USDA Natural Resources Conservation Service

Ecological site R103XY005MN
Clayey Upland Prairies

Last updated: 10/04/2023
Accessed: 05/05/2024

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): 103X–Central Iowa and Minnesota Till Prairies

MLRA 103 is in Minnesota (56 percent) and Iowa (44 percent) and consists of approximately 18 million acres. It is in the Western Lake Section of the Central Lowland Province of the Interior Plains in an area known as the "Des Moines Lobe" of the Wisconsin-age ice sheet. The MLRA is mostly on a young, nearly level to gently rolling, glaciated till plain that has moraines and glacial lake plains in some areas. The plain is covered with glacial till, outwash, and glacial lake deposits. Recent alluvium consisting of clay, silt, sand, and gravel fill the bottoms of most of the major river valleys. Paleozoic bedrock sediments, primarily shale and limestone, underlie the glacial deposits in most of the area.

The annual precipitation increases from northwest to southeast. Most of the rainfall occurs as high-intensity, convective thunderstorms during the summer. Two-thirds or more of the precipitation falls during the freeze-free period. Snowfall is common in winter. Ground water supplies are adequate for the domestic, livestock, municipal, and industrial needs. Nearly all of this area is farmland, and about four-fifths is cropland.

Classification relationships

U.S. Department of Agriculture (USDA)
Land Resource Regions and Major Land Resource Areas (USDA_NRCS, 2006)
Major Land Resource Area (MLRA): Central Iowa and Minnesota Till Prairies (103)

U.S. Forest Service (USFS)
National Hierarchical Framework of Ecological Units (Cleland et al., 2007)
Section: North central Glaciated Plains (251B)
Subsections: Upper Minnesota River-Des Moines Lobe (251BA) and Southern Des Moines Lobe (251Be)

International Vegetation Classification Hierarchy
Class: 2. Shrub and Herb Vegetation
Subclass: 2.B. Temperate and Boreal Grassland and Shrubland
Formation: 2.B.2. Temperate Grassland and Shrubland
Division: 2.B.2.NB. Central North American Grassland and Shrubland

The reference state is similar to Minnesota Department of Natural Resources UPs23 Southern Mesic Prairie

Ecological site concept

The Clayey Upland Prairies ecological site is located on uplands, including lakeplains, ground moraines, and till plains. Soils in this ecological site have a dark surface layer (mollic epipedon) and clayey textures. This site is not subject to flooding or ponding.

Associated sites

R103XY008MN	**Clayey Wet Prairies** The Clayey Wet Prairies ecological site is located on uplands. The soils have a clayey texture and are poorly drained. Wet prairie species, such as prairie cordgrass and wooly sedge, are common. This site is lower on the landscape than the Upland Clayey Prairies site.
R103XY015MN	**Depressional Marsh** The Depressional Marsh ecological site is located in concave, small to medium-sized depressions downslope from the Clayey Upland Prairies site. The soils are wet and commonly exhibit ponding in the early part of the growing season. Plants on these sites are tolerant of wet soils and standing water and include bulrushes, sedges, and cattails.
R103XY016MN	**Organic Marsh** The Organic Marsh ecological site is downslope from the Clayey Upland Prairie site and includes interspersed emergent and floating wetland plants surrounded by open water. Soils are very poorly drained and are ponded throughout most growing seasons.
R103XY009MN	**Calcareous Rim Prairies** The Calcareous Rim Prairies ecological site is located on saturated soils and appears similar to other wet prairie sites. The soils, however, are chemically classified as calcareous. This calcareous site is located on a variety of landscapes on rims surrounding ponded depressions.

Similar sites

R103XY004MN	**Loamy Upland Prairies** The Loamy Upland Prairies ecological site is located on uplands. These soils formed in loamy till and therefore have a loamy texture. This site commonly occurs on sloping areas and is characterized by a surface layer that is dark (a mollic epipedon) and has a surface texture of silt loam or silty clay loam.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Amorpha canescens*
Herbaceous	(1) *Andropogon gerardii* (2) *Panicum virgatum*

Physiographic features

The Clayey Upland Prairies ecological site is throughout MLRA 103 on uplands, including lake plains, ground moraines, and till plains. The soils are primarily on backslopes but may also be on summits and shoulders. The positions are linear to convex, both vertically and horizontally.

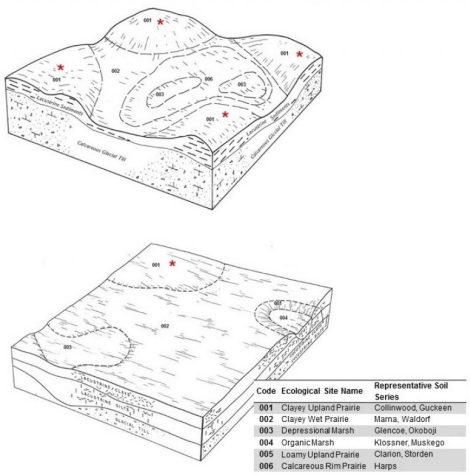


Figure 1. Block diagrams of representative Clayey Upland Prairies and associated ecological sites.

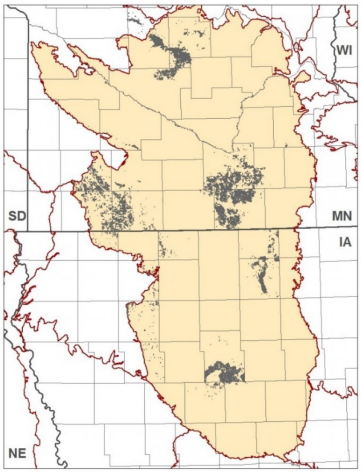


Figure 2. Distribution of the Clayey Upland Prairies ecological site within MLRA 103. In many cases, the data set is not spatially consistent across political boundaries due to the method by which soils were mapped; e. g. due to county subsets.

Table 2. Representative physiographic features

Hillslope profile	(1) Backslope (2) Summit (3) Shoulder
Landforms	(1) Lake plain (2) Ground moraine (3) Till plain
Runoff class	Low to very high
Elevation	689–1,837 ft
Slope	0–40%
Water table depth	12–80 in
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

The soil temperature regime of MLRA 103 is “mesic” (i.e., mean annual soil temperature between 46 and 59°F). The average mean annual precipitation is 32 inches. The average frost free period is 130 days and the average freeze free period is 154 days. This site is warmer than adjacent downslope areas because of cold air drainage. Snow and frost melt sooner in the spring on warmer soils, thus resulting in a longer growing season than in adjacent depressions.

Table 3. Representative climatic features

Frost-free period (characteristic range)	124-136 days
Freeze-free period (characteristic range)	147-158 days
Precipitation total (characteristic range)	30-36 in
Frost-free period (actual range)	113-146 days
Freeze-free period (actual range)	139-173 days
Precipitation total (actual range)	29-36 in
Frost-free period (average)	130 days
Freeze-free period (average)	154 days
Precipitation total (average)	32 in

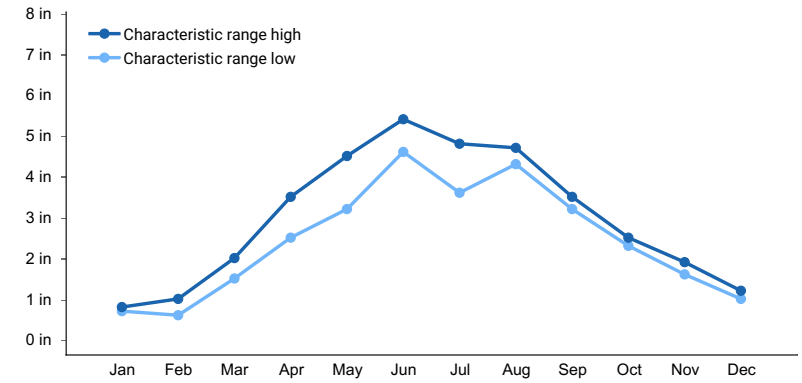


Figure 3. Monthly precipitation range

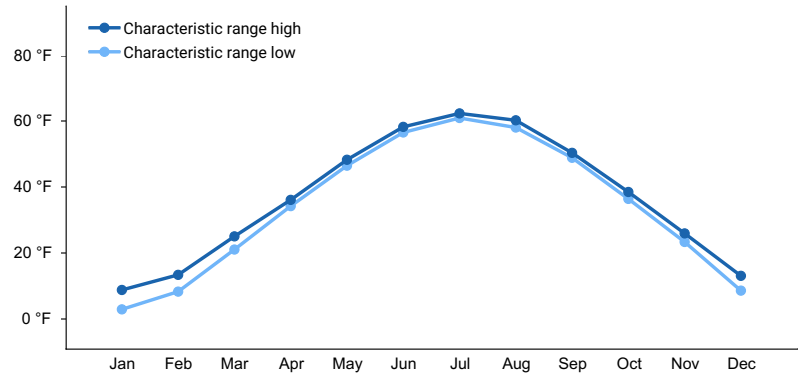


Figure 4. Monthly minimum temperature range

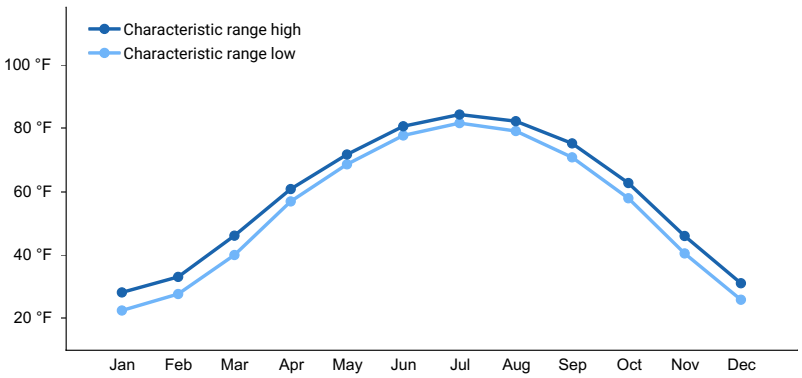


Figure 5. Monthly maximum temperature range

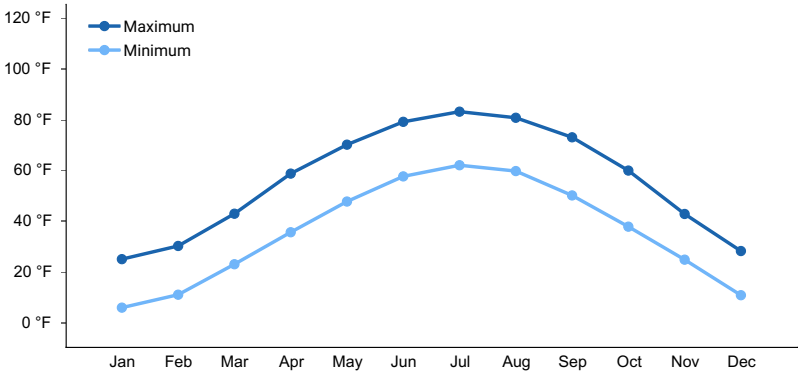


Figure 6. Monthly average minimum and maximum temperature

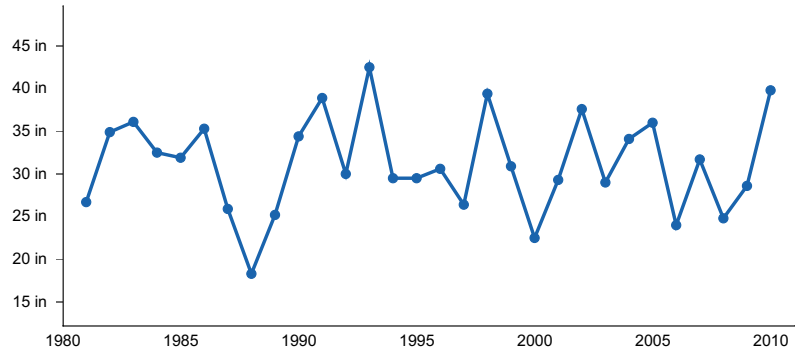


Figure 7. Annual precipitation pattern

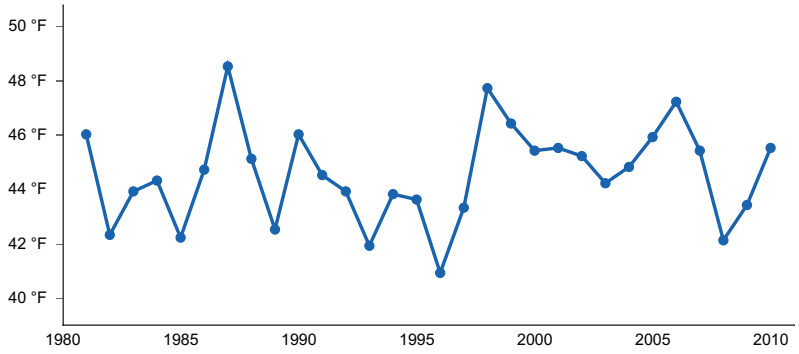


Figure 8. Annual average temperature pattern

Climate stations used

- (1) WEBSTER CITY [USC00138806], Webster City, IA
- (2) JORDAN 1SSW [USC00214176], Jordan, MN
- (3) BUFFALO 2NE [USC00211107], Buffalo, MN
- (4) HUTCHINSON 1 N [USC00213962], Hutchinson, MN
- (5) DES MOINES WSFO-JOHNSTON [USC00132209], Johnston, IA

Influencing water features

The Clayey Upland Prairies ecological site can receive subsurface flow and runoff from higher adjacent sloping ground, but it primarily receives water directly from precipitation. It provides recharge and runoff to adjacent downslope ecological sites. Spring is the wettest time of the year for this site. The soils are classified as endosaturated (i.e., the water table comes from below) and they are not subject to flooding or ponding. The water table is typically at a depth of 12 to 80 inches.

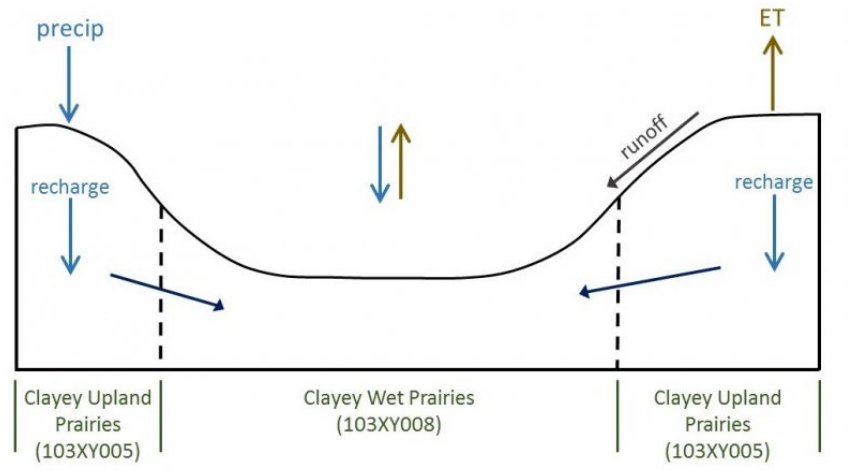


Figure 9. Representation of hydrological factors in a typical area of Clayey Upland Prairies and associated ecological sites on the Des Moines Lobe

(MLRA 103).

Soil features

The Clayey Upland Prairies ecological site is on Guckeen, Kamrar, Strout, Kandiyohi, Ocheda, Sinai, Vinje, and Wilmonton soils.

The soils are lacustrine (relating to or associated with lakes) in origin and are composed of mineral soil material that is commonly stratified (formed in layers) due to the nature and environment in which it was deposited. Drainage ranges from somewhat poorly drained to well drained. Vinje, Bode, and Kamrar soils are well drained. Collinwood, Arkton, Strout, Guckeen, Sinai, and Kamrar soils are moderately well drained. Kandiyohi and Wilmonton soils are somewhat poorly drained.

Table 4. Representative soil features

Parent material	(1) Lacustrine deposits (2) Till
Surface texture	(1) Clay (2) Silty clay (3) Silty clay loam (4) Clay loam
Family particle size	(1) Fine (2) Fine-loamy (3) Fine-silty
Drainage class	Somewhat poorly drained to well drained
Permeability class	Very slow to moderately rapid
Depth to restrictive layer	80 in
Soil depth	60–80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-60in)	7–12 in
Calcium carbonate equivalent (0-40in)	0–30%
Soil reaction (1:1 water) (0-40in)	5.6–8.4
Subsurface fragment volume <=3" (0-40in)	0–15%
Subsurface fragment volume >3" (0-40in)	0–5%

Ecological dynamics

The Clayey Upland Prairies ecological site is characterized by two states: the Reference State (tallgrass prairie) and the Tillage State.

Two plant communities exist in the Reference State are characterized by different fire return intervals. The first community is the High Diversity Prairie, which is characterized by a fire return interval of 3 years or less. The second community is the Old Growth Prairie, which is characterized by a longer fire return interval of up to 5 years. The mechanism of change between communities is fire frequency and the resulting effects fire has on the plant community.

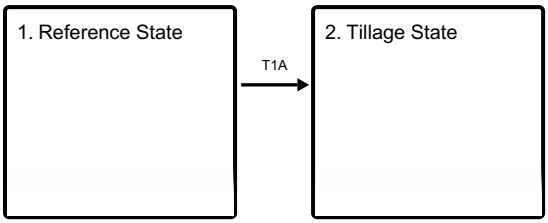
Two communities make up the Tillage State: the Row Crop Community and the Seeded Grassland Community. The Tillage State describes sites that have been tilled and either are currently used for intensive row crop production or

were previously tilled and are currently seeded to a grassland plant community. Transition mechanisms between these communities are traditional agriculture practices such as preparing the site, planting desired species, applying herbicide (weed control), applying fertilizer, and harvesting.

Most areas of the Clayey Upland Prairies ecological site are used for row crop production, specifically a corn-soybean rotation.

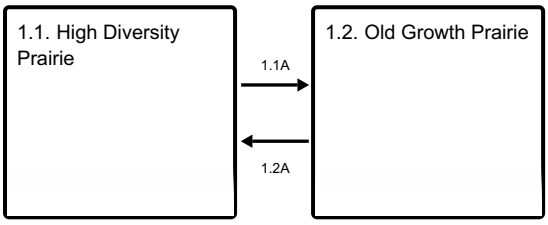
State and transition model

Ecosystem states



T1A - Transition to agriculture; tillage; seeding; continued management

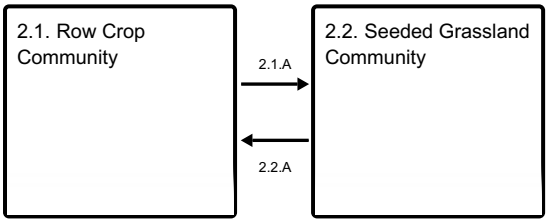
State 1 submodel, plant communities



1.1A - Fire return interval 3-5 years.

1.2A - Fire return interval less than 3 years

State 2 submodel, plant communities



2.1.A - Grass seeding; grassland management

2.2.A - Tillage; crop production

State 1
Reference State

The reference plant community is a warm-season tallgrass prairie that has diverse native grasses and forbs. Community phases within the Reference State are dependent upon the influences of grazing and frequency of fire events. Fire is a trigger that promotes continued herbaceous vegetation dominance and removes dense thatch thereby allowing for seedling regeneration. Fire removes plant litter, helps cycle nutrients, and allows light to reach the seedbed. Areas of this ecological site burn approximately every 5 years or less. Frequent fire maintains the community in a grassland state, by keeping fire-sensitive woody species from proliferating and gaining dominance. The secondary trigger for conversion is grazing. Intensive grazing reduces the extent of highly palatable species thereby allowing the growth of less desirable plants to increase. Grazing management guidelines vary by site depending on site specifics and management objectives. Dominant reference species include leadplant (*Amorpha canescens*), big bluestem (*Andropogon gerardii*), and switchgrass (*Panicum virgatum*). Numerous other grasses and forbs may be present, and high-quality sites will exhibit a diversity of native species. Today, high-quality,

unplowed areas of the Reference State are extremely uncommon. Most remaining natural areas that are managed for tallgrass prairie were once tilled and utilized for agricultural production. It is therefore likely that many of the historic native prairie species are extirpated even from these sites.

Resilience management. Prescribed fire and managed grazing are key resilience management practices. This is a stable plant community when grazing and fire are adequately managed. Prescribed grazing incorporates periods of grazing rest during the growing season which benefits tallgrass maintenance. Excessive grazing can quickly impact the vegetative composition and negatively impact soil stability. Prescribed fire is the controlled application of fire to modify vegetation structure and influence ecological processes.

Dominant plant species

- leadplant (*Amorpha canescens*), shrub
- big bluestem (*Andropogon gerardii*), grass
- switchgrass (*Panicum virgatum*), grass
- Indiangrass (*Sorghastrum nutans*), grass
- white heath aster (*Symphyotrichum ericoides*), other herbaceous
- white prairie clover (*Dalea candida*), other herbaceous
- sunflower (*Helianthus*), other herbaceous
- blazing star (*Liatris*), other herbaceous
- yarrow (*Achillea*), other herbaceous

Community 1.1
High Diversity Prairie

This plant community consists of native warm-season grasses and a variety of native forbs. The vegetative composition is influenced primarily by fire return intervals of less than 3 years. Dominant species include leadplant, big bluestem, switchgrass, Indiangrass, and an array of native forbs. Frequent fire reduces the extent of woody species and maintains the natural dominance and diversity of native grasses and forbs. Fire stimulates seed regeneration and reduces the amount of thatch. Fire creates favorable conditions for leadplant, which typically grows in increased numbers in the spring following a burn. Other grasses that may be present include little bluestem (*Schizachyrium scoparium*), prairie dropseed (*Sporobolus heterolepis*), panicgrass (Dichanthelium spp.), slender wheatgrass (*Elymus trachycaulus*), prairie cordgrass (*Spartina pectinata*), and porcupine grass (Stipa spartea). The composition of forb species is highly diverse and varies more than the composition of grass species. A suite of diagnostic forbs is yet to be developed; however, common species include white heath aster (*Symphyotrichum ericoides*), heart-leaved alexanders (Zizia ericoides), white prairie clover (*Dalea candida*), sunflowers (Helianthus spp.), blazing star (Liatris spp.), yarrow (Achillea spp.), purple coneflower (Echinacea spp.), milkweeds (Asclepias spp.), palespike lobelia (*Lobelia spicata*), hoary puccoon (*Lithospermum canescens*), and multiple species of goldenrod (Solidago spp.).

Resilience management. Prescribed fire and managed grazing are key resilience management practices. This is a stable plant community when grazing and fire are adequately managed. Prescribed grazing incorporates periods of grazing rest during the growing season which benefits tallgrass maintenance. Excessive grazing can quickly impact the vegetative composition and negatively impact soil stability. Prescribed fire is the controlled application of fire to modify vegetation structure and influence ecological processes.

Dominant plant species

- leadplant (*Amorpha canescens*), shrub
- big bluestem (*Andropogon gerardii*), grass
- switchgrass (*Panicum virgatum*), grass
- Indiangrass (*Sorghastrum nutans*), grass
- white heath aster (*Symphyotrichum ericoides*), other herbaceous
- meadow zizia (*Zizia aptera*), other herbaceous
- goldenrod (*Solidago*), other herbaceous
- prairie clover (*Dalea*), other herbaceous
- yarrow (*Achillea*), other herbaceous
- blazing star (*Liatris*), other herbaceous

Community 1.2
Old Growth Prairie

This plant community is characterized by a fire return interval of 3 to 5 years, which is longer than that of Community 1.1. Big bluestem and other native grasses such as switchgrass are dominant, but more woody species grow due to the longer fire return times. Thatch and dead plant residue are denser than in Community 1.1. Thatch increases in abundance annually. Eventually it reduces the rate of seedling regeneration by shading and obstructing the surface.

Resilience management. Prescribed fire and grazing are resilience management practices. Although this community has a longer fire return interval than Community 1.1, it also relies on fire and grazing to maintain vegetation community structure. Prescribed grazing promotes grass regeneration and vigor. By incorporating periods of pasture rest and recovery during the growing season, landowners can insure that the palatable grasses and forbs are maintained within the community. Prescribed fire is the controlled application of fire to modify vegetation structure and influence ecological processes.

Dominant plant species

- leadplant (*Amorpha canescens*), shrub
- big bluestem (*Andropogon gerardii*), grass
- switchgrass (*Panicum virgatum*), grass
- goldenrod (*Solidago*), other herbaceous

Pathway 1.1A
Community 1.1 to 1.2

Fire is the primary trigger that affects the plant community composition. The frequency of fire is the primary factor affecting the transition from Community 1.1 and Community 1.2. Pathway 1.1A consists of a fire free period of 3 to 5 years. It allows for changes such as an increase in number of shrub species, an increase in abundance of dead plant material, and a reduced rate of regeneration. Native warm-season grass species remain dominant, but an increase in extent of various woody species is noticeable within the plant community. Encroachment by woody species continues in the absence of fire. Shrubs and trees out-compete herbaceous vegetation due to height and root depth. Although fire frequency is the main driver of community change, secondary triggers also influence changes in species density and overall community composition. Examples of secondary triggers are grazing and drought.

Pathway 1.2A
Community 1.2 to 1.1

This pathway consists of a fire return interval of less than 3 years. Leadplant flourishes in the spring following burning, and generally, the rate of grass and forb regeneration increases. Fire intolerant woody species are set back, and the amount of dead plant material that can slow new growth is reduced.

State 2
Tillage State

Tillage is the primary mechanism affecting the transition to this state. In this state, dynamic soil properties such as bulk density, structure, organic carbon content, and saturated hydraulic conductivity are altered by agricultural practices. Hydrological modifications (tiling and ditching) are commonly installed to improve drainage, so natural hydrology is altered. Most areas in this state will remain in use for crop production in the foreseeable future – primarily in an intensive corn and soybean rotation. Certain practices can mitigate the impacts of traditional agricultural practices on soil health. Conservation tillage minimizes soil disturbance and can improve soil structure and overall soil health. Corn or soybean plantings and a cover crop rotation can build soil structure, improve infiltration rates, reduce runoff and erosion, and protect water quality. Some areas in this ecological site are not appropriate for intensive crop production due to slope. Where the gradient exceeds 20 percent row crop production is not feasible due to limitations on farm machinery. A small percentage of Clayey Upland Prairies ecological sites have been seeded back to grass. Some previously tilled areas have been converted to warm-season grasslands as part of the NRCS Conservation Reserve Program (CRP). Common warm-season grasses seeded in this

community include big bluestem (*Andropogon gerardii*), Indiangrass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum*). Native forbs are commonly included in seed mixes to benefit wildlife and pollinators. Although highly beneficial to wildlife, these sites generally lack the diversity of species in the Reference State. Depending on the management objectives of the landowner, cool-season grasses are also feasible. The most common cool-season grasses are non-native species, such as reed canarygrass (Phalaris arunidinacea) and Kentucky bluegrass (*Poa pratensis*). Although cool-season grasslands are not as species rich or biologically diverse as warm-season grasslands, they still offer various soil health benefits and some ecological benefits for grassland bird species.

Resilience management. Disturbance management and harvest management are resilience management practices. The maintenance of this state requires that the intensity, frequency, duration, and timing of agricultural practices (disturbances) be managed to control or modify vegetation structure.

Dominant plant species

- corn (*Zea mays*), other herbaceous
- soybean (*Glycine max*), other herbaceous

Community 2.1
Row Crop Community

This plant community typically consists of intensively produced, traditional row crops. Tillage and intentional plant establishment (crop seeding) are the primary triggers for this community. The most common crops are corn and soybeans on an annual rotation. Many crops, however, are feasible for these areas. A secondary trigger is substantial drainage modifications (ditching and tiling), which are commonly installed to improve soil drainage. Conservation tillage practices may be implemented to reduce the hazard of erosion while still maintaining a corn and soybean rotation. These practices can help protect the soil surface from erosion and allow water to infiltrate instead of running off. Examples include no-till or ridge-till, which leave residue on the surface of the field. Additional soil health benefits can be gained by adding alternative crops to fields that are already in conservation tillage. By diversifying the crop rotation, landowners take additional management steps to improve soil health and protect water quality. Species may include legumes, clovers, beans, turnips, or small grains such as ryegrass, oats, rapeseed, winter wheat, winter rye, and buckwheat.

Resilience management. Disturbance management and harvest management are resilience management practices. The maintenance of the desired vegetation community requires management of the intensity, frequency, duration, and timing of disturbances caused by agricultural practices.

Dominant plant species

- corn (*Zea mays*), grass
- soybean (*Glycine max*), other herbaceous

Community 2.2
Seeded Grassland Community

This plant community grows in areas that were previously tilled and used for agricultural production but have been transitioned to either warm-season or cool-season grasses. The primary trigger is the intentional establishment of a grassland community. Warm-season grasses are commonly planted through conservation programs, such as the NRCS Conservation Reserve Program (CRP). Species commonly include big bluestem, switchgrass, and Indiangrass. Also included are a mix of native forbs that benefit wildlife and pollinators. Numerous native grasses and forbs are suitable for this site. Seed mix selection depends on landowner objectives and site-specific characteristics. Grazing management may also be a trigger. Poor grazing management practices on can lead to soil erosion and invasion by cool-season grasses such as smooth brome (*Bromus inermis*) and Kentucky bluegrass (*Poa pratensis*). Resilience management practices include prescribed fire, invasive plant management, and a program of planned grazing that manages the intensity, frequency, and duration of grazing. Less common than warm-season species, but still feasible, are cool-season grass species such as Kentucky bluegrass and reed canarygrass. Many cool-season grasses can be planted, depending on landowner goals. Management inputs include site preparation, seeding, and weed control. Resilience management practices include invasive plant management and a program of planned grazing. Many of these areas are eventually transitioned to annual crop production.

Resilience management. Disturbance management and harvest management are resilience management practices. The maintenance of the desired vegetation structure requires management of the intensity, frequency, duration, and timing of disturbances caused by agricultural practices. Practices include seeding, controlling weeds and brush, and applying fertilizer. Practices include seeding, controlling weeds and brush, and fertilizing. Prescribed fire is a resilience management practice on warm-season grasslands. The controlled application of fire modifies vegetation structure and influence ecological processes.

Dominant plant species

- big bluestem (*Andropogon gerardii*), grass
- switchgrass (*Panicum virgatum*), grass
- Indiangrass (*Sorghastrum nutans*), grass

Pathway 2.1.A
Community 2.1 to 2.2

This pathway converts Community 2.1 (row crops) to Community 2.2 (seeded grassland). The primary mechanism of change is the seeding of desired grass species. Commonly planted species include big bluestem, switchgrass, and Indiangrass. Commercial vegetative seed mixes commonly include a variety of native forbs to enhance wildlife habitat and to benefit native pollinators. This pathway is commonly triggered in conjunction with a conservation program such as the NRCS Conservation Reserve Program (CRP). The site is taken out of crop production and seeded with warm-season grasses to benefit wildlife, soil health, and water quality. Multiple resilience management practices may be needed after establishment of warm-season grasses. Examples include prescribed fire, brush management, and herbaceous weed treatment. Prescribed burning is utilized to reduce the extent of woody vegetation, reduce the buildup of dead plant material, and promote the regeneration of grasses and forbs. Cool-season grasses are also feasible for these communities. Numerous species may be planted, including Kentucky bluegrass, reed canarygrass, smooth brome, tall fescue, perennial rye, and timothy. Legumes, such as white clover and red clover, are commonly incorporated to improve forage nutrition. A small percentage of MLRA 103 currently supports cool-season grasses. Resilience management practices for cool-season grass sites include planned grazing, invasive plant management, and disturbance/harvest management (hay production).

Conservation practices

Forage and Biomass Planting

Pathway 2.2.A
Community 2.2 to 2.1

This pathway converts seeded grassland to cropland. This is a common pathway throughout MLRA 103 as areas are placed in crop production. The mechanisms of change are tillage and intentional plant establishment (crop seeding). Resilience management practices include weed control (herbicide application), field cultivation, fertilizer application, and harvest management.

Transition T1A
State 1 to 2

Transition T1A is the conversion of the reference state to agriculture. The triggers are tillage and intentional plant establishment (crop seeding). Resilience management practices include continual agricultural practices such as seeding, fertilizing, and managing invasive plants with herbicides or field cultivation. Hydrological modifications, such as ditching and tiling, may also be installed.

Constraints to recovery. Tillage and long-term intensive agricultural production generally preclude a return to State 1. Areas in row crop production may be placed in conservation programs and seeded with warm-season grasses, but will not exhibit the natural species diversity or ecological resiliency of State 1.

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 ecological site description.

Other references

Cleland, D.T., J.A. Freeouf, J.E. Keys, G.J. Nowacki, C. Carpenter, and W.H. McNab. 2007. Ecological subregions: Sections and subsections of the conterminous United States. USDA Forest Service, General Technical Report WO-76. Washington, DC.

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Approval

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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)	
Contact for lead author	
Date	05/05/2024
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:**

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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):**

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:**