

# Ecological site R010XC029OR SR Shallow Cool 12-16 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**

The potential native plant community is dominated by Idaho fescue and a complex of mountain, xeric and basin big sagebrush. Bluebunch wheatgrass and Sandberg bluegrass are common along with a variety of forbs. Thurber's needlegrass, wild crab apple, and antelope bitterbrush occur sporadically. Vegetative composition of the community is approximately 70 percent grasses, 10 percent forbs and 20 percent shrubs. Approximate ground cover is 70 to 80 percent (basal and crown).

The soils of this site are shallow over bedrock or duripan. The surface layer is typically very cobbly to stony and the subsoil is very cobbly silty clay loam to stony clay loam over an extremely cobbly clay.

Idaho fescue increases on silt loam surfaces and at higher elevations. Bluebunch wheatgrass increases at lower elevations and on slight south and west exposures. Mountain big sagebrush increases in relationship to xeric and basin big sagebrush with elevation. Wyoming big sagebrush increases at lower elevation and on shallower soils. Thurber's needlegrass increases on coarse surfaces. Antelope bitterbrush and wild crab apple increase over fractured substratums. Production increases with soil depth and precipitation.

#### Associated sites

R010XC04	70R	SR Mountain South 12-16 PZ
		SR Mountain South 12-16 PZ (greater soil depth, south aspect, higher production, different composition –
		higher proportion of PSSPS)

R010XC054OR	<b>SR Mountain Shallow South 12-16 PZ</b> SR Mountain Shallow South 12-16 PZ (south aspect, different composition – higher proportion of PSSPS)
R010XC068OR	SR Cool Mountain North 12-16 PZ SR Cool Mountain North 12-16 PZ (greater soil depth, north aspect, higher production)
R010XC075OR	<b>SR Mountain Shallow North 12-16 PZ</b> SR Mountain Shallow North 12-16 PZ (north aspect, different composition – higher proportion of ARTRV and FEID)
R010XC033OR	SR Cool 12-16 PZ SR Cool 12-16 PZ (greater soil depth, higher production)
R010XC039OR	<b>SR Very Shallow 12-16 PZ</b> SR Very Shallow 12-16 PZ (very shallow soil depth, lower production, different composition – ARRI2/POSE association)
R010XC041OR	<b>SR Very Shallow Rockland 12-16 PZ</b> SR Very Shallow Rockland 12-16 PZ (very shallow soil depth with areas of exposed bedrock, lower production, different composition – ACTH7-POSE/ERIOG association)
R010XC042OR	<b>SR Juniper Tableland 12-16 PZ</b> SR Juniper Tableland 12-16 PZ (very shallow soil depth, lower production, fractured substratum, different composition – JUOC/ARRI2/POSE association)

# Similar sites

R010XC033OR	SR Cool 12-16 PZ SR Cool 12-16 PZ (greater soil depth, higher production)
R010XC075OR	<b>SR Mountain Shallow North 12-16 PZ</b> SR Mountain Shallow North 12-16 PZ (north aspect, different composition – higher proportion of ARTRV and FEID)
R010XC032OR	<b>SR Mountain 12-16 PZ</b> SR Mountain 12-16 PZ (higher elevation, greater soil depth, higher production, different composition – ARTRV and FEID strongly dominant)
R010XC037OR	<b>SR Mountain Shallow 12-16 PZ</b> SR Mountain Shallow 12-16 PZ (higher elevation, different composition – ARTRV and FEID strongly dominant)

#### Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) Artemisia tridentata ssp. vaseyana (2) Artemisia tridentata ssp. xericensis
Herbaceous	<ul><li>(1) Festuca idahoensis</li><li>(2) Pseudoroegneria spicata ssp. spicata</li></ul>

# **Physiographic features**

This site occurs on terraces, tablelands and rolling uplands. Slopes typically range from 2 to 12 percent. Elevations typically range from 4,000 to 5,000 feet.

#### Table 2. Representative physiographic features

Landforms	<ul><li>(1) Terrace</li><li>(2) Plateau</li><li>(3) Hill</li></ul>
Flooding frequency	None
Ponding frequency	None
Elevation	4,000–5,000 ft

Slope	2–12%
Aspect	Aspect is not a significant factor

# **Climatic features**

The annual precipitation ranges from 12 to 16 inches, most of which occurs in the form of snow during the months of December through March. Localized convection storms occasionally occur during the summer. The soil temperature regime is mesic near frigid to frigid with a mean air temperature of 45 degrees F. Temperature extremes range from 90 to -20 degrees F. The frost free period ranges from less than 50 to 90 days. The optimum growth period for plant growth is late April through June.

#### Table 3. Representative climatic features

Frost-free period (characteristic range)	50-90 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	12-16 in
Frost-free period (average)	90 days
Freeze-free period (average)	
Precipitation total (average)	16 in



Figure 1. Monthly precipitation range



Figure 2. Monthly average minimum and maximum temperature

# Influencing water features

Not associated with water features.

# Wetland description

Not applicable

# Soil features

The soils of this site are shallow over bedrock or duripan and well drained. The surface layer is typically a very cobbly silt loam to stony loam about 4 inches thick. The subsoil is a very cobbly silty clay loam to stony clay loam over an extremely cobbly clay. Depth to bedrock or an indurated pan ranges from 10 to 20 inches. Permeability is moderately slow to slow. The available water holding capacity (AWC) is about 2 to 4 inches for the profile. The erosion potential is moderate.

Parent material	<ul><li>(1) Eolian deposits–rhyolite</li><li>(2) Volcanic ash–basalt</li></ul>
Surface texture	(1) Very cobbly silt loam (2) Stony loam
Family particle size	(1) Clayey
Drainage class	Well drained to moderately well drained
Permeability class	Moderately slow to slow
Depth to restrictive layer	10–20 in
Soil depth	10–20 in
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–20%
Available water capacity (0-40in)	2–4 in

#### Table 4. Representative soil features

# **Ecological dynamics**

The potential native plant community is dominated by Idaho fescue and a complex of mountain, xeric, and basin big sagebrush. Bluebunch wheatgrass and Sandberg bluegrass are common along with a variety of forbs. Thurber's needlegrass, wild crab apple, and antelope bitterbrush occur sporadically. Vegetative composition of the community is approximately 70 percent grasses, 10 percent forbs, and 20 percent shrubs. Approximate ground cover is 70 to 80 percent (basal and crown).

#### Range in Characteristics:

Idaho fescue increases on silt loam surfaces and at higher elevations. Bluebunch wheatgrass increases at lower elevations and on slight south and west exposures. Mountain big sagebrush increases in relationship to xeric and basin big sagebrush with elevation. Wyoming big sagebrush increases at lower elevation and on shallower soils. Thurber's needlegrass increases on coarse surfaces. Antelope bitterbrush and wild crab apple increase over fractured substratums. Production increases with soil depth and precipitation.

#### Response to Disturbance - States:

If the condition of the site deteriorates as a result of overgrazing, Idaho fescue and Thurber's needlegrass decrease. Bluebunch wheatgrass initially increases then decreases. Sandberg bluegrass and big sagebrush (mountain, basin, and xeric) increase. Western juniper invades from isolated rocky areas. With continued overgrazing and lack of fire juniper, sagebrush and Sandberg bluegrass dominate the site. Stiff sagebrush often invades from very shallow areas. In the continued absence of fire junipers increase in statue outcompeting shrubs and bare ground increases. Annual invasion is limited unless ground disturbance occurs. With fire and heavy use or ground disturbance, annuals and Sandberg or bulbous bluegrass dominate the site. Excess erosion in the bare soil interspaces markedly reduces the site productivity and contributes to downstream sedimentation.

States: ARTRV-X-T(W)/POSE-Bare Ground; JUOC/ARTRV-X-T(W)/POSE-Bare Ground; POSE-POBU - Annuals-Bare Ground

#### Juniper Response:

Fine fuel reduction from improper grazing and fire suppression has led to an increase in the historical fire return interval on many western rangelands. A reduction in fire frequency on these sites leads to an increase in juniper

cover, a decrease in sagebrush cover followed by a decrease in herbaceous cover and understory diversity. As juniper encroaches sagebrush declines with a subsequent decrease in forbs, bluebunch wheatgrass and needlegrass. Idaho fescue becomes the primary herbaceous species occurring under the canopy of the juniper trees. Sandberg's bluegrass increases in the plant community on lower elevation north slopes and warmer non-aspect sites while bare ground increases in the interspaces between trees. Bitterbrush is more resistant to juniper encroachment than sagebrush and maintains its presence in the community; however vigor and fitness (seed production) may be reduced. The potential for soil erosion increases as the juniper woodland matures and the understory plant community cover declines. The combined effect of overgrazing and juniper invasion increases the rate of decline in ecological function and the probability of crossing a threshold is high.

#### Treatment Response:

This site responds positively to juniper removal if soil erosion is not significant. Seeding may be necessary if there are less than one to two bunchgrass plants per meter square in the understory. Forbs may also need to be seeded if adult plants are no longer present in the understory.

### State and transition model





# **Community 1.1**

**Reference Plant Community - Perennial Forb and Grass Phase** 



The reference native plant community is dominated by Idaho fescue and a complex of mountain, xeric, and basin big sagebrush. Bluebunch wheatgrass and Sandberg bluegrass are common along with a variety of forbs. Thurber's needlegrass, wild crab apple, and antelope bitterbrush occur sporadically. Vegetative composition of the community is approximately 70 percent grasses, 10 percent forbs, and 20 percent shrubs. Approximate ground cover is 70 to 80 percent (basal and crown).

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	560	700	910
Shrub/Vine	160	200	260
Forb	80	100	130
Total	800	1000	1300

#### Table 5. Annual production by plant type



Figure 4. Plant community growth curve (percent production by month). OR4521, B10 SR Mtn Souths & Shallows 12-16. SR Mtn Souths & Shallows 12-16 RPC Growth Curves.

# Community 1.2 Sagebrush Steppe Phase

# Community 1.3 Juniper Sagebrush Steppe - Fire Prone Phase

# Pathway 1.1A Community 1.1 to 1.2

Reduced fire and increased grazing

# Pathway 1.2A

Community 1.2 to 1.1

Fire

Pathway 1.2B Community 1.2 to 1.3

Reduced fire and increased grazing

Pathway 1.3A Community 1.3 to 1.1

Fire

Pathway 1.3B Community 1.3 to 1.2

Fire

State 2 Juniper-dominated State

Community 2.1 Juniper Sagebrush Steppe - Fire Protected Phase

Community 2.2 Juniper Woodland Phase

Pathway 2.1A Community 2.1 to 2.2

No Fire

State 3 Eroded State

Community 3.1 Juniper Woodland Erosional Phase

Transition T1A State 1 to 2

Continued Fire Suppression

Restoration pathway R2A State 2 to 1

Mechanical Juniper Removal

Transition T2A State 2 to 3

Soil Erosion

Additional community tables

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass	/Grasslike	<u> </u>			
1	Dominanat, moderate	rooted bur	400–600		
	Idaho fescue	FEID	Festuca idahoensis	400–600	_
2	Sub-dominant, modera	ate rooted	bunchgrass	100–300	
	bluebunch wheatgrass	PSSPS	Pseudoroegneria spicata ssp. spicata	100–300	_
4	Common, perennial, s	hallow roo	ted grass	20–50	
	Sandberg bluegrass	POSE	Poa secunda	20–50	_
5	Other perennial grasse	es		10–50	
	Thurber's needlegrass	ACTH7	Achnatherum thurberianum	0–50	-
	prairie Junegrass	KOMA	Koeleria macrantha	5–15	_
	threadleaf sedge	CAFI	Carex filifolia	0–10	_
	squirreltail	ELEL5	Elymus elymoides	5–10	-
Forb					
7	Dominant, perennial fo	orbs		60–100	
	buckwheat	ERIOG	Eriogonum	20–30	
	desertparsley	LOMAT	Lomatium	10–20	_
	lupine	LUPIN	Lupinus	10–20	_
	milkvetch	ASTRA	Astragalus	10–20	_
	arrowleaf balsamroot	BASA3	Balsamorhiza sagittata	10–20	_
9	Other forbs			20–80	
	stoneseed	LITHO3	Lithospermum	2–6	
	ragwort	SENEC	Senecio	0–6	_
	phlox	PHLOX	Phlox	2–5	
	sagebrush buttercup	RAGL	Ranunculus glaberrimus	2–5	
	hawksbeard	CREPI	Crepis	2–5	
	fleabane	ERIGE2	Erigeron	2–5	
	common yarrow	ACMI2	Achillea millefolium	2–5	
	Scouler's woollyweed	HISC2	Hieracium scouleri	0–4	
	bastard toadflax	COMAN	Comandra	0–4	_
	bitter root	LERE7	Lewisia rediviva	0–3	
	woodland-star	LITHO2	Lithophragma	1–3	
	agoseris	AGOSE	Agoseris	1–3	
	onion	ALLIU	Allium	1–3	
	pussytoes	ANTEN	Antennaria	1–3	
	stonecrop	SEDUM	Sedum	0–3	
	deathcamas	ZIGAD	Zigadenus	0–3	
	owl's-clover	ORTHO	Orthocarpus	0–2	_
	brodiaea	BRODI	Brodiaea	1–2	
	mariposa lily	CALOC	Calochortus	0–2	
	Indian paintbrush	CASTI2	Castilleja	0–2	_
	bushy bird's beak	CORA5	Cordylanthus ramosus	0–2	_

Shrub	/Vine				
10	Dominant, evergreen, non-sprouting shrub			30–80	
	mountain big sagebrush	ARTRV	Artemisia tridentata ssp. vaseyana	30–80	_
11	Other evergreen shru	bs		40–80	
	big sagebrush	ARTRX	Artemisia tridentata ssp. xericensis	20–50	_
	basin big sagebrush	ARTRT	Artemisia tridentata ssp. tridentata	20–50	_
	threetip sagebrush	ARTR4	Artemisia tripartita	0–30	_
	Wyoming big sagebrush	ARTRW8	Artemisia tridentata ssp. wyomingensis	0–20	_
14	Other shrubs			30–120	
	wild crab apple	PERA4	Peraphyllum ramosissimum	0–30	_
	antelope bitterbrush	PUTR2	Purshia tridentata	0–30	_
	wax currant	RICE	Ribes cereum	5–20	_
	littleleaf horsebrush	TEGL	Tetradymia glabrata	0–15	-
	Saskatoon serviceberry	AMAL2	Amelanchier alnifolia	5–15	_
	yellow rabbitbrush	CHVI8	Chrysothamnus viscidiflorus	5–15	_
	common snowberry	SYAL	Symphoricarpos albus	0–5	_
	mountain snowberry	SYOR2	Symphoricarpos oreophilus	0–5	_
Tree	-		-		
15	Evergreen trees			0–20	
	ponderosa pine	PIPO	Pinus ponderosa	0–20	_
	Douglas-fir	PSME	Pseudotsuga menziesii	0–20	_
	yellow rabbitbrush	CHVI8	Chrysothamnus viscidiflorus	0–10	_
	rubber rabbitbrush	ERNA10	Ericameria nauseosa	0–10	_
	currant	RIBES	Ribes	0–10	-
	horsebrush	TETRA3	Tetradymia	0–10	_

# **Animal community**

#### Livestock grazing:

This site is suitable for livestock grazing use in the late spring, summer, and fall under a planned grazing system. Use should be postponed until the soils are firm enough to prevent trampling damage and soil compaction. Grazing management should be keyed to Idaho fescue. Deferred grazing or rest is recommended at least once every three years.

Native Wildlife Associated with the Potential Climax Community:

This site is commonly used by mule deer, elk, antelope, rabbits, rodents, upland birds and various predators. It is a preferred upland bird nesting and rearing site. Mule deer and elk make excellent use of the site for spring and late fall forage.

# Hydrological functions

The soils of this site are typically in an upland topographic position. They have moderate high runoff potential and medium infiltration rates when the hydrologic cover is good. Under frozen ground conditions runoff potential is significantly increased. This occurs for extended periods when deep rooted perennial bunchgrass cover is negligible. Hydrologic cover is good when the Idaho fescue moderate rooted bunchgrass component is greater than 70 percent of potential.

# Other information

Juniper invasion is a major risk on this site. Increases 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. Juniper control measures include prescribed burning and/or cutting followed by rest to improve vigor, density and seed production of existing deep rooted perennials. Consider seeding following control measures if an inadequate stand of bunchgrass is present.

When incised channels are present, rehabilitation will markedly improve production, reduce downstream sedimentation, and restore good hydrologic characteristics. On altered sites, the reintroduction of Idaho fescue and basin wildrye may be needed to fully restore the site potential.

This site is generally not suited to mechanical seeding because of its shallow depth and stony surface.

### References

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

### Other references

Gucker, Corey L. 2006. Cercocarpus ledifolius. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: https://www.fs.fed.us/database/feis/plants/tree/cerled/all.html [2020, September 30].

Stringham, Tamzen, 2007. Final Report for USDA Ecological Site Description. Oregon State University, Corvallis, Oregon. Agreement No. 68-0436-4090.

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

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# 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)	Jeff Repp and Bruce Franssen
Contact for lead author	Oregon NRCS State Rangeland Management Specialist
Date	04/26/2003
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

### Indicators

- 1. Number and extent of rills: None
- 2. Presence of water flow patterns: None
- 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): 5-20%
- 5. Number of gullies and erosion associated with gullies: None
- 6. Extent of wind scoured, blowouts and/or depositional areas: None
- 7. Amount of litter movement (describe size and distance expected to travel): Fine limited movement
- Soil surface (top few mm) resistance to erosion (stability values are averages most sites will show a range of values): Moderate resistant to erosion: aggregate stability = 3-5
- Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Moderate fine granular to weak medium platy to moderate fine subangular blocky structure, dry color value 4-5, 2-6" thick; low OM (1-4%).
- Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: Moderate to significant ground cover (50-70%) and gentle to moderate slopes (0-30%) moderately 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):

Sub-dominant: Evergreen shrubs

Other: Forbs > perennial, shallow-rooted bunchgrasses

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 annualproduction): Favorable: 1300, Normal: 1000, Unfavorable: 800 lbs/acre/year at high RSI
- 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
- 17. Perennial plant reproductive capability: All species should be capable of reproducing annually