

# Ecological site R043BY212WY Gravelly Foothills and Mountains West

Accessed: 04/24/2024

## General information

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

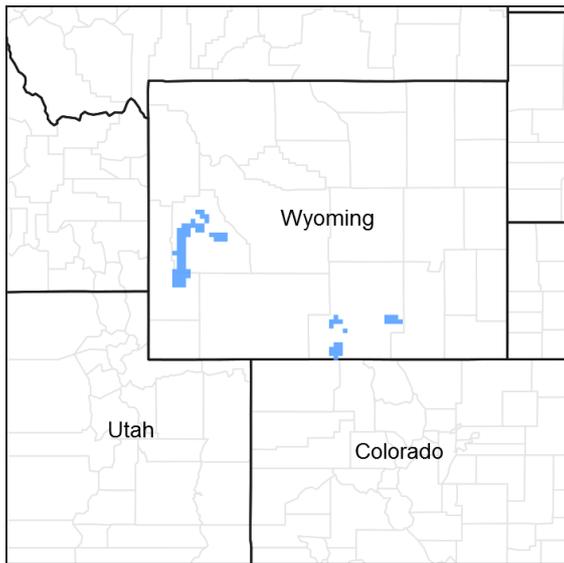


Figure 1. Mapped extent

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

## Associated sites

R043BY262WY	<b>Shallow Loamy Foothills and Mountains West</b> Shallow Loamy
R043BY276WY	<b>Very Shallow Foothills and Mountains West</b> Very Shallow

## Similar sites

R034AY212WY	<b>Gravelly Foothills and Basins West (Gr)</b> Gravelly (Gr) 10-14W has lower production.
R043BY276WY	<b>Very Shallow Foothills and Mountains West</b> Very Shallow (VS) 15-19W lacks a high volume of coarse fragments.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

## Physiographic features

This site occurs on foothills, lake terraces, alluvial and colluvial fans, outwash plains, and rolling to steep hills.

**Table 2. Representative physiographic features**

Landforms	(1) Hill (2) Ridge (3) Escarpment
Flooding frequency	None
Ponding frequency	None
Elevation	5,600–8,300 ft
Slope	1–70%
Ponding depth	0 in

## Climatic features

Annual precipitation ranges from 15-19 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.

Prevailing winds are from the southwest, and strong winds are less frequent than over other areas of Wyoming. Occasional storms, however, can bring brief periods of high winds with gusts exceeding 50 mph.

Growth of native cool season plants begins about May 15 and continues to about August 15.

The following information is from the “Jackson” climate station:

Minimum Maximum 5 yrs. out of 10 between  
Frost-free period (days): 12 60 July 9 – August 12  
Freeze-free period (days): 42 100 June 20 – August 26

Annual Precipitation (inches): <11.98 >19.69 (2 years in 10)

Mean annual precipitation: 17.00 inches

Mean annual air temperature: 38.9°F (23.3°F Avg. Min. to 54.5°F Avg. Max.)

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 “Afton” in Lincoln County; and “Darwin Ranch” in Teton County.

**Table 3. Representative climatic features**

Frost-free period (average)	60 days
Freeze-free period (average)	100 days
Precipitation total (average)	19 in

## Influencing water features

## Soil features

The soils of this site are well-drained soils with sandy or loamy textures and are very gravelly. Coarse fragments up to 3 inches in diameter cover 50-70% of the surface and are greater than 35 percent, by volume, within the first 20 inches of soil. Reactions range from neutral to moderately alkaline. Some of these soils have lime horizons below 12 inches.

**Table 4. Representative soil features**

Surface texture	(1) Gravelly loam (2) Very gravelly
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	20–60 in
Surface fragment cover ≤3"	10–35%
Surface fragment cover >3"	0–10%
Available water capacity (0-40in)	1–3.6 in
Calcium carbonate equivalent (0-40in)	0–5%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	6.1–7.8
Subsurface fragment volume ≤3" (Depth not specified)	25–40%
Subsurface fragment volume >3" (Depth not specified)	15–25%

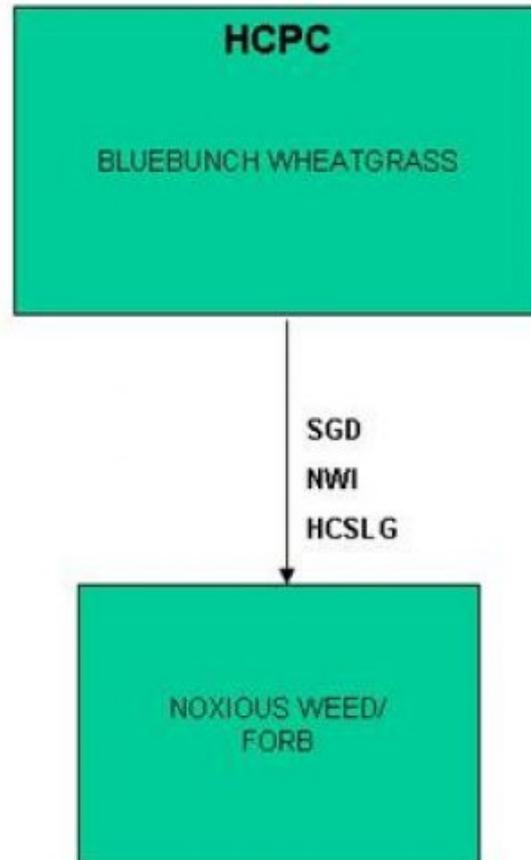
## Ecological dynamics

As this site deteriorates, species such as rhizomatous wheatgrass, Sandberg bluegrass, green rabbitbrush, and unpalatable forbs will increase. Cheatgrass, annual forbs and noxious weeds such as Russian knapweed will invade. Bluebunch wheatgrass, western needlegrass, and bitterbrush will decrease in frequency and production. This site has relatively low productivity potential, and is not well suited to grazing improvement practices unless treated as part of a larger unit containing more productive areas.

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)

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**  
**Bluebunch Wheatgrass Plant Community (HCPC)**

**Community 1.1**  
**Bluebunch Wheatgrass Plant Community (HCPC)**

The interpretive plant community for this site is the Historic Climax Plant Community. Potential vegetation is about 65% grasses or grass-like plants, 15% forbs, and 20% woody plants. The major grasses include bluebunch wheatgrass, western needlegrass, and rhizomatous wheatgrass. Other grasses and grass-like plants include Sandberg, Canby, and mutton bluegrass, bottlebrush squirreltail, needleleaf sedge, California and timber oatgrass, Idaho and spike fescue, mountain muhly, spike trisetum, slender wheatgrass, and prairie junegrass. Dominant woody plants include black sagebrush and bitterbrush. Other woody plants include green rabbitbrush, and low and three-tip sagebrush. A typical plant composition for this state consists of bluebunch wheatgrass 10-25%, western needlegrass 10-25%, rhizomatous wheatgrass 5-10%, other grasses and grass-like plants 10-20%, perennial forbs 5-15%, bitterbrush 5-10%, black sagebrush 1-10%, and 5-10% other woody plants. Ground cover, by ocular estimate, varies from 35-40%. The total annual production (air-dry weight) of this state is about 750 pounds per acre, but it can range from about 650 lbs./acre in unfavorable years to about 1250 lbs./acre in above average years. The following is the growth curve of this plant community expected during a normal year: Growth curve number: WY0201 Growth curve name: 15-19W, UPLAND SITES Growth curve description: ALL UPLAND SITES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC 0 0 0 0 10 35 30 20 5 0 0 0 (Monthly percentages of total annual growth) The state is stable and well adapted to the Central Rocky Mountains 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:

- Severe Ground Disturbance and/or Heavy Continuous Season-Long Grazing with Noxious Weed Invasion will convert this plant community to the Noxious Weed/Forb State.

Figure 3. Plant community growth curve (percent production by month). WY0201, 15-19W Upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				10	35	30	20	5			

**State 2**  
**Noxious Weed/Forb Plant Community**

**Community 2.1**  
**Noxious Weed/Forb Plant Community**

This plant community is a result of frequent and severe grazing or by severe ground disturbance such as gravel mining. Green rabbitbrush, cheatgrass, introduced grasses, and annual forbs are significant components of this plant community. Noxious weeds such as Russian knapweed often invade. The total annual production (air-dry weight) of this state is about 300 pounds per acre, but it can range from about 100 lbs./acre in unfavorable years to about 800 lbs./acre in above average years. The following is the growth curve of this plant community expected during a normal year: Growth curve number: WY0201 Growth curve name: 15-19W, UPLAND SITES Growth curve description: ALL UPLAND SITES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC 0 0 0 0 10 35 30 20 5 0 0 0 (Monthly percentages of total annual growth) The state is unstable and vulnerable to excessive erosion, however rock fragment typically prevents serious erosion from occurring. The biotic integrity of this plant community is at risk depending on how far a shift has occurred in plant composition toward noxious weeds and annual forbs. The watershed is usually at risk or nonfunctioning due to an increase in bare ground. Transitional pathways leading to other plant communities are as follows: It is not often practicable or economically feasible to convert this plant community, however control of noxious weeds is recommended.

Figure 4. Plant community growth curve (percent production by month). WY0201, 15-19W Upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				10	35	30	20	5			

## 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				75–188	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	75–188	–
2				75–188	
	western needlegrass	ACOC3	<i>Achnatherum occidentale</i>	75–188	–
3				38–75	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	38–75	–
4				75–150	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–38	–
	Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>	0–38	–
	mountain brome	BRMA4	<i>Bromus marginatus</i>	0–38	–
	needleleaf sedge	CADU6	<i>Carex duriuscula</i>	0–38	–
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	0–38	–
	timber oatgrass	DAIN	<i>Danthonia intermedia</i>	0–38	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0–38	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	0–38	–
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	0–38	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–38	–
	spike fescue	LEK12	<i>Leucopoa kingii</i>	0–38	–
	mountain muhly	MUMO	<i>Muhlenbergia montana</i>	0–38	–
	muttongrass	POFE	<i>Poa fendleriana</i>	0–38	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–38	–
	spike trisetum	TRSP2	<i>Trisetum spicatum</i>	0–38	–
	California oatgrass	DACA3	<i>Danthonia californica</i>	0–35	–
<b>Forb</b>					
5				38–113	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–38	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0–38	–
	rosy pussytoes	ANRO2	<i>Antennaria rosea</i>	0–38	–
	milkvetch	ASTRA	<i>Astragalus</i>	0–38	–
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	0–38	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0–38	–
	thistle	CIRSI	<i>Cirsium</i>	0–38	–
	hawksbeard	CREPI	<i>Crepis</i>	0–38	–
	fleabane	ERIGE2	<i>Erigeron</i>	0–38	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0–38	–
	false goldenaster	HETER8	<i>Heterotheca</i>	0–38	–
	bitter root	LERER	<i>Lewisia rediviva var. rediviva</i>	0–38	–
	flax	LINUM	<i>Linum</i>	0–38	–
	stoneseed	LITHO3	<i>Lithospermum</i>	0–38	–

	lupine	LUPIN	<i>Lupinus</i>	0–38	–
	creeping barberry	MARE11	<i>Mahonia repens</i>	0–38	–
	locoweed	OXYTR	<i>Oxytropis</i>	0–38	–
	nailwort	PARON	<i>Paronychia</i>	0–38	–
	beardtongue	PENST	<i>Penstemon</i>	0–38	–
	phlox	PHLOX	<i>Phlox</i>	0–38	–
	buttercup	RANUN	<i>Ranunculus</i>	0–38	–
	stonecrop	SEDUM	<i>Sedum</i>	0–38	–
	aster	SYMPH4	<i>Symphyotrichum</i>	0–38	–
	Townsend daisy	TOWNS	<i>Townsendia</i>	0–38	–
	clover	TRIFO	<i>Trifolium</i>	0–38	–
	violet	VIOLA	<i>Viola</i>	0–38	–
<b>Shrub/Vine</b>					
6				8–75	
	black sagebrush	ARNO4	<i>Artemisia nova</i>	8–75	–
7				38–75	
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	38–75	–
8				38–75	
	little sagebrush	ARAR8	<i>Artemisia arbuscula</i>	0–38	–
	threetip sagebrush	ARTR4	<i>Artemisia tripartita</i>	0–38	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0–38	–
	singlehead goldenbush	ERSU13	<i>Ericameria suffruticosa</i>	0–38	–
	American red raspberry	RUID	<i>Rubus idaeus</i>	0–38	–
	thimbleberry	RUPA	<i>Rubus parviflorus</i>	0–38	–

## Animal community

### Animal Community – Wildlife Interpretations

Bluebunch Wheatgrass Plant Community (HCPC): This plant community does not contribute much forage to wildlife nor is it typically inhabited by burrowing animals due to the high volume of coarse fragments in the profile. It is mostly used by wildlife in transit to other habitats. When found proximal to taller sagebrush, these sites are suitable locations for sage grouse leks. When occurring near perennial water, it may be used by killdeer for nesting.

Noxious Weed/Forb 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. If distribution problems occur, stocking rates must be reduced to maintain plant health and vigor.

### Plant Community Production Carrying Capacity\*

(lb./ac) (AUM/ac)

Bluebunch Wheatgrass (HCPC) 650-1250 .25

\* - 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, slope, 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 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. Cryptogamic 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 variety of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

## Wood products

No appreciable wood products are present on the site.

## 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. 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.

Inventory Data References

Data Source	Number of Records	Sample Period	State	County
SCS-RANGE-417	58	1966-1986 WY	Lincoln	& others

## Contributors

K. 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, 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:** Rare to nonexistent. Where present, short and widely spaced.  

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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:** Rare to nonexistent.  

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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 can range from 0-30%.  

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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:** Rare to nonexistent.  

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- 7. Amount of litter movement (describe size and distance expected to travel):** Herbaceous and large woody litter not expected to move.  

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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):** Soil Stability Index ratings range from 2 (interspaces) to 6 (under plant canopy), but average values should be 3.5 or greater.  

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- 9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Describe A-horizons vary from 7-23 inches (18-58 cm) with weak to strong granular or weak sub-angular blocky structure and color hues of 10YR or 2.5YR, values of 4-5, and a chroma of 2-3 (grayish brown to dark brown). Soil OM is typically 1 to 3%.  

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- 10. Effect of community phase composition (relative proportion of different functional groups) and spatial**

**distribution on infiltration and runoff:** Plant community consists of 55-75% grasses, 15% forbs, and 10-30% shrubs. Evenly distributed plant canopy (50-75%) and litter plus moderate to rapid infiltration rates result in minimal runoff. Basal cover is typically less than 10% and marginally affects runoff on this site. Surface rock fragments of 20-50% provide stability to the site, but reduce infiltration.

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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):** None.
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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>> perennial shrubs>perennial forbs>cool season rhizomatous grasses>short cool season bunchgrasses

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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.
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14. **Average percent litter cover (%) and depth ( in):** Litter ranges from 15-20% of total canopy measurement with total litter (including beneath the plant canopy) from 50-70% expected. Herbaceous litter depth typically ranges from 3-10mm. Woody litter can be up to a couple inches (4-6 cm).
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** English: 650-1250 lb/ac (750 lb/ac average); Metric 728-1400 kg/ha (840 kg/ha average).
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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:** Bare ground greater than 50% is the most common indicator of a threshold being crossed. Rabbitbrush, Sandberg bluegrass, buckwheat, and phlox are common increasers. Annual weeds such as cheatgrass and mustards are common invasive species in disturbed sites.
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17. **Perennial plant reproductive capability:** All species are capable of reproducing, except in extreme drought years.
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