USDA Natural Resources Conservation Service

Ecological site F114XB502IN
Wet Till Upland Forest

Last updated: 11/16/2023
Accessed: 05/20/2024

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.

MLRA notes

Major Land Resource Area (MLRA): 114X–Southern Illinois and Indiana Thin Loess and Till Plain

This MLRA is a loess-covered till plain with broad, nearly level summits and steeper slopes in areas. dissected by tributaries of the Ohio and Mississippi Rivers. It is used to produce cash crops, feed grain, and livestock. This MLRA is in Indiana (47 percent), Illinois (38 percent), and Ohio (15 percent) in four separate areas. It makes up about 10,388 square miles (26,904 square kilometers).

This area is in the Till Plains section of the Central Lowland province of the Interior Plains. Well defined valleys with broad flood plains and numerous stream terraces are along the major streams and rivers. The flood plains along the smaller streams are narrow. Broad summits are nearly level or gently sloping. Steep slopes are along rivers and streams. Elevation ranges from 310 feet (90 meters) on the southernmost flood plains to 1,340 feet (410 meters) on the highest ridges. Local relief is mainly 10 to 50 feet (3 to 15 meters) but can be 50 to 100 feet (15 to 30 meters) along drainageways and streams.
The Little Miami River flows through the part of this MLRA in Ohio. The Ohio River flows along the southernmost boundary in some parts of this area in Ohio. The Kaskaskia River flows through the part of this area in Illinois. Tributaries to the Mississippi and Ohio Rivers drain this MLRA.

This area is covered dominantly by loess and Illinoian-age till or outwash. Most of the loess is Late Wisconsin-age Peoria Loess. In some places the Peoria Loess in underlain by Early Wisconsin-age Roxana Silt or by sandier or grittier loess. The loess ranges from 3 to 7 feet (1 or 2 meters) in thickness on stable summits and does not occur on some of the steeper slopes. The underlying Illinoian-age till and outwash commonly contain a paleosol. Meltwater outwash and lacustrine and alluvial deposits are on some of the stream terraces along the major tributaries. The till and outwash are underlain by several bedrock systems. Mississippian and Pennsylvanian bedrock occurs mostly in the western part of the MLRA. Ordovician, Silurian, and Devonian bedrock occurs mostly in the central part. Bedrock outcrops are common on the bluffs along the large rivers and their major tributaries. They also are evident at the base of steep slopes along minor streams and drainageways.

The average annual precipitation ranges from 39 to 47 inches (990 to 1,190 millimeters) with a mean of 42 inches (1,060 millimeters). The annual temperature ranges from 53 to 56 degrees F (11.8 to 13.6 degrees C) with a mean of 55 degrees F (13 degrees C). The freeze-free period ranges from 185 to 215 days with a mean of 200 days.

The dominant soil orders are Alfisols and Entisols. The soils in the area have a mesic soil temperature regime, an aquic or udic soil moisture regime, and mixed or smectitic mineralogy. They are deep or very deep, poorly drained to well drained, and loamy, silty, or clayey. Although limited in extent, some soils have a natric horizon in the part of the MLRA in Illinois. The main soils and their series: Albaqualfs that formed in loess or loess over pedisediment on till plains (Marine series); Endoaqualfs that formed in loess or loess over pedisedimenton till plains (Oconee series); Fluvaquents that formed in alluvium on flood plains (Wakeland series); Fragiudalfs that formed in loess over pedisediment over till (Cincinnati series) and loess over till (Rossmoyne series) on till plains; Glossaqualfs that formed in loess over till on till plains (Avonburg, Clermont, and Cobbsfork series) Hapludalfs that formed in till (Hickory series) and loess over pedisediment (Homen series) on till plains.

The soils on uplands support natural hardwoods. Oak, hickory, beech, and sugar maple are the dominant species. Native grasses grow in some scattered areas between the trees. The soils in low-lying areas support mixed forest vegetation. Pin oak, shingle oak, sweetgum, and black oak are the dominant species on the wetter sites. White oak, black oak, northern red oak, hickory, yellow-poplar, ash, sugar maple, and black walnut grow on the better drained sites. Honey locust is dominant on soils that formed in shaly limestone residuum. Silver maple, eastern cottonwood, American sycamore, pin oak, elm, and sweetgum grow along rivers and streams. Black walnut is abundant on very deep, well drained soils on some small flood plains. Sedge and grass meadows and scattered trees are on some low-lying sites.

Most of this MLRA is in farms and used to produce corn, soybeans, and livestock. Some small grains, including winter wheat, oats, and grain sorghum, also are grown. A small acreage is used for specialty crops, such as popcorn and apple orchards. The grassland supports introduced and native grasses. The forested areas are mainly on steep valley sides and in low-lying parts of flood plains. Surface coal mines make up a small acreage. (USDA, Natural Resources Conservation Service. 2022)

LRU notes

LRU 114XB is in two separate areas in Illinois (66 percent) and Indiana (34 percent). It makes up about 7,005 square miles (18,150 square kilometers). It includes the towns of Brazil, Bloomfield, Cloverdale, and Spencer, Indiana, and Carlyle, Nashville, Hillsboro, Greenville, Vandalia, and Pinckneyville, Illinois. Interstates 55, 64, and 70 cross the part of the MLRA in Illinois. They converge in St. Louis, which is just west of this MLRA. The east edge of the Scott Air Force Base is on the western edge of the area in Illinois.

This area is in the Till Plains Section of the Central Lowland Province of the Interior Plains. Both large and small tributaries of the West Fork of the White River, the Eel River, the Kaskaskia River, and the Little Muddy River dissect the nearly level to very steep uplands. Well defined valleys with broad flood plains and numerous stream terraces are along the major streams and rivers. The flood plains along the smaller streams are narrow. Broad summits are nearly level to gently sloping. Elevation ranges from 350 feet (105 meters) on the southernmost flood plains along the Ohio and Wabash Rivers to 1,190 feet (365 meters) on the highest ridges. Local relief is mainly 10 to 50 feet (3 to 15 meters), but it can be 50 to 100 feet (15 to 30 meters) along drainageways and streams. It generally is low on broad, flat till plains and flood plains and high on the dissected hills bordering rivers or drainage systems.

Classification relationships

Major Land Resource Area (MLRA) (USDA-NRCS, 2022):
114X–Southern Illinois and Indiana Thin Loess and Till Plain

U.S. Forest Service Ecoregions (Cleland et al. 2007):
Domain: Humid Temperate Domain
Division: Hot Continental Division
Province: Eastern Broadleaf Forest (Continental)
Province Code: 222

Ecological site concept

The historic reference plant community had a wide variety of dominant deciduous hardwood trees. Species were those tolerant of seasonally wet soils including swamp white oak green ash, and northern red oak. Sites in Indiana often have pin oak and/or sweetgum present. Understory species on these sites were extremely diverse and varied depending on shade, microtopography and fine soil characteristics.

Today, disturbances such as logging, grazing, oak removal, non-native vegetation and hydrological modifications have created many different forest composition variations. Wetter micro-sites will favor more pin oak, swamp white oak, green ash, bitternut hickory, and maple. Better drained micro-sites will include more mesic species such as northern red oak, bur oak, white ash, and Shumard's oak.

Associated sites

F114XB503IN	**Till Upland Forest** The Till Upland Forest ecological site and the Wet Till Upland Forest ecological site occur on similar landscape positions and are often intermixed. The Till Upland Forest does not have a water table between 0-42 inches, whereas the Wet Till Upland Forest ecological site does.

Similar sites

F114XB403IN	**Wet Outwash Upland Forest** Wet Outwash Upland Forest has a parent material of outwash and occurs on flood plains, stream terraces, terraces and fans, Wet Till Upland Forest ecological sites has a parent material of till and occurs on till plains, and ground moraines.

Table 1. Dominant plant species

Tree	(1) *Quercus* (2) *Fraxinus pennsylvanica*
Shrub	(1) *Cornus* (2) *Asimina triloba*
Herbaceous	(1) *Carex* (2) *Elymus virginicus*

Physiographic features

These sites are found on multiple landforms including till plains, hills, and/or ground moraines.

Table 2. Representative physiographic features

Landforms	(1) Till plain (2) Ground moraine (3) Draw (4) Hillslope (5) Ridge
Runoff class	Low to high
Flooding frequency	None
Ponding frequency	None
Elevation	91–305 m
Slope	0–18%
Water table depth	0–107 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

About 60 percent of the precipitation falls during the freeze-free period. Most of the rainfall occurs as high-intensity, convective thunderstorms during summer. Snowfall is common in winter. The freeze-free period averages about 183 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	146-169 days
Freeze-free period (characteristic range)	175-188 days
Precipitation total (characteristic range)	1,041-1,168 mm
Frost-free period (actual range)	135-169 days

Freeze-free period (actual range)	174-193 days
Precipitation total (actual range)	1,041-1,194 mm
Frost-free period (average)	153 days
Freeze-free period (average)	183 days
Precipitation total (average)	1,118 mm

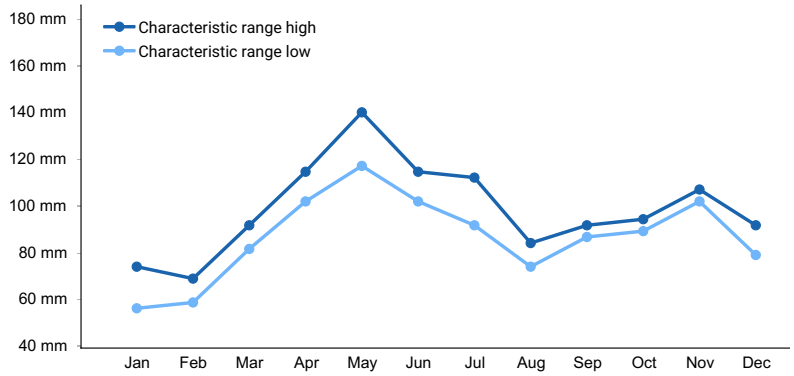


Figure 1. Monthly precipitation range

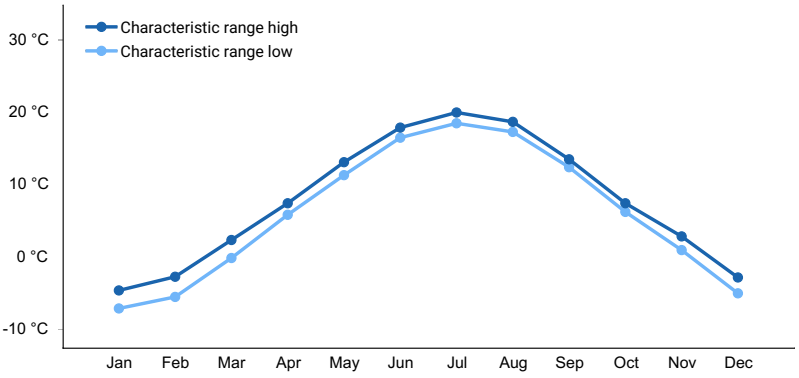


Figure 2. Monthly minimum temperature range

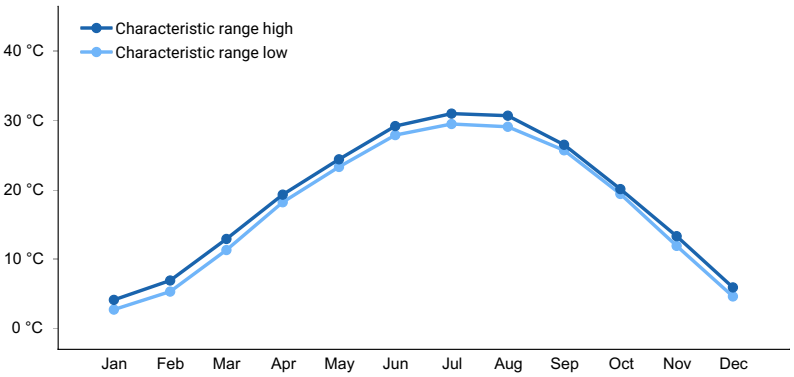


Figure 3. Monthly maximum temperature range

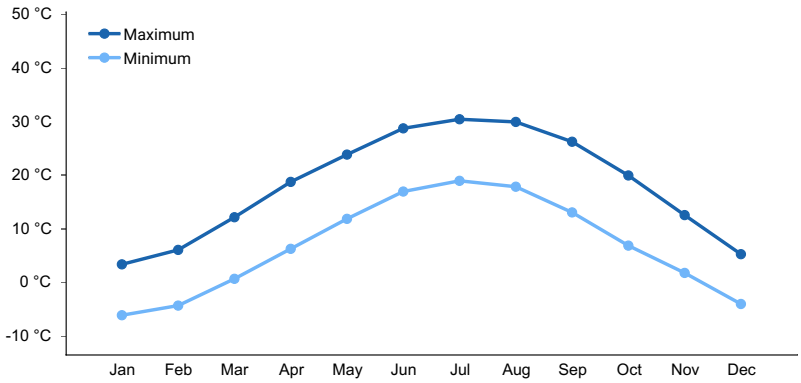


Figure 4. Monthly average minimum and maximum temperature

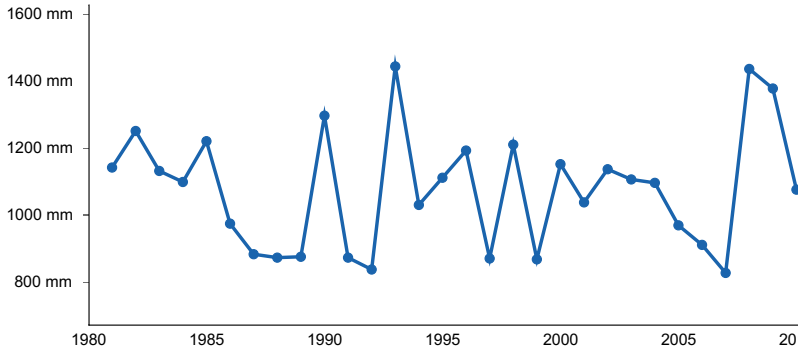


Figure 5. Annual precipitation pattern

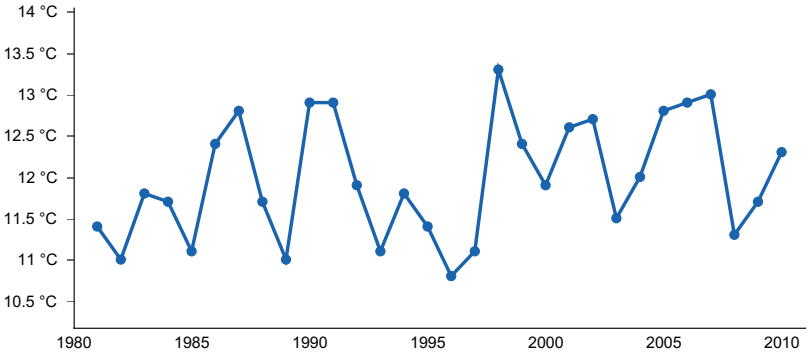


Figure 6. Annual average temperature pattern

Climate stations used

- (1) SHAKAMAK SP [USC00127959], Jasonville, IN
- (2) SPENCER [USC00128290], Spencer, IN
- (3) CARBONDALE SOUTHERN IL AP [USW00093810], De Soto, IL
- (4) WATERLOO [USC00119002], Waterloo, IL
- (5) JERSEYVILLE 2 SW [USC00114489], Jerseyville, IL
- (6) PANA 3E [USC00116579], Pana, IL

Influencing water features

These sites have seasonally high water tables.

Soil features

The soil series associated with this site are: Atlas, Blair, Fishhook, Grantfork, and Vigo. Parent materials is till but can be overlaid by loess, paleosol and/or pedisediment. Altas and Fishhook have restrictive layer (densic material) in the soil from 30 to 61 inches in depth.

Table 4. Representative soil features

Parent material	(1) Till
Surface texture	(1) Silt loam (2) Silty clay loam
Family particle size	(1) Fine (2) Fine-silty
Drainage class	Somewhat poorly drained
Permeability class	Slow to moderate
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0–2%
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)	0–2
Soil reaction (1:1 water) (0-101.6cm)	4.5–7.8
Subsurface fragment volume <=3" (0-101.6cm)	0–6%
Subsurface fragment volume >3" (0-101.6cm)	0–2%

Ecological dynamics

Wet Till Upland reference sites include swamp white oak, bur oak, northern red oak , and green ash. Indiana sites often include sweetgum, pin oak and/or tulip poplar.
Wetter micro-sites will favor more pin oak, swamp white oak, green ash, bitternut hickory, and maple. Better drained micro-sites will include more mesic species such as northern red oak, bur oak, white ash, and Shumard's oak.

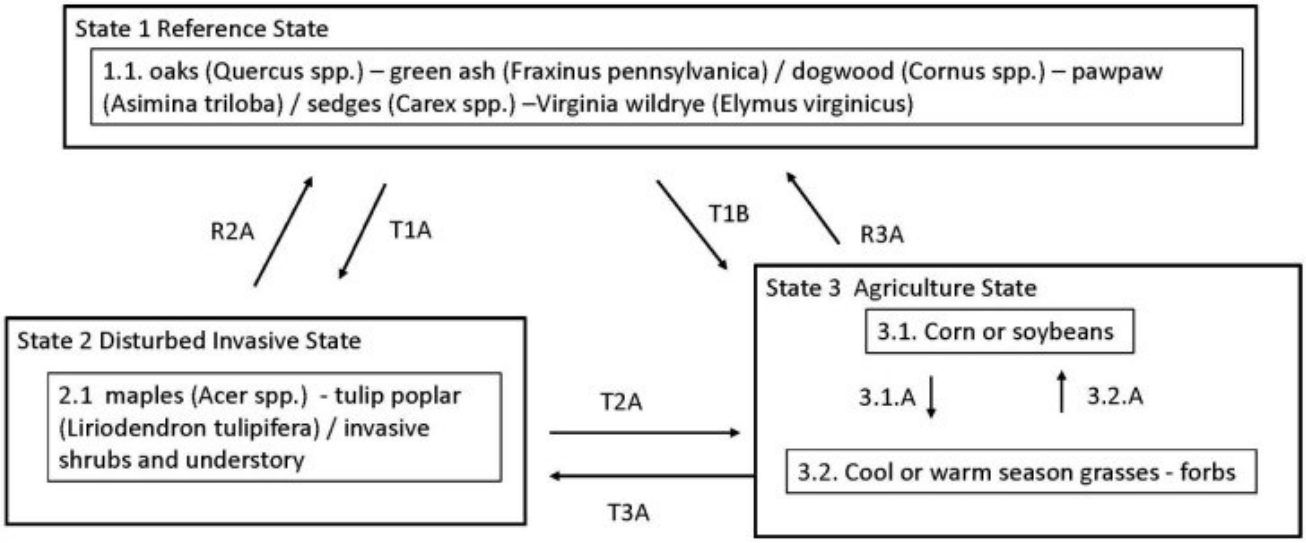
These disturbances will transition this community to a woodland dominated by fast-growing, shade-tolerant species such as maple, ash, poplar, beech, and elm. The resulting dense canopy shade on these sites often results in a more sparse understory community.

Many forest sites in Indiana and Illinois have been invaded by non-native plant species. Many species may be present depending on disturbances and seed sources.

Few high-quality, old-growth communities remain. Agriculture is the largest use of these soils in MLRA 114x.

State and transition model

MLRA 114B -Illinois and Indiana –Wet Till Upland Forest- F114BY502IN



State 1
Reference State

The Wet Till Upland Forest historical reference community is a mature oak hardwood forest. Many soils in this group are mapped in complexes with one to two other soil series. This variation in soils across the landscape will result in subtle to substantial differences in plant communities along a moisture gradient dependent on topography, soil characteristics, and disturbance regimes. Species tolerant of wetter zones include swamp white oak (*Quercus bicolor*), bur oak (*Quercus macrocarpa*), pin oak (*Quercus palustris*), green ash (*Fraxinus pennsylvanica*) and maple (Acer spp.). Species found on slightly higher sites or on soils with slightly better drainage may include northern red oak (*Quercus rubra*), Shumard oak (*Quercus shumardii*), white oak (*Quercus alba*), American elm (*Ulmus americana* L.), ash (Fraxinus spp.), sugar maple (*Acer saccharum*), and common hackberry (*Celtis occidentalis* L.). Understory species on these sites were extremely diverse and varied depending on shade, microtopography, disturbance history, and finer soil characteristics. Few reference sites remain. Today, remaining wooded sites are often dominated by maple and ash. Pin oak and sweetgum are common on many sites in Indiana.

Dominant plant species

- swamp white oak (*Quercus bicolor*), tree
- northern red oak (*Quercus rubra*), tree
- bur oak (*Quercus macrocarpa*), tree
- pin oak (*Quercus palustris*), tree
- dogwood (*Cornus*), shrub
- pawpaw (*Asimina triloba*), shrub
- viburnum (*Viburnum*), shrub
- sedge (*Carex*), grass

Community 1.1
Reference Community

This phase is characterized by a closed canopy dominated by oaks. Multiple species may be present depending on the historic and current disturbance regimes, topography, and drainage. Many soils in this group are mapped complexes with 1-2 other soil series. This will create a mosaic of differing soil characteristic across the landscape along with a mosaic of wet and wet-mesic natural communities. Trees may include northern red oak, bur oak, pin oak, swamp white oak, Shumard oak, green ash, hickories, hackberry, and maples.

Dominant plant species

- swamp white oak (*Quercus bicolor*), tree
- northern red oak (*Quercus rubra*), tree
- pin oak (*Quercus palustris*), tree
- bur oak (*Quercus macrocarpa*), tree
- dogwood (*Cornus*), shrub
- pawpaw (*Asimina triloba*), shrub
- viburnum (*Viburnum*), shrub
- sedge (*Carex*), grass

State 2
Disturbed Invaded State

Many forest sites today have been disturbed and may have had oaks removed through repeated selective harvesting. These sites often have common species of ash (Fraxinus spp.), red maple (*Acer rubrum*), boxelder (*Acer negundo*), silver maple (*Acer saccharinum*), sugar maple (*Acer saccharum*). Sites in Indiana often have sweetgum (*Liquidambar styraciflua*). Various forest composition variations will result due to disturbances such as logging, grazing, oak removal, non-native vegetation, hydrological modifications, etc.

Dominant plant species

- maple (*Acer*), tree
- ash (*Fraxinus*), tree
- sweetgum (*Liquidambar styraciflua*), tree
- cottonwood (*Populus*), tree
- honeysuckle (*Lonicera*), shrub
- blackberry (*Rubus*), shrub
- Nepalese browntop (*Microstegium vimineum*), grass
- garlic mustard (*Alliaria petiolata*), other herbaceous

Community 2.1
Disturbed Invaded Community

Theses sites have incurred disturbances including selective harvest (oak removal), clearing, grazing, recreational uses, development, or absence of natural fire regimes. These disturbances will transition this community to a woodland dominated by fast-growing, shade-tolerant species such as maple, ash, poplar, beech, and elm. The resulting dense canopy shade on these sites often results in a more sparse understory community. Many forest sites in Indiana and Illinois have been invaded by non-native plant species such as garlic mustard (Alliaria petiolate) and Amur bush honeysuckle (*Lonicera maackii*). Other common invasives include creeping Charlie (*Glechoma hederacea*), periwinkle (*Vinca minor*), multiflora rose (*Rosa multiflora*), English ivy (*Hedera helix*), Japanese honeysuckle (*Lonicera japonica*), Burning bush (*Euonymus alatus*) and wintercreeper (*Euonymus fortunei*) Few high-quality, old-growth communities remain. Agriculture is the largest use of these soils in MLRA 114X.

Dominant plant species

- maple (*Acer*), tree
- ash (*Fraxinus*), tree
- cottonwood (*Populus*), tree
- sweetgum (*Liquidambar styraciflua*), tree

- honeysuckle (*Lonicera*), shrub
- blackberry (*Rubus*), shrub
- Nepalese browntop (*Microstegium vimineum*), grass
- garlic mustard (*Alliaria petiolata*), other herbaceous

State 3
Agricultural

This state is characterized by the conversion of the site to agricultural use. Most common practice is a corn and soybean rotation of various types. A small portion of the historic acres are used for forage and pasture. Many crops can be grown on these sites, so species and management practices will depend upon landowner objectives. Sites require hydrology modifications (ditching, tiling) to facilitate crop production. Landowner should be aware of any wetland issues on site prior to agricultural conversion.

Dominant plant species

- tall fescue (*Schedonorus arundinaceus*), grass
- brome (*Bromus*), grass
- Kentucky bluegrass (*Poa pratensis*), grass
- soybean (*Glycine max*), other herbaceous
- corn (*Zea mays*), other herbaceous
- white clover (*Trifolium repens*), other herbaceous
- red clover (*Trifolium pratense*), other herbaceous

Community 3.1
Cropland

This phase is characterized by row crop agriculture of small grains, primarily corn and soybeans. Hydrological modifications (ditching, tiling) may be installed. Landowners should be aware of any potential wetland issues prior to conversion. Species and management will depend upon landowner goals and objectives.

Dominant plant species

- soybean (*Glycine max*), other herbaceous
- corn (*Zea mays*), other herbaceous

Community 3.2
Forage production / Pastureland

This phase is characterized by forage production and/or grazing. Different mixes of, cool season or warm season grasses and forbs, largely clovers, may be grown. Species planted and management inputs will depend upon landowner's production objectives.

Dominant plant species

- tall fescue (*Schedonorus arundinaceus*), grass
- Kentucky bluegrass (*Poa pratensis*), grass
- brome (*Bromus*), grass
- red clover (*Trifolium pratense*), other herbaceous
- white clover (*Trifolium repens*), other herbaceous

Pathway 3.1.A
Community 3.1 to 3.2

Planting of cool or warm season pasture/forage species. Various species and management activities may be utilized depending on goals and objectives.

Pathway 3.2.A

Community 3.2 to 3.1

Planting, either by conventional or no-till methods, of row crop. Management that keeps the site in row crop production. Many different crops can be grown including corn, soybeans, and wheat. Species and management inputs will depend upon landowner objectives. Hydrological modifications may be considered. Landowners should be aware of any wetland issues on site prior to conversion.

Transition T1A
State 1 to 2

Substantial disturbance with no timber stand improvement inputs. This transition often occurs after selective harvesting of higher value trees followed by no management and no long-term control of non-native species.

Transition T1B
State 1 to 3

Clearing of mature high-quality forest for conversion to agricultural production. Landowners should be aware of any potential wetland issues prior to conversion.

Restoration pathway R2A
State 2 to 1

Transition R2A Restoration of site would include planting of oaks and timber stand improvement activities to insure high value trees thrive. Restoration of natural hydrology may be required.

Transition T2A
State 2 to 3

Transition from forest to agricultural state. Activities would be determined by the landowner’s production objectives. Landowners should be aware of and identify wetlands on these sites prior to conversion.

Transition T3A
State 3 to 2

Cropland or pastureland that is abandoned will slowly, but naturally, transition to a mixed deciduous woodland usually dominated by poplar, maple, ash, elm, etc. Species composition will depend on a number of factors including the type and length of disturbance, available seed sources, and the resiliency of the natural community.

Additional community tables

Inventory data references

No field monitoring was conducted as part of this PES development. Future ESD development may result in plant community edits, soil mapunits being added or removed from this grouping, and/or additions or modifications to the narratives, tables, vegetation descriptions and state and transition model.

There are multiple Atlas complex mapunits included in this initial PES group. Atlas soils have a high clay content, so dominant species would have included swamp white oak, bur oak, pin oak, green ash, hackberry, and elm. For further information on Atlas soils refer to “Wet Clayey Till Backslope Woodland” (F113XY912IL) developed in the adjacent MLRA 113.

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Approval

Suzanne Mayne-Kinney, 11/16/2023

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	05/20/2024
Approved by	Suzanne Mayne-Kinney

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:**
