USDA Natural Resources
Conservation Service

Ecological site R034AY368WY
Steep Loamy High Plains Southeast (SLy)

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.

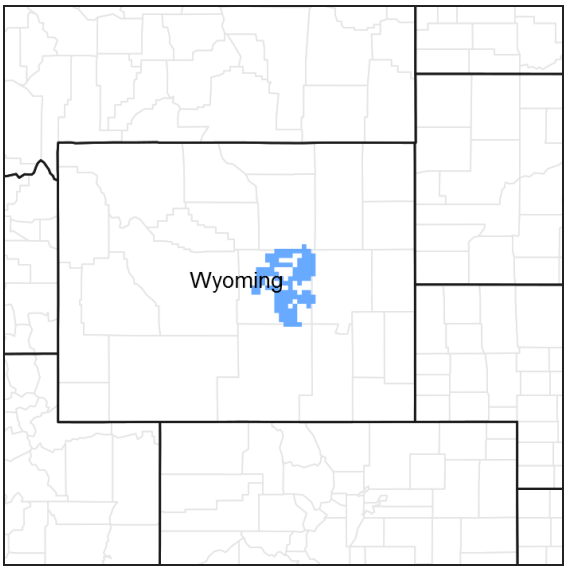


Figure 1. Mapped extent

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 occurs on slopes in excess of 15%

Table 2. Representative physiographic features

Landforms	(1) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	1,676–2,286 m
Slope	15–40%
Ponding depth	0 cm
Aspect	Aspect is not a significant factor

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 are moderately deep (greater than 20” to bedrock) to very deep, well drained soils formed in alluvium. The topsoil, except for thin ineffectual layers, will be very fine sandy loam, loam or silt loam. These soils are not high in salinity and/or alkalinity but do have high concentrations of exchangeable sodium throughout the profile.

Table 4. Representative soil features

Surface texture	(1) Loam (2) Silt loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	51–152 cm
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0%

Available water capacity (0-101.6cm)	9.65–14.48 cm
Calcium carbonate equivalent (0-101.6cm)	3–15%
Electrical conductivity (0-101.6cm)	0–4 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)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0%

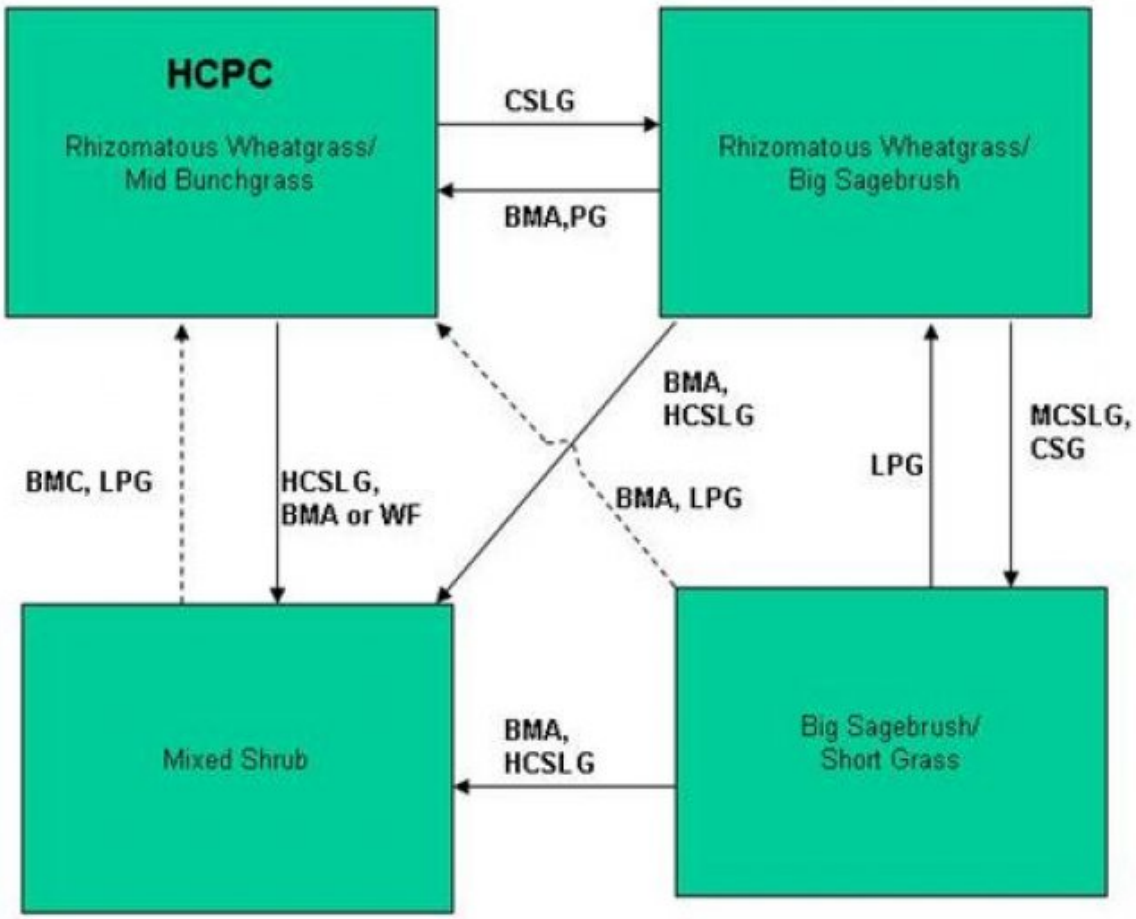
Ecological dynamics

As this site deteriorates from improper grazing management, species such as Big sagebrush and rabbitbrush will increase. Bluebunch wheatgrass will decrease in frequency and production.

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
Rhizomatous Wheatgrass/ Mid Bunchgrass Plant Community (HCPC)

Community 1.1
Rhizomatous Wheatgrass/ Mid Bunchgrass Plant Community (HCPC)

The interpretive plant community for this site is the Historic Climax Plant Community. Potential vegetation is estimated at 75% grasses or grass-like plants, 10% forbs and 15% woody plants. The major grasses include western wheatgrass, bluebunch wheatgrass, muttongrass, and needleandthread. Big sagebrush is the major woody plant. Other woody plants that may occur include black sagebrush, rabbitbrush and snowberry. A typical plant composition for this state consists of western wheatgrass 25-35%, bluebunch wheatgrass 5-15%, muttongrass 5-15%, and needleandthread 5-15%, perennial forbs 5-15%, big sagebrush 0-10%%, and 0-5% other woody species. Ground cover, by ocular estimate, varies from 25-35%. The total annual production (air-dry weight) of this state is about 900 pounds per acre, but it can range from about 400 lbs./acre in unfavorable years to about 1100 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 Rhizomatous Wheatgrass/Big Sagebrush Plant Community. • Heavy Continuous Season-long Grazing following Wild Fire or Brush Management will convert the plant community to the Mixed Shrub 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
Rhizomatous Wheatgrass/Big Sagebrush Plant Community

Community 2.1
Rhizomatous Wheatgrass/Big Sagebrush Plant Community

This plant community is the result of moderate continuous season long grazing of the HCPC. Western wheatgrass and big sagebrush dominate. Mid bunchgrasses are reduced in frequency and production allowing short grasses such as prairie junegrass, blue grama, and Canby bluegrass greater opportunity. Big sagebrush usually comprises 10-20% of annual production. The total annual production (air-dry weight) of this state is about 800 pounds per acre, but it can range from about 300 lbs./acre in unfavorable years to about 1000 lbs./acre in above average years. The soil is not protected and erosion will increase if management is not changed. The biotic integrity may be reduced due to low vegetative production. The watershed is functioning at risk. Transitional pathways leading to other plant communities are as follows: • Prescribed Grazing and Brush Management will return this state to near Historic Climax Plant Community (Rhizomatous Wheatgrass/ Mid Bunchgrass Plant Community). • Moderate Continuous Season-long Grazing or Continuous Spring grazing will convert the plant community to the Big Sagebrush/Shortgrass 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
Big Sagebrush/Shortgrass Plant Community

Community 3.1
Big Sagebrush/Shortgrass Plant Community

This plant community is a result of moderate continuous season-long grazing. Big sagebrush increases to 40-50%% of the annual production. Cool season bunchgrasses decrease while rhizomatous wheatgrass prevails. Annual grasses and forbs increase. The total annual production (air-dry weight) of this state is about 600 pounds per acre, but it can range from about 200 lbs./acre in unfavorable years to about 800 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 and susceptible to invasive species. The watershed is at risk as bare ground increases. Transitional pathways leading to other plant communities are as follows: • Brush Management followed by Long-term Prescribed Grazing may eventually return this state to near Historic Climax Plant Community (Rhizomatous Wheatgrass/Mid Bunchgrass Plant Community). • Brush Management followed by Heavy Continuous Season Long Grazing will convert the community to a Mixed Shrub Plant Community. • Long-term Prescribed Grazing will eventually return this state to the Rhizomatous Wheatgrass/Big Sagebrush 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
Mixed Shrub Plant Community

Community 4.1
Mixed Shrub Plant Community

This plant community is a result of heavy continuous season-long grazing following brush management practices or wild fire. Shrubs including black sagebrush, rabbitbrush, and snowberry compose 50-60% of annual production. Cool season bunchgrasses decrease while rhizomatous wheatgrass prevails. Annuals grasses and forbs increase in productivity. The total annual production (air-dry weight) of this state is about 600 pounds per acre, but it can range from about 200 lbs./acre in unfavorable years to about 800 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: • Brush Management (chemical) followed by Long-term Prescribed Grazing may eventually return this state to near Historic Climax Plant Community (Rhizomatous Wheatgrass/ Mid Bunchgrass 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 (%)
Grass/Grasslike					
1				252–353	
	western wheatgrass	PASM	*Pascopyrum smithii*	252–353	–
2				50–151	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	17–151	–
3				50–151	
	muttongrass	POFE	*Poa fendleriana*	50–151	–
4				50–151	
	needle and thread	HECO26	*Hesperostipa comata*	50–151	–
5				101–252	

5				101–252	
	Grass, perennial	2GP	*Grass, perennial*	0–50	–
		ACBL	*Achnatherum ×bloomeri*	0–50	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–50	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–50	–
	needleleaf sedge	CADU6	*Carex duriuscula*	0–50	–
	threadleaf sedge	CAFI	*Carex filifolia*	0–50	–
	plains reedgrass	CAMO	*Calamagrostis montanensis*	0–50	–
	squirreltail	ELEL5	*Elymus elymoides*	0–50	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–50	–
	mountain muhly	MUMO	*Muhlenbergia montana*	0–50	–
	green needlegrass	NAVI4	*Nassella viridula*	0–50	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–50	–
Forb					
6				50–151	
	Forb, perennial	2FP	*Forb, perennial*	0–50	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–50	–
	bastard toadflax	COUM	*Comandra umbellata*	0–50	–
	fleabane	ERIGE2	*Erigeron*	0–50	–
	buckwheat	ERIOG	*Eriogonum*	0–50	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0–50	–
	beardtongue	PENST	*Penstemon*	0–50	–
	spiny phlox	PHHO	*Phlox hoodii*	0–50	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–50	–
	clover	TRIFO	*Trifolium*	0–50	–
Shrub/Vine					
7				0–101	
	big sagebrush	ARTR2	*Artemisia tridentata*	0–101	–
8				0–50	
	black sagebrush	ARNO4	*Artemisia nova*	0–50	–
9				0–50	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–50	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–50	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	0–50	–

Animal community

Animal Community – Wildlife Interpretations
Rhizomatous Wheatgrass/Mid Bunchgrass Plant Community (HCPC): This plant community provides suitable thermal and escape cover for mule deer, elk, and antelope. Sagebrush provides important winter forage for mule deer, antelope, and elk. Year-round habitat is provided for sage grouse and many other sagebrush obligate species such as the sage sparrow, Brewer’s sparrow, sage thrasher, pygmy rabbit, sagebrush vole, horned lizard, and pronghorn antelope. Other birds that would frequent this plant community include horned larks and golden eagles.

Rhizomatous Wheatgrass/Big Sagebrush Plant Community: This plant community may be beneficial for the same wildlife that would use the Historic Climax Plant Community. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals.

Big Sagebrush/Shortgrass Plant Community: This plant community may be beneficial for the same wildlife that would use the Historic Climax Plant Community. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals. Amount of herbaceous is reduced

Mixed Shrub Plant Community: This plant community may be beneficial for the same wildlife that would use the Historic Climax Plant Community. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals. Amount of herbaceous is reduced.

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)
Rhizomatous Wheatgrass/ Mid Bunchgrass (HCPC) 400-1100 0.3
Rhizomatous Wheatgrass/ Big Sagebrush 300-1000 0.26
Big Sagebrush/Shortgrass 200-800 0.2
Mixed Shrub 200-800 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 B, with localized areas in hydrologic groups A and C. Infiltration ranges from rapid to moderate. Runoff potential for this site varies from low to moderate depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. Areas where ground cover is less than 50% have the greatest potential to have reduced infiltration and higher runoff (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. Pedestals are only slightly present in association with bunchgrasses and shrubs. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogrammic crusts are present, but only cover 1-2% of the soil surface.

Recreational uses

This site provides hunting opportunities for upland game species. The wide varieties of plants which bloom from spring until fall have esthetic values that appeal to visitors.

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:** Short, broken and discontinuous.

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2. **Presence of water flow patterns:** Evident

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3. **Number and height of erosional pedestals or terracettes:** Erosional pedestals may be present with small terracettes present at debris dams.

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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 40-50% occurring in small areas throughout site

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5. **Number of gullies and erosion associated with gullies:** Active gullies should be restricted to areas of concentrated water flow patterns on steeper slopes

6. **Extent of wind scoured, blowouts and/or depositional areas:** Small scoured sites may be observed

7. **Amount of litter movement (describe size and distance expected to travel):** Litter movement is little to none based on topography and water flow patterns

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 50% or greater of soil surface and maintains soil surface integrity. Soil Stability class is anticipated to be 3 or greater.

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. Infiltration is rapid to very rapid

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: Mid stature Bunch Grasses > Mid Stature Rhizomatous Grasses > Shrubs > Forbs = Short grasses

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very Low

14. **Average percent litter cover (%) and depth (in):** Average litter cover is 15-25% with depths of 0.25 to 0.5 inches

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 900 lbs/ac

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:** Sedges, Blue grama, Big sagebrush, Rabbitbrushes, Unpalatable forbs, Annuals, 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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