USDA Natural Resources Conservation Service

Ecological site F109XY030MO
Loamy Floodplain Forest

Accessed: 05/06/2024

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.

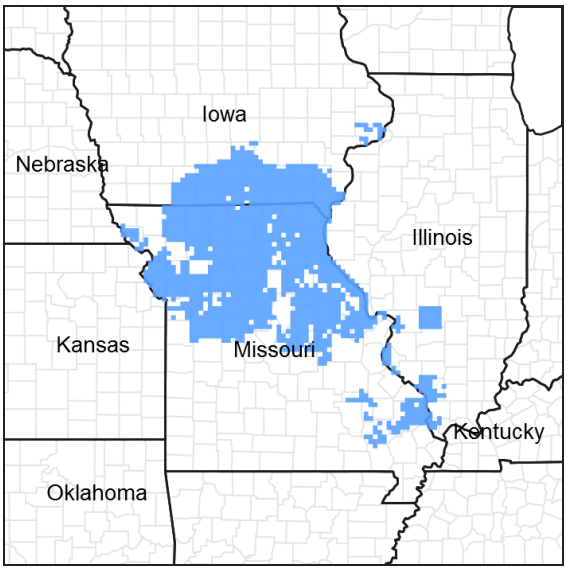


Figure 1. Mapped extent

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 Riverfront Forest.

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 Riverfront Bottomland Forest.

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

The reference state for this ecological site is most similar to a Fraxinus pennsylvanica - Celtis spp. - Quercus spp. - Platanus occidentalis Bottomland Forest (CEGL002410).

Geographic relationship to the Missouri Ecological Classification System (Nigh & Schroeder, 2002):
This ecological site occurs throughout the Central Dissected Till Plains Section.

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”.

Loamy Floodplain Forests are within the green areas on the map. They occur along streams throughout the Till Plain and adjacent areas. They are adjacent to the current or former stream channel. Soils are very deep and loamy. The reference plant community is forest dominated by eastern cottonwood, American elm and hackberry.

Associated sites

F109XY037MO	**Wet Floodplain Woodland** Wet Floodplain Woodlands are in slightly lower positions farther from the active stream channel.
R109XY031MO	**Wet Floodplain Prairie** Wet Floodplain Prairies are in lower, backswamp positions farther from the active stream channel. The reference community is prairie.

Similar sites

F109XY004MO	**Loamy Upland Drainageway Woodland** Loamy Upland Drainageway Woodlands are upstream, in narrow drainageways. The reference state woodland community in the Upland Drainageways contains more upland species, such as white oak and mockernut hickory.

Table 1. Dominant plant species

Tree	(1) *Ulmus americana* (2) *Celtis occidentalis*
Shrub	(1) *Vitis* (2) *Staphylea trifolia*
Herbaceous	(1) *Carex* (2) *Laportea canadensis*

Physiographic features

This site is on floodplains, particularly on natural levees adjacent to the current or historic stream channel. Slopes are 0 to 3 percent. The site receives some runoff from higher floodplains, stream terraces and uplands. This site is subject to occasional to frequent flooding. Scour and/or deposition is common during flooding, which impacts vegetation dynamics.

The following figure (adapted from Benham, 1990) 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 “4” on the figure, and typically contains the active stream channel of the floodplain system. Wet and Ponded Floodplain Prairie sites (lebeled “2” and “3”, respectively) are often in adjacent, backswamp positions farther from the channel. In many areas, Wet Floodplain Woodland sites occur between the Loamy Floodplain Forest and the Wet Prairie sites. Several sites occur in adjacent upland positions, particularly the Till Upland Savanna shown in the figure.

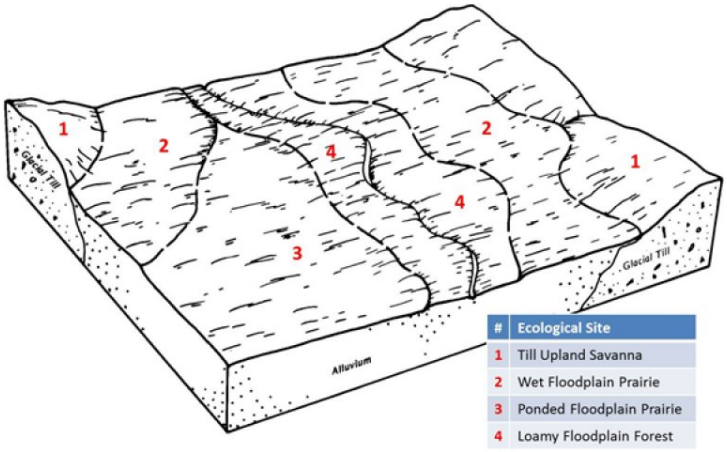


Figure 2. Landscape relationships for this ecological site

Table 2. Representative physiographic features

Landforms	(1) Flood plain
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Occasional to frequent
Ponding frequency	None
Slope	0–4%
Water table depth	30–183 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 is normal, moisture is stored in the soil profile 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 climate within a canopied forest ecological site is measurably different from the climate of the more open grassland or savanna ecological sites.

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)	156 days
Freeze-free period (average)	183 days
Precipitation total (average)	1,092 mm

Climate stations used

- (1) UNIONVILLE [USC00238523], Unionville, MO
- (2) CHILLICOTHE 2S [USC00231580], Chillicothe, MO
- (3) KEOSAUQUA [USC00134389], Keosauqua, IA
- (4) OSCEOLA [USC00136316], Osceola, IA

Influencing water features

This ecological site is typically in natural levee positions directly adjacent to a perennial stream. Stream levels typically respond quickly to storm events, especially in watersheds where surface runoff is dominant. Short- to medium- 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. Streambeds are typically incised into the surrounding floodplain by as much as 10 feet.

Some soils in this ecological site have seasonal water tables below about two feet in the winter and spring, generally receding with the falling river levels in the early summer. The water table has a minimal effect on the vegetative community.

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 sandy loam surface horizons, and loamy subsoils that are mainly sandy loam, silt loam or silty clay loam. Some areas immediately adjacent to higher-gradient streams are sandy throughout. A few soils soils are affected by seasonal wetness. Soil series associated with this site include Belknap, Dockery, Fatima, Flores, Kickapoo, Klum, lands, Nodaway, Perks, Reedscreek, Sandover, and Wakeland.

The accompanying picture of the Dockery series shows the stratified silt loam alluvium characteristic of these soils. Picture from Baker (1998).

Figure 7. Dockery series

Table 4. Representative soil features

Surface texture	(1) Silt loam (2) Sandy loam (3) Silty clay loam
Family particle size	(1) Loamy
Drainage class	Somewhat poorly drained to somewhat excessively drained
Permeability class	Moderately slow to moderately rapid
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	12.7–22.86 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.

The reference plant community is a forest dominated by an overstory of American elm and hackberry with sycamore, green ash and other early successional species scattered throughout. Canopy height is 80 to 100 feet with a canopy closure of 80 to 100 percent. Occasionally bur oak, shellbark hickory, black walnut and other

hardwood species may occur in later stages of development. Loamy Floodplain Forests were a common natural community throughout the region. They occur on natural levees and low floodplains that flood frequently.

Flooding of these ecological sites commonly occurs annually or at least once every 3 years. Loamy sediments, originating from the loess and till in the surrounding uplands, make up a significant portion of the alluvium in these floodplains.

The forest can be dominated by flood tolerant, pioneer tree species such as elm, hackberry, sycamore, cottonwood and green ash. Young stands of these species tend to stabilize the low floodplain and continue to accumulate loamy materials. Consequently, these ecological sites tend to be near even aged. Young stands are often dense with a sparse understory and ground flora.

Over the long term, these floodplains may become so elevated and/or isolated that they begin to accumulate more fine sediments and become more stable and enduring. Oak, shellbark hickory and black walnut 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 forests.

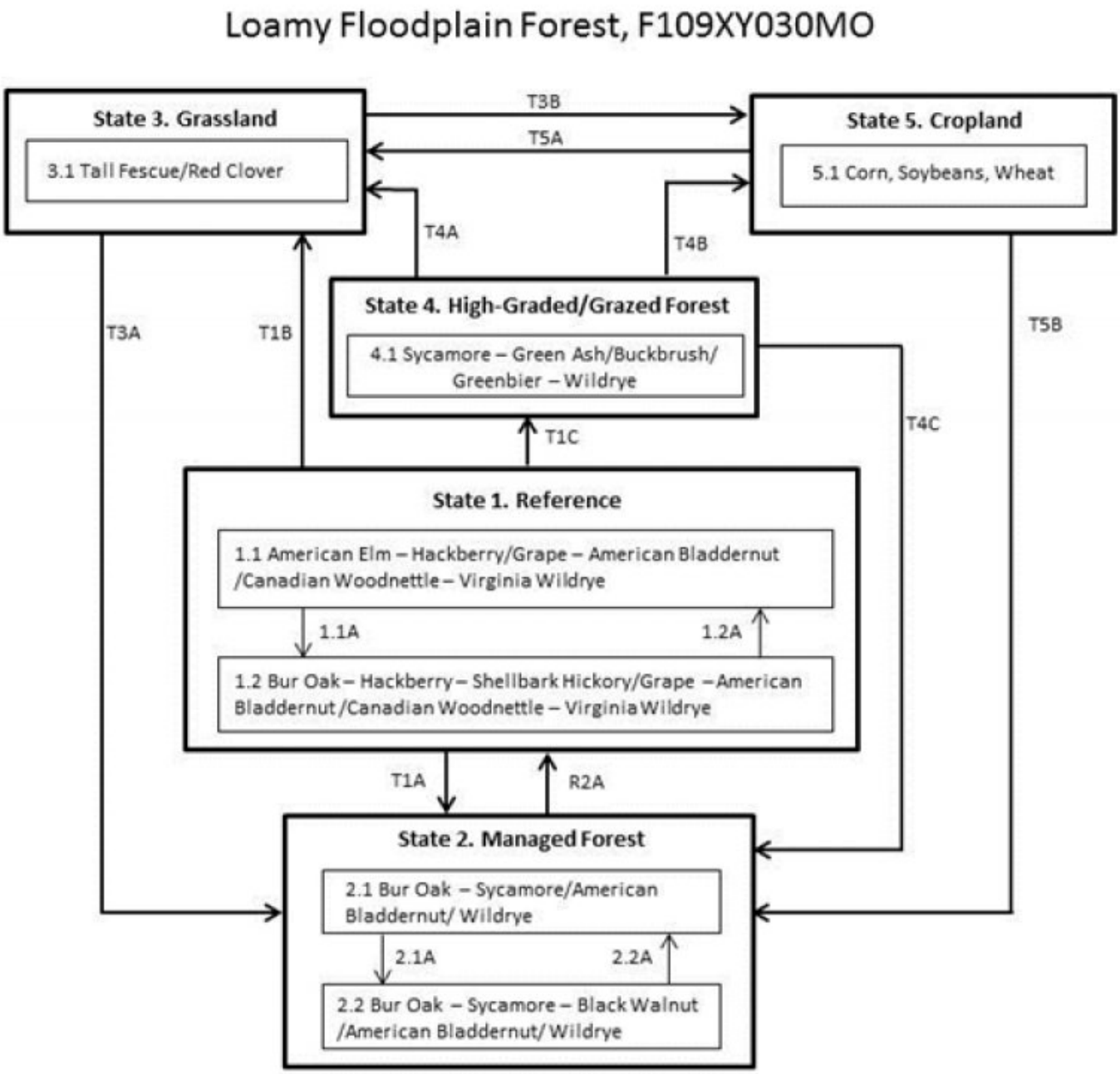
These sites are very productive. Today most of these ecological sites have been cleared and converted to agriculture. While some cleared fields have retained a narrow strip of forest along the river, other sites are often cleared right up to the bank. In such cases, flooding may cause severe stream bank erosion.

Uncontrolled grazing by domestic livestock in the remaining strips of forest is not uncommon and can cause significant damage, killing trees and removing the ground cover, resulting in further de-stabilization and degradation of this ecological site as well. Carefully planned timber harvests can be tolerated in this system, but high grading of the timber will eventually degrade the ecological site.

Loamy Floodplain Forests, still occur as a rather narrow band of forests traversing the river edge, are an abundant floodplain forest type. These bands of forest still play an important role as a source of food and shelter for migrating birds and as a source for course woody debris for the adjacent stream channels.

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
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 (+10-20 years)
1.1A	Long term succession (+10-30 years); sediment accumulation
1.2A	Catastrophic flood: blow-down
2.1A	Crop Tree Release; little to no harvesting (10-20 years)
2.2A	Uneven-age timber management; harvesting

Figure 8. State and Transition model for this ecological sit

State 1

Reference

The historical reference state for this ecological site was old growth bottomland forest. 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, shellbark hickory and black walnut 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 forests.

Community 1.1
American Elm - Hackberry/Grape - American Bladdernut / Canadian Woodnettle - Virginia Wildrye

Figure 9. Loamy Floodplain Forest: Crowder State Park, MO

This community phase is characterized by frequent flood events which impact on the canopy structure and species composition. Flood-tolerant species such as sycamore, eastern cottonwood, green ash and hackberry are common.

Forest overstory. The Forest Overstory Species list is based on 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.

Forest understory. The Forest Understory list is based on 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.

Community 1.2
Bur oak - Hackberry - Shellbark Hickory / Grape - American Bladdernut / Canadian Woodnettle - Virgin

Over the long term, phase 1.1 may become more elevated and/or isolated and accumulate more fine sediments, becoming more stable and enduring. Oaks, shellbark hickory and black walnut begin to accumulate in these later stages of succession.

State 2
Managed Forest

Where this state remains, it has often been subjected to very selective timber harvests. While these forested areas may resemble the reference state, the diversity of tree species has been selectively (removal of oak and walnut) 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
Bur Oak - Sycamore / 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
Bur Oak - Sycamore - Black Walnut / American Bladdernut / 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 Forest state is possible through long-term commitments of time and money.

Community 3.1
Tall Fescue / Red Clover

State 4
High-Graded/Grazed Forest

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
Sycamore - Green Ash / Buckbrush / Greenbrier - Wildrye

State 5
Cropland

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

Community 5.1
Corn, Soybean, Wheat

Transition 1A
State 1 to 2

Uneven-age timber management and selective harvesting will result in a transition to community phase 2.1.

Transition 1B
State 1 to 3

Clearing, pasture planting and prescribed grazing will result in a transition to community phase 3.1.

Transition 1C
State 1 to 4

Poorly planned harvests (high-grading) and uncontrolled grazing will result in a transition to community phase 4.1.

Restoration pathway 2A
State 2 to 1

This state can be restored to a reference state by modifying or eliminating timber harvests, extending rotations, incorporating selective thinning and allowing long-term succession to occur.

Transition 3A
State 3 to 2

Tree planting, long-term succession (30 to 50 years), forest stand improvement and livestock access control will result in a transition to community phase 2.1.

Transition 3B
State 3 to 5

Removing the grass sod, adding conservation tillage and conservation cropping system will result in a transition to community phase 5.1.

Transition 4C
State 4 to 2

Forest stand improvement and livestock access control will result in a transition to community phase 2.1.

Transition 4A
State 4 to 3

Clearing the timber, adding pasture planting and prescribed grazing will result in a transition to community phase 3.1.

Transition 4B
State 4 to 5

Clearing timber, adding tillage and conservation cropping system will result in a transition to community phase 5.1.

Transition 5B
State 5 to 2

Tree planting, long-term succession (30 to 50 years), forest stand improvement, and livestock access control will result in a transition to community phase 2.1.

Transition 5A
State 5 to 3

Pasture planting and prescribed grazing will result in a transition to community phase 3.1.

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							
common hackberry	CEOC	*Celtis occidentalis*	Native	12.2–30.5	10–75	–	–
black walnut	JUNI	*Juglans nigra*	Native	19.8–30.5	10–50	–	–
red mulberry	MORU2	*Morus rubra*	Native	12.2–30.5	5–25	–	–
green ash	FRPE	*Fraxinus pennsylvanica*	Native	12.2–30.5	2–25	–	–
slippery elm	ULRU	*Ulmus rubra*	Native	12.2–18.3	2–25	–	–
silver maple	ACSA2	*Acer saccharinum*	Native	19.8–30.5	5–10	–	–
white ash	FRAM2	*Fraxinus americana*	Native	19.8–30.5	5–10	–	–
shellbark hickory	CALA21	*Carya laciniosa*	Native	12.2–18.3	5–10	–	–
bur oak	QUMA2	*Quercus macrocarpa*	Native	12.2–18.3	2–5	–	–
American elm	ULAM	*Ulmus americana*	Native	–	–	–	–
bitternut hickory	CACO15	*Carya cordiformis*	Native	–	–	–	–
Kentucky coffeetree	GYDI	*Gymnocladus dioicus*	Native	–	–	–	–
American sycamore	PLOC	*Platanus occidentalis*	Native	–	–	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
Virginia wildrye	ELVI3	*Elymus virginicus*	Native	0–0.9	0–5
nodding fescue	FESU3	*Festuca subverticillata*	Native	0–0.9	0–5
sedge	CAREX	*Carex*	Native	0–0.9	0–0.1
Indian woodoats	CHLA5	*Chasmanthium latifolium*	Native	–	–
hairy wildrye	ELVI	*Elymus villosus*	Native	–	–
scouringrush horsetail	EQHY	*Equisetum hyemale*	Native	–	–
hop sedge	CALU4	*Carex lupulina*	Native	–	–
squarrose sedge	CASQ2	*Carex squarrosa*	Native	–	–
Forb/Herb					
Canadian woodnettle	LACA3	*Laportea canadensis*	Native	0–0.9	50–95
wingstem	VEAL	*Verbesina alternifolia*	Native	0–0.9	2–5
clustered blacksnakeroot	SAOD	*Sanicula odorata*	Native	0–0.9	1–2
jewelweed	IMCA	*Impatiens capensis*	Native	0–0.9	1–2
Canadian honewort	CRCA9	*Cryptotaenia canadensis*	Native	0–0.9	0–0.1
wild blue phlox	PHDI5	*Phlox divaricata*	Native	0–0.9	0–0.1
white crownbeard	VEVI3	*Verbesina virginica*	Native	0–0.9	0–0.1
common blue violet	VISO	*Viola sororia*	Native	0–0.2	0–0.1

American lopseed	PHLE5	*Phryma leptostachya*	Native	0–0.9	0–0.1
Canadian clearweed	PIPU2	*Pilea pumila*	Native	0–0.9	0–0.1
jumpseed	POVI2	*Polygonum virginianum*	Native	0–0.9	0–0.1
Canadian blacksnakeroot	SACA15	*Sanicula canadensis*	Native	0–0.9	0–0.1
cutleaf coneflower	RULA3	*Rudbeckia laciniata*	Native	0–0.9	0–0.1
evening campion	SINI	*Silene nivea*	Native	–	–
striped cream violet	VIST3	*Viola striata*	Native	–	–
eastern false rue anemone	ENBI	*Enemion biternatum*	Native	–	–
eastern waterleaf	HYVI	*Hydrophyllum virginianum*	Native	–	–
pale touch-me-not	IMPA	*Impatiens pallida*	Native	–	–
Virginia bluebells	MEVI3	*Mertensia virginica*	Native	–	–
Shrub/Subshrub					
coralberry	SYOR	*Symphoricarpos orbiculatus*	Native	0.6–3	2–5
multiflora rose	ROMU	*Rosa multiflora*	Introduced	0.6–3	0–0.1
American bladdernut	STTR	*Staphylea trifolia*	Native	–	–
burningbush	EUAT5	*Euonymus atropurpureus*	Native	–	–
Tree					
common hackberry	CEOC	*Celtis occidentalis*	Native	0.6–9.1	2–50
chinquapin oak	QUMU	*Quercus muehlenbergii*	Native	2.1–9.1	5–10
bitternut hickory	CACO15	*Carya cordiformis*	Native	2.1–9.1	5–10
slippery elm	ULRU	*Ulmus rubra*	Native	0.6–9.1	2–5
Ohio buckeye	AEGL	*Aesculus glabra*	Native	–	–
American hornbeam	CACA18	*Carpinus caroliniana*	Native	–	–
Vine/Liana					
bristly greenbrier	SMTA2	*Smilax tamnoides*	Native	0–0.9	0–0.1
summer grape	VIAE	*Vitis aestivalis*	Native	–	–
eastern poison ivy	TORA2	*Toxicodendron radicans*	Native	–	–
Virginia creeper	PAQU2	*Parthenocissus quinquefolia*	Native	–	–

Animal community

Wildlife (MDC 2006):
This ecological site is a dense, muti-layered forest, with snags and cavities and down dead wood that provides habitat for many species requiring cool, rich, moist conditions.

Bird species associated with these mature forests include Great Blue Heron (colonies especially in large sycamores and cottonwoods), Bald Eagle, Belted Kingfisher, Red-shouldered Hawk, Northern Parula, Louisiana Waterthrush, Wood Duck, Hooded Merganser, Kentucky Warbler, Hooded Warbler, Acadian Flycatcher, Barred Owl, Pileated Woodpecker, Cerulean Warbler, and Yellow-throated Warbler.

Reptiles and amphibians associated with this ecological site include small-mouthed salamander, central newt, midland brown snake, and gray treefrog.

Hydrological functions

Flooding is an important part of the ecological processes in this site. Many areas also have a seasonal high water table, generally associated with the local groundwater and controlled by the stream level.

Other information

Forestry
Management: Site index values range from 70 to 100. Timber management opportunities are good to excellent. Create group openings of at least 2 acres. Large clearcuts should be minimized if possible to reduce impacts on wildlife and aesthetics. Uneven-aged management using single tree selection or group selection cuttings of ½ to 1 acre are other options that can be used if clear cutting is not desired or warranted. Harvest methods that leave some mature trees to provide shade and soil protection may be desirable. Maintain adequate riparian buffer areas.

Site limitations: Wetness from flooding and/or high water table; Use of equipment may be restricted in spring and other excessively wet periods. Equipment use when wet may compact soil and damage tree roots. Tree planting is difficult during spring flooding periods. Seedling mortality may be high due to excess wetness. Ridging the soil and planting on the ridges may increase survival.

Inventory data references

Plot BUHOCA04 – Fatima soil (reference)
Located in Bunch Hollow CA, Carroll County, MO
Latitude: 39.58407
Longitude: -93.60114

Plot CROWSP01 – Fatima soil (reference)
Crowder State Park, Grundy County, MO
Latitude: 40.12368
Longitude: -93.68755

Plot LOLICA01 – Nodaway soil (reference)
Loutre Lick Access, Montgomery County, MO
Latitude: 38.88071
Longitude: -91.58067

PERSP03 – Pershing State Park – Dockery soil (recon - natural levee)
PERSP04 – Pershing State Park – Dockery soil (recon - natural levee)
PERSP05 – Pershing State Park – Dockery soil (recon - natural levee)
MOCRCA01 – Moniteau Creek CA – Nodaway soil (recon - potential reference)
YECRCA02 – Yellow Creek CA – Dockery soil (recon - natural levee)
YECRCA03 – Yellow Creek CA – Dockery soil (recon - natural levee)
PERSP_KS03 – Pershing State Park – Dockery soil (recon)
PERSP_KS05 – Pershing State Park – Dockery soil (recon)
PERSP_KS08 – Pershing State Park – Dockery soil (recon)

Type locality

Location 1: Carroll County, MO	
Township/Range/Section	T55N R24W S9
UTM zone	N
UTM northing	4381767.28
UTM easting	448376.717
Latitude	39° 35′ 2″
Longitude	-93° 36′ 4″
General legal description	Plot BUHOCA04; Bunch Hollow Cons Area; Fatima soil.
Location 2: Grundy County, MO	
Township/Range/Section	T62N R25W S35

UTM zone	N
UTM northing	4441711.16
UTM easting	441416.719
Latitude	40° 7′ 25″
Longitude	-93° 41′ 15″
General legal description	Plot CROWSP01; Crowder State Park; Fatima soil.

Location 3: Montgomery County, MO	
Township/Range/Section	T48N R6W S4
UTM zone	N
UTM northing	4304496.23
UTM easting	623111.074
Latitude	38° 52′ 50″
Longitude	-91° 34′ 50″
General legal description	Plot LOLICA01; Loutre Lick Access; Nodaway soil.

Other references

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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):**

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

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

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

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

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

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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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:**
