

## Ecological site R111XD007IN Till Depression Prairie

Last updated: 5/28/2020  
Accessed: 05/16/2024

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### 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): 111X—Indiana and Ohio Till Plain

A PROVISIONAL ECOLOGICAL SITE is a conceptual grouping of soil map unit components within a Major Land Resource Area (MLRA) based on the similarities in response to management. Although there may be wide variability in the productivity of the soils grouped into a Provisional Site, the soil vegetation interactions as expressed in the State and Transition Model are similar and the management actions required to achieve objectives, whether maintaining the existing ecological state or managing for an alternative state, are similar. Provisional Sites are likely to be refined into more precise group during the process of meeting the APPROVED ECOLOGICAL SITE DESCRIPTION criteria.

This PROVISIONAL ECOLOGICAL SITE has been developed to meet the standards established in the National Ecological Site Handbook. The information associated with this ecological site does not meet the Approved Ecological Site Description Standard, but it has been through a Quality Control and Quality Assurance processes to assure consistency and completeness. Further investigations, reviews and correlations are necessary before it becomes an Approved Ecological Site Description.

111D – Indiana and Ohio Till Plain, Western Part. This MLRA occurs in two separate areas. One area is in the west-central part of Indiana (73 percent), and the other is in southwestern Ohio (27 percent). The MLRA makes up 5,355 square miles (13,880 square kilometers). It includes the towns of Crawfordville, Delphi, Frankfort, Lafayette, and Liberty, Indiana, and Hamilton, Lebanon, Middletown, and Wilmington, Ohio. Interstates 65 and 74 cross the part of this area in Indiana, and Interstates 71 and 75 cross the part in Ohio. Shades and Turkey Run State Parks are in the part in Indiana, and Caesar Creek and Hueston Woods State Parks are in the part in Ohio. A small portion of the Wright-Patterson Air Force Base, in Ohio, is in the northern part of the area.

This area is in the Till Plains Section of the Central Lowland Province of the Interior Plains. It is dominated by loess hills and flats that are broken in places by moraines, kames, outwash plains, and stream terraces. Narrow, shallow valleys commonly are along the few large streams in the area. Elevation ranges from 530 to 1,050 feet (160 to 320 meters), increasing gradually from southwest to northeast. Relief is mainly a few meters, but in some areas hills rise as much as 100 feet (30 meters) above the adjoining plains.

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Wabash (0512), 68 percent; Great Miami (0508), 15 percent; Middle Ohio (0509), 14 percent; Scioto (0506), 2 percent; and Upper Illinois (0712), 1 percent. Wildcat Creek in Indiana and the Little Miami River in Ohio have been designated as National Wild and Scenic Rivers. Sugar Creek and Walnut Creek occur in the part of the area in northern Indiana, and the Whitewater River is in the part in southeastern Indiana. The Sevenmile, Fourmile, and Great Miami Rivers cross the part of the area in Ohio.

Most of the eastern part of this MLRA is underlain by Late Ordovician shale and limestone. The western part is underlain by shale, siltstone, sandstone, limestone, and dolostone ranging in age from Middle Pennsylvanian to Silurian. Surficial materials include glacial deposits of till, outwash, and lacustrine sediments from Wisconsin and

older glacial periods. A thin or moderately thick mantle of loess overlies much of the area.

## **Classification relationships**

Major Land Resource Area (USDA-Natural Resources Conservation Service, 2006)

USFS Ecological Regions (USDA, 2007):

Sections –Central Till Plains, Beech Maple (222H), Interior Low Plateau-Shawnee Hills (223D), Interior Low Plateau-Bluegrass (223F), Central Till Plains-Oak Hickory (223G), Central Till Plains and Grand Prairies (251D)

Subsections -Bluffton Till Plains (222Ha), Miami-Scioto Plain-Tipton Till Plain (222Hb), Little Miami Old Drift Plain (222Hc), Mad River Interlobate Plains (222Hd), Crawford Uplands (223De), Crawford Escarpment (223Df), Northern Bluegrass (223Fd), Lower Wabash Alluvial Plain (223Gc), Southwest Indiana Glaciated Lowlands (223Ge), Eastern Grand Prairie (253Dd).

NatureServe Systems anticipated (NatureServe, 2011): Agriculture - Cultivated Crops and Irrigated Agriculture, Agriculture - Pasture/Hay, Allegheny-Cumberland Dry Oak Forest and Woodland, Central Interior Acidic Cliff and Talus, Central Interior Highlands Calcareous Glade and Barrens, Central Tallgrass Prairie, Clearcut - Grassland/Herbaceous, Introduced Upland Vegetation – Treed, Managed Tree Plantation, Mississippi River Riparian Forest, North-Central Interior and Appalachian Acidic Peatland, North-Central Interior Beech-Maple Forest, North-Central Interior Dry-Mesic Oak Forest and Woodland, North-Central Interior Dry Oak Forest and Woodland, North-Central Interior Floodplain, North-Central Interior Freshwater Marsh, North-Central Interior Maple-Basswood Forest, North-Central Interior Oak Savanna, North-Central Interior Wet Flatwoods, North-Central Interior Wet Meadow-Shrub Swamp, North-Central Oak Barrens, Northern Atlantic Coastal Plain Hardwood Forest, Ruderal Forest, Ruderal Upland - Old Field, South-Central Interior / Upper Coastal Plain Wet Flatwoods, South-Central Interior Large Floodplain, South-Central Interior Mesophytic Forest, South-Central Interior Small Stream and Riparian, Southern Appalachian Oak Forest, Southern Interior Low Plateau Dry-Mesic Oak Forest, Successional Shrub/Scrub

LANDFIRE Biophysical Settings anticipated (USGS, 2010): Allegheny-Cumberland Dry Oak Forest and Woodland, Bluegrass Savanna and Woodland, Central Interior and Appalachian Floodplain Systems, Central Interior and Appalachian Riparian Systems, Central Interior and Appalachian Shrub-Herbaceous Wetland Systems, Central Interior and Appalachian Swamp Systems, Central Interior Highlands Calcareous Glade and Barrens, Central Interior Highlands Dry Acidic Glade and Barrens, Central Tallgrass Prairie, Great Lakes Coastal Marsh Systems, Mississippi River Alluvial Plain Dry-Mesic Loess Slope Forest, North-Central Interior Beech-Maple Forest, North-Central Interior Dry-Mesic Oak Forest and Woodland, North-Central Interior Dry Oak Forest and Woodland, North-Central Interior Maple-Basswood Forest, North-Central Interior Oak Savanna, North-Central Interior Wet Flatwoods, Paleozoic Plateau Bluff and Talus, Pennyroyal Karst Plain Prairie and Barrens, South-Central Interior Mesophytic Forest, South-Central Interior/Upper Coastal Plain Flatwoods, Southern Appalachian Oak Forest, Southern Interior Low Plateau Dry-Mesic Oak Forest

## **Ecological site concept**

This site is an upland site formed on glacial till parent materials. It is located on the depressions, toeslopes and footslopes, of glacial till plains and moraines. Soil surface is dark in color (3/2 Munsell) and extends beyond 10 inches. The soils are well drained and taxonomically mollisols.

The characteristic vegetation of this site is that of a till prairie dominated by tall-grass prairie species, specifically big bluestem and Indiangrass. Switchgrass and prairie dropseed are other grass species that are common on the site. A diverse assemblage of forbs occur on this site to include, but not limited to, milkweed, asters, sunflowers, and coneflower species. This is a fire dependent system with fires occurring nearly annually or at least every 4 years. The short fire return interval kept woody species from invading and becoming dominant. Larger scale, higher intensity fires occurred during the dormant season with more frequent, smaller fires during the growing season. Grazing by native animals probably had some impact on species richness and diversity, but not near to the extent as exhibited on prairies further west. Due to the productiveness of the mollisols in which this site is found on, the majority of this site has been converted for agricultural production. Areas that have not been converted to agricultural use are now mostly in a woodland state as the fire cycle has been altered and in most cases completely eliminated.

## Associated sites

R111XD006IN	<b>Mollic Till Depression</b> Located on an adjacent landscape position; dark soil surface color extends less than 10 inches deep.
R111XD011IN	<b>Mollic Till Ridge</b> Located on a swell (convex) landscape position; dark soil surface color is less than 10 inches deep.

## Similar sites

R111XD021IN	<b>Dry Outwash Mollisol</b> Located on outwash parent material; soils are moderately well to excessively drained.
R111XD012IN	<b>Till Ridge Prairie</b> Located on a swell (convex) landscape position.
R111XD020IN	<b>Wet Outwash Mollisol</b> Located on outwash parent material; soils are very poorly to somewhat poorly drained.
R111XD026IN	<b>Sand Dune Prairie</b> Located on sand parent material on a dune landscape.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Andropogon gerardii</i> (2) <i>Sorghastrum nutans</i>

## Physiographic features

This ecosite is found in depressional areas on till in MLRA 111D: Indiana and Ohio Till Plain, Western Part.

Table 2. Representative physiographic features

Landforms	(1) Till plain
Flooding frequency	None
Ponding frequency	None
Elevation	149–320 m
Slope	0–6%
Ponding depth	0 cm
Water table depth	145 cm
Aspect	W

## Climatic features

The average annual precipitation in this area is 36 to 43 inches (915 to 1,090 millimeters). Most of the rainfall occurs as convective thunderstorms during the growing season. About half or more of the precipitation occurs during the freeze-free period. Snowfall is common in winter. The average annual temperature is 49 to 54 degrees F (10 to 12 degrees C). The freeze-free period averages about 200 days and ranges from 180 to 215 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	133-151 days
Freeze-free period (characteristic range)	169-182 days

Precipitation total (characteristic range)	991-1,092 mm
Frost-free period (actual range)	132-159 days
Freeze-free period (actual range)	168-187 days
Precipitation total (actual range)	991-1,118 mm
Frost-free period (average)	141 days
Freeze-free period (average)	177 days
Precipitation total (average)	1,041 mm

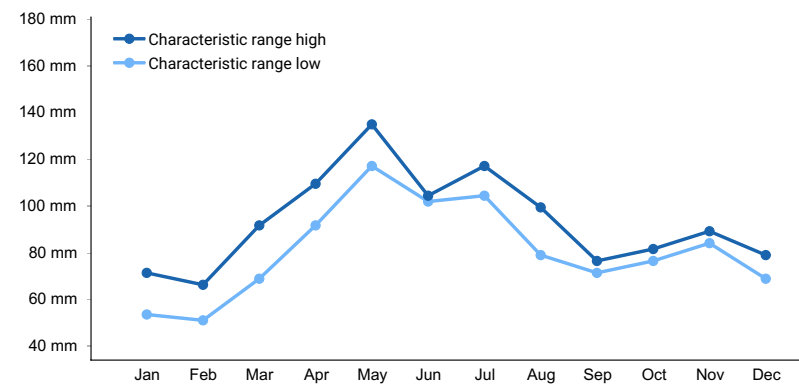


Figure 1. Monthly precipitation range

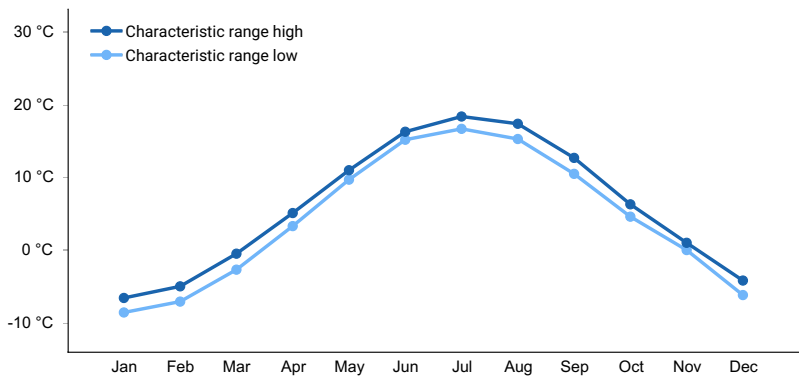


Figure 2. Monthly minimum temperature range

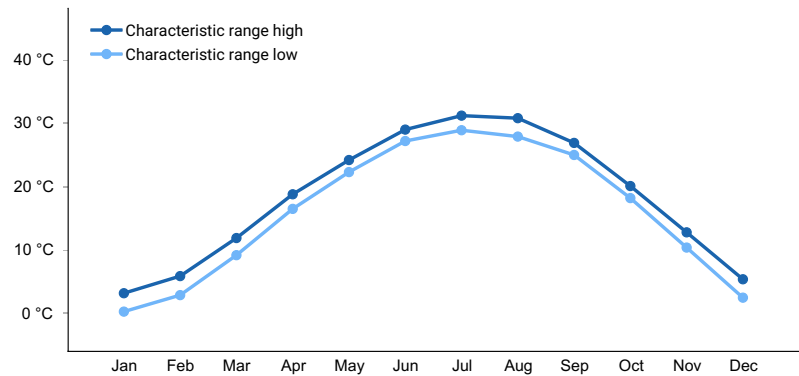
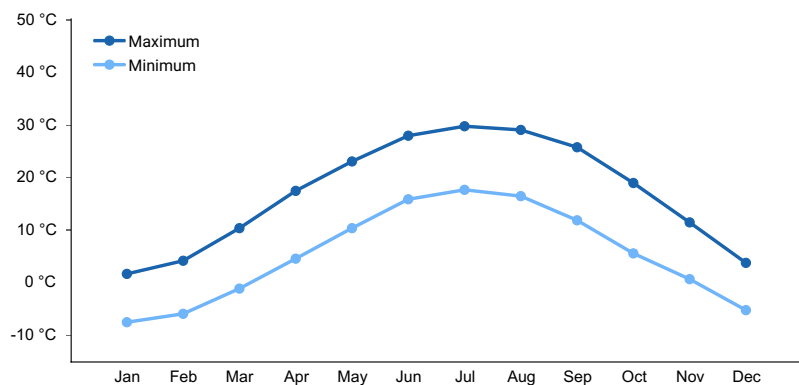
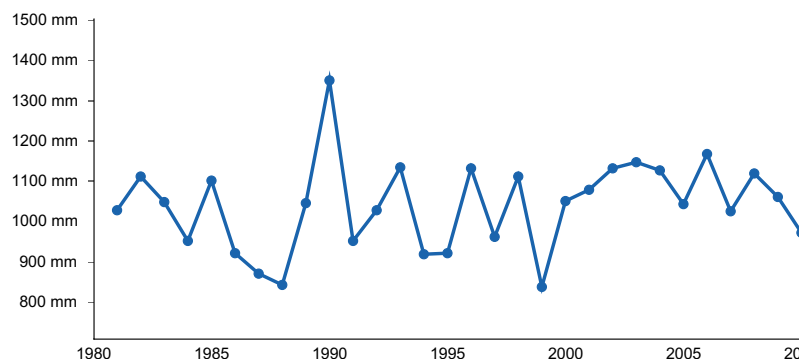


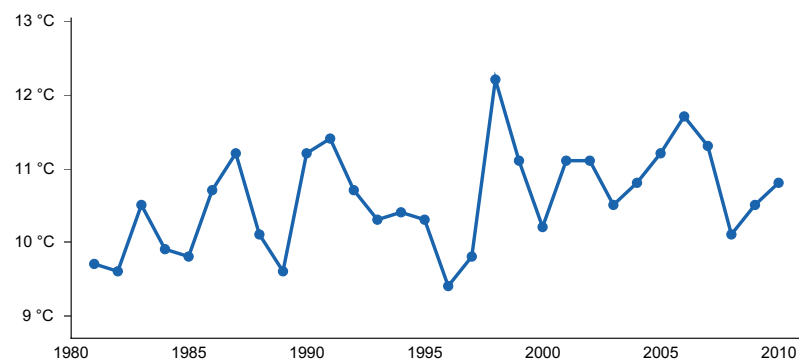
Figure 3. Monthly maximum temperature range



**Figure 4. Monthly average minimum and maximum temperature**



**Figure 5. Annual precipitation pattern**



**Figure 6. Annual average temperature pattern**

## Climate stations used

- (1) FAIRFIELD [USC00332651], Hamilton, OH
- (2) LAFAYETTE 8 S [USC00124715], Lafayette, IN
- (3) TERRE HAUTE INDIANA ST [USC00128723], Terre Haute, IN
- (4) BOSWELL 4WNW [USC00120858], Fowler, IN
- (5) WABASH [USC00129138], Wabash, IN
- (6) WILMINGTON 3 N [USC00339219], Wilmington, OH

## Influencing water features

This ecological site is not influenced by wetland or riparian water features.

## Soil features

The soil series associated with this site are: Tecumseh, Sidell, Linkville, Jasper. They are very deep, well drained, and moderate to moderately rapid permeable soils, with very strongly acidic to neutral soil reaction, that formed in Till.

**Table 4. Representative soil features**

Parent material	(1) Till
Surface texture	(1) Loam (2) Silt loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	203 cm
Surface fragment cover ≤3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	16.51–18.54 cm
Calcium carbonate equivalent (0-101.6cm)	0–13%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	5.5–7.4
Subsurface fragment volume ≤3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	1%

## Ecological dynamics

This site is characterized by the dominance of tall prairie grass species, particularly big bluestem, Indiangrass, and prairie dropseed. This site was maintained by frequent fires, often with a return interval of no more than 5 years. Much less frequently, insect and small mammal herbivory would impact local composition and dominance of the species. The herbaceous cover on the site was high, often times 70-100%.

## State and transition model

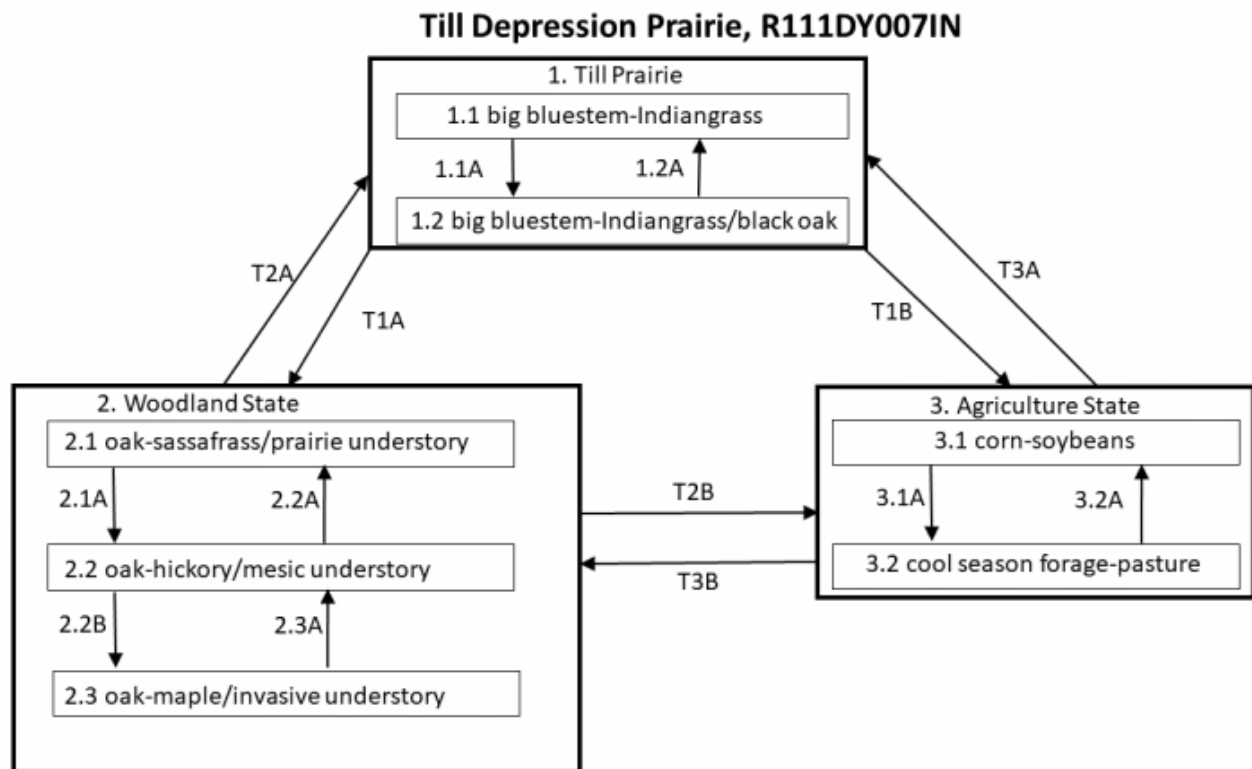


Figure 7. Till Depression Prairie

**Till Depression Prairie, R111DY007IN**  
**Diagram Legend**

T1A	No management, no fire
T1B	Drainage, site preparation, planting, management
T2A	Tree removal, fire
T2B	Remove woody species, drainage, site preparation, planting, management
T3A	Remove drainage, planting, fire
T3B	Remove drainage, planting, forestry practices, no fire
1.1A	No management, no fire
1.2A	Fire
2.1A	No management, no fire
2.2A	Prescribed tree cutting
2.2B	Invasive species establishment, no management
2.3A	Timber stand improvement, mechanical and chemical control of invasive species
3.1A	Pasture/forage planting and maintenance
3.2A	Tillage/no-till planting and management of row crops.

Figure 8. Legend

**State 1**  
**Till Prairie**

This is the reference or diagnostic plant community for this site. In reference conditions, this site was dominated by prairie grass species. Dominant species include big bluestem, Indiangrass, and prairie dropseed. Fire was the main disturbance agent that maintained this site and occurred quite frequently, often with a return interval of 5 years or shorter. The removal of fire from the system and/or lack of woody species management would move this site toward state 2. Drainage and tillage of the site allows the site to be converted to cropland (state 3).

## **Community 1.1**

### **big bluestem/Indiangrass/prairie dropseed**

This phase is characterized by frequent fire events (1-5 years) that maintain herbaceous species dominance. Dominant species include big bluestem, Indiangrass, and prairie dropseed. Secondary species are little bluestem, porcupine grass, and switchgrass.

## **Community 1.2**

### **big bluestem/Indiangrass/black oaks**

This phase is characterized by a longer fire return interval (5-20 years) than phase 1. Big bluestem, Indiangrass, and prairie dropseed remain the dominant species, but the production is less as the thatch builds up. Likewise, fire has allowed for trees, mostly black oak, to get established or to grow from existing grubs.

## **Pathway P1.1**

### **Community 1.1 to 1.2**

no fire, no management

## **Pathway P1.2**

### **Community 1.2 to 1.1**

Fire

## **State 2**

### **Woodland State**

Absence of fire or lack of woody species management will move this site to a woodland state dominated by oak species, specifically black oak and white oak. The understory would contain many of the prairie species until the canopy closed. Woody understory species would include sassafras.

## **Community 2.1**

### **oak/sassafras/prairie understory**

This phase is characterized by the absence of fire. Trees, particularly oak species, have become the dominant growth form on the site. The understory still contains some prairie herbaceous species at the lower tree canopy levels, but they all disappear at the higher levels.

## **Community 2.2**

### **oak/hickory/mesic forest understory**

This phase is characterized by the absence of fire. Trees remain the dominant growth form. Hickory trees become present in the canopy. The understory is occupied mostly by mesic species.

## **Community 2.3**

### **oak/maple/invasive understory**

This phase is characterized by the absence of fire. Trees remain the dominant growth form. More shade tolerant species, particularly sugar maple, become common in the canopy. The understory has been invaded by non-native invasive species, particularly species of Asian bush honeysuckle.

## **Pathway P2.1**

### **Community 2.1 to 2.2**

No management. No fire.



**Pathway P2.1**  
**Community 2.1 to 2.3**

no management/ increase in exotic species

**Pathway P2.2**  
**Community 2.2 to 2.1**

Management to increase desired species.

**Pathway P2.2A**  
**Community 2.2 to 2.3**

Increase in invasive species

**Pathway P2.3**  
**Community 2.3 to 2.1**

Timber stand improvement, mechanical and chemical control of invasive species

**State 3**  
**Agriculture State**

This site has largely been converted to agricultural use. Most of the historic acres are now in row crop agricultural use. Most common is a corn and soybean rotation of various types. A small portion of the site is not used to grow hay or cool season forage and used for grazing.

**Community 3.1**  
**Corn/Soybeans**

This phase is characterized by row crop agriculture of small grains, primarily corn and soybeans.

**Community 3.2**  
**cool season forage/pasture**

This phase is characterized by forage or grazing agriculture. Different mixes of, generally, cool season grasses and forbs, largely clovers, are grown.

**Pathway P3.1**  
**Community 3.1 to 3.2**

Planting and management of forage species.

**Pathway P3.2**  
**Community 3.2 to 3.1**

Establishment of row crops

**Transition T 1-2**  
**State 1 to 2**

No woody species management and/or no fire moves the site to the woodland state

**Transition T 1-3**  
**State 1 to 3**

Installation of drainage via either a ditch, field tile, or both followed by tillage and seeding move the site to the

agriculture state. Regular agricultural practices maintain the site.

### **Restoration pathway R 2-1** **State 2 to 1**

Remove all trees and woody vegetation, seeding, and fire restores the site to the reference state.

### **Transition T 2-3** **State 2 to 3**

Removal of the trees, installation of drainage system, tillage and planting of the crop move this site to the agriculture state.

### **Restoration pathway R 3-1** **State 3 to 1**

Site preparation, removal of drainage (if needed), seeding, and regular application of fire.

### **Restoration pathway R 3-2** **State 3 to 2**

Forestry planting/practice, no fire applied.

## **Additional community tables**

### **Other references**

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## **Contributors**

Tyler Staggs

## Approval

Chris Tecklenburg, 5/28/2020

## 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)	TYLER STAGGS
Contact for lead author	
Date	05/16/2024
Approved by	Chris Tecklenburg
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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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):**

- 
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):**
- 

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:**
-