

# Ecological site F111XC003IN

## Sandy Interdune

Accessed: 05/09/2024

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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.

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 in depressions on glacial till plains, land plains, on sandy parent material. It is located on the footslopes, toeslopes, and back slopes with less than 7% slope. Drainage of the soils on this site ranges from somewhat poorly drained to moderately well drained. There are 5 distinct states: 1) the oak woodland state (reference state); 2) agriculture state; 3) early successional forest state; 4) high graded state; 5) fire suppressed state. Fire intensity and frequency was the principle driver for this site, with low intensity ground fires every (4-17) years being common. Since settlement, most of this site has been converted to agriculture with the majority being row crop agriculture. The most common practice involves grain rotations between corn and soybeans.

### Associated sites

R111XC001IN	<b>Sand Dune</b> Higher on the landscape and in a convex position.
R111XC002IN	<b>Wet Sandy Interdune</b> Lower on the landscape and wetter. Herbaceous dominated in reference condition.

### Similar sites

F111XC007IN	<b>Glacial Ridge</b> On a convex landscape position with more mesic tree species present.
F111XC009IN	<b>Overflow</b> Higher canopy cover of trees, generally exceeds 60%.

Table 1. Dominant plant species

Tree	(1) <i>Quercus velutina</i> (2) <i>Quercus alba</i>
Shrub	(1) <i>Cornus florida</i>
Herbaceous	(1) <i>Andropogon gerardii</i> (2) <i>Sorghastrum nutans</i>

### Physiographic features

This site is located in the 111C - Indiana and Ohio Till plain, Northwestern Part Major Land Resources area (MLRA). This site is classified as an upland site located in depressions on outwash plains, lake plains, and developed on sandy material. Drainage is characterized somewhat poorly to moderate well drained.

**Table 2. Representative physiographic features**

Landforms	(1) Interdune (2) Depression
Slope	0–3%
Water table depth	15–71 cm
Aspect	Aspect is not a significant factor

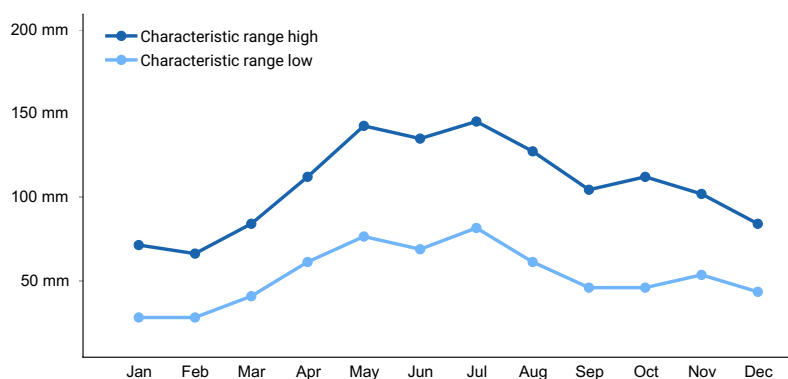
## Climatic features

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.

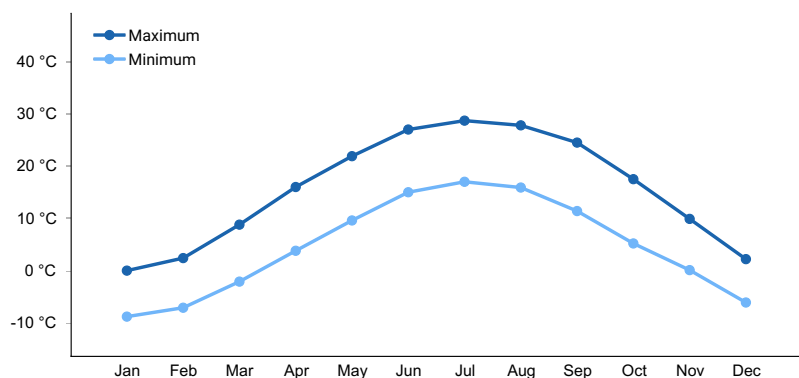
The average first frost should occur around October 12 and the last freeze of the season should occur around April 25.

**Table 3. Representative climatic features**

Frost-free period (average)	160 days
Freeze-free period (average)	189 days
Precipitation total (average)	1,041 mm



**Figure 1. Monthly precipitation range**



**Figure 2. Monthly average minimum and maximum temperature**

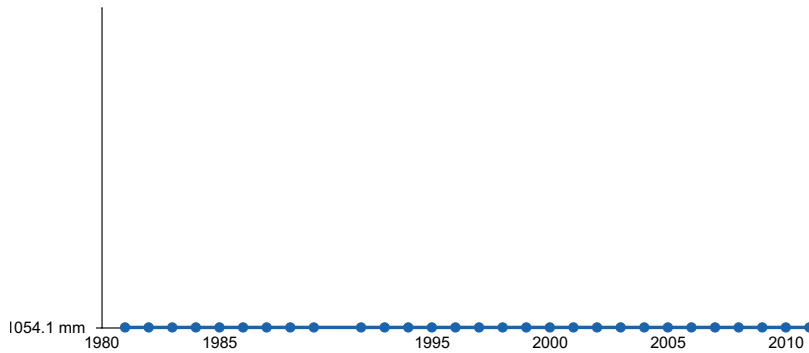


Figure 3. Annual precipitation pattern

### Climate stations used

- (1) DELPHI 2 N [USC00122149], Delphi, IN
- (2) LOGANSPORT CICOTT ST [USC00125117], Logansport, IN
- (3) PLYMOUTH [USC00126989], Plymouth, IN
- (4) RENSSELAER [USC00127298], Rensselaer, IN
- (5) ROCHESTER [USC00127482], Rochester, IN
- (6) CHALMERS 5 W [USC00121417], Chalmers, IN
- (7) FRANCESVILLE [USC00123078], Francesville, IN
- (8) GOSHEN 3SW [USC00123418], Goshen, IN
- (9) WARSAW [USC00129240], Warsaw, IN
- (10) WEST LAFAYETTE 6 NW [USC00129430], West Lafayette, IN
- (11) WINAMAC 2SSE [USC00129670], Winamac, IN
- (12) LAGRANGE 1 S [USC00124730], LaGrange, IN
- (13) LAKEVILLE [USC00124782], Lakeville, 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 Sandy Interdune ecological site, the soils of this site are a dark gray at the surface with a thick sandy layer. The largest soil component in this site is Morocco.

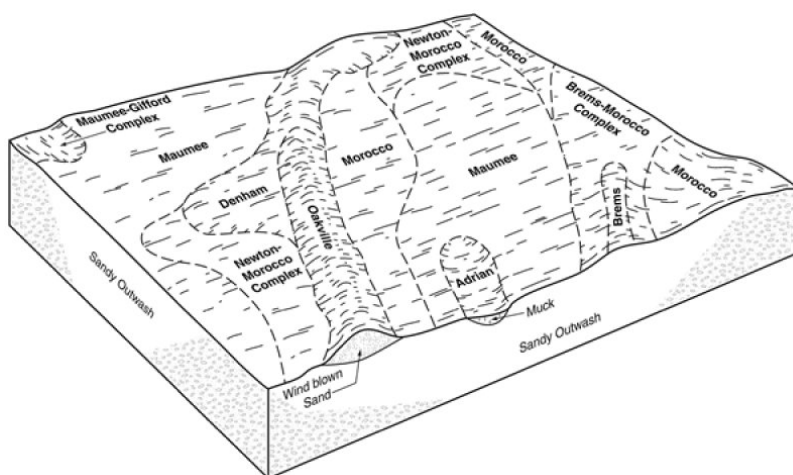


Figure 5. Morocco Block Diagram

Table 4. Representative soil features

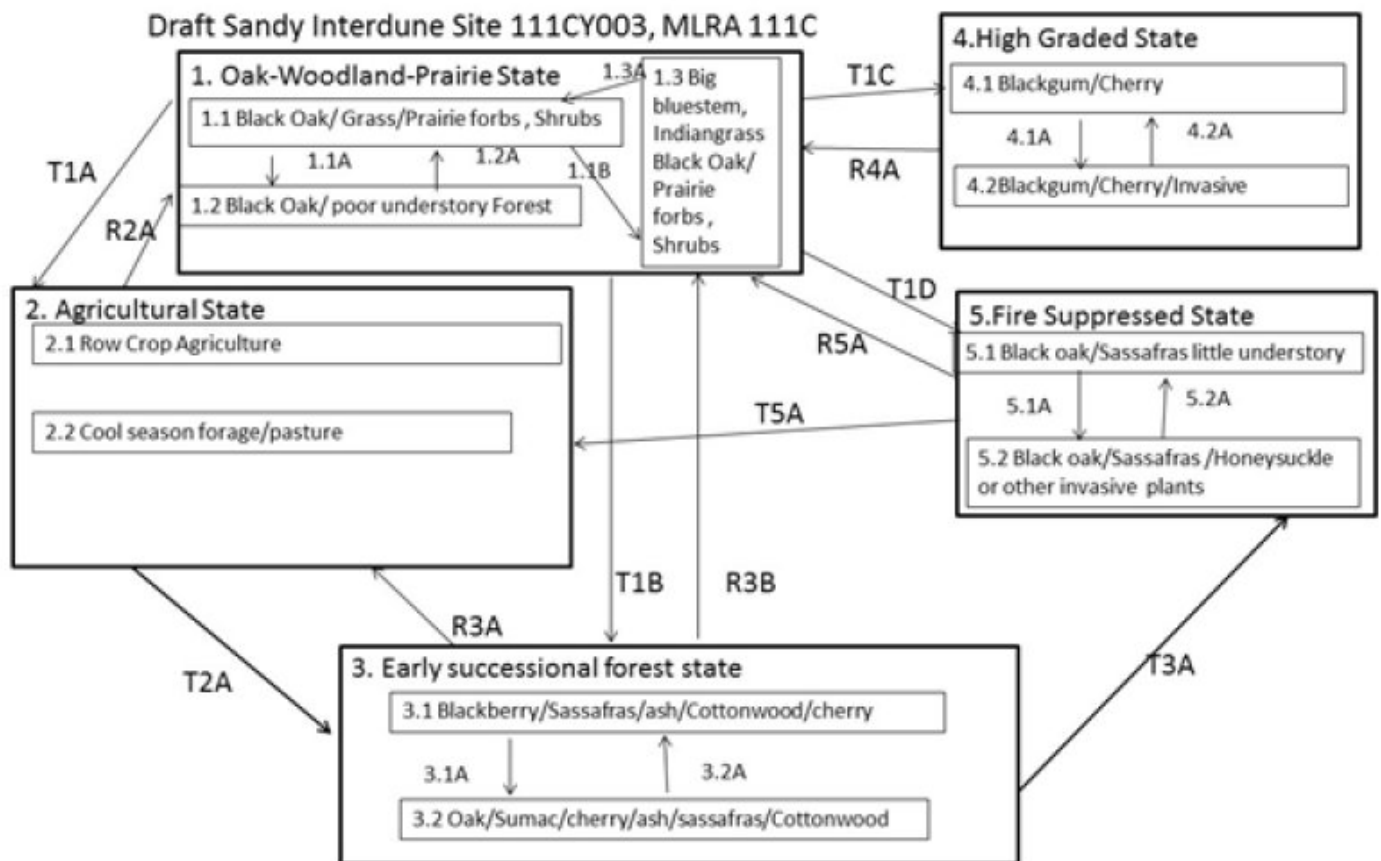
Parent material	(1) Eolian sands–sandstone
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Surface texture	(1) Loamy fine sand (2) Loamy sand
Family particle size	(1) Sandy
Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Rapid
Surface fragment cover <=3"	0–5%
Subsurface fragment volume <=3" (Depth not specified)	0–10%

## Ecological dynamics

The historic plant community of the Sandy Interdune ecological site is an oak woodland. This site is characterized as being a mostly woody species dominated site adjacent to prairies and savannas and formed part of the continuum between prairie and forest. Fire intensity and frequency was the principle driver for this site, with low intensity ground fires every (4-17) years being common. Longer fire return intervals would lead the site to being a forest type. Canopy cover would range from 21-60% for the reference state community. Since settlement, most of this site has been converted to agriculture with the majority being row crop agriculture. The most common practice involves grain rotations between corn and soybeans.

## State and transition model



Refer to narrative in the Plant Community Section for detailed descriptions of these transitions/pathways. **1.1A/1.3A/T1D** No management & no fire **1.1B-Fire**; **1.2A** Timber stand improvement (TSI); **T1A /R3A/T5A** Clearing, Site Prep & Seeding; **T1B** – Clear-cut & Succession; **T1C** Selective Harvest/no TSI. **R2A-** Planting & TSI; **T2A**– Abandonment/poor mgt; **R3B-** Long term succession & TSI measures; **3.1A** – Succession & planting oak if absent; **3.2A** Cutting or disturbance; **T3A/T4B** - Fire Suppression; **R4A** – TSI & Planting; **R5A** Prescribed harvest & fire

Figure 6. F111CY003IN - Sandy Interdune State and Transition

## State 1 Oak Woodland-Prairie State

This is the reference or diagnostic plant community for this site. In reference condition, this site was an oak woodland with the understory comprised largely of herbaceous prairie species. Fire intensity and frequency was the major disturbance factor for the maintenance of this site. Fires occurred about every 20 years. Tree canopy cover ranged from 21-60% and tree height maxed out at about 80ft. Black oak was the most dominant tree, but white oak, hickory species, and black cherry were also present. Removal of fire or the lengthening of the return interval would move this site toward state 5, a forested state. Tree harvest management would move this site to either state 3 or 4.

### **Community 1.1** **black oak/prairie herbaceous species woodland**

This community phase was an oak woodland with the understory comprised largely of herbaceous prairie species. Fire intensity and frequency was the major disturbance factor for the maintenance of this site. Fires occurred about every 20 years. Tree canopy cover ranged from 21-60% and tree height maxed out at about 80ft. Black oak was the most dominant tree, but white oak, hickory species, and black cherry were also present.

### **Community 1.2** **black oak/poor understory**

This community phase was an oak woodland but at the higher limits for tree canopy cover. The lack of fire and increase in shade have reduced the diversity and abundance of the understory.

### **Community 1.3** **prairie/black oak woodland**

This community phase was an oak woodland but at the lower limits for tree canopy cover. The short time since the last fire or more frequent fires or timber stand improvement have this phase closely resembling that of an oak savanna. Prairie grass species such as big bluestem and Indiangrass become more prominent and abundant.

## **State 2** **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 2.1** **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 2.2** **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 3** **Early Successional Forest State**

This state consists of early colonizing trees, shrubs, and herbaceous plants. This is the result of clear-cutting the reference state and succession with little to no management. The woodland and prairie phases of the reference community are lost in large part due to the lack of fire as disturbance. Long term succession and timber stand improvement measures can move this site back towards the reference state. Continued fire suppression will move this towards a forest state (#5).

### **Community 3.1** **blackberry/sassfras/ash**

This phase is characterized by early colonizing woody species, mostly shrubs and small trees. This is a result of clear cutting and succession without the use of fire. Species such as blackberry, sassafras, and ash become the dominant species. Some of the prairie herbaceous species will be present in the understory for a time, but will be eventually outcompeted.

### **Community 3.2** **oak/sumac/cherry/ash**

This phase is characterized by early colonizing woody species, but larger species start to dominate the canopy. Oak can become present again, if planted or less likely through natural distribution. Nearly all the herbaceous prairie species have disappeared from the understory and have been replaced by more shade tolerant woody species.

### **Pathway 3.2A** **Community 3.2 to 3.1**

Tree cutting or any other type of disturbance to remove some of the upper canopy trees.

### **State 4** **High Graded State**

This state is a forested state with increased tree cover (61-80%) over the reference state and the loss of most of the prairie species in the understory. The canopy tree species become dominated by less-marketable tree species that are fire intolerant. This is due to selective harvest without follow up timber stand improvement practices and lack of fire. Timber stand improvement, planting of desired tree species, and fire can restore this to the reference state.

### **Community 4.1** **blackgum/cherry**

This phase is characterized by two classes of trees. Those that have little market value as timber, such as black gum and those that are often small in numbers or size in the reference state like black cherry. The understory is still largely composed of prairie herbaceous species.

### **Community 4.2** **blackgum/cherry/invasive species**

This phase is characterized by two classes of trees. Those that have little market value as timber, such as black gum and those that are often small in numbers or size in the reference state like black cherry. The absence of disturbance or management have allowed this to develop into a forest phase with a canopy greater than 80% cover. Lack of management has the understory dominated by invasive shade tolerant species such as Asian bush honeysuckle and Callery pear

### **Pathway 4.1A** **Community 4.1 to 4.2**

No management, especially invasive species management

### **Pathway 4.2A** **Community 4.2 to 4.1**

Invasive species management. Cut and spray of non-native bush honeysuckle.

### **State 5** **Fire Suppressed State**

This state is an oak forest (81-100% canopy) state dominated by black oaks, with an increase in the amount of white oaks, hickories, and given enough time more mesophytic species like sugar maple present in the canopy. Nearly all the prairie herbaceous species are gone from the understory and replaced by more shade loving, fire intolerant woody species. Sassafras becomes common in the understory. With little to no management, the understory will often be invaded by and taken over by invasive honeysuckle species.

### **Community 5.1**

#### **black oak/sassafras/sparse understory**

This phase is an oak forest (81-100% canopy cover) dominated by black oaks. Sassafras and other more shade tolerant woody species become more abundant in the understory.

### **Community 5.2**

#### **black oak/sassafras/invaded understory**

This phase is an oak forest (81-100% canopy cover) dominated by black oaks. Sassafras and other more shade tolerant woody species become more abundant in the understory. Lack of management allows the understory to become dominated by non-native invasive species such as the many species of bush honeysuckle and Callery pear.

### **Pathway 5.1A**

#### **Community 5.1 to 5.2**

Succession in the absence of fire or tree species management.

### **Pathway 5.2A**

#### **Community 5.2 to 5.1**

Invasive species management

## **Additional community tables**

### **Other references**

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## Contributors

Tyler Staggs

## 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	
Approved by	
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:
- 
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:**
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17. **Perennial plant reproductive capability:**
-