USDA Natural Resources
Conservation Service

Ecological site R010XB046OR
JD Shrubby Mountain South 12-16 PZ

Accessed: 05/12/2025

General information

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

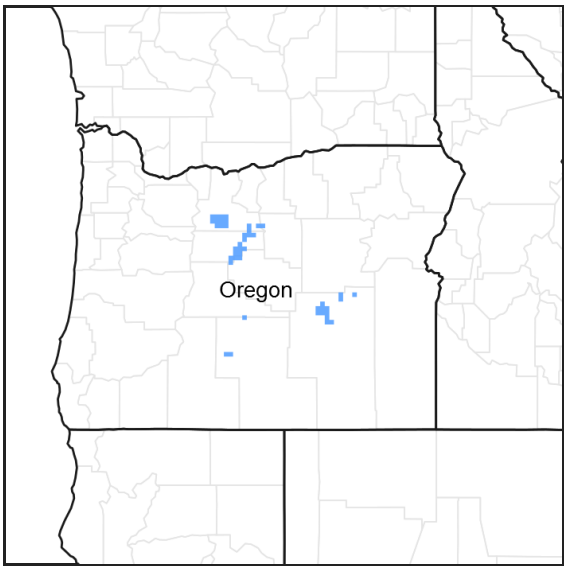

Figure 1. Mapped extent

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

Associated sites

R010XB071OR	**JD Shrubby Mountain North 12-16 PZ** Shrubby Mountain North 12-16" PZ
R010XB082OR	**JD Shrubby Claypan 12-16 PZ** Shrubby Mountain Clayey 12-16" PZ

Similar sites

R010XC047OR	**SR Mountain South 12-16 PZ** SR Mountain South 12-16" PZ (substratum bedrock not shaly or highly fractured)

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Purshia tridentata* (2) *Artemisia tridentata var. vaseyana*
Herbaceous	(1) *Pseudoroegneria spicata* (2) *Festuca idahoensis*

Physiographic features

This site occurs on southerly aspects of terraces, tablelands, and mountain plateaus. Slopes range from 12 to 50 percent. Elevations range from 3,500 to 6,000 feet.

Table 2. Representative physiographic features

Landforms	(1) Terrace (2) Plateau
Flooding frequency	None
Ponding frequency	None
Elevation	1,067–1,829 m
Slope	12–50%
Water table depth	152 cm
Aspect	S

Climatic features

The annual precipitation ranges from 12 to 16 inches, most of which occurs in the form of snow during the months of November through March. Localized, occasionally severe convection storms occur during the summer. The soil temperature regime is frigid to mesic near frigid with a mean annual air temperature of about 45 degrees F. Temperature extremes range from 100 to -30 degrees F. The frost-free period ranges from 50 to 90 days. The optimum period for plant growth is from April through June.

Table 3. Representative climatic features

Frost-free period (average)	90 days
Freeze-free period (average)	0 days
Precipitation total (average)	406 mm

Influencing water features

Soil features

The soils of this site are shallow to moderately deep and well-drained. Typically the surface layer is a loam to shaly laom about 5 to 12 inches thick. The subsoil is a very shaly loam to a very gravelly loam about 12 inches thick. Depth to shale or highly fractured bedrock may range from 10 to 40 inches. Permeability is moderate to slow. The available water holding capacity is about 1 to 5 inches for the profile. The potential for erosion is moderate to severe. The representative soil for this site is Venator very shaly loam, 12-65% slopes; Loamy-skeletal, mixed, mesic Lithic Haploxerolls.

Table 4. Representative soil features

Surface texture	(1) Stony loam (2) Channery loam (3) Gravelly silty clay loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to slow
Soil depth	25–102 cm
Surface fragment cover <=3"	14–37%

Surface fragment cover >3"	0–26%
Available water capacity (0-101.6cm)	2.54–12.7 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.1–8.4

Ecological dynamics

Range in Characteristics:
The reference native plant community is dominated by mountain big sagebrush, antelope bitterbrush and bluebunch wheatgrass. Idaho fescue, basin wildrye, needlegrasses, Indian ricegrass, and a variety of forbs and shrubs are common in the stand. Vegetative composition of the community by air-dry weight is approximately 65 percent grasses, 10 percent forbs, and 25 percent shrubs. Foliar cover of Ponderosa pine ranges to a maximum of 5 percent with a minimum of 10 percent antelope bitterbrush.

Bluebunch wheatgrass is the dominant grass on due south exposures. Antelope bitterbrush and mountain big sagebrush are the dominant shrubs. Idaho fescue will increase on easterly slopes. Basin wildrye increases in areas of colluvium. Thurber needlegrass will increase on more coarse textured surface soils. Production increases with soil depth, particularly on colluvial toe slopes. Scattered ponderosa pine is present.

Response to Disturbance:

If the condition of the site deteriorates as a result of overgrazing, bluebunch wheatgrass decreases while big sagebrush increases and annuals invade. With further deterioration, bluebunch wheatgrass, and antelope bitterbrush decrease and bare soil interspaces increase. Western juniper will increase in the absence of fire. Excess erosion in the bare interspaces markedly reduces the site production and contributes to downstream sedimentation.

Treatment Response:

South facing aspects lack resiliency and typically respond poorly to Juniper removal due to shallow soils and heat. One repair pathway (RP2) located between State 1 and 2 indicates that potential for rehabilitation of the juniper controlled plant community exists. The potential for success is less than that of the juniper-sagebrush steppe phase in State 1 due primarily to aspect and soils. Treatment of juniper should incorporate lopping of limbs to provide microsites for seedling establishment along with seeding of desired grasses, forbs and shrubs. Fire is not a recommended tool of rehabilitation due to the increased risk of cheatgrass invasion. A second repair pathway (RP3) exists between States 1 and 3. Treatment of the Sandberg bluegrass, cheatgrass and rabbitbrush phase would require chemical control of the rabbitbrush and cheatgrass along with seeding. Treatment of the juniper woodland and shallow rooted grasses phase would also require control on the cheatgrass while removing juniper and seeding desirable species. The potential for failure of rehabilitation projects within State 3 is high. Because of this, every effort should be taken to prevent threshold forcing events from occurring.

Reference Plant Community

State 1 – Reference State

Three plant community phases occur in the Reference State. They are phase 1.1, the Reference Plant Community Phase (RPCP) which is the perennial grass phase, phase 1.2, the sagebrush phase and phase 1.3, the juniper-sagebrush phase.

Phase 1.1. The Reference Plant Community Phase (RPCP) is the perennial grass phase. This plant community is

strongly dominated by bluebunch wheatgrass with Sandberg bluegrass and Thurber needlegrass being common and lesser amounts of other perennial grasses and a small amount of forbs. Mountain big sagebrush and antelope bitterbrush are common. Grasses compose 80 % of the community, forbs 5% and shrubs 15%. Ecological processes are controlled by the perennial grasses.

Phase 1.2. The sagebrush phase results with prescribed grazing with normal fire frequency of 40-60 years (CP1.1A). The composition of sagebrush within the plant community will increase as the length of time between fires becomes greater. A period of improper grazing can accelerate the increase in sagebrush even if the bunchgrass plant community is maintained. Under prescribed grazing and fire the plant community pathway (CP1.2A) moves back toward Phase 1.1, the perennial grass community. With the continued absence of fire and improper grazing management or drought (CP1.2B) the plant community will move towards phase 1.3, juniper-sagebrush.

Phase 1.3. The juniper-sagebrush phase is dominated by Juniper, mountain big sagebrush, bluebunch wheatgrass, and Sandberg bluegrass. This plant community is a result of the absence of fire with improper grazing or drought and can occur through community pathways CP1.1B or CP1.2B. This phase is the “at risk” plant community within State 1. If the site deteriorates the potential for cheatgrass invasion and juniper increases. With proper grazing and fire this phase can be returned (RT1 & RT2) to Phase 1.1 by community pathway CP 1.3A. This “at risk” phase can transition to State 2 (IRT1A) “characterized by juniper dominance with a perennial grass understory” with suppressed fire or State 3 (IRT1B) “characterized by the loss of deep rooted perennial grass functional groups” with improper grazing management, and/or drought and continued lack of fire

State 2. This State is dominated by juniper. Initially, Phase 2.1, the juniper-sagebrush phase is occupied by juniper, mountain big sagebrush, Sandberg bluegrass, and Idaho fescue with a trace of bluebunch wheatgrass and cheatgrass. If fire continues to be suppressed and improper grazing continues, juniper will continue to increase and out compete both the sagebrush and bunchgrass understory. When fine fuels are reduced and fire will no longer carry (fire proof), the site transitions to a juniper woodland community (Phase 2.2). The potential for soil erosion increases as the juniper woodland matures and the understory plant community declines. The risk of an irreversible transition (IRT2A) over an abiotic threshold to the juniper woodland erosional phase of State 4 increases with increasing slope and increasing bare ground. The repair pathway (RP1) from state 2 back to State 1 is generally not economically feasible and would require mechanical treatment of the junipers prior to initiating prescribed burns. The potential for needing to reseed to adapted grasses, forbs and shrubs is extremely high. In this state all of the ecological processes are controlled by juniper.

State 3. This state is dominated in the understory by cheatgrass and in the overstory by either juniper (Phase 3.1) or rabbitbrush (Phase 3.2). Sagebrush and the deep-rooted perennial bunch grasses have almost been entirely replaced in the understory of the plant community by cheatgrass and Sandberg bluegrass. This state has developed as a result of continued improper grazing in the absence of fire (IRT1B) and this transition moves the plant community to the juniper woodland shallow-rooted grasses phase (3.1). If fire occurs, the plant community transitions to the cheatgrass, Sandberg bluegrass, and rabbitbrush phase (3.2). The risk of an irreversible transition (IR3A) to the erosional State 4 is paramount with continued improper grazing in combination with the lack of fire (4.1) or with frequent fire (4.2). The repair pathway (RP2) from State 3 back to State 1 is generally not economically feasible and requires mechanical treatment of the juniper, chemical treatment of the cheatgrass and rabbitbrush, and reseeding of desirable grasses, forbs, and shrubs. Ecological processes in this state are controlled by the juniper and/or the shallow rooted grasses and cheatgrass.

State 4. This state is dominated by cheatgrass and shallow-rooted grasses in the understory with junipers (4.1) or rabbitbrush (4.2) in the overstory. This state is recognized by the soil erosion that is occurring or has occurred on site. Since this state has occurred through widespread erosion from State 2 (IRT2A) or State 3 (IRT3A), the increase in bare ground makes the site more susceptible to increased wind and/or water erosion. Abiotic factors control site resources and ecological functions. Rehabilitation of this state may not be practical or possible due to extreme soil loss.

State and transition model

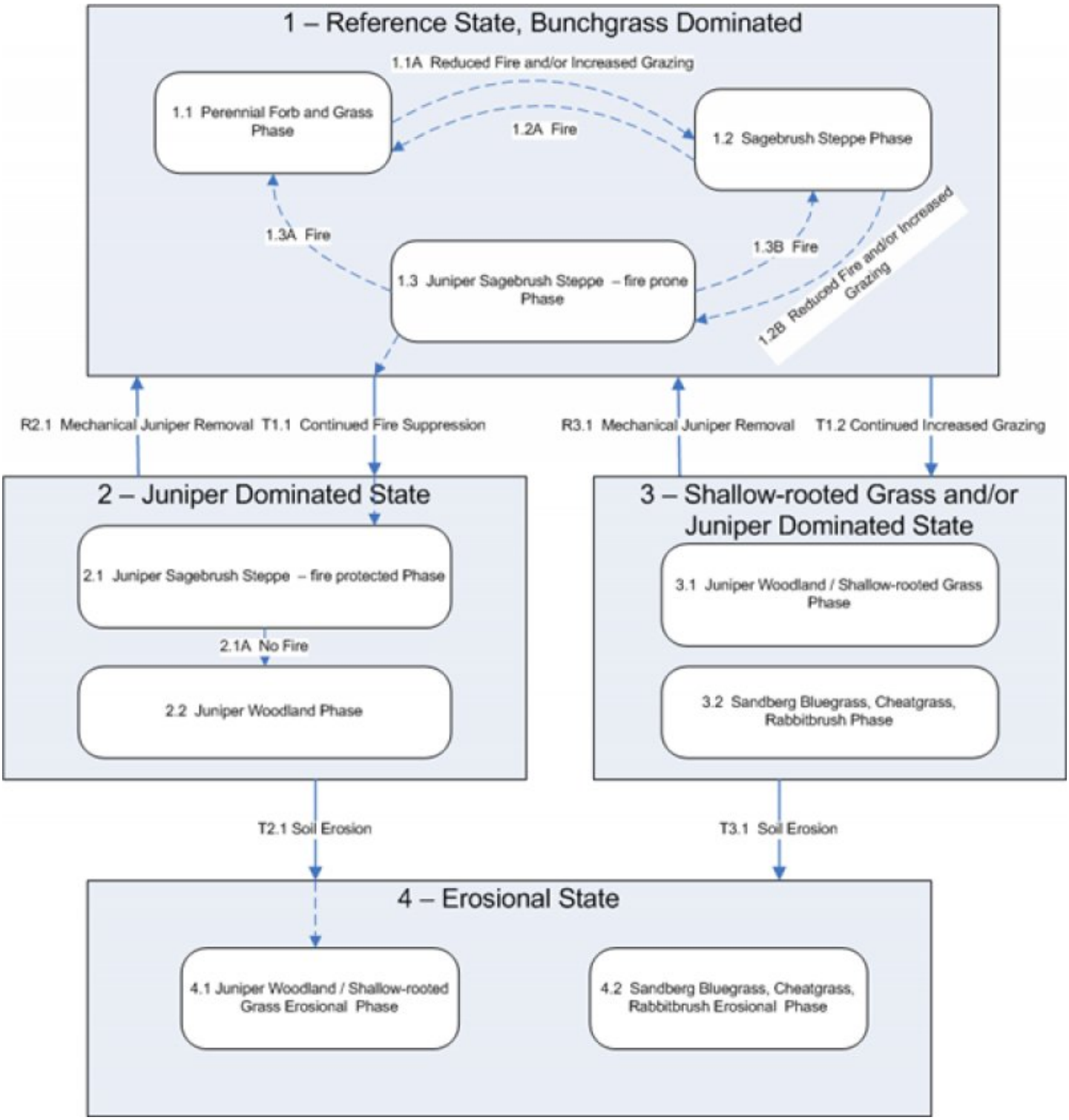

Figure 3. Group 3, STM

State 1
Reference State

Community 1.1
Reference Plant Community

The potential native plant community is dominated by mountain big sagebrush, antelope bitterbrush, and bluebunch wheatgrass. Idaho fescue, basin wildrye, needlegrass, Indian ricegrass, and a variety of forbs and shrubs are common in the stand. Vegetative composition of the community by air-dry weight is approximately 65 percent grasses, 10 percent forbs, and 25 percent shrubs. Foliar cover of Ponderosa pine ranges to a maximum of 5 percent with a minimum of 10 percent antelope bitterbrush.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	729	947	1240
Shrub/Vine	258	336	437
Forb	112	146	191
Tree	22	28	38
Total	**1121**	**1457**	**1906**

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Perennial, deep-rooted, bunchgrass**			437–729	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	437–729	–
2	**Perennial, moderate to deep-rooted, bunchgrass**			204–364	
	Idaho fescue	FEID	*Festuca idahoensis*	146–219	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	29–73	–
	basin wildrye	LECI4	*Leymus cinereus*	15–44	–
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	15–29	–
4	**Perennial, shallow-rooted, bunchgrass**			15–44	
	Sandberg bluegrass	POSE	*Poa secunda*	15–44	–
5	**Other perennial grasses, all**			15–44	
	California brome	BRCA5	*Bromus carinatus*	0–22	–
	squirreltail	ELEL5	*Elymus elymoides*	0–22	–
Forb					
7	**Perennial, all, dominant**			73–146	
	milkvetch	ASTRA	*Astragalus*	15–29	–
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	15–29	–
	buckwheat	ERIOG	*Eriogonum*	15–29	–
	desertparsley	LOMAT	*Lomatium*	15–29	–
	lupine	LUPIN	*Lupinus*	15–29	–
9	**Other perennial forbs, all**			15–117	
	common yarrow	ACMI2	*Achillea millefolium*	0–10	–
	agoseris	AGOSE	*Agoseris*	0–10	–
	brodiaea	BRODI	*Brodiaea*	0–10	–
	Indian paintbrush	CASTI2	*Castilleja*	0–10	–
	hawksbeard	CREPI	*Crepis*	0–10	–
	larkspur	DELPH	*Delphinium*	0–10	–
	fleabane	ERIGE2	*Erigeron*	0–10	–
	waterleaf	HYDRO4	*Hydrophyllum*	0–10	–
	western stoneseed	LIRU4	*Lithospermum ruderale*	0–10	–
	beardtongue	PENST	*Penstemon*	0–10	–
	phacelia	PHACE	*Phacelia*	0–10	–

	phlox	PHLOX	*Phlox*	0–10	–
Shrub/Vine					
11	**Perennial, deciduous, dominant**			219–291	
	antelope bitterbrush	PUTR2	*Purshia tridentata*	219–291	–
12	**Perennial, evergreen, sub-dominant**			58–102	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	44–73	–
	slender buckwheat	ERMI4	*Eriogonum microthecum*	15–29	–
14	**Perennial, deciduous, sub-dominant**			29–58	
	currant	RIBES	*Ribes*	15–29	–
15	**Other perennial shrubs, all**			15–44	
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	0–8	–
	curl-leaf mountain mahogany	CELE3	*Cercocarpus ledifolius*	0–8	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–8	–
	green rabbitbrush	ERTE18	*Ericameria teretifolia*	0–8	–
	common snowberry	SYAL	*Symphoricarpos albus*	0–8	–
	horsebrush	TETRA3	*Tetradymia*	0–8	–
Tree					
16	**Perennial, evergreen, dominant**			15–44	
	ponderosa pine	PIPO	*Pinus ponderosa*	15–44	–
17	**Perennial, evergreen, sub-dominant**			0–29	
	western juniper	JUOC	*Juniperus occidentalis*	0–29	–

Animal community

Livestock grazing:

This site is suited to use by cattle, sheep, and horses during the summer and fall under a planned grazing system. Care should be taken to avoid trampling damage and soil compaction when soils are wet.

Native Wildlife Associated with the Potential Climax Community:

Mule deer
Elk
Hawks
Rodents
Songbirds

This site provides food and cover for mule deer, elk, rodents, and a variety of birds and their associated predators. Antelope bitterbrush provides valuable fall/winter forage.

Hydrological functions

The soils are in hydrologic groups B and C. The soils of this site have moderately low to moderately high runoff potential.

Wood products

This site is suspectible to increase in western juniper. Where this has occurred the site will yield firewood, fence

posts, and other specialty products.

Other information

Increase in western juniper and the subsequent competition for moisture will lead to a reduction of soil cover and accelerated soil loss. Improving infiltration and permeability, and reducing runoff should be the immediate goal of juniper control.

Contributors

BLM/SCS Team - Burns, A. Bahn, J. Thompson, H. Barrett
Cici Brooks
Ed Petersen

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)	Jeff Repp and Bruce Frannsen
Contact for lead author	State Rangeland Management Specialist for NRCS - Oregon
Date	08/06/2012
Approved by	Bob Gillaspy
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None, moderate sheet & rill erosion hazard (severe on steeper slopes)

2. **Presence of water flow patterns:** None

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):** 5-20%

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

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

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

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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):** Moderately resistant to erosion: aggregate stability = 3-5

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Shallow t moderately deep, well drained loams to shaley loams (5-12" thick): moderate OM (2-4%)

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Moderate ground cover (40-60%) and gentle to steep slopes (12-50%) moderately limit rainfall impact and overland flow

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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: Bluebunch wheatgrass > Antelope bitterbrush > Idaho fescue > other grasses > other shrubs > forbs

    Sub-dominant:

    Other:

    Additional:

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

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Favorable: 1700, Normal: 1300, Unfavorable: 1000 lbs/acre/year at high RSI (HCPC)

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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:** 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.

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

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