

# Ecological site R078CY090OK Ponded Bottomland

Last updated: 9/15/2023  
Accessed: 11/24/2024

## 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.

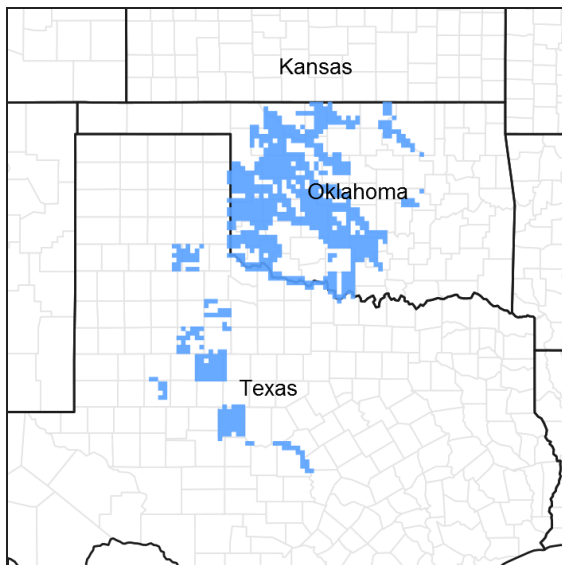


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

## MLRA notes

Major Land Resource Area (MLRA): 078C—Central Rolling Red Plains, Eastern Part

MLRA 78C is characterized by moderately dissected, rolling plains with prominent ridges and valleys and numerous terraces adjacent to dissecting streams. Loamy and clayey soils are generally deep, well drained, and developed in calcareous and gypsiferous sediments of Permian age.

## LRU notes

NA

## Classification relationships

This ecological site is correlated to soil components at the Major Land Resource Area (MLRA) level which is further described in USDA Ag Handbook 296.

## Ecological site concept

These sites occur on soils with sandy loam surface textures that remain wet for long periods of time. During these wet periods, hydrophytic vegetation may dominate the site. If the hydrology of the site is altered, the plant

community may transition to an alternative state.

## Similar sites

R078CY095OK	<b>Subirrigated Bottomland</b> Sandy floodplain soils. Typically not ponded. Endosaturation.
-------------	---

Table 1. Dominant plant species

Tree	(1) <i>Salix nigra</i>
Shrub	Not specified
Herbaceous	(1) <i>Andropogon glomeratus</i>

## Physiographic features

These sites are nearly level bottomlands of small streams that usually drain sandy areas. Formerly called Wetland, Wetlands, or Wet Meadows, Meadow sites are next to stream channels that have been filled, or backed up, if you will, with sand or silt causing the water table to be at, or very near, the soil surface. Many of the streams are spring fed, so water runs most of the year to year round. Meadows are usually soggy grassy areas of soft, naturally waterlogged ground. Willow (*Salix* sp.) and cottonwood (*Populus* sp.) trees grow in varying densities amongst grassy and grasslike plants.

Table 2. Representative physiographic features

Landforms	(1) River valley > Flood plain
Runoff class	High
Flooding duration	Brief (2 to 7 days) to very long (more than 30 days)
Flooding frequency	Occasional to frequent
Ponding duration	Long (7 to 30 days) to very long (more than 30 days)
Ponding frequency	None to frequent
Elevation	244–671 m
Slope	0–1%
Ponding depth	0–30 cm
Water table depth	0–91 cm
Aspect	Aspect is not a significant factor

## Climatic features

MLRA 78C lies within the subtropical sub-humid climate regime. This regime is characterized by rapid changes in temperature; marked extremes, both daily and annual; and rather erratic rainfall. The weather is alternately influenced by cold dry air from the Arctic Circle, and warm moist air from the Gulf of Mexico.

Seasonal changes are gradual. Spring is a season of variable weather and relatively high precipitation with prevailing winds from the southwest. Summers are generally hot with low humidity. Fall has long periods of pleasant weather interspersed with moderate to heavy rains. Winter is open and moderate to cold with winds from the north and infrequent snows.

Wind speeds average more than eleven miles an hour with prevailing southern winds. Rather strong winds can occur in all months of the year. While strong gusty winds occur, severe dust storms are rare.

Approximately 75 percent of the rainfall occurs during the warm season, and much of it comes in storms of high intensity and short duration in May and June. These rains can be particularly erosive on sites where vegetation is sparse. Occasional droughts are to be expected. Lack of rainfall and hot, dry winds often curtail forage production

during July and August.

**Table 3. Representative climatic features**

Frost-free period (characteristic range)	163-186 days
Freeze-free period (characteristic range)	192-199 days
Precipitation total (characteristic range)	686-813 mm
Frost-free period (actual range)	147-186 days
Freeze-free period (actual range)	182-202 days
Precipitation total (actual range)	660-813 mm
Frost-free period (average)	171 days
Freeze-free period (average)	194 days
Precipitation total (average)	762 mm

### **Climate stations used**

- (1) CHATTANOOGA [USC00341706], Chattanooga, OK
- (2) ALTUS IRIG RSCH STN [USC00340179], Elmer, OK
- (3) WATONGA [USC00349364], Watonga, OK
- (4) FREEDOM [USC00343358], Freedom, OK
- (5) ARNETT 3NE [USC00340332], Arnett, OK
- (6) CARNEGIE 5 NE [USC00341504], Carnegie, OK

### **Influencing water features**

This site is influenced by adjacent stream channels, including flooding and ponding.

### **Wetland description**

Wetland features are site specific, please check with the local USDA/NRCS office to determine wetland conditions at the area in question.

### **Soil features**

Soils are mapped for each county within the MLRA. Mapunits are representations of the major soil series component(s) and named accordingly. Each Mapunit is spatially represented on a digital soils map as polygons of different shapes and sizes. Within these Mapunits, there are often minor soil series components included. These minor components are soils that occur within a Mapunit polygon but are of small extent (15% or less of the Mapunit area). However, it is difficult to separate these minor soils spatially due to the scale of soil mapping.

Ecological sites are correlated at the component level of the soil survey. Therefore, a single Mapunit may contain multiple Ecological Sites just as it may contain multiple soil components. This is important to understand when investigating soils and Ecological Sites. A soil survey Mapunit may be correlated to a single Ecological Site based on the major component; however, there may be inclusional areas of additional Ecological Sites which are correlated to the minor components of that particular soil Mapunit.

Representative soil components for this site include:

Ezell

This site is characterized by soils having a very high water table. Surface Soils are mostly fine sandy loam, but may range to clay loams. Salts are not concentrated enough to affect the vegetation composition. The soils are wet alluvial soils. They are classified as "Hydric".

**Table 4. Representative soil features**

Parent material	(1) Alluvium–quartzite
Surface texture	(1) Loam (2) Fine sandy loam (3) Loamy sand
Family particle size	(1) Sandy
Drainage class	Somewhat poorly drained to very poorly drained
Permeability class	Moderately rapid to rapid
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	4.32–12.7 cm
Calcium carbonate equivalent (0-101.6cm)	0–35%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–7%
Subsurface fragment volume >3" (Depth not specified)	0%

## Ecological dynamics

The information contained in the State and Transition Diagram (STD) and the Ecological Site Description was developed using archeological and historical data, professional experience, and scientific studies. The information presented is representative of a very complex set of plant communities. Not all scenarios or plants are included. Key indicator plants, animals and ecological processes are described to inform land management decisions.

This site is dominated by an overstory of willow (*Salix* spp.) and cottonwood trees (*Populus* spp.) with an understory of bushy bluestem (*Andropogon glomeratus*), sedges and rushes. Some areas near the boundaries will be nearly pure stands of bushy bluestem. Other areas usually have good stands of swithgrass (*Panicum virgatum*). Some areas of may have Indiangrass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), beaked panicum (*Panicum anceps*), and little bluestem (*Schizachyrium scoparium*). Indigobush amomorpha (*Amorpha fruticosa*) may also be found on site. Annual production is estimated at 6500 pounds per acre during years of favorable growing conditions and 2500 pounds per acre during periods of less than favorable conditions. Because of the ever present water, that is the essence of this site, forage production is always excellent and predictive. In very rare cases, where complete dry up occurs for an extended period of time, the site will slowly lose wetland and wetland-like plants like bushy bluestem. Tallgrasses will suffer, but not succumb. The site will simply become a tallgrass/midgrass flux midgrass/tallgrass "prairie like" site. "Drier climate type" plants will increase, so plants like little bluestem will begin to flourish. Production may decrease by one-half.

### State and Transition Diagram:

A State and Transition Diagram for the Poned Sandy Bottomland (R078CY090OK) site is depicted below. Thorough descriptions of each state, transition, and pathway follow the model. Experts base this model on available experimental research, field observations, professional consensus, and interpretations. It is likely to change as knowledge increases.

Plant communities will differ across the MLRA because of the natural variability in weather, soils, and aspect. The Reference Plant Community is not necessarily the management goal; other vegetative states may be desired plant communities as long as the Range Health assessments are in the moderate and above category.

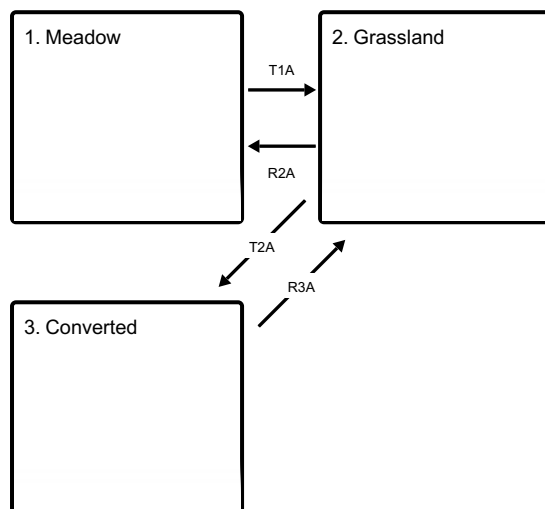
The biological processes on this site are complex. Therefore, representative values are presented in a land management context. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

Composition by dry weight and percent canopy cover are provided to describing the functional groups. Most observers find it easier to visualize or estimate percent canopy for woody species (trees and shrubs).

The following diagram suggests some pathways that the vegetation on this site might take. There may be other states not shown on the diagram. This information is intended to show what might happen in a given set of circumstances. It does not mean that this would happen the same way in every instance. Local professional guidance should always be sought before pursuing a treatment scenario.

## State and transition model

### Ecosystem states



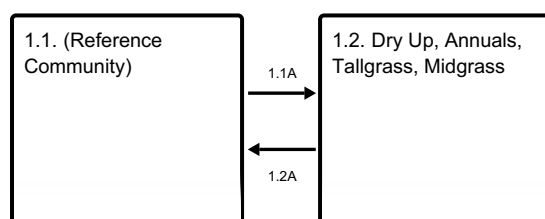
**T1A** - Lowering of the water table, may be coupled with prolonged drought conditions

**R2A** - Restoration of influencing water features

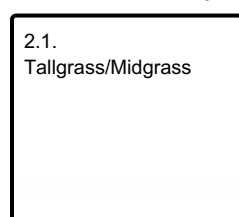
**T2A** - Extensive soil disturbance and lowering of the water table, followed by seeding

**R3A** - Absence of disturbance and restoration of influencing water features

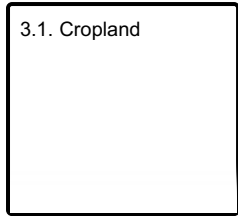
### State 1 submodel, plant communities



### State 2 submodel, plant communities



State 3 submodel, plant communities



**State 1  
Meadow**

This is the reference or diagnostic state for the site. The description is based on early range site descriptions, clipping data, professional consensus of experienced range specialists, and analysis of field work.

**Community 1.1  
(Reference Community)**

Moisture is usually at the surface or very near the surface all year. There are rare occasions when the area may dry up and there will not be water at or near the surface, but usually this drying is not severe (complete or longterm) and does not drastically affect site vegetation. The site is usually dominated by an overstory of willow (*Salix* spp.) and cottonwood (*Populus* spp.) trees with an understory of bushy bluestem (*Andropogon glomeratus*), sedges and rushes. Some areas near the boundaries will be nearly pure stands of bushy bluestem. Other areas usually have good stands of switchgrass (*Panicum virgatum*), Indiangrass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), beaked panicum (*Panicum anceps*), and little bluestem (*Schizachyrium scoparium*). Broomsedge bluestem (*Andropogon virginicus*) and indigobush amorphia (*Amorpha fruticosa*) will be present. Annual production is estimated at 6,500 pounds per acre during years of favorable growing conditions and 2,500 pounds per acre during periods of less than favorable conditions. It's obvious that the loss of water in the upper profile is the primary driver to other states. Grazing also affects the states by reducing the tallgrasses and other desirable cattle forages but, because of the natural high resiliency of the site, these desirable plants will quickly return upon a return to proper stocking rates.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2382	4287	6193
Tree	420	757	1093
<b>Total</b>	<b>2802</b>	<b>5044</b>	<b>7286</b>

Figure 9. Plant community growth curve (percent production by month). OK0001, Native, Warm Season Grasses. Typically, the summer growing season for warm season grasses begins April 5 to 15 and ends October 15 to 25. Nearly three-fourths of the season production will occur before the first of July. This varies from year to year depending upon temperatures and precipitation..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	5	10	20	30	10	5	10	6	2	1

**Community 1.2  
Dry Up, Annuals, Tallgrass, Midgrass**

Upon complete dry up, or a loss of the high water table, this site loses its' wetland-like plants, increases in annual plants, and becomes a Annual/Tallgrass/Midgrass "prairie" that fluctuates between tallgrass and midgrass dominance depending upon available moisture depth. This is the typical pathway of the site as water leaves, and is easily recognized by the number, quantity and kind of annuals on site. These states are often seen when wetlands or waterways are drained. The annual stage is followed by an upland "prairie type" appearance where the site starts looking like a normal tallgrass or midgrass site with no aquatics. Of course, production is reduced approximately

one half by dry up.

**Figure 10. Plant community growth curve (percent production by month). OK0001, Native, Warm Season Grasses. Typically, the summer growing season for warm season grasses begins April 5 to 15 and ends October 15 to 25. Nearly three-fourths of the season production will occur before the first of July. This varies from year to year depending upon temperatures and precipitation..**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	5	10	20	30	10	5	10	6	2	1

### **Pathway 1.1A Community 1.1 to 1.2**

As the water table drop below the rooting zone for short periods, the community may shift towards 1.2.

### **Pathway 1.2A Community 1.2 to 1.1**

With the restoration of the water table to the rooting zone, the community may shift back to 1.1.

## **State 2 Grassland**

### **Community 2.1 Tallgrass/Midgrass**

In those very rare cases where complete dry up occurs for an extended period of time (a complete season or more), the site will slowly lose all the wetland and wetland-like plants like bushy bluestem. There will be a very noticeable increase of annuals and the site will seem to be failing (look out of place), but will soon turn "prairie like". Tallgrasses will suffer, but not necessarily succumb. The site will simply and gradually become a tallgrass/midgrass flux midgrass/tallgrass "prairie" looking bottomland. "Drier climate type" (deeper rooted) plants will increase, so plants like broomsedge bluestem and little bluestem will begin to flourish. The overall extent of the expression of the bluestems cannot be predicted. Sometimes they will really come on, sometimes they won't, but there will be an increase. Production may decrease by one-half.

## **State 3 Converted**

### **Community 3.1 Cropland**

The higher islands and higher open areas may be cultivated for crops, planted to permanent native, or introduced pasture species, or let "go back" to native species. Under complete dry up, the entire site may be cultivated. Even though a Meadow site may have been in cultivation for a substantial period of time, it is not always impossible for the site to return to something resembling the reference state. Especially if, after complete dry up, the site's "close to surface" water regime returns. This site can be very productive and resilient. Cultivation is definitely not a one-way street for this ecological site. The return of a cultivated field to the reference state depends on the integrity of the soil's A horizon, length of time in cultivation, loss of organic matter, soil type, and water table depth. There are many examples in Oklahoma, Kansas, and Texas of abandoned cultivated fields that have re-vegetated; are in excellent condition; and closely resemble the reference state. Sometimes, however, it is very difficult to determine if fields were cultivated. Some of these sites may have been reseeded, others were not. If the soil resource has not been heavily degraded and given enough time, the site could get back to the reference state or something very close to it.

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

If the water table drops below the rooting zone for many species in State 1 for long periods (multiple years), the site will transition to state 2.

## Restoration pathway R2A

### State 2 to 1

With hydrology restored and the water table elevated to the rooting zone, the site may be restored to state 1.

## Transition T2A

### State 2 to 3

Many of these sites are converted to cropland through cultivation. Soil properties and hydrology have been altered significantly.

## Restoration pathway R3A

### State 3 to 2

Through a planned restoration program that includes range planting and prescribed grazing, the site may be restored to something similar to state 2. It may take many years to achieve.

## Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Tallgrasses</b>			841–2186	
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	280–729	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	280–729	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	140–364	–
	big bluestem	ANGE	<i>Andropogon gerardii</i>	140–364	–
2	<b>Midgrasses</b>			701–1821	
	bushy bluestem	ANGL2	<i>Andropogon glomeratus</i>	420–1093	–
	broomsedge bluestem	ANVI2	<i>Andropogon virginicus</i>	140–364	–
	beaked panicgrass	PAAN	<i>Panicum anceps</i>	140–364	–
	Florida paspalum	PAFL4	<i>Paspalum floridanum</i>	140–364	–
3	<b>Cool-Season Grasses</b>			841–2186	
	sedge	CAREX	<i>Carex</i>	420–1093	–
	rush	JUNCU	<i>Juncus</i>	420–1093	–
<b>Tree</b>					
4	<b>Tree/Shrub</b>			420–1093	
	false indigo bush	AMFR	<i>Amorpha fruticosa</i>	140–364	–
	baccharis	BACCH	<i>Baccharis</i>	140–364	–
	eastern cottonwood	PODE3	<i>Populus deltoides</i>	140–364	–
	willow	SALIX	<i>Salix</i>	140–364	–

## Animal community

Native animals that occupy this site include bobwhite quail, white-tailed deer, turkey, squirrel, various small mammals and grassland birds. The site provides roosting trees for turkey and cover and nesting habitat for both turkey and quail. Deer frequent the site for screening cover and escape cover. Many white-tailed deer fawns are



observed in the tall grass cover in the spring. Many species of small mammals find this site ideal habitat. Predators such as bobcats are often seen also.

## **Hydrological functions**

The usual high water table enables growth of lush vegetation. Wetland characteristics often prevail and the site acts as a filter for overland flow. Evaporation is minimized by tall and dense plant growth that shades the soil surface. The site contributes to the stability of the overall riparian system that occurs along major streams.

## **Recreational uses**

Usually boggy and hard to traverse. Used for bird, animal watching and other activities associated with viewing nature. Hawks, owls, woodpeckers, rabbits, squirrels, raccoons and many other indigenous birds and animals will be seen. Hunting and trapping are sportman activities on this site.

## **Wood products**

Several species of trees might be found on this site, but there is not enough for any appreciable harvest of wood products.

## **Other products**

None

## **Inventory data references**

The original information presented here was derived from field observations by Dr. Jack Eckroat, in the summers of 2007 and 2008, correlated to office files and old Range Site Technical Descriptions (1961 USDA/SCS). Species compositions are as complete as possible. Production will vary by species from within years, from year to year, and from site to site. Production figures are intended to show best estimates of the relationships between the total biomass and hierarchy of the different species.

Range Site Descriptions and historical accounts of vegetative conditions at the time of early settlement in the area were used in the development of this site description. Vegetative inventories were made at several site locations for support documentation.

Inventory Data References (documents):

NRCS FOTG-Section II-Range Site Descriptions

NRCS-NRI 417 Data

NRCS Clipping Data Summaries

Clipping data and other observations on file in the Oklahoma NRCS State Office:

100 USDA

Stillwater, Oklahoma 74074

## **Other references**

This "Approved" site was included in an update project during 2013. The State&Transition model was re-formatted and the ESD was edited to fit the new ESIS format. The concepts and vegetative data contained therein was not altered. The entire ESD will be reviewed, updated, and subjected to the QC/QA processes as part of a future project. CW

## **Contributors**

Dr. Jack Eckroat, Grazing Lands Specialist, NRCS, Oklahoma

PES Edits by Tyson Morley, MLRA Soil Scientist, Altus, Oklahoma

## Approval

Bryan Christensen, 9/15/2023

## Acknowledgments

Site Development and Testing Plan

Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document.

Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

## 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)	Jack Eckroat
Contact for lead author	100 USDA, Suite 206, Stillwater, OK 74074
Date	12/01/2008
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** None

---

2. **Presence of water flow patterns:** Very few if any.

---

3. **Number and height of erosional pedestals or terracettes:** None

---

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** <20%. Bare ground may vary throughout site.

---

5. **Number of gullies and erosion associated with gullies:** None. These sites are associated with stream channels or old channels which are spring fed. Therefore, channels may exist but may be actual gullies.

---

6. **Extent of wind scoured, blowouts and/or depositional areas:** None

- 
7. **Amount of litter movement (describe size and distance expected to travel):** Very little movement due to flatter slopes and good infiltration
- 
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability classes 5-6. Soils stable with good organic matter content.
- 
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Refer to soil series description for the site.
- 
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Overstory of trees help slow water impact and infiltration is good. Grass component slows runoff to allow for slow infiltration into soils that are usually poorly drained. Runoff not typically a concern.
- 
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None
- 
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: Trees
- Sub-dominant: Tallgrasses, Midgrasses, Shortgrasses, Cool-season Perennial Grasses
- Other: Forbs
- Additional:
- 
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Some can be expected.
- 
14. **Average percent litter cover (%) and depth ( in):** 95% @ 1 inch
- 
15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 2500-6500
- 
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: Sites can be invaded by many annuals in drier periods. Potential for eastern redcedar, mainly around the edges where drier conditions exist.

---

17. **Perennial plant reproductive capability:** All species are capable of reproducing, both by vegetation and by seed.
-