USDA Natural Resources Conservation Service

Ecological site F109XY037MO
Wet Floodplain Woodland

Accessed: 05/18/2024

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.

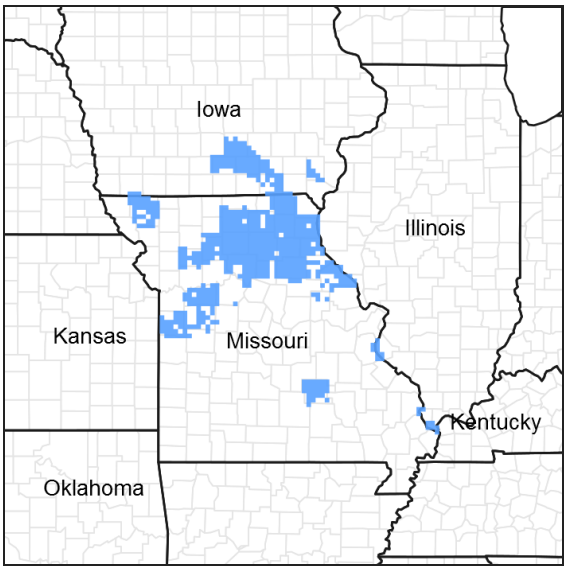


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 109X–Iowa and Missouri Heavy Till Plain

The Iowa and Missouri Heavy Till Plain (area outlined in red on the map) is an area of rolling hills interspersed with interfluve divides and alluvial valleys. Elevation ranges from about 660 feet along the lower reaches of rivers, to about 980 feet on stable interfluve summits in southern Iowa. Relief is about 80 to 160 feet between major streams and adjacent interfluve 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-Illinoisan aged till on interfluves, 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.

Classification relationships

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

Missouri Department of Conservation Forest and Woodland Communities (Missouri Department of Conservation, 2006):
The reference state for this ecological site is most similar to a Bottomland Woodland.

National Vegetation Classification System Vegetation Association (NatureServe, 2010):

The reference state for this ecological site is most similar to a Quercus macrocarpa - Quercus palustris - Quercus bicolor / Calamagrostis canadensis Wooded Herbaceous Vegetation (CEGL005120).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):
This ecological site occurs in many Land Type Associations, primarily within the following Subsections:
Chariton River Hills
Claypan Till Plains
Wyaconda River Dissected Till Plains

Ecological site concept

NOTE: This is a “provisional” Ecological Site Description (ESD) that is under development. It contains basic ecological information that can be used for conservation planning, application and land management. As additional information is collected, analyzed and reviewed, this ESD will be refined and published as “Approved”.

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. The reference plant community is woodland with an overstory dominated by American elm, bur oak, pin oak and shellbark and a dense ground flora of sedges.

Associated sites

F109XY030MO	**Loamy Floodplain Forest** Loamy Floodplain Forest sites are often in adjacent, natural levee positions between this site and the active stream channel.
R109XY002MO	**Loess Upland Prairie** Loess Upland Prairies are often the dominant ecological site in the adjacent uplands.
R109XY031MO	**Wet Floodplain Prairie** Wet Floodplain Prairies are often in adjacent, backswamp positions farther from the channel.

Similar sites

R109XY036MO	**Wet Loess High Terrace Savanna** Wet Loess High Terrace Savannas have a similar overstory species composition but with a more open canopy. These sites do not flood and can be more sloping.

Table 1. Dominant plant species

Tree	(1) *Quercus palustris* (2) *Quercus macrocarpa*
Shrub	Not specified
Herbaceous	(1) *Carex* (2) *Spartina pectinata*

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 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 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.

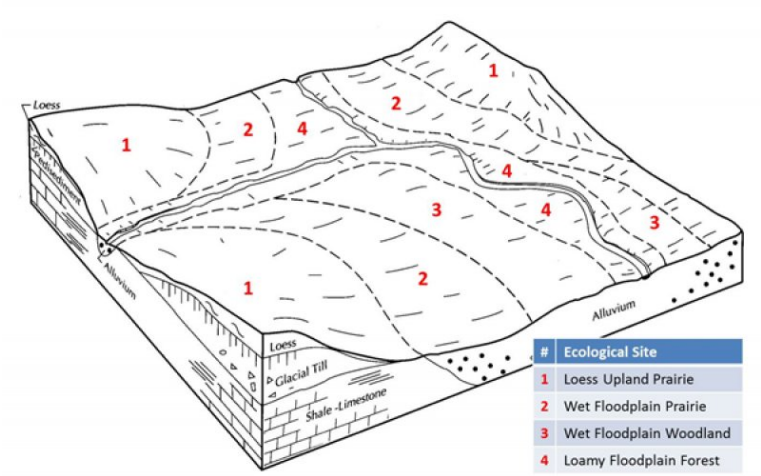


Figure 2. Landscape relationships for this ecological site

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Flood-plain step
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Rare to occasional
Ponding frequency	None
Slope	0–5%
Water table depth	15–61 cm
Aspect	Aspect is not a significant factor

Climatic features

The Iowa and Missouri Heavy Till Plain MLRA has a continental type of climate marked by strong seasonality. In winter, dry-cold air masses, unchallenged by any topographic barriers, 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, equally unchallenged by topographic barriers, 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.

This MLRA experiences small regional differences in climates that grade inconspicuously into each other. The basic gradient for most climatic characteristics is along a line from north to south. Both mean annual temperature and precipitation exhibit fairly minor gradients along this line.
Mean January minimum temperature follows the north-to-south gradient. However, mean July maximum temperature shows hardly any geographic variation in the region. Mean July maximum temperatures have a range of only two to three degrees across the region.

Mean annual precipitation varies along the same gradient as temperature – lower annual precipitation in the north, higher in the south. Seasonality in precipitation is very pronounced due to strong continental influences. June precipitation, for example, averages four to five 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. Drought indirectly affects ecological communities by increasing plant and animal susceptibility to the probability and severity of fire. Frequent fires encourage the development of grass/forb dominated communities and understories.

Superimposed upon the basic MLRA climatic patterns are local topographic influences that create topoclimatic, or microclimatic variations. For example, air drainage at nighttime may produce temperatures several degrees lower in valley bottoms than on side slopes. At critical times during the year, this phenomenon may produce later spring or earlier fall freezes in valley bottoms. Slope orientation is an important topographic influence on climate. Summits and south-and-west-facing slopes are regularly warmer and drier, supporting more grass dominated communities than adjacent north- and-east-facing slopes that are cooler and moister that support more woody dominated communities. Finally, the cooler microclimate within a canopied forest is measurably different from the climate of a more open and warmer grassland or savanna area.

Source: University of Missouri Climate Center - http://climate.missouri.edu/climate.php; Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin, United States Department of Agriculture Handbook 296 - http://soils.usda.gov/survey/geography/mlra/

Table 3. Representative climatic features

Frost-free period (average)	166 days
Freeze-free period (average)	188 days
Precipitation total (average)	1,067 mm

Climate stations used

- (1) BRUNSWICK [USC00231037], De Witt, MO
- (2) MEMPHIS [USC00235492], Memphis, MO
- (3) ALBIA 3 NNE [USC00130112], Albia, IA
- (4) CHARITON 1 E [USC00131394], Chariton, IA
- (5) KEOKUK LOCK DAM 19 [USC00134381], Keokuk, IA
- (6) BROOKFIELD [USC00230980], Brookfield, MO
- (7) LONG BRANCH RSVR [USC00235050], Macon, MO

Influencing water features

This ecological site is in floodplains of perennial streams, but are not typically adjacent to the current stream channel. They are influenced by a seasonal high water table, due to high groundwater levels in these topographically low positions. The water table is typically near the surface in late fall through spring, receding in the summer.

Stream levels typically respond quickly to storm events, especially in watersheds where surface runoff is dominant. Medium- to long-duration flooding is common in many areas, particularly during spring and early summer storm events. Constructed levees, often accompanied by stream channelization, have altered the hydrology and flooding dynamics in many places.

This site is in the RIVERINE wetlands class of the Hydrogeomorphic (HGM) classification system (Brinson, 1993), and are Forested Palustrine wetlands (Cowardin et al., 1979).

Soil features

These soils have no rooting restriction. They were formed under forest 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.

Table 4. Representative soil features

Surface texture	(1) Silt loam (2) Silty clay loam

Family particle size	(1) Loamy
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Slow to moderately slow
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	17.78–20.32 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)	4.5–7.3
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

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.

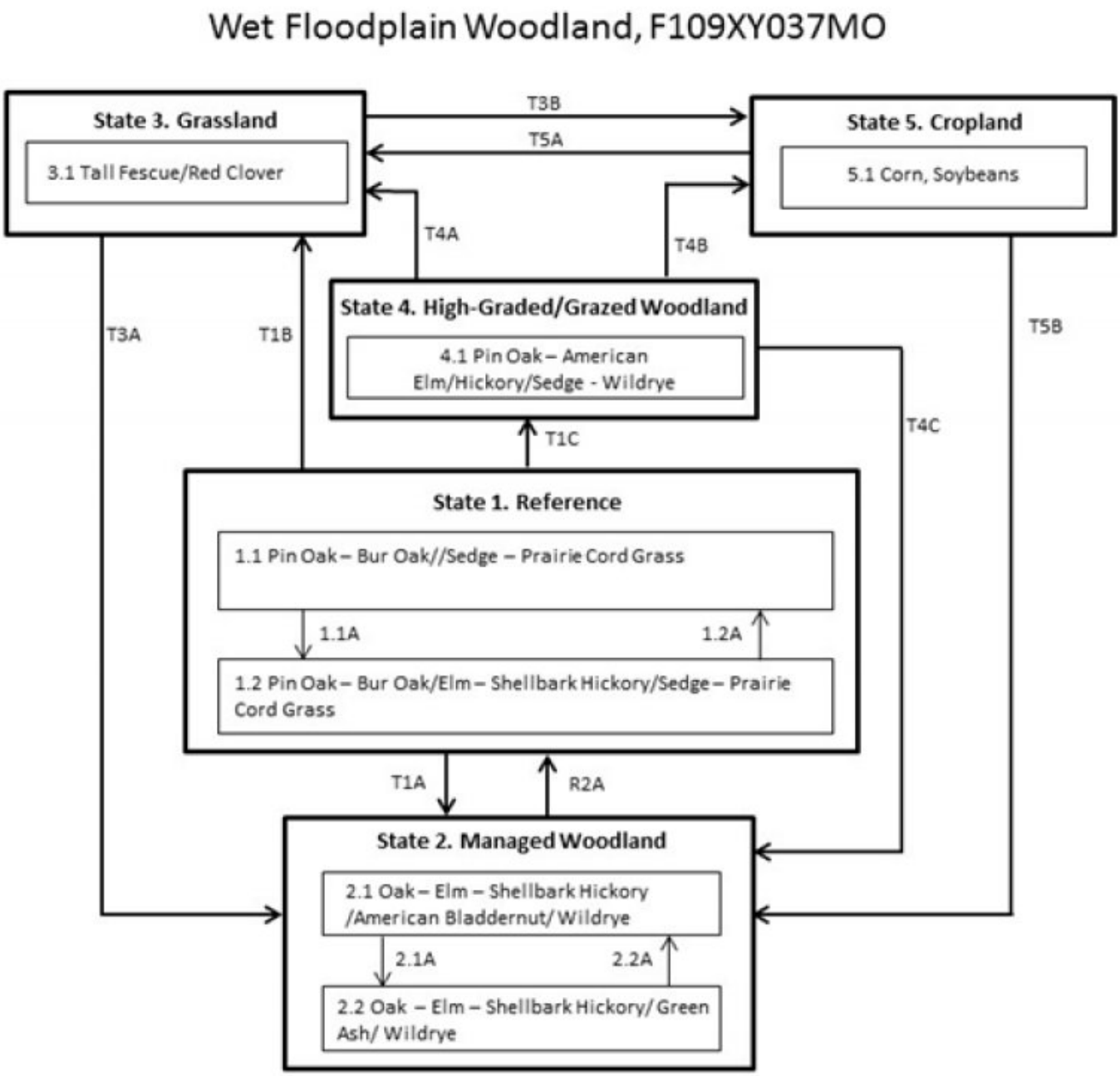
Wet Floodplain Woodlands occupy a transitional area between lower, wetter and more clayey wet prairies and higher, better drained riverfront forests. They have loamy to clayey soil textures and are poorly drained, consequently limiting the density of trees creating a woodland structure. In addition, 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 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.

State and transition model



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

Figure 7. State & Transition Model for this ecological site

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. The understory was complex, with multiple layers of shade-tolerant species. 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.

Community 1.1
Pin Oak – Bur Oak//Sedge – Prairie Cord Grass

Figure 8. Atlanta Conservation Area, Macon county, MO

This phase is composed of elm, bur oak, pin oak and shellbark hickory that form a medium to tall (70 to 80 feet), semi-open (60 to 80 percent) canopy over an understory with dense sedge ground cover.

Forest overstory. The Forest Overstory Species list is based on seven reconnaissance-level plots, as well as commonly occurring species listed in Nelson (2010). Species identified from plot data include cover percentages (except for a few) and canopy heights. Species not found in plots, but listed in Nelson, do not include cover and canopy data.

Forest understory. The Forest Understory list is based on seven reconnaissance-level plots, as well as commonly occurring species listed in Nelson (2010). Species identified from plot data include cover percentages, and canopy heights. Species not found in plots, but listed in Nelson, do not include cover and canopy data. Note that plot data for canopy heights are by height class, not actual species heights. All grasses and forbs are in the 0.3 to 3 foot height class.

Community 1.2

Pin Oak – Bur Oak/Elm – Shellbark Hickory/Sedge – Prairie Cord Grass

This phase is similar to phase 1.1 but with lower disturbance frequencies such as flooding and fire, a mid-story layer of elm and shellbark hickory quickly develops.

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 tern succession may allow a return to the reference state where hydrologic regimes are least altered.

Community 2.1
Oak – Elm – Shellbark Hickory /American Bladdernut/ Wildrye

This phase has been subjected to timber harvests which has altered the species composition and created a more open canopy.

Community 2.2
Oak – Elm – Shellbark Hickory/ Green Ash/ Wildrye

Community phase 2.2 is characterized by an increase in overstory species diversity and stand age. Canopy closure is greater than phase 2.1.

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.

Community 3.1
Tall Fescue/Red Clover

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.

Community 4.1
Pin Oak – American Elm/Hickory/Sedge - Wildrye

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.

Community 5.1
Corn/ Soybeans

Additional community tables

Table 5. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
shellbark hickory	CALA21	*Carya laciniosa*	Native	9.1–30.5	5–95	–	–
bur oak	QUMA2	*Quercus macrocarpa*	Native	9.1–30.5	10–75	–	–
pin oak	QUPA2	*Quercus palustris*	Native	9.1–21.3	0.1–25	–	–
American elm	ULAM	*Ulmus americana*	Native	9.1–21.3	10–20	–	–
slippery elm	ULRU	*Ulmus rubra*	Native	9.1–21.3	5–10	–	–
green ash	FRPE	*Fraxinus pennsylvanica*	Native	9.1–21.3	2–5	–	–
sugar maple	ACSA3	*Acer saccharum*	Native	9.1–21.3	2–5	–	–
river birch	BENI	*Betula nigra*	Native	9.1–21.3	2–5	–	–
common hackberry	CEOC	*Celtis occidentalis*	Native	9.1–21.3	2–5	–	–
red mulberry	MORU2	*Morus rubra*	Native	9.1–21.3	2–5	–	–
swamp white oak	QUBI	*Quercus bicolor*	Native	21.3–30.5	1–2	–	–
eastern cottonwood	PODE3	*Populus deltoides*	Native	–	–	–	–
silver maple	ACSA2	*Acer saccharinum*	Native	21.3–30.5	–	–	–
American sycamore	PLOC	*Platanus occidentalis*	Native	9.1–30.5	–	–	–
hawthorn	CRATA	*Crataegus*	Native	9.1–21.3	–	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
Indian woodoats	CHLA5	*Chasmanthium latifolium*	Native	–	10–75
Virginia wildrye	ELVI3	*Elymus virginicus*	Native	–	1–10
Muskingum sedge	CAMU9	*Carex muskingumensis*	Native	–	5–10
Frank's sedge	CAFR3	*Carex frankii*	Native	–	0.1–10
Gray's sedge	CAGR5	*Carex grayi*	Native	–	0.1–10
squarrose sedge	CASQ2	*Carex squarrosa*	Native	–	5–10
three-way sedge	DUAR3	*Dulichium arundinaceum*	Native	–	2–5
shoreline sedge	CAHY3	*Carex hyalinolepis*	Native	–	1–2
hop sedge	CALU4	*Carex lupulina*	Native	–	0.1–1

hop sedge	CAES4	*Carex lupulina*	Native		0.1–1
sedge	CAREX	*Carex*	Native	–	0.1–1
eastern woodland sedge	CABL	*Carex blanda*	Native	–	0.1–1
fowl mannagrass	GLST	*Glyceria striata*	Native	–	0.1–1
whitegrass	LEVI2	*Leersia virginica*	Native	–	0.1–1
rock muhly	MUSO	*Muhlenbergia sobolifera*	Native	–	0.1–1
bluejoint	CACA4	*Calamagrostis canadensis*	Native	–	–
sweet woodreed	CIAR2	*Cinna arundinacea*	Native	–	–
prairie cordgrass	SPPE	*Spartina pectinata*	Native	–	–
Forb/Herb					
violet	VIOLA	*Viola*	Native	–	1–50
calico aster	SYLA4	*Symphyotrichum lateriflorum*	Native	–	2–50
limestone wild petunia	RUST2	*Ruellia strepens*	Native	–	25–50
Canadian honewort	CRCA9	*Cryptotaenia canadensis*	Native	–	5–50
Canadian woodnettle	LACA3	*Laportea canadensis*	Native	–	5–25
aster	SYMPH4	*Symphyotrichum*	Native	–	0.1–25
Canadian blacksnakeroot	SACA15	*Sanicula canadensis*	Native	–	5–25
knotweed	POLYG4	*Polygonum*	Native	–	0.1–10
jewelweed	IMCA	*Impatiens capensis*	Native	–	5–10
eastern greenviolet	HYCO6	*Hybanthus concolor*	Native	–	2–5
jumpseed	POVI2	*Polygonum virginianum*	Native	–	1–5
bristly buttercup	RAHI	*Ranunculus hispidus*	Native	–	2–5
Canadian clearweed	PIPU2	*Pilea pumila*	Native	–	0.1–5
cutleaf coneflower	RULA3	*Rudbeckia laciniata*	Native	–	0.1–2
common blue violet	VISO	*Viola sororia*	Native	–	1–2
beggarticks	BIDEN	*Bidens*	Native	–	1–2
great ragweed	AMTR	*Ambrosia trifida*	Native	–	1–2
American hogpeanut	AMBR2	*Amphicarpaea bracteata*	Native	–	0.1–1
bulbous bittercress	CABU3	*Cardamine bulbosa*	Native	–	0.1–1
sweetscented joe pye weed	EUPU21	*Eutrochium purpureum*	Native	–	0.1–1
white crownbeard	VEVI3	*Verbesina virginica*	Native	–	0.1–1
clustered blacksnakeroot	SAOD	*Sanicula odorata*	Native	–	0.1–1
rosinweed	SILPH	*Silphium*	Native	–	0.1–1
stinging nettle	URDI	*Urtica dioica*	Native	–	0.1–1
white avens	GECA7	*Geum canadense*	Native	–	0.1–1
waterhorehound	LYCOP4	*Lycopus*	Native	–	0.1–1
wild blue phlox	PHDI5	*Phlox divaricata*	Native	–	0.1–1
tall thimbleweed	ANVI3	*Anemone virginiana*	Native	–	0.1–1
green dragon	ARDR3	*Arisaema dracontium*	Native	–	0.1–1
swamp verbena	VEHA2	*Verbena hastata*	Native	–	–
sawtooth sunflower	HEGR4	*Helianthus grosseserratus*	Native	–	–
giant ironweed	VEGI	*Vernonia gigantea*	Native	–	–
Shrub/Subshrub					
eastern poison ivy	TORA2	*Toxicodendron radicans*	Native	0.1–0.9	0.1–50

blackhaw	VIPR	*Viburnum prunifolium*	Native	3–9.1	1–2
multiflora rose	ROMU	*Rosa multiflora*	Introduced	0.1–1.5	1–2
coralberry	SYOR	*Symphoricarpos orbiculatus*	Native	0.1–1.5	1–2
red elderberry	SARA2	*Sambucus racemosa*	Native	0.1–0.9	0.1–1
common buttonbush	CEOC2	*Cephalanthus occidentalis*	Native	–	–
Tree					
shellbark hickory	CALA21	*Carya laciniosa*	Native	0.1–9.1	5–100
pin oak	QUPA2	*Quercus palustris*	Native	0.1–0.9	5–10
green ash	FRPE	*Fraxinus pennsylvanica*	Native	0.1–9.1	0.1–10
slippery elm	ULRU	*Ulmus rubra*	Native	0.1–9.1	0.1–5
bitternut hickory	CACO15	*Carya cordiformis*	Native	0.1–0.9	0.1–5
Ohio buckeye	AEGL	*Aesculus glabra*	Native	3–9.1	1–2
red mulberry	MORU2	*Morus rubra*	Native	0.1–0.9	1–2
silver maple	ACSA2	*Acer saccharinum*	Native	0.1–0.9	1–2
bur oak	QUMA2	*Quercus macrocarpa*	Native	0.1–9.1	0.1–1
American elm	ULAM	*Ulmus americana*	Native	0.1–9.1	–
common hackberry	CEOC	*Celtis occidentalis*	Native	0.1–0.9	–
Vine/Liana					
bristly greenbrier	SMTA2	*Smilax tamnoides*	Native	0.1–0.9	0.1–10
fourleaf yam	DIQU	*Dioscorea quaternata*	Native	0.1–0.9	0.1–1
Virginia creeper	PAQU2	*Parthenocissus quinquefolia*	Native	0.1–0.9	0.1–1

Animal community

Wildlife (MDC 2006):
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 additional 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.

Other information

Forestry
Management: 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. Un-surfaced 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. Un-surfaced roads and skid trails may be impassable during rainy periods.

Inventory data references

Plot ATLACA01 – Piopolis soil (reference)
Located in Atlanta CA, Macon County, MO
Latitude: 39.873309
Longitude: -92.489039

Plot PERSSP02 – Blackoar soil (reference)
Located in Pershing State Park, Linn County, MO
Latitude: 39.747835
Longitude: - 93.221928

Plot PERSSP_KS07 – Blackoar soil (reference)
Located in Pershing State Park, Linn County, MO
Latitude: 39.76639
Longitude: - 93.217548

Plot YECRCA01 - Tice soil (reference)
Located in Yellow Creek CA, Chariton County, MO
Latitude: 39.577585
Longitude: - 93.221957

Plot YECRCA04 – Tice soil (reference)
Located in Yellow Creek CA, Chariton County, MO
Latitude: 39.581828
Longitude: - 93.228218

Plot YECRCA_KS04 – Tice soil (reference)
Located in Yellow Creek CA, Chariton County, MO
Latitude: 39.577435
Longitude: - 93.222091

Plot DERICA_KS05 – Blackoar soil (reference)
Located in Deer Ridge CA, Lewis County, MO
Latitude: 40.19233
Longitude: - 91.801538

Plot CROWSP02 – Piopolis soil (recon - clayey, ponded inclusion (cottonwood)– not include in summaries)
Located in Crowder State Park, Grundy County, MO
Latitude: 40.122977
Longitude: - 93.688516

Other references

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

Brinson, M.M. 1993. A hydrogeomorphic classification for wetlands. Technical Report WRP-DE-4, U.S. Army Corps of Engineers, Engineer Waterways Experiment Station, Vicksburg, MS.

Cowardin, L.M., V. Carter, F.C. Golet, & E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Dept. of Interior, Fish & Wildlife Service, Office of Biological Services, Washington DC.

Missouri Department of Conservation. 2006. Missouri Forest and Woodland Community Profiles. Missouri Department of Conservation, Jefferson City, Missouri.

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.

Contributors

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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	
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):**

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

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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:**