USDA Natural Resources Conservation Service

Ecological site F115XA011IL
Wet Loamy Terrace

Last updated: 12/30/2024
Accessed: 01/07/2025

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

Ecological site concept

The historic pre-European settlement vegetation or reference plant community for Wet Loamy Terrace ecological site was a mature deciduous forest with a dense tree canopy. This wet hardwood forest community is found in LRU 115XA along rivers, streams, and swamps. Sites generally have an oak component unless frequent, long-term flooding occurs. Species may include pin oak (*Q. palustris*), swamp chestnut oak (*Quercus michauxii*), and swamp white oak (*Q. bicolor*). In the most southern counties of LRU 115XA, cherrybark oak (Q. pagoda) may be present. Other tree species include hickories (Carya spp.), eastern cottonwood (*Populus deltoides*), green ash (*Fraxinus pennsylvanica*), red maple (Acer rubrum), elms (Ulmus spp.), and sweetgum (*Liquidambar styraciflua*).

The understory consists of shade-tolerant shrubs and a diverse shade-tolerant herbaceous layer. These sites occurred on somewhat poorly drained to poorly drained terraces with slopes generally less than 5%, so sites are not substantially influenced by slope or aspect.

Sedges (Carex spp.) and wet tolerant forbs and grases are prominent in the herbaceous layer. Common vine species include graybark grape (*Vitis cinerea*l), riverbank grape (*Vitis riparia*), trumpet creeper (*Campsis radicans*), and eastern poison ivy (*Toxicodendron radicans*). Historically, these communities were influenced by fire, drought, windstorms, ice storms, and ungulate grazing. (LANDFIRE, NatureServe, 2020)

Today, anthropogenic disturbances such as oak removal, invasive species, and agriculture uses have modified most sites. Remaining woodlands have usually incurred repeated disturbances and may exhibit an increased density of silver and red maples, green ash, poplar, boxelder, and non-native plant species.

Associated sites

F115XA008IL	**Loamy Terrace** Loamy Terrace. These sites are located on terraces. Soils are moderately well drained to well drained.
F115XA015IL	**Loamy Floodplain** Loamy Floodplain. These sites are located on floodplains and are moderately well to well drained.

Similar sites

F115XA007IL	**Wet Clayey Terrace** Wet Clayey Terrace. These sites are also on terraces and are also somewhat poorly drained to poorly drained. Soils are clayey in texture.

Table 1. Dominant plant species

Tree	(1) *Quercus palustris* (2) *Quercus bicolor*
Shrub	(1) *Cornus* (2) *Salix*
Herbaceous	(1) *Carex* (2) *Boehmeria cylindrica*

Physiographic features

These sites are located on various landforms including stream terraces, lake terrace, lakeplains, floodplain step, lake plain depression, and/or stream terrace depression. Elevation of these sites are between 328’ to 1017’ and slopes vary from 0-5%. Runoff class is negligible to slow. Flooding and ponding range from none to frequent. Sites may be influenced by a seasonal high-water table. (NASIS, 2020)

Table 2. Representative physiographic features

Landforms	(1) Stream terrace (2) Terrace (3) Lake plain (4) Flood-plain step (5) Depression
Runoff class	Negligible to low
Flooding frequency	None to frequent
Ponding frequency	None to frequent
Elevation	328–1,017 ft
Slope	0–5%
Water table depth	0–24 in
Aspect	Aspect is not a significant factor

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 representative freeze-free period ranges from 192-199 days and the representative frost free period ranges from 171-179 days. The following information is based on data taken from 5 NOAA weather stations within MLRA 115X as provided in EDIT.

Table 3. Representative climatic features

Frost-free period (characteristic range)	165-179 days
Freeze-free period (characteristic range)	188-206 days
Precipitation total (characteristic range)	45-46 in
Frost-free period (actual range)	164-180 days
Freeze-free period (actual range)	186-206 days
Precipitation total (actual range)	41-47 in
Frost-free period (average)	173 days
Freeze-free period (average)	196 days
Precipitation total (average)	45 in

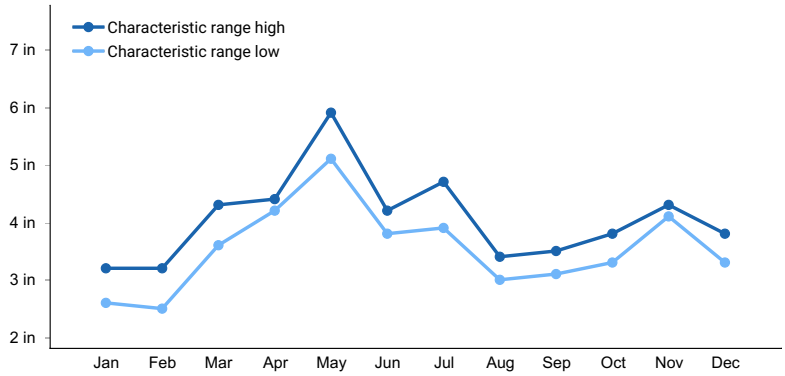


Figure 1. Monthly precipitation range

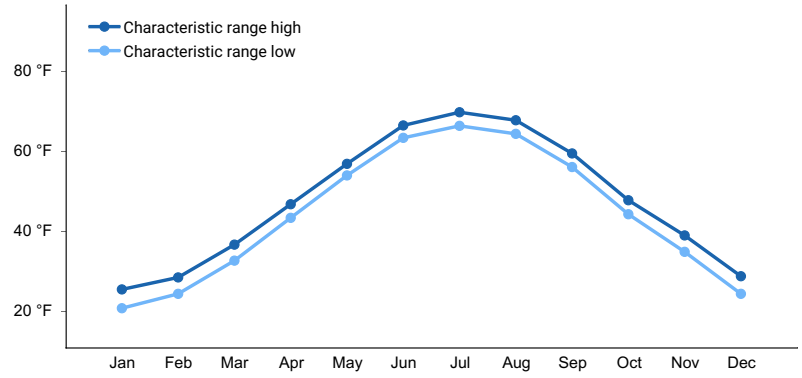


Figure 2. Monthly minimum temperature range

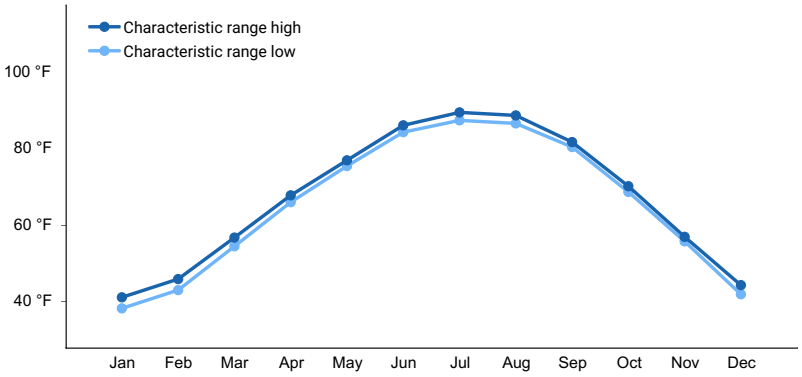


Figure 3. Monthly maximum temperature range

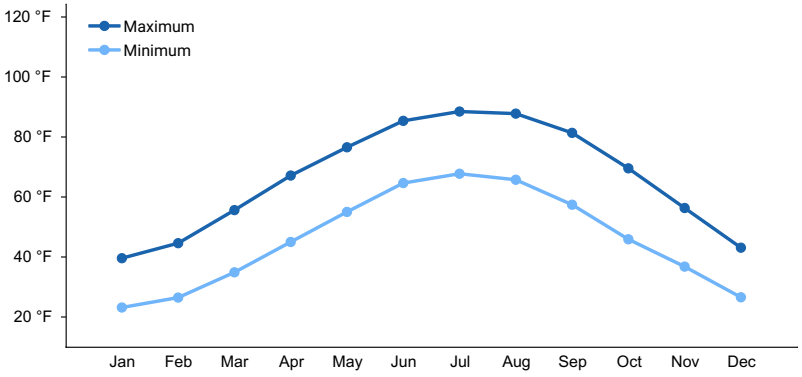


Figure 4. Monthly average minimum and maximum temperature

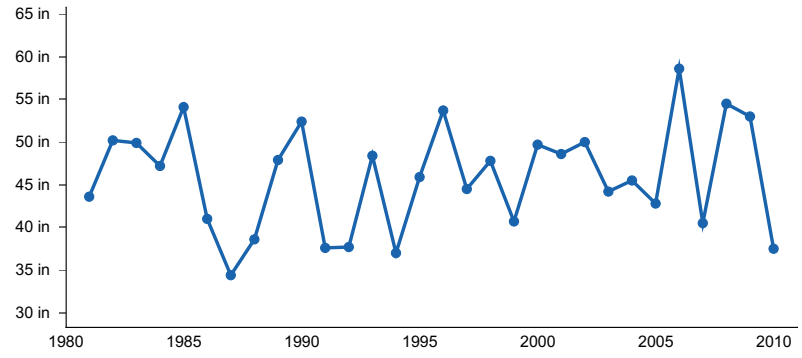


Figure 5. Annual precipitation pattern

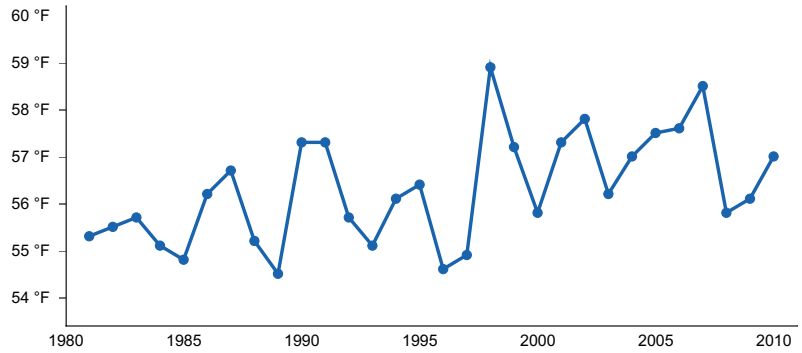


Figure 6. Annual average temperature pattern

Climate stations used

- (1) EVANSVILLE REGIONAL AP [USW00093817], Evansville, IN
- (2) MT VERNON [USC00126001], Uniontown, IN
- (3) VINCENNES 5 NE [USC00129113], Vincennes, IN
- (4) TERRE HAUTE CAA AP [USW00093823], Terre Haute, IN
- (5) HUTSONVILLE PWR PLT [USC00114317], Fairbanks, IL
- (6) MT CARMEL [USC00115888], Mount Carmel, IL
- (7) GRAYVILLE [USC00113612], Mount Carmel, IL
- (8) EVANSVILLE MUSEUM [USC00122731], Henderson, IN

Influencing water features

Wet Loamy Terrace sites are frequently influenced by riparian water features. Ponding may occur and a seasonally high groundwater level is characteristic of these sites. Flooding ranges from non to frequent. Precipitation is the main source of water for vegetation. Wet Loamy Terrace sites are generally located on convex or flat topography.

Soil features

The site concept is very deep soils, poorly drained to somewhat poorly drained, with a permeability ranging from very slow to moderately slow. Runoff ranges from negligible to medium. Parent materials include alluvium, outwash, glaciolacustrine deposits, silty material and loess, silty sediments, and/or lacustrine deposits. Wet layer depths range from 0” – 24”. (NASIS, 2020)

Series included in this initial PES grouping include Crawleyville, Evansville, Harco, Henshaw, Marissa, New Haven, Patton, Ragsdale, Ruark, Springerton, and Vincennes.

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Loess (3) Outwash (4) Glaciolacustrine deposits
Surface texture	(1) Loam (2) Silt loam (3) Silty clay loam
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Very 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)	6–9 in
Calcium carbonate equivalent (Depth not specified)	0–30%
Electrical conductivity (Depth not specified)	0 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0
Soil reaction (1:1 water) (Depth not specified)	4.5–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Vegetative community species, structure and density is regulated by the frequency, duration and depth of flooding, moisture availability, seasonal high water table depth, and soil physical properties which will vary from site to site and from year to year. Most of the sites included in this group have no or rare flooding and ponding; however, many sites have a seasonal high water table. Those sites that have frequent flooding and/or ponding will exhibit different community structure and composition, especially in the understory stratum. These sites will exhibit a continuum of wet, wet-mesic, and mesic species depending on landscape position.

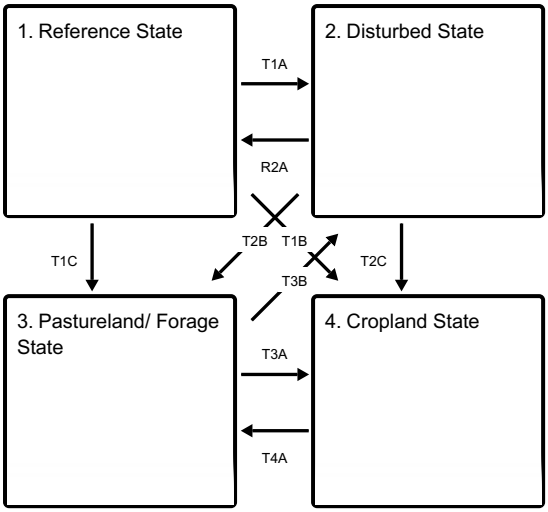
The Wet Loamy Terrace reference site was historically a mature, mixed, deciduous forest that included wet-tolerant oaks and hickories. On convex or flat, poorly drained sites, pin oak, swamp white oak, and swamp chestnut oak may be present. Cherrybark oak may be present in only the southern most part of LRU 115XA. The lowest terrace sites with more frequent flooding would be characterized by a reduction of oaks and an increase in cottonwood, silver maple, elm, boxelder, and willows. The diverse, native understory would have included wet-tolerant sedges and forbs.

Historically, fire played a role in the maintenance of these systems, especially during dry periods. Periodic, low-severity fires kept woodlands open, removed the litter, and stimulated the understory growth. During longer periods without fire, woody brush and understory species will increase and the herbaceous understory will diminish due to competition and shade. The return of fire would open the woodlands up again and stimulate an increase in density and diversity of ground flora species

Today, most of these ecological sites have been cleared, drained and converted to pastureland or cropland. 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.

State and transition model

Ecosystem states



T1A - Large scale disturbance

T1C - Clearing of site; agricultural production for forage

T1B - Clearing of site; agricultural production of row crops.

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

T2B - Clearing; agricultural production of forage

T2C - Clearing; agricultural production of row crops

T3B - Abandonment of agricultural practices

T3A - Site preparation and tillage, seeding, weed control, cropland management

T4A - Transition site to forage production; seeding; weed/brush control; pasture management

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 4 submodel, plant communities

4.1. Cropland community

State 1
Reference State

This wet hardwood forest community is found in LRU 115XA along rivers, streams, and swamps. Sites generally have an oak component unless frequent, long-term flooding occurs. Species may include pin oak (*Q. palustris*), swamp chestnut oak (*Quercus michauxii*), and swamp white oak (*Q. bicolor*). Other tree species include hickories (Carya spp.), eastern cottonwood (*Populus deltoides*), green ash (*Fraxinus pennsylvanica*), maple (Acer spp.), elms (Ulmus spp.), and sweetgum (*Liquidambar styraciflua*). The understory consists of shade-tolerant shrubs and a diverse shade-tolerant herbaceous layer. Willows (Salix spp.), roughleaf dogwood (*Cornus drummondii*) and possumhaw (*Ilex decidua*) are common shrubs. These sites occurred on somewhat poorly drained to poorly drained terraces with slopes generally less than 5%, so sites are not substantially influenced by slope or aspect. Sedges (Carex spp.) and wet tolerant forbs and grasses are prominent in the herbaceous layer. Common vine species include graybark grape (*Vitis cinerea*l), riverbank grape (*Vitis riparia*), trumpet creeper (*Campsis radicans*), and eastern poison ivy (*Toxicodendron radicans*). Historically, these communities were influenced by fire, drought, windstorms, ice storms, and ungulate grazing. (LANDFIRE, NatureServe, 2020)

Dominant plant species

- pin oak (*Quercus palustris*), tree
- swamp white oak (*Quercus bicolor*), tree
- dogwood (*Cornus*), shrub
- willow (*Salix*), shrub
- sedge (*Carex*), grass
- smallspike false nettle (*Boehmeria cylindrica*), other herbaceous

Community 1.1
Reference community

The Wet Loamy Terrace reference site was historically a mature, mixed, deciduous forest that often include wet-tolerant oaks and hickories. On convex or flat, poorly drained sites, pin oak, swamp white oak, and swamp chestnut oak may be present. The lowest terrace sites with more frequent flooding would be characterized by a reduction of oaks and an increase in silver maple, elm, boxelder, and willows. The diverse, native understory would have included wet-tolerant sedges and forbs. These sites will show a mosaic of species based on the frequency, duration and depth of flooding, moisture availability, seasonal highwater table depth, and soil physical properties which will vary from site to site and from year to year.

Dominant plant species

- pin oak (*Quercus palustris*), tree
- swamp white oak (*Quercus bicolor*), tree
- dogwood (*Cornus*), shrub
- willow (*Salix*), shrub
- sedge (*Carex*), grass
- smallspike false nettle (*Boehmeria cylindrica*), other herbaceous

State 2
Disturbed State

Most Wet Loamy Terrace sites have been altered due to disturbances including previous clearing and hydrological modifications. Some sites have been grazed or had intermittent selective harvest (i.e. oak removal). Trees on site

will depending on the type, length, and severity of disturbances and if natural hydrological processes are still in place. Diversity of species may also be reduced, especially if there has been an introduction of non-native species.

Dominant plant species

- maple (*Acer*), tree
- cottonwood (*Populus*), tree
- ash (*Fraxinus*), tree
- willow (*Salix*), shrub
- dogwood (*Cornus*), shrub
- sedge (*Carex*), grass

Community 2.1
Disturbed community

These ecological sites are characterized by large-scale disturbances. Site may have been cleared, drained, selectively logged, or previously converted to pastureland. Species on site will vary depending on the type and severity of disturbance. Invasive non-native vegetation is a serious concern in many remaining wooded area

Dominant plant species

- maple (*Acer*), tree
- ash (*Fraxinus*), tree
- cottonwood (*Populus*), tree
- willow (*Salix*), shrub
- dogwood (*Cornus*), shrub
- sedge (*Carex*), grass

State 3
Pastureland/ Forage State

A portion of these sites have been converted to pastureland or forage production. Species selection will depend upon the objectives and goals of the landowner; however, commonly planted grasses include tall fescue (*Schedonorus arundinaceus*), brome (Bromus spp.), white clover (*Trifolium repens*) and red clover (*Trifolium pratense*). Species health and productivity are determined by the management and long-term overgrazing on some sites has caused soil erosion and compaction. Hydrological modification such as ditching may be present on some sites.

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

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. Tiling or ditching may be installed to improve drainage.

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

State 4
Cropland State

Hydrological modifications such as ditching and tiling are often used on these sites to increase crop production. Common crops include corn (*Zea mays*), soybeans (*Glycine max*), and occasionally winter wheat (*Triticum aestivum*). Some landowners choose to convert sites to cool season grasses for a period before resuming cropland production. A return to the historical Reference State from State 4 is unlikely, if not impossible.

Dominant plant species

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

Community 4.1
Cropland community

This community is characterized by the management and production of row crop agriculture. Common species include corn, soybean and wheat. Many other crops are suitable for these sites, and species selection will depend upon the landowners goals and objectives.

Dominant plant species

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

Transition T1A
State 1 to 2

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

Transition T1C
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. Hydrological modifications such as ditching and/or tiling may be installed to facilitate improved drainage.

Transition T1B
State 1 to 4

Site is transitioned to an agricultural site focused on row crop production. Management inputs would include clearing, site preparation, seeding and weed control. Hydrological modifications such as ditching and tiling are usually installed to facilitate drainage.

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 restoration of any hydrological modifications.

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. Tiling or ditching may be installed to improve drainage on these sites.

Transition T2C

State 2 to 4

Site is cleared and row crop production is initiated. Management inputs would include tree/shrub removal, site preparation, seeding, and weed control. Ditching and tiling is often installed to improve drainage.

Transition T3B
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 type, severity, and length of disturbance and available seed sources. Any hydrological modifications on site will also influence the plant community composition.

Transition T3A
State 3 to 4

Management inputs that transition a site from pasture or forage production to a site that is utilized for row crop production.

Transition T4A
State 4 to 3

Management inputs to transition a site from cropland production to a state of pasture/forage production.

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.

Other references

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.

Braun, E. Lucy. 2001. Deciduous forests of eastern North America. Caldwell, N.J.: Blackburn Press.

Cleland, D. T., J. A. Freeouf, J. E. Keys, G. J. Nowacki, C. Carpenter, and W. H. McNab. 2007. Ecological Subregions: Sections and Subsections of the Coterminous United States. USDA Forest Service, General Technical Report WO-76. Washington, DC. 92 pp.

Comer P. J., Faber-Langendoen D, Evans R, Gawler S. C, Josse C, Kittel G, Menard S, Pyne M, Reid M, Schulz K, Snow K, and Teague J. 2003. Ecological Systems of the United States: A Working Classification of U.S. Terrestrial Systems. NatureServe, Arlington, Virginia.

Cowardin, L.M., V. Carter, F. C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep water habitats of the United States. U.S. Dept. of Interior, Fish & Wildlife Service, Office of Biological Services, Washington DC. FWS/OBS-79/31. 142 pp.

Homoya, M. A., Abrell, D. B., Aldrich, J. R., & Post, T. W. (1985). The Natural Regions of Indiana. Indiana Academy of Science, 94, 245-269

Jackson, Marion T. 1997. The Natural heritage of Indiana. Bloomington: Indiana University Press, published in association with the Indiana Department of Natural Resources and the Indiana Academy of Science.

LANDFIRE (Landfire National Vegetation Dynamics Database). 2009. Landfire National Vegetation Dynamics Models. Landfire Project, USDA Forest Service, U.S. Department of Interior. (http://www.LANDFIRE.gov/index.php: accessed 2020).

Mohlenbrock, R. H. and D. M. Ladd. 1978. Distribution of Illinois Vascular Plants. Southern Illinois Univ. Press, Carbondale and Edwardsville, Ill. 282 pp.

Mohlenbrock, R. H. 2003. Vascular Flora of Illinois, 3rd edition. Carbondale, Illinois: Southern Illinois University Press. 736 pp.

National Cooperative Soil Survey (NCSS). National Cooperative Soil Characterization Database. Available online: https://ncsslabdatamart.sc.egov.usda.gov/. Accessed: 2020.

NatureServe. 2018. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Association Detail Report: CEGL002427) (Accessed: 2020)

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey (SSS NRCS WSS). Available online at the following link: https://websoilsurvey.sc.egov.usda.gov/. Accessed 2020.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Official Soil Series Descriptions (SSS NRCS OSD). Available online. Accessed 2020. https://soilseries.sc.egov.usda.gov/osdname.aspx

United States Department of Agriculture, Natural Resources Conservation Service (USDA – NRCS). 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. USDA Handbook 296. 682 pp.

United States Department of Agriculture, Natural Resources Conservation Service. 2022. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture, Agriculture Handbook 296.

USDA, NRCS. 2018. The PLANTS Database (http://plants.usda.gov, 1 March 2018). National Plant Data Team, Greensboro, NC 27401-4901 USA.

Voigt, J. W., and R. H. Mohlenbrock. 1964. Plant communities of southern Illinois. Southern Illinois University Press, Carbondale. 202 pp.

Whitaker, John O., Charles J. Amlaner, Marion T. Jackson, George R. Parker, and Peter Evans Scott. 2012. Habitats and ecological communities of Indiana presettlement to present. Bloomington: Indiana University Press.

Contributors

Anita Arends, Ecological Site Specialist, USDA-NRCS, Illinois
Ralph Tucker, Soil Survey Office Leader, USDA-NRCS, Missouri
Dena Anderson, Resource Soil Scientist, USDA-NRCS, Indiana
Zack Weber, Soil Scientist, USDA-NRCS, Illinois

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	01/07/2025
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:**

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:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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:**

17. **Perennial plant reproductive capability:**