USDA Natural Resources Conservation Service

# Ecological site R103XY034MN
# Floodplain Marsh

Last updated: 10/04/2023
Accessed: 05/05/2024

## 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): 103X–Central Iowa and Minnesota Till Prairies

MLRA 103 is in Minnesota (56 percent) and Iowa (44 percent) and consists of approximately 18 million acres. It is in the Western Lake Section of the Central Lowland Province of the Interior Plains in an area known as the "Des Moines Lobe" of the Wisconsin-age ice sheet. The MLRA is mostly on a young, nearly level to gently rolling, glaciated till plain that has moraines and glacial lake plains in some areas. The plain is covered with glacial till, outwash, and glacial lake deposits. Recent alluvium consisting of clay, silt, sand, and gravel fill the bottoms of most of the major river valleys. Paleozoic bedrock sediments, primarily shale and limestone, underlie the glacial deposits in most of the area.

The annual precipitation increases from northwest to southeast. Most of the rainfall occurs as high-intensity, convective thunderstorms during the summer. Two-thirds or more of the precipitation falls during the freeze-free period. Snowfall is common in winter. Ground water supplies are adequate for the domestic, livestock, municipal, and industrial needs. Nearly all of this area is farmland, and about four-fifths is cropland.

## Classification relationships

Major Land Resource Area (MLRA): Central Iowa and Minnesota Till Prairies (103) (USDA Handbook 296, 2006)

USFS Subregions: North Central Glaciated Plains Section (251B); Upper Minnesota River-Des Moines Lobe (251BA) and Southern Des Moines Lobe (251Be) Subsections (Cleland et al. 2007)

## Ecological site concept

The Floodplain Marsh ecological site occurs on floodplains along rivers and drainageways. This site is influenced by hydrologic interactions with the adjacent river which influences the depth of soil saturation. Soils are very poorly drained. Flooding and ponding occurs frequently. The plant community is highly variable depending on hydrology but consists of native wet grasses and scattered hardwoods.

## Associated sites

| | |
|---|---|
| F103XY032MN | **Loamy Floodplains**<br>The Loamy Floodplains ecological site is located on medium textured alluvium throughout MRLA 103. Soils textures include loam, silt loam, sandy loam, and fine sandy loam. Some areas within this ecological site will exhibit long-term flooding (7-30 days). |
| F103XY033MN | **Wet Floodplains**<br>The Wet Floodplains ecological site occurs in both floodplains and depressions and is extensive throughout MLRA 103. Soils include both Mollisols and Entisols, and soil drainage class is very poorly drained to poorly drained. Areas within this site flood frequently, and some areas may incur very long periods of flooding (over 30 days). |

## Similar sites

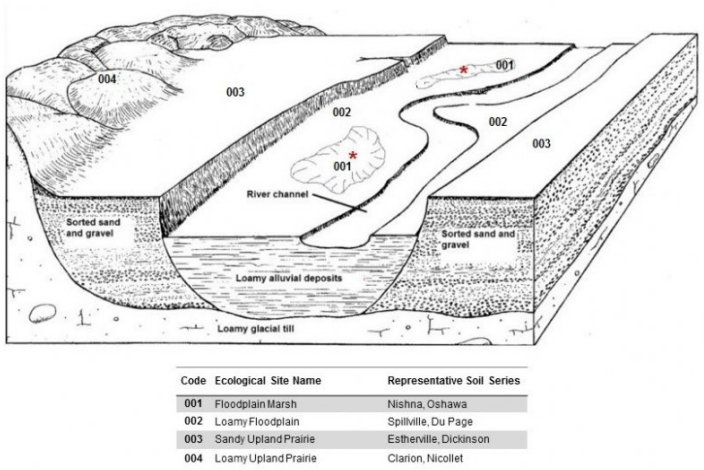
| | |
|---|---|
| R103XY035MN | **Organic Floodplain Marsh**<br>The Organic Floodplain Marsh ecological site is located on floodplains and depressions primarily in the northern portion of MLRA 103. Soils are very poorly drained and derived from organic parent materials. This site can flood and pond frequently for long periods of time. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | (1) *Ulmus*<br>(2) *Acer saccharinum* |
| Shrub | (1) *Vitis* |
| Herbaceous | (1) *Carex typhina* |

## Physiographic features

The Floodplain Marsh ecological site occurs adjacent to rivers or streams and this site is characterized by a hydrological relationship to the nearby waterbody. The depth to saturation fluctuates based on the river or stream levels and influences the plant community composition and structure. This site can flood or pond frequently, especially during the wetter months of the year.




| Code | Ecological Site Name | Representative Soil Series |
|---|---|---|
| 001 | Floodplain Marsh | Nishna, Oshawa |
| 002 | Loamy Floodplain | Spillville, Du Page |
| 003 | Sandy Upland Prairie | Estherville, Dickinson |
| 004 | Loamy Upland Prairie | Clarion, Nicollet |

**Figure 1. Block diagrams of the representative Floodplain Marsh and associated ecological sites.**

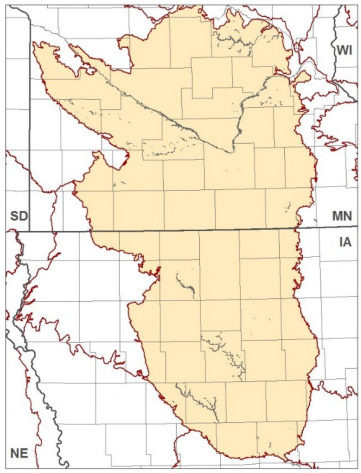



**Figure 2. Distribution of the Floodplain Marsh ecological site within MLRA 103. In many cases, the data set is not spatially consistent across political boundaries due to the method by which soils were mapped; e.g. due to county subsets.**

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Flood plain<br>(2) Depression |
| Runoff class | Negligible to very low |
| Flooding duration | Very brief (4 to 48 hours)  to long (7 to 30 days) |
| Flooding frequency | None to frequent |
| Ponding duration | Very long (more than 30 days) |
| Ponding frequency | None to frequent |
| Elevation | 689–1,837 ft |
| Slope | 0–2% |
| Water table depth | 6–72 in |
| Aspect | Aspect is not a significant factor |

## Climatic features

The soil temperature regime of MLRA 103 is classified as “mesic” (i.e., mean annual soil temperature between 46 and 59°F). The average freeze-free period of this ecological site is 149 days, while the frost-free period is 130 days. Average mean annual precipitation is 33 inches, which includes rainfall plus the water equivalent from snowfall. Cold air drainage from above and the fact that wet soils are generally colder than dry soils make this site colder than adjacent, upslope sites. As a result, snow and frost remain longer in the spring, thus resulting in shorter growing seasons than the adjacent uplands

**Table 3. Representative climatic features**

| | |
|---|---|
| Frost-free period (characteristic range) | 126-135 days |
| Freeze-free period (characteristic range) | 147-152 days |
| Precipitation total (characteristic range) | 30-36 in |
| Frost-free period (actual range) | 124-136 days |
| Freeze-free period (actual range) | 137-160 days |
| Precipitation total (actual range) | 30-38 in |
| Frost-free period (average) | 130 days |
| Freeze-free period (average) | 149 days |
| Precipitation total (average) | 33 in |

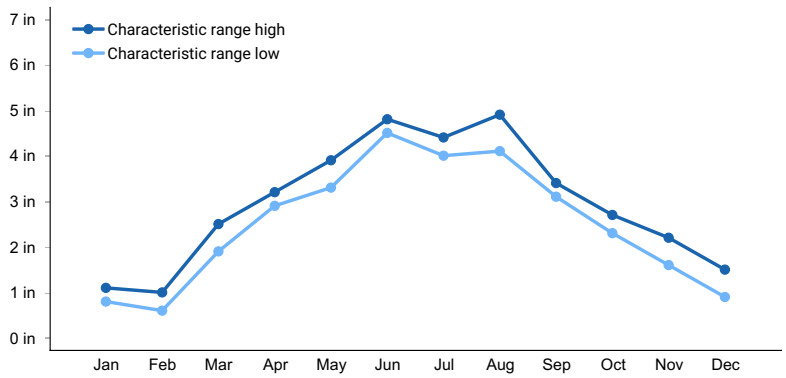



**Figure 3. Monthly precipitation range**

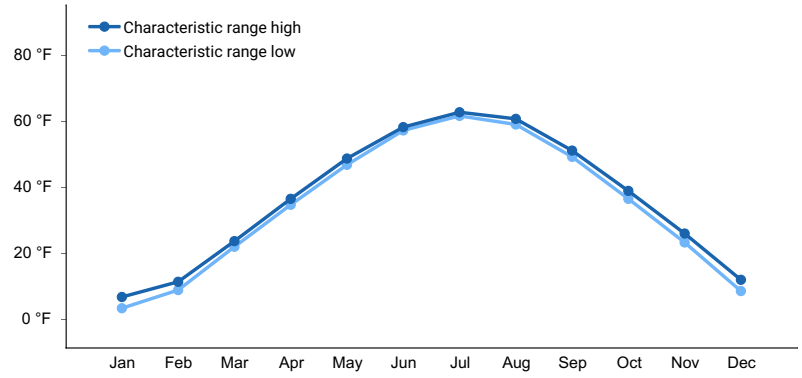



**Figure 4. Monthly minimum temperature range**

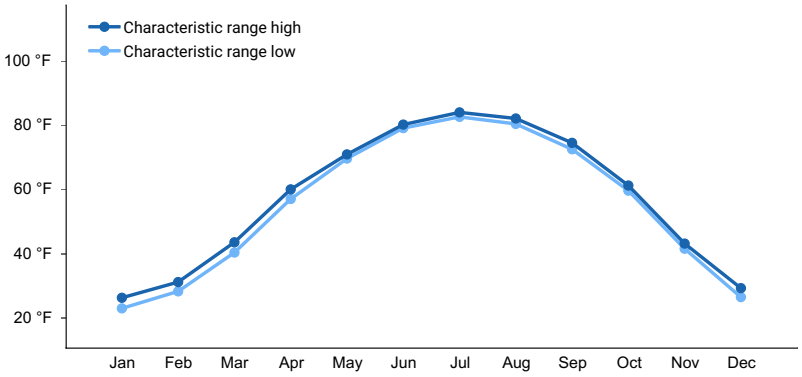



**Figure 5. Monthly maximum temperature range**

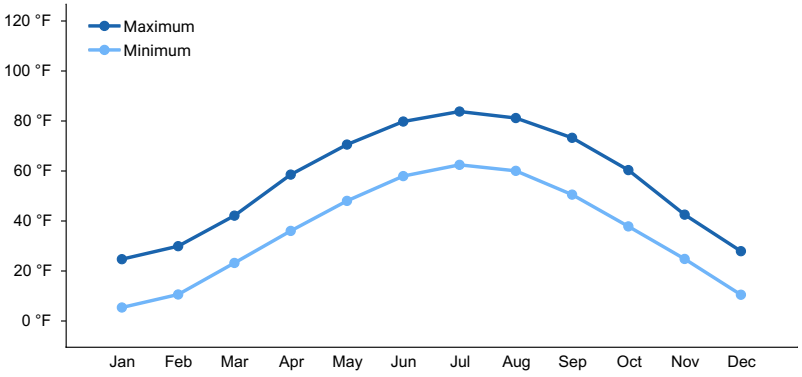



**Figure 6. Monthly average minimum and maximum temperature**

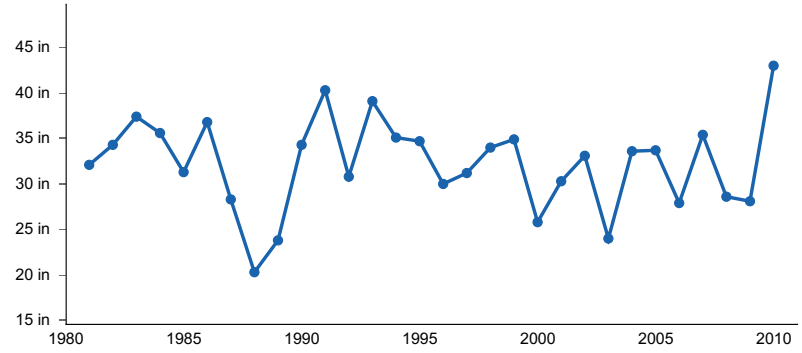



**Figure 7. Annual precipitation pattern**

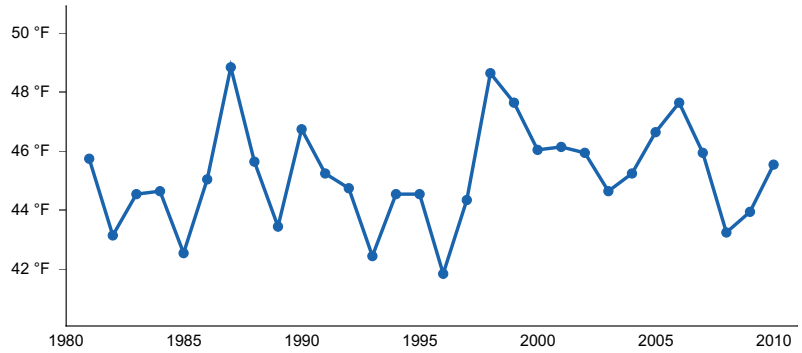



**Figure 8. Annual average temperature pattern**

## Climate stations used

- (1) BOONE [USC00130807], Boone, IA
- (2) STEWART [USC00218025], Brownton, MN
- (3) NEW ULM 2 SE [USC00215887], New Ulm, MN
- (4) WASECA EXP STN [USC00218692], Waseca, MN
- (5) CHASKA [USC00211465], Chaska, MN
- (6) DELANO [USC00212088], Delano, MN

## Influencing water features

With natural hydrology intact, the Floodplain Marshes ecological site are heavily influenced by the river or stream that is slightly below them, and level of a regional water table. During most months, especially the warmer ones, this site receives precipitation and runoff, even though these are a minor water sources compared to the adjacent river or stream.

During the spring months many of these soils are flooded. They are classified as endosaturated. The water table is typically at or above the soil surface for a time during the spring due to flooding and/or ponding and may drop to as low as four or more feet later in the growing season during dry periods. In the hydrogeomorphic (HGM) classification system, this site is considered a part of a riverine complex. This site has a Cowardin Hydrologic classification of Palustrine, Broad-Leaved Deciduous Forested Wetland, Seasonally Flooded. It also has a United States Army Corps of Engineers Wetland Plant Community of A; Seasonally Flooded Basins.

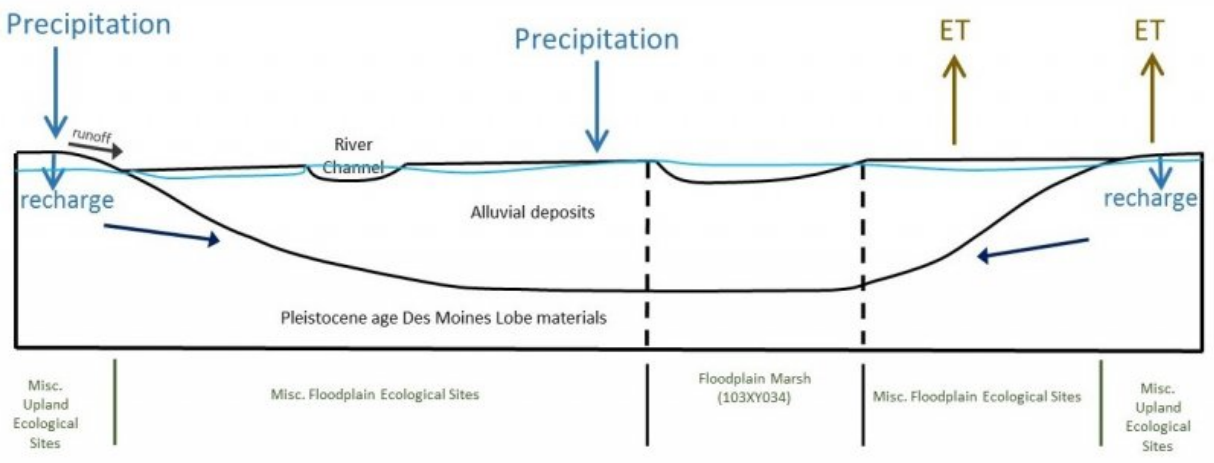



**Figure 9. Representation of hydrological factors in a typical area of the Floodplain Marsh and associated ecological sites on the Des Moines Lobe (MLRA 103).**

## Soil features

The soils of the Floodplain Marshes ecological site are alluvial in origin and are of a drainage class and moisture status that makes them hydric. They are composed of mineral soil material, often have buried A horizons or

irregular decreases in carbon from the surface, and stratified textures. There are two basic subdivisions of taxonomy: Mollisols and Entisols. The Mollisols are the dominant soil order of this site. These soils have thick mollic epipedons largely due to slope wash and alluvial deposition and not necessarily due to development under prairie vegetation like the majority of Mollisols in other settings. The Entisols have thinner epipedons since they have either just had recent alluvium deposited on top of them or have been eroded by flowing river water. The majority of the Mollisols in this group, like Oshawa, Mayer, Nishna and Suckercreek have a typic mollic epipedon. The surface texture is variable with most any texture possible in the fine, fine loamy, coarse-loamy, fine-silty, and sandy family. The subsurface, below the mollic epipedon, tends to be stratified, sometimes very strongly stratified and highly variable. The parent materials are alluvial materials derived mostly from original Des Moines lobe materials, except for where a river or stream crosses the MLRA boundary from an adjacent one.

The soils included are mapped in riverine environments in MLRA103 and are either Mollisols or Entisols. Regardless of the soil morphology, these could have historically supported woodland or forest vegetation. The soils of this site that are Mollisols could largely be in this order simply because alluvial deposition and slope wash have increased the thickness of the epipedon. In MLRA 103, just because a soil is in the Mollisol order, does not mean that it supported prairie vegetation.

The soil series of this site are Wabash, Suckercreek, Rauville, Oshawa, Nishna, Mayer, Kalmarville, Fluvaquents, Aquents

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Alluvium |
| Surface texture | (1) Clay loam<br>(2) Loam<br>(3) Silty clay loam<br>(4) Sandy loam |
| Family particle size | (1) Fine<br>(2) Fine-loamy<br>(3) Coarse-loamy<br>(4) Fine-silty<br>(5) Sandy |
| Drainage class | Very poorly drained |
| Permeability class | Very slow to very rapid |
| Soil depth | 80 in |
| Surface fragment cover <=3" | 0% |
| Surface fragment cover >3" | 0% |
| Available water capacity (0-60in) | 6–12 in |
| Calcium carbonate equivalent (0-40in) | 0–30% |
| Soil reaction (1:1 water) (0-40in) | 5.1–8.4 |
| Subsurface fragment volume <=3" (0-40in) | 0–30% |
| Subsurface fragment volume >3" (0-40in) | 0–30% |

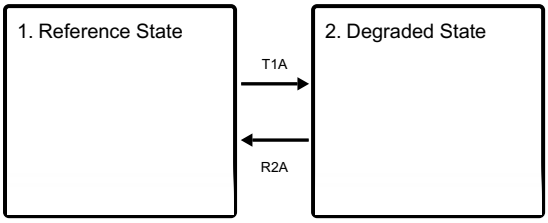
## Ecological dynamics

The Floodplain Marsh ecological site is characterized by a hydrological relationship to a stream or river. Vegetation includes native, wet-tolerant grasses and forbs with scattered hardwood trees. Today, many of these sites have been destroyed or disturbed by the establishment of invasive species or through conversion to agriculture. The state and transition model (STM) consists of the Reference State and the Degraded Marsh State. The Reference State describes a natural community with wet-tolerant native grasses and scattered hardwoods. State 2 is a Degraded

Marsh State in which disturbances have modified the plant community composition and structure. Hydrological alterations, unmanaged grazing, and invasive species are common disturbance triggers. At this time, an agricultural state is not included in the model. Due to the limitations of frequent flooding and soil wetness, most of these sites in MLRA 103 were not drained.

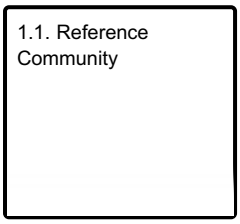
## State and transition model

**Ecosystem states**

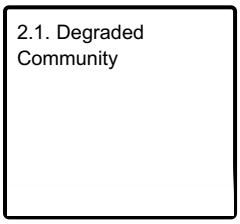



**T1A** - Site disturbance altering the natural plant community

**State 1 submodel, plant communities**




**State 2 submodel, plant communities**




## State 1
## Reference State

Because the Floodplain Marsh ecological site occurs along rivers and drainageways, the plant community is constantly influenced by flooding and soil moisture variations. Flooding and ponding can be frequent during the wetter seasons of the year. This state consists of wet-tolerant native grasses and forbs along with scattered hardwood trees. Plant community structure and composition will vary depending on the depth and duration of flooding. Severe flooding has the potential to modify plant community composition. In the early successional stage, grasses and shrubs will dominant. As the plant community ages, trees will increase in number and density.

### Dominant plant species

- silver maple (*Acer saccharinum*), tree
- elm (*Ulmus*), tree
- grape (*Vitis*), shrub
- cattail sedge (*Carex typhina*), grass
- softstem bulrush (*Schoenoplectus tabernaemontani*), grass
- rice cutgrass (*Leersia oryzoides*), grass

## Community 1.1
## Reference Community

Native vegetation is a mix of water tolerant grass species with scattered hardwood trees. Sedges, bulrushes, rice cut grass, and rushes are common. Species density and composition will vary by flooding duration and frequency.

**Dominant plant species**

- silver maple (*Acer saccharinum*), tree
- elm (*Ulmus*), tree
- grape (*Vitis*), shrub
- softstem bulrush (*Schoenoplectus tabernaemontani*), grass
- cattail sedge (*Carex typhina*), grass
- rice cutgrass (*Leersia oryzoides*), grass

### State 2
### Degraded State

This State is characterized by a disturbed and degraded plant community condition with mixed hardwoods and non-native species. A key characteristics of this state includes the presence, and often dominance, of non-native species. The structure and composition of the natural plant community has been altered from the reference condition.

**Dominant plant species**

- silver maple (*Acer saccharinum*), tree
- elm (*Ulmus*), tree
- reed canarygrass (*Phalaris arundinacea*), grass
- garlic mustard (*Alliaria petiolata*), other herbaceous

### Community 2.1
### Degraded Community

This plant community exhibits an increase in woody species and invasive plants. Tree species may include silver maple, American elm, and slippery elm. Western poison ivy, wild grape, garlic mustard, and cattail sedge may be present. Various understory species may be on these sites depending on the disturbance regime and hydrology. Invasive plants may be dominant, especially in the ground layer.

**Dominant plant species**

- silver maple (*Acer saccharinum*), tree
- elm (*Ulmus*), tree
- reed canarygrass (*Phalaris arundinacea*), grass
- garlic mustard (*Alliaria petiolata*), other herbaceous

### Transition T1A
### State 1 to 2

The transition mechanism to the Degraded State is substantial ecological disturbance that negatively impacts the natural plant community. Examples are grazing, altered hydrology, and invasive plant species.

### Restoration pathway R2A
### State 2 to 1

Restoration includes controlling non-native vegetation, protecting the site from disturbances, and restoring any alterations to hydrology.

### 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 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 these plots and the sources identified in ecological site description.

## Other references

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Minnesota Department of Natural Resources. 2005. Field Guide to the Native Plant Communities of Minnesota: the Prairie Parkland and Tallgrass Aspen Parklands Provinces. Ecological Land Classification Program, Minnesota County Biological Survey, and Natural Heritage and Nongame Research Program. St. Paul, Minnesota.

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## Contributors

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## Approval

Suzanne Mayne-Kinney, 10/04/2023

## 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 | 05/05/2024 |
| 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:**