USDA Natural Resources Conservation Service

Ecological site R010XC044OR
SR South Schist 9-12 PZ

Last updated: 12/13/2023
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.

MLRA notes

Major Land Resource Area (MLRA): 010X–Central Rocky and Blue Mountain Foothills

This MLRA is characterized by gently rolling to steep hills, plateaus, and low mountains at the foothills of the Blue Mountains in Oregon and the Central Rocky Mountains in Idaho. The geology of this area is highly varied and ranges from Holocene volcanics to Cretaceous sedimentary rocks. Mollisols are the dominant soil order and the soil climate is typified by mesic or frigid soil temperature regimes, and xeric or aridic soil moisture regimes. Elevation ranges from 1,300 to 6,600 feet (395 to 2,010 meters), increasing from west to east. The climate is characterized by dry summers and snow dominated winters with precipitation averaging 8 to 16 inches (205 to 405 millimeters) and increasing from west to east. These factors support plant communities with shrub-grass associations with considerable acreage of sagebrush grassland. Big sagebrush, bluebunch wheatgrass, and Idaho fescue are the dominant species. Stiff sagebrush, low sagebrush, and Sandberg bluegrass are often dominant on sites with shallow restrictive layers. Western juniper is one of the few common tree species and since European settlement has greatly expanded its extent in Oregon. Nearly half of the MLRA is federally owned and managed by the Bureau of Land Management. Most of the area is used for livestock grazing with areas accessible by irrigation often used for irrigated agriculture.

Classification relationships

U.S. National Vegetation Classification Standard (NVCS)
Group: G310. Intermountain Semi-Desert Steppe & Shrubland
Alliance: A1032. Glossopetalon spinescens Shrubland Alliance
Association: CEGL001100. Glossopetalon spinescens var. aridum / Pseudoroegneria spicata Shrubland

Ecological site concept

In reference condition, this site supports a plant community dominated by a sparse community of bluebunch wheatgrass (Pseudoroegneria spicata) with a scattered layer of spiny greasebrush (Glossopetalon spinescens) often present. This site occurs on rocky canyon walls and south-facing side slopes of hills and ravines with annual precipitation ranging from 9 to 12 inches. The soils of this site are typified by moderately deep, extremely channery loam derived from schist with areas of rock outcrop. The soil climate of this site is frigid and aridic. Ecological dynamics of this site were historically driven by climate and fire cycles. As a dry canyon site, this site is vulnerable to invasion by exotic annual bromes (Bromus spp.) if the disturbance regime is altered.

This is a provisional ecological site whose accelerated development from a draft site was undertaken with little to no field verification and is subject to extensive review and revision before final approval. All data herein was developed using existing information and literature and should be considered provisional and contingent upon field validation prior to use in conservation planning.

Associated sites

R010XC052OR	**SR Shallow South Schist 9-12 PZ** Adjacent shallow slopes

Similar sites

R010XC052OR	**SR Shallow South Schist 9-12 PZ** Shallow soils

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Glossopetalon spinescens*
Herbaceous	(1) *Pseudoroegneria spicata ssp. spicata*

Physiographic features

This site occurs on rocky canyon walls and south-facing side slopes of hills and ravines. Slopes range from 30 to 80 percent. Elevations range from 2,000 to 4,000 feet (600 to 1,200 meters). This site does not experience ponding or flooding and no water table is present within the soil profile.

Table 2. Representative physiographic features

Landforms	(1) Upland > Canyon (2) Upland > Hill (3) Upland > Ravine
Flooding frequency	None
Ponding frequency	None
Elevation	2,000–4,000 ft
Slope	30–80%
Aspect	SE, S, SW

Climatic features

The annual precipitation ranges from 9 to 12 inches (225 to 300mm), most of which occurs in the form of snow during the months of November through March. Localized, occasionally severe, convectional storms occur during the summer. The soil temperature regime is mesic with a mean annual air temperature of 50° F (10° C). Temperature extremes range from 100 to -20° F (38 to -29° C). The frost-free period ranges from 110 to 140 days. The optimum period for plant growth is from April through June. Climate graphs are based on the nearest available climate stations to representative site locations and are provided to indicate general climate patterns.

Table 3. Representative climatic features

Frost-free period (characteristic range)	110-140 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	9-12 in
Frost-free period (average)	125 days
Freeze-free period (average)	
Precipitation total (average)	11 in

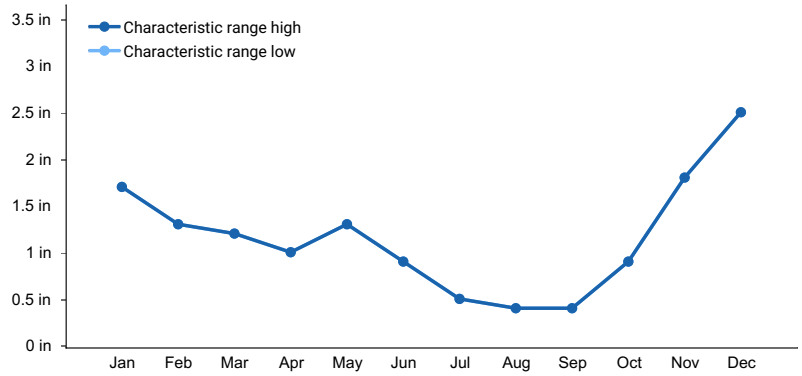


Figure 1. Monthly precipitation range

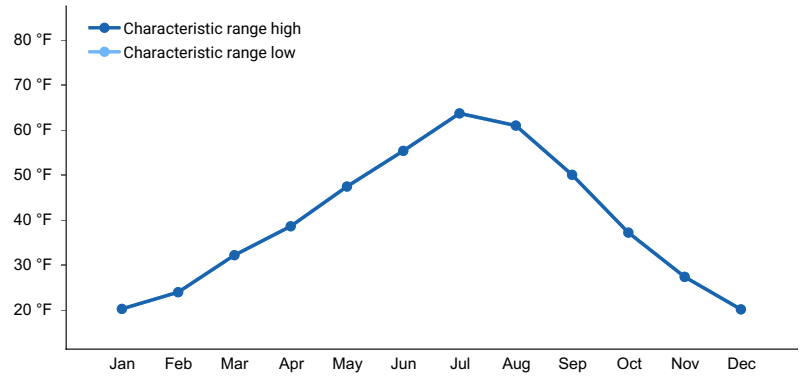


Figure 2. Monthly minimum temperature range

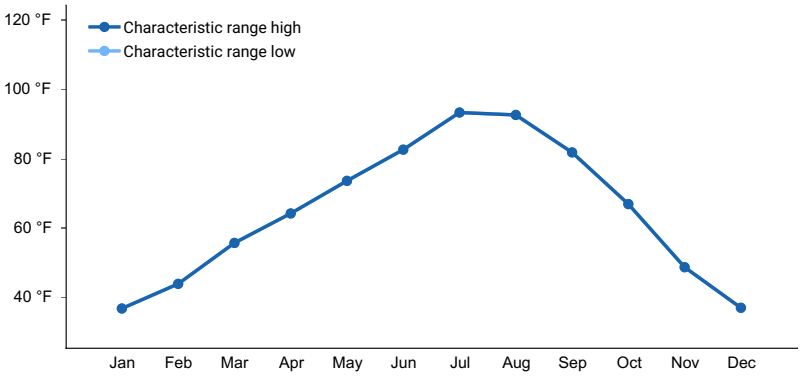


Figure 3. Monthly maximum temperature range

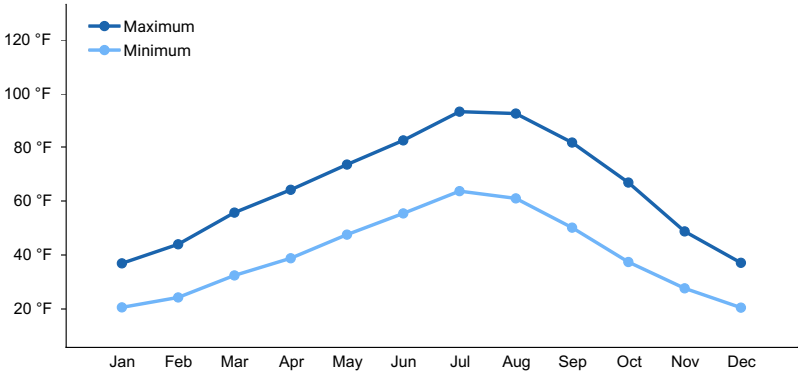


Figure 4. Monthly average minimum and maximum temperature

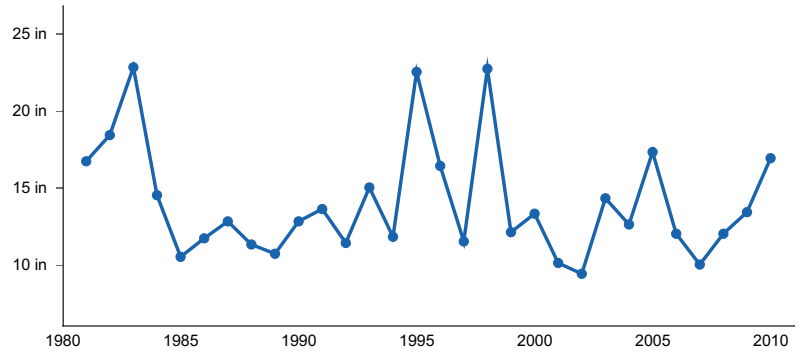


Figure 5. Annual precipitation pattern

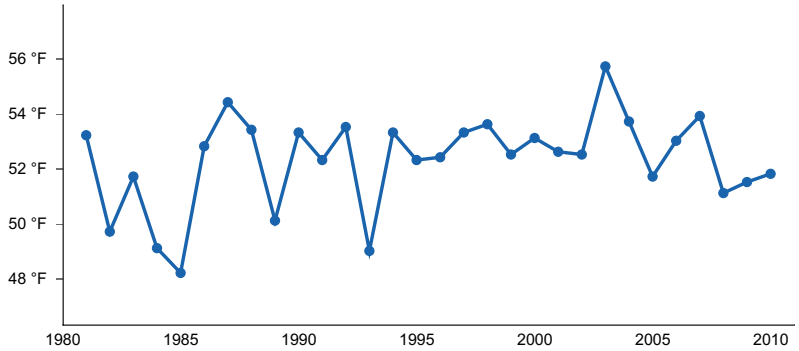


Figure 6. Annual average temperature pattern

Climate stations used

- (1) HUNTINGTON [USC00354098], Huntington, OR

Influencing water features

This site is not influenced by adjacent or on site water features.

Wetland description

Not applicable

Soil features

The soils of this site are typically moderately deep and well-drained with areas of rock outcrop. Typically the surface layer is an extremely channery loam about 7 inches thick. The subsoil is an extremely channery clay loam about 23 inches thick. Depth to bedrock is about 20 to 40 inches. Permeability is moderate. The available water holding capacity is about 4 to 6 inches for the profile. The potential for erosion is severe. These soils are derived from graywacke and schist.

Table 4. Representative soil features

Parent material	(1) Colluvium–graywacke (2) Residuum–graywacke (3) Colluvium–biotite schist (4) Residuum–biotite schist
Surface texture	(1) Extremely channery loam
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderate

Depth to restrictive layer	20–40 in
Soil depth	20–40 in
Surface fragment cover <=3"	0–45%
Surface fragment cover >3"	0–45%
Available water capacity (0-40in)	4–6 in
Soil reaction (1:1 water) (0-40in)	6.6–7.8
Subsurface fragment volume <=3" (4-40in)	50–70%
Subsurface fragment volume >3" (4-40in)	5–15%

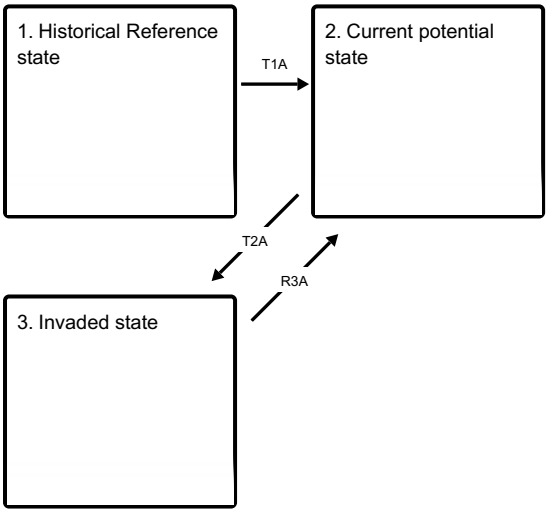
Ecological dynamics

Fire may have been historically infrequent in this site due to low productivity and fuel loads. When it does occur, fire will remove aboveground biomass from bluebunch wheatgrass but plant mortality is generally low (Robberecht and Defossé 1995) because the buds are underground (Conrad and Poulton 1966) or protected by foliage. Uresk et al. (1976) reported burning increased vegetative and reproductive vigor of bluebunch wheatgrass. Thus, bluebunch wheatgrass is considered to experience slight damage to fire but is more susceptible in drought years (Young 1983). Plant response will vary depending on season, fire severity, fire intensity and post-fire soil moisture availability. Little information is available as to the effects of fire on spiny greasebrush.

This site is most susceptible to erosion by water. Where this has occurred, the underlying parent material may be exposed. Improperly managed grazing may alter plant community composition and promote invasion of non native plant species. Bluebunch wheatgrass decreases while annual bromes such as cheatgrass (*Bromus tectorum*), japanese brome (Bromus japonicus), and rattlesnake brome (*Bromus briziformis*) will invade. At high levels of invasion, this site may shift to an alternative state. In this state, bare soil markedly increases and erosion is accelerated.

State and transition model

Ecosystem states



T1A - Introduction of non-native species from vectors such as grazing animals, vehicles or humans.

T2A - Severe or continuous disturbance in the presence of non-native annual species (e.g. catastrophic fire and soil disturbing treatments or inappropriate grazing management resulting in utilization of perennial bunchgrasses that impacts the plant's ability to recover)

R3A - Seeding with native perennial bunchgrasses (or non-native perennial grasses in some cases); mechanical, biological or chemical treatment of exotic species; and alteration of grazing management.

State 1 submodel, plant communities

1.1. Reference Plant Community

State 1
Historical Reference state

The Reference State 1.0 is representative of the natural range of variability under pristine conditions. The reference state is bunchgrass dominated with a drought adapted shrub component. State dynamics are maintained by interactions between climatic patterns and disturbance regimes. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These are maintained by elements of ecosystem structure and function such as the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Plant community phase changes are primarily driven by fire and/or periodic drought.

Dominant plant species

- spiny greasebush (*Glossopetalon spinescens*), shrub
- bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*), grass

Community 1.1
Reference Plant Community

The reference plant community is a sparsely vegetated grass/shrub community dominated by bluebunch wheatgrass. Spiny greasebush and spiny hopsage (*Grayia spinosa*) are scattered in the stand. Vegetative composition of the community is approximately 80 percent grasses, 10 percent forbs, and 10 percent shrubs. Approximate ground cover is 30 to 50 percent (basal and crown).

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	511	557	602
Forb	42	74	105
Shrub/Vine	28	60	91
Total	**581**	**691**	**798**

State 2
Current potential state

This state is similar to the Reference State 1.0 yet it is not in pristine conditions. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Non-natives may increase in abundance but will not become dominant within this State. These non-natives can be highly flammable and can promote fire where historically fire had been infrequent. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These are maintained by elements of ecosystem structure and function such as the presence of all structural and functional groups low fine fuel loads, and retention of organic matter and nutrients. Positive feedbacks decrease ecosystem resilience and stability of the state. Processes and characteristics that contribute to positive feedbacks include the non-natives species' high seed output, persistent seed bank, rapid growth rate, ability to cross pollinate, and adaptations for seed dispersal.

Dominant plant species

- spiny greasebush (*Glossopetalon spinescens*), shrub
- bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*), grass

State 3
Invaded state

This community is characterized by the dominance of annual non-native grass species such as cheatgrass (*Bromus tectorum*), japanese brome (Bromus japonicus), and rattlesnake brome (*Bromus briziformis*). These exotic species will largely displace native perennial bunchgrasses and forbs, increase bare ground and render the site vulnerable to soil erosion.

Dominant plant species

- cheatgrass (*Bromus tectorum*), grass
- medusahead (*Taeniatherum caput-medusae*), grass

Transition T1A
State 1 to 2

Introduction of non-native species from vectors such as grazing animals, vehicles or humans.

Transition T2A
State 2 to 3

Severe or continuous disturbance in the presence of non-native annual species (e.g. catastrophic fire and soil disturbing treatments or inappropriate grazing management resulting in utilization of perennial bunchgrasses that impacts the plant's ability to recover)

Restoration pathway R3A
State 3 to 2

Restoration of some structural and functional plant groups may be possible with a combination of intensive management inputs and significant time. Inputs may include seeding with native perennial bunchgrasses (or non-native perennial grasses in some cases); mechanical, biological or chemical treatment of exotic species; and alteration of grazing management.

Context dependence. Multiple attempts may be required and likelihood of failure is high given hot and dry site conditions and low site resilience. Success will likely be somewhat contingent upon favorable weather patterns following treatment.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Perennial, deep-rooted, dominant**			490–560	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	490–560	–
2	**Perennial, deep-rooted, sub-dominant**			14–28	
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	7–14	–
	squirreltail	ELEL5	*Elymus elymoides*	7–14	–
4	**Perennial, shallow-rooted, sub-dominant**			7–14	
	Sandberg bluegrass	POSE	*Poa secunda*	7–14	–
Forb					
7	**Perennial, all, dominant**			14–42	
	milkvetch	ASTRA	*Astragalus*	7–21	–
	desertparsley	LOMAT	*Lomatium*	7–21	–
8	**Perennial, all, sub-dominant**			14–28	
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	7–14	–
	cliff beardtongue	PERU	*Penstemon rupicola*	7–14	–
9	**Other perennial forbs, all**			14–35	
	common yarrow	ACMI2	*Achillea millefolium*	0–4	–
	agoseris	AGOSE	*Agoseris*	0–4	–
	onion	ALLIU	*Allium*	0–4	–
	larkspur	DELPH	*Delphinium*	0–4	–
	buckwheat	ERIOG	*Eriogonum*	0–4	–
	western stoneseed	LIRU4	*Lithospermum ruderale*	0–4	–
	stoneseed	LITHO3	*Lithospermum*	0–4	–
	blazingstar	MENTZ	*Mentzelia*	0–4	–
	beardtongue	PENST	*Penstemon*	0–4	–
	phacelia	PHACE	*Phacelia*	0–4	–
Shrub/Vine					
13	**Perennial, deciduous, dominant**			14–56	
	spiny greasebush	GLSP	*Glossopetalon spinescens*	14–56	–
14	**Perennial, deciduous, sub-dominant**			7–14	
	spiny hopsage	GRSP	*Grayia spinosa*	7–14	–
15	**Other perennial shrubs, all**			7–21	
	hackberry	CELTI	*Celtis*	0–7	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–7	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–7	–

Animal community

Livestock Grazing:

This site is not suited to use by cattle, sheep, or horses for grazing. The slopes are steep to very steep with unstable soils.

Native Wildlife Associated with the Potential Climax Community:

Mule deer
Elk
Rodents
Hawks
Songbirds

This site is critical for mule deer and elk.

Hydrological functions

The soils are in hydrologic group C. The soils of this site have moderately high runoff potential.

Other information

This site is not conductive to mechanical improvement measures due to steepness of slope, coarse and unstable soil conditions, and limited cover.

References

. Fire Effects Information System. http://www.fs.fed.us/database/feis/.

. 2021 (Date accessed). USDA PLANTS Database. http://plants.usda.gov.

Other references

Chambers, J., B. Bradley, C. Brown, C. D'Antonio, M. Germino, J. Grace, S. Hardegree, R. Miller, and D. Pyke. 2013. Resilience to Stress and Disturbance, and Resistance to *Bromus tectorum* L. Invasion in Cold Desert Shrublands of Western North America. Ecosystems:1-16.

Conrad, C. E. and C. E. Poulton. 1966. Effect of a wildfire on Idaho fescue and bluebunch wheatgrass. Journal of Range Management:138-141.

Robberecht, R. and G. Defossé. 1995. The relative sensitivity of two bunchgrass species to fire. International Journal of Wildland Fire 5:127-134.

Stringham, T.K., D. Snyder, and A. Wartgow. 2016. State-and-Transition Models for USFS Crooked River National Grassland Major Land Resource Area B10 Oregon. DRAFT Report. University of Nevada Reno.

Uresk, D. W., J. F. Cline, and W. H. Rickard. 1976. Impact of wildfire on three perennial grasses in south- central Washington. Journal of Range Management 29:309-310.

Young, R.P. 1983. Fire as a vegetation management tool in rangelands of the Intermountain region. In: Monsen, S.B. and N. Shaw (Eds). Managing Intermountain rangelands—improvement of range and wildlife habitats: Proceedings of symposia; 1981 September 15-17; Twin Falls, ID; 1982 June 22-24; Elko, NV. Gen. Tech. Rep. INT-157. Ogden, UT. U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. Pp. 18-31.

USNVC [United States National Vegetation Classification]. 2020. United States National Vegetation Classification Database, V2.03. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC. [http://usnvc.org/ accessed 9/25/2020}

Contributors

A. Bahn, H. Barrett
M. Parks
2020/2021 update Andrew Neary

Approval

Kirt Walstad, 12/13/2023

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	08/07/2012
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None to some, severe sheet & rill erosion hazard

2. **Presence of water flow patterns:** none to some

3. **Number and height of erosional pedestals or terracettes:** None

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 10-25%

5. **Number of gullies and erosion associated with gullies:** None

6. **Extent of wind scoured, blowouts and/or depositional areas:** None, slight to moderate wind erosion hazard

7. **Amount of litter movement (describe size and distance expected to travel):** Fine - limited movement

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Significantly resistant to erosion: aggregate stability = 4-6

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Moderately deep well drained extremely channery loam (7 inches thick): Moderate OM (2-4%)

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Low ground cover (30-50%) and moderate to steep slopes (3-80%) slightly limit rainfall impact and overland flow

---

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: Bluebunch wheatgrass > forbs > shrubs

    Sub-dominant:

    Other:

    Additional:

---

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

---

14. **Average percent litter cover (%) and depth (in):**

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Favorable: 1200, Normal: 700, Unfavorable: 400 lbs/acre/year at high RSI (HCPC)

---

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:** Perennial brush species will increase with deterioration of plant community. Western juniper readily invades the site. Cheatgrass and Medusahead invade sites that have lost deep rooted perennial grass functional groups.

---

17. **Perennial plant reproductive capability:** All species should be capable of reproducing annually

---