

## *Ecological Site Description*

### **Wet Floodplain Woodland**

**F109XY037MO**

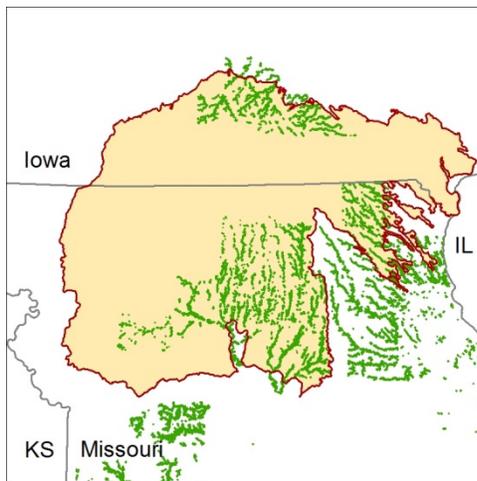
- (*Quercus palustris* - *Quercus macrocarpa*//*Carex* - *Spartina pectinata*)
- (pin oak – bur oak//sedge – prairie cord grass)

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**

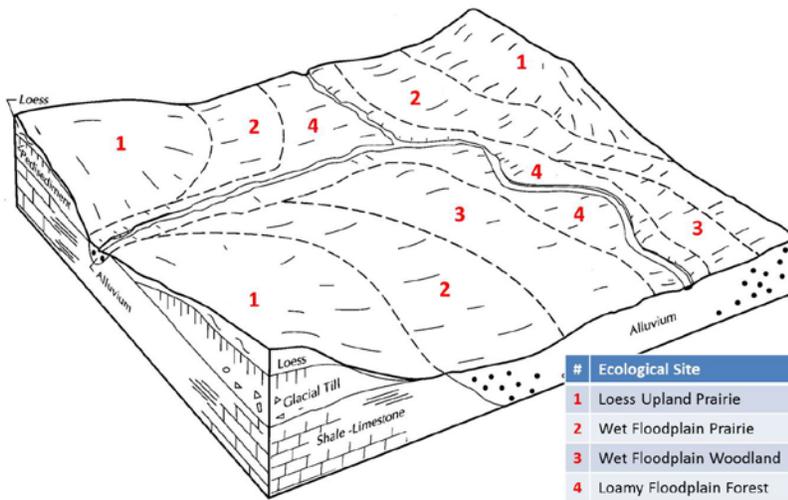
The Iowa and Missouri Heavy Till Plain (area outlined in red on the map) is an area of rolling hills interspersed with interfluvial divides and alluvial valleys. Elevation ranges from about 660 feet along the lower reaches of rivers, to about 980 feet on stable interfluvial summits in southern Iowa. 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 Floodplain Woodlands are within the green areas on the map. They occur along streams, primarily in the eastern portion of the Till Plain and adjacent areas. They are often associated with Loamy Floodplain Forest sites, which are usually on slightly higher positions adjacent to stream channels. In some areas they are adjacent to Wet Floodplain Prairie sites, which are in slightly lower, wetter positions. Soils are very deep, with seasonal high water tables, and are subject to flooding.

### **Physiographic Features**

This site is on floodplains and floodplain steps, with slopes of 0 to 3 percent. The site generates some runoff to adjacent lower floodplain sites, and receives some runoff from higher stream terraces and uplands. This site is subject to flooding.



The adjacent figure (adapted from Abney, 1997) shows the typical landscape position of this ecological site, and landscape relationships among the major ecological sites of the floodplains and adjacent uplands. This site is within the area labeled as “3” on the figure, and is typically adjacent to the Loamy Floodplain Forest site that contains the active stream channel. Wet Floodplain Prairie sites are often in adjacent, backswamp positions farther

from the channel. Several sites occur in adjacent upland positions, such as the Loess Upland Prairie shown in the figure.

**Soil Features**

These soils have no rooting restriction. They were formed under woodland vegetation, with periodic depositional flood events. Organic matter content is variable. Parent material is alluvium. They have silt loam or silty clay surface horizons, and loamy or clayey subsoils. They are affected by a seasonal high water table during the spring months. Soil series associated with this site include Blackoar, Piopolis, Quiver, Tice, Twomile, and Westerville.

**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 Floodplain Woodlands occupy a transitional area between lower, wetter and more clayey wet prairies and higher, better drained riverfront forests. They have loamy to clayey soil textures and are poorly drained, consequently limiting the density of trees creating a woodland structure. In addition, the transitional position between prairie and riverfront forest causes periodic fire to have an influence on their woodland structure. Elm, bur oak, pin oak and shellbark hickory form a medium to tall (70 to 80 feet), semi-open (60 to 80 percent) canopy over an understory with a dense sedge ground cover.

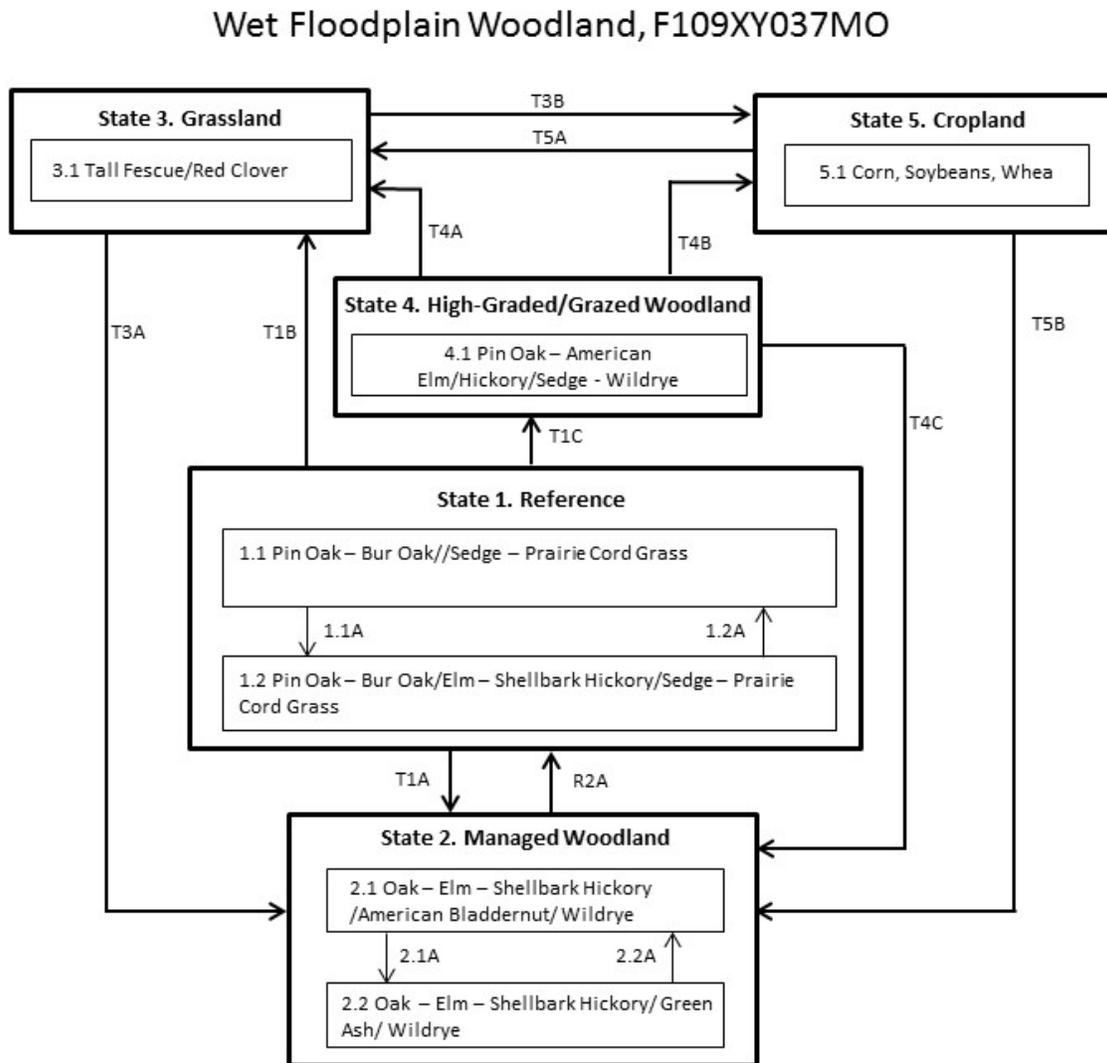
Prior to levee development and channeling, these areas were regularly flooded by a mixture of over-bank, headwater floods and slow-moving backwater floods. In most years, flood duration would have been rather short, occupying these sites for less than a month as waters receded to lower prairie and marsh areas. In addition to flooding, periodic fire also played a role in controlling woody

species. Fire during dry periods kept the canopy and understory open, and promoted a dense herbaceous ground flora.

Today most of these ecological sites have been cleared, drained and farmed or converted to cool season grassland. Only a few remnants exist. While their flood regime has been altered, their landscape position and soil properties still make them prime candidates for wet woodland development and management. These ecological sites are optimal locations for oak management in the floodplains.

A State and Transition Diagram is depicted in Figure 1. 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.

**Figure 1: State and Transition Diagram**



Code	Event/Activity/Process
T1A	Uneven-age timber management; harvesting
T1B, T4A	Clearing; pasture planting; prescribed grazing
T5A	Pasture planting; prescribed grazing
T1C	Poorly planned harvest (high-grading); uncontrolled grazing; no fire
T3B	Tillage; conservation cropping system
T4B	Clearing; tillage; conservation cropping system
T3A, T5B	Tree planting; long-term succession (+30-50 years); forest stand improvement; access control
T4C	Forest stand improvement; access control
R2A	Forest stand improvement; long term succession (+30 years); prescribed fire
1.1A	Long term succession (+10-30 years); sediment accumulation; no fire
1.2A	Catastrophic flood: blow-down; prescribed fire
2.1A	Little to no harvesting (10-20 years)
2.2A	Crop Tree Release; harvesting

## Ecological States

### State 1: Reference

The historical reference state for this ecological site was old growth bottomland woodland. Natural flooding cycles were the primary processes affecting this ecologic site. Maximum tree age was likely 150 to 200 years. A highly diverse ground flora was also present. Vines were common and went well into the canopy. Scattered open areas were common. A change to more frequent, higher-intensity floods on the modern landscape creates more frequent canopy gaps, and introduces or helps to maintain more flood-tolerant species such as sycamore, eastern cottonwood, green ash and hackberry.

Over the long term, these floodplains may become more elevated and/or isolated and accumulate more fine sediments, becoming more stable and enduring. Oaks and shellbark hickory begin to accumulate in these later stages of succession. Catastrophic floods will often partially or completely knock down the early species and regenerate this site creating a mosaic of early to late successional floodplain woodlands.

### State 2: Managed Woodland

Where this state remains, it has often been subjected to very selective timber harvests. While these woodland areas may resemble the reference state, the diversity of tree species has been selectively (removal of many oaks) altered. Reducing harvests and extending rotations will cause a transition to *community phase 2.2*. Eliminating harvests, implementing selective thinning, and allowing long term succession may allow a return to the reference state where hydrologic regimes are least altered.

### State 3: Grassland

Many acres of this ecological site have been converted to non-native grasslands of tall fescue and red clover. This state frequently transitions to a cropland state especially when commodity prices are high. A return to a near-reference state from this state is not recommended. Transitioning to a Managed Woodland state is possible through long-term commitments of time and money.

### State 4: High Graded/Grazed Woodland

This state is subjected to uncontrolled grazing and high-graded timber harvests. The grazing will open up the understory and remove much of the diverse ground flora. This can lead to erosion of the topsoil during floods. Grazed units also often undergo timber harvest removing a wide variety of outstanding hardwood trees, further diminishing the structural and compositional diversity. A return to the near-reference state will require a long-term commitment including the elimination of grazing, planting of trees and perhaps shrub and herbaceous species, and very limited targeted timber harvests and thinning.

### State 5: Cropland

Many areas of this ecological site have been converted to row crop agriculture. They can transition to a grassland state. A return to the near-reference state is not practical from this state. Transitioning to a Managed Woodland state may be possible through long-term commitments of time and money.

## Reference State Plant Community

### Canopy Trees

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
BUR OAK	<i>Quercus macrocarpa</i>	20-30	80
GREEN ASH	<i>Fraxinus pennsylvanica</i>	10-20	80
PIN OAK	<i>Quercus palustris</i>	20-30	80
SWAMP WHITE OAK	<i>Quercus bicolor</i>	10-20	80
SHELLBARK HICKORY	<i>Carya laciniosa</i>	10-20	60
COTTONWOOD	<i>Populus deltoides</i>	5-10	90
AMERICAN ELM	<i>Ulmus americana</i>	10-20	80

### Shrubs

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
BUTTONBUSH	<i>Cephalanthus occidentalis</i>	5-20	10

### Forbs

Common Name	Botanical Name	Cover % (low-high)
SAWTOOTH SUNFLOWER	<i>Helianthus grosseserratus</i>	10-20
IRON WEED	<i>Veronia gigantea</i>	5-10
BLUE VERVAIN	<i>Verbena hastata</i>	

### Grasses and sedges

Common Name	Botanical Name	Cover % (low-high)
HOP SEDGE	<i>Carex lupulina</i>	10-30
SQUARROSE SEDGE	<i>Carex squarrosa</i>	10-30
SCOURING RUSH	<i>Carex grayi</i>	10-30
SHORELINE SEDGE	<i>Carex hyalinolepis</i>	10-30
FRANK'S SEDGE	<i>Carex frankii</i>	10-30
PRAIRIE CORD GRASS	<i>Spartina pectinata</i>	10-30
WOOD REED GRASS	<i>Cinna arundinacea</i>	10-30
BLUEJOINT GRASS	<i>Calamagrostis canadensis</i>	10-30

## Site Interpretations

### Wildlife

- Tall emergent trees along with an uneven canopy structure and canopy gaps associated with this ecological site are important for heron colonies, eagle nesting, Mississippi kites, and other bird species in addition to being important migratory songbird stopover sites.
- Ephemeral pools provide important amphibian breeding habitat.
- Bird species associated with these sites include Indigo Bunting, Willow Flycatcher, Yellow Warbler, Red-headed Woodpecker, Eastern Wood-Pewee, Great Crested Flycatcher, Tree Swallow, Orchard Oriole, and Baltimore Oriole.
- Reptile and amphibian species associated with Floodplain Woodlands include tiger salamander, small-mouthed salamander, midland brown snake, gray treefrog, plains leopard frog, southern leopard frog, and western chorus frog.

### Forestry

- **Management:** Estimated site index values range from 50 to 90. On the wettest sites, timber management opportunities may be limited. Management of these groups is often difficult

because of the great variation in species, age, stocking levels and seasonal wetness. Use seed-tree, group selection, or clear cutting regeneration methods. Harvest favoring reproduction of the less-shade tolerant species such as pin oak, sycamore, and cottonwood. Maintain adequate riparian buffer areas.

- **Limitations:** Wetness from flooding; high water table. Use of equipment may be restricted in spring and other excessively wet periods. Restrict activities to dry periods or surfaced areas. Equipment use when wet may compact soil and damage tree roots. Unsurfaced roads and traffic areas tend to be slippery and form ruts easily. Access to forests is easiest during periods in late summer or winter when soils are frozen or dry. Planting is extremely difficult during spring periods. Seedling mortality may be high due to excess wetness. Unsurfaced roads and skid trails may be impassable during rainy periods.

## 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

*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**

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