Ecological site R115XC003IL
Loess Hill Prairie

Last updated: 12/30/2024
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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): 115X–Central Mississippi Valley Wooded Slopes

This MLRA is characterized by deeply dissected, loess-covered hills bordering well defined valleys of the Illinois, Mississippi, Missouri, Ohio, and Wabash Rivers and their tributaries. It is used to produce cash crops and livestock. About one-third of the area is forested, mostly on the steeper slopes. This area is in Illinois (50 percent), Missouri (36 percent), Indiana (13 percent), and Iowa (1 percent) in two separate areas. It makes up about 25,084 square miles (64,967 square kilometers).

Most of this area is in the Till Plains section and the Dissected Till Plains section of the Central Lowland province of the Interior Plains. The Springfield-Salem plateaus section of the Ozarks Plateaus province of the Interior Highlands occurs along the Missouri River and the Mississippi River south of the confluence with the Missouri River. The nearly level to very steep uplands are dissected by both large and small tributaries of the Illinois, Mississippi, Missouri, Ohio, and Wabash Rivers. The Ohio River flows along the southernmost boundary of this area in Indiana. Well defined valleys with broad flood plains and numerous stream terraces are along the major streams and rivers. The flood plains along the smaller streams are narrow. Broad summits are nearly level to undulating. Karst topography is common in some parts along the Missouri and Mississippi Rivers and their tributaries. Well-developed karst areas have hundreds of sinkholes, caves, springs, and losing streams. In the St. Louis area, many of the karst features have been obliterated by urban development.

Elevation ranges from 90 feet (20 meters) on the southernmost flood plains to 1,030 feet (320 meters) on the highest ridges. Local relief is mainly 10 to 50 feet (3 to 15 meters) but can be 50 to 150 feet (15 to 45 meters) in the steep, deeply dissected hills bordering rivers and streams. The bluffs along the major rivers are generally 200 to 350 feet (60 to 105 meters) above the valley floor.

The uplands in this MLRA are covered almost entirely with Peoria Loess. The loess can be more than 7 feet (2 meters) thick on stable summits. On the steeper slopes, it is thin or does not occur. In Illinois, the loess is underlain mostly by Illinoian-age till that commonly contains a paleosol. Pre-Illinoian-age till is in parts of this MLRA in Iowa and Missouri and to a minor extent in the western part of Illinois. Wisconsin-age outwash, alluvial deposits, and sandy eolian material are on some of the stream terraces and on dunes along the major tributaries. The loess and glacial deposits are underlain by several bedrock systems. Pennsylvanian and Mississippian bedrock are the most extensive. To a lesser extent are Silurian, Devonian, Cretaceous, and Ordovician bedrock. Karst areas have formed where limestone is near the surface, mostly in the southern part of the MLRA along the Mississippi River and some of its major tributaries. Bedrock outcrops are common on the bluffs along the Mississippi, Ohio, and Wabash Rivers and their major tributaries and at the base of some steep slopes along minor streams and drainageways.

The annual precipitation ranges from 35 to 49 inches (880 to 1,250 millimeters) with a mean of 41 inches (1,050 millimeters). The annual temperature ranges from 48 to 58 degrees F (8.6 to 14.3 degrees C) with a mean of 54 degrees F (12.3 degrees C). The freeze-free period ranges from 150 to 220 days with a mean of 195 days.

Soils The dominant soil orders are Alfisols and, to a lesser extent, Entisols and Mollisols. The soils in the area have a mesic soil temperature regime, an aquic or udic soil moisture regime, and mixed or smectitic mineralogy. They are shallow to very deep, excessively drained to poorly drained, and loamy, silty, or clayey.

The soils on uplands in this area support natural hardwoods. Oak, hickory, and sugar maple are the dominant species. Big bluestem, little bluestem, and scattered oak and eastern redcedar grow on some sites. The soils on flood plains support mixed forest vegetation, mainly American elm, eastern cottonwood, river birch, green ash, silver maple, sweetgum, American sycamore, pin oak, pecan, and willow. Sedge and grass meadows and scattered trees are on some low-lying sites. (United States Department of Agriculture, Natural Resources Conservation Service, 2022).

LRU notes

The Central Mississippi Valley Wooded Slopes, Northern part (Land Resource Unit (LRU) 115XC) encompasses the Wyaconda River Dissected Till Plains, Mississippi River Hills, and Mississippi River Alluvial Plain (Schwegman et al. 1973; Nelson 2010). It spans three states – Illinois (73 percent), Iowa (6 percent), and Missouri (21 percent) – comprising about 13,650 square miles (Figure 1). The elevation ranges from 420 feet above sea level (ASL) along the Mississippi River floodplains to 885 feet on the upland ridges. Local relief varies from 10 to 20 feet but can be as high as 50 to 100 feet along drainageways and streams and the bluffs on the major rivers reaching 250 feet above valley floors. Wisconsin-aged loess covers the uplands, while Illinoian glacial drift lies directly below. The loess and drift deposits are underlain by several bedrock systems, including the Cretaceous, Pennsylvania, Mississippian, Silurian, Devonian, and Ordovician Systems. Wisconsin outwash deposits and sandy eolian material occur along stream terraces of major tributaries (USDA-NRCS 2006).

The vegetation across the region 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 (Taft et al. 2009). During the most recent climatic shifts, forested ecosystems maintained footholds on steep valley sides and wet floodplains. Due to the physiography of the MLRA, forests were the dominant ecosystems and were affected by such natural disturbances as droughts, wind, lightning, and occasional fire (Taft et al. 2009)

Classification relationships

USFS Subregions: Central Dissected Till Plains (251C)Section; Western Mississippi River Hills (251Ce), Mississippi River and Illinois Alluvial Plains (251Cf), Eastern Mississippi River Hills (251Ci), Galesburg Dissected Till Plain (251Cj), and Wyaconda River Dissected Till Plain (251Cm) Subsections (Cleland et al. 2007)

U.S. EPA Level IV Ecoregion: Upper Mississippi River Alluvial Plain (72d), River Hills (72f), and Western Dissected Illinoian Till Plain (72i) (USEPA 2013)

National Vegetation Classification – Ecological Systems: Central Tallgrass Prairie (CES205.683) (NatureServe 2018)

National Vegetation Classification – Plant Associations: Schizachyrium scoparium – Sorghastrum nutans – Bouteloua curtipendula Loess Hill Grassland (CEGL005183) (Nature Serve 2018)

Biophysical Settings: Central Tallgrass Prairie (BpS 4914210) (LANDFIRE 2009)

Illinois Natural Areas Inventory: Loess hill prairie (White and Madany 1978)

Missouri Terrestrial Natural Communities: Dry-mesic loess/glacial till prairie (Nelson 2010)

Ecological site concept

Loess Hill Prairies are located within the green areas on the map. They occur on upland backslopes. The soils are

Entisols and Mollisols that are well to somewhat excessively drained and very deep, formed in loess and loess-covered substrates.

The historic pre-European settlement vegetation on this ecological site was dominated by midgrass prairie. Little bluestem (Schizachyrium scoparium (Michx.) Nash) and sideoats grama (Bouteloua curtipendula (Michx.) Torr.) are the dominant grasses on the site. Other grasses present can include Indiangrass (Sorghastrum nutans (L.) Nash) and big bluestem (Andropogon gerardii Vitman) (White and Madany 1978; NatureServe 2018). Forbs typically associated with an undisturbed plant community associated with this ecological site can include green comet milkweed (Asclepias viridiflora Raf.), grooved flax (Linum sulcatum Riddell), and slimflower scurfpea (Psoralidium tenuiflorum (Pursh) Rydb.) (White and Madany 1978; Taft et al. 1997). Fire is the primary disturbance factor that maintains this site, while drought is a secondary factor (LANDFIRE 2009).

Associated sites

F115XC005IL	**Loess Upland Forest** Loess and loess-covered substrates including Atlas, Baylis, Bunkum, Caseyville, Creal, Derinda, Dodge, Fayette, Fishhook, Hickory, Kendall, Keomah, Keswick, Menfro, Metea, Navlys, Rozetta, Seaton, Stookey, Stronghurst, Sylvan, Thebes, Timula, Ursa, and Winfield soils
F115XC007IL	**Loess Protected Backslope Forest** Loess and loess-covered substrates on north and east facing slopes including Atlas, Baylis, Fayette, Hennepin, Hickory, Keswick, Menfro, Seaton, Stookey, Sylvan, Timula, and Ursa soils
F115XC008IL	**Loess Exposed Backslope Woodland** Loess and loess-covered substrates on south and west facing slopes including Atlas, Baylis, Fayette, Hennepin, Hickory, Keswick, Menfro, Seaton, Stookey, Sylvan, Timula, and Ursa soils

Similar sites

R115XC002IL	**Loess Upland Prairie** Loess Upland Prairies occur on upland summits and shoulders and support a more mesic plant community

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Schizachyrium scoparium* (2) *Bouteloua curtipendula*

Physiographic features

Loess Hill Prairies occur on upland backslopes, usually on south and west-facing aspects. They are situated on elevations ranging from approximately 341 to 1738 feet ASL. The site does not experience flooding but rather generates runoff to adjacent, downslope ecological sites.

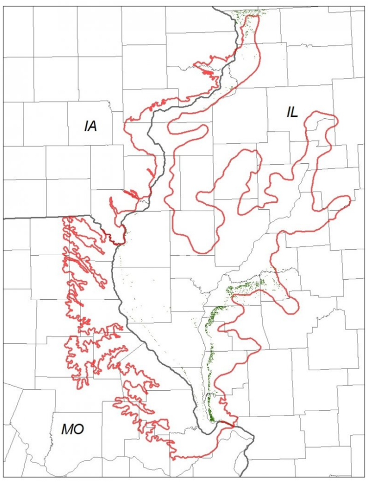


Figure 1. Location of Loess Hill Prairie ecological site within LRU 115XC.

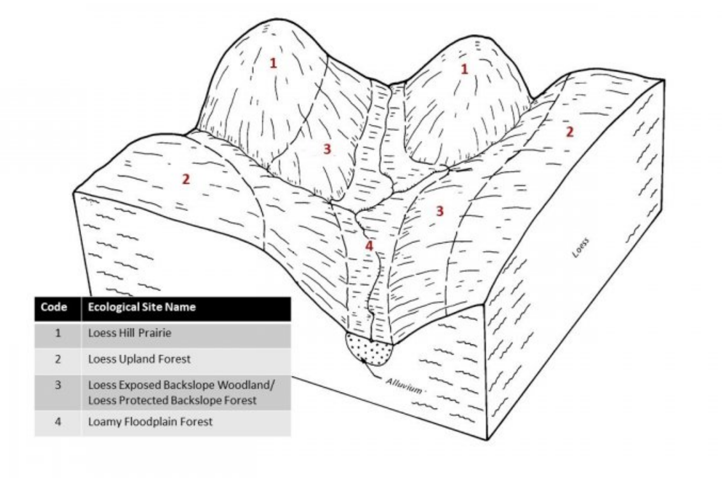


Figure 2. Representative block diagram of Loess Hill Prairie and associated ecological sites.

Table 2. Representative physiographic features

Hillslope profile	(1) Backslope
Slope shape across	(1) Convex
Slope shape up-down	(1) Convex
Landforms	(1) Upland > Hillside
Runoff class	High
Flooding frequency	None
Ponding frequency	None
Elevation	104–530 m
Slope	18–60%
Water table depth	203 cm
Aspect	W, NW, S, SW

Climatic features

The Central Mississippi Valley Wooded Slopes, Northern Part falls into the humid subtropical (Cfa) and hot-summer humid continental climate (Dfa) 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 LRU 115XC 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 196 days, while the frost-free period is about 162 days. The majority of the precipitation occurs as rainfall in the form of convective thunderstorms during the growing season. Average annual precipitation is 39 inches, which includes rainfall plus the water equivalent from snowfall. The average annual low and high temperatures are 42 and 63°F, respectively.

Table 3. Representative climatic features

Frost-free period (characteristic range)	160-164 days

Freeze-free period (characteristic range)	194-197 days
Precipitation total (characteristic range)	965-1,016 mm
Frost-free period (actual range)	158-166 days
Freeze-free period (actual range)	193-198 days
Precipitation total (actual range)	940-1,016 mm
Frost-free period (average)	162 days
Freeze-free period (average)	196 days
Precipitation total (average)	991 mm

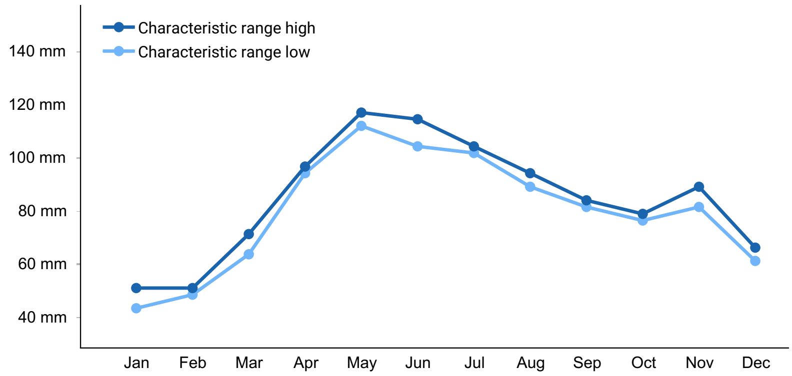


Figure 3. Monthly precipitation range

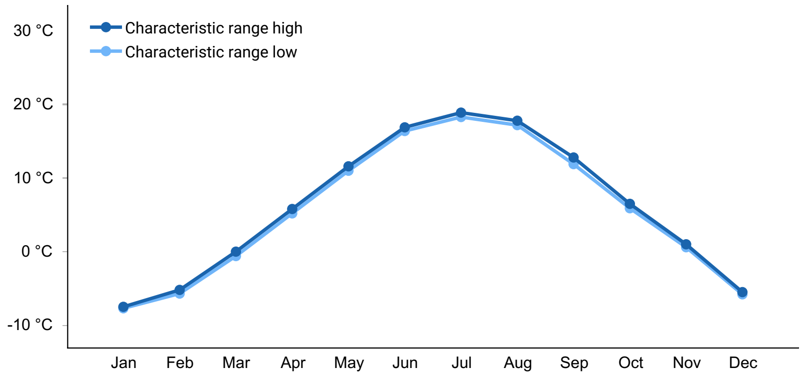


Figure 4. Monthly minimum temperature range

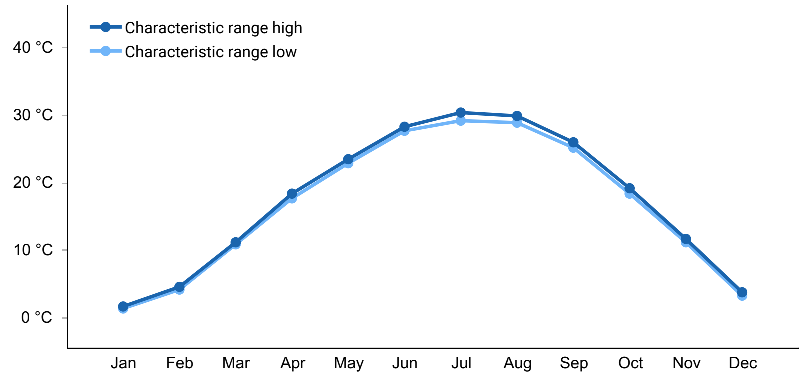


Figure 5. Monthly maximum temperature range

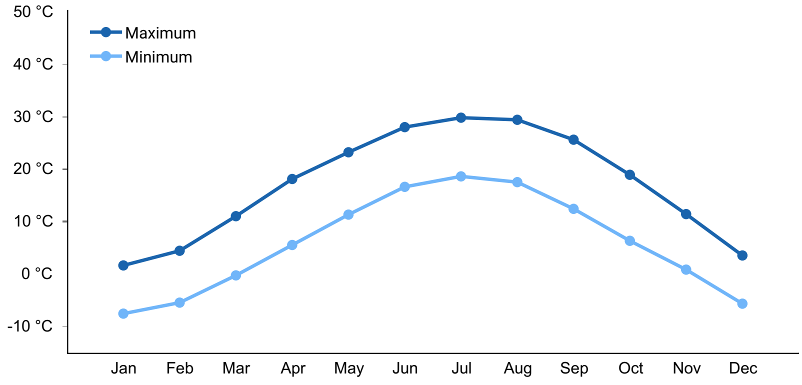


Figure 6. Monthly average minimum and maximum temperature

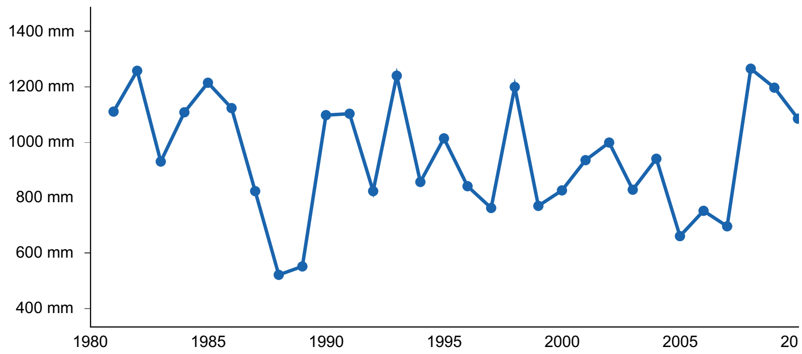


Figure 7. Annual precipitation pattern

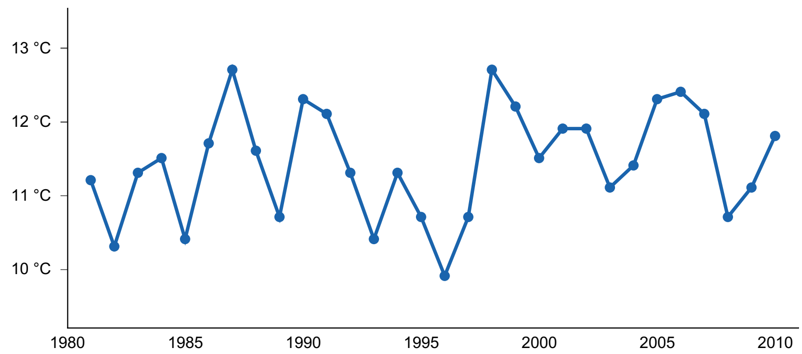


Figure 8. Annual average temperature pattern

Climate stations used

- (1) WINCHESTER [USC00119331], Winchester, IL
- (2) ATHENS 2SW [USC00110306], Athens, IL
- (3) QUINCY RGNL AP [USW00093989], Quincy, IL

Influencing water features

Loess Hill Prairies are not influenced by wetland or riparian water features. Precipitation is the main source of water for this ecological site. Infiltration is moderate (Hydrologic Group B), and surface runoff is high. Surface runoff contributes some water to downslope ecological sites.

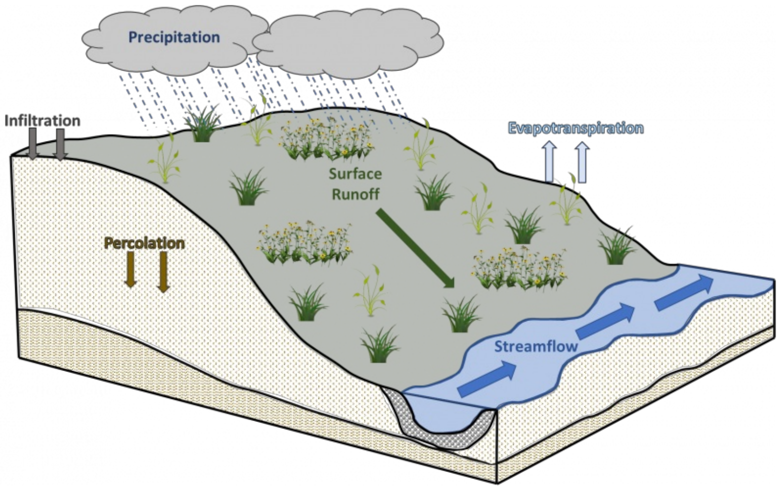


Figure 9. Hydrologic cycling in Loess Hill Prairie ecological site.

Soil features

Soils of Loess Hill Prairies are in the Entisols and Mollisols orders, further classified as Typic Udorthents and Typic Hapludolls with moderate infiltration and high runoff potential. The soil series associated with this site includes Bold, Hamburg, and Lacrescent. The parent material is loess and loess-covered substrates and the soils are well to somewhat excessively drained and very deep. Soil pH classes are neutral to moderately alkaline. No rooting restrictions are noted for the soils of this ecological site.

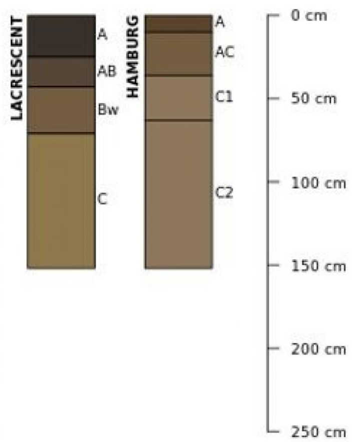


Figure 10. Profile sketches of soil series associated with Loess Hill Prairie.

Table 4. Representative soil features

Parent material	(1) Loess
Surface texture	(1) Silt loam
Family particle size	(1) Coarse-silty
Drainage class	Well drained to somewhat excessively drained
Permeability class	Slow to moderately slow
Depth to restrictive layer	203 cm
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	10.16–22.86 cm

Calcium carbonate equivalent (Depth not specified)	0–50%
Electrical conductivity (Depth not specified)	0–2 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0
Soil reaction (1:1 water) (Depth not specified)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	10–17%
Subsurface fragment volume >3" (Depth not specified)	21–37%

Ecological dynamics

The MLRA lies within the tallgrass prairie ecosystem of the Midwest, but a variety of environmental and edaphic factors resulted in a landscape that historically supported upland hardwood forests, lowland mixed forests, and scattered grass and sedge meadows. Loess Hill Prairies form an aspect of this vegetative continuum. This ecological site occurs on upland backslopes on well to somewhat excessively drained soils. Species characteristic of this ecological site consist of heliophytic, fire-adapted herbaceous vegetation.

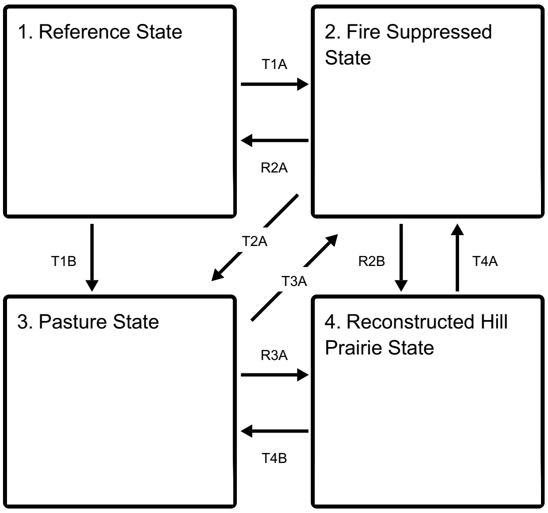
Fire is a critical disturbance factor that maintains Loess Hill Prairies. Fire intensity typically consisted of periodic, low-intensity surface fires occurring every 1 to 3 years (LANDFIRE 2009). Ignition sources included summertime lightning strikes from convective storms and bimodal, human ignitions 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 has also played a role in shaping this ecological site. The periodic episodes of reduced soil moisture in conjunction with the well to somewhat excessively-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. When coupled with fire, periods of drought can further delay the establishment of woody vegetation (Pyne et al. 1996).

Today, Loess Hill Prairies are limited in their extent, having been type-converted to pastureland. Remnants that do exist show evidence of indirect anthropogenic influences from fire suppression 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

Ecosystem states



T1A - Long-term fire suppression and/or land abandonment

T1B - Cultural treatments are implemented to increase forage quality and yield

R2A - Site preparation, non-native species control, and native seeding

T2A - Cultural treatments are implemented to increase forage quality and yield

R2B - Site preparation, non-native species control, and native seeding

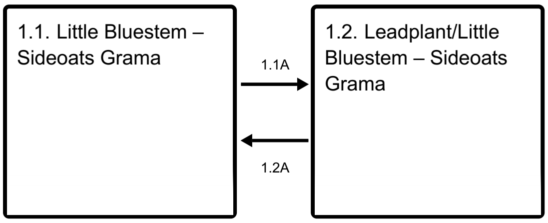
T3A - Long-term fire suppression and/or land abandonment

R3A - Site preparation, non-native species control, and native seeding

T4A - Long-term fire suppression and/or land abandonment

T4B - Cultural treatments are implemented to increase forage quality and yield

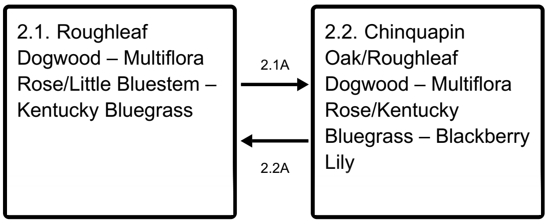
State 1 submodel, plant communities



1.1A - Natural succession; brief fire free period

1.2A - Fires- 1 to 3 year return interval

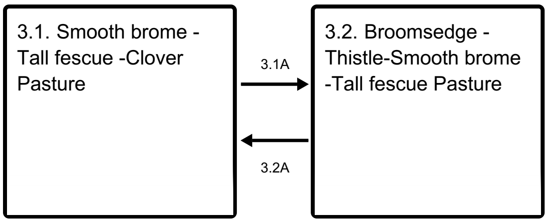
State 2 submodel, plant communities



2.1A - Fire suppression, 20 years+

2.2A - Single large disturbance event

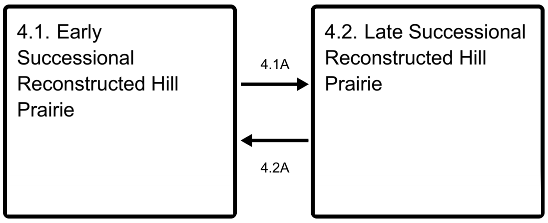
State 3 submodel, plant communities



3.1A - Grazing; overutilization of forage plants

3.2A - Grazing; forage plants not overutilized

State 4 submodel, plant communities



4.1A - Invasive species/woody species control

4.2A - Drought or improper timing/use of management actions

State 1
Reference State

The reference plant community is categorized as a hill prairie community, dominated by herbaceous vegetation. The two community phases within the reference state are dependent on fire. The intensity and frequency alter species composition, cover, and extent, while regular fire intervals keep woody species from dominating. Drought has more localized impacts in the reference phase, but does contribute to overall species composition, diversity, cover, and productivity.

Dominant plant species

- little bluestem (*Schizachyrium scoparium*), grass
- sideoats grama (*Bouteloua curtipendula*), grass

Community 1.1
Little Bluestem – Sideoats Grama

Sites in this reference community phase are dominated by a mix of mostly midgrasses and forbs. Vegetative cover is continuous (95 to 100 percent) and plants can reach heights between 3 and 6 feet tall (LANDFIRE 2009; NatureServe 2018). Little bluestem, sideoats grama, and Indiangrass are the dominant warm-season grasses present on the site. Characteristic forbs can include green comet milkweed, grooved flax, slimflower scurfpea, false boneset (*Brickellia eupatorioides* (L.) Shinners var. eupatorioides), pale beardtongue (*Penstemon pallidus* Small), prairie blue-eyed grass (*Sisyrinchium campestre* E.P. Bicknell), and Great Plains lady's tresses (*Spiranthes magnicamporum* Sheviak) (White and Madany 1978). Fire with low intensity will maintain this community phase, but a few years without fire allows the community to mature, shifting to phase 1.2 (LANDFIRE 2009).

Dominant plant species

- little bluestem (*Schizachyrium scoparium*), grass
- sideoats grama (*Bouteloua curtipendula*), grass

Community 1.2
Leadplant/Little Bluestem – Sideoats Grama

This reference community phase represents a successional shift following an extended fire return interval. The lack of fire allows woody shrubs – such as leadplant (*Amorpha canescens* Pursh) – to develop in the prairie community. Perennial, warm-season grasses and a diversity of forbs continue to be dominant components on the site. A hot fire every 1 to 3 years will reduce the shrub cover, shifting the site back to community phase 1.1 (LANDFIRE 2009).

Dominant plant species

- leadplant (*Amorpha canescens*), shrub
- little bluestem (*Schizachyrium scoparium*), grass
- sideoats grama (*Bouteloua curtipendula*), grass

Pathway 1.1A
Community 1.1 to 1.2

Natural succession as a result of a brief fire-free period.

Pathway 1.2A
Community 1.2 to 1.1

Hot fire every 1 to 3 years.

State 2
Fire Suppressed State

Long-term fire suppression can transition the reference hill prairie community into a woody-invaded scrub-prairie state. This state is evidenced by a well-developed shrub layer and sparse trees (LANDFIRE 2009). Proximity to lands that have been altered provide opportunities for non-native invasive species to readily colonize this state, thereby reducing the native biodiversity and changing the vegetative community.

Dominant plant species

- roughleaf dogwood (*Cornus drummondii*), shrub
- multiflora rose (*Rosa multiflora*), shrub
- little bluestem (*Schizachyrium scoparium*), grass
- Kentucky bluegrass (*Poa pratensis*), grass

Community 2.1
Roughleaf Dogwood – Multiflora Rose/Little Bluestem – Kentucky Bluegrass

This community phase represents the early stages of fire-suppression. In as little as six fire-free years, the prairie is disrupted and succeeded by woody shrubs. Native species – e.g., roughleaf dogwood (*Cornus drummondii* C.A. Mey) and smooth sumac (*Rhus glabra* L.) – and non-native species – e.g., multiflora rose (*Rosa multiflora* Thunb.) and common buckthorn (*Rhamnus cathartica* L.) – can form dense thickets with cover reaching up to 30 percent and plant heights as tall as 9 feet (LANDFIRE 2009). Some native prairie plants will persist, but non-native herbaceous species tolerant of shading may encroach on the site.

Dominant plant species

- roughleaf dogwood (*Cornus drummondii*), shrub
- multiflora rose (*Rosa multiflora*), shrub
- little bluestem (*Schizachyrium scoparium*), grass
- Kentucky bluegrass (*Poa pratensis*), grass

Community 2.2
Chinquapin Oak/Roughleaf Dogwood – Multiflora Rose/Kentucky Bluegrass – Blackberry Lily

Sites falling into this community phase have a well-established shrub layer, and scattered trees begin to develop in the continued absence of fire. The shrub canopy can be diverse, including both native and non-native species. Roughleaf dogwood and smooth sumac are common natives, and multiflora rose, common buckthorn, and Amur honeysuckle (*Lonicera maackii* (Rupr.) Herder) are frequently invading non-natives. Chinquapin oak (*Quercus* *muehlenbergii* Engelm.), white ash (*Fraxinus americana* L.), and elms (Ulmus L.) may be some encroaching native trees. The non-native white mulberry (*Morus alba* L.) may also be encountered. Non-native herbaceous species known to invade hill prairies include Kentucky bluegrass, blackberry lily (*Belamcanda chinensis* (L.) DC.), and white sweet clover (*Melilotus officinalis* (L.) Lam.) (INHS PRI n.d.).

Dominant plant species

- chinquapin oak (*Quercus muehlenbergii*), tree
- roughleaf dogwood (*Cornus drummondii*), shrub
- multiflora rose (*Rosa multiflora*), shrub
- little bluestem (*Schizachyrium scoparium*), grass
- Kentucky bluegrass (*Poa pratensis*), grass

Pathway 2.1A
Community 2.1 to 2.2

Continued fire suppression in excess of 20 years.

Pathway 2.2A
Community 2.2 to 2.1

Single large disturbance event such as selective removal of woody species.

State 3
Pasture State

The pasture state occurs when the reference state is converted to a farming system that emphasizes domestic livestock production known as grassland agriculture. Fire suppression, periodic cultural treatments (e.g., clipping, drainage, soil amendment applications, planting new species and/or cultivars, mechanical harvesting) and grazing by domesticated livestock transition and maintain this state (USDA-NRCS 2003). Early settlers seeded non-native species, such as smooth brome (*Bromus inermis* Leyss.), tall fescue (Festuca arundinacea) and Kentucky bluegrass (*Poa pratensis* L.), to help extend the grazing season (Smith 1998). Over time, as lands were continuously harvested or grazed by herds of cattle, the non-native species were able to spread and expand across the landscape, reducing the native species diversity and ecological function.

Dominant plant species

- smooth brome (*Bromus inermis*), grass
- tall fescue (*Schedonorus arundinaceus*), grass
- Kentucky bluegrass (*Poa pratensis*), grass
- alfalfa (*Medicago*), other herbaceous
- clover (*Trifolium*), other herbaceous

Community 3.1
Smooth brome -Tall fescue -Clover Pasture

This community is characterized by seeded cool-season grass and forbs. Species will depend upon landowner goals and objectives and may include many different grasses and forbs. Common species include smooth brome (*Bromus inermis*), tall fescue (Festuca arundinacea), Kentucky bluegrass (*Poa pratensis*), timothy (*Phleum pratense*), red clover (*Trifolium pratense*) and white clover (*Trifolium repens* L.). Management inputs include control of weeds and brush. These sites are managed to ensure a proper forage/animal balance. Plants are not overutilized and have adequate rest and recovery.

Dominant plant species

- smooth brome (*Bromus inermis*), grass
- tall fescue (*Schedonorus arundinaceus*), grass
- Kentucky bluegrass (*Poa pratensis*), grass
- white clover (*Trifolium repens*), other herbaceous

- red clover (*Trifolium pratense*), other herbaceous

Community 3.2
Broomsedge -Thistle-Smooth brome -Tall fescue Pasture

Overutilization of the pasture will result in a shift to include more undesirable species such as thistle (Cirsium spp.), broomsedge (*Andropogon virginicus* L.), ironweed (*Vernonia gigantea*), buttercup (Ranunculus spp.), ragweed (Ambrosia spp.) and blackberries (Rubus spp.). Many woody and weed species may be present depending on seed sources and level of soil disturbance. This community reflects an improper forage-to-animal balance which will negatively impact forage productivity and reproduction, soil health, and water quality. Ecological resiliency is compromised under these conditions.

Dominant plant species

- broomsedge bluestem (*Andropogon virginicus*), grass
- crabgrass (*Digitaria*), grass
- tall fescue (*Schedonorus arundinaceus*), grass
- smooth brome (*Bromus inermis*), grass
- thistle (*Cirsium*), other herbaceous
- buttercup (*Ranunculus*), other herbaceous
- ironweed (*Vernonia*), other herbaceous
- ragweed (*Ambrosia*), other herbaceous

Pathway 3.1A
Community 3.1 to 3.2

Site is grazed and forage plants are overutilized.

Pathway 3.2A
Community 3.2 to 3.1

The site is grazed but there is a correct animal to forage plant balance.

State 4
Reconstructed Hill Prairie State

Prairie reconstructions have become an important tool for repairing natural ecological functions and providing habitat protection for numerous grassland dependent species. Because the historic plant and soil biota communities of the tallgrass prairie were highly diverse with complex interrelationships, historic prairie replication cannot be guaranteed on landscapes that have been so extensively manipulated for extended timeframes (Kardol and Wardle 2010; Fierer et al. 2013). Therefore, ecological restoration should aim to aid the recovery of degraded, damaged, or destroyed ecosystems. A successful restoration will have the ability to structurally and functionally sustain itself, demonstrate resilience to the natural ranges of stress and disturbance, and create and maintain positive biotic and abiotic interactions (SER 2002). The reconstructed prairie state is the result of a long-term commitment involving a multi-step, adaptive management process. Diverse, species-rich seed mixes are important to utilize as they allow the site to undergo successional stages that exhibit changing composition and dominance over time (Smith et al. 2010). On-going management via prescribed fire can help the site progress from an early successional community dominated by annuals and some weeds to a later seral stage composed of native, perennial grasses, forbs, and a few shrubs. Establishing a prescribed fire regimen that mimics natural disturbance patterns can increase native species cover and diversity while reducing cover of non-native forbs and grasses.

Dominant plant species

- little bluestem (*Schizachyrium scoparium*), grass
- sideoats grama (*Bouteloua curtipendula*), grass

Community 4.1
Early Successional Reconstructed Hill Prairie

This community phase represents the early community assembly from prairie reconstruction and is highly dependent on the seed mix utilized and the timing and priority of planting operations. The seed mix should look to include a diverse mix of cool-season and warm-season annual and perennial grasses and forbs typical of the reference state (e.g., Indiangrass, little bluestem, purple prairie clover). Cool-season annuals can help provide litter that promotes cool, moist soil conditions to the benefit of the other species in the seed mix. The first season following site preparation and seeding will typically result in annuals and other volunteer species forming a majority of the vegetative cover. Control of non-native species, particularly perennial species, is crucial at this point to ensure they do not establish before the native vegetation (Martin and Wilsey 2012). After the first season, native warm-season grasses should begin to become more prominent on the landscape.

Dominant plant species

- little bluestem (*Schizachyrium scoparium*), grass

Community 4.2
Late Successional Reconstructed Hill Prairie

Appropriately timed disturbance regimes (e.g., prescribed fire) applied to the early successional community phase can help increase the beta diversity, pushing the site into a late successional community phase over time. While prairie communities are dominated by grasses, these species can suppress forb establishment and reduce overall diversity and ecological function (Martin and Wilsey 2006; Williams et al. 2007). Reducing accumulated plant litter from perennial bunchgrasses allows more light and nutrients to become available for forb recruitment, allowing greater ecosystem complexity (Wilsey 2008).

Dominant plant species

- little bluestem (*Schizachyrium scoparium*), grass
- sideoats grama (*Bouteloua curtipendula*), grass

Pathway 4.1A
Community 4.1 to 4.2

Selective herbicides are used to control non-native species, and prescribed fire helps to increase the native species diversity and control woody vegetation.

Pathway 4.2A
Community 4.2 to 4.1

Reconstruction experiences a decrease in native species diversity from drought or improper timing of management actions (e.g., reduced fire frequency, use of non-selective herbicides).

Transition T1A
State 1 to 2

Long-term fire suppression transitions the site to the fire-suppressed scrub state (2).

Transition T1B
State 1 to 3

Cultural treatments to enhance forage quality and yield transitions the site to the pasture state (3).

Restoration pathway R2A
State 2 to 1

Restoration activities will depend on the characteristics of the site and may include site preparation, woody species control, invasive species control, and seeding of desired native species.

Transition T2A
State 2 to 3

Cultural treatments to enhance forage quality and yield transitions the site to the pasture state (3).

Restoration pathway R2B
State 2 to 4

Site preparation, invasive species control, and seeding native species transition this site to the reconstructed tallgrass prairie state (5).

Transition T3A
State 3 to 2

Land abandonment transitions the site to the fire-suppressed scrub state (2).

Restoration pathway R3A
State 3 to 4

Site preparation, invasive species control, and seeding native species transition this site to the reconstructed tallgrass prairie state (4).

Transition T4A
State 4 to 2

Land abandonment transitions the site to the fire-suppressed scrub state (2).

Transition T4B
State 4 to 3

Cultural treatments to enhance forage quality and yield transition the site to the pasture state (3).

Additional community tables

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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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
Contact for lead author	
Date	01/10/2025
Approved by	Suzanne Mayne-Kinney
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:**

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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:**
