USDA Natural Resources
Conservation Service

Ecological site R111XC005IN
Glacial Depression

Accessed: 05/20/2025

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): 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.

111C – Indiana and Ohio Till Plain, Northwestern Part. This MLRA is in the glaciated part of north-central Indiana and is dominated by glacial till plains broken in places by lake plains, outwash plains, and flood plains. Areas that parallel most of the major rivers and streams have deposits of sand.

Although it is an important agricultural region, MLRA 111C hosts a large proportion of Indiana’s biodiversity.

Classification relationships

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

USFS Ecological Regions (USDA, 2007):
Sections - Central Till Plains, Beech Maple (222H), South Central Great Lakes (222J), Central Till Plains and Grand Prairies (251D)

Subsections - Kalamazoo-Elkhart Moraines and Plains (222Jh), Steuben Interlobate Moraines (222Ji), Bluffton Till Plains (222Ha), Entrenched Valleys (222Hf), Miami-Scioto Plain-Tipton Till Plain (222Hb), Kankakee Sands (251Dg) and Eastern Grand Prairie (251Dd).

NatureServe Systems anticipated (NatureServe, 2011): Agriculture-Pasture/Hay, Agriculture-Cultivated Crops and Irrigated Agriculture, Central Interior Highlands calcareous Glade and Barrens, Central Interior Highlands Dry Acidic Glade & Barrens, Central Tallgrass Prairie, Harvested Forest-Grass Regeneration, Harvested Forest-Herbaceous Regeneration, Introduced Upland Vegetation – Treed, Laurentian-Acadian Alkaline Conifer-Hardwood Swamp, Laurentian-Acadian Northern Hardwoods Forest, Laurentian-Acadian Northern Pine-Oak Forest, Laurentian-Acadian Wet Meadow-Shrub Swamp, Laurentian Pine-Oak Barrens, Managed Tree Plantation, North-Central Interior and Appalachian Acidic Peatland, North-Central Interior Beech-Maple Forest, North-Central Interior Dry Oak Forest & Woodland, North-Central Interior Dry-Mesic Oak Forest & Woodland, North-Central Interior Floodplain, North-Central Interior Freshwater Marsh, North-Central Interior Maple-Basswood Forest, North-Central Interior Oak Savanna, North-Central Interior Sand Gravel Tallgrass Prairie, North-Central Interior Wet Flatwoods, North-Central Interior Wet Meadow-Shrub Swamp, North-Central Oak Barrens, Ruderal Forest, Ruderal Upland-Old Field, South-Central Interior Large Floodplain.

LANDFIRE Biophysical Settings anticipated (USGS, 2010): North-Central Interior Oak Savanna, North-Central Interior Sand and Gravel Tallgrass Prairie, Central Interior and Appalachian Swamp Systems, North-Central Interior Dry-Mesic Oak Forest and Woodland, North-Central Interior Dry Oak Forest and Woodland, North-Central Interior Beech-Maple Forest, North Central Oak Barrens, Central Interior and Appalachian Floodplain Systems, Great Lakes Coastal Marsh Systems, Central Interior and Appalachian Shrub-Herbaceous wetland systems, North Central Wet Flatwoods, North-Central Interior Maple-Basswood Forest, Central Tallgrass Prairie, South-Central Interior Mesophytic Forest, Boreal White Spruce-Fire-Hardwood Forest-Inland, Great Lakes Pine Barrens, Great Lakes Wet-Mesic Lakeplain Prairie, Laurentian-Acadian Alkaline Conifer-Hardwood Swamp, Laurentian-Acadian Floodplain Systems, Laurentian-Acadian Shrub-Herbaceous Wetland Systems, Laurentian Pine-Oak Barrens, Northern Sugar Maple-Basswood Forest, Paleozoic Plateau Bluff and Talus.

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. There are 4 distinct states: 1. wet prairie (reference state), 2. woodland state, 3. agriculture state, 4. old field state. Fire frequency and intensity were the principle disturbance factors that worked along with soil moisture regimes to define the difference between the first two states. Currently, the majority of this site is in the agriculture state and mostly used for corn and soybean production.

Associated sites

F111XC007IN	**Glacial Ridge**
R111XC006IN	**Flat Glacial Ridge**
R111XC011IN	**Limnic Muck**
R111XC012IN	**Mineral Muck**
R111XC013IN	**Deep Muck**

Similar sites

R111XC008IN	**Wet Overflow**
R111XC002IN	**Wet Sandy Interdune**

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Calamagrostis canadensis* (2) *Spartina pectinata*

Physiographic features

This site is located in the 111C - Indiana and Ohio Till Plain, Northwestern Part Major Land Resource Area. It is classified as an upland site. This site was formed silt covered or loamy till. It is located on the toeslopes and footslopes of depressions on glacial till plains and moraines.

Table 2. Representative physiographic features

Landforms	(1) Depression
Runoff class	Negligible to low

Flooding frequency	Occasional to frequent
Ponding duration	Long (7 to 30 days) to very long (more than 30 days)
Ponding frequency	Occasional to frequent
Elevation	525–1,181 ft
Slope	0–5%
Ponding depth	0–6 in
Water table depth	0–15 in
Aspect	Aspect is not a significant factor

Climatic features

The climate is humid continental in nature typified by large season temperature differences, with warm to hot, humid summers and cold winters. Precipitation is relatively well distributed year-round.

The average first frost should occur around October 12 and the last freeze of the season should occur around April 25.

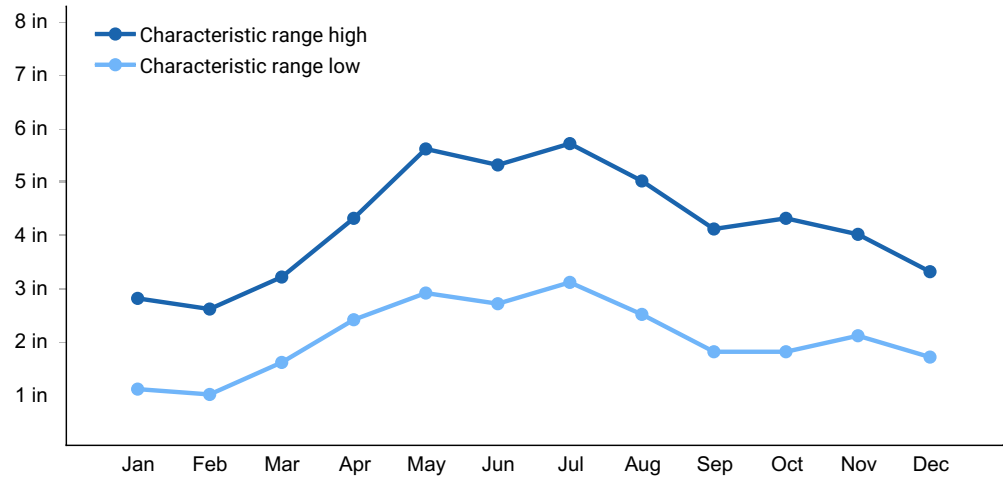

Figure 1. Monthly precipitation range

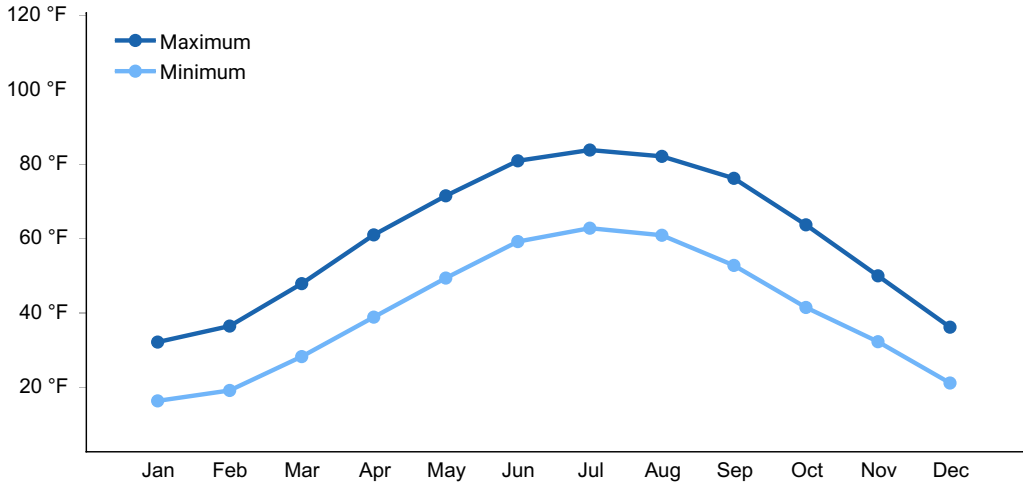

Figure 2. Monthly average minimum and maximum temperature

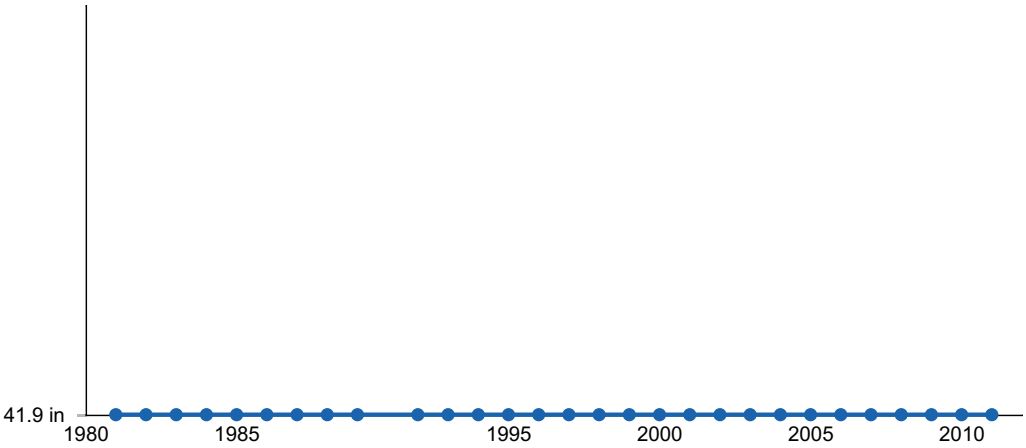

Figure 3. Annual precipitation pattern

Climate stations used

- (1) CHALMERS 5 W [USC00121417], Chalmers, IN
- (2) FRANCESVILLE [USC00123078], Francesville, IN
- (3) GOSHEN 3SW [USC00123418], Goshen, IN
- (4) PLYMOUTH [USC00126989], Plymouth, IN
- (5) PRAIRIE HEIGHTS [USC00127102], LaGrange, IN
- (6) RENSSELAER [USC00127298], Rensselaer, IN
- (7) WEST LAFAYETTE 6 NW [USC00129430], West Lafayette, IN
- (8) DELPHI 2 N [USC00122149], Delphi, IN
- (9) LAGRANGE 1 S [USC00124730], LaGrange, IN
- (10) LAKEVILLE [USC00124782], Lakeville, IN
- (11) LOGANSPORT CICOTT ST [USC00125117], Logansport, IN
- (12) ROCHESTER [USC00127482], Rochester, IN
- (13) WARSAW [USC00129240], Warsaw, IN
- (14) WINAMAC 2SSE [USC00129670], Winamac, IN

Influencing water features

This being an upland site, it is not influenced by water from a wetland or stream.

Soil features

In a representative profile for the Glacial Depression ecological site, the soils of this soil are dark to very dark gray at the surface with mollic epipedons that extend to 20 inches or greater.

It should be noted that there may be inclusions of other soils and because of mapping scale are not divided out.

The two largest soil components in this site are Brookston and Wolcott.

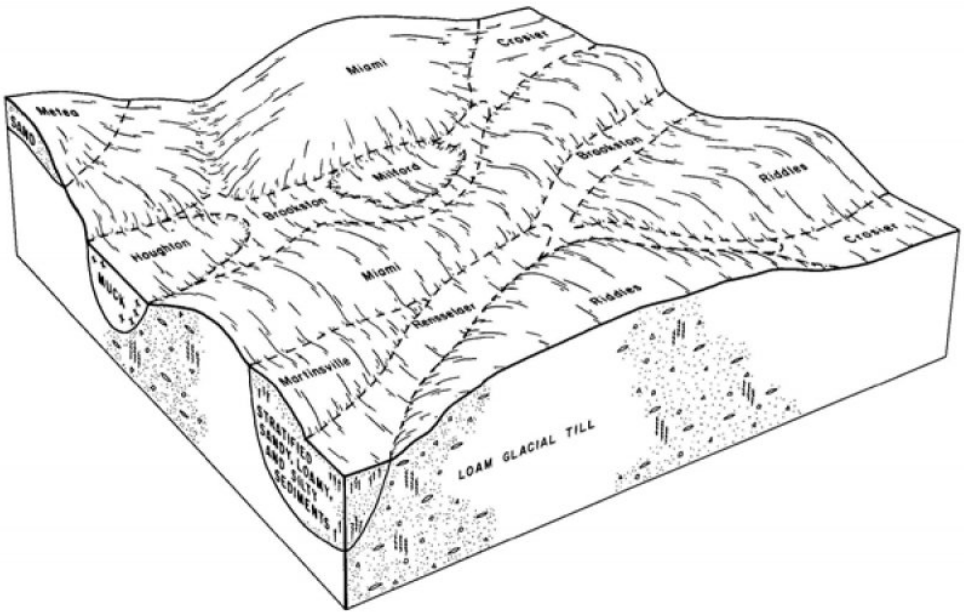

Figure 5. R111CY005IN - Glacial Depression Block Diagram

Table 3. Representative soil features

Surface texture	(1) Clay loam (2) Loam
Family particle size	(1) Loamy
Drainage class	Very poorly drained to moderately well drained
Permeability class	Slow to moderate
Surface fragment cover <=3"	0–5%

Ecological dynamics

The historic plant community of the Glacial Depression ecological site is a wet prairie. This site is primarily made up of herbaceous species and dominated by graminoids like bluejoint, prairie cordgrass, and big bluestem. Herbaceous species dominance is

maintained by a short fire return interval that works in conjunction with the soil moisture regime. The soils are saturated to ponded in the early part of the growing season, but dry later creating a lot of fine fuel to carry fire.

Since settlement, the majority of this site has been converted to agricultural use with the majority being in row crop agriculture. This was accomplished via improved drainage by ditches and field tile along with tillage.

State and transition model

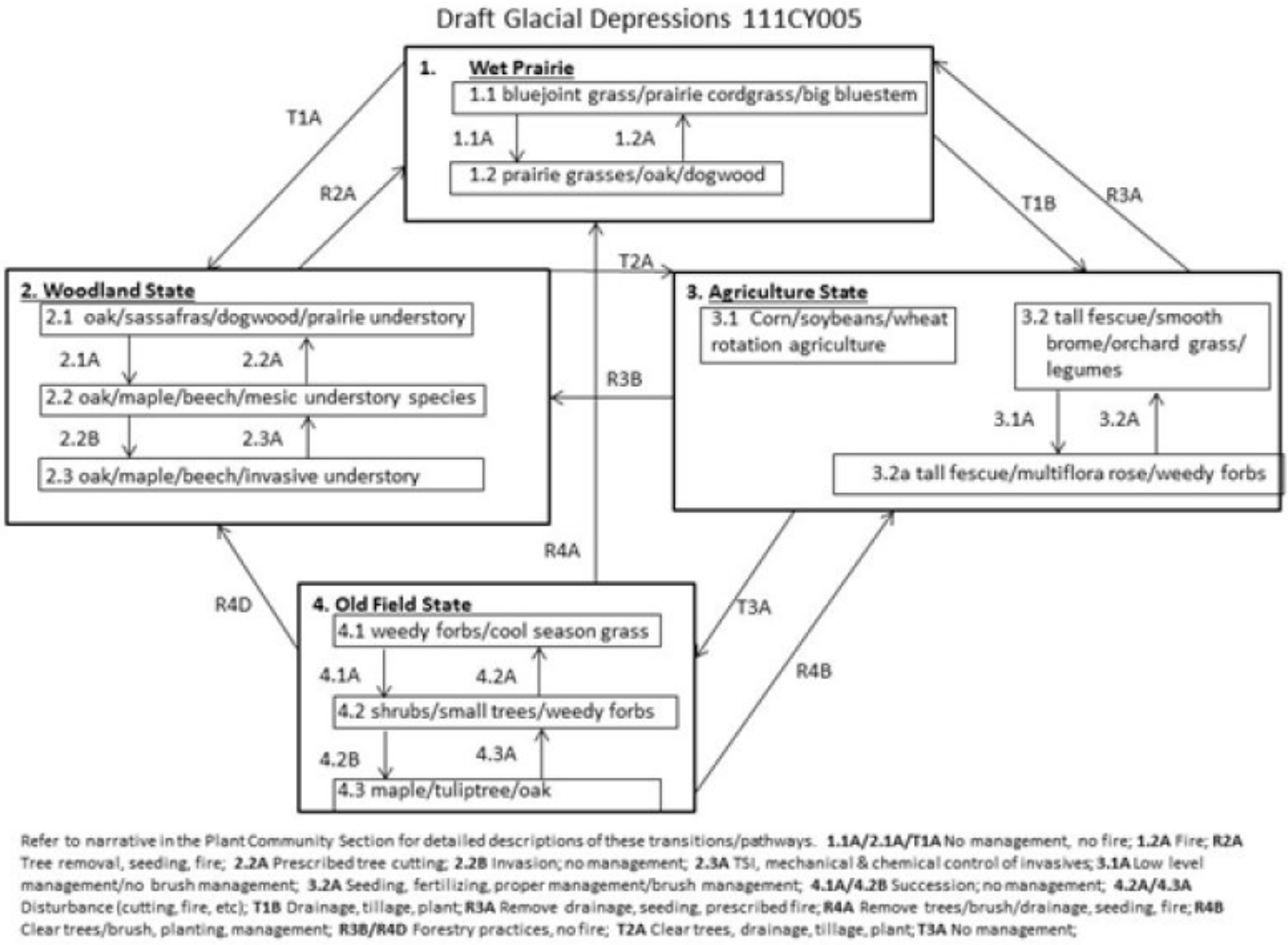

Figure 6. R111CY005IN - Glacial Depressions Ecological Site

State 1
Wet Prairie

This is the reference or diagnostic plant community for the site. In reference conditions, this site was dominated by herbaceous prairie species, specifically bluejoint, prairie cordgrass, and big bluestem. Herbaceous species dominance is maintained by a short fire return interval that works in conjunction with the soil moisture regime. The soils are saturated to ponded in the early part of the growing season, but dry later creating a lot of fine fuel to carry fire. Removal of fire from the system allowed trees to invade and

eventually dominate the site. Restoration back to the reference state is possible with the removal of drainage (if needed) and regular fire at a 2-5 year interval. Conversion to agriculture was accomplished via improved drainage by ditches and field tile along with tillage. Restoration back to the reference state is possible with the removal of drainage, seeding of appropriate species, and regular fire at a 2-5 year interval.

Community 1.1
bluejoint/prairie cordgrass/big bluestem

This phase is characterized by regular fire that maintains the grass dominated nature of the site.

Community 1.2
prairie grasses/oak/dogwood

This phase is characterized by protection from or a longer time since the last fire. Trees, particularly oak species, start to invade the site. More frequent fire will return the phase back to phase 1.

Pathway 1.1A
Community 1.1 to 1.2

No management or fire.

Pathway 1.2A
Community 1.2 to 1.1

Fire on a 2-5 year interval.

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 pin oak and swamp white oak. The understory would contain many of the prairie species until the canopy closed. Woody understory species would include sassafras and dogwood.

Community 2.1
oak/sassafrass/dogwood/prairie understory

This phase is characterized by the absence of fire 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/maple/beech/mesic forest understory

This phase is characterized by the absence of fire fire. Trees remain dominant, but more shade tolerant trees, sugar maple and beech, start to appear in the canopy.

Community 2.3
oak/maple/beech/invasive understory

This phase is characterized by the absence of fire fire. Trees remain dominant, but more shade tolerant trees, sugar maple and beech, start to appear in the canopy. Invasive species come to dominate the understory after initial invasion. Species like Callery pear and Asian bush honeysuckle are the main understory species.

Pathway 2.1A
Community 2.1 to 2.2

No management and no fire.

Pathway 2.2A
Community 2.2 to 2.1

Prescribed timber harvest and timber stand improvement practices.

Pathway 2.2B
Community 2.2 to 2.3

Invasion of non-native invasive species in the understory and no invasive species management.

Pathway 2.3A
Community 2.3 to 2.2

Timber stand improvement practices, mechanical and chemical control of invasives.

State 3
Agriculture

This site has largely been converted to agricultural use. Roughly 75% of the historic acres are now in row crop agricultural use. Most common is a corn and soybean rotation of various types. Roughly 5% of the site is not used to grow hay or cool season forage and used for grazing.

Community 3.1
Row Crop Agriculture

This phase is characterized by row crop agriculture of small grains, primarily corn, soybeans, and occasionally wheat. Seeding and management could transition this phase to phase 2.

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. Tillage, seeding and management could transition this phase to phase 1.

State 4
Old Field State

Abandoned agricultural lands move into the old field state. This state is dominated at the outset by cool season grasses, mostly fescue, and weedy, opportunistic forbs. Absent management or fire, the site will progress to a shrub dominated phase then to that of a mesic forest.

Community 4.1
weedy forbs/cool season grasses

This phase is characterized by the absence of any management after being used for agriculture. Weedy forbs and non-native cool season grasses dominate.

Community 4.2
shrubs/small trees/woody forbs

Continued absence of management allows the site to become dominated by woody species. Shrubs and smaller, colonizing species, trees dominate the site. The same herbaceous component as found in phase 4.1 is present, just at a reduced amount.

Community 4.3
maple/tuliptree/oak

Continued absence of management allows for the site to develop into a mixed mesic forest. Maple and tuliptree are the two most dominate tree species in the canopy.

Pathway 4.1A
Community 4.1 to 4.2

Succession with no management to include fire.

Pathway 4.2A
Community 4.2 to 4.1

Disturbance applied or as occurs. Can include fire, tree cutting, weather event, etc.

Pathway 4.2B
Community 4.2 to 4.3

Succession with no management.

Pathway 4.3A
Community 4.3 to 4.2

Disturbance to include tree cutting, fire, or weather event that removes some or all canopy level trees

Transition 1A
State 1 to 2

No fire, absence of woody species management.

Transition 1B
State 1 to 3

Drainage via ditch or field tile, tillage, and regular agricultural practices.

Restoration pathway 2A
State 2 to 1

Tree removal, seeding of appropriate species and fire.

Transition 2A
State 2 to 3

Clear trees, install drainage, tillage, and planting of crop

Restoration pathway 3A
State 3 to 1

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

Restoration pathway 3B
State 3 to 2

Forestry planting/practice, no fire applied.

Transition 3A
State 3 to 4

No management. Agricultural practices abandoned and succession allowed to take place

Restoration pathway 4A
State 4 to 1

Remove trees/brush, remove or block off drainage, seeding, and fire.

Restoration pathway 4C
State 4 to 2

Forestry practices to include planting of appropriate tree species, timber stand improvement practices and no fire.

Restoration pathway 4B
State 4 to 3

Clear trees/brush, plant crops, regular agricultural management.

Additional community tables

Inventory data references

Site was developed using Tier 1 field reconnaissance, expert opinion, and a review of the literature.

Other references

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Contributors

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Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	05/20/2025
Approved by	Greg Schmidt

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:**