

# Ecological site F114XA102IN

## Lacustrine Terrace Forest

Last updated: 9/26/2024  
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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): 114X–Southern Illinois and Indiana Thin Loess and Till Plain

Overview of the MLRA MLRA 114 makes up about 4,550 square miles (11,795 square kilometers). The three parts of this MRLA are mostly in the Till Plains Section of the Central Lowland Province of the Interior Plains. The western third of the western part is in the Highland Rim Section of the Interior Low Plateaus Province of the Interior Plains. The eastern half of the eastern part is in the Kanawha Section of the Appalachian Plateaus Province of the Appalachian Highlands.

Both large and small tributaries of the Ohio River dissect the nearly level to very steep glaciated uplands in this area. The major streams and rivers have well defined valleys with broad flood plains and numerous stream terraces. The flood plains along the smaller streams are narrow. Broad summits are nearly level to gently sloping. Elevation ranges from 320 feet (100 meters) on the southernmost flood plain along the Ohio River to 1,250 feet (380 meters) on the highest ridges. Local relief is mainly 10 to 50 feet (3 to 15 meters), but it can be 50 to 100 feet (15 to 30 meters) along drainageways and streams. Also, the Ohio River bluffs are as much as 300 feet (90 meters) above the river valley floor.

### Classification relationships

US Forest Service EcoRegion: 222 Eastern Broadleaf Forest (Continental) Province

Homoya's Natural Regions of Indiana: Bluegrass Region

The following NatureServe Explorer Ecological System has a high level of probability to match the ecological site found on these soils. Field verification and ESD development is needed prior to using this information for conservation planning and/or restoration initiatives: South-Central Interior Mesophytic Forest CES 202.887.

### Ecological site concept

The Sloping Lacustrine Forest site is found on sloping lacustrine soils and are a mesic hardwood forest with a substantial oak component. Species include sugar maple, northern red oak, American beech, sugar maple, white oak, tulip tree, white ash, and basswood. Understory vegetation density and composition will depend on canopy cover, micro-topography, and disturbance regime and may vary from site to site. The high-quality sites will exhibit a diverse array of native herbaceous species including numerous spring wildflowers. Understory herbaceous and shrub species present in examples of this system can vary. Stands dense tree cover have less shrub and herbaceous species while stand with more open tree canopy cover will tend to have a dense understory. The most abundant component of the shrub layer is often samplings of canopy trees.

### Associated sites

F114XA101IN	<b>Wet Lacustrine Forest</b> Wet Lacustrine Forest. These sites are very poorly drained to somewhat poorly drained.
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## Similar sites

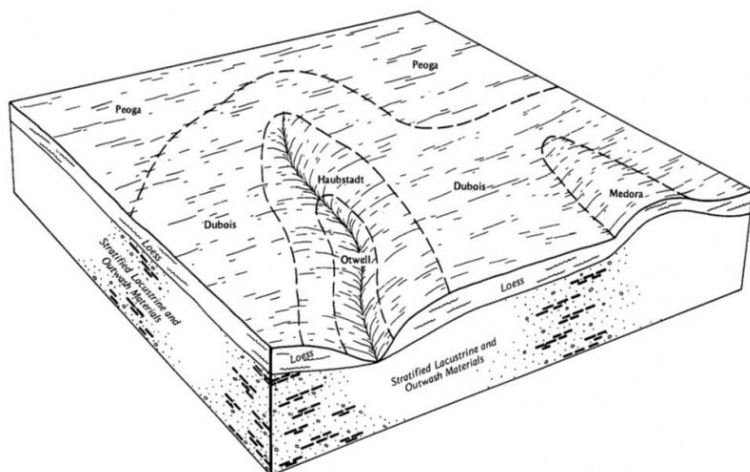
F114XA501IN	<b>Wet Till Flatwoods</b> Wet Till Forest. These sites are on till plains and share many similar species.
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**Table 1. Dominant plant species**

Tree	(1) <i>Quercus rubra</i> (2) <i>Acer saccharum</i>
Shrub	(1) <i>Viburnum acerifolium</i> (2) <i>Lindera benzoin</i>
Herbaceous	(1) <i>Asarum canadense</i> (2) <i>Galium circaezans</i>

## Physiographic features

These sites are found on stream terraces and lake plains. Slopes generally range from 8-20%.



**Figure 1. Physiographic Image – Block diagram with Dubois, Haubstadt and Otwell representing a site on the landscape.**

**Table 2. Representative physiographic features**

Landforms	(1) Valley > Terrace (2) Lake plain
Runoff class	Low to very high
Flooding frequency	None
Ponding frequency	None
Elevation	340–1,020 ft
Slope	0–20%
Water table depth	6–70 in
Aspect	Aspect is not a significant factor

## Climatic features

About 60 percent of the precipitation falls during the freeze-free period. Most of the rainfall occurs as high-intensity, convective thunderstorms during summer. Snowfall is common in winter. The freeze-free period averages about

180 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	153-158 days
Freeze-free period (characteristic range)	178-181 days
Precipitation total (characteristic range)	46-47 in
Frost-free period (actual range)	153-159 days
Freeze-free period (actual range)	177-181 days
Precipitation total (actual range)	46-47 in
Frost-free period (average)	156 days
Freeze-free period (average)	179 days
Precipitation total (average)	46 in

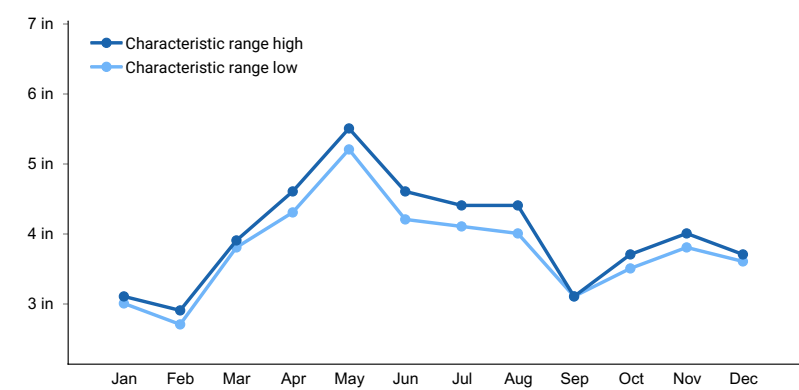


Figure 2. Monthly precipitation range

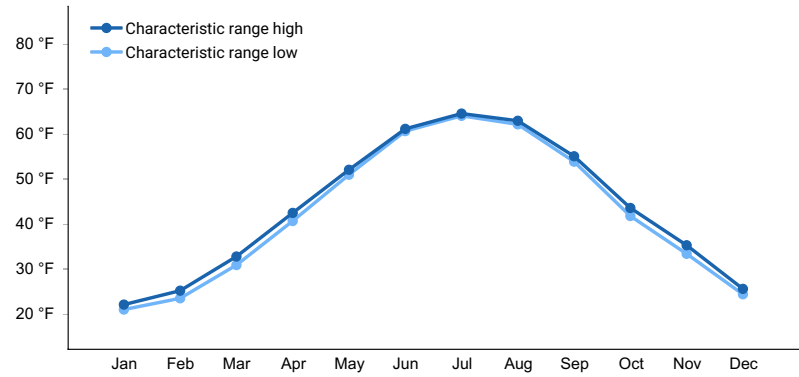


Figure 3. Monthly minimum temperature range

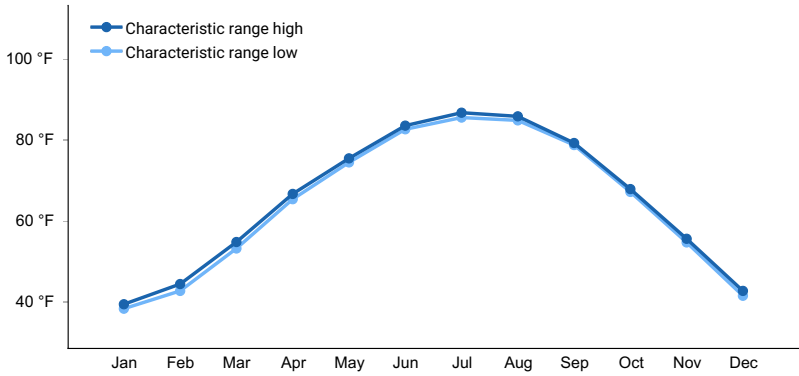
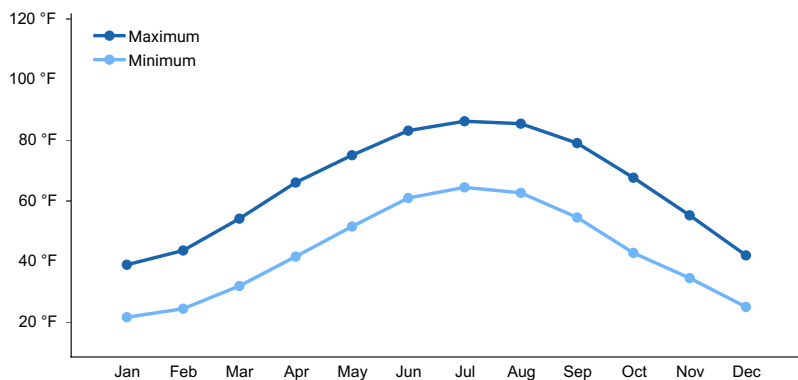
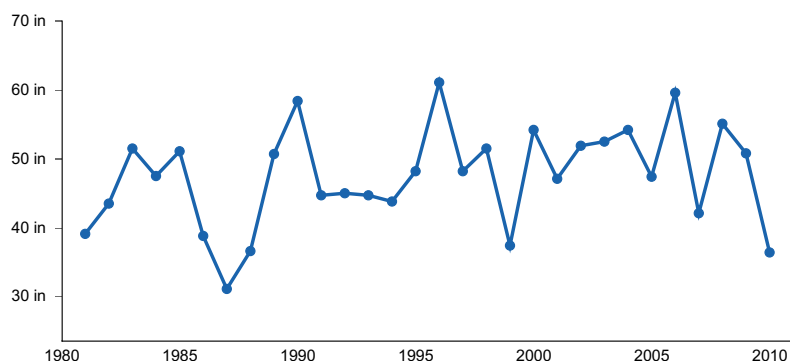


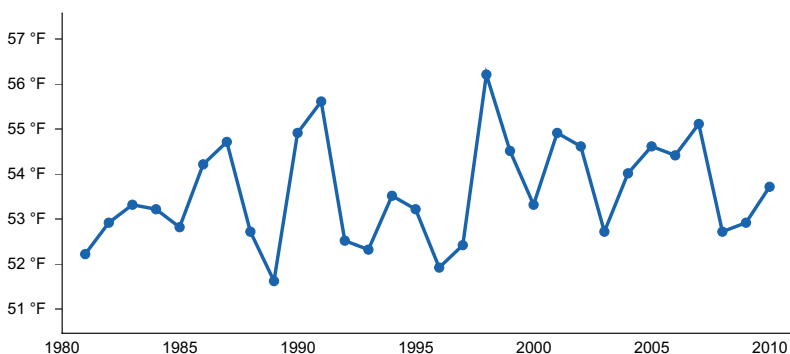
Figure 4. Monthly maximum temperature range



**Figure 5. Monthly average minimum and maximum temperature**



**Figure 6. Annual precipitation pattern**



**Figure 7. Annual average temperature pattern**

## Climate stations used

- (1) NORTH VERNON 2 ESE [USC00126435], North Vernon, IN
- (2) SEYMOUR 2 N [USC00127935], Seymour, IN
- (3) MILFORD [USC00335268], Milford, OH

## Influencing water features

This ecological site is not influenced by wetland or riparian water features. Some sites may have a seasonally high water table.

## Soil features

Soils are somewhat poorly drained to moderately well drained, and very slow to moderate permeable soils, with acidic to neutral soil reaction, that formed in glaciolacustrine deposits and lacustrine deposits. Soils are very deep but may have a restrictive layer between 20-40". Soil series currently in this group include Bartle, Dubois, Haubstadt, Otwell, and Pekin.

**Table 4. Representative soil features**

Parent material	(1) Loess (2) Lacustrine deposits (3) Outwash (4) Alluvium
Surface texture	(1) Silt loam
Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Very slow to moderate
Depth to restrictive layer	22–40 in
Soil depth	80 in
Surface fragment cover ≤3"	0%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	4.5–7.7 in
Soil reaction (1:1 water) (Depth not specified)	4.4–5.9
Subsurface fragment volume ≤3" (Depth not specified)	0–7%
Subsurface fragment volume >3" (Depth not specified)	0%

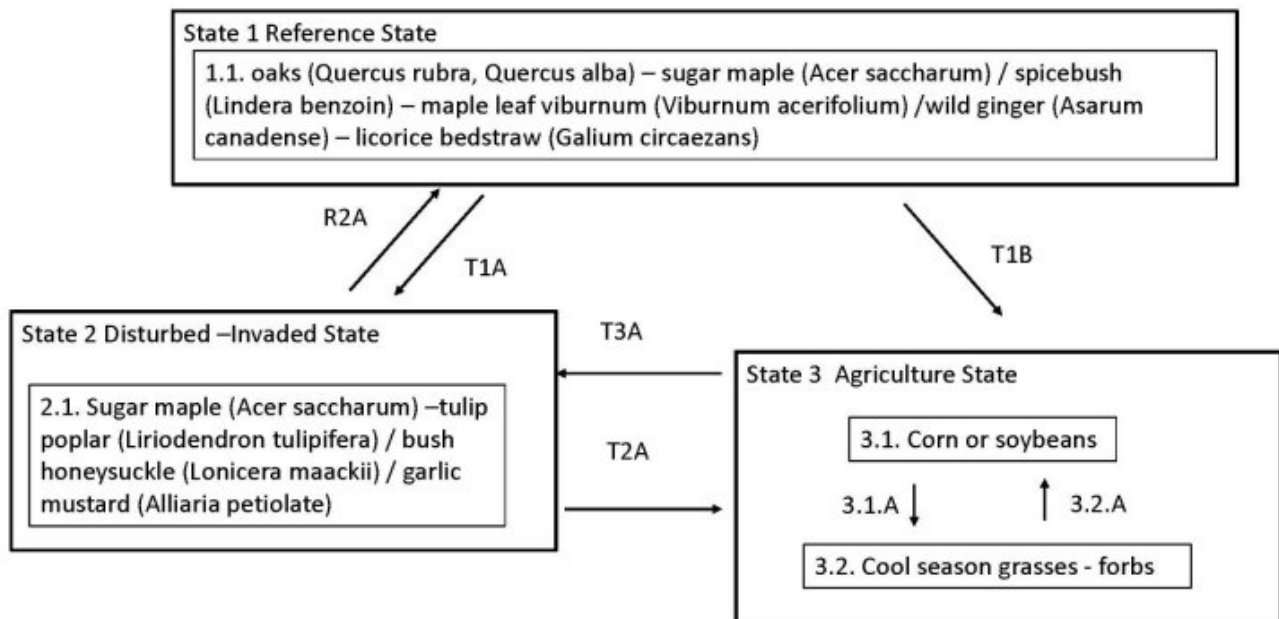
## Ecological dynamics

The historic plant community of the Lacustrine Forest ecological site is a mesic hardwood forest with a strong oak component. On high quality sites, the major canopy species include northern red oak (*Quercus rubra*), white oak (*Q. alba*), sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), basswood (*Tilia americana*) and tulip-tree (*Liriodendron tulipifera*). Other species on site may include black walnut (*Juglans nigra*), shagbark hickory (*Carya ovata*), bitternut hickory (*Carya cordiformis*), American elm (*Ulmus americana*), and white ash (*Fraxinus americana*). Numerous native understory species are found on these sites.

According to USDA-USFS LANDFIRE data, full stand replacement fires on these sites were rare (<1000 year intervals), with a large-scale windthrow event occurring in at about half that interval. Small gap disturbance was the most common disturbance event that allowed propagation of these species.

Historic disturbances including selective logging of oaks have allowed many of these sites to be dominated by quick growing, shade tolerant species such as sugar maple and tulip poplar.

## State and transition model



## State 1

### Reference State -Forestland

This is the diagnostic plant community for this site is a high quality mixed hardwood forest. Dominant species include northern red oak, white oak, sugar maple, American beech, basswood, white ash, and black walnut. Various shrub species may be present along with a highly diverse understory including numerous spring ephemerals. Numerous native understory plants may be found on these sites.

#### Dominant plant species

- northern red oak (*Quercus rubra*), tree
- white oak (*Quercus alba*), tree
- sugar maple (*Acer saccharum*), tree
- hybrid hickory (*Carya*), tree
- American beech (*Fagus grandifolia*), tree
- northern spicebush (*Lindera benzoin*), shrub
- mapleleaf viburnum (*Viburnum acerifolium*), shrub
- Canadian wildginger (*Asarum canadense*), other herbaceous
- bedstraw (*Galium*), other herbaceous
- sanicle (*Sanicula*), other herbaceous
- alumroot (*Heuchera*), other herbaceous
- ticktrefoil (*Desmodium*), other herbaceous

## Community 1.1

## Mixed Hardwood Forest

This phase is characterized by a high quality, diverse, mature mixed hardwood forest with oaks, hickory, sugar maple, ashes, and American beech as key component. Additional canopy species include basswood, tulip-tree, black walnut, and elms.

### Dominant plant species

- northern red oak (*Quercus rubra*), tree
- sugar maple (*Acer saccharum*), tree
- white oak (*Quercus alba*), tree
- hybrid hickory (*Carya*), tree
- American beech (*Fagus grandifolia*), tree
- northern spicebush (*Lindera benzoin*), shrub
- mapleleaf viburnum (*Viburnum acerifolium*), shrub
- Canadian wildginger (*Asarum canadense*), other herbaceous
- bedstraw (*Galium*), other herbaceous
- ticktrefoil (*Desmodium*), other herbaceous
- alumroot (*Heuchera*), other herbaceous
- sanicle (*Sanicula*), other herbaceous

## State 2

### Disturbed -Invaded Forest State

Many of these sites have been invaded by non-native vegetation due to anthropogenic disturbances including timber harvest, road construction, recreation activities (ORV), and unmanaged grazing. Numerous species may be present depending on the disturbance type and severity and available seed exposure.

### Dominant plant species

- maple (*Acer*), tree
- ash (*Fraxinus*), tree
- Amur honeysuckle (*Lonicera maackii*), shrub
- autumn olive (*Elaeagnus umbellata*), shrub
- Nepalese browntop (*Microstegium vimineum*), grass
- garlic mustard (*Alliaria petiolata*), other herbaceous
- Japanese honeysuckle (*Lonicera japonica*), other herbaceous

## Community 2.1

### Disturbed -Invaded Community

This community is characterized by the establishment and eventual dominance of invasive species in the midstory and/or understory. Common invasives include, but are not limited to, Asian bush honeysuckle (*Lonicera maackii*), Callery pear (*Pyrus calleryana* Decne.), garlic mustard (*Alliaria petiolata*), Japanese stiltgrass (*Microstegium vimineum*), tree-of-heaven (*Ailanthus*), Japanese honeysuckle (*Lonicera japonica*) and wintercreeper (*Euonymus fortunei*).

### Dominant plant species

- Amur honeysuckle (*Lonicera maackii*), shrub
- autumn olive (*Elaeagnus umbellata*), shrub
- garlic mustard (*Alliaria petiolata*), other herbaceous
- Japanese honeysuckle (*Lonicera japonica*), other herbaceous

## State 3

### Agricultural State

This state is characterized by the conversion of the site to agricultural use. The most common land use is a corn-soybean rotation. A portion of the historic acres are used for hay production and pasture. Most pastureland is seeded with cool-season grasses such as tall fescue with forbs such as red clover.

### **Dominant plant species**

- tall fescue (*Schedonorus arundinaceus*), grass
- red clover (*Trifolium pratense*), other herbaceous
- corn (*Zea*), other herbaceous
- soybean (*Glycine*), other herbaceous

## **Community 3.1**

### **Row crops**

This phase is characterized by row crop agriculture of small grains. The primarily agricultural commodities are corn and soybeans; however, numerous species can be grown depending on the landowner's objectives.

### **Dominant plant species**

- corn (*Zea*), other herbaceous
- soybean (*Glycine*), other herbaceous

## **Community 3.2**

### **Pastureland**

These sites are generally seeded in cool season grasses with a mix of forbs and utilized for hay production or grazing.

### **Dominant plant species**

- tall fescue (*Schedonorus arundinaceus*), grass
- brome (*Bromus*), grass
- Kentucky bluegrass (*Poa pratensis*), grass
- red clover (*Trifolium pratense*), other herbaceous
- white clover (*Trifolium repens*), other herbaceous

## **Pathway 3.1.A**

### **Community 3.1 to 3.2**

Establishment of pastureland for forage production. Mechanism and practices will depend on management objectives and what grasses and forbs are desired. Warm or cool season grasses may be utilized and numerous forbs may be included in the seeding mix.

## **Pathway 3.2.A**

### **Community 3.2 to 3.1**

Planting, either by conventional or no-till methods, of row crop. Continual management required. Many different species can be grown on these sites but a corn-soybean rotation is the most common.

## **Transition T1A**

### **State 1 to 2**

Establishment of invasive understory species with no management to control their abundance or distribution.

## **Transition T1B**

### **State 1 to 3**

Conversion of site to agricultural uses includes clearing of trees and other wood species, site preparation, tillage, seeding, and continued maintenance. Practices depend on management objectives and crop type.

## **Restoration pathway R2A**



## **State 2 to 1**

Numerous long-term management activities will be required to restore these sites to the reference community. Chemical and mechanical treatment of the invasive species will be critical, along with the planting of desired tree species. Planting will depend on available seed sources. Timber stand improvement activities will be needed such as brush control, weed control, and selective thinning.

## **Transition T2A State 2 to 3**

Activities include clearing of trees/brush, weed treatment, site preparation, seeding and continuous management. Practices will depend on crops seeded and management objectives.

## **Transition T3A State 3 to 2**

Agricultural sites no longer managed will move toward successional stages including annual weeds and grasses to perennial grasses, forbs, shrubs and trees. Tree species will eventually become dominant; however, the species composition will be dependent upon seed availability. Site usually are pioneered by fast-growing species such as maple, ash, cottonwood, tulip poplar, eastern red cedar and locust.

## **Additional community tables**

### **Inventory data references**

No field monitoring was conducted as part of this PES development. Future ESD development may result in plant community edits, soil mapunits being added or removed from this grouping, and/or additions or modifications to the narratives, tables, vegetation descriptions and state and transition model.

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**Approval**

Greg Schmidt, 9/26/2024

**Acknowledgments**

PES documents developed for adjacent MLRAs in Indiana and Ohio served as a source of information as these MLRAs often shared similar soil series with MLRA 114A. NRCS county soil surveys were a valuable reference including tree species observed on site by NRCS staff. Soil Survey and NRCS Indiana resource soil scientists contributed field observation, field notes, and extensive soil mapping expertise.

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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)	A. Arends, ESI Specialist
Contact for lead author	
Date	05/10/2025
Approved by	Greg Schmidt
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):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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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:**

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