

# Ecological site R010XC049OR SR Shrubby Mountain South 16-20 PZ

Accessed: 05/08/2024

## 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.

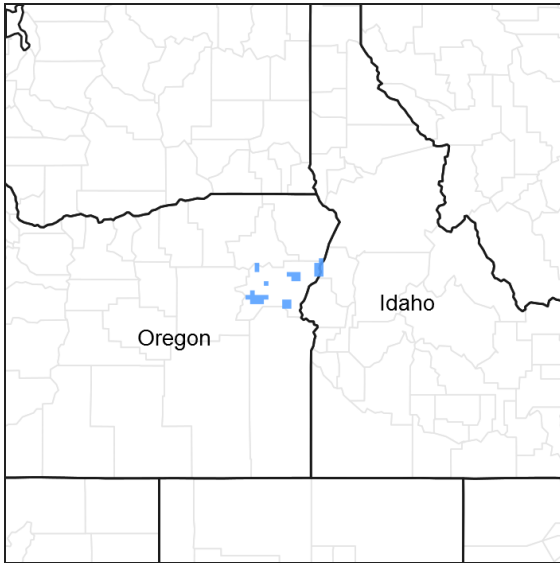


Figure 1. Mapped extent

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

R010XC034OR	<b>SR Shrubby Mountain Loam 16-20 PZ</b> SR Shrubby Mountain Loam 16-20" PZ
R010XC055OR	<b>SR Mountain Shallow South 16-20 PZ</b> SR Mountain Shallow South 16-20" PZ
R010XC067OR	<b>SR Shrubby Mountain North 16-20 PZ</b> SR Shrubby Mountain North 16-20" PZ

## Similar sites

R010XC055OR	<b>SR Mountain Shallow South 16-20 PZ</b> SR Mountain Shallow South 16-20" PZ (shallower depth, lower production)
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Purshia tridentata</i> (2) <i>Prunus emarginata</i>
Herbaceous	(1) <i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>

## Physiographic features

This site occurs adjacent to forestland on south exposure backslopes of tablelands and mountain plateaus. Slopes range from 12 to 60 percent. Elevations range from 3200 to 5700 feet.

**Table 2. Representative physiographic features**

Landforms	(1) Plateau
Elevation	975–1,737 m
Slope	12–60%
Aspect	S

## Climatic features

The annual precipitation ranges from 16 to 20 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 near frigid to frigid with a mean annual air temperature of about 44 degrees F. Temperature extremes range from 90 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)	508 mm

## Influencing water features

### Soil features

The soils of this site are typically moderately deep to deep and well-drained. Typically the surface layer is a loam to a gravelly loam 6 to 20 inches thick. The subsoil is an extremely gravelly clay, silty clay, or clay loam about 20 inches thick. Depth to bedrock or an indurated pan may range from 20 to over 40 inches. Permeability is moderately slow. The available water holding capacity is about 6 to 8 inches for the profile. The potential for erosion is moderate to severe.

**Table 4. Representative soil features**

Surface texture	(1) Gravelly loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Moderately slow
Soil depth	51–102 cm
Available water capacity (0-101.6cm)	15.24–20.32 cm

## Ecological dynamics

Range in Characteristics:

Bluebunch wheatgrass is highest in composition on due south slopes. Needlegrasses increase with coarse loamy surface. Idaho fescue will increase on more east facing slopes. Shrubs maintain a fairly even mixed stand. As a site influenced by fire, the shrubs/grass composition of the stand may be determined by fire frequency. Root sprouting

shrubs are favored with a higher fire frequency.

#### Response to Disturbance:

If the condition of the site deteriorates as a result of overgrazing, bluebunch wheatgrass decreases while Sandberg bluegrass, needlegrass, blue wildrye, mountain big sagebrush, antelope bitterbrush, and snowberry increase. With further deterioration, needlegrasses decrease, unpalatable shrubs increase and annuals invade. Areas of bare ground increase and excessive erosion in the bare soil interspaces markedly reduces the site productivity 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. Repair pathways located between States 1 and 2 indicate 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.

### **State and transition model**

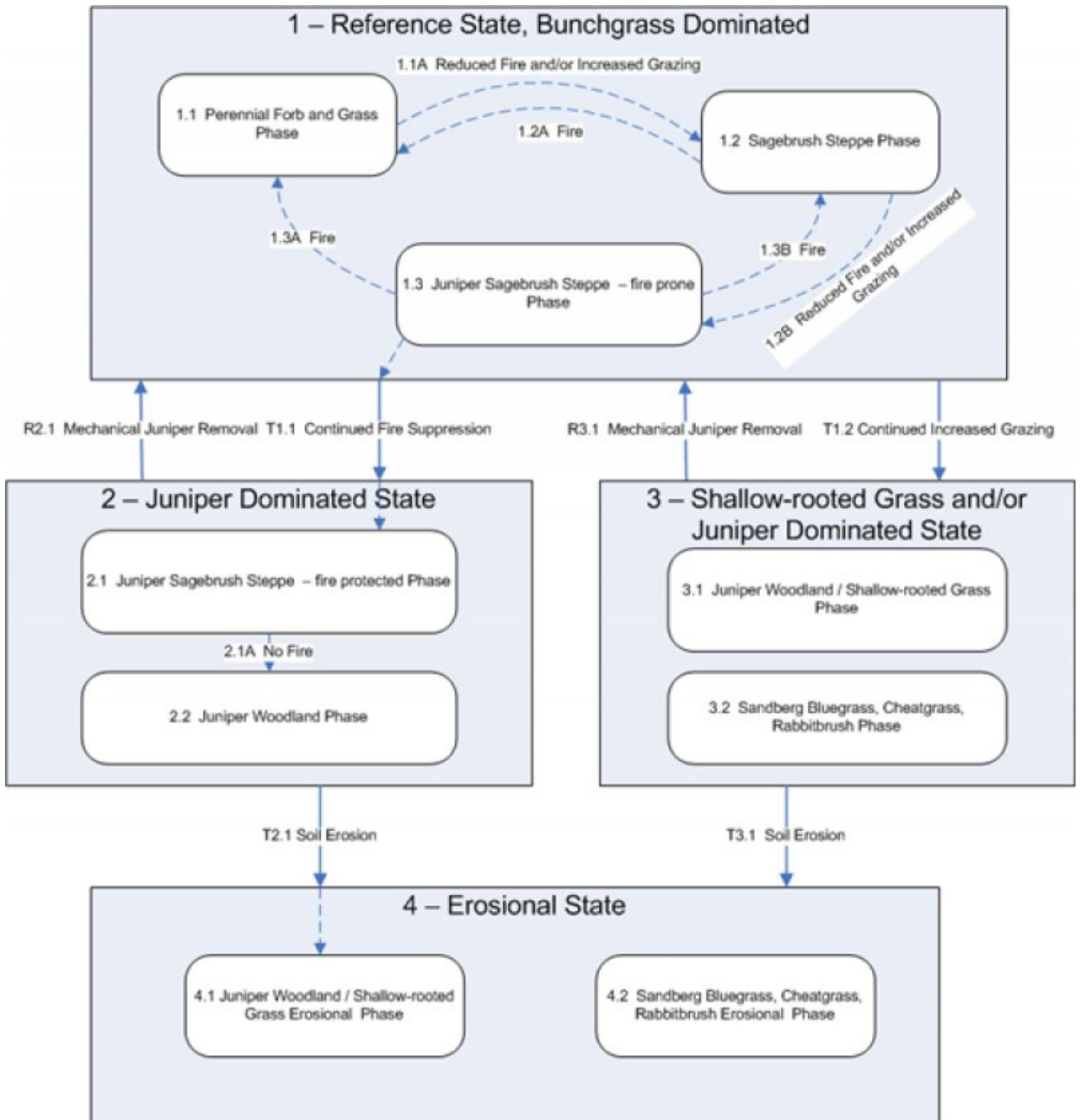


Figure 3. Group 3, STM

## State 1 Reference State

The potential native plant community is dominated by mountain big sagebrush, antelope bitterbrush, and bluebunch wheatgrass. Taller shrubs, such as bitter cherry and serviceberry, are prominent in the stand. Squaw apple, needlegrasses and buckwheat are common. Vegetative composition of the community is approximately 40 percent grasses, 5 percent forbs, and 55 percent shrubs. Approximate ground cover is 60 to 70 percent (basal and crown).

### Community 1.1 Perennial Forb and 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. Grasses

compose 90 % of the community, and forbs 10%. Ecological processes are controlled by the perennial grasses.

## Community 1.2 Sagebrush Steppe Phase

The Reference Plant Community Phase (RPCP) is the sagebrush steppe 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. 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.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	897	1345	1614
Shrub/Vine	146	202	235
Forb	56	84	101
Tree	22	50	67
<b>Total</b>	<b>1121</b>	<b>1681</b>	<b>2017</b>

Figure 5. Plant community growth curve (percent production by month).  
OR4531

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	15	30	25	15	0	10	0	0	0

## Community 1.3 Juniper Sagebrush Steppe - fire prone Phase

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 occurs through community pathway 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 to Phase 1.1 or 1.2 by community pathway CP 1.3A or CP 1.3B. This “at risk” phase can transition to State 2 “characterized by juniper dominance with a perennial grass understory” with continued lack of fire or State 3 “characterized by the loss of deep rooted perennial grass functional groups” with improper grazing management, and/or drought and continued lack of fire.

### Pathway 1.1A Community 1.1 to 1.2

As time since fire progresses, woody vegetation begins to become established. Increased or improper grazing pressure can accelerate this progression.

### Pathway 1.2A Community 1.2 to 1.1

Prescribed fire will significantly reduce the shrub and tree composition.

### Conservation practices

Prescribed Burning

### **Pathway 1.2B** **Community 1.2 to 1.3**

Continued fire suppression and/or increased grazing pressure will allow the woody vegetation to increase.

### **Pathway 1.3A** **Community 1.3 to 1.1**

Prescribed fire which removes the woody vegetation will return this plant community to one dominated by perennial herbaceous vegetation.

#### **Conservation practices**

Prescribed Burning

### **Pathway 1.3B** **Community 1.3 to 1.2**

Prescribed fire which reduces the woody vegetation will return this plant community to one dominated by perennial herbaceous vegetation with some woody plants remaining.

#### **Conservation practices**

Prescribed Burning

## **State 2** **Juniper Dominated**

Recognized by the need to mechanically treat the juniper woodland prior to initiating a prescribed burn. Sagebrush is stressed and dying (Juniper Sagebrush Steppe phase). Juniper Sagebrush Steppe phase with juniper dominance, Idaho fescue beneath tree canopies, bareground interspaces with a trace of bluebunch wheatgrass and an increase in Sandberg bluegrass. As the juniper woodland matures, sagebrush and bluebunch wheatgrass are eliminated and the potential for soil erosion increases (Juniper Woodland phase). In this state all of the ecological processes are controlled by juniper.

### **Community 2.1** **Juniper Sagebrush Steppe- fire protected phase**

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)

### **Community 2.2** **Juniper Woodland Phase**

The potential for soil erosion increases as the juniper woodland matures and the understory plant community declines. The risk of an irreversible transition (T2.1) over an abiotic threshold to the juniper woodland erosional phase of state 4 increases with increasing slope and increasing bare ground. The repair pathway (R2.1) 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.

## **Pathway 2.1A**

### **Community 2.1 to 2.2**

With the lack of fire, this community will transition to community 2.2 (Juniper Woodland Phase).

## **State 3**

### **Shallow-rooted Grass and/or Juniper Dominated State**

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 (T1.2) and this transition moves the plant community to the juniper woodland shallow-rooted grasses phase (3.1).

## **Community 3.1**

### **Juniper Woodland/Shallow-rooted Grass**

This state is dominated in the understory by cheatgrass and/or Sandberg bluegrass and in the overstory by juniper.

## **Community 3.2**

### **Sandberg bluegrass, Cheatgrass, Rabbitbrush Phase**

This state is dominated in the understory by sheatgrass and in the overstory by rabbitbrush.

## **State 4**

### **Erosional State**

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 (T2.1) or State 3 (T3.1), 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.

## **Community 4.1**

### **Juniper Woodland/Shallow-rooted Grass Erosional Phase**

This community phase is dominated by cheatgrass and shallow-rooted grasses in the understory with junipers in the overstory.

## **Community 4.2**

### **Sandberg bluegrass, Cheatgrass, Rabbitbrush Erosional Phase**

This community phase is dominated by cheatgrass and shallow-rooted grasses in the understory with rabbitbrush in the overstory.

## **Transition T1.1**

### **State 1 to 2**

Continued fire suppression will result in Juniper dominating the site and being large enough to be protected from fire damage.

## **Transition T1.2**

### **State 1 to 3**

Severe overgrazing and/or drought cause a significant reduction in deep rooted perennial bunchgrasses facilitating cheatgrass invasion and/or Sandberg bluegrass increase and the potential for juniper dominance. Continued

abusive grazing eliminates bunchgrasses, facilitates cheatgrass as the dominant understory and juniper as the dominate overstory. Juniper out competes sagebrush creating the Juniper Woodland Shallow-rooted grass community phase (3.1). Continued abusive grazing with fire eliminates bunchgrasses, cheatgrass and/or Sandberg bluegrass dominates understory with an overstory of rabbitbrush (3.2).

## Restoration pathway R2.1

### State 2 to 1

Mechanical removal of western juniper can return this site to the Reference State (State 1). Care must be taken to ensure that the desired perennial herbaceous vegetation is intact and able to respond to the release of water and nutrients. May require seeding of native grasses and shrubs.

#### Conservation practices

Brush Management
Prescribed Grazing

## Transition T2.1

### State 2 to 4

As western juniper continues to dominate the site and perennial herbaceous vegetation becomes sparse, soil movement increases. The risk of an irreversible transition over an abiotic threshold to the juniper woodland erosional phase of State 4 increases with increasing slope and increasing bare ground.

## Restoration pathway R3.1

### State 3 to 1

Mechanical removal of western juniper with seeding of grasses and shrubs can return this site to the Reference State. Requires seeding of native grasses and shrubs.

#### Conservation practices

Brush Management
Range Planting

## Transition T3.1

### State 3 to 4

Severe overgrazing in combination with lack of fire creates potential for an irreversible transition to the Juniper Woodland Shallow-rooted grass erosional phase (4.1) within State 4. Abusive grazing and/or severe drought increases bareground facilitating wind and water erosion of soil. The Sandberg bluegrass, cheatgrass, rabbitbrush phase (3.2) will also transition to State 4 with similar disturbances or with frequent fire return intervals.

## Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
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Table 7. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Perennial, deep-rooted</b>			504–841	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	420–588	–
	needlegrass	ACHNA	<i>Achnatherum</i>	84–252	–



2	<b>Perennial, deep-rooted</b>			50–185	
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	34–135	–
	sedge	CAREX	<i>Carex</i>	17–50	–
4	<b>Perennial, shallow-rooted</b>			17–50	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	17–50	–
5	<b>Other Perennial Grasses</b>			34–84	
	mountain brome	BRMA4	<i>Bromus marginatus</i>	0–34	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0–34	–
	blue wildrye	ELGL	<i>Elymus glaucus</i>	0–34	–
<b>Forb</b>					
7	<b>Perennial Forbs, dominant</b>			34–84	
	buckwheat	ERIOG	<i>Eriogonum</i>	34–84	–
8	<b>Perennial Forbs, sub-dominant</b>			34–67	
	common yarrow	ACMI2	<i>Achillea millefolium</i>	17–34	–
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	17–34	–
9	<b>Other Perennial Forbs</b>			17–50	
	onion	ALLIU	<i>Allium</i>	0–17	–
	milkvetch	ASTRA	<i>Astragalus</i>	0–17	–
	brodiaea	BRODI	<i>Brodiaea</i>	0–17	–
	waterleaf	HYDRO4	<i>Hydrophyllum</i>	0–17	–
	western stoneseed	LIRU4	<i>Lithospermum ruderales</i>	0–17	–
	lupine	LUPIN	<i>Lupinus</i>	0–17	–
	beardtongue	PENST	<i>Penstemon</i>	0–17	–
	phacelia	PHACE	<i>Phacelia</i>	0–17	–
	phlox	PHLOX	<i>Phlox</i>	0–17	–
	violet	VIOLA	<i>Viola</i>	0–17	–
	deathcamas	ZIGAD	<i>Zigadenus</i>	0–17	–
<b>Shrub/Vine</b>					
11	<b>Evergreen Shrubs</b>			84–168	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	84–168	–
13	<b>Deciduous Shrubs, Dominant</b>			336–813	
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	168–336	–
	bitter cherry	PREM	<i>Prunus emarginata</i>	84–252	–
	wild crab apple	PERA4	<i>Peraphyllum ramosissimum</i>	84–168	–
14	<b>Deciduous Shrubs, sub-dominant</b>			84–235	
	Saskatoon serviceberry	AMAL2	<i>Amelanchier alnifolia</i>	34–84	–
	chokecherry	PRVI	<i>Prunus virginiana</i>	17–50	–
	wax currant	RICE	<i>Ribes cereum</i>	17–50	–
	common snowberry	SYAL	<i>Symphoricarpos albus</i>	17–50	–
15	<b>Other Shrubs</b>			34–101	
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0–34	–
	slender buckwheat	ERMI4	<i>Eriogonum microthecum</i>	0–34	–
	creeping barberry	MARE11	<i>Mahonia repens</i>	0–34	–

Tree					
16	Evergreen			0–67	
	western juniper	JUOC	<i>Juniperus occidentalis</i>	0–34	–
	ponderosa pine	PIPO	<i>Pinus ponderosa</i>	0–34	–

## Animal community

Livestock Grazing:

This site is suited to use by cattle, sheep, and horses in late spring, summer, and fall under a planned grazing system. Use should be postponed until soils are firm enough to avoid trampling damage and soil compaction.

Native Wildlife Associated with the Potential Climax Community:

Mule deer  
Elk  
Hawks  
Rodents  
Songbirds

This site offers food and cover for mule deer and elk.

## Hydrological functions

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

## Wood products

This site is susceptible to increase in western juniper. Where this has occurred, the site will yield fence posts, firewood and specialty products.

## Other information

The soils in this site have good water holding capacities providing late season water for plant growth and slow water releases to streams. Increase in western juniper and the subsequent competition for moisture will lead to a reduction of available forage. Overgrazing can easily reduce ground cover and accelerate soil loss. Improving infiltration and permeability, and reducing runoff should be the immediate goal of juniper control. When incised channels are present, rehabilitation will markedly improve production, reduce downstream sedimentation, and restore good hydrologic characteristics. On altered sites, the reintroduction of basin wildrye may be needed to fully restore the site potential.

## Contributors

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## 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 in Oregon
Date	08/07/2012
Approved by	Bob Gillaspay
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** None to some, moderate to severe sheet & rill erosion hazard  
\_\_\_\_\_
2. **Presence of water flow patterns:** none to some  
\_\_\_\_\_
3. **Number and height of erosional pedestals or terracettes:** None to very few (some frost heaving)  
\_\_\_\_\_
4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 5-15%  
\_\_\_\_\_
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  
\_\_\_\_\_
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  
\_\_\_\_\_
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**  
Moderately deep to deep well drained loam to gravelly loam (6-20 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:** Significant ground cover (60-70%) and gentle to steep slopes (12-60%) moderately to significantly 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

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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 > shrubs > other grasses > 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
- 

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: 1800, Normal: 1500, 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:** 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
-