USDA Natural Resources Conservation Service

Ecological site F115XA010IL
Loamy Backslope Terrace

Last updated: 12/30/2024
Accessed: 01/10/2025

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): 115X–Central Mississippi Valley Wooded Slopes

This MLRA is characterized by deeply dissected, loess-covered hills bordering well defined valleys of the Illinois, Mississippi, Missouri, Ohio, and Wabash Rivers and their tributaries. It is used to produce cash crops and livestock. About one-third of the area is forested, mostly on the steeper slopes. This area is in Illinois (50 percent), Missouri (36 percent), Indiana (13 percent), and Iowa (1 percent) in two separate areas. It makes up about 25,084 square miles (64,967 square kilometers).

Most of this area is in the Till Plains section and the Dissected Till Plains section of the Central Lowland province of the Interior Plains. The Springfield-Salem plateaus section of the Ozarks Plateaus province of the Interior Highlands occurs along the Missouri River and the Mississippi River south of the confluence with the Missouri River. The nearly level to very steep uplands are dissected by both large and small tributaries of the Illinois, Mississippi, Missouri, Ohio, and Wabash Rivers. The Ohio River flows along the southernmost boundary of this area in Indiana. 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 undulating. Karst topography is common in some parts along the Missouri and Mississippi Rivers and their tributaries. Well-developed karst areas have hundreds of sinkholes, caves, springs, and losing streams. In the St. Louis area, many of the karst features have been obliterated by urban development.

Elevation ranges from 90 feet (20 meters) on the southernmost flood plains to 1,030 feet (320 meters) on the highest ridges. Local relief is mainly 10 to 50 feet (3 to 15 meters) but can be 50 to 150 feet (15 to 45 meters) in the steep, deeply dissected hills bordering rivers and streams. The bluffs along the major rivers are generally 200 to 350 feet (60 to 105 meters) above the valley floor.

The uplands in this MLRA are covered almost entirely with Peoria Loess. The loess can be more than 7 feet (2 meters) thick on stable summits. On the steeper slopes, it is thin or does not occur. In Illinois, the loess is underlain mostly by Illinoian-age till that commonly contains a paleosol. Pre-Illinoian-age till is in parts of this MLRA in Iowa and Missouri and to a minor extent in the western part of Illinois. Wisconsin-age outwash, alluvial deposits, and sandy eolian material are on some of the stream terraces and on dunes along the major tributaries. The loess and glacial deposits are underlain by several bedrock systems. Pennsylvanian and Mississippian bedrock are the most extensive. To a lesser extent are Silurian, Devonian, Cretaceous, and Ordovician bedrock. Karst areas have formed where limestone is near the surface, mostly in the southern part of the MLRA along the Mississippi River and some of its major tributaries. Bedrock outcrops are common on the bluffs along the Mississippi, Ohio, and Wabash Rivers and their major tributaries and at the base of some steep slopes along minor streams and drainageways.

The annual precipitation ranges from 35 to 49 inches (880 to 1,250 millimeters) with a mean of 41 inches (1,050 millimeters). The annual temperature ranges from 48 to 58 degrees F (8.6 to 14.3 degrees C) with a mean of 54 degrees F (12.3 degrees C). The freeze-free period ranges from 150 to 220 days with a mean of 195 days.

Soils The dominant soil orders are Alfisols and, to a lesser extent, Entisols and Mollisols. 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 shallow to very deep, excessively drained to poorly drained, and loamy, silty, or clayey.

The soils on uplands in this area support natural hardwoods. Oak, hickory, and sugar maple are the dominant species. Big bluestem, little bluestem, and scattered oak and eastern redcedar grow on some sites. The soils on flood plains support mixed forest vegetation, mainly American elm, eastern cottonwood, river birch, green ash, silver maple, sweetgum, American sycamore, pin oak, pecan, and willow. Sedge and grass meadows and scattered trees are on some low-lying sites. (United States Department of Agriculture, Natural Resources Conservation Service, 2022)

LRU notes

Most of this LRU (Land Resource Unit) is in the glaciated Till Plains Section of the Central Lowland Province of the Interior Plains. The southeast corner is in the Highland Rim Section (locally known as the Shawnee Hills Section) of the Interior Low Plateaus Province of the Interior Plains. The nearly level to very steep uplands in this LRU are dissected by both large and small tributaries of the Wabash and Ohio Rivers. 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.

This area is covered almost entirely with Wisconsin loess. The loess can be more than 7 feet (2 meters) thick on stable summits. On the steeper slopes, it is thin or does not occur. The loess throughout the area is underlain dominantly by glacial till. Wisconsin outwash, alluvial deposits, and sandy eolian material are on some of the stream terraces and on dunes along the major tributaries in the area. The loess and glacial drift are underlain by Pennsylvanian-age bedrock. Bedrock outcrops are common in the walls of the valleys along the Wabash and Ohio Rivers and at the base of some steep slopes along minor streams and drainageways.

The dominant soil orders in this LRU are Alfisols, Entisols, Inceptisols, and Mollisols. The soils in the area have a mesic soil temperature regime, a udic or aquic soil moisture regime, and dominantly mixed or smectitic mineralogy. The soils are very deep, poorly drained to excessively drained, and loamy, silty, or clayey. Nearly level Endoaqualfs (Iva series) and Argiaquolls (Ragsdale series) formed in loess on broad upland summits and flats. Nearly level to steep Hapludalfs (Alford, Iona, Muren, Stoy, and Sylvan series) and Fragiudalfs (Hosmer series) formed in loess on uplands. Hapludalfs (Alvin, Bloomfield, and Princeton series) and Argiudolls (Ade series) formed in sandy eolian material in areas of dunes on uplands and stream terraces. Steep and very steep Hapludalfs (Hickory series) formed in Illinoian till along the major streams and dissected upland drainageways. Hapludalfs (Wellston series) formed in siltstone or sandstone residuum on strongly sloping to steep side slopes underlain by bedrock.

The soils in the major stream valleys include Hapludolls (Carmi series), Argiudolls (Elston series), and Hapludalfs (Skelton series), all of which formed in outwash on nearly level to moderately sloping stream terraces and outwash plains. Endoaquolls (Montgomery series), Endoaquepts (Zipp series), Epiaqualfs (McGary series), and Hapludalfs (Shircliff and Markland series) formed in clayey lacustrine sediments on nearly level to strongly sloping lacustrine terraces or lake plains. Endoaquepts (Evansville series), Endoaquolls (Patton series), and Hapludalfs (Henshaw and Uniontown series) formed in silty sediments on terraces and lake plains.

LRU notes (excerpts from Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. USDA Handbook 296, 2006)

Classification relationships

Hierarchical framework relationships
Major Land Resource Area (MLRA) 115X–Central Mississippi Valley Wooded Slopes

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
Section Code: 222G, 222D

International Vegetation Classification Hierarchy
Class: 1. Forest & Woodland
Subclass: 1.B. Temperate & Boreal Forest & Woodland
Formation: 1.B.2. Cool Temperate Forest & Woodland
Division: 1.B.2.Na. Eastern North American Forest & Woodland

Ecological site concept

The historic pre-European settlement vegetation or reference plant community for Loamy Backslope Terrace ecological sites was a mature deciduous forest with a dense tree canopy and a substantial oak component. The understory consisted of shade-tolerant shrubs and a diverse shade-tolerant herbaceous layer. These sites occurred on well-drained and moderately well drained terraces. Most mapunits in this PES group have slopes of 10-25% - although the highest slope is 50%. Sites will exhibit differences in vegetation due to slope, aspect, drainage, and depth to wet layer. The available water capacity of these sites is still high (mostly 7-8 inches).

These sloping sites historically include numerous tree species including northern red oak (*Quercus rubra*), Shumard oak (*Quercus shumardii*), white ash (*Fraxinus americana*), basswood (*Tilia americana*), hickory (Carya spp.), sugar maple (*Acer saccharum*), white oak (*Quercus alba*), black walnut (*Juglans nigra*), white ash (*Fraxinus americana*), and American witchhazel (Hamamelis virginiana). Higher slopes, especially those on south and southwestern aspects, may exhibit more white oak and shagbark hickory.

The native shrub and herbaceous layers varied depending on slope and disturbances. Shrubs on these sites included hazelnut (*Corylus americana*) and northern spicebush (*Lindera benzoin*). The understory was a diverse mix of shade-tolerant native herbaceous species.

Associated sites

F115XA008IL	**Loamy Terrace** Loamy Terrace. These sites are also on terraces, have soils with a loamy texture, and share many similar species.

Similar sites

F115XA008IL	**Loamy Terrace** Loamy Terrace. These sites are also on terraces, have soils with a loamy texture, and share many similar species.

Table 1. Dominant plant species

Tree	(1) *Quercus rubra* (2) *Quercus shumardii var. shumardii*
Shrub	(1) *Corylus americana* (2) *Lindera benzoin*
Herbaceous	(1) *Amphicarpaea bracteata* (2) *Galium*

Physiographic features

These sites are located on various landforms including outwash terraces and outwash plains. Elevation of these sites are generally between 338’ to 820’ and slopes vary from 10-50%. Runoff classes range from medium to high. These sites do not flood or pond. (NASIS, 2020)

Table 2. Representative physiographic features

Landforms	(1) Stream terrace (2) Lake terrace (3) Outwash plain (4) Outwash terrace (5) Terrace
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	334–820 ft
Slope	10–50%
Water table depth	0–30 in
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 in summer. Snowfall is common in winter. The average annual temperature is 53 to 57 degrees F (11 to 14 degrees C). The representative freeze-free period ranges from 192-199 days and the representative frost-free period ranges from 171-179. The following information is based on data taken from 5 NOAA weather stations within MLRA 115X as selected in EDIT.

Table 3. Representative climatic features

Frost-free period (characteristic range)	171-179 days
Freeze-free period (characteristic range)	192-199 days
Precipitation total (characteristic range)	44-47 in
Frost-free period (actual range)	166-180 days
Freeze-free period (actual range)	190-204 days
Precipitation total (actual range)	40-48 in
Frost-free period (average)	175 days
Freeze-free period (average)	196 days
Precipitation total (average)	45 in

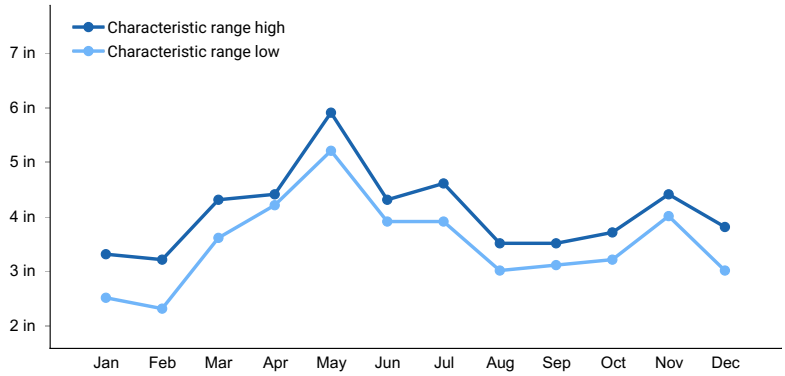


Figure 1. Monthly precipitation range

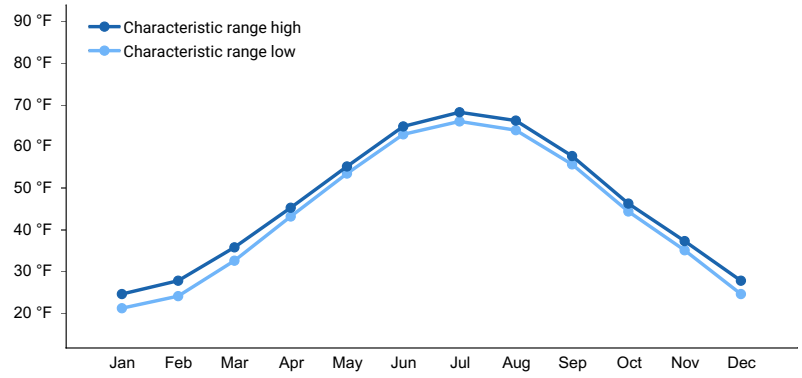


Figure 2. Monthly minimum temperature range

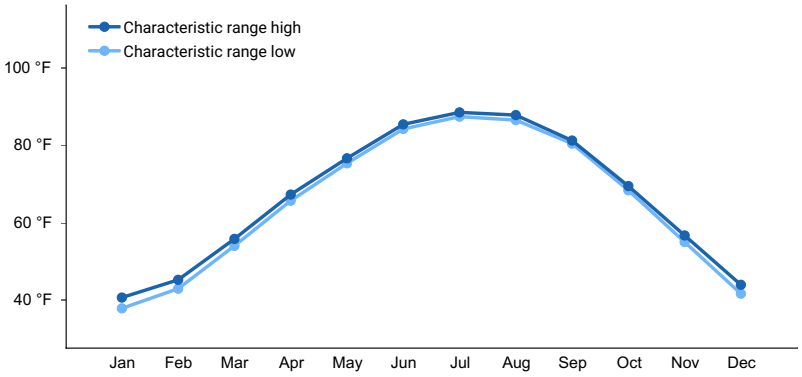


Figure 3. Monthly maximum temperature range

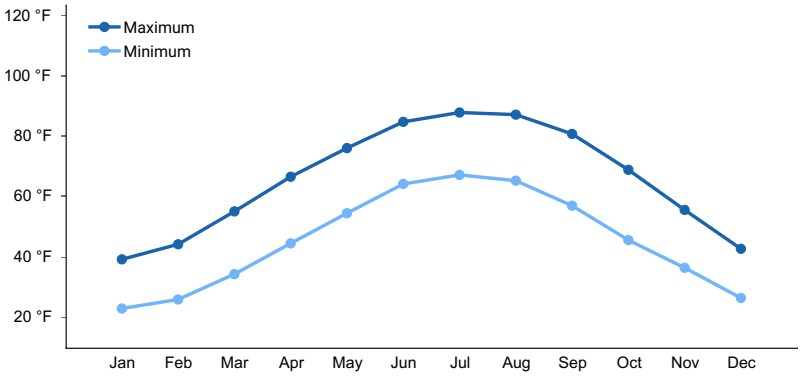


Figure 4. Monthly average minimum and maximum temperature

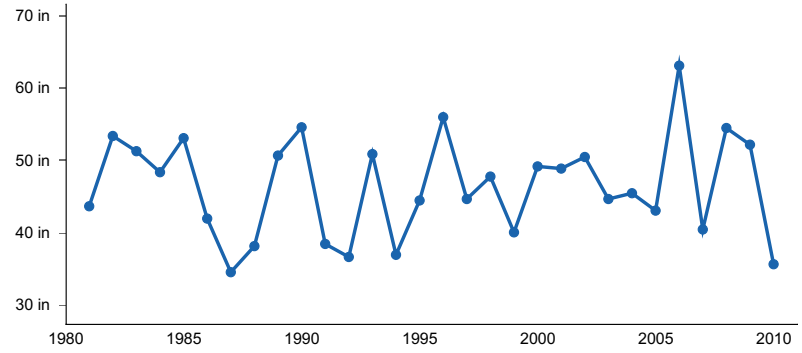


Figure 5. Annual precipitation pattern

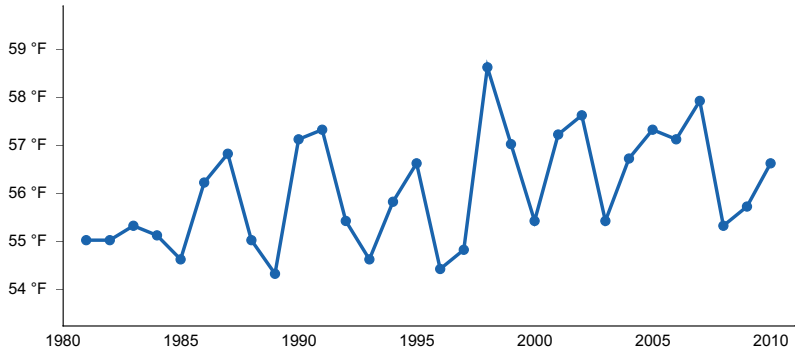


Figure 6. Annual average temperature pattern

Climate stations used

- (1) TERRE HAUTE CAA AP [USW00093823], Terre Haute, IN
- (2) VINCENNES 5 NE [USC00129113], Vincennes, IN
- (3) EVANSVILLE REGIONAL AP [USW00093817], Evansville, IN
- (4) MT VERNON [USC00126001], Uniontown, IN
- (5) PRINCETON 1 W [USC00127125], Princeton, IN

Influencing water features

Loamy Backslope Terrace sites are generally not influenced by riparian water features. Precipitation is the main source of water for vegetation. On these sloping sites, surface runoff water occurs to downslope ecological sites.

Soil features

These sites are very deep, moderately well drained to well drained, with slow to moderately slow permeability. They are formed in older calcareous alluvium from loess or loess and the underlying stratified outwash deposits. Taxonomic classes in this group include fine-loamy, mixed, active, mesic Typic Paleudalfs and fine-silty, mixed, superactive, mesic Oxyaquic Hapludalfs. (NASIS, 2020) Two soil series are included in this PES group: Negley and Uniontown. All mapunits have slopes in excess of 10%.

Table 4. Representative soil features

Parent material	(1) Outwash (2) Lacustrine deposits (3) Lacustrine deposits
Surface texture	(1) Silt loam (2) Loam (3) Stony silty clay loam
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderately slow
Soil depth	60–80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	5–8 in
Electrical conductivity (Depth not specified)	0 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0–5

Soil reaction (1:1 water) (Depth not specified)	4.5–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–4%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This ecological site is located on moderately well drained to well drained soils and are generally located on stream terraces. Sites either do not flood or rarely flood and ponding does not occur. The characteristic ecological community for Loamy Backslope Terrace sites is a deciduous forest with a substantial oak component and a high level of canopy diversity. Sites will exhibit variations in species composition based on drainage, slope, aspect, and water table depth which ranges from 30” to greater than 6 feet.

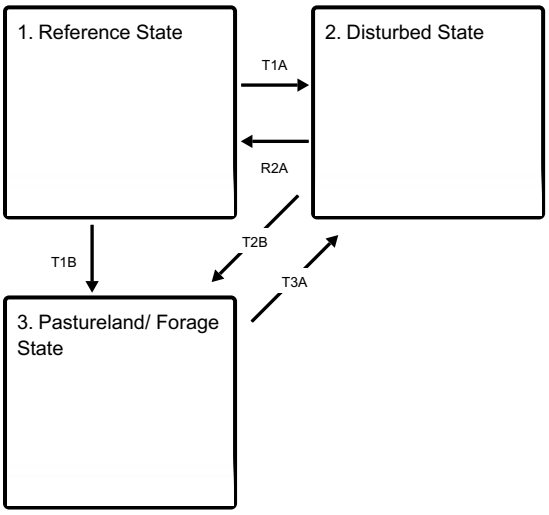
Multiple species of oaks were historically present on these sites, so fire was an influencing factor. Other natural impacts such as drought, wind damage, and ice storms influenced these communities over centuries. Long-term periods of drought, especially if fire occurred in conjunction with a drought, would have influenced the species composition, shrub density, plant mortality, and tree growth rates.

Cleared sites on higher slopes are often grazed; however, management is limited by slope. Landowners should be aware of potential overgrazing impacts such as soil erosion, soil compaction, water quality impacts, and noxious weeds. Invasive non-native vegetation is a serious concern in many remaining wooded areas as bush honeysuckle, euonymus, Japanese honeysuckle, privet, and other non-native plants have been introduced and are increasing without management controls.

A provisional state and transition diagram (STM) is shown in Figure 2. The model is a provisional draft and it is expected to change as field verification occurs.

State and transition model

Ecosystem states



T1A - Large scale disturbance

T1B - Clearing of site; agricultural production - forage

R2A - Restoration inputs such as planting, brush control, prescribed fire, and timber stand improvement.

T2B - Clearing; agricultural production - forage

T3A - Abandonment of agricultural practices

State 1 submodel, plant communities

1.1. Reference community

State 2 submodel, plant communities

2.1. Disturbed community

State 3 submodel, plant communities

3.1. Pastureland/Forage community

State 1
Reference State

This State is characterized by a mature, diverse, deciduous forest with a substantial oak component. These sloping sites historically include numerous tree species including northern red oak (*Quercus rubra*), Shumard oak (*Quercus shumardii*), white ash (*Fraxinus americana*), basswood (*Tilia americana*), hickory (Carya spp.), sugar maple (*Acer saccharum*), white oak (*Quercus alba*), and black walnut (*Juglans nigra*). Higher slopes, especially those on south and southwestern aspects, will exhibit more white oak and shagbark hickory. The native shrub and herbaceous layers varied depending on slope and disturbances. Shrubs on these sites included hazelnut (*Corylus americana*) and northern spicebush (*Lindera benzoin*). The understory was a diverse mix of shade-tolerant native herbaceous species including a number of spring ephemerals. Historically these sites were influenced by wildfires, wind damage, ice storms, and grazing by native mammals. A natural fire regime reduced the number and density of fire-intolerant species on site and encouraged oak regeneration. Maple, ash, and tulip poplar will increase with an absence of fire on these sites. These species will also become dominant if oaks are removed from the site through selective harvest.

Dominant plant species

- northern red oak (*Quercus rubra*), tree
- Shumard oak (*Quercus shumardii var. shumardii*), tree
- hybrid hickory (*Carya*), tree
- sugar maple (*Acer saccharum*), tree
- black walnut (*Juglans nigra*), tree
- pawpaw (*Asimina triloba*), shrub
- dogwood (*Cornus*), shrub
- American hazelnut (*Corylus americana*), shrub
- sedge (*Carex*), grass
- mayapple (*Podophyllum peltatum*), other herbaceous
- bedstraw (*Galium*), other herbaceous

Community 1.1
Reference community

Dominant plant species

- northern red oak (*Quercus rubra*), tree
- Shumard oak (*Quercus shumardii var. shumardii*), tree
- sugar maple (*Acer saccharum*), tree
- hybrid hickory (*Carya*), tree
- black walnut (*Juglans nigra*), tree
- American hazelnut (*Corylus americana*), shrub
- northern spicebush (*Lindera benzoin*), shrub
- sedge (*Carex*), grass
- mayapple (*Podophyllum peltatum*), other herbaceous
- bedstraw (*Galium*), other herbaceous

State 2
Disturbed State

Many of these ecological sites have been altered due to disturbances such as clearing, grazing, selective harvest (i.e. oak removal), and/or an invasion of non-native species. Trees on site, will depending on the type, length and severity of disturbances. Sites that have had a long-term absence of fire will display the following characteristics: an increase in fire -intolerant species, decrease in oak regeneration, an increase in shrub density, an increase in leaf-litter buildup, and an increase in shade-tolerant understory species. Diversity of species may also be reduced, especially if there has been an introduction of non-native species such as bush honeysuckle (*Lonicera maackii*). Many of these sites are eventually transitioned to Pastureland (State 3) or cropland (State 4) on lower slope sites.

Dominant plant species

- sugar maple (*Acer saccharum*), tree
- white ash (*Fraxinus americana*), tree
- tuliptree (*Liriodendron tulipifera*), tree

Community 2.1
Disturbed community

This is a disturbed, successional community that includes a variety of fast-growing trees such as maples and ashes. Other species may include maple, ash, and tuliptree. Shrub and understory species will depend on the type, severity and length of disturbances, available seed sources, and management inputs, if present.

Dominant plant species

- silver maple (*Acer saccharinum*), tree
- tuliptree (*Liriodendron tulipifera*), tree
- white ash (*Fraxinus americana*), tree

State 3
Pastureland/ Forage State

Most Loamy Backslope Terrace sites have been altered due to disturbances. Some sites have also been grazed or had intermittent selective harvest (i.e. oak removal). Trees on site, will depending on the type, length and severity of disturbances. Sites that have had a long-term absence of fire will display the following characteristics: an increase in fire -intolerant species, decrease in oak regeneration, an increase in shrub density, an increase in leaf-litter buildup, and an increase in shade-tolerant understory species. Diversity of species may also be reduced, especially if there has been an introduction of non-native species such as bush honeysuckle (*Lonicera maackii*).

Dominant plant species

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

Community 3.1
Pastureland/Forage community

Some of these sites are not appropriate for agricultural production due to slope and associated risks of soil erosion and water quality degradation. On sites that have lower slopes, managed grazing may be an appropriate use. These sites are managed for forage production and often include tall fescue (*Schedonorus arundinaceus*), brome (Bromus spp.), white clover (*Trifolium repens*) and red clover (*Trifolium pratense*). Selection of species will depend on the landowner's objectives.

Dominant plant species

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

Transition T1A
State 1 to 2

Severe disturbances, such as clearing or selective harvesting (oak/hickory removal) , will transition this site to State 2.

Transition T1B
State 1 to 3

Site is transitioned to an agricultural site focused on forage production. Management inputs would include clearing, site preparation, seeding and weed/brush control.

Restoration pathway R2A
State 2 to 1

Restoration would require long-term management inputs including planting of desired species, weed control, brush control, timber stand improvement, and prescribed fire.

Transition T2B
State 2 to 3

Site is cleared and forage/pasture production is initiated. Management inputs would include tree/shrub removal, site preparation, seeding, and weed/brush control.

Transition T3A
State 3 to 2

Site is abandoned and slowly would transition to a wooded state dominated by deciduous trees. Species on site would depend on the severity and length of disturbance and available seed sources.

Additional community tables

Inventory data references

A Provisional Ecological Site Description (PESD) describes ecological potential and ecosystem dynamics of land areas and their potential management. Ecological sites are linked to soil survey map unit components, which allows for mapping of ecological sites. A PESD with a provisional status represents the lowest tier of documentation that is releasable to the public. No field level data have been collected as part of this PESD. It is expected that a PESD will continue to be refined through field verification and field sampling.

Reference and alternative state concepts, including the state-and-transition model and vegetative communities are

not yet well-documented and will require field sampling for verification.

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Approval

Suzanne Mayne-Kinney, 12/30/2024

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	01/10/2025
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:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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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:**
