Ecological site R010XC034OR
SR Shrubby Mountain Loam
16-20 PZ

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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.

Ecological site concept

In reference condition, this site supports a plant community dominated by mountain big sagebrush (Artemisia tridentata ssp. vaseyana), antelope bitterbrush (Purshia tridentata), and Idaho fescue (Festuca idahoensis). Abiotically, this site is characterized by moderately deep to deep soils, gentle slopes and adjacency to forestland. Compared to other grass-shrub sites within this LRU, this site experiences higher precipitation and therefore has high production. The soil climate is mesic to near frigid and xeric. Historically, plant community dynamics were driven primarily by disturbances such as periodic fire and drought. Presently, reference conditions are less common and current dynamics are influenced by the spread of invasive species, proliferation of western juniper (Juniperus occidentalis), livestock grazing pressures and fire suppression. 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

R010XC049OR	**SR Shrubby Mountain South 16-20 PZ** Adjacent south slopes
R010XC054OR	**SR Mountain Shallow South 12-16 PZ** Adjacent shallow south slopes
R010XC067OR	**SR Shrubby Mountain North 16-20 PZ** Adjacent north slopes

Similar sites

R010XB028OR	**JD Shrubby Mountain 12-16 PZ** Lower precipitation
R010XC067OR	**SR Shrubby Mountain North 16-20 PZ** North slopes within the same precipitation zone

Table 1. Dominant plant species

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

Physiographic features

This site occurs adjacent to forestland on the backslopes of canyons, tablelands, and mountain plateaus. Slopes range from 0 to 12 percent. Elevations range from 3,200 to 4,500 feet (975 to 1,375 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) Mountains > Canyon (2) Foothills > Plateau
Flooding frequency	None
Ponding frequency	None
Elevation	980 – 1,370 m
Slope	0 – 10 %
Aspect	Aspect is not a significant factor

Climatic features

The annual precipitation ranges from 16 to 20 inches (400 to 500 mm), 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 typically mesic to near frigid with a mean annual air temperature of 48° F (9° C). Temperature extremes range from 90 to -30° F (32 to -34° C). The frost-free period ranges from 80 to 150 days. The optimum period for plant growth is from April through mid-July. 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)	80-150 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	410-510 mm
Frost-free period (average)	110 days
Freeze-free period (average)	
Precipitation total (average)	460 mm

- (1) RICHLAND [USC00357160], Richland, 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 to deep and well-drained. Typically the surface layer is a loam or coarse sandy loam from 8 to 20 inches thick. The subsoil is a sandy loam or coarse sandy clay loam from 8 to 22 inches thick. Depth to bedrock or an indurated pan may range from 20 to 60 inches. Permeability is moderate. 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

Parent material	(1) Residuum – igneous rock
Surface texture	(1) Loam (2) Sandy loam
Family particle size	(1) Sandy (2) Coarse-loamy (3) Fine-loamy
Drainage class	Well drained

Permeability class	Moderate
Depth to restrictive layer	50 – 150 cm
Soil depth	50 – 150 cm
Surface fragment cover <=3"	0 – 50 %
Surface fragment cover >3"	0 – 50 %
Available water capacity (0-101.6cm)	15.24 – 20.32 cm
Soil reaction (1:1 water) (0-101.6cm)	5.6 – 7.3
Subsurface fragment volume <=3" (10.2-152.4cm)	10 – 30 %
Subsurface fragment volume >3" (10.2-152.4cm)	0 – 10 %

Ecological dynamics

Range in Characteristics:

Needlegrasses increase on more coarse textured soils and at the lower end of the precipitation range. Shrubs will increase with soil depth and precipitation. Tall shrubs often occur in groups with shorter shrubs forming a shrub and grass mosaic. As a fire-influenced community, the frequency of fire will have a major impact on the composition of the stands. Root sprouting shrubs are favored with a higher fire frequency.

Ecological Dynamics and Disturbance Response:

Ecological dynamics of this site are primarily driven by interactions between climatic patterns and disturbance regimes. Frequent low intensity fires were the historical disturbance that maintained the reference state and drove plant community shifts within the state. Intensity and frequency of these fires is strongly influence by drought cycles and/or insect or disease attacks on the plant community. Introduction of exotic annual grasses compromises the resistance and resiliency of the site, putting it at higher risk of crossing a threshold into another state.

Periodic drought regularly influences sagebrush ecosystems and drought duration and severity has increased throughout the 20th century in much of the Intermountain West. Major shifts away from historical precipitation patterns have the greatest potential to alter ecosystem function and productivity. Species composition and productivity can be altered by the timing of precipitation and water availability with the soil profile (Bates et al. 2006).

The range and density of western juniper has increased since the middle of the nineteenth century (Tausch 1999, Miller and Tausch 2000). Causes for expansion of western juniper into sagebrush ecosystems include wildfire suppression, historic livestock grazing, and climate change (Bunting 1994). Mean fire return intervals prior to European settlement in these ecosystems were 15 to 25 years

(Burkhardt and Tisdale 1976, Young and Evans 1981), frequent enough to inhibit the encroachment of western juniper into these cover types (Miller and Tausch 2000). With the increased suppression of wildfire and livestock grazing, which reduces ground fuels and understory competition, regeneration and establishment of western juniper have expanded into suitable sites previously dominated by shrubs (Burns and Honkala 1990). An increase in crown density causes a decrease in understory perennial vegetation and an increase in bare ground. This allows for the invasion of non-native annual species such as cheatgrass (Bromus tectorum) and medusahead (Taeniatherum caput-medusae). With annual species in the understory wildfire can become more frequent and increase in intensity. With frequent wildfires these plant communities can convert to annual species with a sprouting shrub and juvenile tree overstory.

(Adapted from: Stringham, T.K et al., 2017)

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Perennial, deep-rooted, dominant**			717-1076	
	Idaho fescue	FEID	*Festuca idahoensis*	717-1076	–
2	**Perennial, deep-rooted, sub-dominant**			143-502	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	90-269	–
	needlegrass	ACHNA	*Achnatherum*	36-143	–
	blue wildrye	ELGL	*Elymus glaucus*	18-90	–
5	**Other perennial grasses, all**			18-54	
	California brome	BRCA5	*Bromus carinatus*	0-11	–
	sedge	CAREX	*Carex*	0-11	–
	squirreltail	ELEL5	*Elymus elymoides*	0-11	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0-11	–
	Sandberg bluegrass	POSE	*Poa secunda*	0-11	–
Forb					
7	**Perennial, all, dominant**			54-90	
	buckwheat	ERIOG	*Eriogonum*	54-90	–
8	**Perennial, all, sub-dominant**			18-54	
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	18-54	–
9	**Other perennial forbs, all**			18-72	
	common yarrow	ACMI2	*Achillea millefolium*	0-7	–
	milkvetch	ASTRA	*Astragalus*	0-7	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	0-7	–
	fleabane	ERIGE2	*Erigeron*	0-7	–
	waterleaf	HYDRO4	*Hydrophyllum*	0-7	–
	stoneseed	LITHO3	*Lithospermum*	0-7	–
	desertparsley	LOMAT	*Lomatium*	0-7	–
	lupine	LUPIN	*Lupinus*	0-7	–
	phacelia	PHACE	*Phacelia*	0-7	–
	buttercup	RANUN	*Ranunculus*	0-7	–
Shrub/Vine					
11	**Perennial, evergreen, dominant**			179-538	
	antelope bitterbrush	PUTR2	*Purshia tridentata*	90-359	–
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	90-179	–
14	**Perennial, deciduous, sub-dominant**			126-377	

	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	36-90	–
	chokecherry	PRVI	*Prunus virginiana*	36-90	–
	wax currant	RICE	*Ribes cereum*	18-54	–
	common snowberry	SYAL	*Symphoricarpos albus*	18-54	–
15	**Other perennial shrubs, all**			36-72	
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0-36	–
	creeping barberry	MARE11	*Mahonia repens*	0-36	–
Tree					
16	**Perennial, evergreen, dominant**			36-72	
	western juniper	JUOC	*Juniperus occidentalis*	18-36	–
	ponderosa pine	PIPO	*Pinus ponderosa*	18-36	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 10. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 12. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 13. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 14. Community 4.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 15. Community 5.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 16. Community 5.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

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 the soils are firm enough to withstand trampling damage and soil compaction. Native Wildlife Associated with the Climax Plant 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 B. The soils of this site have moderately low 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

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.

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Approval

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

Indicators

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

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

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

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):** Slight to moderate resistance to erosion: aggregate stability = 1-4

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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 coarse sandy loam (8-20 inches thick): Low to moderate OM (0-3%)

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Moderate to significant ground cover (60-70%) and gentle slopes (0-12%) effectively 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: Idaho fescue > Antelope bitterbrush > Bluebunch wheatgrass > other 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

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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: 2000, normal: 1600, Unfavorable: 1200 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 dep rooted perennial grass functional groups.

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