

Ecological site R010XC080OR SR Mahogany Mountain Loam 14-18 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 curleaf mountain mahogany (*Cercocarpus ledifolius*), antelope bitterbrush (*Purshia tridentata*) and Idaho fescue (*Festuca idahoensis*). Ponderosa pine (*Pinus ponderosa*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), wax currant (*Ribes cereum*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) are also prominent. Cover of ponderosa pine is less than 10 percent. This site is typified abiotically by moderately deep to deep, skeletal soils and areas of rock outcrop. The soil climate of this site is frigid and xeric. Historically, the ecological dynamics of this site were driven by infrequent fire and cycles of drought. Presently, reference conditions are less common and current dynamics are also influenced by the spread of invasive species, the expansion 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

R010XC032OR	SR Mountain 12-16 PZ SR Mountain 12-16 PZ
R010XC033OR	SR Cool 12-16 PZ SR Cool 12-16 PZ

R010XC059OR	SR Mahogany Rockland 12+ PZ Mahogany Rockland 12
R010XC066OR	SR Mountain North 12-16 PZ SR Mountain North 12-16 PZ
R010XC082OR	SR Dry Pine 14-16 PZ Dry Pine 14-16
R010XC037OR	SR Mountain Shallow 12-16 PZ SR Mountain Shallow 12-16 PZ
R010XC039OR	SR Very Shallow 12-16 PZ SR Very Shallow 12-16 PZ
R010XC047OR	SR Mountain South 12-16 PZ SR South 12-16 PZ

Similar sites

R010XC059OR	SR Mahogany Rockland 12+ PZ Very shallow soils
R010XC082OR	SR Dry Pine 14-16 PZ Mountain mahogany and areas of rock outcrop less common

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Cercocarpus ledifolius</i> (2) <i>Purshia tridentata</i>
Herbaceous	(1) <i>Festuca idahoensis</i>

Physiographic features

This site occurs adjacent to woodlands on tablelands and mountain plateaus. Slopes typically range from 2 to 20 percent. This site occurs on all aspects. Elevations typically range from 4,000 to 5,700 feet (1,200 to 1,750 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) Upland > Plateau (2) Upland > Mountain slope
Flooding frequency	None
Ponding frequency	None
Elevation	4,000–5,700 ft
Slope	2–20%
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

The annual precipitation ranges from 14 to 18 inches (350 to 450 mm), 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 frigid with a mean air temperature of 43° F (6° C). Temperature extremes range from 90 to -30° F (32 to -34° C). The frost free period ranges from less than 30 to 60 days. The optimum growth period for plant growth is May through June. 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)	30-60 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	14-18 in
Frost-free period (average)	40 days
Freeze-free period (average)	
Precipitation total (average)	16 in

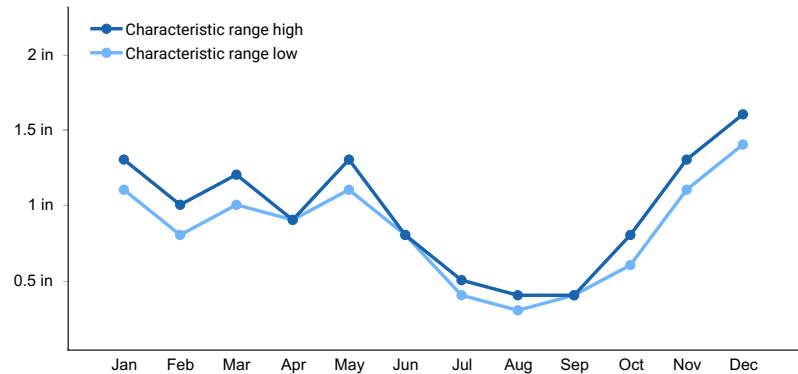


Figure 1. Monthly precipitation range

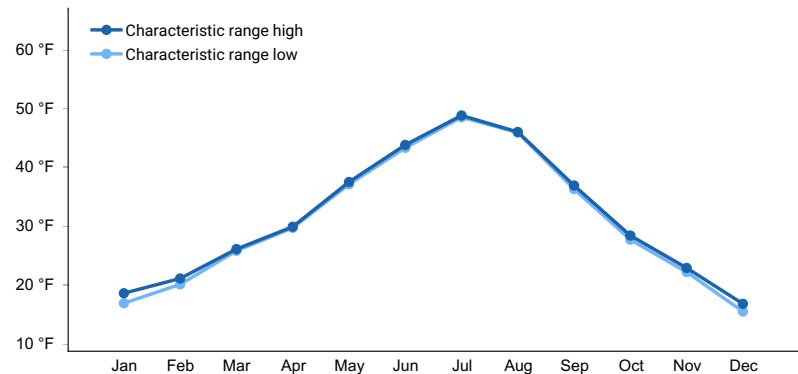


Figure 2. Monthly minimum temperature range

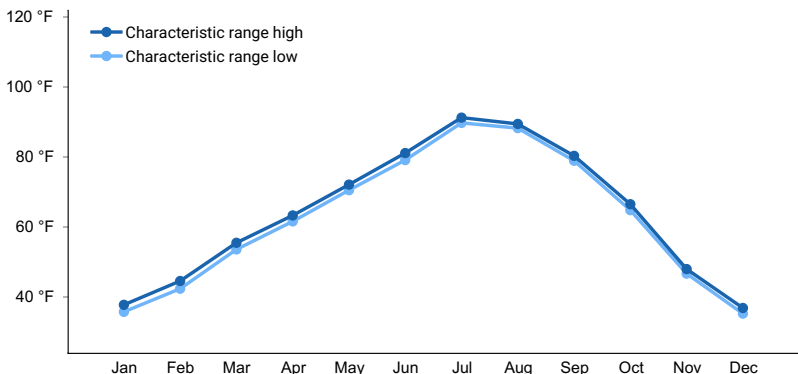


Figure 3. Monthly maximum temperature range

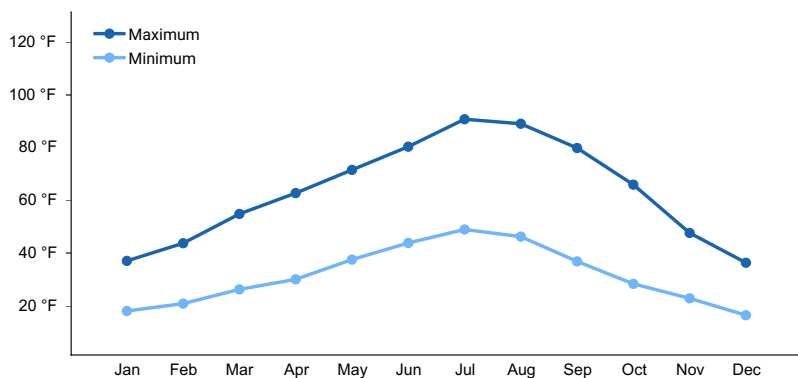


Figure 4. Monthly average minimum and maximum temperature

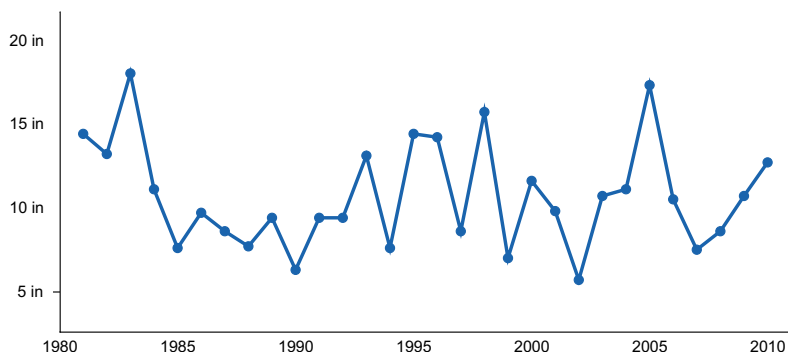


Figure 5. Annual precipitation pattern

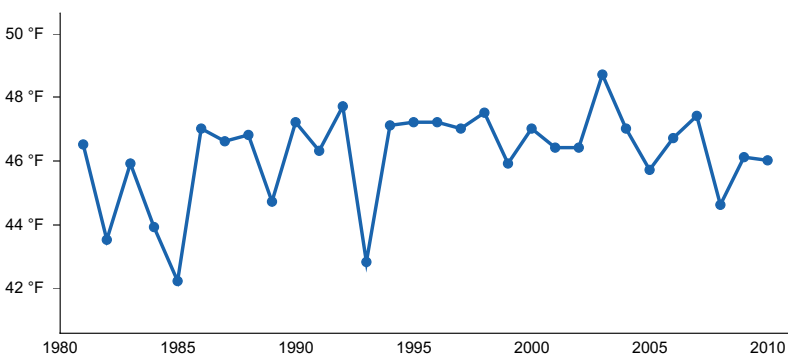


Figure 6. Annual average temperature pattern

Climate stations used

- (1) DREWSEY [USC00352415], Drewsey, OR
- (2) RIVERSIDE 7 SSW [USC00357208], Burns, 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 over tuffaceous bedrock and well drained. Areas of rock outcrop are common. Typically, the surface layer is a very cobbly loam about 10 inches thick. Variable amounts of coarse fragments are present. The subsoil is a stony clay loam about 20 inches thick. Depth to bedrock or an indurated pan ranges from 20 to 40 inches. Permeability is moderate. The available water holding capacity (AWC) is about 4 to 8

inches for the profile. The erosion potential is moderate to severe.

Table 4. Representative soil features

Parent material	(1) Residuum–volcanic rock (2) Colluvium–volcanic rock (3) Residuum–welded tuff (4) Colluvium–welded tuff
Surface texture	(1) Stony loam (2) Very cobbly loam (3) Very gravelly loam
Family particle size	(1) Loamy-skeletal (2) Clayey-skeletal (3) Fine
Drainage class	Well drained
Permeability class	Moderate to moderately slow
Depth to restrictive layer	20–40 in
Soil depth	20–40 in
Surface fragment cover <=3"	0–45%
Surface fragment cover >3"	0–45%
Available water capacity (0-40in)	4–8 in
Soil reaction (1:1 water) (0-40in)	6.1–7.8
Subsurface fragment volume <=3" (4-40in)	10–45%
Subsurface fragment volume >3" (4-40in)	10–50%

Ecological dynamics

The potential native plant community is dominated by curl-leaf mountain mahogany, antelope bitterbrush and Idaho fescue. Ponderosa pine, mountain big sagebrush, wax currant and bluebunch wheatgrass are prominent. Bluebunch wheatgrass, prairie junegrass and a variety of forbs are present. Mountain mahogany canopy cover ranges from 5 to over 20 percent. Canopy cover of scattered 80 year old and older ponderosa pine ranges up to 10 percent. Vegetative composition of the community by air dry weight to 4.5 feet is approximately 40 percent grasses, 10 percent forbs and 50 percent shrubs. Approximate ground cover is 70 to 80 percent (basal and crown).

Range in Characteristics:

In the reference state, curl-leaf mountain mahogany canopy cover ranges from 5 to over 20 percent. A scattered overstory of mature 80 year old and older ponderosa pine makes up to 10 percent of the canopy cover. Idaho fescue the dominant deep rooted perennial bunchgrass increases on northerly exposures. Bluebunch wheatgrass increases on slight south and west exposures. Production, antelope bitterbrush and wax currant increase over fractured bedrock and at the upper end of the precipitation zone. The original stand is maintained by a fire frequency of 10 to 25 years.

Response to Disturbance - States:

If the condition of the site deteriorates as a result of overgrazing, Idaho fescue initially decreases followed by a decrease in bluebunch wheatgrass and antelope bitterbrush. Mountain big sagebrush and Sandberg bluegrass increase. Western juniper strongly invades and bare ground increases. Rhizomatous bluegrasses, cheatgrass and other annuals invade. With further deterioration and lack of fire juniper dominates the site, out-competing mountain mahogany and big sagebrush. The fire hazard increases as juniper ladder fuels build up and the site becomes extremely susceptible to fire. A mid-summer hot fire severely impacts mountain mahogany, ponderosa pine and western juniper. While mountain mahogany may initially resprout following fire, it is usually killed (Gucker 2006).

The overstory is eliminated and bare ground significantly increases. Excessive erosion reduces the site productivity and contributes to downstream sedimentation.

Juniper Response:

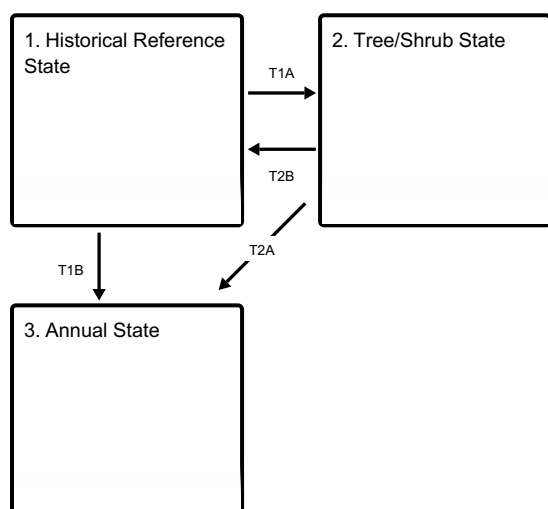
Fine fuel reduction from improper grazing and fire suppression has led to an increase in the historical fire return interval on many western rangelands. A reduction in fire frequency on these sites leads to an increase in juniper cover, a decrease in sagebrush cover followed by a decrease in herbaceous 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:

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

Ecosystem states



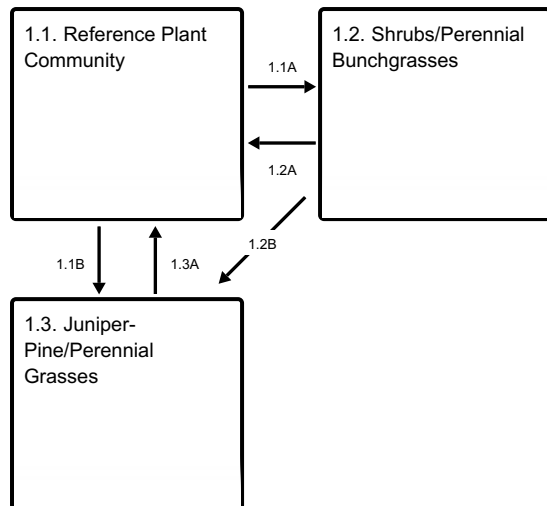
T1A - Disruption of the fire return interval, extending time without fire which allows for conifer expansion, especially western juniper

T1B - Catastrophic fire in the presence of invasive annual grasses,

T2B - Mechanical or chemical treatment of controlling brush or mechanical treatment of juniper along with treatment of non-native invasive species. Desired grasses and forbs may need to be seeded.

T2A - Catastrophic fire in the presence of invasive annual grasses.

State 1 submodel, plant communities



1.1A - Low severity fire

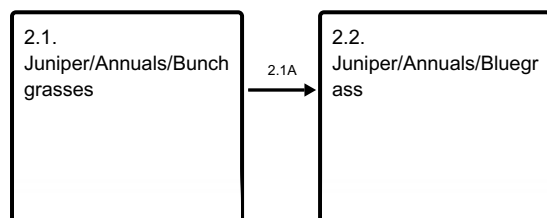
1.1B - Low severity fire, high severity fire, drought or inappropriate grazing.

1.2A - Time without fire

1.2B - high severity fire, drought or inappropriate grazing

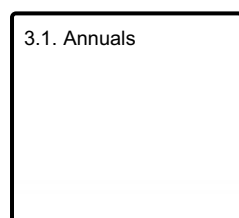
1.3A - Time without fire

State 2 submodel, plant communities



2.1A - Time without fire

State 3 submodel, plant communities



State 1

Historical Reference State

The Reference State 1.0 is a representation of the natural range of variability. The reference state has 3 general community phases; a shrub-grass dominant phase, a perennial grass dominant phase and a shrub dominant phase. State dynamics are maintained by interactions between climatic patterns and disturbance regimes. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Plant community phase changes are primarily driven by fire, periodic drought and/or insect or disease attack. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These feedbacks include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients.

Dominant plant species

- curl-leaf mountain mahogany (*Cercocarpus ledifolius*), shrub
- antelope bitterbrush (*Purshia tridentata*), shrub

- Idaho fescue (*Festuca idahoensis*), grass

Community 1.1

Reference Plant Community

The potential native plant community is dominated by mountain mahogany, antelope bitterbrush and Idaho fescue. Ponderosa pine, mountain big sagebrush, wax current, western juniper and bluebunch wheatgrass are prominent in the stand. Vegetative composition of the community by air-dry weight to 4.5 feet is 40 percent grasses, 5 percent forbs and 55 percent shrubs. The canopy cover of 80 year old and older ponderosa pine ranges to 10 percent. Mountain mahogany minimum canopy cover is 5 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	450	540	675
Grass/Grasslike	400	480	600
Forb	100	120	150
Tree	50	60	75
Total	1000	1200	1500

Community 1.2

Shrubs/Perennial Bunchgrasses

Mountain mahogany, bitterbrush, and other shrubs reduced. Deep-rooted perennial bunchgrasses and forbs increase.

Community 1.3

Juniper-Pine/Perennial Grasses

Mountain mahogany and bitterbrush decrease. Deep-rooted perennial bunchgrasses decrease. Young western juniper and pine increasing.

Pathway 1.1A

Community 1.1 to 1.2

Low severity fire

Pathway 1.1B

Community 1.1 to 1.3

Low severity fire, high severity fire, drought or inappropriate grazing.

Pathway 1.2A

Community 1.2 to 1.1

Time without fire

Pathway 1.2B

Community 1.2 to 1.3

high severity fire, drought or inappropriate grazing.

Pathway 1.3A

Community 1.3 to 1.1

Time without fire

State 2

Tree/Shrub State

This state is characterized by a dominance of conifers and/or shrubs. Western juniper and/or ponderosa pine dominate the overstory. Mountain mahogany, bitterbrush and other shrubs are either co-dominant with trees, or declining on site. Deep rooted perennial bunchgrasses may still be present, but they are no longer controlling site resources. Soil moisture, soil nutrients and soil organic matter distribution and cycling have been spatially and temporally altered.

Dominant plant species

- ponderosa pine (*Pinus ponderosa*), tree
- western juniper (*Juniperus occidentalis*), tree
- curl-leaf mountain mahogany (*Cercocarpus ledifolius*), shrub
- antelope bitterbrush (*Purshia tridentata*), shrub

Community 2.1

Juniper/Annuals/Bunchgrasses

Juniper dominant; mountain mahogany and bitterbrush decreasing to remnants; deep-rooted perennial bunchgrasses decreasing; annual non-native species dominant in the tree understory.

Community 2.2

Juniper/Annuals/Bluegrass

Juniper is dominant; mountain mahogany and bitterbrush decreasing to remnants; deep-rooted perennial bunchgrasses missing; Sandberg bluegrass an annual non-native species dominant in understory.

Pathway 2.1A

Community 2.1 to 2.2

Time without fire

State 3

Annual State

This state is characterized by the dominance of annual non-native species such as cheatgrass, medusahead, and ventenata in the understory. Shrubs may be present in the overstory, but are not controlling site function.

Dominant plant species

- cheatgrass (*Bromus tectorum*), grass
- North Africa grass (*Ventenata dubia*), grass
- medusahead (*Taeniatherum caput-medusae*), grass

Community 3.1

Annuals

Annual non-native species are dominant. Tree and shrub overstory greatly reduced or missing. Perennial grasses decrease or are missing. Increase in annual forbs.

Transition T1A

State 1 to 2

Disruption of the fire return interval, extending time without fire which allows for conifer expansion, especially western juniper

Transition T1B

State 1 to 3

Catastrophic fire in the presence of invasive annual grasses,

Restoration pathway T2B

State 2 to 1

Requires mechanical or chemical treatment of controlling brush or mechanical treatment of juniper along with treatment of non-native invasive species. Desired grasses and forbs may need to be seeded.

Transition T2A

State 2 to 3

Catastrophic fire in the presence of invasive annual grasses.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	Dominant, perennial deep-rooted grass			240–360	
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	240–360	–
2	Sub-dominant, perennial deep-rooted grass			120–240	
	bluebunch wheatgrass	PSSPS	<i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>	120–240	–
3	Sub-dominant, perennial shallow rooted grass			12–36	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	12–36	–
6	Other perennial grasses			37–174	
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	12–36	–
	sedge	CAREX	<i>Carex</i>	12–36	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	8–24	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	0–24	–
	bluegrass	POA	<i>Poa</i>	0–24	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	5–15	–
	mountain brome	BRMA4	<i>Bromus marginatus</i>	0–15	–
Forb					
7	Dominant, perennial forbs			36–72	
	buckwheat	ERIOG	<i>Eriogonum</i>	12–24	–
	lupine	LUPIN	<i>Lupinus</i>	12–24	–
	ragwort	SENEC	<i>Senecio</i>	12–24	–
10	Other perennial forbs			37–136	
	common yarrow	ACMI2	<i>Achillea millefolium</i>	6–12	–
	milkvetch	ASTRA	<i>Astragalus</i>	6–12	–
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	6–12	–
	fleabane	ERIGE2	<i>Erigeron</i>	6–12	–
	desertparsley	LOMAT	<i>Lomatium</i>	6–12	–

	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	0–10	–
	phlox	PHLOX	<i>Phlox</i>	3–6	–
	stonecrop	SEDUM	<i>Sedum</i>	0–6	–
	largehead clover	TRMA3	<i>Trifolium macrocephalum</i>	0–6	–
	waterleaf	HYDRO4	<i>Hydrophyllum</i>	0–6	–
	woodland-star	LITHO2	<i>Lithophragma</i>	2–6	–
	stoneseed	LITHO3	<i>Lithospermum</i>	0–6	–
	brodiaea	BRODI	<i>Brodiaea</i>	0–6	–
	mariposa lily	CALOC	<i>Calochortus</i>	0–6	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0–6	–
	bushy bird's beak	CORA5	<i>Cordylanthus ramosus</i>	0–6	–
	pussytoes	ANTEN	<i>Antennaria</i>	2–6	–
Shrub/Vine					
11	Dominant shrubs			360–600	
	curl-leaf mountain mahogany	CELE3	<i>Cercocarpus ledifolius</i>	240–360	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	120–240	–
14	Sub--dominant shrubs			56–126	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	36–96	–
	wax currant	RICE	<i>Ribes cereum</i>	20–30	–
15	Other shrubs			18–74	
	basin big sagebrush	ARTRT	<i>Artemisia tridentata ssp. tridentata</i>	6–12	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	6–12	–
	western juniper	JUOC	<i>Juniperus occidentalis</i>	0–12	–
	Woods' rose	ROWO	<i>Rosa woodsii</i>	6–12	–
	common snowberry	SYAL	<i>Symphoricarpos albus</i>	0–10	–
	Saskatoon serviceberry	AMAL2	<i>Amelanchier alnifolia</i>	0–10	–
	big sagebrush	ARTRX	<i>Artemisia tridentata ssp. xericensis</i>	0–6	–
Tree					
16	Dominant tree			36–96	
	ponderosa pine	PIPO	<i>Pinus ponderosa</i>	36–96	–

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 mountain mahogany reproduction and 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 site for upland bird nesting and rearing areas. Mule deer and elk make excellent use of the site for cover and seasonal spring through 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 high. 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 and bluebunch wheatgrass deep rooted bunchgrass component is greater than 70 percent of potential. The soils are in hydrologic group C.

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 mountain mahogany and available forage. Overgrazing can easily reduce ground cover and accelerate soil loss. Improving infiltration, permeability and reducing runoff should be the immediate goal of juniper control. Juniper 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.

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.

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Contributors

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2020/2021 update Andrew Neary

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 Frannsen
Contact for lead author	NRCS Oregon State Rangeland Management Specialist
Date	04/24/2003
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 some terracettes (convection storms)

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

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):** Weak medium platy to moderate fine subangular blocky to medium granular structure, dry color value 4-5, 2-9 inches thick; Moderate (1-7%) SOM

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Moderate ground cover (60-70%) and gentle slopes (2-20%) effectively 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: Cool-season, deep rooted, bunchgrasses >= Evergreen shrubs

Sub-dominant: Deciduous shrubs

Other: Other perennial grasses >= Perennial forbs

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: 1500, Normal: 1200, Unfavorable: 1000 lbs/acre/year at high RSI
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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:** 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
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