

Ecological site R034AY256WY  
Shallow Breaks Foothills and Basins West (SwBr)

Accessed: 05/18/2024

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.

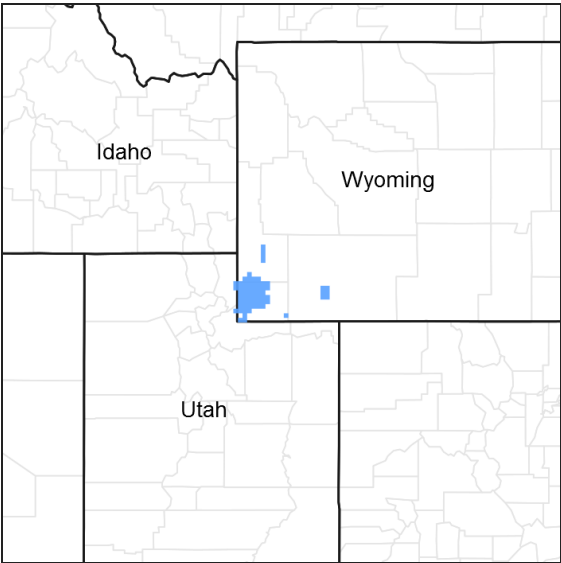


Figure 1. Mapped extent

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.

Associated sites

R034AY258WY	<b>Shallow Clayey Foothills and Basins West (SwCy)</b> Shallow Clayey 10-14W
R034AY262WY	<b>Shallow Loamy Foothills and Basins West (SwLy)</b> Shallow Loamy 10-14W
R034AY276WY	<b>Very Shallow Foothills and Basins West (VS)</b> Very Shallow 10-14W

Similar sites

R034AY156WY	<b>Shallow Breaks Green River and Great Divide Basins (SwBr)</b> Shallow Breaks 7-9GR has lower production.
R034AY276WY	<b>Very Shallow Foothills and Basins West (VS)</b> Very Shallow 10-14W has lower production, and junipers are limited to higher elevations.

Table 1. Dominant plant species

Tree	(1) <i>Juniperus osteosperma</i>
Shrub	(1) <i>Artemisia tridentata</i>

Herbaceous	Not specified
------------	---------------

## Physiographic features

This site is usually found in an upland position on gently sloping to very steep topography. It may be found on all exposures, but is primarily found on south and west facing slopes. Elevations are mostly above 7000 feet.

**Table 2. Representative physiographic features**

Landforms	(1) Ridge (2) Escarpment
Flooding frequency	None
Ponding frequency	None
Elevation	2,134–2,286 m
Slope	30–70%
Ponding depth	0 cm
Aspect	S, SW, W

## 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 August 15. Some green up of cool season plants usually occurs in September depending upon fall moisture occurrences.

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at <http://www.wcc.nrcs.usda.gov/cgibin/state.pl?state=wy> website. Other climate stations representative of this precipitation zone include "Border 3 N" and Kemmerer Wtr Trtmt" in Lincoln County; "Evanston 1 E" in Uinta County; and "Merna" in Sublette County.

**Table 3. Representative climatic features**

Frost-free period (average)	67 days
Freeze-free period (average)	97 days
Precipitation total (average)	356 mm

## Influencing water features

There are no water features associated with this site.

## Soil features

The soils of this site are shallow (less than 20" to bedrock) well-drained soils formed in residuum. These soils have rapid to slow permeability and can be of any texture. This site usually occurs on steep slopes, but may be on any slope. Included in this site are small areas of exposed bedrock and very shallow to deep pockets of soil. This bedrock usually develops large cracks and crevices where junipers can utilize moisture. Parent material is residuum

and colluvium from sedimentary bedrock. The surface texture can be sandy loam, loam, and loamy fine sand with the texture modifiers of gravelly, and channery.

Major soil series correlated to this site include: Spool and some phases of Rentsac series.

Other soil series in MLRA 34A correlated to this site include: Blackhall.

**Table 4. Representative soil features**

Parent material	(1) Residuum—sandstone and shale
Surface texture	(1) Channery sandy loam (2) Loam (3) Loamy fine sand
Family particle size	(1) Sandy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	25–51 cm
Surface fragment cover ≤3"	0–20%
Surface fragment cover >3"	0–20%
Available water capacity (0–101.6cm)	1.27–3.05 cm
Calcium carbonate equivalent (0–101.6cm)	0–15%
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)	6.6–8.4
Subsurface fragment volume ≤3" (Depth not specified)	0–40%
Subsurface fragment volume >3" (Depth not specified)	0–30%

## Ecological dynamics

As this site leaves the historic state, juniper increases. Big sagebrush initially increases, but eventually decreases when the juniper canopy passes a threshold. Cheatgrass and annual forbs often invade, but even they will be removed from the site once juniper reaches its maximum density. Cool season bunchgrasses such as bluebunch wheatgrass, Indian ricegrass, and needleandthread will decrease in frequency and production after sagebrush declines.

These plant communities narratives may not represent every possibility, but they probably are the most prevalent and repeatable plant communities. The plant composition tables shown above have been developed from the best available knowledge at the time of this revision. As more data is collected, some of these plant communities may be revised or removed, and new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities”. According to the USDA NRCS National Range and Pasture Handbook, Desired Plant Communities (DPC’s) will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

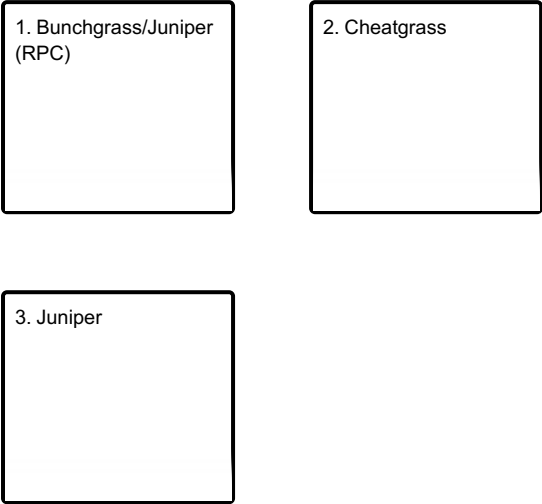
The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going

from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical accounts have also been used.

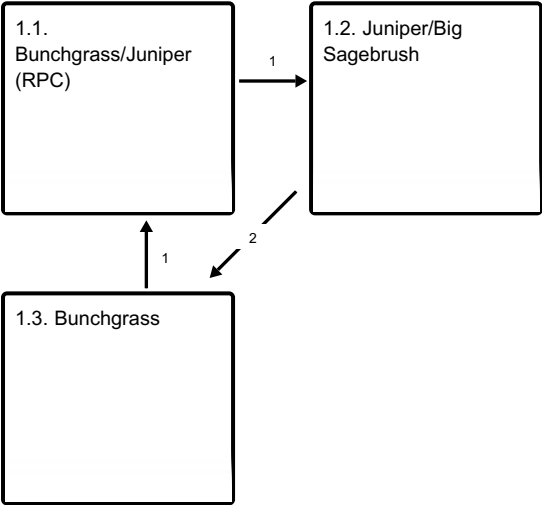
The following is a State and Transition Model Diagram that illustrates the common plant communities (states) that can occur on the site and the transitions between these communities. The ecological processes will be discussed in more detail in the plant community narratives following the diagram.

State and transition model

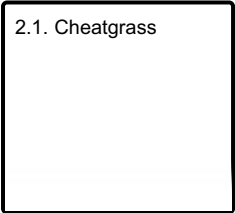
Ecosystem states



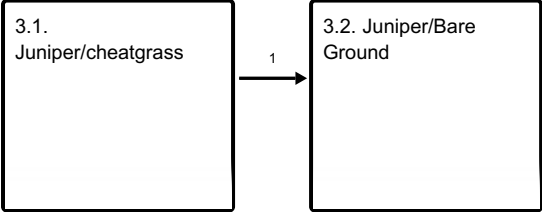
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1  
Bunchgrass/Juniper (RPC)

Community 1.1  
Bunchgrass/Juniper (RPC)

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores and is suited for grazing by domestic livestock. Potential vegetation is about 50% grasses or grass-like plants, 10% forbs, and 40% woody plants. The major grasses include bluebunch wheatgrass, Canby bluegrass, rhizomatous wheatgrass, Indian ricegrass, and needleandthread. Other grasses include Sandberg and mutton bluegrass, prairie junegrass, Letterman needlegrass, bottlebrush squirreltail, plains reedgrass, and needleleaf sedge. Junipers and Wyoming big sagebrush are the dominant woody plants. Other woody plants include bitterbrush, limber pine, black sagebrush, and green rabbitbrush. A typical plant composition for this state consists of bluebunch wheatgrass 20-30%, rhizomatous wheatgrass 1-10%, Canby bluegrass 5-10%, Indian ricegrass 5-10%, needleandthread 5-10%, other grasses and grass-like plants 15-25%, perennial forbs 5-10%, junipers 20-40%, Wyoming big sagebrush 5-10%, and 5-10% other woody species. Ground cover, by ocular estimate, varies from 10-25%. The total annual production (air-dry weight) of this state is about 1200 pounds per acre, but it can range from about 900 lbs./acre in unfavorable years to about 1400 lbs./acre in above average years. The state is stable and well adapted to the Cool Central Desertic Basins and Plateaus climatic conditions. 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:

- Heavy Continuous Season-Long Grazing will convert this plant community to the Juniper/Big Sage State.
- Wildfire or Prescribed Fire will convert this plant community to the Cheatgrass State.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	504	673	785
Tree	303	404	471
Forb	101	135	157
Shrub/Vine	101	135	157
Total	1009	1347	1570

Figure 5. Plant community growth curve (percent production by month).  
WY0301, 34AC, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	40	50			5			

Community 1.2  
Juniper/Big Sagebrush

This plant community is a result of frequent and severe grazing in the absence of fire or brush management. Juniper, Wyoming big sagebrush, and other woody species dominate this community, often exceeding 80% of the annual production. Rhizomatous wheatgrass and annual forbs make up the majority of the understory. 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 1000 lbs./acre in above average years. Soil erosion is accelerated because of increased bare ground. The biotic community has been compromised, but is relatively stable. The watershed is functioning, but is at risk of further degradation. Water flow patterns and pedestals are obvious. Infiltration is reduced and runoff is increased. Transitional pathways leading to other plant communities are as follows:

- Mechanical Brush Management followed by deferment for 1 to 2 years as part of a Prescribed Grazing plan will return this state to near Historic Climax Plant Community (Bluebunch Wheatgrass/Juniper State). Care should be taken when planning brush management to consider wildlife habitat and critical winter ranges.
- Wildfire or Prescribed Fire will convert this plant community to the Cheatgrass State.

Figure 6. Plant community growth curve (percent production by month).

WY0301, 34AC, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	40	50			5			

## Community 1.3

### Bunchgrass

Once a fire occurs, the shrub and tree component is reduced and the site is dominated by cool-season bunchgrasses such as bluebunch wheatgrass, Indian ricegrass, and needleandthread.

## Pathway 1

### Community 1.1 to 1.2

Over time and in the absence of disturbance, primarily fire, the juniper and big sage become dominant.

## Pathway 2

### Community 1.2 to 1.3

Prescribed or wildfire remove the juniper and big sage from dominance, and now bunchgrasses dominate.

### Conservation practices

Prescribed Burning
--------------------

## Pathway 1

### Community 1.3 to 1.1

Over time, and without disturbance such as fire, juniper and big sage return to the site.

## State 2

### Cheatgrass

## Community 2.1

### Cheatgrass

This plant community is the result of wildfire or a hot prescribed fire. Dominant species include green rabbitbrush and rhizomatous wheatgrass. Cheatgrass often invades, on south and west facing slopes in particular, effectively increasing the fire frequency and preventing the re-establishment of non-sprouting woody species. The total annual production (air-dry weight) of this state is about 400 pounds per acre, but it can range from about 200 lbs./acre in unfavorable years to about 600 lbs./acre in above average years. The state is vulnerable to excessive erosion. The biotic integrity of this plant community is at risk depending on how far a shift has occurred in plant composition toward green rabbitbrush, cheatgrass, and annual forbs. The watershed is at risk as bare ground increases. Transitional pathways leading to other plant communities are as follows: • Chemical Seedbed Preparation and Re-seeding followed by deferment for 1 to 2 years as part of a Prescribed Grazing plan will return this plant community to near Historic Climax Plant Community (Bluebunch Wheatgrass/Juniper State) although cheatgrass will remain a part of the plant community. Additional deferment may be necessary and should be prescribed on an individual site basis.

Figure 7. Plant community growth curve (percent production by month).  
WY0301, 34AC, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	40	50			5			

## State 3

### Juniper

## Community 3.1 Juniper/cheatgrass

## Community 3.2 Juniper/Bare Ground

Juniper canopy has increased to maximum density, and through alleleopathic affects has removed virtually all other vegetation.

## Pathway 1 Community 3.1 to 3.2

As juniper canopy increases, its alleleopathic affects remove all vegetation from the understory.

## 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				269–404	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	269–404	—
2				67–135	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	67–135	—
3				67–135	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	67–135	—
4				67–135	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	67–135	—
5				13–135	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	13–135	—
6				202–336	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–67	—
	Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>	0–67	—
	needleleaf sedge	CADU6	<i>Carex duriuscula</i>	0–67	—
	plains reedgrass	CAMO	<i>Calamagrostis montanensis</i>	0–67	—
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0–67	—
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–67	—
	muttongrass	POFE	<i>Poa fendleriana</i>	0–67	—
<b>Forb</b>					
7				13–135	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–67	—
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0–67	—
	textile onion	ALTE	<i>Allium textile</i>	0–67	—
	rosy pussytoes	ANRO2	<i>Antennaria rosea</i>	0–67	—
	milkvetch	ASTRA	<i>Astragalus</i>	0–67	—
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0–67	—
	fleabane	ERIGE2	<i>Erigeron</i>	0–67	—
	buckwheat	ERIOG	<i>Eriogonum</i>	0–67	—

	aster	EUCEP2	<i>Eucephalus</i>	0–67	–
	beardtongue	PENST	<i>Penstemon</i>	0–67	–
	phacelia	PHACE	<i>Phacelia</i>	0–67	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	0–67	–
	stonecrop	SEDUM	<i>Sedum</i>	0–67	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	0–67	–
	stemless mock goldenweed	STAC	<i>Stenotus acaulis</i>	0–67	–
	clover	TRIFO	<i>Trifolium</i>	0–67	–
<b>Tree</b>					
8				269–538	
	Rocky Mountain juniper	JUSC2	<i>Juniperus scopulorum</i>	269–538	–
	Rocky Mountain juniper	JUSC2	<i>Juniperus scopulorum</i>	269–538	–
<b>Shrub/Vine</b>					
9				67–135	
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	67–135	–
10				67–135	
	black sagebrush	ARNO4	<i>Artemisia nova</i>	0–67	–
	mountain mahogany	CERCO	<i>Cercocarpus</i>	0–67	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0–67	–
	limber pine	PIFL2	<i>Pinus flexilis</i>	0–67	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	0–67	–

## Animal community

### Animal Community – Wildlife Interpretations

Bunchgrass/Juniper Plant Community (RPC): This plant community provides excellent thermal and escape cover for wintering mule deer and elk. Year-round habitat is provided for mule deer, bobcat, cottontail rabbits, jackrabbits, sage grouse and many other birds such as the black-throated sparrow, lark sparrow, green-tailed towhee, and neotropical migrants. Juniper provides good thermal cover and nesting habitat for many bird species.

Juniper/Big Sagebrush Plant Community: This plant community may be useful 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.

Cheatgrass Plant Community: This plant community exhibits a low level of plant species diversity. In most cases it is not a desirable plant community to select as a wildlife habitat management objective.

### 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.

Plant Community Production (lb./ac) and Carrying Capacity\* (AUM/ac)



Bluebunch Wheatgrass/Juniper (HCPC) 900-1400 lb./ac and .15 AUM/ac

Juniper/Big Sagebrush 400-1000 lb./ac and .12 AUM/ac

Cheatgrass 200-600 lb./ac and .04 AUM/ac

\* - 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 highly variable and is dominated by soils in hydrologic group B and C, with localized areas in hydrologic group D. Infiltration ranges from slow to very rapid. Runoff potential for this site varies from moderate to high depending on soil hydrologic group, depth to and permeability of bedrock, slope, and ground cover (refer to Part 630, NRCS National Engineering Handbook for detailed hydrology information).

Rills and gullies may be present, but should be small. Water flow patterns should be barely distinguishable. Pedestals are only slightly present in association with bunchgrasses such as bluebunch wheatgrass. 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 hunting opportunities for upland game species. Variable topography, rock outcrop, and juniper trees appeal to hikers.

## **Wood products**

Limber pine and juniper may be used for firewood and very limited use for fence posts.

## **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. Those involved in developing this site include: Bill Christensen, Range Management Specialist, NRCS; Karen Clause, Range Management Specialist, NRCS; and Everet Bainter, Range Management Specialist, NRCS. 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**

Karen Clause

## **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)	K. Clause, B. Brazee, E. Bainter
Contact for lead author	karen.clause@wy.usda.gov or 307-367-2257
Date	03/16/2007
Approved by	E. Bainter
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** Some expected on this site. Where present, short and widely spaced.

---
2. **Presence of water flow patterns:** Some can be observed.

---
3. **Number and height of erosional pedestals or terracettes:** Rare to slight.

---
4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground can range from 10-40%.

---
5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present. Some U-shaped, healing gullies may be present.

---
6. **Extent of wind scoured, blowouts and/or depositional areas:** Rare to nonexistent.

---
7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous litter expected to move in small amounts downslope. Large woody debris from sagebrush and juniper will show no movement.

---
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil Stability Index ratings range from 2 (interspaces) to 6 (under plant canopy), but average values should be 3.0 or greater.

---
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil data is limited for this site. Described A-horizons vary from 4-17 inches (10-43 cm) with OM of 1 to 2%.

---
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant community consists of 30-80% grasses, 10% forbs, and 10-60% shrubs. Unevenly distributed plant canopy (40-70%) and litter plus slow to moderate infiltration rates result in slight to moderate

runoff. Basal cover is typically less than 5% for this site and does very little to effect runoff on this site.

---

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:

Sub-dominant:

Other:

Additional: Mid-size, cool season bunchgrasses= evergreen trees>>cool season rhizomatous grasses=perennial shrubs=perennial forbs>short, cool season bunchgrasses

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Minimal decadence, typically associated with shrub component.
- 

14. **Average percent litter cover (%) and depth ( in):** Litter ranges from 5-25% of total canopy measurement with total litter (including beneath the plant canopy) from 30-75% expected. Herbaceous litter depth typically ranges from 3-10mm. Woody litter can be up to a couple inches (4-6 cm).
- 

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** English: 900-1400 lb/ac (1200 lb/ac average); Metric 1008-1568 kg/ha (1344 kg/ha average).
- 

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:** Bare ground greater than 60% and the presence of cheatgrass are the most common indicators of a threshold being crossed. Junipers, rabbitbrush, Wyoming big sagebrush, Sandberg bluegrass, and goldenweed are common increasers. Annual weeds such as cheatgrass, mustards, kochia, lambsquarter, and Russian thistle are common invasive species in disturbed sites.
- 

17. **Perennial plant reproductive capability:** All species are capable of reproducing, except in drought years.
-