

Ecological site R112XY120MO

Loamy Upland Drainageway

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-Mesic Bottomland Prairie. National Vegetation Classification System Vegetation Association (NatureServe, 2010): The reference state for this ecological site is most similar to *Andropogon gerardii* - *Panicum virgatum* - *Helianthus grosseserratus* Herbaceous Vegetation (CEGL002024). Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002): This ecological site occurs throughout the Cherokee Plains Subsection, and in southern Land Type Associations 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 Loamy Upland Drainageway ecological site is located in an upland water receiving position and moves concentrated water.

Associated sites

R112XY102KS	Clayey Upland The Clayey Upland ecological site is above the Loamy Upland Drainageway 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 Loamy Upland Drainageway 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.

Similar sites

R112XY121MO	Wet Upland Drainageway The Wet Upland Drainageway ecological sites are located on similar landform positions but are wetter than the Loamy Upland Drainageway ecological sites and have a shallower water table (6-24 inches).
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Salix humilis</i>
Herbaceous	(1) <i>Andropogon gerardii</i> (2) <i>Tripsacum dactyloides</i>

Physiographic features

The Loamy Upland Drainageway ecological site is on upland drainageways with slopes that range from 1 to 3 percent. The site receives runoff from upland sites and is subject to flooding.

The block figure 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 “4” on the figure, in narrow drainageways that include the active stream channel. A variety of ecological sites may be upslope, such as the Shallow Sandstone Uplands (2) site shown here.

Figure 1. MLRA 112 block diagram

Table 2. Representative physiographic features

Landforms	(1) Drainageway
Runoff class	Very low to medium
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)

Flooding frequency	Occasional to frequent
Ponding frequency	None
Elevation	200 – 380 m
Slope	0 %
Water table depth	60 – 180 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)	160-190 days
Freeze-free period (characteristic range)	190-210 days
Precipitation total (characteristic range)	1,090-1,170 mm
Frost-free period (actual range)	160-190 days
Freeze-free period (actual range)	180-210 days
Precipitation total (actual range)	1,070-1,190 mm
Frost-free period (average)	170 days
Freeze-free period (average)	190 days

Precipitation total (average)	1,120 mm
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- (1) HUMBOLDT [USC00143867], Humboldt, KS
- (2) WAGONER [USC00349247], Wagoner, OK
- (3) PAOLA [USC00146209], Paola, KS
- (4) ELDORADO SPRINGS [USC00232511], El Dorado Springs, MO
- (5) HOLDENVILLE 2SSE [USC00344235], Holdenville, OK
- (6) NEVADA WTP [USC00235987], Nevada, MO
- (7) BUTLER 4W [USC00231145], Butler, MO
- (8) COFFEYVILLE MUNI AP [USW00093967], Coffeyville, KS

Influencing water features

Loamy Upland Drainageway ecological sites are occasionally to frequently flooded.

Soil features

The soils that makeup the Loamy Upland Drainageway ecological site have no rooting restriction and were formed under prairie vegetation with periodic depositional flood events. Organic matter content is high and the parent material is alluvium. They have silt loam surface horizons and loamy substrata. These soils are not affected by seasonal wetness. Soil series associated with this site include Cleora, Radley, and Verdigris.

The accompanying picture of the Verdigris series shows the nearly uniform dark silt loam alluvium characteristic of these soils. Picture from Peer (2004).

Figure 8. Verdigris series

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silt loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderate to moderately rapid
Soil depth	150 – 200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified

Available water capacity (0-101.6cm)	20.32 – 22.86 cm
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	4.5 – 6.5
Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

The reference community is characterized as a prairie unit with a ground cover dominated by big and little bluestem, Indiangrass, switchgrass, Eastern gamagrass, and a wide variety of prairie wildflowers. Other species such as Culver's root, Michigan lily, and bunchflower add to the mix of upland drainageway prairie species. Slightly higher areas within or at the edge of the drainageways can support scattered bur oak, pin oak, elm, shellbark hickory, and willow.

These areas flooded frequently but the duration was brief. In addition to the flooding and periodic wetness, fire played a key role, likely occurring at least once every three years. Fire removed dead plant litter and provided room for a lush growth of prairie vegetation. Fire also controlled woody species encroachment. Grazing impacted these sites by altering the composition, fuel loads, and structure of the vegetation that created a diversity of structure and composition. The partially wooded drainageway core would have burned less intensely and less frequently. During fire free intervals woody species would have increased in abundance and spread out onto the prairie. This is depicted in the Woody State.

These sites are productive. Today, Loamy Upland Drainageways are nearly extirpated from the region as the former high terrace prairies and savannas have been converted to intensive agriculture. While re-establishing prairie and savanna on converted agriculture sites is beneficial to wildlife, restoration to the reference state from agricultural land is a long term proposition with uncertain outcomes.

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 eight community phases. 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

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 6. Community 1.2 plant community composition

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

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 5.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 6.1 plant community composition

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

Wildlife* Game species that utilize this ecological site include: Northern Bobwhite will utilize this ecological site for food (seeds, insects) and cover needs (escape, nesting and roosting cover). Cottontail rabbits will utilize this ecological site for food (seeds, soft mast) and cover needs. Turkey will utilize this ecological site for food (seeds, green browse, soft mast, and insects) and nesting and brood-rearing cover. Turkey poults feed heavily on insects provided by this site type. 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. Bird species associated with this ecological site's reference state condition: Breeding birds as related to vegetation structure (related to time since fire, grazing, haying, and mowing): Vegetation Height Short (0.5 meter, low litter levels, bare ground visible): Grasshopper Sparrow, Horned Lark, Upland Sandpiper, Greater Prairie Chicken, Northern Bobwhite Mid-Vegetation Height (0.5 – 1 meter, moderate litter levels, some bare ground visible): Eastern Meadowlark, Dickcissel, Field Sparrow, Upland Sandpiper, Greater Prairie Chicken, Northern Bobwhite, Eastern Kingbird, Bobolink, Lark Sparrow Tall Vegetation Height (> 1 meter, moderate-high litter levels, little bare ground visible): Henslow's Sparrow, Dickcissel, Greater Prairie Chicken, Field Sparrow, Northern Bobwhite, Sedge Wren, Northern Harrier Brushy – Mix of grasses, forbs, native shrubs (e.g., *Rhus copallina*, *Prunus americana*, *Rubus* spp., *Rosa carolina*) and small trees (e.g., *Cornus racemosa*): Bell's Vireo, Yellow-Breasted Chat, Loggerhead Shrike, Brown Thrasher, Common Yellowthroat Winter Resident: Short-Eared Owl, Le Conte's Sparrow Amphibian and reptile species associated with this ecological site's reference state condition: prairies with or nearby to fishless ponds/pools (may be ephemeral) may have Eastern Tiger Salamander (*Ambystoma tigrinum tigrinum*) and Western Chorus Frog (*Pseudacris triseriata triseriata*); prairies with crawfish burrows may have Northern Crawfish Frog (*Rana areolata circulosa*); other species include Northern Prairie Skink (*Eumeces septentrionalis septentrionalis*), Ornate Box Turtle (*Terrapene ornata ornata*), Western Slender Glass Lizard (*Ophisaurus attenuatus attenuatus*), Eastern Yellow-bellied Racer (*Coluber constrictor flaviventris*), Prairie Ring-necked Snake (*Diadophis punctatus arnyi*), and Bullsnake (*Pituophis catenifer sayi*). Small mammals associated with this ecological site's reference state condition: Least Shrew (*Cryptotis parva*), Franklin's Ground Squirrel (*Spermophilus franklinii*), Plains Pocket Gopher (*Geomys bursarius*), Prairie Vole (*Microtus ochrogaster*), Southern Bog Lemming (*Synaptomys cooperi*), Meadow Jumping Mouse (*Zapus hudsonius*), Thirteen-lined Ground Squirrel (*Spermophilus tridecemlineatus*) and Badger (*Taxidea taxus*). Invertebrates: 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: Regal Fritillary butterfly (*Speyeria idalia*) whose larvae feed primarily on native prairie violets (*Viola pedata*, *V. pedatifida*, and *V. sagittata*); Mottled Dusky Wing butterfly (*Erynnis martialis*), Golden Byssus butterfly (*Problema byssus kumskaka*), Delaware Skipper butterfly (*Atryone logan logan*), and Crossline Skipper butterfly (*Polites origenes*). The larvae of the moth *Eucosma bipunctella* bore into compass

plant (*Silphium laciniatum*) roots and feed and the larvae of the moth *Eucosma giganteana* bore into a number of *Silphium* species roots and feed. Native bees, important pollinators, that may be associated with this ecological site's reference condition include: *Colletes brevicornis*, *Andrena beameri*, *A. helianthiformis*, *Protandrena rudbeckiae*, *Halictus parallelus*, *Lasioglossum albipennis*, *L. coreopsis*, *L. disparilis*, *L. nymphaeum*, *Ashmeadiella buconis*, *Megachile addenda*, *Anthidium psoraleae*, *Eucera hamata*, *Melissodes coloradensis*, *M. coreopsis*, and *M. vernoniae*. The Short-winged Katydid (*Amblycorypha parvipennis*), Green Grasshopper (*Hesperotettix speciosus*) and Two-voiced Conehead katydid (*Neoconcephalus bivocatus*) are possible orthopteran associates of this ecological site. Other invertebrate associates include the 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

Reference and alternative states within the state-and-transition model are not yet well- documented or supported and will require additional field sampling for refinement.

Other references

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Approval

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	09/27/2026
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills:

2. Presence of water flow patterns:

3. Number and height of erosional pedestals or terracettes:

4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):

5. Number of gullies and erosion associated with gullies:

6. Extent of wind scoured, blowouts and/or depositional areas:

7. Amount of litter movement (describe size and distance expected to travel):

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):

10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:

11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):

12. Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):

Dominant:

Sub-dominant:

Other:

Additional:

13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):

14. Average percent litter cover (%) and depth (in):

15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):

16. Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:

17. Perennial plant reproductive capability:
