USDA Natural Resources
Conservation Service

Ecological site R010XC051OR
SR High Mountain South 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.

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

R010XC053OR	**SR High Mountain Loam 18+ PZ** Woodland sites High Mountain Loam 18"+ PZ

Similar sites

R010XC049OR	**SR Shrubby Mountain South 16-20 PZ** Shrubby Mountain South 16-20" PZ (higher production, tall shrubs present)

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. vaseyana*
Herbaceous	(1) *Eriogonum* (2) *Pseudoroegneria spicata ssp. spicata*

Physiographic features

This site occurs near forestland on south exposures of canyon walls and on backslopes of tablelands and mountain plateaus. Slopes range from 12 to 70 percent. Elevations range from 4500 to 6200 feet.

Table 2. Representative physiographic features

Landforms	(1) Canyon (2) Plateau
Elevation	1,372–1,890 m
Slope	12–70%
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 April. Localized, occasionally severe, convection storms occur during the summer. The soil temperature regime is frigid with a mean annual air temperature of 43 degrees F. Temperature extremes range from 90 to -30 degrees F. The frost-free period ranges from 30 to 60 days. The optimum period for plant growth is from May through mid-July.

Table 3. Representative climatic features

Frost-free period (average)	60 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 very gravelly loam from 6 to 20 inches thick. The subsoil is a very gravelly loam about 10 to 33 inches thick. Depth to granite or rhyolitic bedrock ranges from 20 to over 60 inches. Permeability is moderate to moderately rapid. The available water holding capacity is about 4 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) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid
Soil depth	51–152 cm
Available water capacity (0-101.6cm)	10.16–20.32 cm

Ecological dynamics

Range in Characteristics:

Production and composition is dependent on soil texture and depth. Needlegrasses, blue wildrye, and buckwheat increase on more coarse textured soils. Production increases with soil depth.

Response to Disturbance:

If the condition of the site deteriorates as a result of overgrazing, bluebunch wheatgrass decreases while mountain big sagebrush, needlegrasses and Sandberg bluegrass increase. With further deterioration, needlegrasses

decrease and shrubs including buckwheat continue to increase. Canada bluegrass and annual bromes invade. Under deteriorated conditions Sandberg bluegrass, low mountain brome, shrubs and annuals dominate the site. Bare ground markedly increases and excessive erosion 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. 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

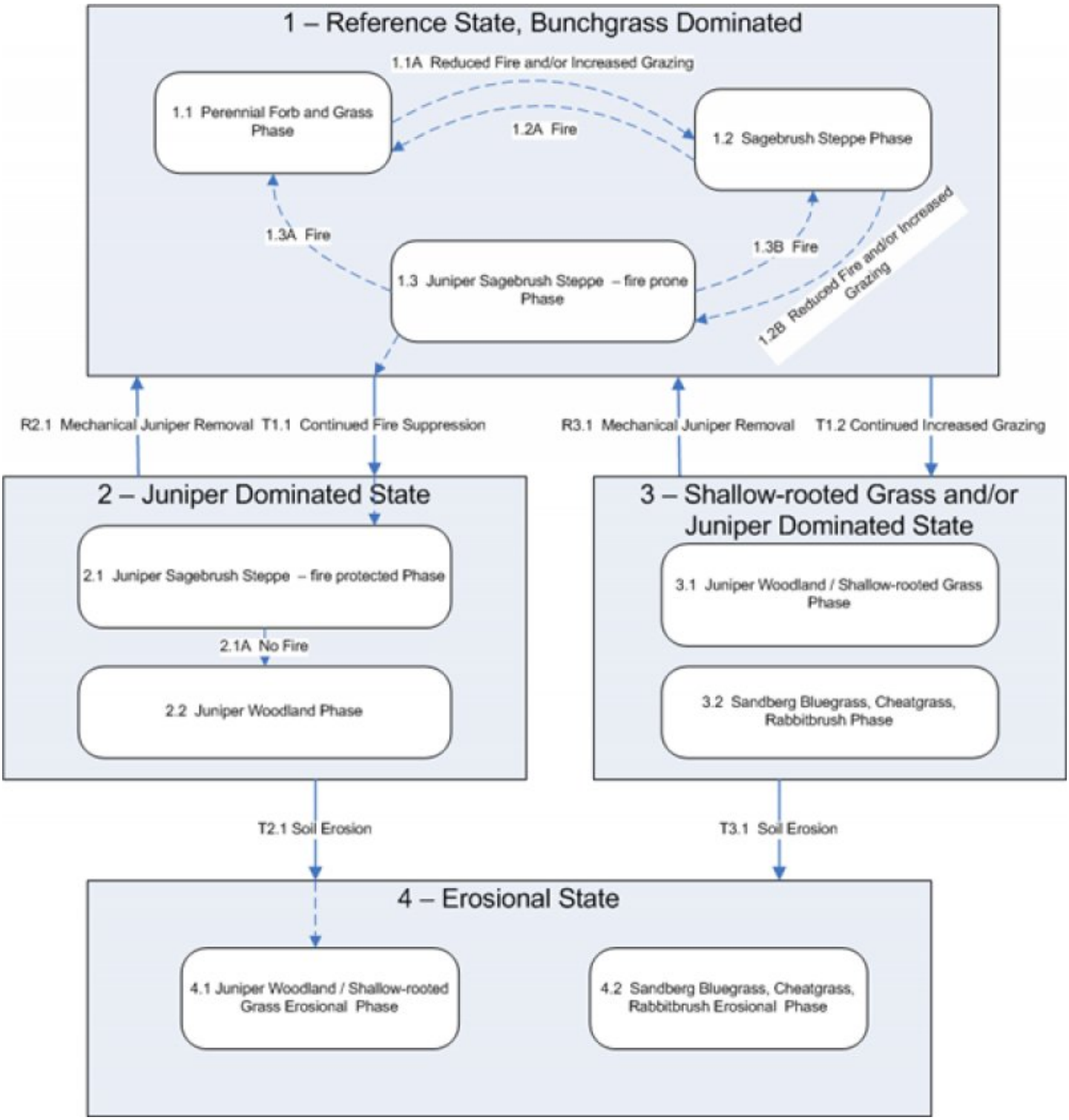

Figure 3. Group 3, STM

State 1
Reference State

Community 1.1
Sagebrush Steppe Plant Community

The potential native plant community is dominated by mountain big sagebrush, bluebunch wheatgrass, shrubby buckwheat and needlegrasses. Idaho fescue, blue wildrye, threadleaf sedge, and a variety of shrubs are common in the stand. Vegetative composition of the community is approximately 75 percent grasses, 10 percent forbs, and 15 percent shrubs. Approximate ground cover is 50 to 60 percent (basal and crown).

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	869	1009	1345
Shrub/Vine	140	188	252
Forb	101	135	179
Tree	11	13	17
Total	**1121**	**1345**	**1793**

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, dominant**			538–807	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	538–807	–
2	**Perennial, deep-rooted, sub-dominant**			161–592	
	needlegrass	ACHNA	*Achnatherum*	40–135	–
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	40–135	–
	threadleaf sedge	CAFI	*Carex filifolia*	27–108	–
	blue wildrye	ELGL	*Elymus glaucus*	27–108	–
	Idaho fescue	FEID	*Festuca idahoensis*	27–108	–
4	**Perennial, shallow-rooted, sub-dominant**			27–40	
	Sandberg bluegrass	POSE	*Poa secunda*	27–40	–
5	**Other perennial grassses, all**			27–67	
	mountain brome	BRMA4	*Bromus marginatus*	0–27	–
	squirreltail	ELEL5	*Elymus elymoides*	0–27	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–27	–
	basin wildrye	LECI4	*Leymus cinereus*	0–27	–
Forb					
7	**Perennial, all, dominant**			67–202	
	buckwheat	ERIOG	*Eriogonum*	67–202	–
8	**Perennial, all, sub-dominant**			40–81	
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	13–27	–
	phlox	PHLOX	*Phlox*	13–27	–
	ragwort	SENEC	*Senecio*	13–27	–
9	**Other perennial forbs, all**			13–67	
	common yarrow	ACMI2	*Achillea millefolium*	0–13	–
	brodiaea	BRODI	*Brodiaea*	0–13	–
	avens	GEUM	*Geum*	0–13	–
	Scouler's woollyweed	HISC2	*Hieracium scouleri*	0–13	–
	waterleaf	HYDRO4	*Hydrophyllum*	0–13	–
	western stoneseed	LIRU4	*Lithospermum ruderale*	0–13	–
	bluebells	MERTE	*Mertensia*	0–13	–
	phacelia	PHACE	*Phacelia*	0–13	–

	buttercup	RANUN	*Ranunculus*	0–13	–
	stonecrop	SEDUM	*Sedum*	0–13	–
	deathcamas	ZIGAD	*Zigadenus*	0–13	–
Shrub/Vine					
11	**Perennial, evergreen, dominant**			67–202	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	67–202	–
12	**Perennial, evergreen, sub-dominant**			13–40	
	rabbitbrush	CHRYS9	*Chrysothamnus*	13–40	–
14	**Perennial, deciduous, sub-dominant**			13–40	
	wax currant	RICE	*Ribes cereum*	13–40	–
15	**Other perennial shrubs, all**			27–135	
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	0–27	–
	creeping barberry	MARE11	*Mahonia repens*	0–27	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	0–27	–
	rose	ROSA5	*Rosa*	0–27	–
	common snowberry	SYAL	*Symphoricarpos albus*	0–27	–
Tree					
16	**Perennial, evergreen, dominant**			0–27	
	western juniper	JUOC	*Juniperus occidentalis*	0–13	–
	ponderosa pine	PIPO	*Pinus ponderosa*	0–13	–

Animal community

Livstock Grazing:

This site is suited to use by cattle, sheep, and horses during the 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 occured, 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.

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 Gillaspy
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, moderate to severe sheet & rill erosion hazard

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):** 10-20%

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

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):** Moderately deep to deep well drained loam to very gravelly oam (6-20 inches 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 (50-60%) and gentle to steep slopes (12-70%) moderately to slightly 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 > Buckwheat = Mountain big sagebrush > Needlegrass > 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: 1600, Normal: 1200, Unfavorable: 900 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