

Ecological site R108XA007IL

Wet Loess Upland Prairie

Last updated: 11/05/2024

Accessed: 09/17/2026

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): 108X—Illinois and Iowa Deep Loess and Drift

The Illinois and Iowa Deep Loess and Drift, Eastern Part (MLRA 108A) encompasses the Grand Prairie physiographic division (Schewman et al. 1973). It spans two states – Illinois (97 percent) and Indiana (3 percent) – comprising about 11,145 square miles (Figure 1). The elevation ranges from 985 feet above sea level (ASL) in the northern part to 660 feet above sea level in the southern part. Local relief varies from 3 to 10 feet on most of the area which is on broad flat uplands. The maximum relief is about 160 feet along major streams. The northern part of this area is underlain by Ordovician and Silurian limestone and the southern part is underlain by Pennsylvanian shale, siltstone, and limestone. Except for some areas along streams where bedrock is exposed, glacial drift covers all the MLRA. The glacial drift consists of till and stratified outwash and is of Wisconsinan age. A moderately thin to thick layer of loess covers the entire area (USDA-NRCS 2006). The vegetation in the MLRA has undergone drastic changes over time. At the end of the last glacial episode – the Wisconsinan glaciation – the evolution of vegetation began with the development of tundra habitats, followed by a phase of spruce and fir forests, and eventually spruce-pine forests. Not until approximately 9,000 years ago did the climate undergo a warming trend which prompted the development of deciduous forests dominated by oak and hickory. As the climate continued to warm and dry, prairies began to develop approximately 8,300 years ago. Another shift in climate that resulted in an increase in moisture prompted the emergence of savanna-like habitats from 8,000 to 5,000 years before present. Moisture continued to increase in the southernmost region 5,000 years ago, resulting in an increase of forested systems (Taft et al. 2009). Fire, droughts, and grazing by native mammals helped to maintain the prairies and savannas until the arrival of European settlers, and the forests were maintained by droughts, wind, lightning, and occasional fire (Taft et al. 2009; NatureServe 2018).

Classification relationships

USFS Subregions: Central Till Plains and Grand Prairies (251D) and Central Till Plains-Beech-Maple Sections; Northern Grand Prairie (251Dc), Eastern Grand Prairie (251Dd), Southern Grand Prairie (251De), and Entrenched Valleys (222Hf) Subsections (Cleland et al. 2007) U.S. EPA Level IV Ecoregion: Illinois/Indiana Prairies (54a) and Glaciated Wabash Lowlands (72b) (USEPA 2013) National Vegetation Classification – Ecological Systems: Central Tallgrass Prairie (CES205.683) (NatureServe 2018) National Vegetation Classification – Plant Associations: *Andropogon gerardii* – *Panicum virgatum* – *Helianthus grosseserratus* Wet Meadow (CEGL002024) (Nature Serve 2018) Biophysical Settings: Central Tallgrass Prairie (BpS 4914210) (LANDFIRE 2009) Illinois Natural Areas Inventory: Wet-mesic prairie (White and Madany 1978)

Ecological site concept

Wet Loess Upland Prairies are located within the blue areas on the map (Figure 1). They occur on uplands. The soils are Alfisols and Mollisols that are poorly-drained and deep, formed in loess. The historic pre-European settlement vegetation on this ecological site was dominated by a mix of upland and hydrophytic herbaceous vegetation as this site spanned the hydric/non-hydric boundary. Big bluestem (*Andropogon gerardii* Vitman) and bluejoint (*Calamagrostis canadensis* L.) are the dominant species on the site. Other monocots present on the site include switchgrass (*Panicum virgatum* L.), Indiangrass (*Sorghastrum nutans* (L.) Nash), and prairie cordgrass (*Spartina pectinata* Bosc ex Link) (White and Madany 1978). Species indicative of an undisturbed ecological site can include fourflower yellow loosestrife (*Lysimachia quadriflora* Sims) and button erylngo (*Eryngium yuccifolium* Michx.) (White and Madany 1978; Taft et al. 1997; NatureServe 2018). Fire is the primary disturbance factor that maintains this site, while herbivory and drought are secondary factors (LANDFIRE 2009).

Associated sites

R108XA008IL	Ponded Loess Sedge Meadow Loess parent material that can experience ponding including Brooklyn, Elpaso, Hartsburg, and Streator
R108XA006IL	Loess Upland Prairie Loess parent material that is not shallow to the water table including Arrowsmith, Catlin, Chenoa, Dana, Danabrook, Flanagan, Graymont, Harco, La Rose, Lisbon, Mona, Normal, Parr, Raub, Rooks, Rutland, Saybrook, Varna, Wenona, and Wyanet

Similar sites

R108XA013IL	Wet Outwash Prairie Wet Outwash Prairies are a similar HGM wetland, but the parent material is shallow loess over outwash
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Andropogon gerardii</i> (2) <i>Calamagrostis canadensis</i>

Physiographic features

Wet Loess Upland Prairies occur on uplands. They are situated on elevations ranging from approximately 541 to 935 feet ASL. The site does not experience flooding but rather generates runoff to adjacent, downslope ecological sites (Table 1).

Figure 1. Figure 1. Location of Wet Loess Upland Prairie ecological site within MLRA 108A.

Table 2. Representative physiographic features

Slope shape across	(1) Linear
Slope shape up-down	(1) Linear
Landforms	(1) Upland
Runoff class	Negligible
Elevation	170 – 290 m
Slope	0 %

Water table depth	20 cm
Aspect	Aspect is not a significant factor

Climatic features

The Illinois and Iowa Deep Loess and Drift, Eastern Part falls into the hot-summer humid continental climate (Dfa) and the humid subtropical continental climate (Cfa) Köppen-Geiger climate classifications (Peel et al. 2007). The two main factors that drive the climate of the MLRA are latitude and weather systems. Latitude, and the subsequent reflection of solar input, determines air temperatures and seasonal variations. Solar energy varies across the seasons, with summer receiving three to four times as much energy as opposed to winter. Weather systems (air masses and cyclonic storms) are responsible for daily fluctuations of weather conditions. High-pressure systems are responsible for settled weather patterns where sun and clear skies dominate. In fall, winter, and spring, the polar jet stream is responsible for the creation and movement of low-pressure systems. The clouds, winds, and precipitation associated with a low-pressure system regularly follow high-pressure systems every few days (Angel n.d.).

The soil temperature regime of MLRA 108A 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 166 days, while the frost-free period is about 134 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 approximately 38 inches, which includes rainfall plus the water equivalent from snowfall (Table 3). The average annual low and high temperatures are 40 and 61°F, respectively.

Climate data and analyses are derived from 30-year averages gathered from four 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)	130-140 days
Freeze-free period (characteristic range)	170 days
Precipitation total (characteristic range)	940-970 mm
Frost-free period (actual range)	130-140 days
Freeze-free period (actual range)	170 days
Precipitation total (actual range)	940-970 mm
Frost-free period (average)	130 days
Freeze-free period (average)	170 days
Precipitation total (average)	970 mm

- (1) MINONK [USC00115712], Minonk, IL
- (2) SAYBROOK 2N [USC00117590], Saybrook, IL

- (3) DECATUR AP [USW00003887], Decatur, IL
- (4) DE KALB [USC00112223], Dekalb, IL

Influencing water features

Wet Loess Upland Prairies are classified as a MINERAL SOIL FLATS: saturated, recharge, herbaceous wetland under the Hydrogeomorphic (HGM) classification system (Smith et al. 1995; USDA-NRCS 2008) and as a Palustrine, Persistent Emergent, Seasonally Saturated wetland under the National Wetlands Inventory (FGDC 2013). Precipitation is the main source of water for this ecological site (Smith et al. 1995). Infiltration is very slow (Hydrologic Group D) for undrained soils, and surface runoff is negligible (Figure 4).

Primary wetland hydrology indicators for an intact Wet Loess Upland Prairies may include: A2 High water table and A3 Saturation. Secondary wetland hydrology indicators may include: C2 Dry-season water table and D5 FAC-neutral test (USACE 2010).

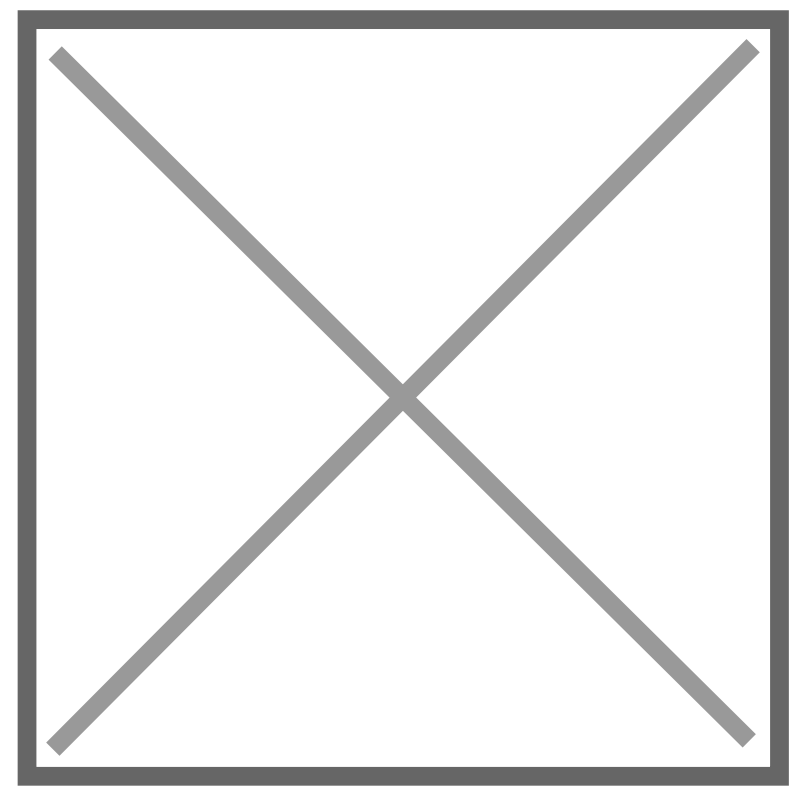


Figure 8. Figure 4. Hydrologic cycling in Wet Loess Upland Prairie ecological site.

Soil features

Soils of Wet Loess Upland Prairies are in the Alfisols and Mollisols orders, further classified as Mollic Albaqualfs and Typic Endoaquolls with very slow infiltration and negligible runoff potential. The soil series associated with this site includes Brooklyn, Elpaso and Hartsburg (Figure 5). The parent material is loess and the soils are poorly-drained and deep with seasonal high-water tables. Soil pH classes are strongly acid to moderately alkaline. No rooting restrictions are noted for the soils of this ecological site (Table 5).

Figure 9. Figure 5. Profile sketches of soil series associated with Wet Loess Upland Prairie.

Table 4. Representative soil features

Parent material	(1) Loess
Family particle size	(1) Fine-silty (2) Fine

Drainage class	Poorly drained
Permeability class	Slow to moderately slow
Soil depth	200 cm

Ecological dynamics

The information in this Ecological Site Description, including the state-and-transition model (STM), was developed based on historical data, current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant species, disturbances, and ecological processes are described to inform land management decisions.

The MLRA lies within the tallgrass prairie ecosystem of the Midwest. The heterogeneous topography of the area results in variable microclimates and fuel matrices that in turn support prairies, savannas, and forests. Wet Loess Upland Prairies form an aspect of this vegetative continuum. This ecological site occurs on uplands on poorly-drained soils. Species characteristic of this ecological site consist of a mix of upland and hydrophytic herbaceous vegetation.

Fire is a critical disturbance factor that maintains Wet Loess Upland Prairies. Fire intensity typically consisted of periodic, low-intensity surface fires occurring every 2 to 5 years (LANDFIRE 2009). Ignition sources included summertime lightning strikes from convective storms and bimodal, human ignitions during the spring and fall seasons. Native Americans regularly set fires to improve sight lines for hunting, driving large game, improving grazing and browsing habitat, agricultural clearing, and enhancing vital ethnobotanical plants (Barrett 1980).

Drought and grazing by native ungulates have also played a role in shaping this ecological site. The periodic episodes of reduced soil moisture in conjunction with the poorly-drained soils have favored the proliferation of plant species tolerant of such conditions. Drought can also slow the growth of plants and result in dieback of certain species. Large mammals, specifically prairie elk (*Cervus elaphus*), bison (*Bos bison*), and white-tailed deer (*Odocoileus virginianus*), likely occurred in low densities resulting in limited impacts to plant composition and dominance (LANDFIRE 2009). When coupled with fire, periods of drought and herbivory can greatly delay the establishment of woody vegetation (Pyne et al. 1996).

Today, Wet Loess Upland Prairies have been greatly reduced as most areas have been converted to agricultural production. Corn (*Zea mays* L.) and soybeans (*Glycine max* (L.) Merr.) are the dominant crops grown, but small patches of forage land may be present. Remnants that do exist show evidence of indirect anthropogenic influences from fire suppression, subsurface drainage, and non-native species invasion. A return to the historic plant community may not be possible following extensive land modification, but long-term conservation agriculture or prairie reconstruction efforts can help to restore some biotic diversity and ecological function. The state-and-transition model that follows provides a detailed description of each state, community phase, pathway, and transition. This model is based on available experimental research, field observations, literature reviews, professional consensus, and interpretations.

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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Table 9. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 3.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 4.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 13. Community 4.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 14. Community 5.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 15. 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 this ecological site description.

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This project could not have been completed without the dedication and commitment from a variety of staff members (Table 6). Team members supported the project by serving on the technical team, assisting with the development of state and community phases of the state-and-transition model, providing peer review and technical editing, and conducting quality control and quality assurance reviews. Table 6. List of primary contributors and reviewers. Organization Name Title Location Natural Resources Conservation Service: Scott Brady, Acting Regional Ecological Site Specialist, Havre, MT Stacey Clark, Regional Ecological Site Specialist, St. Paul, MN Tonie Endres, Senior Regional Soil Scientist, Indianapolis, IN Tiffany Justus, Soil Scientist, Aurora, IL Lisa Kluesner, Ecological Site Specialist, Waverly, IA Kevin Norwood, Soil Survey Regional Director, Indianapolis, IN Kristine Ryan, MLRA Soil Survey Leader, Aurora, IL Sarah Smith, Soil Scientist, Aurora, IL This site was originally approved by Chris Tecklenburg, 5/01/2020.

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	05/01/2020
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:
