USDA Natural Resources Conservation Service

Ecological site R043BY276WY
Very Shallow Foothills and Mountains West

Accessed: 05/21/2025

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.

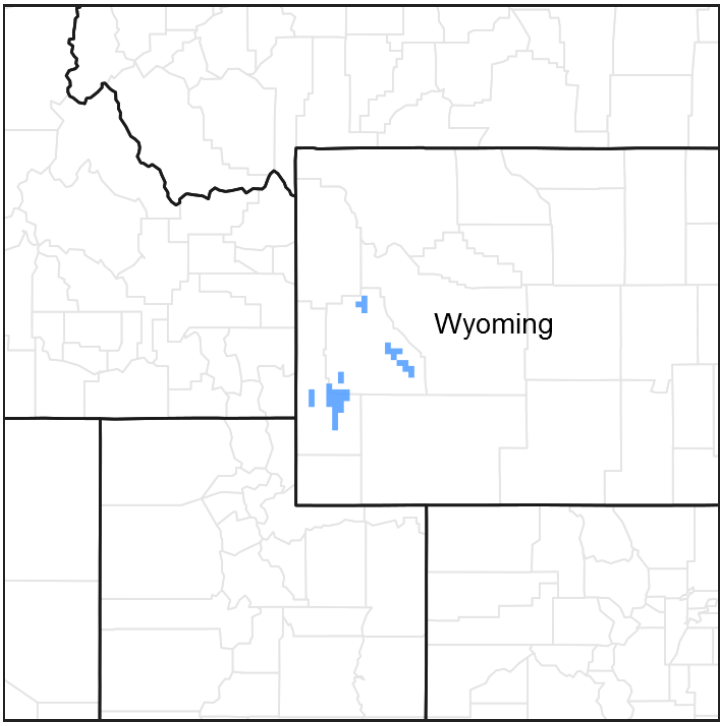


Figure 1. Mapped extent

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

R043BY212WY	**Gravelly Foothills and Mountains West** Gravelly
R043BY262WY	**Shallow Loamy Foothills and Mountains West** Shallow Loamy

Similar sites

R034AY276WY	**Very Shallow Foothills and Basins West (VS)** Very Shallow (VS) 10-14W has lower production.
R043BY212WY	**Gravelly Foothills and Mountains West** Gravelly (Gr) 15-19W has a high volume of coarse fragments.
R043BY272WY	**Stony Foothills and Mountains West** Stony (St) 15-19W has 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 in an upland position with a wide variety of slopes. It is prevalent on wind-swept ridges.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Escarpment
Flooding frequency	None
Ponding frequency	None
Elevation	1,707–2,530 m
Slope	1–70%
Ponding depth	0 cm

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)	483 mm

Influencing water features

Soil features

Soils of this site are generally less than 10 inches deep, but will include areas of exposed bedrock and pockets of deep soil. Bedrock, of all types except igneous and soft clay shale, may be fractured which allows shrub species to grow. Soils are well-drained, and infiltration is good above bedrock. Runoff commonly occurs from these sites due to shallow soils and limited water storage capacity.

Table 4. Representative soil features

Surface texture	(1) Gravelly sandy loam (2) Channery fine sandy loam (3) Flaggy loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately slow to rapid
Soil depth	10–25 cm
Surface fragment cover <=3"	10–40%
Surface fragment cover >3"	0–30%
Available water capacity (0-101.6cm)	1.78–3.81 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
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)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	10–40%
Subsurface fragment volume >3" (Depth not specified)	10–30%

Ecological dynamics

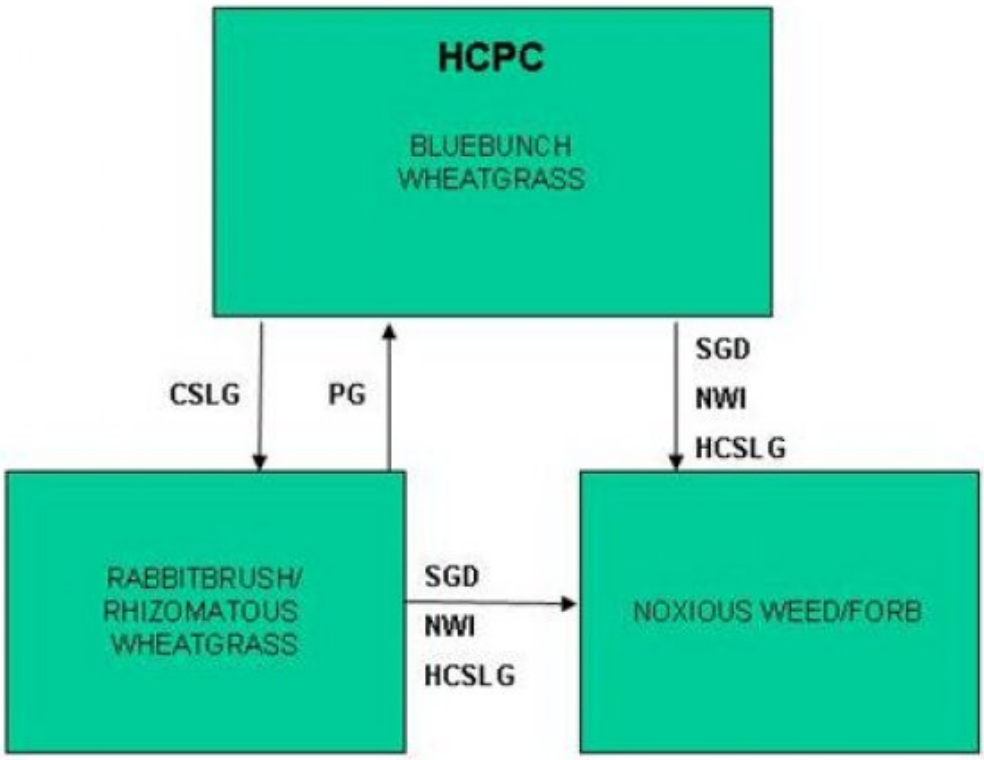
As this site deteriorates, species such as rhizomatous wheatgrass, snowberry, green rabbitbrush, and mountain muhly will increase. Cool season bunchgrasses such as bluebunch wheatgrass and spike fescue will decrease in frequency and production. Noxious weeds, annual forbs, and cheatgrass often invade severely disturbed areas. 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 estimated at 65% grasses or grass-like plants, 15% forbs, and 20% woody plants. The major grasses include bluebunch wheatgrass and rhizomatous wheatgrass. Other grasses and grasslikes include Sandberg, Canby, big, and mutton bluegrass, prairie junegrass, Letterman needlegrass, needleleaf sedge, California and timber oatgrass, bottlebrush squirreltail, Idaho fescue, mountain brome, mountain muhly, oniongrass, and spike trisetum. A variety of woody plants may include black and mountain big sagebrush, green rabbitbrush, bitterbrush, chokecherry, serviceberry, currant, snowberry, and mountain mahogany. A typical plant composition for this state consists of bluebunch wheatgrass 20-40%, rhizomatous wheatgrass 1-10%, other grasses and grass-like plants 15-35%, perennial forbs 5-15%, and 5-20% woody plants. Ground cover, by ocular estimate, varies from 30-35%. The total annual production (air-dry weight) of this state is about 600 pounds per acre, but it can range from about 450 lbs./acre in unfavorable years to about 750 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 or Heavy, Continuous Season-long Grazing along with Noxious Weed Invasion will convert this plant community to the Noxious Weed/Forb State. • Continuous Season-long Grazing will convert the plant community to the Rabbitbrush/Rhizomatous Wheatgrass State.

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			

State 2
Rabbitbrush/Rhizomatous Wheatgrass Plant Community

Community 2.1
Rabbitbrush/Rhizomatous Wheatgrass Plant Community

This plant community is a result of long-term continuous grazing. The stand is composed

of almost entirely rhizomatous wheatgrass and rabbitbrush with such forbs as phlox and goldenweed present as well. This state is commonly found on exposed, windswept ridges that are subject to harsh climatic conditions as well as severe winter use due to their exposed nature. The total annual production (air-dry weight) of this state is about 350 pounds per acre, but it can range from about 150 lbs./acre in unfavorable years to about 400 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 protected from excessive erosion. The biotic integrity of this plant community is usually intact, however forage value will decrease and wildlife values will shift toward different species. The watershed is functioning. Transitional pathways leading to other plant communities are as follows: • Severe Ground Disturbance or Heavy, Continuous Season-long Grazing along with Noxious Weed Invasion will convert this plant community to the Noxious Weed/Forb State. • Prescribed Grazing will eventually return this state to near Historic Climax Plant Community (Bluebunch Wheatgrass State).

Figure 5. 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 3
Noxious Weed/Forb Plant Community

Community 3.1
Noxious Weed/Forb Plant Community

This plant community is a result of severe ground disturbance either with or without improper grazing use. Green rabbitbrush, cheatgrass, and annual forbs are often significant components of this plant community. Noxious weeds such as Russian knapweed or thistles invade. The total annual production (air-dry weight) of this state is about 250 pounds per acre, but it can range from about 100 lbs./acre in unfavorable years to about 450 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. The biotic integrity of this plant community is at risk depending on how far a shift has occurred in plant composition toward cheatgrass 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 6. 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 (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				135–269	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	135–269	–
2				7–67	
	western wheatgrass	PASM	*Pascopyrum smithii*	7–67	–
3				101–235	
	Grass, perennial	2GP	*Grass, perennial*	0–34	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0–34	–
	mountain brome	BRMA4	*Bromus marginatus*	0–34	–
	needleleaf sedge	CADU6	*Carex duriuscula*	0–34	–
	threadleaf sedge	CAFI	*Carex filifolia*	0–34	–
	California oatgrass	DACA3	*Danthonia californica*	0–34	–
	timber oatgrass	DAIN	*Danthonia intermedia*	0–34	–
	squirreltail	ELEL5	*Elymus elymoides*	0–34	–
	Idaho fescue	FEID	*Festuca idahoensis*	0–34	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–34	–
	spike fescue	LEKI2	*Leucopoa kingii*	0–34	–
	oniongrass	MEBU	*Melica bulbosa*	0–34	–
	mountain muhly	MUMO	*Muhlenbergia montana*	0–34	–
	muttongrass	POFE	*Poa fendleriana*	0–34	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–34	–

	spike trisetum	TRSP2	*Trisetum spicatum*	0–34	–
Forb					
4				34–101	
	Forb, perennial	2FP	*Forb, perennial*	0–34	–
	common yarrow	ACMI2	*Achillea millefolium*	0–34	–
	pussytoes	ANTEN	*Antennaria*	0–34	–
	milkvetch	ASTRA	*Astragalus*	0–34	–
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	0–34	–
	sego lily	CANU3	*Calochortus nuttallii*	0–34	–
	hawksbeard	CREPI	*Crepis*	0–34	–
	cryptantha	CRYPT	*Cryptantha*	0–34	–
	fleabane	ERIGE2	*Erigeron*	0–34	–
	buckwheat	ERIOG	*Eriogonum*	0–34	–
	false goldenaster	HETER8	*Heterotheca*	0–34	–
	bitter root	LERER	*Lewisia rediviva var. rediviva*	0–34	–
	stoneseed	LITHO3	*Lithospermum*	0–34	–
	creeping barberry	MARE11	*Mahonia repens*	0–34	–
	bluebells	MERTE	*Mertensia*	0–34	–
	evening primrose	OENOT	*Oenothera*	0–34	–
	locoweed	OXYTR	*Oxytropis*	0–34	–
	ragwort	PACKE	*Packera*	0–34	–
	beardtongue	PENST	*Penstemon*	0–34	–
	phacelia	PHACE	*Phacelia*	0–34	–
	phlox	PHLOX	*Phlox*	0–34	–
	stonecrop	SEDUM	*Sedum*	0–34	–
	aster	SYMPH4	*Symphyotrichum*	0–34	–
	Townsend daisy	TOWNS	*Townsendia*	0–34	–
	clover	TRIFO	*Trifolium*	0–34	–
	American vetch	VIAM	*Vicia americana*	0–34	–
Shrub/Vine					
5				34–135	
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	0–34	–
	black sagebrush	ARNO4	*Artemisia nova*	0–34	–

	black sagebrush	ARNO4	*Artemisia nova*	0–34	–
	big sagebrush	ARTR2	*Artemisia tridentata*	0–34	–
	mountain mahogany	CERCO	*Cercocarpus*	0–34	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–34	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	0–34	–
	limber pine	PIFL2	*Pinus flexilis*	0–34	–
	chokecherry	PRVI	*Prunus virginiana*	0–34	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	0–34	–
	currant	RIBES	*Ribes*	0–34	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	0–34	–

Animal community

Animal Community – Wildlife Interpretations
Bluebunch Wheatgrass Plant Community (HCPC): When blown clear, this plant community provides winter and spring forage for large grazers when snow depth prevents foraging on other sites. Otherwise, it is mostly used by wildlife in transit to other habitats. When found proximal to taller sagebrush, these sites can be suitable sage grouse lek locations.

Rabbitbrush/Rhizomatous Wheatgrass 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.

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) 450-750 .15
Rabbitbrush/Rhizomatous Wheatgrass 150-600 .1
Noxious Weed/Forb 100-450 .08

* - 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 and soil depth are the principal factors limiting forage production on this site. This site is dominated by soils in hydrologic group C and D. Infiltration ranges from very slow to slow. Runoff potential for this site varies from moderate to high depending on soil hydrologic group, depth and fracturing 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. Cryptogrammic crusts are present, but only cover 1-2% of the soil surface.

Recreational uses

This site provides hunting opportunities for upland game species. Wildflowers that bloom throughout the growing season have esthetic values that appeal 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:** Some rills to be expected on this site. Depending on slope, rills range from .5-2 inches (1-5 cm) wide and are found every 3-6 feet (1-2 m).

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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:** Slight pedestalling evident.

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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 20-50%.

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5. **Number of gullies and erosion associated with gullies:** Active gullies, where present, should be rare.

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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 litter expected to move in moderate amounts. Large woody debris will show only slight movement down slope.

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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 1 (interspaces) to 6 (under plant canopy), but average values should be 3.0 or greater.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Currently no soil series are correlated to this ecological site. Soil Organic Matter of less than 3% is expected.

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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 65-85% grasses, 15% forbs, and 0-20% shrubs/trees. Sparse plant canopy (40-60%) and litter plus slow to moderate infiltration rates result in slight to moderate runoff. Basal cover is typically less than 10% and marginally affects runoff on this site. Surface rock outcrop of 10-30% provide stability to the site, but reduce infiltration. Runoff can be rapid on this site with a moderate to high erosion hazard associated with steep slopes.

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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/trees>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 10-30% of total canopy measurement with total litter (including beneath the plant canopy) from 30-50% expected. Herbaceous litter depth typically ranges from 3-10mm. Woody litter can be up to several inches (>6 cm).

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** English: 450-750 lb/ac (600 lb/ac average); Metric 504-840 kg/ha (672 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 75% 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.
