

Ecological Site Description

Wet Loess High Terrace Savanna

R109XY036MO

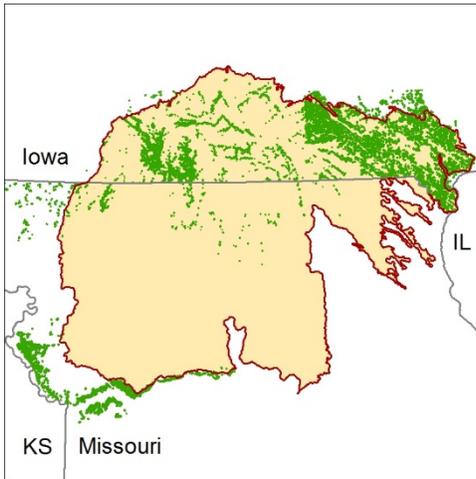
- (*Quercus palustris* - *Quercus macrocarpa*/*Salix humilis*/ *Spartina pectinata* - *Andropogon gerardii*)
- (pin oak – bur oak/prairie willow/prairie cord grass – big bluestem)

An Ecological Site Description (ESD) is a reference document of ecological knowledge regarding a particular land area (ecological site). An ESD describes ecological potential and ecosystem dynamics of land areas and their potential management. Ecological sites are linked to soil survey map unit components, which allows for mapping of ecological sites. (**NOTE:** *This is a “provisional” ESD, and is subject to change. It contains basic ecological information sufficient for conservation planning and land management in Missouri. After additional information is developed and reviewed, a “Correlated” ESD will be published and will be available via the Web Soil Survey <http://websoilsurvey.nrcs.usda.gov> .)*

Major Land Resource Area: 109 – Iowa and Missouri Heavy Till Plain

Introduction

The Iowa and Missouri Heavy Till Plain (area outlined in red on the map) is an area of rolling hills interspersed with interfluvial divides and alluvial valleys.



Elevation ranges from about 660 feet along the lower reaches of rivers, to about 980 feet on stable interfluvial summits in southern Iowa. Relief is about 80 to 160 feet between major streams and adjacent interfluvial summits. Most of the till plain drains south to the Missouri River via the Grand and Chariton River systems, but the northeastern portion drains southeast to the Mississippi River. Loess caps the pre-Illinoian aged till on interfluvial divides, whereas the till is exposed on side slopes. Mississippian aged limestone and Pennsylvanian aged sandstone and shale crop out on lower slopes in some areas.

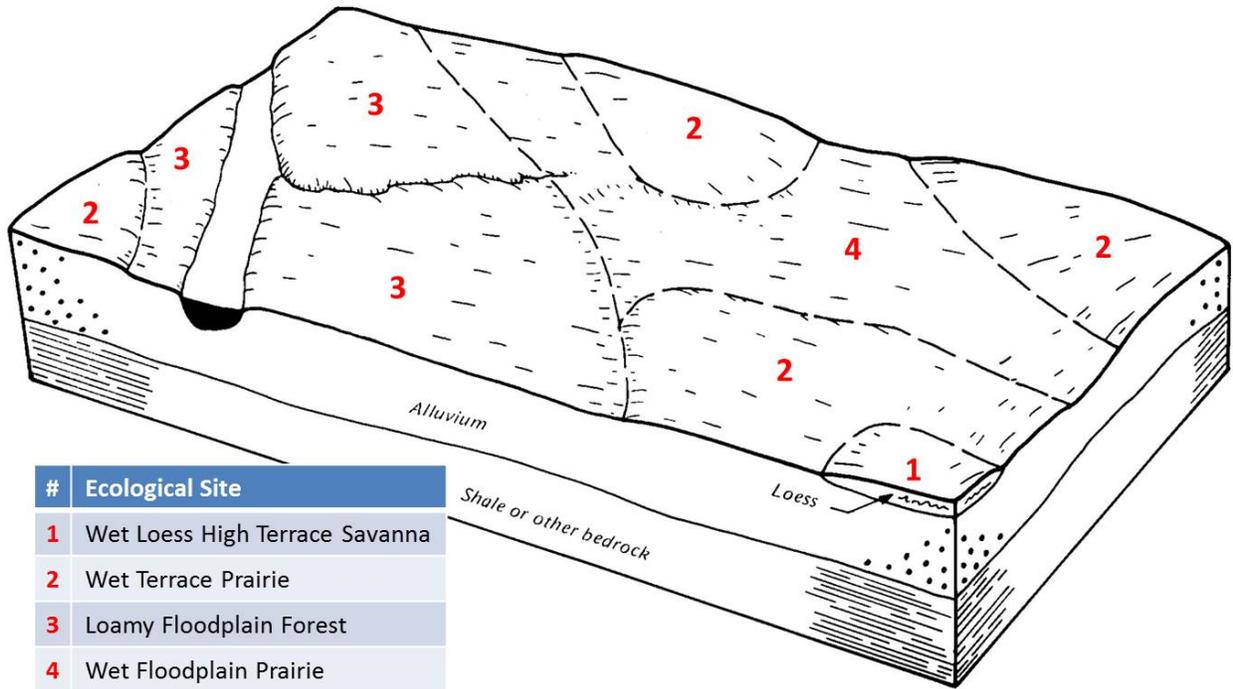
Wet Loess High Terrace Savannas are within the green areas on the map. These sites are primarily in the north and northeast parts of the MLRA, and on similar landscapes to the southwest. Soils are very deep, with loamy subsoils and seasonal high water tables.

Physiographic Features

This site is on high, Pleistocene-aged, loess-covered stream terraces and on footslopes with slopes of 0 to 9 percent. The site generates some runoff to adjacent lower terrace and floodplain sites, and receives some runoff from adjacent uplands. This site does not flood.

The following figure (adapted from Boeckman, 1992) shows the typical landscape position of this ecological site, and landscape relationships among the major ecological sites of the floodplains and stream terraces. This site is within the area labeled as “1” on the figure, and is typically associated

with Wet Terrace Prairie sites, and Floodplain ecological sites such as the Loamy Floodplain Forest and Wet Floodplain Prairie sites shown in the figure.



Soil Features

These soils have no rooting restriction. The soils were formed under prairie vegetation, and have dark, organic-rich surface horizons. Parent material is loess, with alluvium or colluvium at depth. Footslope areas are formed entirely in colluvium. They have silt loam or loam surface horizons and clayey subsoils. They are affected by a seasonal high water table during the spring months. Soil series associated with this site include Bevier, Cantril, Edina, Grundy, Pering, and Pershing.

Ecological Dynamics

Information contained in this section was developed using historical data, professional experience, field reviews, and scientific studies. The information presented is representative of very complex vegetation communities. Key indicator plants, animals and ecological processes are described to help inform land management decisions. Plant communities will differ across the MLRA because of the naturally occurring variability in weather, soils, and aspect. The Reference Plant Community is not necessarily the management goal. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

Wet Loess High Terrace Savannas occur at the base of slopes below Till Upland Prairies and above Wet Floodplain Prairies on relatively stable former floodplain positions that rarely flooded. This landscape position receives water from upslope, and poor drainage causes it to be periodically saturated. These conditions along with periodic fire, likely occurring at least once every 3 years, had a strong influence on excluding trees. Fire during dry periods removed the dense mat of leaf litter creating opportunities for plants less aggressive than the grasses and sedges.

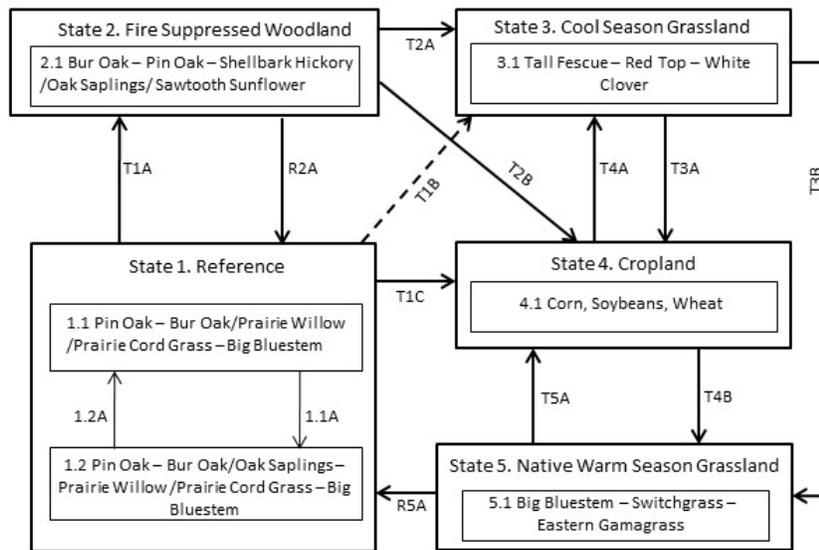
Wet Loess High Terrace Savannas are dominated by a dense cover of wet tolerant grasses and forbs. On slightly higher areas within or at the edge of the soil component scattered elm, bur oak, pin oak, shellbark hickory and willow occurred throughout the landscape.

These sites were also subjected to grazing by native large herbivores, such as bison, elk, and deer. Grazing by native herbivores would have effectively kept understory conditions open, creating conditions more favorable to ground flora species and minimizing woody trees and shrubs.

Today most of these ecological sites have been drained and farmed. Only a very few remnants exist. During wet years, they do act as ephemeral farmed wetlands in the agricultural landscape. Their position and soil properties still make them good candidates for wet prairie and savanna development management.

A State and Transition Diagram follows. Detailed descriptions of each state, transition, plant community, and pathway follow the model. This model is based on available experimental research, field observations, professional consensus, and interpretations. It is likely to change as knowledge increases.

Wet Loess High Terrace Savanna, R109XY036MO



| Code | Event/Activity/Process |
|---------------|---|
| T1A | Fire suppression > 20 years; woody invasion |
| T1B | Tillage; vegetative seeding; grassland management |
| T1C, T3A, T5A | Tillage; conservation cropping system |
| T2A | Woody removal; tillage; vegetative seeding; grassland management |
| T2B | Woody removal; tillage; conservation cropping system |
| T4A | Vegetative seeding ; grassland management |
| T3B, T4B | Vegetative seeding; prescribed fire; grassland management |
| 1.1A | Fire-free interval 10+ years |
| 1.2A | Fire interval 1-3 years |
| R2A | Woody removal; thinning; prescribed fire 1-3 years |
| R5A | Vegetative seeding; prescribed fire 1-3 years; tree planting; long rotation |

Ecological States

State 1: Reference

This state is native oak savanna dominated by an understory of prairie cordgrass, big bluestem, eastern gamagrass and a wide variety of prairie forbs. This state occurs on level to gently sloping soils and are affected by a seasonal high water table during the spring months. Bur oak, pin oak, shellbark hickory, American elm, American hazelnut, prairie willow and wild plum occurred in small groves or as scattered individuals across the landscape.

Two phases can occur that will transition back and forth depending on fire frequencies. Longer fire free intervals will allow woody species to increase such as oak saplings, prairie willow, dogwoods and wild plum. When fire intervals shorten these woody species will decrease.

This state is very rare. Nearly all former reference states have been converted to cool season grassland and intensive agriculture cropland or reverted to a woodland community.

State 2: Fire Suppressed Woodland

Degraded reference states that have experienced fire suppression and woody invasion for 20 or more years will transition to this state. With fire suppression, woody species such as bur oak, pin oak, and shellbark hickory will begin to increase transitioning this state from a savanna to an open woodland. Native herbaceous ground cover will also decrease.

State 3: Cool Season Grassland

Conversion of other states to non-native cool season species such as tall fescue, red top and white clover has been common in this area. Occasionally, these pastures may have scattered bur oaks.

Long term uncontrolled grazing and/or a lack of grassland management can cause significant soil erosion and compaction and increases in less productive species such as Kentucky bluegrass and weedy forbs such as ironweed. A return to the reference state may be impossible, requiring a very long term series of management options.

State 4: Cropland

This is the dominant state that exists currently with intensive cropping of corn, wheat and soybeans occurring. Some conversion to cool season hayland may occur for a limited period of time before transitioning back to cropland. Limited acres are sometimes converted to native warm season grassland through federal set-aside programs.

State 5: Native Warm Season Grassland

Conversion from the Cool Season Grassland (State 3) or the Cropland (State 4) to this state is increasing due to renewed interest in warm season grasses as a supplement to cool season grazing systems or as a native restoration activity. This state can be transformed back to a reference state. Substantial restoration time, management inputs and costs will still be needed.

Reference State Plant Community

Canopy Trees

| Common Name | Botanical Name | Cover % (low-high) | Canopy Height (ft) |
|-------------------|---------------------------|--------------------|--------------------|
| PIN OAK | <i>Quercus palustris</i> | 5-10 | 70 |
| BUR OAK | <i>Quercus macrocarpa</i> | 5-10 | 70 |
| SHELLBARK HICKORY | <i>Carya laciniosa</i> | 5-10 | 60 |
| RED ELM | <i>Ulmus rubra</i> | 5-10 | 50 |

Shrubs

| Common Name | Botanical Name | Cover % (low-high) | Canopy Height (ft) |
|----------------|--------------------------|--------------------|--------------------|
| PRAIRIE WILLOW | <i>Salix humiis</i> | 5-20 | 5 |
| FALSE INDIGO | <i>Amorpha fruticosa</i> | 5-20 | 4 |

Forbs

| Common Name | Botanical Name | Cover % (low-high) |
|--------------------|----------------------------------|--------------------|
| SWAMP MILKWEED | <i>Asclepias incarnata</i> | 5-20 |
| SMALL WHITE ASTER | <i>Aster fragilis</i> | 5-20 |
| SAWTOOTH SUNFLOWER | <i>Helianthus grosseserratus</i> | 5-20 |
| WINGED LOOSESTRIFE | <i>Lythrum alatum</i> | 5-20 |
| FALSE ASTER | <i>Boltonia asteroides</i> | 5-20 |
| SWEET CONEFLOWER | <i>Rudebeckia subtomentosa</i> | 5-20 |
| TICKSEED SUNFLOWER | <i>Bidens aristosa</i> | 5-20 |
| IRONWEED | <i>Vernonia fasciculata</i> | 5-20 |
| BUNCH FLOWER | <i>Melanthium virginicum</i> | 5-20 |
| CULVER'S ROOT | <i>Veronicastrum virginicum</i> | 5-20 |

Grasses and sedges

| Common Name | Botanical Name | Cover % (low-high) |
|--------------------|---------------------------------|--------------------|
| HOP SEDGE | <i>Carex lupulina</i> | 10-20 |
| FOX SEDGE | <i>Carex vulpinoidea</i> | 10-20 |
| FESCUE SEDGE | <i>Carex festucacea</i> | 10-20 |
| SWITCHGRASS | <i>Panicum virgatum</i> | 10-20 |
| PRAIRIE CORD GRASS | <i>Spartina pectinata</i> | 20-40 |
| CANADA WILDRYE | <i>Elymus canadensis</i> | 10-20 |
| BIG BLUESTEM | <i>Andropogon gerardii</i> | 20-30 |
| BLUEJOINT GRASS | <i>Calamagrostis Canadensis</i> | 10-20 |

Site Interpretations

Influencing Water Features

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

Wildlife*

Prairie Phase

- 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, American Bittern, Marsh Wren, and Common Yellowthroat.

Migratory birds: Sora, Virginia Rail, Sedge Wren, American 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*), prairies with crawfish burrows may have Northern Crawfish Frog (*Rana areolata circumlosa*); Western Fox Snake (*Elaphe vulpina vulpina*), and Western Massasauga rattlesnake (*Sistrurus catenatus tergeminus*).
- 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 katydid. 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*)

Savanna Phase:

- Both snags and live cavity or den trees provide important food and cover for vertebrate wildlife. Snags are also very important to invertebrate species. Wood Duck and Red-headed Woodpecker utilize snags and den trees for foraging, nesting or shelter. "Wolf" trees are a particularly valuable type of live cavity tree. These large diameter, often open-grown, old-ages, hollow trees provide both cavities for wildlife and usually hard or soft mast food sources. Large diameter snags and den trees are particularly important wildlife habitat features to retain.
- Extremely little is known about this phase of this ecological site. It is assumed that many of the animal species described under the prairie phase of this ecological site are found in the

savanna phase. Additional species that might be expected in the savanna phase: Red-headed Woodpecker, Wood Duck, Yellow Warbler, Fox Squirrel, and Indiana Bat.

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

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.

Glossary

Backslope – a hillslope profile position that forms the steepest and generally linear, middle portion of the slope.

Backswamp – marshy or swampy, depressed areas of flood plains between natural levees and valley sides or terraces

Calcareous – the presence of calcium carbonate in the soil parent material within the rooting zone; relatively alkaline

Claypan – a dense, compact, slowly permeable layer in the subsoil having much higher clay content than the overlying material

Chert – hard, extremely dense or compact crystalline sedimentary rock, consisting dominantly of interlocking crystals of quartz

Cliff – a significant vertical, or near vertical, rock exposure

Dolomite – a type of sedimentary rock that is a carbonate mineral composed of calcium magnesium carbonate

Drainageway – the upper most reach of a stream channel system characterized by little meandering

Dry – a site where soil moisture is limiting during the growing season; low available water capacity

Dune – a low mound, ridge, bank or hill of loose, wind-blown sand

Exposed – steep, south and west-facing slopes, which are warmer and drier than other slope aspects

Flatwoods – a type of woodland that occurs on soils with a root restricting subsoil layer within 20 to 30 inches, resulting in very slow runoff and ponding that remains saturated for most of the winter and early spring months but dries out and becomes very dry in the summer months; plants that grow there must be adapted to both conditions

Floodplain – the nearly level plain that borders a stream and is subject to inundation under flood-stage conditions

Footslope – a hillslope position at the base of a slope where hillslope sediment (colluvium) accumulates

Forest – a vegetative community dominated by trees forming a closed canopy and interspersed with shade-tolerant understory species

Fragipan – a dense, brittle subsoil horizon that is extremely hard and compact when dry

Glade – open, rocky, barren vegetative community dominated by drought-adapted forbs and grasses, typically with scattered, stunted woody plants

Igneous – bedrock formed by cooling and solidification of magma. Granite and rhyolite are typical igneous bedrocks in Missouri

Limestone – a type of sedimentary rock composed largely of calcium carbonate

Loess – material transported and deposited by wind and consisting predominantly of silt-size particles

Loamy – soil material containing a relatively equal mixture of sand and silt and a somewhat smaller proportion of clay

Marsh – a type of wetland that is dominated by herbaceous rather than woody plant species

Moist – a site that is moderately well to well drained and has high available water capacity, resulting in a well-balanced supply of moisture (neither too dry nor too wet).

Mudstone – blocky or massive, fine-grained sedimentary rock in which the proportions of clay and silt are approximately equal

Natric – a soil horizon that displays a blocky, columnar, or prismatic structure and has a subhorizon with an exchangeable-sodium saturation of over 15%

Outwash – stratified sediments of sand and gravel removed or “washed out” from a glacier by melt-water streams

Prairie – a vegetative community dominated by perennial grasses and forbs with scattered shrubs and very few trees

Protected – steep, north- and east-facing slopes, which are cooler and moister than other slope aspects

Residuum - unconsolidated, weathered, or partly weathered mineral material that accumulates by disintegration of bedrock in place

Riser – a component of terraces and flood-plain steps consisting of the steep side slope; the escarpment

Riverfront – a vegetative community in the floodplain immediately adjacent and generally parallel to a river or stream channel

River hills – a geographic area characterized by thick, dissected loess deposits, formed immediately adjacent to the edges of the Missouri and Mississippi River floodplains

Sandy – a coarse-sized soil containing a large mixture of sand and gravels and a somewhat smaller proportion of silts and clays with excessive drainage

Sandstone – a sedimentary rock containing dominantly sand-size particles

Savanna – grasslands interspersed with open-grown scattered trees, groupings of trees, and shrubs

Shale – a sedimentary rock formed from clay, silty clay, or silty clay loam deposits and having the tendency to split into thin layers

Shallow – a site with bedrock within 20 inches of the surface

Shoulder – the slope profile position that forms the convex surface near the top of a hill slope; it comprises the transition zone from summit to backslope

Sinkhole – a closed, circular or elliptical depression, commonly funnel-shaped, characterized by subsurface drainage and formed either by dissolution of the surface of underlying bedrock or by collapse of underlying caves within bedrock

Summit – the top or highest area of a hillslope

Swale – shallow, closed depressions irregularly spaced across a floodplain or terrace with an irregularly undulating surface.

Swamp – an area of low, saturated ground, intermittently or permanently covered with water, and predominantly vegetated by shrubs and trees.

Talus – rock fragments of any size or shape (usually coarse and angular) derived from and lying at the base of a cliff or very steep rock slope.

Terrace – a step-like surface, bordering a valley floor that represents the former position of a flood plain

Till – dominantly unsorted and unstratified soil material deposited directly by a glacier

Upland – a general term for the higher ground of a region, in contrast with a low-lying, adjacent land such as a valley or floodplain

Wet – a somewhat poorly, poorly or very poorly drained site that has an oversupply of moisture during the growing season

Woodland – a highly variable vegetative community with a canopy of trees ranging from 30 to 100 percent closure with a sparse midstory and a dense ground flora of grasses, sedges and forbs

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