USDA Natural Resources Conservation Service

Ecological site R113XY904IL
Upland Prairie

Last updated: 5/17/2024
Accessed: 05/12/2025

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): 113X–Central Claypan Areas

The eastern Illinois portion of the Central Claypan Areas MLRA is in the Till Plains Section of the Central Lowland Province of the Interior Plains (USDA-NRCS, 2006) and includes the Southern Till Plain Natural Division of the natural divisions of Illinois (Schwegman, 1973; 1997; IDNR, 2018) in south-central Illinois. South-central Illinois is a dissected Illinoisan till plain south of the terminal Wisconsin moraine. This region consists of nearly level to gently sloping, old till plains. Stream valleys are shallow and generally are narrow. Elevation is about 660 feet (200 meters), increasing gradually from south to north. Local relief is generally low on the broad, flat till plains and flood plains and high on the dissected hills bordering rivers or drainage systems. The Kaskaskia, Little Muddy, Little Wabash, Embarras, and Skillet Fork rivers are part of this area. This region is covered with loess, which overlies old glacial drift (Illinoisan till) that has a high content of clay. Fragipans are also present. Pennsylvanian limestone and shale bedrock underlay the glacial till. The dominant soil orders in this region are Alfisol and Mollisol. The soils in the area predominantly have a mesic soil temperature regime, an aquic or udic soil moisture regime, and mixed or smectitic mineralogy. They generally are very deep, well drained to poorly drained, and loamy or clayey. (USDA-NRCS, 2006).

Classification relationships

Major Land Resource Area (MLRA) (USDA-NRCS, 2006):
113 – Central Claypan Areas, Eastern Part

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: Central Till Plains, Oak-Hickory Section
Section Code: 222G

Ecological site concept

The historic reference plant community was a mesic tall grass prairie with a tree canopy of less than 10 percent. There is a single layer of dominant graminoids intermixed with abundant forbs and occasional scattered shrubs and trees (NatureServe 2018).

Big bluestem (Andropogon gerardii Vitman)* was the dominant grass on Upland Prairies. Other common grasses included little bluestem (Schizachyrium scoparium (Michx.) Nash), and Indiangrass (Sorghastrum nutans (L.) Nash) (NatureServe 2018). Forbs typical of an undisturbed plant community associated with this ecological site included candle anemone (Anemone cylindrica A. Gray), downy gentian (Gentiana puberulenta J. Pringle), stiff sunflower (Helianthus rigidus Nutt. ssp. pauciflorus), tall cinquefoil (Potentilla arguta Pursh), pinnate prairie coneflower

(Ratibida pinnata (Vent.) Barnhart) and prairie violet (Viola pedatifida G. Don) (White 1978; NatureServe 2015). Shrubs, such as silky dogwood (Cornus obliqua Raf.) and white meadowsweet (Spiraea alba Du Roi), were present but not overly abundant (Mohlenbrock and Ladd, 1978; Mohlenbrock, 1986). On lower slopes and draws where water periodically accumulated, more mesic prairie species such as switchgrass (Panicum virgatum L.), eastern gamagrass (Tripsacum dactyloides (L.) L.), Culver's root (Veronicastrum virginicum (L.) Farw.), Michigan lily (Lilium michiganense Farw.), and Virginia bunchflower (Veratrum virginicum (L.) W.T. Aiton) may have been added to the diverse mix of prairie species (White 1978).

Shrubs, when present, were generally low-growing and sparse and included leadplant (Amorpha canescens Pursh), New Jersey tea (Ceanothus americanus L.), and Carolina rose (Rosa carolina L.). Occasional fire-tolerant oaks (Quercus spp.) were also scattered throughout the landscape. Fire is the primary disturbance factor that maintains this site, while herbivory and drought are secondary factors (LANDFIRE 2009; White 1978; NatureServe 2018).

* All plant common and scientific names in this document were obtained from the U.S. Department of Agriculture – Natural Resources Conservation Service National PLANTS Database (USDA NRCS, 2018).

Associated sites

R113XY902IL	**Natric Till Plain Savanna** Found on similar landscape positions but soil profile has high sodium levels that impact species composition.
R113XY903IL	**Wet Upland Prairie** Found on similar landscape positions but with poorer drainage and higher seasonal water tables.
F113XY919IL	**Wet Silty Floodplain Forest** Found in drainageways and floodplains below Upland Prairies.

Similar sites

R113XY903IL	**Wet Upland Prairie** Found on similar landscape positions but with poorer drainage and higher seasonal water tables.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Amorpha canescens* (2) *Ceanothus americanus*
Herbaceous	(1) *Andropogon gerardii* (2) *Schizachyrium scoparium*

Physiographic features

This site consists of moderately well drained, moderately permeable soils on knobs and ridges on the Illinoisan till plain. They formed in loess and the underlying loamy deposits. Slopes range from 2 to 10 percent. The site generates runoff to adjacent, downslope ecological sites. This site does not flood.

Table 2. Representative physiographic features

Hillslope profile	(1) Shoulder
Slope shape across	(1) Convex
Landforms	(1) Upland > Till plain (2) Upland > Ground moraine (3) Upland > Knoll
Runoff class	Low to medium
Elevation	110–200 m
Slope	2–10%

Water table depth	91 cm
Aspect	Aspect is not a significant factor

Climatic features

The soil temperature regime of MLRA 113 is classified as mesic, where the mean annual soil temperature is between 47 and 59°F. Temperature and precipitation occur along a north-south gradient, where temperature and precipitation increase the further south you travel (USDA-NRCS 2006). The majority of the precipitation occurs as rainfall in the form of convective thunderstorms during the growing season.

Table 3. Representative climatic features

Frost-free period (characteristic range)	158-172 days
Freeze-free period (characteristic range)	189-197 days
Precipitation total (characteristic range)	1,092-1,118 mm
Frost-free period (actual range)	152-174 days
Freeze-free period (actual range)	189-202 days
Precipitation total (actual range)	1,092-1,143 mm
Frost-free period (average)	164 days
Freeze-free period (average)	194 days
Precipitation total (average)	1,118 mm

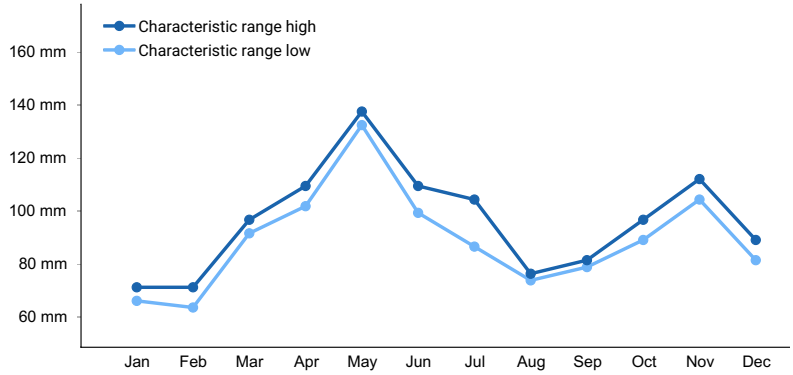


Figure 1. Monthly precipitation range

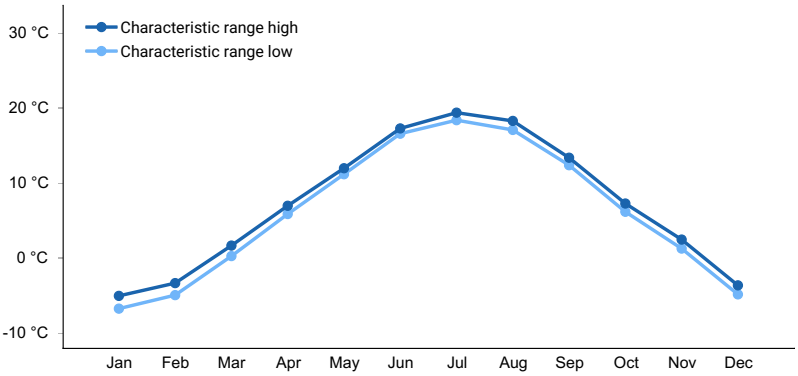


Figure 2. Monthly minimum temperature range

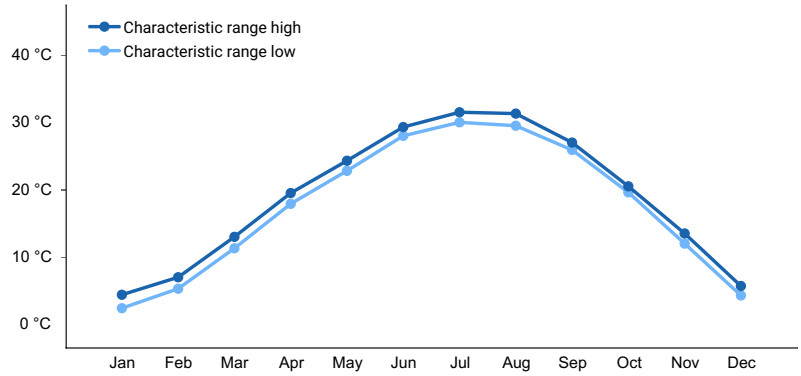


Figure 3. Monthly maximum temperature range

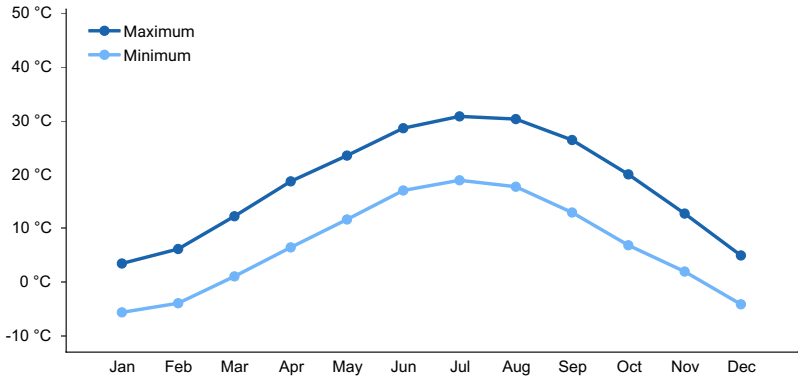


Figure 4. Monthly average minimum and maximum temperature

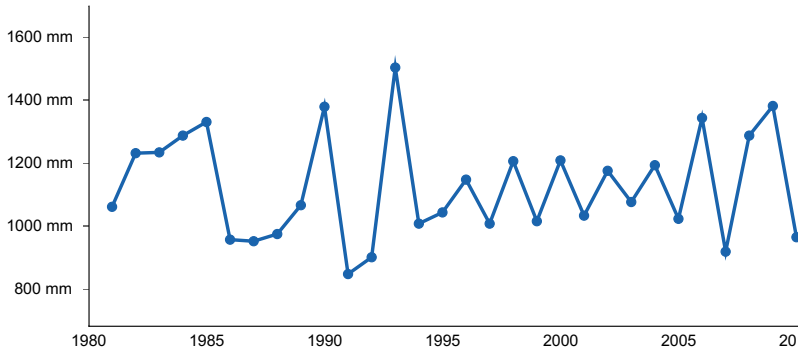


Figure 5. Annual precipitation pattern

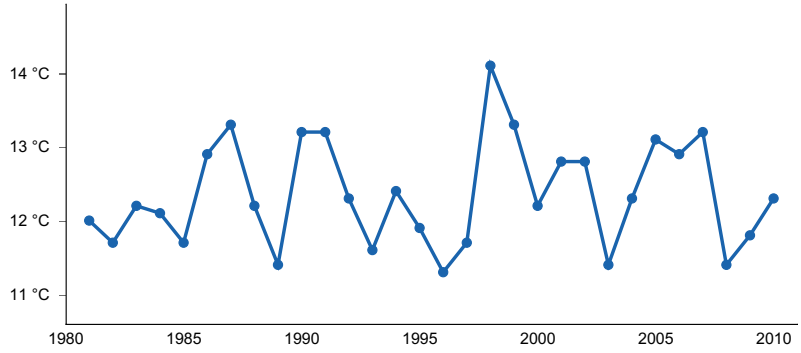


Figure 6. Annual average temperature pattern

Climate stations used

- (1) BENTON 2 N [USC00110608], Benton, IL
- (2) IUKA 12 SW [USC00114400], Centralia, IL
- (3) NEWTON 6 SSE [USC00116159], Newton, IL

Influencing water features

This ecological site is influenced by a seasonal water table, perched on the subsoil or on underlying till. Seeps may occur in headslope positions, particularly in the spring and following heavy rainfall events. These seeps are source areas for first-order ephemeral streams, typically within drainageway ecological sites downslope. Where present, these headslope seeps are in the SLOPE wetlands class of the Hydrogeomorphic (HGM) classification system (Brinson, 1993). (SSS NRCS WSS, 2018) (SSS NRCS OSD, 2018).

Soil features

These soils have no major rooting restriction. The soils were formed primarily under prairie vegetation, and have a dark colored, mollic intergrade, silt loam surface horizon. Parent material is loess over pedisediment and till. Subsoils are silty clay loam. Soils have a water table within 2 to 4 feet of the surface during the period February through April in normal years. Soil series associated with this site include Richview. (NCSS, 2018; SSS NRCS OSD, 2018).

Table 4. Representative soil features

Parent material	(1) Loess (2) Drift
Surface texture	(1) Silt loam
Family particle size	(1) Fine-silty
Drainage class	Moderately well drained
Permeability class	Moderately slow
Soil depth	183 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	20.32 cm
Sodium adsorption ratio (Depth not specified)	0–5
Soil reaction (1:1 water) (Depth not specified)	4.5–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–1%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The MLRA lies within the transition zone between the eastern deciduous forests and the tallgrass prairies. The heterogeneous topography of the area results in variable microclimates and fuel matrices that in turn are able to support prairies, savannas, woodlands, and forests. Upland Prairies form an aspect of this vegetative continuum. This ecological site occurs on upland upper to mid slopes.

The reference plant community was characterized as a tallgrass prairie unit dominated by little and big bluestem, Indian grass and a wide variety of prairie wildflowers. Fire plays a role in the maintenance of this mesic prairie, with an average fire frequency of every two to five years. Ignition sources included summertime lightning strikes from convective storms and bimodal, human ignitions during the spring and fall seasons. Native Americans regularly set fires to improve sight lines for hunting, driving large game, improving grazing and browsing habitat, agricultural clearing, and enhancing vital ethnobotanical plants (Barrett 1980). Woody species can become more abundant in the absence of fire. These periodic fires removed the litter, and stimulated the growth and flowering of the grasses and forbs. During fire free intervals, woody understory species increased and the herbaceous understory diminished. The return of fire would open up the prairies again and stimulate the abundant ground flora species.

(Anderson, 1975; Brugam et.al., 2016; White, 1978).

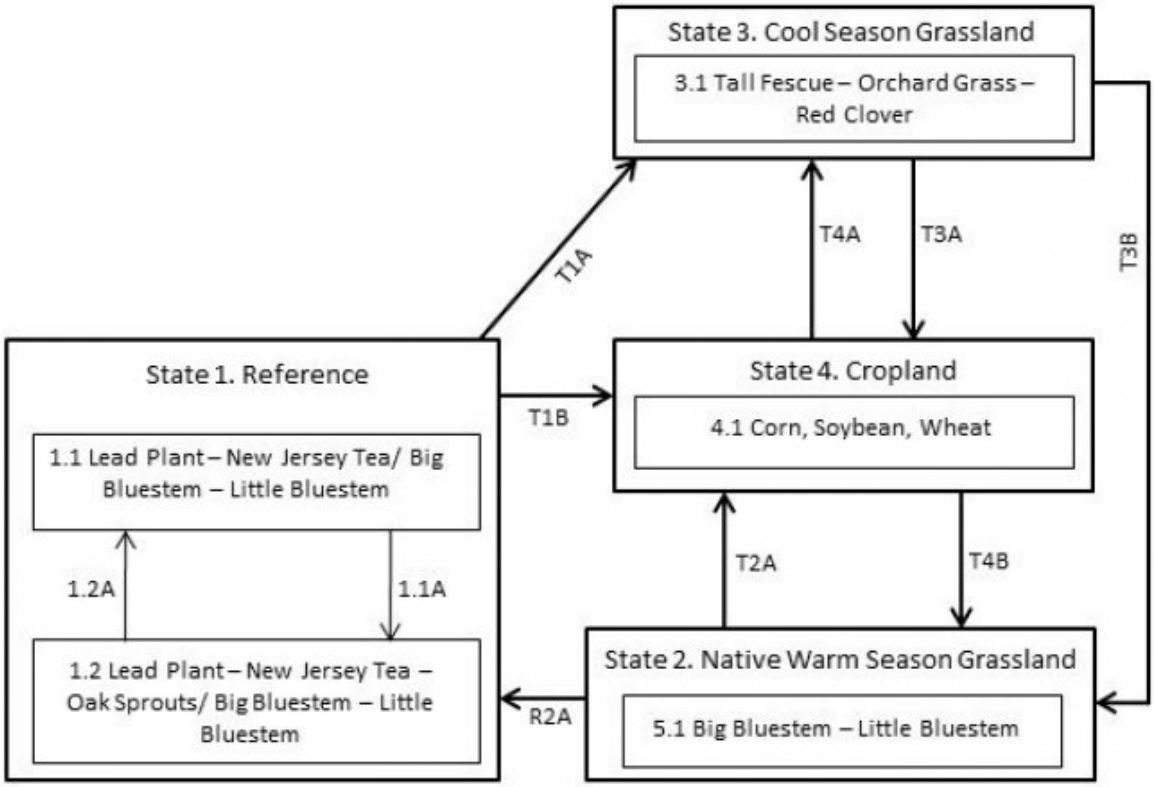
Upland Prairies were also subjected to disturbances from grazing by native large herbivores, such as bison (Bos bison), prairie elk (Cervus elaphus), and white-tailed deer (Odocoileus virginianus). (Anderson, 1982). This activity served a more limited role, compared to fire, in impacting community composition and structure but likely contributed to woody species reduction.

Today, most Upland Prairies have been converted to agricultural production. Corn (*Zea mays* L.) and soybeans (*Glycine max* (L.) Merr.) are the dominant crops grown, but small patches of forage land may be present. Disturbed remnants that do exist show evidence of indirect anthropogenic influences from fire suppression and non-native species invasion. A return to the historic plant community may not be possible following extensive land modification, but long-term conservation agriculture or prairie reconstruction efforts can help to restore some biotic diversity and ecological function.

A provisional state and transition diagram is depicted in Figure 2. Detailed descriptions of each state, transition, plant community, and pathway follow the model. This model is based on historical data, current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios may not be included. It may change as knowledge increases.

State and transition model

Upland Prairie, R113XY904IL



Code	Event/Activity/Process
T1A	Tillage; vegetative seeding; pest management; grassland management
T1B, T3A, T2A	Tillage; conservation cropping system; pest management
T4A	Vegetative seeding ; grassland management
T3B, T4B	Vegetative seeding; prescribed fire; grassland management
1.1A	Fire-free interval 10+ years
1.2A	Fire interval 2-5 years
R2A	Vegetative seeding; prescribed fire 2-5 years

State 1
Reference

This state is a mesic prairie community dominated by big bluestem, little bluestem and forbs. This state occurs on gently sloping upland soils that have a seasonal high water table during the spring months in most years. Two phases can occur that will transition back and forth depending on fire and ponding frequencies. Longer fire free intervals will allow woody species to increase such as silky dogwood and oak sprouts. When fire intervals shorten these woody species will decrease. This state is extremely rare. Nearly all sites have been converted to cool season grassland and cropland.

Dominant plant species

- leadplant (*Amorpha canescens*), shrub
- New Jersey tea (*Ceanothus americanus*), shrub
- big bluestem (*Andropogon gerardii*), grass
- little bluestem (*Schizachyrium scoparium*), grass

Community 1.1
Lead Plant – New Jersey Tea/ Big Bluestem – Little Bluestem

Dominant plant species

- leadplant (*Amorpha canescens*), shrub
- New Jersey tea (*Ceanothus americanus*), shrub
- big bluestem (*Andropogon gerardii*), grass
- little bluestem (*Schizachyrium scoparium*), grass

Community 1.2
Lead Plant – New Jersey Tea – Oak Sprouts/ Big Bluestem – Little Bluestem

Dominant plant species

- leadplant (*Amorpha canescens*), shrub
- New Jersey tea (*Ceanothus americanus*), shrub
- oak (*Quercus*), shrub
- big bluestem (*Andropogon gerardii*), grass
- little bluestem (*Schizachyrium scoparium*), grass

Pathway 1.1A
Community 1.1 to 1.2

Fire-free interval 10+ years

Pathway 1.2A
Community 1.2 to 1.1

Fire interval 2-5 years

State 2
Native Warm Season Grassland

Conversion from the Cool Season Grassland (State 3) or the Cropland (State 4) to this state is increasing due to renewed interest in warm season grasses as a supplement to cool season grazing systems or as a native restoration activity. This state is the most easily transformable state back to a reference state. Substantial restoration time and management inputs will be needed.

Dominant plant species

- big bluestem (*Andropogon gerardii*), grass
- little bluestem (*Schizachyrium scoparium*), grass

State 3
Cool Season Grassland

Conversion of other states to non-native cool season species such as tall fescue (*Schedonorus arundinaceus* (Schreb.) Dumort., nom. cons.) and red clover (*Trifolium pratense* L.) has been common in the MLRA. A return to the reference state may be impossible, requiring a very long term series of management options.

Dominant plant species

- tall fescue (*Schedonorus arundinaceus*), grass
- orchardgrass (*Dactylis glomerata*), grass
- red clover (*Trifolium pratense*), other herbaceous

State 4
Cropland

This is the dominant state that exists currently with intensive cropping of corn (*Zea mays* L.), soybeans (*Glycine max* (L.) Merr.), and common wheat (*Triticum aestivum* L.) occurring. Some conversion to cool season hay land occurs for a limited period of time before transitioning back to cropland. Limited acres are sometimes converted to native warm season grassland.

Dominant plant species

- corn (*Zea mays*), grass
- common wheat (*Triticum aestivum*), grass
- soybean (*Glycine max*), other herbaceous

Transition T1A
State 1 to 3

Tillage; vegetative seeding; pest management; grassland management

Transition T1B
State 1 to 4

Tillage; conservation cropping system; pest management

Restoration pathway R2A
State 2 to 1

Vegetative seeding; prescribed fire 2-5 years

Transition T2A
State 2 to 4

Tillage; conservation cropping system; pest management

Transition T3B
State 3 to 2

Vegetative seeding; prescribed fire; grassland management

Transition T3A
State 3 to 4

Tillage; conservation cropping system; pest management

Transition T4B
State 4 to 2

Vegetative seeding; prescribed fire; grassland management

Transition T4A
State 4 to 3

Vegetative seeding ; grassland management

Additional community tables

Inventory data references

No field plots were available for this site. A review of the scientific literature and professional experience were used to approximate the plant communities and ecological dynamics for this provisional ecological site. Information for the state-and-transition model was obtained from the same sources. All community phases are considered provisional based on the sources identified in ecological site description.

Other references

Relationship to other established ecological classifications:
Biophysical Setting (LANDFIRE, 2018); the reference community of this ecological site is most similar to: Central Tallgrass Prairie (CES205.683).

National Vegetation Classification System (NatureServe, 2018): the reference community of this ecological site is most similar to the following NVC Association: Andropogon gerardii – Sorghastrum nutans – (Sporobolus heterolepis) – Liatris spp. – Ratibida pinnata Grassland; CEGL002203.

Illinois Natural Areas Survey (INAS) (White, 1978); the reference community of this ecological site is most similar to: INAS Community Class – Prairie; Natural community – Mesic Prairie

Contributors

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Approval

Suzanne Mayne-Kinney, 5/17/2024

Acknowledgments

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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	05/12/2025
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:

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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:**
