USDA Natural Resources Conservation Service

Ecological site F122XY001KY
Deep Well Drained Cherty Uplands

Accessed: 05/17/2024

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): 122X–Highland Rim and Pennyroyal

MLRA 122 is in Tennessee (47 percent), Kentucky (43 percent), Indiana (7 percent), and Alabama (3 percent). It makes up about 21,530 square miles (55,790 square kilometers).

SOILS:
Many of the soils in this MLRA are Udalfs. The moderately deep to very deep, well drained, clayey soils formed in limestone residuum. They are dominantly in rolling to steep areas of the “Outer Basin” (Mimosa, Braxton, Gladdice, and Hampshire series) and the undulating to hilly areas of the “Inner Basin” (Talbott and Bradyville series). The most agriculturally productive soils are the very deep, well drained, clayey or loamy soils that formed in alluvium and/or loess over alluvium or limestone residuum in nearly level to undulating areas (Armour, Cumberland, Harpeth, Lomond, and Maury series). The less extensive soils generally are moderately well drained to somewhat poorly drained and formed in loamy or clayey alluvium and/or residuum (Byler, Capshaw, Colbert, and Tupelo series). This MLRA has a significant acreage of Mollisols. Shallow or moderately deep, well drained, clayey Udolls (Ashwood and Barfield series) formed in limestone residuum dominantly in rolling to steep areas. Very shallow, well drained, clayey Rendolls (Gladeville series) formed in limestone residuum dominantly in undulating to rolling areas of the “Inner Basin.” Very deep, well drained or moderately well drained Udolls (Arrington, Egam, Lynnville, and Staser series) and somewhat poorly drained or poorly drained Aquolls (Agee, Godwin, and Lanton series) formed in loamy or clayey alluvium derived from limestone on flood plains. Most of the remaining soils on flood plains are moderately well drained or well drained Udepts (Lindell and Ocana series). Udults are of small extent in this area. Most are very deep, well drained, and loamy and formed in gravelly colluvium or colluvium and the underlying residuum on steep hillsides (Dellrose soils). Rock outcrops are common on uplands.

BIOLOGICAL RESOURCES:
This area supports mixed oak forest vegetation. White oak, black oak, northern red oak, and some scarlet oak are the dominant tree species. Shagbark hickory, bitternut hickory, pignut hickory, and mockernut hickory also occur. Oak, blackgum, flowering dogwood, sassafras, Virginia pine, pitch pine, and shortleaf pine grow mostly on ridgetops.

(Excerpt from United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.)

Classification relationships

Scientific Name: Southern Interior Low Plateau Dry-Mesic Oak Forest, Unique Identifier: CES202.898

Possible Association:
Quercus falcata - *Quercus alba* - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest
Translated Name: Southern Red Oak - White Oak - Mockernut Hickory / Sourwood / Deerberry Forest

Common Name: Interior Southern Red Oak - White Oak Forest
Unique Identifier: CEGL007244
Classification Approach: International Vegetation Classification (IVC)

Ecological site concept

Only two tree species can be selected for entry into the database as dominants; however, multiple tree species may be dominant on these sites depending on aspect, soil depth, seed sources, management, and disturbance history.

State 1. Forestland.
Phase 1.1: Plant species dominants:
White oak – southern red oak/ blueberry – smilax / Virginia snakeroot – licorice bedstraw.
(*Quercus alba* - *Quercus falcata* / Vaccinium spp. - Smilax spp. / *Aristolochia serpentaria* –*Galium circaezans*)

State: 2. Pasture
Phase 2.1: Managed Pasture. Plant species dominants: *Schedonorus arundinaceus* (tall fescue)
Pasture plant species are dependent on seeding, weed control, concurrent land uses, on-going levels of disturbance, and landowner goals. Individual site and soil characteristics, along with management activities, will influence production levels.

State: 3 – Transitional (Abandoned Field)
Phases 3.1: Plant species dominants: *Juniperus virginiana*/ Rubus spp.- *Rosa multiflora*/ *Vernonia gigantea* -*Schedonorus arundinaceus*
Eastern red cedar /blackberry – multiflora rose/ ironweed- tall fescue
Tree species regeneration on these sites will depend on disturbance, soil characteristics, adjacent plant communities and seed sources, post-disturbance management inputs, presence or absence of continued site disturbances(grazing), slope, and aspect.

State 4: Phase 4.1. Abandoned Croplands
Plant species dominant:
henbit deadnettle (*Lamium amplexicaule*) – mouse-eared chickweed (Cerastium L.)
Abandonment of cropland would result in many weed species taking over the site. Initially, annual weeds would be predominate followed by grasses, shrubs and finally, pioneers trees.

State 5: Phase 5.1. Cropland
Dependent upon seeding and management. Most common crops are corn and soybeans.
It would require years of management, plantings, and weed control to establish successional communities that could transition to a reference community

Table 1. Dominant plant species

Tree	(1) *Quercus alba* (2) *Quercus falcata*
Shrub	(1) *Vaccinium* (2) *Smilax*
Herbaceous	(1) *Aristolochia serpentaria* (2) *Euphorbia corollata*

Physiographic features

These sites are found on uplands.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Knob

Flooding frequency	None
Ponding frequency	None
Elevation	122–396 m
Slope	2–50%
Water table depth	152 cm

Climatic features

Climate
The average annual precipitation in this area is 43 to 63
inches (1,090 to 1,600 millimeters), increasing to the south. The maximum precipitation occurs in winter and early in spring, and the minimum occurs in fall. Most of the rainfall occurs as high-intensity, convective thunderstorms. Snowfall may occur in winter. The average annual temperature is 52 to 60 degrees F (11 to 16 degrees C), increasing to the south. The freeze-free period averages 210 days and ranges from 185 to 235 days. The longer freeze-free periods occur in the more southerly parts of the area.

(Excerpt from United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.)

Table 3. Representative climatic features

Frost-free period (average)	180 days
Freeze-free period (average)	202 days
Precipitation total (average)	1,346 mm

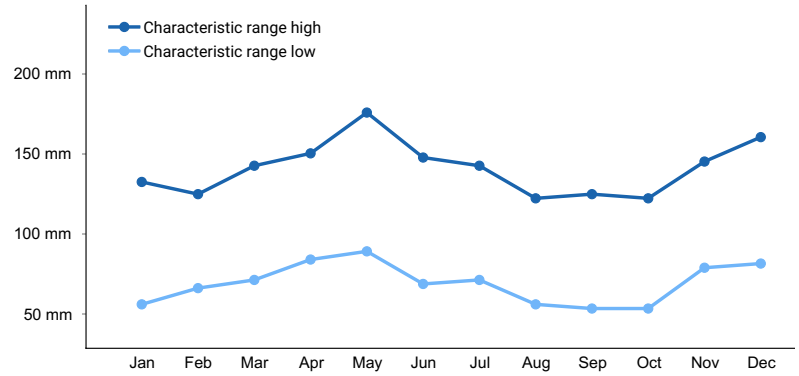

Figure 1. Monthly precipitation range

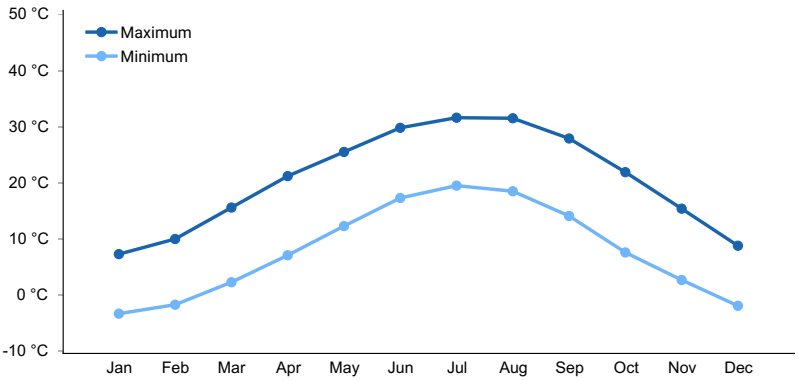

Figure 2. Monthly average minimum and maximum temperature

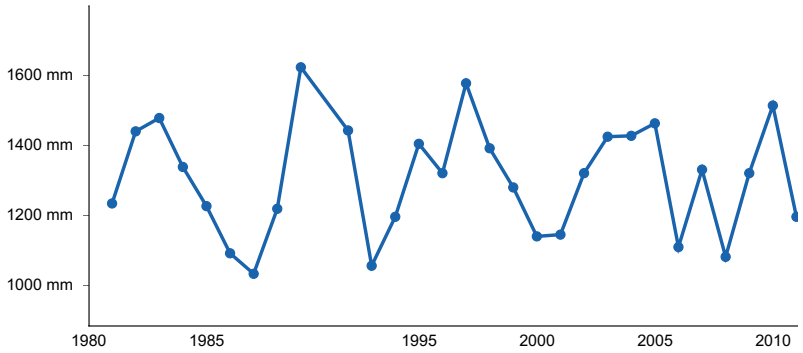

Figure 3. Annual precipitation pattern

Climate stations used

- (1) CLARKSVILLE WWTP [USC00401790], Clarksville, TN
- (2) BOWLING GREEN WARREN CO AP [USW00093808], Bowling Green, KY
- (3) WAYNESBORO [USC00409502], Waynesboro, TN
- (4) SALEM [USC00127755], Salem, IN

Influencing water features

These sites have no influencing water features.

Soil features

These upland soils are deep, well drained, and cherty.

Table 4. Representative soil features

Parent material	(1) Residuum–cherty limestone (2) Colluvium–limestone and shale
Surface texture	(1) Gravelly silt loam (2) Coarse gravelly loam (3) Very gravelly sandy clay loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow to moderate
Soil depth	102–254 cm
Surface fragment cover <=3"	0–8%
Surface fragment cover >3"	1–8%
Available water capacity (0-101.6cm)	15.24–22.86 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	4.5–5.5
Subsurface fragment volume <=3" (Depth not specified)	0–35%

Subsurface fragment volume >3" (Depth not specified)	0–18%

Ecological dynamics

F122XY001KY
Deep Well Drained Cherty Uplands
MLRA 122
Initial Soil Series: Baxter, Britwater, Christian, Cumberland, Frederick, Hammack, Vertrees

Individual sites deserve a detailed understanding before conservation and restoration practices are implemented; therefore, it should be noted that the communities described in this provisional document reflect plant communities that are likely to be found on these soils and have not been field verified. Therefore, this PES describes hypotheses based on available data of many different scales and sources and has not been developed utilizing site-specific ecological field monitoring. This PES also does not encompass the entire complexity or diversity of these sites. Field studies would be required to develop a comprehensive and science-based native plant restoration plan for these sites.

Forest Vegetation as listed in Official Series Descriptions (OSD):
Baxter: Native forests are oak, hickory, elm, maple, beech, ironwood, persimmon, dogwood, hackberry, black walnut, eastern redcedar, shortleaf and Virginia Pine.

Britwater: Native vegetation was mostly hardwoods such as oaks, hickory, and black walnut.

Christian: Forest consists of red, white, and black oaks, hickory, pines, dogwood, and red cedar.

Cumberland: About 5 percent is in woodland consisting chiefly of oaks, hickory, elm, maple, and beech. (Cumberland is a thermic soil series. Mapunits located in Kentucky may be placed in this group pending field verification).

Frederick: Vegetation is largely hardwoods such as oak, hickory, maple, and yellow poplar.

Hammack: Some of the steeper areas are in forest consisting of oak, hickory, gum, maple, hackberry, and poplar.

Vertrees: Native forests consisted of oaks, hickory, elm, maple, dogwood, red cedar, persimmon, and sassafras as the dominant species.

State 1. Forestland. Only two tree species can be selected for entry into the database as dominants; however, multiple tree species may be dominant on these sites and it will vary depending on aspect, soil depth, seed sources, management, and disturbance history.

Phase 1.1: Plant species dominants:

White oak – southern red oak/ blueberry – smilax / Virginia snakeroot – licorice bedstraw.
(*Quercus alba* - *Quercus falcata* / Vaccinium spp. - Smilax spp. / *Aristolochia serpentaria –Galium circaezans*)

Forests on these limestone-influenced sites are generally mixed oak or oak-hickory. In areas with more topography, the north and east slopes may show an increase in shade tolerant hardwood species such as maples. Understory communities are usually well-developed and contain herbs and forbs that thrive on limestone soils. The shrub layer is usually sparse in older, reference type communities but may be dense in successional stages.

Depending upon external influences such as fire and site management history, tree species may include white oak, southern red oak, Shumard oak, black oak, sugar maple, shagbark hickory, mockernut hickory, eastern redbud, dogwood, white ash, and blue ash. (*Quercus alba*, *Quercus falcata*, *Quercus muehlenbergii*, *Quercus velutina*, *Acer saccharum*, *Carya ovata*, Carya tomentosa, *Cercis canadensis*, *Cornus florida*, *Fraxinus americana*, and *Fraxinus quadrangulata*).

Higher quality understory communities reflect the limestone influence and may include:

twinleaf, false rue anemone, early meadow rue, Dutchman's breeches, squirrel corn, nodding trillium, shooting star, alumroot, false Solomon's seal, yellow trout lily, celandine poppy, yellow corydalis, large-flowered bellwort, sessile trillium, blue-eyed Mary, wild yam, jack in the pulpit, smooth Solomon's seal, avens, glade bluets, beaked agrimony, white snakeroot. (*Delphinium tricorne*, *Jeffersonia diphylla*, *Enemion biternatum*, *Thalictrum dioicum*, *Dicentra cucullaria*, *Dicentra canadensis*, *Trillium flexipes*, *Dodecatheon meadia*, *Heuchera americana*, Maiantheum racemosa, *Erythronium americanum*, *Stylophorum diphyllum*, *Corydalis flavula*, *Uvularia grandiflora*, *Trillium sessile*, *Collinsia verna*, *Dioscorea quaternata*, *Arisaema triphyllum*, *Geum canadense*, *Agrimonia rostellata*, and *Ageratina altissima*.)

Shrubs and vines on these sites may include coralberry, spicebush, various grapes, Virginia creeper, and poison ivy. (*Symphoricarpos orbiculatus*, *Lindera benzoin*, Vitis spp., *Parthenocissus quinquefolia*, and *Toxicodendron radicans*).

The absence of a natural fire regime and a history of disturbances (logging, grazing, etc.) are influences that will move this community from an old growth mixed-oak or oak-hickory community to a more mesic hardwood community. Long-term lack of a natural fire regime or human disturbances can create a more mesic, shady environment which enhances the reproduction of quick growing, fire intolerant, shade-tolerant species such as maples and reduces the successful regeneration of oaks and hickories.

This state may in impacted by the invasion of non-native honeysuckle within the understory. Lonicera spp. (usually L. maackii in central Kentucky) alters the native plant communities due to shade and competition. Long-term, multi-year control efforts are required to control this aggressive non-native plant and restore native woodlands.

State: 2. Pasture
Phase 2.1: Managed Pasture. Plant species dominants: *Schedonorus arundinaceus* (tall fescue)

Narrative: Pasture plant species are dependent on seeding, weed control, concurrent land uses, on-going levels of disturbance, and landowner goals. Individual site and soil characteristics, along with management activities, will influence production levels.

Many species of grass, both warm and cool season, are available and suitable for these sites. Common forage species include tall fescue, orchard grass, Kentucky bluegrass, Johnson grass, timothy, and various species of clover.

Management of pasture sites should follow conservation planning standards and protocols which include watershed protection, soil health, and adequate forage species.

Transitioning this state to a reference condition would require long-term timber stand improvement practices to control non-native vegetation and manage for desired hardwood species.

State: 3 – Transitional (Abandoned Field)
Phases 3.1: Plant species dominants: *Juniperus virginiana*/ Rubus spp.- *Rosa multiflora*/ *Vernonia gigantea* -*Schedonorus arundinaceus*
Eastern red cedar /blackberry – multiflora rose/ ironweed- tall fescue

Narrative: Tree species regeneration on these sites will depend on the severity and duration of disturbance, soil characteristics, adjacent plant communities and seed sources, post-disturbance management inputs, presence or absence of continued site disturbances (grazing), slope, and aspect.

Transitioning this state to a reference condition will likely require timber stand improvement practices to control non-native vegetation and manage for desired hardwood species.

State 4: Phase 4.1. Abandoned Croplands

Plant species dominant:
henbit deadnettle (*Lamium amplexicaule*) – mouse-eared chickweed (Cerastium L.)

Abandonment of cropland would result in many weed species taking over the site. Initially, annual weeds would be

predominate followed by grasses, shrubs and finally, pioneers trees.

It would require years of management, plantings, and weed control to establish successional communities that could transition to a reference community.

State 5: Phase 5.1. Cropland
Dependent upon seeding and management. Most common crops are corn and soybeans.

It would require years of management, plantings, and weed control to establish successional communities that could transition to a reference community.

TO VALIDATE THE INFORMATION IN THIS PROVISIONAL ECOLOGICAL SITE DESCRIPTION FUTURE FIELD WORK IS NEEDED. This will include field inspection and data collection including medium to high intensity sampling, soil correlations, and analysis of that data. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce a document to be utilized for on-site conservation planning.

State and transition model

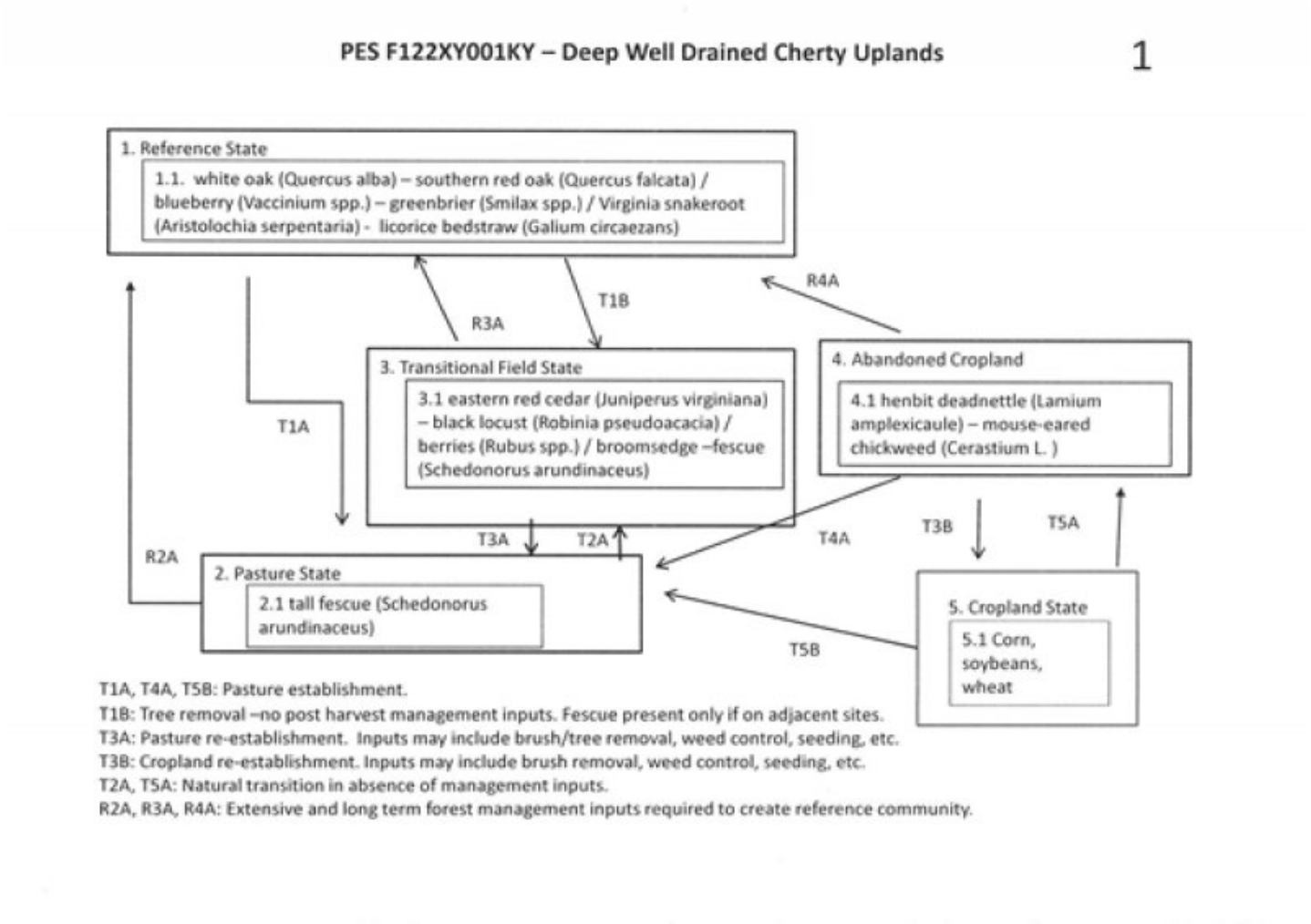

Figure 5. Group 1

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:**

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):**

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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:**
