Ecological site R108XD944IA
Wet Loess High Terrace Savanna

Last updated: 10/17/2024
Accessed: 09/20/2026

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, Western Part MLRA covers parts of both Iowa and Missouri and is known locally as part of the Southern Iowa Drift Plain. A silty loess deposit of varying thickness (5 to 20 feet) covers a series of glacial advances known collectively as pre-Illinoisan till. This till, deposited more than half a million years ago, was subjected to multiple instances of extreme erosion as well as periods of subdued erosion and intense weathering. The loess is thickest in the western part of the MLRA and generally thins eastward. In some areas, the loess has been removed and the older weathered till, called a “paleosol,” entirely exposed. These highly weathered soils, or paleosols, have a high content of clay, which slows the downward movement of water through the profile and causes water to move laterally instead of vertically. Wet areas, or “side-hill seeps,” commonly form where these paleosols become exposed along hillsides (Prior, 1991). The dominant soil orders in this MLRA are Mollisols and Alfisols and, to a lesser extent, Entisols and Inceptisols. Most of the soils are Udolls or Udalfs. Aquolls are on the flatter interfluves. The soils in the area dominantly have a mesic soil temperature regime, an aquic or udic soil moisture regime, and mixed mineralogy. They generally are very deep, well drained to poorly drained, and silty, loamy, or clayey. These soils on uplands include somewhat poorly drained, nearly level Argiudolls (Macksburg series); moderately well drained, gently sloping to strongly sloping Argiudolls (Sharpsburg series); poorly drained, nearly level Argiaquolls (Winterset series); and well drained strongly, sloping to steep Hapludalfs (Gara, Lindley, Ladoga, and Armstrong series) (USDA-NRCS, 2006). The western part of the Illinois and Iowa Deep Loess and Drift is a segment of three other MLRAs within the Central Feed Grains and Livestock Region. The other areas are: the West-Central part (108C), the East-Central part (108B) and the Eastern part (108A).

Classification relationships

Major Land Resource Area (MLRA): Illinois and Iowa Deep Loess and Drift, Western Part (108D) USFS Subregions: Central Dissected Till Plains Section (251C); Loess Hills (251Cb) and Central Dissected Till and Loess Plain (251Cc) Subsections (Cleland et al, 2007) Relationship to Other Established Classifications: NatureServe Classification: Ecological System: North-Central Interior Dry-Mesic Oak Forest and Woodland (4116); Ecological Association: Central Tallgrass Big Bluestem Loess Prairie (NatureServe, 2013) Landfire Biophysical Setting: Central Tallgrass Prairie (4314210) (Landfire, 2009)

Ecological site concept

Wet Loess High Terrace Savannas are within the red areas on the map (Figure 1). These sites formed in loess parent material and can be found on stream terraces in river valleys. Typically these sites are located along streams and are found in lower wet areas, surrounded by the drier loess high terrace savanna ecological sites. Soils are typically Mollisols, characterized by deep, dark colored surfaces high in organic matter due to the dominant savanna vegetation and have no rooting restrictions. Plant communities consist of mostly grasses and few forbs, trees and shrubs.

Associated sites

R108XD940IA	**Loess High Terrace Savanna** Loess High Terrace Savanna. Fine and fine-silty soils including Sharpsburg, Macksburg, Ladoga, Givin and Hedrick series.

R108XD941IA	**Loamy Terrace Savanna** Loamy Terrace Savanna.Fine-silty soils including Watkins and Wiota series.
F108XD901IA	**Loamy Floodplain Forest** Loamy Floodplain.Fine-silty and coarse-loamy soils including Dockery, Landes, Nodaway, Huntsville and Kennebec series.

Similar sites

R108XD864IA	**Wet Upland Prairie** Wet Upland Prairie. Fine soils including Clearfield, Clarinda, Rinda, Sperry and Winterset series.
R108XD940IA	**Loess High Terrace Savanna** Loess High Terrace Savanna. Fine and fine-silty soils including Sharpsburg, Macksburg, Ladoga, Givin and Hedrick series.

Table 1. Dominant plant species

Tree	(1) *Quercus macrocarpa*
Shrub	Not specified
Herbaceous	(1) *Calamagrostis canadensis* (2) *Carex pellita*

Physiographic features

Wet Loess High Terrace Savannas are of small extent, and can be found on stream terraces in river valleys along streams in the south west and north east parts of MLRA 108D. These sites are within a dissected till plain landscape. Slopes are generally less than 2 percent. These sites typically occur in low areas of treads on stream terraces where water collects.

Table 2. Representative physiographic features

Landforms	(1) Stream terrace
Runoff class	Negligible to low
Flooding frequency	None
Ponding frequency	None
Elevation	210 – 420 m

Slope	0 %
Water table depth	0 – 90 cm
Aspect	Aspect is not a significant factor

Climatic features

The soil temperature regime of MLRA 108D is classified as “mesic” where the mean annual soil temperature is between 46 and 59°F (Soil Survey Staff, 2014). The average freeze-free period of this ecological site is about 166 days, while the frost-free period is about 144 days.

Average annual precipitation is 31 inches, which includes rainfall plus the water equivalent from snowfall.. The average annual low and high temperatures are 38 and 60°F, respectively.

Table 3 Representative climatic features

Frost-free period (characteristic range)	130-150 days
Freeze-free period (characteristic range)	160-170 days
Precipitation total (characteristic range)	910-940 mm
Frost-free period (actual range)	130-150 days
Freeze-free period (actual range)	150-180 days
Precipitation total (actual range)	910-970 mm
Frost-free period (average)	140 days
Freeze-free period (average)	160 days
Precipitation total (average)	940 mm

- (1) CLARINDA [USC00131533], Clarinda, IA
- (2) INDIANOLA 2W [USC00134063], Indianola, IA
- (3) KNOXVILLE [USC00134502], Knoxville, IA
- (4) MARYVILLE 2E [USC00235340], Maryville, MO
- (5) GUTHRIE CTR [USC00133509], Guthrie Center, IA

Influencing water features

The soils at this site are poorly drained. Permeability is moderately slow to slow. The soil at this site is in hydrologic group C/D or B/D (Hydrologic Soil Group, 2016). Land capability class is 2w or 3w (Land Capability Classification, 2016). Depth of endosaturation is

between 0 and 3 feet. This ecological site is influenced by a seasonal high water table. In some soils on high, loess-covered stream terraces, the water table is perched on a clayey subsoil. Soils on footslopes are affected by lateral flow from upslope.

This ecological site contains wetlands which fit into the MINERAL FLAT class in the Hydrogeomorphic (HGM) system (Brinson, 1993). The water source is direct precipitation, because there are no upslope contributing sites. Vertical water percolation in the soil is impeded by the clayey subsoil, resulting in significant lateral discharge to adjacent downslope ecological sites. Sloping footslope positions, which receive water from upslope, may be in the SLOPE HGM class. Wetness and hydrology in most areas have been altered with the use of surface ditches, upslope diversion terraces, and other methods. Unaltered areas are Emergent Palustrine wetlands (Cowardin et al., 1979).

Soil features

These soils have no major rooting restriction. The soils were formed under savanna vegetation, and have dark, organic-rich surface horizons. Parent material is loess. The soils have silty clay loam surface horizons. Subsoils are silty clay loam or silty clay. Winterset and Sperry are the soil series associated with this site.

Table 4. Representative soil features

Parent material	(1) Loess
Surface texture	(1) Silty clay loam (2) Silty clay
Drainage class	Poorly drained
Permeability class	Slow to moderately slow
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (Depth not specified)	20.32 cm
Calcium carbonate equivalent (Depth not specified)	Not specified
Soil reaction (1:1 water) (Depth not specified)	6.1 – 6.7
Subsurface fragment volume <=3" (Depth not specified)	Not specified

Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

Reference plant community is categorized as a wet loess savanna and includes grasses and forbs, with scattered oak grubs and clumps of shrubs. The grubs form as multi-stemmed stump sprouts and are the result of repeated exposure fire. The oak grubs huge root masses allowed them to achieve canopy ascension even after annual fires. Species composition typically includes Calamagrostis Canadensis, Carex pellita, Quercus macrocarpa, and Quercus alba. Fire, grazing, drought, are all disturbances influencing the dynamics at this site. These sites likely burned every 1 to 3 years. Grazing by whitetail deer, and prairie elk, was rare. Bison as well may have been also present, grazing to a lesser extent. Disturbances from these animals removed thatch, litter, and reduced the proliferation of small trees and shrubs (Mutel, 2008). As this region was settled, fire suppression was common in these savannas and any existing savannas not yet converted to agriculture have since shifted to a woodland or forest state, even as the moderately deep depth to shale bedrock tends to inhibit quick canopy regrowth. Areas converted to agriculture are commonly used for corn and soybean production today.

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 2.1 plant community composition

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

Table 8. Community 3.1 plant community composition

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

Table 9. Community 4.1 plant community composition

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

Table 10. Community 5.1 plant community composition

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

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

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Approval

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Acknowledgments

This ESD was originally approved prior to April 2021.

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	09/20/2026
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:**
