

Ecological site R034AY346WY  
Sands High Plains Southeast (Sa)

Accessed: 05/13/2025

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.

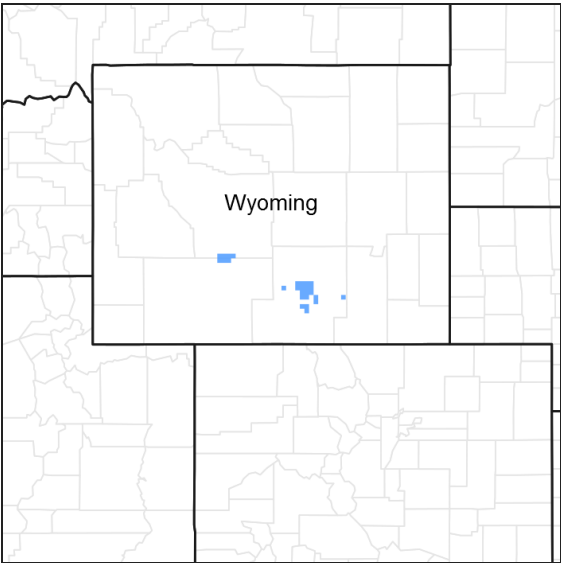


Figure 1. Mapped extent

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.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site usually occurs in an upland position on rolling to very rough topography. Slopes are commonly 10 to 30%.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	1,676–2,286 m
Slope	5–60%
Ponding depth	0 cm

Aspect	Aspect is not a significant factor
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## Climatic features

Annual precipitation ranges from 10-14 inches per year. Wide fluctuations may occur in yearly precipitation and result in more dry years than those with more than normal precipitation. Temperatures show a wide range between summer and winter and between daily maximums and minimums. This is predominantly due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring.

Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 mph.

Growth of native cool season plants begins about April 15 and continues to about June 15. Some green up of cool season plants usually occurs in September.

The following information is from the "Laramie" climate station:

Minimum Maximum 5 yrs. out of 10 between

Frost-free period (days): 57 149 June 1 – September 16

Freeze-free period (days): 94 183 May 15 – September 28

Annual Precipitation (inches): 5.8 17.34

Mean annual precipitation: 11.53 inches

Mean annual air temperature: 42.2 F (30.4 F Avg. Min. to 53.9 F Avg. Max.)

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at <http://www.wcc.nrcs.usda.gov/> website. Other climate station(s) representative of this precipitation zone include "Dixon " and "Medicine Bow".

**Table 3. Representative climatic features**

Frost-free period (average)	149 days
Freeze-free period (average)	183 days
Precipitation total (average)	356 mm

## Influencing water features

Stream type: None

## Soil features

The soils of this site formed primarily in aeolian deposits and less commonly in residuum. They are deep and moderately deep sandy soils. This soil can develop into active sand dunes with the deterioration of cover.

**Table 4. Representative soil features**

Surface texture	(1) Fine sand (2) Loamy fine sand
Family particle size	(1) Sandy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	51–152 cm
Surface fragment cover <=3"	0%

Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	3.05–6.35 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
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)	6.1–7.8
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0%

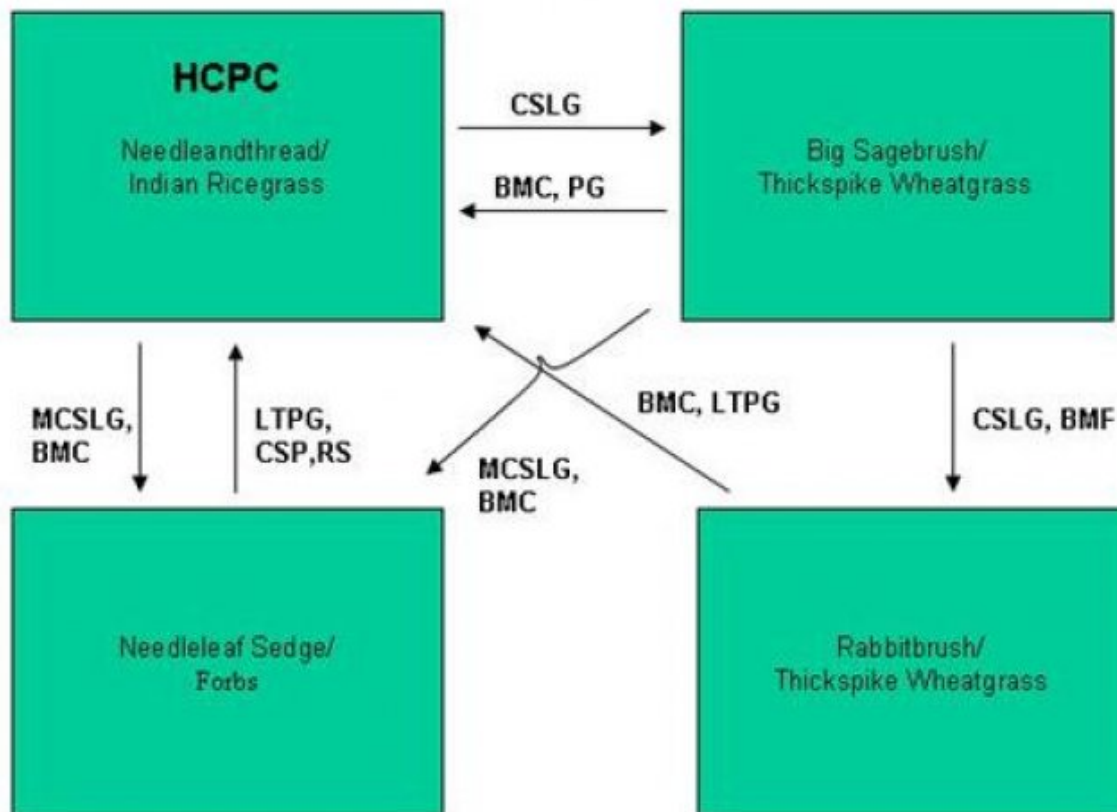
## Ecological dynamics

As this site deteriorates from improper grazing management, species such as needleleaf sedge, big sagebrush, and rabbitbrush increase. Desirable mid grasses such as needleandthread, Indian ricegrass, and thickspike wheatgrass decrease. Excessive use on this site may result in blowouts and development of active dunes.

The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical accounts have also been used.

The following is a State and Transition Model Diagram that illustrates the common plant communities (states) that can occur on the site and the transitions between these communities. The ecological processes will be discussed in more detail in the plant community narratives following the diagram.

## State and transition model



BMA – Brush Management (all methods)  
BMC – Brush Management (chemical)  
BMF – Brush Management (fire)  
BMM – Brush Management (mechanical)  
CSP – Chemical Seedbed Preparation  
CSLG – Continuous Season-long Grazing  
DR – Drainage  
CSG – Continuous Spring Grazing  
HB – Heavy Browse  
HCSLG – Heavy Continuous Season-long Grazing  
HI – Heavy Inundation  
LPG – Long-term Prescribed Grazing  
MT – Mechanical Treatment (chiseling, ripping, pitting)  
MCSLG – Moderate Continuous Season Long Grazing

NF – No Fire  
NS – Natural Succession  
NWC – Noxious Weed Control  
NWI – Noxious Weed Invasion  
NU – Nonuse  
P&C – Plow & Crop (including hay)  
PG – Prescribed Grazing  
RPT – Re-plant Trees  
RS – Re-seed  
SGD – Severe Ground Disturbance  
SHC – Severe Hoof Compaction  
WD – Wildlife Damage (Beaver)  
WF – Wildfire

## State 1

### Needleandthread/ Indian Ricegrass Plant Community (HCPC)

#### Community 1.1

##### Needleandthread/ Indian Ricegrass Plant Community (HCPC)

The interpretive plant community for this site is the Historic Climax Plant Community. Potential vegetation is estimated at 80% grasses or grass-like plants, 10% forbs and 10% woody plants. A typical plant composition for this state consists of needleandthread 35-45%, Indian ricegrass 15-25%, thickspike wheatgrass 10-20%, perennial forbs 5-10%, and shrubs 5-10%. Ground cover, by ocular estimate, varies from 25-45%. The total annual production (air-dry weight) of this state is about 1400 pounds per acre, but it can range from about 900 lbs./acre in unfavorable years to about 1700 lbs./acre in above average years. This state is extremely stable and well adapted to the Cool Central Desertic Basins and Plateaus climate. The diversity in plant species allows for high drought resistance. This is a sustainable plant community (site/soil stability, watershed function, and biologic integrity). Transitions or pathways leading to other plant communities are as follows: • Continuous Season-long Grazing will convert the plant community to the Big Sagebrush/Thickspike Plant Community. • Moderate Continuous Season-long Grazing with Brush Management (chemical) will convert the plant community to the Needleleaf Sedge/Forbs Plant Community.

Figure 4. Plant community growth curve (percent production by month).  
WY0901, 34AI, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	35	40	10	0	5	0	0	0

## State 2

### Big Sagebrush/Thickspike Wheatgrass Plant Community

#### Community 2.1

##### Big Sagebrush/Thickspike Wheatgrass Plant Community

This plant community is the result of continuous season long grazing of the HCPC. Big sagebrush and thickspike wheatgrass dominate. Big sagebrush may comprise 30-40% of total annual production. When compared to the HCPC mid bunchgrasses have decreased, thickspike wheatgrass remains, and big sagebrush has increased. The total annual production (air-dry weight) of this state is about 1000 pounds per acre, but it can range from about 500 lbs./acre in unfavorable years to about 1300 lbs./acre in above average years. This site is relatively stable but because understory vegetation is reduced, erosion may be higher than desired. The biotic integrity of the site has been reduced to loss of mid bunchgrasses. The watershed is functioning with continued disturbance it may be at risk. Transitional pathways leading to other plant communities are as follows: • Brush Management (chemical) with Prescribed Grazing will return this state to near Historic Climax Plant Community (Needleandthread/Indian Ricegrass Plant Community). • Continuous Season Long Grazing, Brush Management (fire) will convert this site to a Rabbitbrush/Thickspike Wheatgrass Plant Community • Moderate Continuous Season-long Grazing, Brush Management (chemical) will convert the plant community to the Needleleaf Sedge/ Forbs Plant Community.

Figure 5. Plant community growth curve (percent production by month).  
WY0901, 34AI, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	35	40	10	0	5	0	0	0

## State 3

### Rabbitbrush/Thickspike Wheatgrass Plant Community

#### Community 3.1

##### Rabbitbrush/Thickspike Wheatgrass Plant Community

This plant community is a result of continuous season-long grazing coupled with fire. Rubber rabbitbrush quickly

replaces big sagebrush as the dominant shrub. There is also an increase in forbs and annuals. The total annual production (air-dry weight) of this state is about 1000 pounds per acre, but it can range from about 500bs./acre in unfavorable years to about 1300 lbs./acre in above average years. This state is relatively stable but vulnerable to excessive erosion. The biotic integrity of this plant community is at risk with changing growth forms of woody species and an increase in short lived forbs. The watershed may be at risk as bare ground increases. Transitional pathways leading to other plant communities are as follows: • Brush Management (chemical) followed by Long-term Prescribed Grazing may eventually return this state to near Historic Climax Plant Community (Needleandthread /Indian Ricegrass Plant Community).

Figure 6. Plant community growth curve (percent production by month).  
WY0901, 34AI, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	35	40	10	0	5	0	0	0

## State 4 Needleleaf Sedge/Forbs Plant Community

### Community 4.1 Needleleaf Sedge/Forbs Plant Community

This plant community is a result of moderate to heavy continuous season-long grazing and brush management. Short grasses and grasslike plants have replaced mid bunchgrasses with forbs such as wild buckwheat, scurfpeas, and sand dock within the interspaces. This community is also susceptible to invasion by sunflowers, Russian thistle, and other non-native annuals. The total annual production (air-dry weight) of this state is about 700 pounds per acre, but it can range from about 400 lbs./acre in unfavorable years to about 1000 lbs./acre in above average years. This state is unstable and vulnerable to excessive erosion. The biotic integrity of this plant community is at risk or non-functioning. The watershed is usually at risk or non-functioning as bare ground increases. Transitional pathways leading to other plant communities are as follows: • Long Term Prescribed Grazing with Chemical Seedbed Prep and Reseeding may eventually return this state to near Historic Climax Plant Community (Needleandthread /Indian Ricegrass Plant Community).

Figure 7. Plant community growth curve (percent production by month).  
WY0901, 34AI, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	35	40	10	0	5	0	0	0

## Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1				549–706	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	549–706	–
2				235–392	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	235–392	–
3				157–314	
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	157–314	–
4				78–314	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–78	–
		ACBL	<i>Achnatherum ×bloomeri</i>	0–78	–
	needleleaf sedge	CADU6	<i>Carex duriuscula</i>	0–78	–
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	0–78	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0–78	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–78	–
	muttongrass	POFE	<i>Poa fendleriana</i>	0–78	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–78	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	0–78	–
	blowout grass	REFL	<i>Redfieldia flexuosa</i>	0–78	–
<b>Forb</b>					
5				78–157	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–78	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0–78	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0–78	–
	beardtongue	PENST	<i>Penstemon</i>	0–78	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	0–78	–
	scurfpea	PSORA2	<i>Psoralidium</i>	0–78	–
	dock	RUMEX	<i>Rumex</i>	0–78	–
	clover	TRIFO	<i>Trifolium</i>	0–78	–
<b>Shrub/Vine</b>					
6				0–78	
	shortspine horsebrush	TESP2	<i>Tetradymia spinosa</i>	0–78	–
7				0–78	
	spineless horsebrush	TECA2	<i>Tetradymia canescens</i>	0–78	–
8				78–157	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–78	–
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	0–78	–
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	0–78	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0–78	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	0–78	–

## Animal community

### Animal Community – Wildlife Interpretations

Needleandthread/Indian Ricegrass Plant Community (HCPC): The predominance of grasses in this plant community favors grazing species. Antelope, elk, and small grassland mammals are usually present. Thermal and escape cover for deer is limited but topographic relief provides some cover. A variety of reptiles and birds also frequent this site.

Big Sagebrush/Thickspike Wheatgrass Plant Community: This plant community may be useful for the same wildlife that would use the Historic Climax Plant Community. Increased shrubs provide additional cover and browse for species associated with this site.

Rabbitbrush/Thickspike Wheatgrass Plant Community: This plant community may be useful for the same wildlife that would use the Historic Climax Plant Community. Increased shrubs provide additional cover and browse for species associated with this site.

Needleleaf Sedge/Forb Plant Community: This community provides limited forage for antelope and other grazers.

### Animal Community – Grazing Interpretations

The following table lists suggested stocking rates for cattle under continuous season-long grazing under normal growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using this information along with animal preference data, particularly when grazers other than cattle are involved. Under more intensive grazing management, improved harvest efficiencies can result in an increased carrying capacity. If distribution problems occur, stocking rates must be reduced to maintain plant health and vigor.

#### Plant Community Production Carrying Capacity\*

(lb./ac) (AUM/ac)

Needleandthread/Indian Ricegrass (HCPC) 900-1700 0.4

Big Sagebrush/Thickspike Wheatgrass 500-1300 0.3

Rabbitbrush/Thickspike Wheatgrass 500-1300 0.3

Needleleaf Sedge/Forbs 400-1000 0.2

\* - Continuous, season-long grazing by cattle under average growing conditions.

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage for cattle, sheep, or horses. During the dormant period, the forage for livestock use needs to be supplemented with protein because the quality does not meet minimum livestock requirements.

## Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group A, with localized areas in hydrologic group B. Infiltration potential for this site varies from moderately rapid to very rapid depending on soil hydrologic group and ground cover. Runoff varies from very low to moderately low (refer to Part 630, NRCS National Engineering Handbook for detailed hydrology information).

Rills and gullies should not typically be present. Water flow patterns should be barely distinguishable if at all present. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent.

## Recreational uses

This site provides hunting opportunities for upland game species. The wide variety of plants which bloom from spring until fall have an esthetic value that appeals to visitors. The sandy nature of the soils appeals to Off-Road Vehicle (ORV) users.



## Wood products

No appreciable wood products are present on the site.

## Other products

None noted.

## Inventory data references

Inventory Data References (narrative)

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel were also used. Other sources used as references include: USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties.

Inventory Data References

Data Source Number of Records Sample Period State County

SCS-RANGE-417 69 1967-1988 WY Carbon

& others

## Contributors

B. Brazee

## 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	05/01/2005
Approved by	E. Bainter
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** Rills should not be present

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2. **Presence of water flow patterns:** Barely observable

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3. **Number and height of erosional pedestals or terracettes:** Essentially non-existent

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not**

**bare ground):** Bare ground is 20-30% occurring in small areas throughout site

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5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present
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6. **Extent of wind scoured, blowouts and/or depositional areas:** Active blowouts should not be present
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7. **Amount of litter movement (describe size and distance expected to travel):** Little to no plant litter movement. Plant litter remains in place and is not moved by erosional forces.
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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):** Plant cover and litter is at 70% or greater of soil surface and maintains soil surface integrity. Soil Stability class is anticipated to be 4 or greater.
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Use Soil Series description for depth and color of A-horizon
- 

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Grass canopy and basal cover should reduce raindrop impact and slow overland flow providing increased time for infiltration to occur. Healthy deep rooted native grasses enhance infiltration and reduce runoff. Infiltration is Moderately rapid to Very Rapid.
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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):** No compaction layer or soil surface crusting should be present.
- 

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: Tall and Mid stature Grasses > Shrubs > Forbs = Short stature grasses/grasslikes

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very Low
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14. **Average percent litter cover (%) and depth ( in):** Average litter cover is 25-35% with depths of 0.25 to 1.0 inches

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1400 lbs/ac

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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:** Upland sedges, Annuals, Unpalatable forbs, and Species found on Noxious Weed List

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17. **Perennial plant reproductive capability:** All species are capable of reproducing

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