USDA Natural Resources Conservation Service

Ecological site R112XY124KS
Wet Floodplain

Last updated: 11/05/2024
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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): 112X–Cherokee Prairies

MLRA 112 (Cherokee Prairies) is in Kansas (48 percent), Oklahoma (29 percent), and Missouri (23 percent) makes up about 20,885 square miles (54,092 square kilometers).

This area is in the Osage Plains Section of the Central Lowland Province of the Interior Plains. It is a gently sloping to rolling dissected plains. Elevation ranges from 120 to 1,540 feet (30 to 470 meters). Even though the area is thoroughly dissected, local relief typically is only 3 to 10 feet (1 to 3 meters) and major valleys generally are less than 8 feet (25 meters) below the adjacent uplands.

The extent of the major hydrologic unit area is made up of major rivers such as the Neosho, Verdigris, Osage, and Marais des Cygnes. The Harry Truman reservoir lies in the western part of Lake of the Ozarks in Missouri and is on the Osage and Grand Rivers.

This area is dominantly underlain by Pennsylvanian and in some areas, Permian and Mississippian sandstone, shale, and limestone bedrock. The northern part of the area has a thin mantle of loess. The dominant soils within this region are Mollisols and Entisols. Alfisols occur in the eastern part of the MLRA. There are small areas of Vertisols throughout the MLRA. It also contains small areas of Vertisols. Soils in this region are developed in residuum, loess, colluvium, and alluvium. These soils were developed under big bluestem, little bluestem, Indiangrass, and switchgrass on the western part of this area. The eastern part of the area and the valleys in the western part support hardwoods, mainly northern red oak, white oak, and shagbark hickory with islands of tall prairie grasses being common. Major wildlife species of this area are deer, cottontail rabbit, fox squirrel, and bobwhite quail.

This MLRA is mostly rangeland, hayland, and pasture. More than two-fifths of the area supports pasture grasses and legumes. The western part of this area generally supports tall prairie grasses. Big bluestem, little bluestem, Indiangrass, and switchgrass are the main species. The cropland is used to produce winter wheat, soybeans, corn, grain sorghum, and other feed grains. The forested areas are mainly on steep valley sides and in low-lying areas on flood plains.

Classification relationships

U.S. Department of Agriculture
Major Land Resource Area (MLRA) 112 - Cherokee Prairies

US Forest Service Ecoregions (1994-1995):
Domain name: Humid Temperate Domain
Division name: Prairie Division
Province name: Prairie Parkland (Temperate) Province
Province code: 251

Terrestrial Natural Community Type in Missouri (Nelson, 2010):
The reference state for this ecological site is most similar to a Wet Bottomland Prairie.

National Vegetation Classification System Vegetation Association (NatureServe, 2010):
The reference state for this ecological site is most similar to Spartina pectinata - Carex spp. - Calamagrostis canadensis - Lythrum alatum - (Oxypolis rigidior) Herbaceous Vegetation (CEGL002224).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002): This ecological site occurs primarily in the Four Rivers Alluvial Plains and South Grand Alluvial Plains Land Type Associations of the Cherokee Plains Subsection, and the Scarped Osage Plains Alluvial Plains Land Type Association of the Scarped Osage Plains Subsection.

NatureServe (2018):
Class: Shrub & Herb Vegetation
Subclass: Temperate & Boreal Grassland & Shrubland
Formation: Temperate Grassland & Shrubland
Division: Central North American Grassland & Shrubland
Macrogroup: Central Lowlands Tallgrass Prairie
Group: Central Tallgrass Prairie
Alliance: Central Dry & Dry-Mesic Tallgrass Prairie

Ecological site concept

The Wet Floodplain ecological site is located in broad floodplain and floodplain-steps landforms along major rivers and stream. This site is made up of soils that have seasonal or perennial high-water table less than 24 inches from the surface.

Associated sites

R112XY123KS	**Loamy Terrace** The Loamy Terrace ecological site is slightly above the Wet Floodplain ecological site. This site is made up of moderately to well drained soils with silt loam and loam surface layers and has a parent material of loamy and clayey alluvium. It is generally on a slope range of 0 to 3 percent.
R112XY102KS	**Clayey Upland** The Clayey Upland ecological site is above the Wet Floodplain ecological site. This site is made up of poorly to moderately well drained soils with silt loam to silty clay surface layers and clayey subsoils. It has a parent material of loess over residuum and residuum from limestone and shale. It is generally on a slope range of 1 to 15 percent.
R112XY103KS	**Loamy Upland** The Loamy Upland ecological site is above the Wet Floodplain ecological site. This site is made up of somewhat poorly to well drained soils with silt loam, loam, and silty clay loam surface layers and has a parent material of loess over residuum and residuum from limestone, sandstone, and shale. It is generally on a slope range of 1 to 15 percent.
R112XY122OK	**Wet Terrace** The Wet Terrace ecological site is slightly above the Wet Floodplain ecological site. This site is made up of poorly to somewhat poorly drained soils with silt loam surface layers, and loamy to clayey subsoils. It has a parent material of clayey and loamy alluvium. It is generally on a slope range of 0 to 2 percent.

Similar sites

R112XY125KS	**Loamy Floodplain** The Loamy Floodplain ecological site is similar to the Wet Floodplain ecological site because of the similar landscape position. However, the Loamy Floodplain is drier with a deeper water table (24-72 inches).

Table 1. Dominant plant species

Tree	Not specified

Shrub	(1) *Cephalanthus occidentalis* (2) *Amorpha fruticosa*
Herbaceous	(1) *Spartina pectinata* (2) *Calamagrostis canadensis*

Physiographic features

Wet Floodplain ecological sites are located on floodplains and floodplain-steps, with slopes of less than 3 percent. Typically these sites are in backswamp positions and are often not adjacent to the stream channel. Sites not protected by levees are subject to flooding.

The block diagram below (adapted from Preston, 1977) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. It is within the area labeled “3” on the figure. Loamy Floodplain (4) sites are often adjacent to this site, adjacent to the stream channel. The dashed lines within the Wet Floodplain area on the diagram indicate the various soils included in this ecological site.

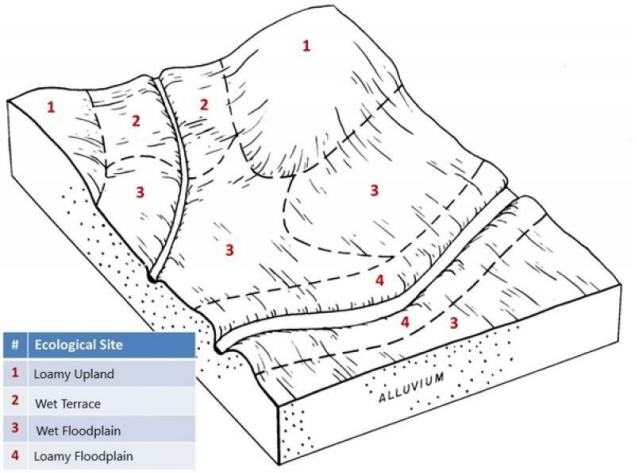


Figure 1. Landscape relationships for Wet Floodplain sites and other ecological sites.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Flood-plain step
Runoff class	Medium to high
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Rare to occasional
Ponding frequency	None
Elevation	137–395 m
Slope	0–3%
Water table depth	15–61 cm
Aspect	Aspect is not a significant factor

Climatic features

MLRA 112 (Cherokee Prairies) has a continental climate marked by strong seasonality. In winter, dry-cold air masses periodically swing south from the northern plains and Canada. If they invade reasonably humid air, snowfall and rainfall result. In summer, moist, warm air masses swing north from the Gulf of Mexico and can produce abundant amounts of rain, either by fronts or by convectional processes. In some summers, high pressure stagnates over the region, creating extended droughty periods. Spring and fall are transitional seasons when abrupt

changes in temperature and precipitation may occur due to successive, fast-moving fronts separating contrasting air masses. Seasonality in precipitation is very pronounced due to strong continental influences. June precipitation, for example, averages three to four times greater than January precipitation. During years when precipitation comes in a fairly normal manner, moisture is stored in the top layers of the soil during the winter and early spring, when evaporation and transpiration are low. During the summer months the loss of water by evaporation and transpiration is high, and if rainfall fails to occur at frequent intervals, drought will result. Drought directly influences ecological communities by limiting water supplies, especially at times of high temperatures and high evaporation rates.

Representative climatic features shown in Table 3 were derived from the climate stations selected for use within the MLRA.

Table 3. Representative climatic features

Frost-free period (characteristic range)	165-191 days
Freeze-free period (characteristic range)	193-215 days
Precipitation total (characteristic range)	1,067-1,168 mm
Frost-free period (actual range)	161-196 days
Freeze-free period (actual range)	188-220 days
Precipitation total (actual range)	1,041-1,168 mm
Frost-free period (average)	181 days
Freeze-free period (average)	204 days
Precipitation total (average)	1,118 mm

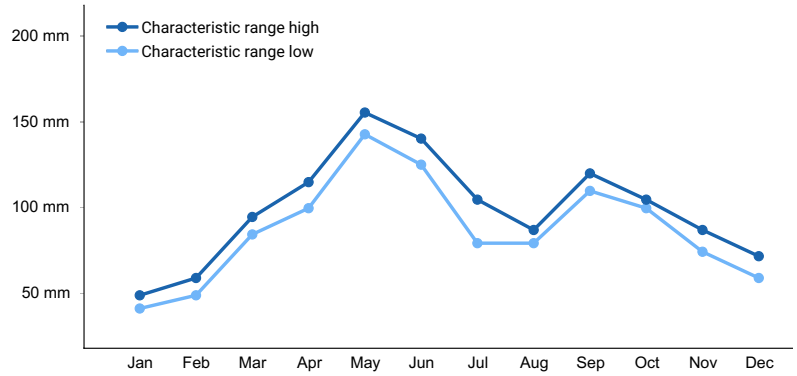


Figure 2. Monthly precipitation range

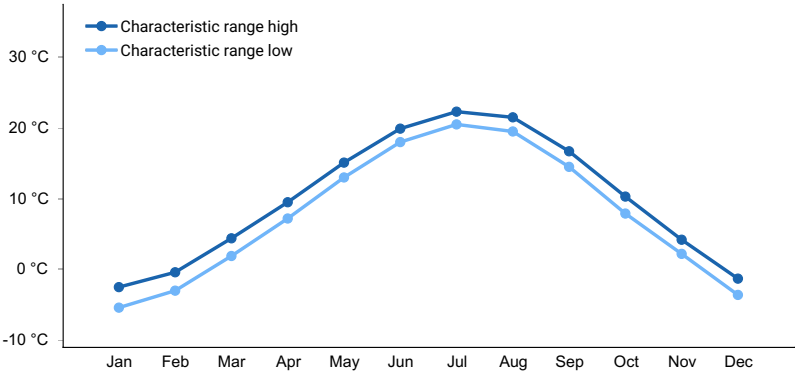


Figure 3. Monthly minimum temperature range

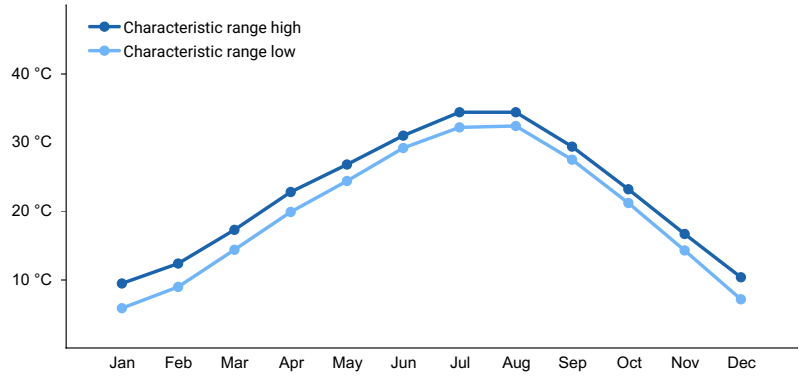


Figure 4. Monthly maximum temperature range

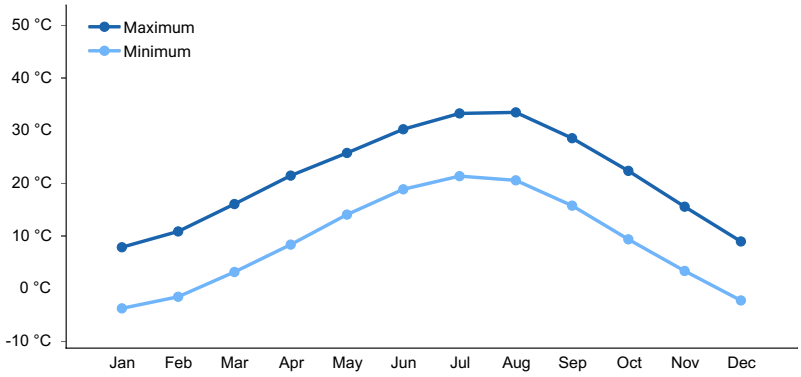


Figure 5. Monthly average minimum and maximum temperature

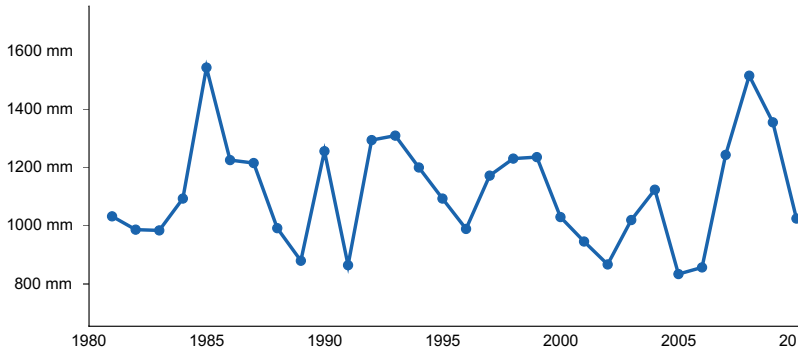


Figure 6. Annual precipitation pattern

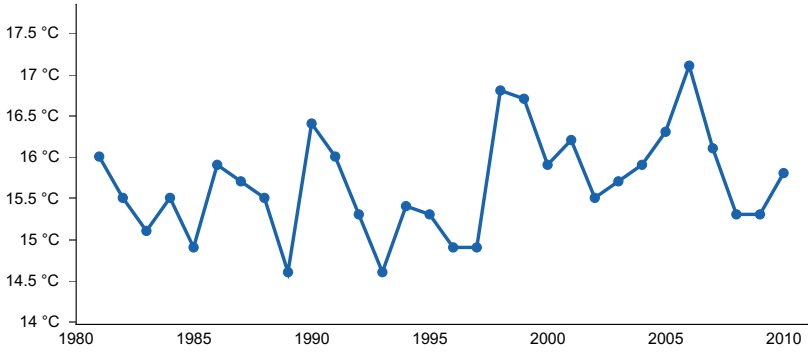


Figure 7. Annual average temperature pattern

Climate stations used

- (1) NOWATA [USC00346485], Nowata, OK
- (2) WAGONER [USC00349247], Wagoner, OK
- (3) TULSA INTL AP [USW00013968], Tulsa, OK

- (4) COLUMBUS [USC00141740], Columbus, KS
- (5) PARSONS 2 NW [USC00146242], Parsons, KS
- (6) HOLDENVILLE 2SSE [USC00344235], Holdenville, OK
- (7) ELDORADO SPRINGS [USC00232511], El Dorado Springs, MO

Influencing water features

Cowardin wetland types include: Palustrine Emergent Temporarily Flooded and Seasonally Flooded

Soil features

Soils that make up the Wet Floodplain ecological site are affected by a seasonal water table in the spring months. They were formed under prairie vegetation, and have dark, organic-rich surface horizons. The parent material is alluvium. The soils have silty clay loam, silty clay texture or silt loam surface horizons, and clayey substrata lacking argillic horizons. Soil series associated with this site include Boley, Girard, Lanton, Latanier, Leanna, Lightning, McCune, Moreland, Osage, Roebuck, and Wynona.

The accompanying picture of the Osage series shows a dark silty clay loam surface horizon over dark gray silty clay subsoil. The dull gray colors indicate seasonal wetness, which affects the species composition of the reference community and the ecological dynamics of the site.

Figure 8. Osage series. Picture from Peer (2004).

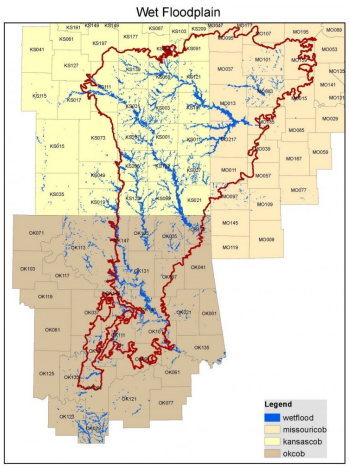


Figure 9. Mapunit locations within MLRA 112.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silty clay loam (2) Silty clay (3) Silt loam

Family particle size	(1) Clayey
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Very slow to slow
Soil depth	51–203 cm
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	12.7–20.32 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	5.1–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–2%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Wet Floodplain ecological sites occupy low landscape positions in the floodplain associated with former meander scars, tributary stream channels, and backwater lowlands between natural levees. These sites exist because of their association with low, wet areas with poorly drained, heavy textured soils. These conditions along with periodic fire have a strong influence on excluding trees. Wet Floodplains are dominated by a dense cover of wetland species, including prairie cord grass, sedges, and wet tolerant forbs. Slightly higher areas within or at the edge of the prairie support widely scattered elm, bur oak, pin oak, shellbark hickory, and willow.

Prior to levee development and channeling, these areas were regularly flooded by typically slow-moving backwater floods. Some further inundation and ponding occurred through groundwater movement. Unaltered sites usually were flooded at least three months of the year. In addition to flooding, periodic fire also played a role in keeping woody species at bay. Fire during dry periods removed the dense mat of leaf litter creating opportunities for plants less aggressive than the grasses and sedges. In the long term, siltation slowly filled these depressions, altering flood duration and causing a shift toward floodplain forest communities.

Today most of these ecological sites have been drained and farmed. However, because of their site conditions, during wet years, they act as ephemeral farmed wetlands in the agricultural landscape. While their flood regime usually has been altered, their position and soil properties still make them good candidates for wet prairie development management. Left unfarmed, these sites can quickly develop into naturally wet communities.

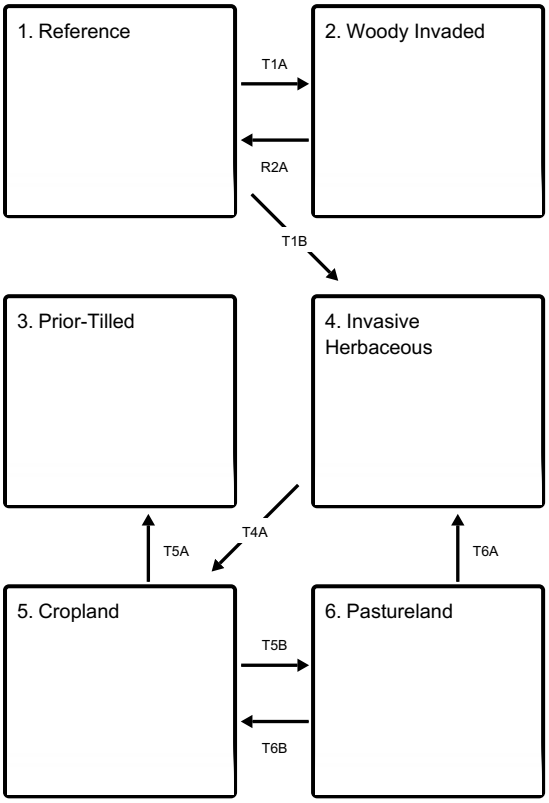
The state and transition model is provided to diagram the complex interactions briefly discussed here. The model includes states, plant communities, transitions, and restoration pathways detailing what experts have gathered from available experimental research, field observations, professional consensus, and interpretations. There may be other states or plant communities, with additional transitions and restoration pathways, not shown in the model, as well as noticeable variations within those illustrated.

The state and transition model consists of six states and seven community phases. These states and community phases interact based on the timing, intensity, and frequency of prescribe burning and prescribed grazing, flooding events, introduction of invasive species, and tillage practices. The Reference State (1) is typically burned every 1 to 3 years. Fire removes dead plant litter and provides room for a lush growth of prairie vegetation. Fires and intense flooding events also keep woody species from invading the rangeland. The Woody Invaded State (2) is characterized by a fire frequency and return interval greater than 20 years and a canopy cover percent between 40

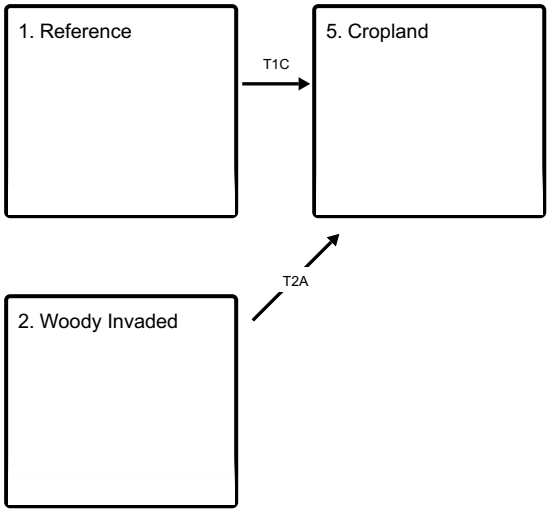
and 60 percent. The Prior-Tilled State (3) consists of sites that were allowed to regenerate through natural revegetation or artificially reseeded after tillage practices have ceased. The Invasive Herbaceous State (4) is characterized by invasive, non-native grasses and forbs. The Cropland State (5) consists of land converted to agricultural cropland and dominated by row crops. The Pastureland State (6) is characterized by seeded grasses, usually cool season, that receive fertilizer and irrigation inputs to maintain the pasture, often used for grazing.

State and transition model

Ecosystem states



States 1, 5 and 2 (additional transitions)



T1A - Long term fire suppression (20+ years) and no significant flooding events.

T1B - Invaded by non-native grasses and forbs.

T1C - Tillage and seeding of agricultural crops.

R2A - Removal of woody species by fire, mechanical methods, and/or significant floods.

T2A - Tillage and seeding of agricultural crops.

T4A - Tillage and seeding of agricultural crops.

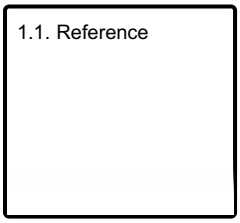
T5A - Natural revegetation or reseeding

T5B - Seeding of grasses and pasture management

T6A - Invaded by non-native grasses and forbs.

T6B - Tillage and seeding of agricultural crops

State 1 submodel, plant communities



State 2 submodel, plant communities

2.1. Shrub and/or Tree

State 3 submodel, plant communities

3.1. Go-Back

3.2. Reseed

State 4 submodel, plant communities

4.1. Sericea Lespedeza

State 5 submodel, plant communities

5.1. Cropland

State 6 submodel, plant communities

6.1. Fescue, Brome, Bluegrass

State 1
Reference

The Reference State is dominated by water tolerant vegetation such as wet prairies or sedge meadows that are not connected to groundwater (not seepage communities or fens). It experiences full horizon saturation (endosaturation), at least briefly throughout the growing season. Sites usually are flooded at least three months of the year. Long duration flooding regimes are common during some years. Within this state are two plant community phases that can occur and will transition back and forth depending on fire return intervals and flooding events.

Characteristics and indicators. An introduction and/or increase of woody plants can occur in the Reference State and initiates the transition to the Woody Invaded State. With the lengthening of fire return interval, lack of fire intensity, and lack of significant flooding events, there is a greater chance of woody species to establish and increase. Within the Reference State, the woody vegetation will generally be less than 15 percent canopy cover per acre. An introduction of seed from introduced, invasive or noxious plants can occur in the Reference State and is the starting point for transition to the Pastureland and/or Invasive Herbaceous State. If introduced, invasive, or noxious plants are present, they should not exceed those percentages shown in the plant communities identified in the Pastureland State and Invasive Herbaceous State. Tillage has not been a disturbance in the Reference State.

Resilience management. The Reference State is maintained through fire, flooding, and management. Longer fire return intervals and a lack of flooding events will allow woody species to increase. When fire return intervals shorten, or when there is significant flooding, these woody species will decrease or be eliminated. Management will include strategies to prevent non-native seed introduction (woody or herbaceous) and scouting with targeted control methods if initial establishment occurs.

Dominant plant species

- false indigo bush (*Amorpha fruticosa*), shrub
- common buttonbush (*Cephalanthus occidentalis*), shrub
- prairie cordgrass (*Spartina pectinata*), grass
- sedge (*Carex*), grass
- knotweed (*Polygonum*), other herbaceous
- bearded beggarticks (*Bidens aristosa*), other herbaceous
- spotted joe pye weed (*Eutrochium maculatum*), other herbaceous

Community 1.1
Reference

This community is characterized by wet-tolerant native shrubs and grasses including buttonbush, false indigo, prairie cordgrass, and bluejoint grass. Periodic flooding and a natural fire regime control woody species.

Dominant plant species

- common buttonbush (*Cephalanthus occidentalis*), shrub
- false indigo bush (*Amorpha fruticosa*), shrub
- sedge (*Carex*), grass
- prairie cordgrass (*Spartina pectinata*), grass
- bluejoint (*Calamagrostis canadensis*), grass
- knotweed (*Polygonum*), other herbaceous
- winged lythrum (*Lythrum alatum*), other herbaceous
- bearded beggarticks (*Bidens aristosa*), other herbaceous

State 2
Woody Invaded

The Woody Invaded State is dominated by a shrub and/or tree plant community. The increase and spread of shrubs and trees resulted from fire suppression and flooding reduction for 20 or more years. Woody plants can increase up to 34% from a lack of fire according to a study from 1937 to 1969, in contrast to a 1% increase on burned areas (Bragg and Hulbert, 1976). Periodic burning and significant flooding events will hinder the establishment of most woody species and favor forbs and grasses. However, not all unburned areas have a woody plant invasion. Birds, small mammals, and livestock are instrumental in the distribution and spread of seed for most tree and shrub species common to this site. The speed of encroachment varies considerably.

Characteristics and indicators. Hydrologic function in the Woody Invaded State is affected by the amount of shrub and/or tree cover compared to the Reference State. Canopy interception loss can vary from 25.4% to 36.7% (Thurow and Hester, 1997). A small rainfall event is usually retained in the foliage and does not reach the litter layer at the base of the tree. Only when canopy storage is reached and exceeded does precipitation fall to the soil surface. Interception losses associated with the accumulation of leaves, twigs, and branches at the bases of trees are considerably higher than losses associated with the canopy. The decomposed material retains approximately 40% of the water that is not retained in the canopy (Thurow and Hester, 1997). Soil properties affected include biological activity, infiltration rates, and soil fertility. The Woody Invaded State has not had tillage as a disturbance and could have plants identified in the Invasive Herbaceous State and/or the Pastureland State present on the site.

Resilience management. The Woody Invaded State is characterized as a degraded reference site that has experienced fire suppression for 20 or more years, a lack of significant flooding events, and insufficient woody plant control methods such as mechanical, chemical, biological. The lack of sunlight, due to shading by the shrubs and/or trees, will favor cool-season species that can reduce fire intensity if fire timing is during their active growth period and would help sustain the Woody Invaded State.

Dominant plant species

- silver maple (*Acer saccharinum*), tree
- American elm (*Ulmus americana*), tree
- eastern cottonwood (*Populus deltoides*), tree
- dogwood (*Cornus*), shrub
- sedge (*Carex*), grass
- sawtooth sunflower (*Helianthus grosseserratus*), other herbaceous

Community 2.1
Shrub and/or Tree

This community has numerous woody species that have encroached due to fire suppression and flooding reduction. Common species include silver maple, American elm, dogwood, sawtooth sunflower, and sedges.

Dominant plant species

- silver maple (*Acer saccharinum*), tree
- American elm (*Ulmus americana*), tree
- cottonwood (*Populus*), tree
- dogwood (*Cornus*), shrub
- sedge (*Carex*), grass
- sawtooth sunflower (*Helianthus grosseserratus*), other herbaceous

State 3
Prior-Tilled

The Prior-Tilled State consists of abandoned cropland where the original plant community was destroyed through inversion by tillage but revegetation has occurred. Two plant communities are identified in the Prior-Tilled State and are identified by revegetation factors. The communities are identified as being naturally revegetated through succession (Go-back) or planted/seeded to species similar in composition to the reference plant community (Reseed). Plant species composition in the Prior-Tilled State is difficult to define due to the variability of plant communities that can exist.

Characteristics and indicators. The Prior-Tilled State is an alternative state since the energy, hydrologic, and nutrient cycles are significantly altered to that of the Reference State in its natural disturbance regime. Repeated tillage and planting of annual crops resulted in major changes in soil conditions. Reductions in organic matter, mineral levels, soil structure, oxygen levels, and water holding capacity, along with increased runoff/erosion and shifts in the populations of soil-dwelling organisms, are common in this state. The extent of these changes are dependent upon duration of cropping, crop types grown, and other management practices. Bulk density, aggregate stability, soil structure, and plant functional and structural groups are not fully restored to that of the Reference State. Mechanical tillage can destroy soil aggregation. Soil aggregates are an example of dynamic soil property change. Aggregate stability is critical for infiltration, root growth, and resistance to water and wind erosion (Brady and Weil, 2008).

Resilience management. The Prior-Tilled State is a result of a land use management decision and is sustained by diminished soil function. Implementation of practices that positively impact plant community diversity, energy flow, and nutrient and water cycle, should benefit rehabilitation. Documentation does not support rehabilitation to a Reference State within known management time frames.

Dominant plant species

- prairie threeawn (*Aristida oligantha*), grass
- composite dropseed (*Sporobolus compositus*), grass
- big bluestem (*Andropogon gerardii*), grass
- Indiangrass (*Sorghastrum nutans*), grass
- purple loosestrife (*Lythrum salicaria*), other herbaceous
- annual ragweed (*Ambrosia artemisiifolia*), other herbaceous
- common sunflower (*Helianthus annuus*), other herbaceous

- Illinois bundleflower (*Desmanthus illinoensis*), other herbaceous
- Maximilian sunflower (*Helianthus maximiliani*), other herbaceous

Community 3.1
Go-Back

This plant community occurs on areas that were formerly farmed. When tillage operations ceased, the areas were allowed to revegetate or “go back” naturally in contrast to artificial reseeding to a selected species or group of species. The go-back process is a slow, gradual transformation that requires many years and many successional changes or stages in the plant community. The speed and extent of revegetation depends on the size of the area, level of grazing management and the proximity of the area to existing seed sources. In the initial stages of revegetation, the site is usually dominated by annual ragweed, Canadian horseweed, common sunflower, annual marshelder and golden tickseed. Gradually these are replaced by annual grasses including prairie threeawn, prairie cupgrass, field brome and bearded sprangletop. Usually plant succession will progress until the plant community is dominated by perennial grasses and grasslike plants including composite dropseed, foxtail barley, marsh bristlegrass, silver beardgrass, buffalograss, and Torrey’s rush. These plants can form a stable community. In time and with prescribed grazing management, other perennial grasses and forbs common in the Reference State return to the site. Go-back areas will be invaded by trees and shrubs. The more common include Siberian elm, common hackberry, eastern cottonwood, black willow, and roughleaf dogwood. Occasional burning is necessary to controlling these woody plants.

Dominant plant species

- prairie threeawn (*Aristida oligantha*), grass
- prairie cupgrass (*Eriochloa contracta*), grass
- composite dropseed (*Sporobolus compositus*), grass
- annual ragweed (*Ambrosia artemisiifolia*), other herbaceous
- common sunflower (*Helianthus annuus*), other herbaceous
- purple loosestrife (*Lythrum salicaria*), other herbaceous

Community 3.2
Reseed

This plant community occurs on areas that were formerly farmed. When farming operations ended, the area was seeded and established to a mixture of plants, usually native species common in the Reference State. Most seeding mixtures consisted of a blend of grasses that included big bluestem, Indiangrass, switchgrass and little bluestem. In some locations seed of additional plants such as eastern gamagrass, prairie bundleflower and Maximilian sunflower were included in the mixture. Once these areas become fully established, production is comparable to that of the Reference State. When reseeded areas and areas supporting native rangeland exist in the same pasture, they seldom are utilized at the same intensity because domestic livestock usually prefer plants on the native rangeland areas. When feasible, reseeded plant communities should be managed as separate pastures or units. These areas are also generally productive when managed for hay production. Some seeded areas are invaded by trees and shrubs during the establishment period of the desired plants. These invader species commonly include Siberian elm, common hackberry, eastern redcedar, eastern cottonwood, black willow, and roughleaf dogwood. Occasional burning is effective in controlling the establishment of these woody plants.

Dominant plant species

- big bluestem (*Andropogon gerardii*), grass
- Indiangrass (*Sorghastrum nutans*), grass
- switchgrass (*Panicum virgatum*), grass
- Illinois bundleflower (*Desmanthus illinoensis*), other herbaceous
- Maximilian sunflower (*Helianthus maximiliani*), other herbaceous

State 4
Invasive Herbaceous

The Invasive Herbaceous State is identified by a significant presence of non-native herbaceous plant species and is

characterized by the composition of plant species and soil functions that govern the ecological processes.

Characteristics and indicators. Species that define this state include sericea lespedeza. Sericea lespedeza community phases are partially defined by the total production exceeding 15% by weight on a per acre basis. Ecological processes within this state that are affected and differ from the Reference State are hydrologic cycle and nutrient cycle. Water content and infiltration rates are also affected by the species in the plant community phase.

Resilience management. The Invasive Herbaceous State is sustained through continued reduction in health and vigor of native plant species and the increase in health and vigor, including seed production, of non-native herbaceous species. Ensuring a lack of forage quality due to season of grazing, and type of grazing animal, of the non-native plants will deter grazing of non-native plant species and increase grazing pressure on native plant species. A general lack of treatment measures for individual species control, maintenance, and/or eradication will also allow persistence of this state.

Dominant plant species

- sericea lespedeza (*Lespedeza cuneata*), shrub

Community 4.1
Sericea Lespedeza

Sericea lespedeza (*Lespedeza cuneata*) is present at levels exceeding 15% by weight on a per acre basis and governing the ecological processes and potential uses of this community. Sericea lespedeza is invasive and listed as a statewide noxious weed in Kansas. It competes with the native plant community for sunlight, water, and nutrients, and produces allelopathic compounds (toxic chemicals that negatively impact the germination and/or growth of other plants). It also contains tannins, that limit palatability, and produces copious amounts of seed that remain viable in the soil for decades. This species will quickly invade rangelands without proactive control measures.

Resilience management. Sericea lespedeza (*Lespedeza cuneata*) is extremely competitive with its allelopathic nature, lower palatability compared to native species, and good seedling vigor. To prevent further loss of native plant composition, ensure native plant vigor remains high via a forage-animal balance based on forage composition and palatability, utilize spot application of herbicides to control new and existing sericea lespedeza plants, and consider diversifying grazing livestock type. Control measures for sericea lespedeza involve herbicide application following extension recommendations and product label for proper rates and timing. Utilization and control can also be provided through sheep and goat grazing. Conventional management practices such as prescribed grazing with cattle and dormant-season fire have been less than effective in preventing the spread of sericea lespedeza in rangelands. Some suppression of sericea lespedeza has been observed after mowing or summer burning. Late summer fire significantly reduces seed production the year of burn. An integrated approach is needed when treating this species.

Dominant plant species

- sericea lespedeza (*Lespedeza cuneata*), shrub

State 5
Cropland

The Cropland State is dominated by row crops such as corn, wheat, and soybeans. It occurs on areas that have been mechanically tilled and converted to agricultural cropland. After tillage, efforts are then taken to plant various crops through a conservation cropping system. This state is common. Many sites have been converted to agricultural cropland.

Resilience management. This state is a result of a land use management decision.

Dominant plant species

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

Community 5.1
Cropland

This community occurs on areas where land use has been converted through mechanical tillage to intensive agriculture by conservation cropping. Primary crops are corn, wheat, and soybeans.

Dominant plant species

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

State 6
Pastureland

The Pastureland State is identified by a significant presence of non-native herbaceous plant species and is characterized by the composition of plant species, agronomic inputs from direct fertilization, and soil functions that govern the ecological processes. Sites consisting of introduced species and managed for their continued presence or spread should not be evaluated within this model and instead, consider using a separate land use model such as Pasture.

Characteristics and indicators. Tall fescue, smooth brome, and Kentucky bluegrass are partially defined by the total production exceeding 40% by weight on a per acre basis. Ecological processes within this state that are affected and differ from the Reference State are hydrologic cycle and nutrient cycle. Water content and infiltration rates are also affected by the species in the plant community phase.

Resilience management. Pastureland is sustained through continued reduction in health and vigor of native plant species and the increase in health and vigor, including seed production, of non-native herbaceous species. Agronomic inputs from direct fertilization or nutrient-rich runoff from adjacent crop fields will provide advantages for non-native cool-season grass species growth. Ensuring a lack of forage quality due to season of grazing, type of grazing animal, or chemical composition of the non-native plants will deter grazing of non-native plant species and increase grazing pressure on native plant species. A general lack of treatment measures for individual species control, maintenance, and/or eradication will also allow persistence of this state.

Dominant plant species

- tall fescue (*Schedonorus arundinaceus*), grass
- smooth brome (*Bromus inermis*), grass
- Kentucky bluegrass (*Poa pratensis*), grass

Community 6.1
Fescue, Brome, Bluegrass

Tall fescue, smooth brome, and Kentucky bluegrass (all being cool-season grasses) are present at levels exceeding 40% by weight on a per acre basis and are governing the ecological processes and potential uses of this community. Timing of plant growth has shifted from summer (May through August) and now mostly occurs in spring and fall (March to May and September to November). Fire intensity of late spring burns can be greatly impeded due to the significant quantity of cool-season grass present. Any one or a combination of these species can be considered an invaded community. Soil dynamic property changes include biological activity and soil fertility.

Resilience management. Tall fescue, smooth brome, and Kentucky bluegrass are sustained or increased with nutrient additions and absence of fire. To prevent further loss of native plant composition, avoid nutrient additions, ensure native plant vigor remains high via a forage-animal balance based on forage composition and seasonal availability, utilize herbicides when natives are dormant but cool-seasons are actively growing, and utilize consecutive late spring prescribed burns. Chemical control will involve herbicide application following extension recommendations and product label for proper rates and timing. Intensifying grazing pressure (leaf removal of cool-season grasses) during the spring and fall and removing grazing pressure during the summer will reduce cool-season grass vigor and allow native warm-season plants an opportunity to maximize growth and gain vigor.

Prescribed burning will require sufficient standing dead material in order to conduct a burn in late spring as warm-season grasses initiate growth. If the goal is continued presence or spread of tall fescue, smooth brome, or Kentucky bluegrass, consider using a separate land use model such as Pasture.

Dominant plant species

- tall fescue (*Schedonorus arundinaceus*), grass
- smooth brome (*Bromus inermis*), grass
- Kentucky bluegrass (*Poa pratensis*), grass

Transition T1A
State 1 to 2

Long term fire suppression (20+ years) and no significant flooding events will transition the Reference State to a Woody Invaded State. A lack of fire and flooding events will allow woody species to establish and increase, shifting the site to dominant trees and shrubs with a reduction in desirable grasses and forbs in the understory.

Transition T1B
State 1 to 4

A transition from Reference to an Invasive Herbaceous State occurs when the site is invaded by Sericea lespedeza with the total production exceeding 15% by weight on a per acre basis.

Transition T1C
State 1 to 5

Tillage (or no-till if that management style is preferred) and seeding of agricultural crops will transition this site from a Reference State to a Cropland State.

Restoration pathway R2A
State 2 to 1

Restoration actions to return to a Reference State may include machinery woody removal and prescribed fire every 1-3 years. A significant flooding event may also remove a large number of woody species. Efforts will be costly, labor-intensive, and can take many years, if not decades. Once canopy levels reach greater than 20 percent, estimated cost to remove trees is very expensive and includes high energy inputs.

Transition T2A
State 2 to 5

Tillage (or no-till if that management style is preferred) and seeding of agricultural crops will transition this site from a Woody Invaded State to a Cropland State.

Transition T4A
State 4 to 5

Tillage (or no-till if that management style is preferred) and seeding of agricultural crops will transition this site from an Invasive Herbaceous State to a Cropland State.

Transition T5A
State 5 to 3

Allowing the site to naturally revegetate as it regenerates, or reseeding the site with native grasses and forbs with proper management afterwards will transition this site from a Cropland to a Prior-Tilled State.

Transition T5B
State 5 to 6

Seeding of cool season grasses and forbs and proper pasture management will transition this Cropland to a Pastureland.

Transition T6A
State 6 to 4

A transition from Pastureland to an Invasive Herbaceous State occurs when the site is invaded by Sericea lespedeza with the total production exceeding 15% by weight on a per acre basis.

Transition T6B
State 6 to 5

Tillage (or no-till if that management style is preferred) and seeding of agricultural crops will transition this site from a Pastureland to a Cropland.

Additional community tables

Animal community

Wildlife*

Game species that utilize this ecological site include:
White-tailed Deer will utilize this ecological site for browse (plant leaves in the growing season, seeds and soft mast in the fall/winter). This site type also can provide escape cover.

Migratory Waterbirds: Sora, Common Snipe and Virginia Rail

Furbearers: Muskrat, Beaver, and Mink.

Bird species associated with this ecological site's reference state condition:
Breeding birds: Sedge Wren, Red-Winged Blackbird, Least Bittern, Marsh Wren, and Common Yellowthroat.

Migratory birds: Sora, Virginia Rail, Sedge Wren, Least Bittern, Yellow Rail and Common Snipe.

Amphibian and reptile species associated with this ecological site's reference state condition: Western Chorus Frog (Pseudacris triseriata triseriata), Plains Leopard Frog (Rana blairi), Graham's Crayfish Snake (Regina grahamii), Midland Brown Snake (Storeria dekayi wrightourm), and prairies with crawfish burrows may have Northern Crawfish Frog (Rana areolata circulosa).

Small mammals associated with this ecological site's reference state condition: Muskrat (Ondatra zibethicus), Southern Bog Lemming (Synaptomys cooperi), and Mink (Mustela vison).

Many native insect species are likely associated with this ecological site, especially native bees, ants, beetles, butterflies and moths, and crickets, grasshoppers and katydids. However information on these groups is often lacking enough resolution to assign them to individual ecological sites.

Insect species known to be associated with this ecological site's reference state condition: Swamp Milkweed Leaf Beetle (Labidomera clivicollis), Cordgrass Planthopper (Prokelisia crocea), Dion Skipper butterfly (Euphyes dion), Duke's Skipper butterfly (Euphyes dukesi), native bees (Lasioglossum hartii, Hesperapis carinata, Svastra atripes and Cemolobus ipomoeae), Bullate Meadow katydid (Orchelimum bullatum) and Sedge Grasshopper (Stethophyma celatum).

Other invertebrates: Grassland Crayfish (Procambarus gracilis)

*This section prepared by Mike Leahy, Natural Areas Coordinator, Missouri Department of Conservation, 2013

Other information

Forestry

Management: This ecological site is not recommended for traditional timber management activity. Historically this site was dominated by a ground cover of native prairie grasses and forbs. Some scattered open grown trees may have also been present. May be suitable for non-traditional forestry uses such as windbreaks, environmental plantings, alley cropping (a method of planting, in which rows of trees or shrubs are interspersed with rows of crops) or woody bio-fuels.

Inventory data references

Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low and medium intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document.

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Approval

Suzanne Mayne-Kinney, 11/05/2024

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	11/21/2024
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:**

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):**

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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:**
