

## *Ecological Site Description*

### **Wet Upland Drainageway Prairie**

**R109XY029MO**

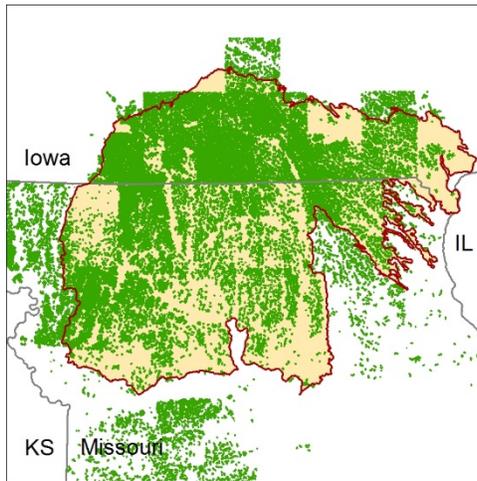
- (/Amorpha fruticosa /Spartina pectinata - Andropogon gerardii)
- (/false indigo/prairie cord grass – big bluestem)

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.

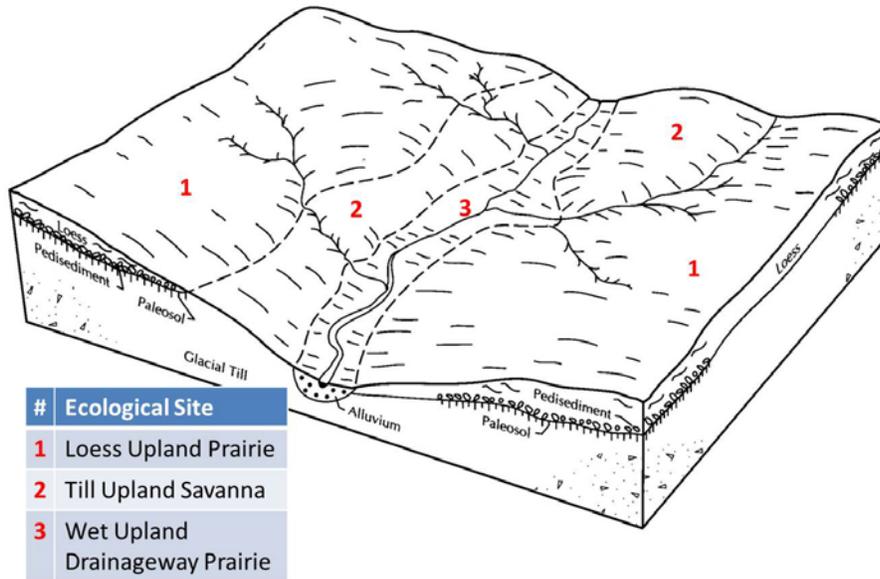


Wet Upland Drainageway Prairies are within the green areas on the map. These sites are widely distributed in small delineations throughout the upland portions of the MLRA and in adjacent areas. They are associated with Wet Floodplain Prairie sites downstream, and with adjacent upland ecological sites. Soils are very deep, seasonally wet, and subject to flooding.

#### **Physiographic Features**

This site is in narrow drainageways in the uplands, with slopes of 0 to 5 percent. The site receives runoff from adjacent upland sites. Most areas are subject to frequent, brief flooding.

The following figure (adapted from Abney, 1997) shows the typical landscape position of this ecological site, and landscape relationships among the major ecological sites of the uplands. The site is within the area labeled as “3”, and is typically downslope from Till Upland Savanna and Loess Upland Prairie sites.



**Soil Features**

These soils are affected by a seasonal water table in the spring months. They were formed under prairie vegetation, and have dark, organic-rich surface horizons. Parent material is alluvium. They associated with this site include Ackmore, Arbela, Blackoar, Bremer, Colo, Coppock, Excello, Gifford, Humeston, Nevin, Otter, Speed, Tice, Vesser, Wabash, and Zook.

**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 Upland Drainageway Prairies are found in narrow, low order, upland drainages. This ecological site most often occupied the entire small floodplain below Upland Loess or Till Prairies. This landscape position receives water from upslope and seasonal wetness causes it to be periodically saturated. Accordingly, the presence of trees is limited and is dominated by moisture tolerant grasses, sedges and forbs. Slightly higher areas of the drainageway support occasional widely scattered elm, bur oak, pin oak, and shellbark hickory.

These areas flood occasionally. In addition to flooding and seasonal wetness, fire played a key role in keeping woody species at bay, likely occurring at least once every 3 years. Fire during dry periods removed the dense mat of leaf litter creating opportunities for plants less aggressive than the grasses and sedges.

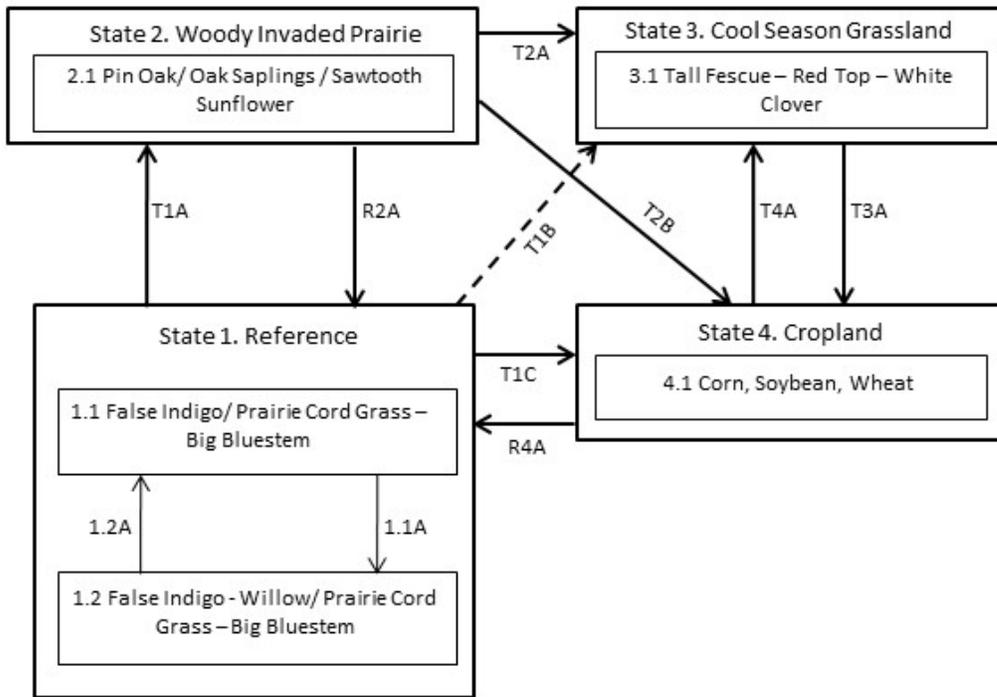
Wet Upland Drainageway Prairies were also subjected to grazing by native large herbivores. Grazing by native herbivores, such as bison, elk, and deer, would have effectively kept understory conditions open, creating conditions more favorable to ground flora species and minimizing woody trees and shrubs.

Today most of these ecological sites have been drained and turned into agricultural use. Very few, if any, quality remnants exist. While their flood regime usually has been altered, because of their site conditions, during wet years, they still act as ephemeral farmed wetlands in the agricultural

landscape. Left unfarmed, these wet upland drainageways can be developed into wet prairies and savannas and are prime candidates for restoration of this type of system.

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.

### Wet Upland Drainageway Prairie, R109XY029MO



Code	Event/Activity/Process
T1A	Fire suppression > 20 years; woody invasion; reduced flooding duration
T1B	Tillage; vegetative seeding; grassland management; drainage water management
T1C	Tillage; conservation cropping system; drainage water management
T3A	Tillage; conservation cropping system
T2A	Woody removal; tillage; vegetative seeding; grassland management
T2B	Woody removal; tillage; conservation cropping system
T4A	Vegetative seeding; grassland management
1.1A	Fire-free interval 10+ years; reduced flooding duration
1.2A	Flooding; prescribed fire
R2A	Woody removal; prescribed fire
R3A, R4A	Vegetative seeding; prescribed fire; restore natural hydrology

**Ecological States**

**State 1: Reference**

This state is typical of wet prairies that are not connected to groundwater (not seepage communities or fens) and that experience full horizon saturation (endosaturation), at least briefly during part of the growing season.

Two phases can occur that will transition back and forth depending on fire and flooding frequencies. Longer fire and flooding free intervals will allow woody species to increase such prairie willow, dogwoods and false indigo. When fire and flooding intervals shorten these woody species will decrease or be eliminated.

This state is very rare. Nearly all sites have been converted to intensive agriculture cropland along with some cool season grassland.

**State 2: Woody Invaded Prairie**

Degraded reference states that have experienced fire suppression and flooding reduction for 20 or more years will transition to this state.

With fire suppression and reduced flooding, woody species such as pin oak and bur oak will begin to increase transitioning this state from a prairie to a Woody Invaded Prairie. Native ground cover will also decrease. Transition from this state to cool season grasslands (State 3) or intensive cropland (State 4) was very common.

**State 3: Cool Season Grassland**

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

Transitioning to a Cropland State to help eliminate non-native grassland species and then restoring to a reference state is usually the easiest and most useful method of restoration from this state.

**State 4: Cropland**

This is the dominant state that exists currently with intensive cropping of corn, soybeans, and wheat occurring. A return to the reference state may be difficult and costly, requiring a very long term series of management options.

**Reference State Plant Community**

Canopy Trees

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
PIN OAK	<i>Quercus palustris</i>	0-5	80
BUR OAK	<i>Quercus macrocarpa</i>	0-5	80
SHELLBARK HICKORY	<i>Carya laciniosa</i>	0-5	70
RED ELM	<i>Ulmus rubra</i>	0-5	60

## Shrubs

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
PRAIRIE WILLOW	<i>Salix humilis</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
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
SMARTWEED	<i>Polygonum hydropiperoides</i>	5-20
WATER SMARTWEED	<i>Polygonum amphibium</i>	5-20
SMOOTH WHITE ASTER	<i>Symphotrichum racemosum</i>	5-20
SOUTHERN BLUE FLAG	<i>Iris virginica</i>	5-20
SPOTTED JOE PYE WEED	<i>Eupatorium maculatum</i>	5-20
AMERICAN BUGLEWEED	<i>Lycopus americanus</i>	5-20
TICKSEED SUNFLOWER	<i>Bidens aristosa</i>	5-20
SWAMP AGRIMONY	<i>Agrimonia parviflora</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
SWITCH GRASS	<i>Panicum virgatum</i>	10-20
PRAIRIE CORD GRASS	<i>Spartina pectinata</i>	20-30
CANADA WILDRYE	<i>Elymus canadensis</i>	10-20
BIG BLUESTEM	<i>Andropogon gerardii</i>	20-30
FOWL MANNA GRASS	<i>Glyceria striata</i>	5-20
SPIKE RUSH	<i>Eleocharis palustris</i>	5-20

**Site Interpretations***Influencing Water Features*

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

*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, 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 circulosa*); 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 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

### 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

## **References**

Abney, Mark A. 1997. Soil Survey of Chariton County, Missouri. U.S. Dept. of Agric. Natural Resources Conservation Service.

Fitzgerald, J.A. and D.N. Pashley. 2000a. Partners in Flight bird conservation plan for the Ozark/Ouachitas. American Bird Conservancy.

Fitzgerald, J.A. and D.N. Pashley. 2000b. Partners in Flight bird conservation plan for the Dissected Till Plains. American Bird Conservancy.

Heitzman, J.R. and J.E. Heitzman. 1996. Butterflies and moths of Missouri. 2<sup>nd</sup> ed. Missouri Department of Conservation, Jefferson City.

Jacobs, B. 2001. Birds in Missouri. Missouri Department of Conservation, Jefferson City.

Johnson, T.R. 2000. The amphibians and reptiles of Missouri. 2<sup>nd</sup> ed. Missouri Department of Conservation, Jefferson City.

NatureServe. 2010. Vegetation Associations of Missouri (revised). NatureServe, St. Paul, Minnesota.

Nelson, Paul W. 2010. The Terrestrial Natural Communities of Missouri. Missouri Department of Conservation, Jefferson City, Missouri.

Nigh, Timothy A., & Walter A. Schroeder. 2002. Atlas of Missouri Ecoregions. Missouri Department of Conservation, Jefferson City, Missouri.

Pitts, D.E. and W.D. McGuire. 2000. Wildlife management for Missouri landowners. 3<sup>rd</sup> ed. Missouri Department of Conservation, Jefferson City.

Schwartz, C.W., E.R. Schwartz and J.J. Conley. 2001. The wild mammals of Missouri. University of Missouri Press, Columbia and Missouri Department of Conservation, Jefferson City.