

Ecological site R010XC047OR

SR Mountain South

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.

Associated sites

R010XC039OR	SR Very Shallow 12-16 PZ SR Very Shallow 12-16" PZ (non-aspect site, very shallow soil, Sandberg bluegrass dominant with stiff sagebrush, lower production)
R010XC032OR	SR Mountain 12-16 PZ SR Mountain 12-16" PZ (non-aspect site, higher elevation, Idaho fescue dominant, mountain big sagebrush strongly dominant sagebrush)
R010XC033OR	SR Cool 12-16 PZ SR Cool 12-16" PZ (non-aspect site, Idaho fescue dominant)
R010XC037OR	SR Mountain Shallow 12-16 PZ SR Mountain Shallow 12-16" PZ (non-aspect site, shallower soil, Idaho fescue dominant, lower production)
R010XC054OR	SR Mountain Shallow South 12-16 PZ SR Mountain Shallow South 12-16 PZ (shallower soil, lower production)
R010XC059OR	SR Mahogany Rockland 12+ PZ SR Mahogany Rockland 12+ PZ (fractured bedrock, mountain mahogany dominant)
R010XC066OR	SR Mountain North 12-16 PZ SR Mountain North 12-16" PZ (north aspect, colder temperature, Idaho fescue dominant, mountain big sagebrush strongly dominant big sagebrush)
R010XC068OR	SR Cool Mountain North 12-16 PZ SR Cool Mountain North 12-16 PZ (north aspect, Idaho fescue dominant)

Similar sites

R010XC054OR	SR Mountain Shallow South 12-16 PZ SR Mountain Shallow South 12-16 PZ (shallower soil, lower production)
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Table 1. Dominant plant species

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

Physiographic features

This site occurs on south aspects of terraces, tablelands and mountain plateaus. Slopes typically range from 12 to 60%. Elevations typically range from 3,500 to 6,000 feet.

Table 2. Representative physiographic features

Landforms	(1) Terrace (2) Plateau (3) Mountain slope
Elevation	1,070 – 1,830 m
Slope	10 – 60 %
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 convection storms occasionally occur during the summer. The soil temperature regime is mesic to frigid near mesic with a mean air temperature of 47 degrees F. Temperature extremes range from 100 to -30 degrees F. The frost free period ranges from 50 to 90 days. The optimum growth period for plant growth is May through June.

Table 3 Representative climatic features

Frost-free period (average)	90 days
Freeze-free period (average)	
Precipitation total (average)	410 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 gravelly clay loam about 5 to 12 inches thick. The subsoil is a stony clay loam to clay 10 to 20 inches thick. Depth to bedrock, an indurated pan or consolidated sediments ranges from 20 to 60 inches. Occasionally the soil is a fine gravelly coarse sandy loam over a granitic-like substratum. Permeability is moderate to moderately slow. The available water holding capacity (AWC) is about 6 to 8 inches for the profile. The erosion potential is moderate to severe.

Table 4. Representative soil features

Parent material	(1) Eolian deposits – rhyolite
Surface texture	(1) Gravelly loam (2) Silty clay loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Moderate to slow
Soil depth	50 – 150 cm
Available water capacity (0-101.6cm)	15.24 – 20.32 cm

Ecological dynamics

The reference native plant community is dominated by bluebunch wheatgrass and a big sagebrush complex of mountain, xeric, basin and Wyoming big sagebrush. Wild crab apple and antelope bitterbrush occur sporadically. Idaho fescue, Thurber's needlegrass, Sandberg bluegrass and a variety of forbs are present. Vegetative composition of the community is approximately 75 percent grasses, 10 percent forbs and 15 percent shrubs. Approximate ground cover is 60 to 70 percent (basal and crown).

Range in Characteristics:

Bluebunch wheatgrass is strongly dominant on south facing aspects. Idaho fescue increases with elevation and as the aspect changes to the southeast. Thurber needlegrass increases on a gravelly surface. Mountain big sagebrush increases in relationship to basin and xeric big sagebrush with elevation. Deciduous shrubs increase at the upper end of the precipitation zone and over gravelly and fractured substratums. Production increases with soil depth and precipitation.

Response to Disturbance:

If the condition of the site deteriorates as a result of overgrazing, bluebunch wheatgrass and Idaho fescue decrease. Big sagebrush (mountain, basin & xeric) rapidly increases and juniper invades from rock outcrops. With continued overgrazing big sagebrush and juniper dominate the overstory Cheatgrass and other annuals invade. With further deterioration and lack of fire juniper invasion continues. Sagebrush and other shrubs decrease from juniper competition and bare ground increases. With fire and overgrazing juniper and big sage are severely impacted. Rabbitbrush increases and annuals and biennial forbs invade. Bare ground increases and excessive erosion contributes to downstream sedimentation.

States: JUOC/ARTRV-X-T/Annuals-Bare Ground; CHVI8/Annuals-Bare Ground (with fire)

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 on north facing aspects 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 thwarted. 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:

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 1. SR Mountain South 12-16 PZ State and Transition Mo

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Dominant, perennial, deep-rooted bunchgrass			448-673	
	bluebunch wheatgrass	PSSPS	<i>Pseudoroegneria spicata ssp. spicata</i>	448-673	–
2	Sub-dominant, perennial, deep-rooted bunchgrass			135-392	
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	112-336	–
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	22-56	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	11-22	–
4	Sub-dominant, perennial, shallow-rooted grass			11-34	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	11-34	–
5	Other perennial grasses			0-56	
	needlegrass	ACHNA	<i>Achnatherum</i>	0-22	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0-22	–
	mountain brome	BRMA4	<i>Bromus marginatus</i>	0-22	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0-22	–
Forb					
7	Dominant, perennial forb			22-56	
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	22-56	–
8	Sub-dominant, perennial forbs			45-90	
	milkvetch	ASTRA	<i>Astragalus</i>	11-22	–
	desertparsley	LOMAT	<i>Lomatium</i>	11-22	–
	lupine	LUPIN	<i>Lupinus</i>	11-22	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	11-22	–
9	Other perennial forbs			0-90	
	buckwheat	ERIOG	<i>Eriogonum</i>	0-11	–
	fleabane	ERIGE2	<i>Erigeron</i>	0-11	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	0-11	–
	phlox	PHLOX	<i>Phlox</i>	0-11	–
	stoneseed	LITHO3	<i>Lithospermum</i>	0-11	–
	beardtongue	PENST	<i>Penstemon</i>	0-11	–

	phacelia	PHACE	<i>Phacelia</i>	0-11	–
	sagebrush buttercup	RAGL	<i>Ranunculus glaberrimus</i>	0-11	–
	ragwort	SENEC	<i>Senecio</i>	0-11	–
	deathcamas	ZIGAD	<i>Zigadenus</i>	0-11	–
	larkspur	DELPH	<i>Delphinium</i>	0-11	–
	waterleaf	HYDRO4	<i>Hydrophyllum</i>	0-11	–
	woodland-star	LITHO2	<i>Lithophragma</i>	0-11	–
	brodiaea	BRODI	<i>Brodiaea</i>	0-11	–
	mariposa lily	CALOC	<i>Calochortus</i>	0-11	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0-11	–
	bastard toadflax	COMAN	<i>Comandra</i>	0-11	–
	agoseris	AGOSE	<i>Agoseris</i>	0-11	–
	onion	ALLIU	<i>Allium</i>	0-11	–
	pussytoes	ANTEN	<i>Antennaria</i>	0-11	–
Shrub/Vine					
11	Dominant perennial shrubs			56-168	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	34-78	–
	wild crab apple	PERA4	<i>Peraphyllum ramosissimum</i>	0-34	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	0-34	–
	basin big sagebrush	ARTRT	<i>Artemisia tridentata ssp. tridentata</i>	11-22	–
15	Other perennial shrubs			0-45	
	common snowberry	SYAL	<i>Symphoricarpos albus</i>	0-22	–
	horsebrush	TETRA3	<i>Tetradymia</i>	0-22	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0-22	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	0-22	–
	slender buckwheat	ERMI4	<i>Eriogonum microthecum</i>	0-22	–
Tree					
16	Evergreen Tree			0-22	
	western juniper	JUOC	<i>Juniperus occidentalis</i>	0-22	–
	ponderosa pine	PIPO	<i>Pinus ponderosa</i>	0-22	–

Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 13. Community 4.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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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 for Idaho fescue and bluebunch wheatgrass. Deferred grazing or rest is recommended at least once every three years. **Wildlife Associated with the Site:** This site is commonly used by mule deer, elk, antelope, rabbits, rodents, upland birds and various predators. It is a preferred site for upland bird nesting and rearing areas. Mule deer and elk make excellent use of the site for late spring and 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 bluebunch wheatgrass deep rooted bunchgrass component is >70 percent of potential. The soils are in hydrologic groups C and D.

Wood products

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

Other information

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

Contributors

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Approval

Kirt Walstad, 3/11/2025

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.

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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 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 to significantly resistant to erosion: aggregate stability = 3-6

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Moderately deep to deep well drained loam or silty clay (5-12 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: Moderate ground cover (50-70%) and gentle to steep slopes (12-60%) 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):

Dominant: Bluebunch wheatgrass > Idaho fescue > shrubs > forbs

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: 1400, Normal: 1000, Unfavorable: 700 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: 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
