).

State and transition model

Figure 11. STM

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 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 3.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 13. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 14. Community 4.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 15. Community 4.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 16. Community 5.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 17. Community 5.2 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.

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Approval

Chris Tecklenburg, 5/21/2020

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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)	Lisa Kluesner
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Contact for lead author	
Date	10/29/2026
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:
