

Ecological site R034AY304WY

Clayey High Plains Southeast (Cy)

Accessed: 05/12/2025

General information

**Provisional.** A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

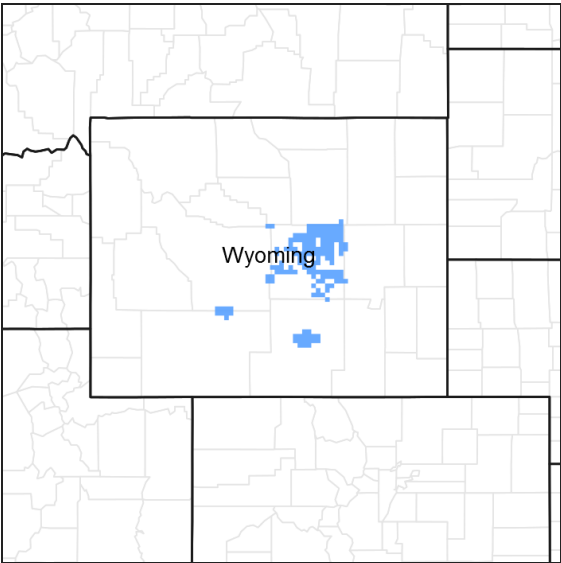


Figure 1. Mapped extent

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.

Associated sites

R034AY306WY	Clayey Overflow High Plains Southeast (CyO)
R034AY322WY	Loamy High Plains Southeast (Ly)
R034AY350WY	Sandy High Plains Southeast (Sy)
R034AY358WY	Shallow Clayey High Plains Southeast (SwCy)

Similar sites

R034AY322WY	Loamy High Plains Southeast (Ly)
R034AY104WY	Clayey Green River and Great Divide Basins (Cy)

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

## Physiographic features

This site occurs in valley bottoms and on gently sloping to steep mountain slopes. It is found on all exposures with a tendency toward north and east slopes at lower elevations

**Table 2. Representative physiographic features**

Landforms	(1) Hill (2) Alluvial fan (3) Stream terrace
Flooding frequency	None
Ponding frequency	None
Elevation	5,500–7,500 ft
Slope	0–60%
Ponding depth	0 in

## 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)	14 in

## Influencing water features

Stream type: None

## Soil features

These are moderately deep and deep (at least 20 inches deep) well drained soils with more than 35 percent clay in the subsoil. Some soil cracking (not severe) occurs during the dry summer months, especially where the plant cover has been reduced. Water holding capacity is high, but surface intake is restricted which causes runoff and reduces effectiveness of precipitation.

**Table 4. Representative soil features**

Surface texture	(1) Gravelly clay loam (2) Silty clay loam (3) Clay
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Very slow to moderately slow
Soil depth	20–60 in
Available water capacity (0-40in)	5.5–6 in
Calcium carbonate equivalent (0-40in)	5–15%
Electrical conductivity (0-40in)	0–8 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	6.6–8.4

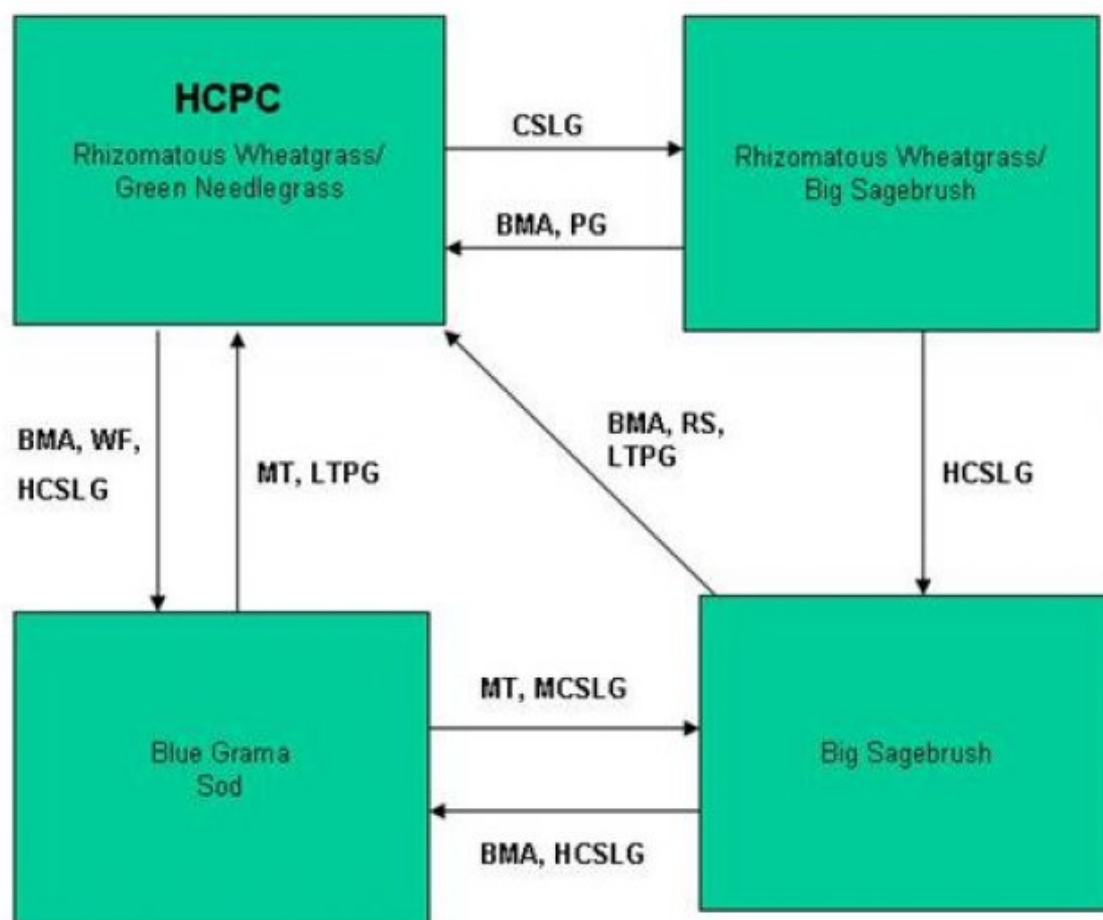
## Ecological dynamics

As this site deteriorates from improper grazing management, species such as big sagebrush, blue grama and unpalatable forbs will increase. Green needlegrass and rhizomatous wheatgrasses 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/ Green Needlegrass Plant Community (HCPC)

Community 1.1  
Rhizomatous Wheatgrass/ Green Needlegrass 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. The major grasses include western wheatgrass, green needlegrass, bluebunch wheatgrass, and bottlebrush squirreltail. Birdfoot and big sagebrush are woody components. Other woody plants that may occur include Gardner’s saltbush and winterfat. A typical plant composition for this state consists of western wheatgrass 40-50%, green needlegrass 15-25%, bluebunch wheatgrass 5-10%, bottlebrush squirreltail 5-10%, perennial forbs 5-10%, birdfoot sagebrush 5-10%, and 5-10% other woody species. Ground cover, by ocular estimate, varies from 30-40%. 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 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. • Brush Management, Wild Fire followed by Moderate to Heavy Continuous Season-long Grazing will convert the plant community to the Blue Grama Sod Plant Community.

Figure 3. 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. Big sagebrush becomes 10-20% of production and rhizomatous wheatgrasses dominate. Birdfoot sagebrush remains at 5-10%. When compared to the HCPC, green needlegrass and bluebunch wheatgrass have decreased, rhizomatous wheatgrasses have increased. The total annual production (air-dry weight) of this state is about 800 pounds per acre, but it can range from about 400 lbs. /acre in unfavorable years to about 1200 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: • Brush Management followed by Prescribed Grazing or Long-term Prescribed Grazing will return this state to near Historic Climax Plant Community (Rhizomatous Wheatgrass/ Green Needlegrass Plant Community). • Heavy Continuous Season-long Grazing will convert the plant community to the Big Sagebrush 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 3  
Big Sagebrush Plant Community

Community 3.1  
Big Sagebrush Plant Community

This plant community is a result of heavy continuous season-long grazing. Severe hoof compaction typically occurs due to fine soil textures. Big sagebrush increases to 50-60% of the annual production. Cool season bunchgrasses are replaced with sparse short grasses such as Sandberg bluegrass, prairie junegrass, and blue grama. Rhizomatous wheatgrasses remain in the community. Annual forbs and cheatgrass become established. The total annual production (air-dry weight) of this state is about 600 pounds per acre, but it can range from about 400 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 followed by Reseeding and Prescribed Grazing or Long-term Prescribed Grazing may eventually return this state to near Historic Climax Plant Community (Rhizomatous Wheatgrass/ Green Needlegrass Plant Community). • Brush Management followed by Heavy Continuous Season Long Grazing will convert this community to Blue Grama Sod 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 4  
Blue Grama Sod Plant Community

Community 4.1  
Blue Grama Sod Plant Community

This plant community is a result of heavy continuous season-long grazing following brush management practices. Severe hoof compaction typically occurs due to fine soil textures. Blue grama becomes the dominant species. Pricklypear, Sandberg bluegrass, woody aster, and birdfoot sagebrush are present along with rhizomatous wheatgrass. 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 800bs./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: • Mechanical Treatment followed by Long-term Prescribed Grazing may eventually return this state to near Historic Climax Plant Community (Rhizomatous Wheatgrass/ Green Needlegrass Plant Community). • Mechanical Treatment followed by Moderate Continuous Season Long Grazing will convert this community to 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

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1				400–500	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	400–500	–
2				150–250	
	green needlegrass	NAVI4	<i>Nassella viridula</i>	150–250	–
3				50–100	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	50–100	–
4				50–100	
	squirreltail	ELEL5	<i>Elymus elymoides</i>	50–100	–
5				0–50	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–50	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0–50	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–50	–
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	0–50	–
	plains reedgrass	CAMO	<i>Calamagrostis montanensis</i>	0–50	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–50	–
	mountain muhly	MUMO	<i>Muhlenbergia montana</i>	0–50	–
	muttongrass	POFE	<i>Poa fendleriana</i>	0–50	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–50	–
<b>Forb</b>					
6				50–100	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–50	–
	wild onion	ALAS2	<i>Allium ascalonicum</i>	0–50	–
	phlox	PHLOX	<i>Phlox</i>	0–50	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	0–50	–
	clover	TRIFO	<i>Trifolium</i>	0–50	–
	woodyaster	XYLOR	<i>Xylorhiza</i>	0–50	–
<b>Shrub/Vine</b>					
7				50–100	
	birdfoot sagebrush	ARPE6	<i>Artemisia pedatifida</i>	50–100	–
8				50–100	
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	0–50	–
	Gardner's saltbush	ATGA	<i>Atriplex gardneri</i>	0–50	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0–50	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	0–50	–

## Animal community

Rhizomatous Wheatgrass/Green Needlegrass Plant Community (HCPC): The predominance of grasses in this plant community favors grazers and mixed feeders such as antelope and elk. Suitable thermal and escape cover is limited to topographical variance. When found adjacent to sagebrush dominated sites, this plant community may provide brood rearing and foraging opportunities for sage grouse, as well as lek sites. Other birds and mammals visit this site and may include meadowlarks, raptors, rabbits, and ground squirrels.

Rhizomatous Wheatgrass/Big Sagebrush Plant Community: This plant community may be useful for the same

wildlife that would use the Historic Climax Plant Community. Additional cover is available in this community but foraging resources have been reduced.

**Blue Grama Sod 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 Plant Community:** This plant community may be useful for the same wildlife that would use the Historic Climax Plant Community. Additional cover is available in this community but foraging resources have been 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/Green Needlegrass (HCPC) 500-1300 0.3

Rhizomatous Wheatgrass/Big Sagebrush 400-1200 0.3

Blue Grama Sod 400-800 0.2

Big Sagebrush 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 C, with localized areas in hydrologic group D. Infiltration ranges from very slow to moderately slow. Runoff potential for this site varies from moderate to high depending on soil hydrologic group and ground cover. In many cases, lesser sloping areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. Greater sloping 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 hydrologic 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. Cryptogammic crusts are present, but only cover 1-2% of the soil surface.

## **Recreational uses**

This site provides limited hunting opportunities

## **Wood products**

No appreciable wood products are present on the site.

## **Other products**



None noted.

## Inventory data references

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.

## 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)	Brendan Brazee, Everet Bainter, Mark Shirley
Contact for lead author	Everet Bainter
Date	05/01/2005
Approved by	Everet 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:** None

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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 5 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 Slow.
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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: Mid stature Cool Season Rhizomatous Grasses = Mid stature Cool Season Bunch Grasses > Short stature Warm Season Grasses > Shrubs > Forbs
- 
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 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):** 1000 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: Birdfoot sagewort, Prickly Pear, Broom Snakeweed, 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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