USDA Natural Resources Conservation Service

Ecological site F114XA501IN
Wet Till Flatwoods

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

MLRA 114A 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

USFS: 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: North-Central Interior Wet Flatwoods, Unique Identifier: CES202.700

Ecological site concept

The Wet Till Flatwoods state is a mature forest with wet-tolerant species including swamp white oak, pin oak, sweetgum, beech, green ash, and maple. Swamp chestnut oak and blackgum may also be present. Stands occur on somewhat poorly drained to poorly drained uplands or in depressions on level glacial lakeplains or outwash plains. There is an impermeable or nearly impermeable clay resulting in a shallow, perched water table. Ponding is common during the wet seasons and droughts in the summer, leading to a complex of forest upland and wetland species. Deciduous hardwoods and softwoods predominate. Shrubs may include black chokeberry (Aronia melanocarpa), paw paw (Asiminia triloba), and strawberry bush (Euonymus obovatus).

The herbaceous layer, can be sparse to dense, depending on the ponding regime. Length of flooding and depth of clay layer will influence the understory native plant community. Understory species may include Boehmeria cylindrica, multiple Carex species (Carex blanda, Carex laxiculmis, Carex squarrosa, Carex intumescens, etc.), Elymus riparius, Elymus virginicus, Cardamine bulbosa, Cardamine pensylvanica, Claytonia virginica, Oxalis violacea, Podophyllum peltatum, Galium tinctorium, Glyceria striata, Mitchella repens, Osmunda regalis, *Osmunda cinnamomea*, and Cinna arundinacea.

The majority of these sites are now agricultural and being utilized as cropland or pastureland. Natural hydrology has been modified via tiling and ditching Few mature, high-quality, reference communities still exist today.

Associated sites

F114XA502IN	**Till Uplands** The Till Uplands groups is associated geographically but consists of better drained soil series and more upland plant communities.

Similar sites

F114XA101IN	**Wet Lacustrine Forest** Wet Lacustrine Forest. This sites also have wet-tolerant forest species.

Table 1. Dominant plant species

Tree	(1) *Quercus palustris* (2) *Liquidambar styraciflua*
Shrub	(1) *Asimina triloba* (2) *Cornus*
Herbaceous	(1) *Carex*

Physiographic features

These sites are located on somewhat poorly drained to poorly drained till uplands or in depressions on glacial lakeplains or outwash plains.

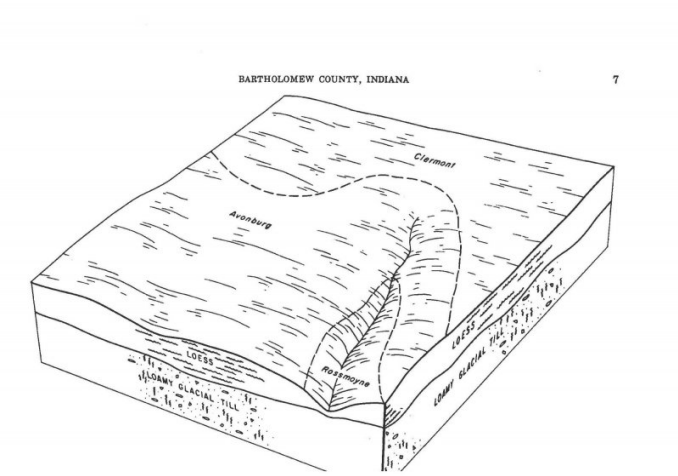


Figure 1. Physiographic Image - Block diagram with Avonburg and Clermont soils.

Table 2. Representative physiographic features

Landforms	(1) Upland > Till plain
Runoff class	Negligible to very low
Flooding frequency	None
Ponding duration	Very brief (4 to 48 hours) to long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	91–305 m
Slope	0–12%
Ponding depth	0–25 cm

Water table depth	0–25 cm
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)	176-186 days
Precipitation total (characteristic range)	1,118-1,194 mm
Frost-free period (actual range)	153-159 days
Freeze-free period (actual range)	176-191 days
Precipitation total (actual range)	1,092-1,194 mm
Frost-free period (average)	156 days
Freeze-free period (average)	182 days
Precipitation total (average)	1,143 mm

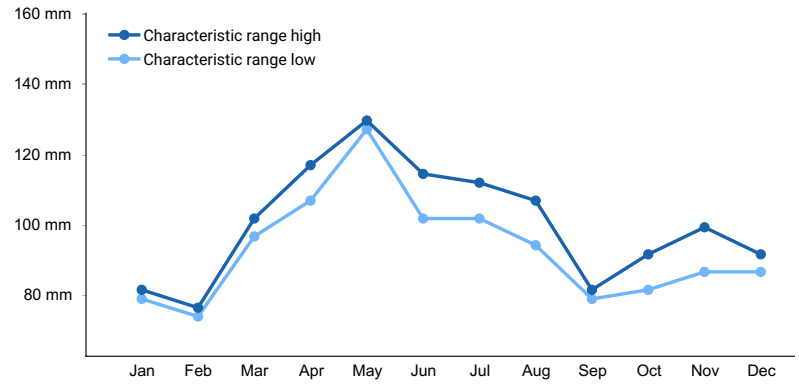


Figure 2. Monthly precipitation range

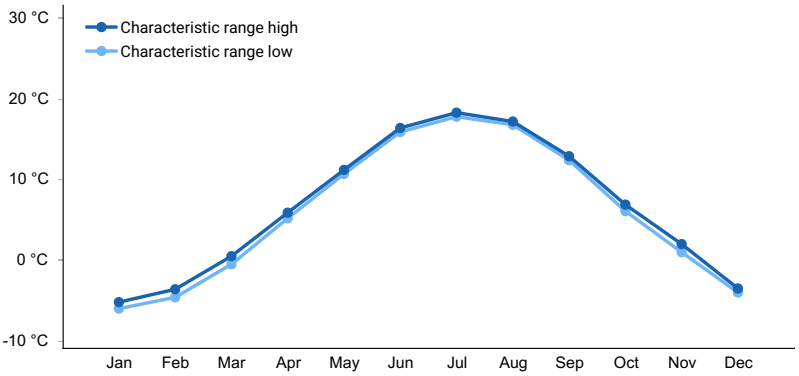


Figure 3. Monthly minimum temperature range

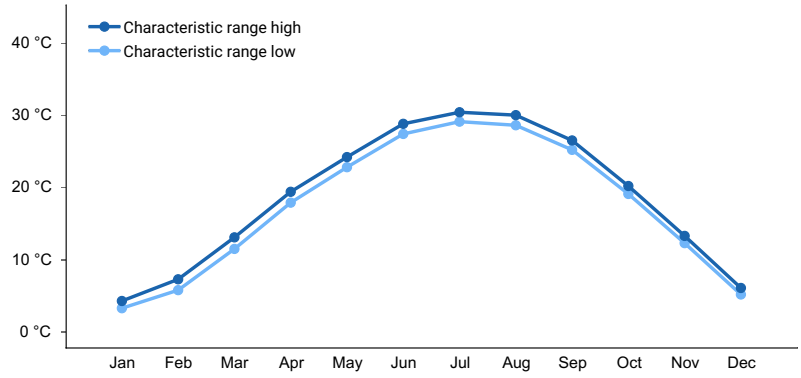


Figure 4. Monthly maximum temperature range

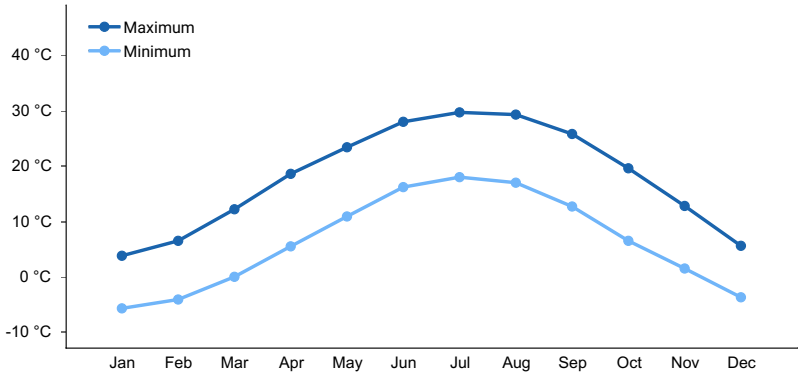


Figure 5. Monthly average minimum and maximum temperature

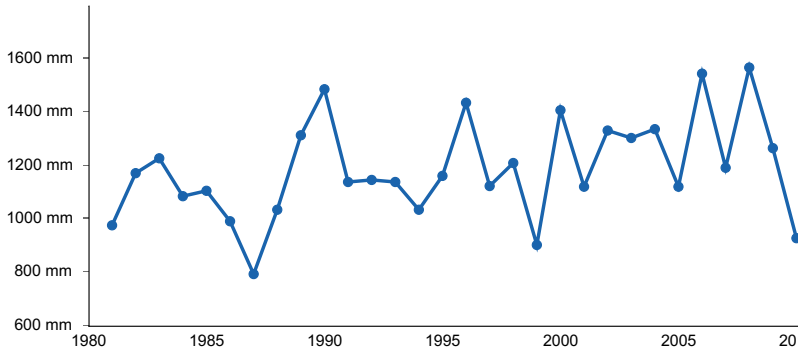


Figure 6. Annual precipitation pattern

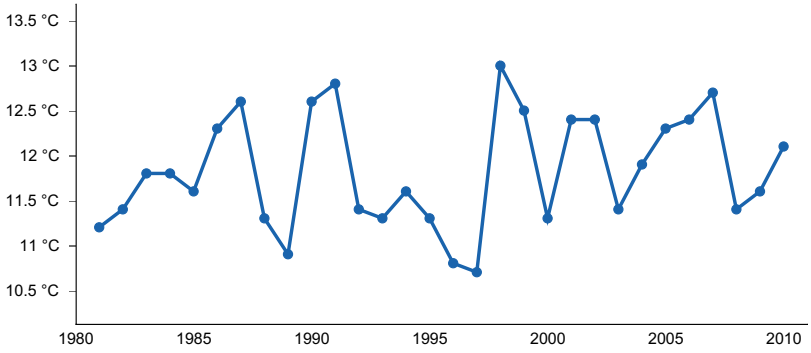


Figure 7. Annual average temperature pattern

Climate stations used

- (1) HILLSBORO [USC00333758], Hillsboro, OH
- (2) NORTH VERNON 2 ESE [USC00126435], North Vernon, IN
- (3) SCOTTSBURG [USC00127875], Scottsburg, IN

Influencing water features

Drainage and permeability (slow to moderate) along with landscape position lead much of the site being ponded, most often in the spring and occasionally in the fall.

Soil features

Soils in this groups are generally somewhat poorly to poorly drained till soils. Series include Atlas, Avonburg, Blanchester, Clermont, and Cobbsfork.

Table 4. Representative soil features

Parent material	(1) Loess (2) Till (3) Lacustrine deposits
Surface texture	(1) Silty clay loam (2) Silt loam
Drainage class	Somewhat poorly drained to very poorly drained
Permeability class	Very slow to slow
Depth to restrictive layer	64–127 cm
Soil depth	152–203 cm
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0–1%
Available water capacity (12.7-20.3cm)	Not specified
Soil reaction (1:1 water) (11.4-17.8cm)	Not specified
Subsurface fragment volume <=3" (0-7.6cm)	Not specified
Subsurface fragment volume >3" (0-2.5cm)	Not specified

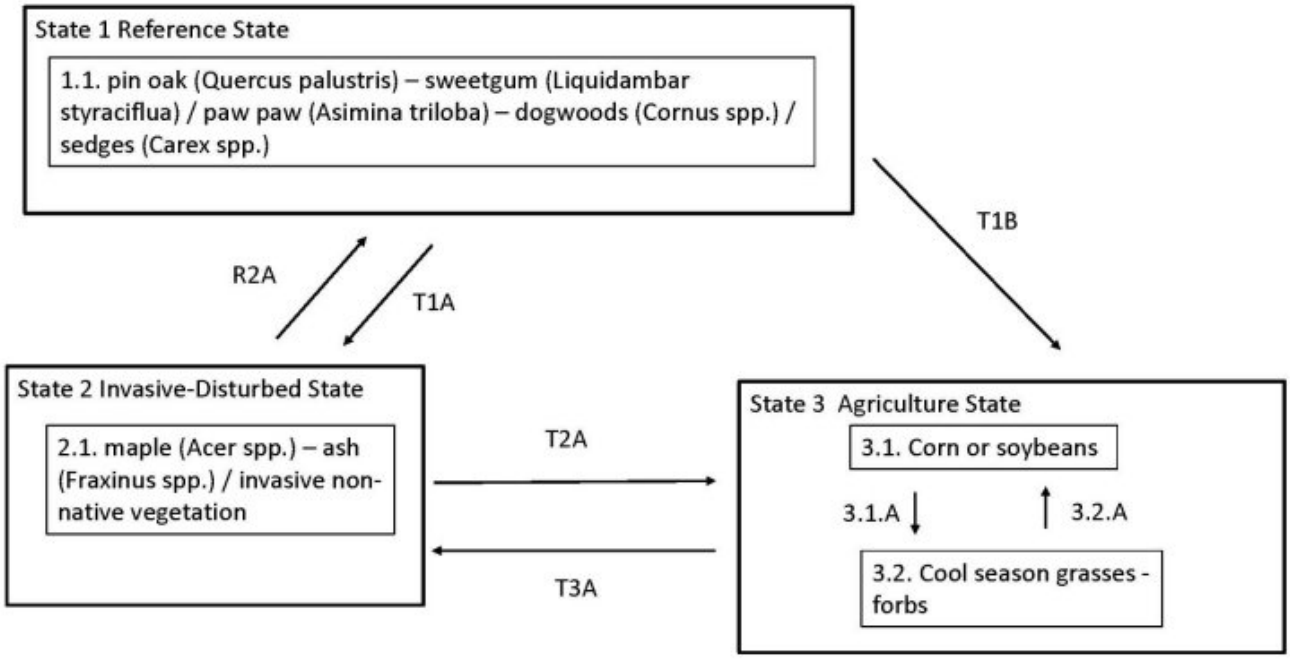
Ecological dynamics

Vegetation on these sites are influenced by the soil characteristics which include a sol layer that creates a seasonal, shallow perched water table. Ponding is common during the wetter seasons with dry conditions occurring during the summer and early autumn.

Microtopography,, drainage, and the fluctuating moisture conditions lead to a mosaic of forest wetland and upland species across the broader landscape. On the wetter portions of these sites, water-tolerant oaks such as pin oak (*Quercus palustris*), swamp chestnut oak (*Q. michauxii*), and/or swamp white oak (*Q. bicolor*) dominate. Associate tree species may including red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), green ash (*Fraxinus pennsylvanica*), and silver maple (*Acer saccharinum*). In slightly better drained micro-sites, more mesic upland species may be found including red oak (*Q. rubra*), white oak (*Q. alba*), American beech (*Fagus grandifolia*), tulip poplar (*Liriodendron tulipifera*), white ash (*Fraxinus americana*), and hickories (Carya spp.).

Most of these sites have been functionally alter through disturbance. Agriculture and urban development are now the biggest uses of these soil. Hydrology modification such as tiling and ditching have occurred on the majority of sites.

State and transition model



State 1
Reference State

Historically, these sites were mature forests with water tolerant forest species. Pin oak, swamp white oak, green ash, sweetgum, and a variety of maples were present. Microtopography and soil variations created a mosaic across the landscape. On the better-drained portions of these ecosystems, mesic upland species were present such as northern red oak, white oak, white ash, American elm, sugar maple, tulip poplar, blackgum, and beech. Ponding frequency and depth influenced the species distribution and community composition. Shrub and understory species vary and are dependent upon ponding frequency and length. Flooding, windthrow, drought, and fire are the natural influences to these systems.

Dominant plant species

- pin oak (*Quercus palustris*), tree
- sweetgum (*Liquidambar styraciflua*), tree
- swamp white oak (*Quercus bicolor*), tree
- green ash (*Fraxinus pennsylvanica*), tree
- maple (*Acer*), tree
- dogwood (*Cornus*), shrub
- pawpaw (*Asimina triloba*), shrub
- sedge (*Carex*), grass

Community 1.1
Forestland

These sites are characterized by fluctuating moisture levels and microtopography which results in a complex mosaic of wet forest and upland forest species. *Quercus palustris* and/ or *Quercus bicolor* are typically found on the wetter portions and are often associated with *Acer rubrum*. *Quercus alba*, *Quercus rubra*, and *Fagus grandifolia* are common in the better-drained areas. *Liquidambar styraciflua*, *Nyssa sylvatica*, *Acer saccharinum*, *Fraxinus americana*, and *Fraxinus pennsylvanica* are often found on these sites. Understory herbaceous and shrub species vary due to moisture fluctuations and canopy density. Some common species in the wetter portions include Carex spp., *Osmunda cinnamomea*, Cephalanthus spp., Alnus spp., and Ilex spp.

Dominant plant species

- pin oak (*Quercus palustris*), tree
- swamp white oak (*Quercus bicolor*), tree
- sweetgum (*Liquidambar*), tree
- maple (*Acer*), tree
- ash (*Fraxinus*), tree
- dogwood (*Cornus*), shrub
- pawpaw (*Asimina triloba*), shrub
- sedge (*Carex*), grass

State 2
Invaded- Disturbed State

This State is characterized by anthropological disturbances and the subsequent invasion of non-native plants. Species composition will vary greatly depending on the type/severity of disturbance, previous land use, and available seed sources.

Dominant plant species

- maple (*Acer*), tree
- ash (*Fraxinus*), tree
- sweetgum (*Liquidambar*), tree
- honeysuckle (*Lonicera*), shrub
- spindletree (*Euonymus*), shrub
- rose (*Rosa*), shrub
- reed canarygrass (*Phalaris arundinacea*), grass
- reed (*Phragmites*), grass
- purple loosestrife (*Lythrum salicaria*), other herbaceous
- Japanese honeysuckle (*Lonicera japonica*), other herbaceous

Community 2.1
Invaded- Disturbed Woodland

This community is typified by multiple non-native plants, usually in the understory and shrub layers. Species depend on type and severity of disturbance, previous land use, and available seed sources.

Dominant plant species

- maple (*Acer*), tree
- green ash (*Fraxinus pennsylvanica*), tree
- sweetgum (*Liquidambar*), tree
- honeysuckle (*Lonicera*), shrub
- spindletree (*Euonymus*), shrub
- rose (*Rosa*), shrub
- reed (*Phragmites*), grass
- reed canarygrass (*Phalaris arundinacea*), grass
- purple loosestrife (*Lythrum salicaria*), other herbaceous
- Japanese honeysuckle (*Lonicera japonica*), other herbaceous

State 3
Agricultural State

Most of these sites are in row crops or pasture. Plant species selection and land management depend upon the goals and objectives of the landowners.

Dominant plant species

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

Community 3.1
Cropland

Most of these soils are in cropland production with corn and soybeans a common crop rotation. A variety of crops can be grown on these sites and species selection is dependent upon management objectives. Hydrological modifications such as ditching or tiling is likely present.

Community 3.2
Pastureland

A smaller percentage of agricultural lands are being utilized to grow forage. Cool season grasses, such as fescue, are commonly planted along with forbs such as white and red clover. Many species of warm and cool season grasses can be grown on these sites.

Pathway 3.1.A
Community 3.1 to 3.2

Transitioning a cropland to a forage production system will require multiple management inputs such as site preparation, seeding, and weed control.

Pathway 3.2.A
Community 3.2 to 3.1

Transitioning a pasture field to a crop file will require multiple management inputs including site preparation, seeding, and weed control.

Transition T1A
State 1 to 2

This transition reflects the change in community from a reference state of native plants to a compromised community due to invasive species. Disturbances (logging, grazing, etc.) is the usual precursor to invasion of non-native plants.

Transition T1B
State 1 to 3

Transitioning to an agricultural state would require tree clearing, brush removal, site preparation, seeding/planting, and weed control. Hydrological modification such as ditching and tiling are often installed. NOTE: Landowner should be aware of the current federal regulations regarding protection of existing wetlands and seek appropriate technical assistance prior to use conversion.

Restoration pathway R2A
State 2 to 1

Restoration to a reference community state would require management inputs such as brush and weed control. Multiple years of treatment would be required. Hydrological system restoration may also be installed.

Transition T2B
State 2 to 3

Transitioning to an agricultural state would require tree clearing, brush removal, site preparation, seeding/planting, and weed control. Hydrological modification such as ditching and tiling would likely be recommended. NOTE: Landowner should be aware of the current federal regulations regarding protection of existing wetlands and seek appropriate technical assistance prior to use conversion.

Transition T3A
State 3 to 2

Abandonment of the site will result in a series of successional plant communities consisting of native and non-native vegetation. Initially, annual and perennial herbaceous and grass species will dominant the sites followed by an increasing number of shrubs and tree saplings. Species composition will depend on prior use, severity of disturbances, and available seed sources.

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.

Other references

NRCS References
PES documents developed for adjacent MLRAs in Indiana and Ohio served as a source of information as these MLRAs often split counties and/or shared similar soil series with MLRA 114A. USDA-NRCS county soil surveys for the counties within MLRA 114A where a valuable reference including tree species observed on site by NRCS staff. NRCS Indiana resource soil scientists contributed field observation, field notes, and extensive soil mapping expertise.

Additional References:
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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 regions often shared similar soil series with MLRA 114A. NRCS county soil surveys where 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.

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	05/12/2025

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:

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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:**
