

USDA icon Natural Resources
Conservation Service

Ecological site R108XD824IA

Wet Upland Drainageway Prairie

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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): 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 Cordgrass Wet Prairie (NatureServe, 2013) Landfire Biophysical Setting: Central Tallgrass Prairie (4314210) (Landfire, 2009)

Ecological site concept

These sites formed in local alluvium parent material and can be found in drainageways on uplands. Typically these sites are located down slope from wet upland prairie ecological sites and intermingled with Loamy Upland Drainageway Prairies and Loamy Footslope Savannas. Soils are typically Mollisols, characterized by deep, dark colored surfaces high in organic matter due to the dominant prairie vegetation and have no rooting restrictions. Plant communities consist of mostly grasses, sedges, forbs and shrubs.

Associated sites

R108XD841IA	Loamy Footslope Savanna Loamy Footslope Savanna. Fine-loamy and fine-silty textured soils including Arbor, Ely, Judson and Olmitz series.
R108XD864IA	Wet Upland Prairie Wet Upland Prairie. Fine textured soils including Sperry, Winterset, Clarinda, Rinda and Clearfield series.

R108XD863IA	Till Upland Prairie Till Upland Prairie. Fine and fine-loamy soils, including Adair, Armstrong, Bucknell, Gara, Lamoni and Shelby.
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Similar sites

R108XD864IA	Wet Upland Prairie Wet Upland Prairie. Fine textured soils including Sperry, Winterset, Clarinda, Rinda and Clearfield series.
R108XD821IA	Loamy Upland Drainageway Prairie Loamy Upland Drainageway Prairie.Fine-silty soil including the Kennebec series.
F108XD851IA	Loamy Upland Drainageway Woodland Loamy Upland Drainageway Woodland.Fine-silty soil including the Nodaway series.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Calamagrostis canadensis</i> (2) <i>Carex pellita</i>

Physiographic features

Wet Upland Drainageway Prairies are of large extent, and can be found in drainageways in uplands throughout MLRA 108D. These sites are within a dissected till plain landscape. Slopes are generally less than 5 percent. These sites typically occur in areas where soil deposits from upslope have accumulated.

Figure 1. Block diagrams representing typical soil-landform sequences in Loess Ridges. Red asterisk identifies soil component correlated to Wet Upland Drainageway Prairie.

Table 2. Representative physiographic features

Landforms	(1) Drainageway
Runoff class	Negligible to low
Flooding frequency	None to frequent
Ponding frequency	None

Elevation	150 – 480 m
Water table depth	0 – 120 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)	140-150 days
Freeze-free period (characteristic range)	160-180 days
Precipitation total (characteristic range)	910-940 mm
Frost-free period (actual range)	140-150 days
Freeze-free period (actual range)	160-180 days
Precipitation total (actual range)	890-970 mm
Frost-free period (average)	140 days
Freeze-free period (average)	170 days
Precipitation total (average)	910 mm

- (1) GREENFIELD [USC00133438], Greenfield, IA
- (2) KNOXVILLE [USC00134502], Knoxville, IA
- (3) DES MOINES INTL AP [USW00014933], Des Moines, IA
- (4) BEDFORD [USC00130576], Bedford, IA
- (5) INDIANOLA 2W [USC00134063], Indianola, IA
- (6) CLARINDA [USC00131533], Clarinda, IA
- (7) CRESTON 2 SW [USC00131962], Creston, IA

Influencing water features

The drainage at this site is somewhat poor or poor. Permeability is moderate to very slow. The soil at this site is in hydrologic group B (Hydrologic Soil Group, 2016). The land capability class is 2w (Land Capability Classification, 2016). Depth of endosaturation is between 0 and 4 feet. This ecological site is influenced by a seasonal high water table, resulting from a combination of high groundwater levels and slow hydraulic conductivity, which impedes throughflow from precipitation and flood events. The water table is typically near the surface in late fall through spring, receding in the summer.

This site is in the SLOPE wetlands class of the Hydrogeomorphic (HGM) classification system (Brinson, 1993), and are Emergent Palustrine wetlands (Cowardin et al., 1979).

This ecological site contains first-order streams, which originate from headslope positions at the upper reaches of the units, and are fed from smaller headslopes in the adjacent uplands. The lower reaches of units often contain second-order streams. These streams are ephemeral in most years, with flow in the late fall, winter, and spring months, generally disappearing in the summer, or reduced to isolated pools in the lower reaches. Stream levels typically respond quickly to storm events, especially in watersheds where surface runoff is dominant. Short-duration flooding is common in many areas. Streambeds are typically incised into the surrounding floodplain by as much as 10 feet.

Soil features

These soils have no major rooting restriction. The soils were formed under prairie vegetation, and have dark, organic-rich surface horizons. Parent material is alluvium. The soils have silt loam or silty clay loam surface horizons. Subsoils are silt loam, silty clay loam or silty clay. Soil series associated with this site include Ackmore, Colo, Vesser and Zook.

Figure 8. Distribution of Wet Upland Drainageway Prairies within MLRA 108D

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silt loam (2) Silty clay loam
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Very slow to moderate
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (Depth not specified)	20 – 22.35 cm
Calcium carbonate equivalent (Depth not specified)	Not specified

Soil reaction (1:1 water) (Depth not specified)	10 – 6.9
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 mesic upland prairie and includes grasses and sedges, forbs, and shrubs. Species composition typically includes *Spartina pectinate*, *Calamagrostis Canadensis*, *Carex pellita*, and *Juncus arcticus littoralis*. Fire, grazing, drought, are all disturbances influencing the dynamics at this site. These sites likely burned 3 to 5 times every 10 years. Grazing by whitetail deer, prairie elk, was common, and 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, these prairies were typically altered to better suit agricultural needs. Corn and soybean production is common in these areas today. Very few small remnants of this prairie exist now.

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 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 3.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 13. Community 5.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 14. 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.

Other references

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Approval

Suzanne Mayne-Kinney, 10/17/2024

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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)	John Hammerly, soil scientist Dan Pulido, SSOL
Contact for lead author	
Date	09/21/2026
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:
