Ecological site R010XB029OR
JD Claypan 9-12 PZ

Last updated: 12/13/2023
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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 ecological site supports a plant community dominated by low sagebrush (Artemisia arbuscula) and bluebunch wheatgrass (Pseudoroegneria spicata). Abiotically, this site is characterized by soils typically with bedrock or claypans at shallow depths encouraging the growth of low sagebrush. The soil climate is Mesic near Frigid/Aridic. Historically, plant community dynamics were driven primarily by disturbances such as localized fire and drought. Presently, reference conditions are less common and current dynamics are influenced by the spread of invasive species, proliferation of western juniper (Juniperus occidentalis), livestock grazing pressures and fire suppression.

Associated sites

R010XC021OR	**SR Clayey 9-12 PZ** Adjacent sites with clayey subsoils not heavy enough to restrict root penetration
R010XB022OR	**JD Clayey 9-12 PZ** Adjacent sites with clayey subsoils not heavy enough to restrict root penetration

Similar sites

R010XB080OR	**JD Claypan 12-16 PZ** higher production, higher precipitation
R010XC038OR	**SR Very Shallow 9-12 PZ** very shallow soils

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia arbuscula*
Herbaceous	(1) *Pseudoroegneria spicata ssp. spicata* (2) *Poa secunda*

Physiographic features

This site occurs on terraces and uplands. Slopes range from 2 to 20 percent. Elevations range from 3,700 to 5,000 feet (1,150 to 1,500 meters). This site occurs on all aspects. This site is not subject to ponding or flooding and no water table is present within the soil profile.

Table 2. Representative physiographic features

Landforms	(1) Upland > Terrace
Flooding frequency	None
Ponding frequency	None
Elevation	3,700–5,000 ft
Slope	2–20%
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

The annual precipitation ranges from 9 to 12 inches (225 to 300mm), most of which occurs as snow during December through February. The mean annual air temperature ranges from 43 to 49° F (6 to 9.5° C). Soil temperature regime ranges mesic to mesic/frigid. The average frost-free period ranges from 60 to 100 days. The period of optimum plant growth is from April through June. The graphs below are populated from the closest available weather station to representative site locations and are provided to indicate general climate patterns.

Table 3. Representative climatic features

Frost-free period (characteristic range)	60-100 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	9-12 in
Frost-free period (average)	80 days
Freeze-free period (average)	
Precipitation total (average)	11 in

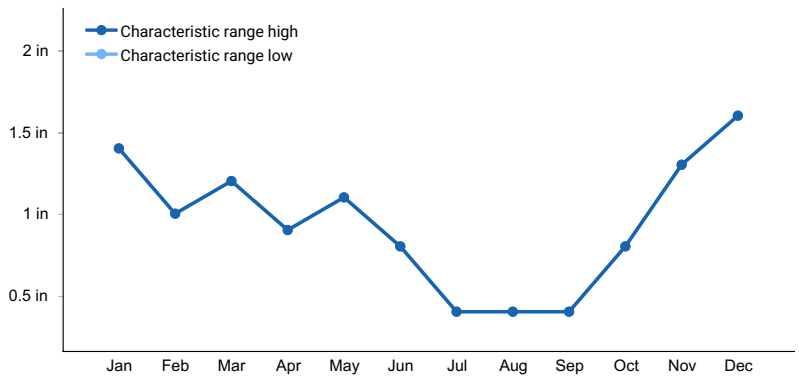


Figure 1. Monthly precipitation range

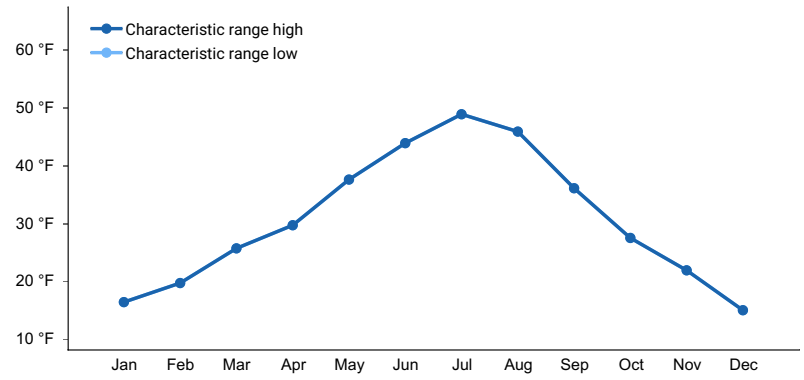


Figure 2. Monthly minimum temperature range

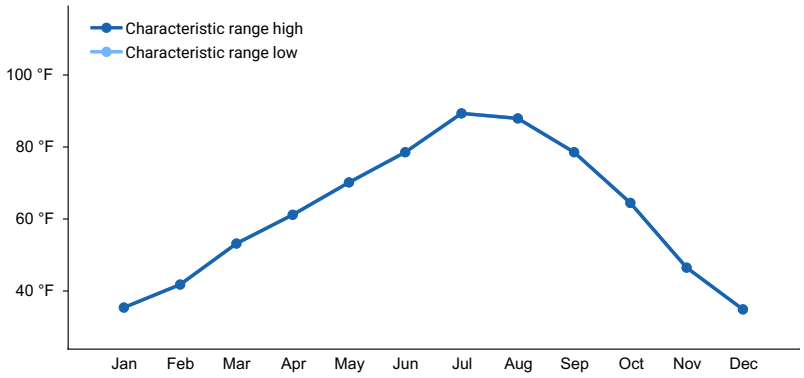


Figure 3. Monthly maximum temperature range

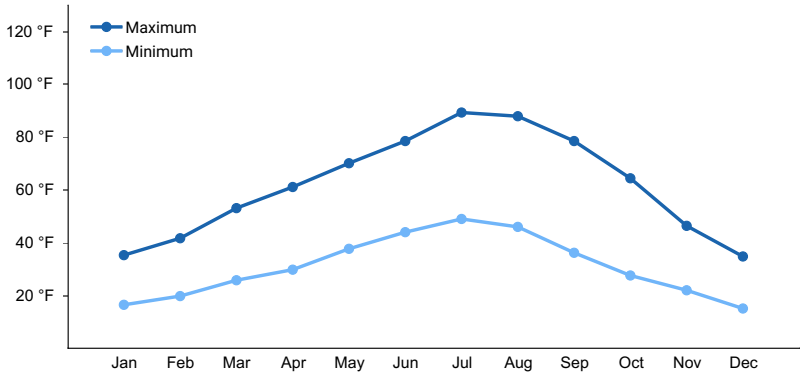


Figure 4. Monthly average minimum and maximum temperature

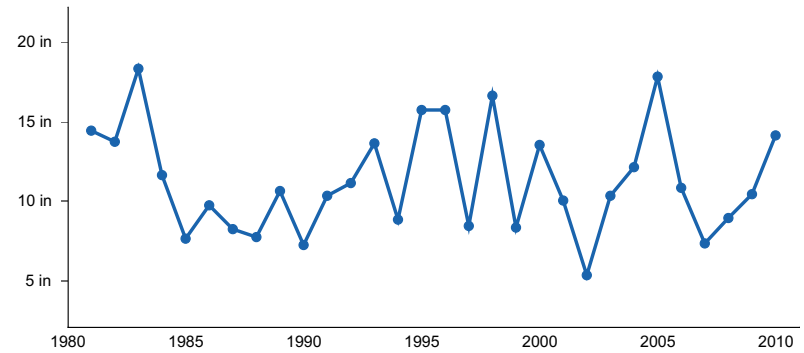


Figure 5. Annual precipitation pattern

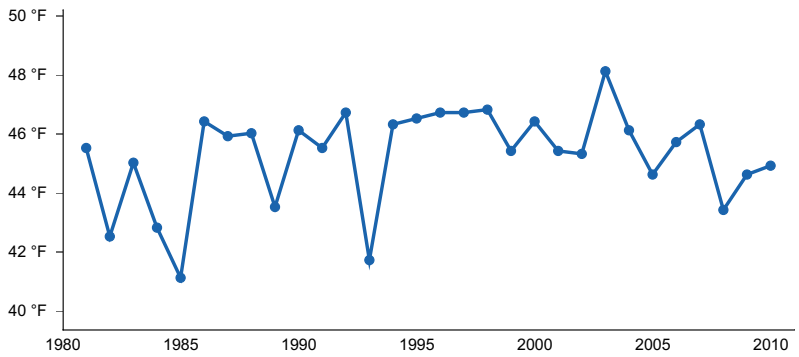


Figure 6. Annual average temperature pattern

Climate stations used

- (1) DREWSEY [USC00352415], Drewsey, OR

Influencing water features

This site is not influenced by water from a wetland or stream.

Wetland description

N/A

Soil features

The soils of this site are shallow to a strongly developed claypan over consolidated alluvium or bedrock. They are formed in loess and a variety of residuum including andesite, basalt, welded tuff, diatomaceous earth and/or tuffaceous sedimentary rocks. The surface layer is typically a gravelly loam 2 to 10 inches thick. The subsoil is typically a gravelly or cobbly clay with a clay content of 35 to 60 percent. Subsoil thickness ranges from 7 to 35 inches. Permeability is slow and the shrink-swell potential is high. The potential for water erosion is moderate. The available water holding capacity (AWC) is 2 to 4 inches.

Table 4. Representative soil features

Parent material	(1) Loess (2) Residuum–volcanic and sedimentary rock
Surface texture	(1) Gravelly loam
Family particle size	(1) Clayey-skeletal (2) Fine
Drainage class	Well drained
Permeability class	Slow to moderate
Depth to restrictive layer	10–20 in
Soil depth	10–40 in
Surface fragment cover <=3"	0–45%
Surface fragment cover >3"	0–45%
Available water capacity (0-40in)	2–4 in
Soil reaction (1:1 water) (0-40in)	6.6–7.8
Subsurface fragment volume <=3" (4-40in)	5–40%

Subsurface fragment volume >3" (4-40in)	5–45%

Ecological dynamics

The reference plant community is dominated by low sagebrush and bluebunch wheatgrass. Sandberg bluegrass, prairie junegrass and a variety of forbs are present. The potential vegetative composition is approximately 75 percent grass, 10 percent forbs and 15 percent shrubs.

Ecological Dynamics and Disturbance Response :

Variability in plant composition and production is dependent on soil depth and texture. Sandberg bluegrass increases with thinner soil surface layers. Idaho fescue increases on deeper soils at higher precipitation ranges and on north aspects. Thurber needlegrass increases over coarser textured soil surfaces. Production increases with soil depth.

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

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

The Great Basin sagebrush communities have high spatial and temporal variability in precipitation both among years and within growing seasons. Nutrient availability is typically low but increases with elevation and closely follows moisture availability. The invasibility of plant communities is often linked to resource availability. Disturbance can decrease resource uptake due to damage or mortality of the native species and depressed competition or can increase resource pools by the decomposition of dead plant material following disturbance. The invasion of sagebrush communities by cheatgrass (*Bromus tectorum*) has been linked to disturbances (fire, abusive grazing) that have resulted in fluctuations in resources (Chambers et al. 2007).

The range and density of western juniper has increased since the middle of the nineteenth century (Tausch 1999, Miller and Tausch 2000). Causes for expansion of western juniper into sagebrush ecosystems include wildfire suppression, historic livestock grazing, and climate change (Bunting 1994). Mean fire return intervals prior to European settlement in low sagebrush ecosystems were greater than 100 years, however frequent enough to inhibit the encroachment of western juniper into these low productive sagebrush cover types (Miller and Tausch 2000). Thus, trees were isolated to fire-safe areas such as rocky outcroppings and areas with low-productivity. An increase in crown density causes a decrease in understory perennial vegetation and an increase in bare ground. This allows for the invasion of non-native annual species such as cheatgrass. With annual species in the understory wildfire can become more frequent and increase in intensity. With frequent wildfires these plant communities can convert to annual species with a sprouting shrub and juvenile tree overstory.

The species most likely to invade these sites are cheatgrass and medusahead. Medusahead is a cool-season annual grass that germinates in the fall, overwinters as a seedling, and initiates growth in the spring (Miller et al. 1999a). Expansion of Medusahead creates seed reserves that can infest adjoining areas and cause changes to the fire regime. Medusahead has a high silica content which may contribute to its resistance to decomposition (Bovey et al. 1961), and the accumulation of the thatch layer. Mature medusahead is very flammable. Fire can remove the thatch layer, consume standing vegetation, and even reduce seed levels. Furbush (1953) reported that timing a burn while the seeds were in the milk stage effectively reduced medusahead the following year. He further reported that adjacent unburned areas became a seed source for reinvasion the following year. Medusahead can be successfully controlled with a combination of prescribed burning and application of pre-emergent herbicide. Revegetation of medusahead invaded rangelands has a higher likelihood of success when using introduced perennial bunchgrasses such as crested wheatgrass (Davies et al. 2015).

Fire Ecology:

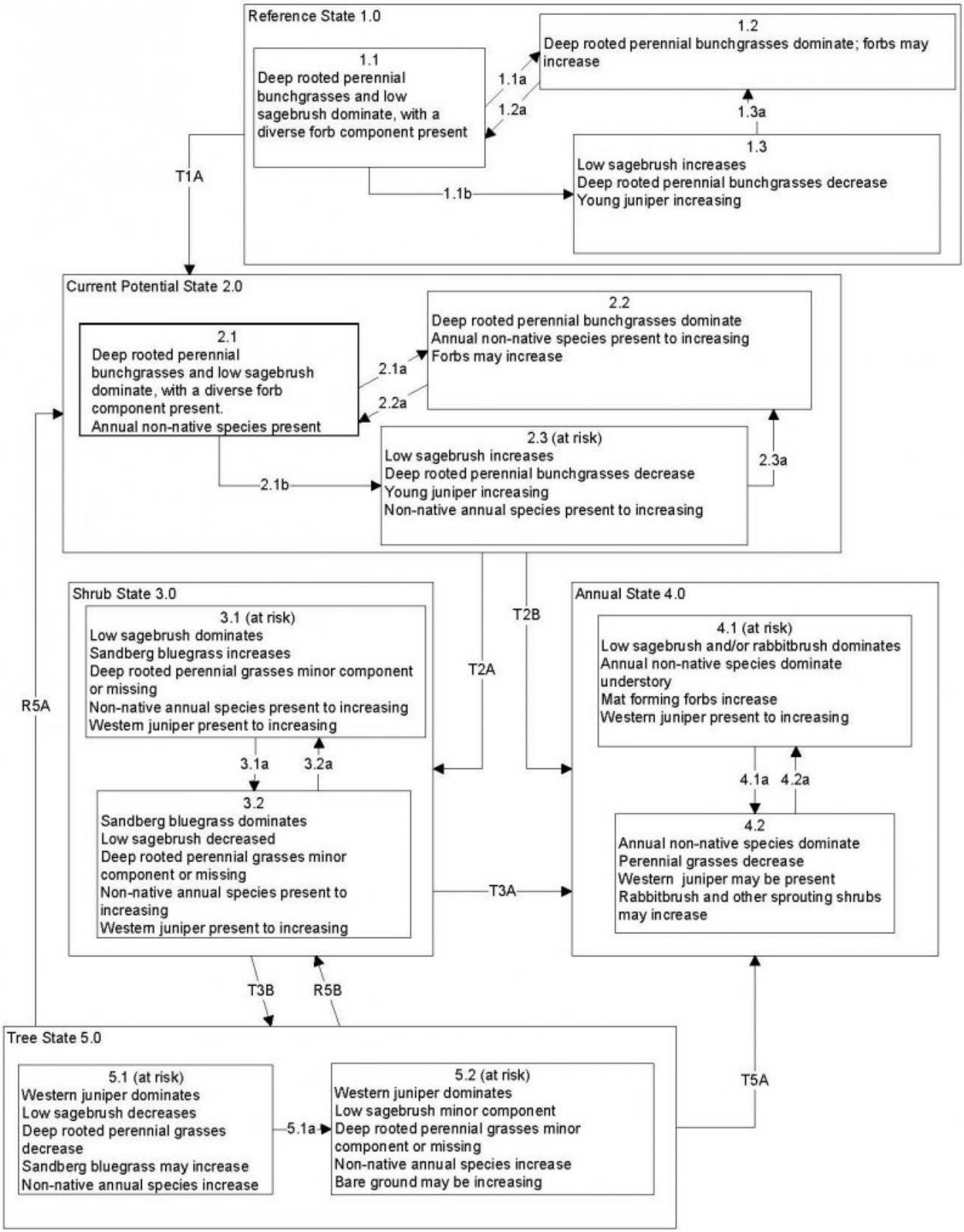
Fire will remove aboveground biomass from bluebunch wheatgrass but plant mortality is generally low (Robberecht and Defossé 1995) because the buds are underground (Conrad and Poulton 1966) or protected by foliage. Uresk et al. (1976) reported burning increased vegetative and reproductive vigor of bluebunch wheatgrass. Thus, bluebunch wheatgrass is considered to experience slight damage to fire but is more susceptible in drought years (Young 1983). Plant response will vary depending on season, fire severity, fire intensity and post-fire soil moisture availability. Sandberg bluegrass (*Poa secunda*), has been found to increase following fire likely due to its low stature and productivity (Daubenmire 1975). Sandberg bluegrass may retard reestablishment of deeper rooted bunchgrass.

Low sagebrush is killed by fire and does not sprout (Young 1983). Establishment after fire is from seed, generally blown in and not from the seed bank (Bradley et al. 1992). Fire risk is greatest following a wet, productive year when there is greater production of fine fuels (Beardall and Sylvester 1976). Fire return intervals have been estimated at 100-200 years in black sagebrush dominated sites (Kitchen and McArthur 2007) and likely is similar in the low sagebrush ecosystems; however, historically fires were probably patchy due to the low productivity of these sites. Fine fuel loads generally average 100 to 400 pounds per acre (110- 450 kg/ha) but are occasionally as high as 600 pounds per acre (680 kg/ha) in low sagebrush habitat types (Bradley et al. 1992). Recovery time of low sagebrush following fire is variable (Young 1983). After fire, if regeneration conditions are favorable, low sagebrush recovers in 2 to 5 years, however on harsh sites where cover is low to begin with and/or erosion occurs after fire, recovery may require more than 10 years (Young 1983). Slow regeneration may subsequently worsen erosion (Blaisdell et al. 1982).

Western juniper is intolerant of fire and historically was kept in restricted sites by natural fires. With the increased suppression of wildfire and livestock grazing which reduces ground fuels and understory competition, regeneration and establishment of western juniper have expanded into suitable sites previously dominated by sagebrush (Burns and Honkala 1990). Fire resistance depends on age of tree. Seedlings, saplings and poles are highly vulnerable to fire. Mature trees, because they have foliage further from the ground, less fine fuels near the trunk and thick bark have some fire resistance (Burns and Honkala 1990). With the low production of the understory vegetation, high severity fires within this plant community were not likely and rarely became crown fires (Bradley et al. 1992, Miller and Tausch 2000). With an increase of cheatgrass in the understory, fire severity is likely to increase. Western juniper reestablishes by seed from nearby seed source or surviving seeds.

Adapted from: Stringham, T.K., D. Snyder, and A. Wartgow 2016. State-and-Transition Models for USFS Crooked River National Grassland Major Land Resource Area B10 Oregon. DRAFT Report. University of Nevada Reno.

State and transition model


Reference State 1.0
1.1
Deep rooted perennial bunchgrasses and low sagebrush dominate, with a diverse forb component present
1.2
Deep rooted perennial bunchgrasses dominate; forbs may increase
1.3
Low sagebrush increases
Deep rooted perennial bunchgrasses decrease
Young juniper increasing
1.1a
1.2a
1.3a
1.1b
T1A
Current Potential State 2.0
2.1
Deep rooted perennial bunchgrasses and low sagebrush dominate, with a diverse forb component present.
Annual non-native species present
2.2
Deep rooted perennial bunchgrasses dominate
Annual non-native species present to increasing
Forbs may increase
2.3 (at risk)
Low sagebrush increases
Deep rooted perennial bunchgrasses decrease
Young juniper increasing
Non-native annual species present to increasing
2.1a
2.2a
2.1b
2.3a
Shrub State 3.0
3.1 (at risk)
Low sagebrush dominates
Sandberg bluegrass increases
Deep rooted perennial grasses minor component or missing
Non-native annual species present to increasing
Western juniper present to increasing
3.2
Sandberg bluegrass dominates
Low sagebrush decreased
Deep rooted perennial grasses minor component or missing
Non-native annual species present to increasing
Western juniper present to increasing
3.1a
3.2a
T2A
T2B
T3A
T3B
R5B
R5A
Annual State 4.0
4.1 (at risk)
Low sagebrush and/or rabbitbrush dominates
Annual non-native species dominate understory
Mat forming forbs increase
Western juniper present to increasing
4.2
Annual non-native species dominate
Perennial grasses decrease
Western juniper may be present
Rabbitbrush and other sprouting shrubs may increase
4.1a
4.2a
Tree State 5.0
5.1 (at risk)
Western juniper dominates
Low sagebrush decreases
Deep rooted perennial grasses decrease
Sandberg bluegrass may increase
Non-native annual species increase
5.2 (at risk)
Western juniper dominates
Low sagebrush minor component
Deep rooted perennial grasses minor component or missing
Non-native annual species increase
Bare ground may be increasing
5.1a
T5A

Reference State 1.0 Community Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid seral community, dominated by grasses and forbs.
1.1b: Time and lack of disturbance. Excessive herbivory and/or long-term drought may also reduce perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire creates sagebrush/grass mosaic.

Transition T1A: Introduction of non-native species

Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid seral community, dominated by grasses and forbs.
2.1b: Time and lack of disturbance. Inappropriate grazing management and/or long-term drought may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for shrub regeneration.
2.3a: Low severity fire creates sagebrush/grass mosaic. Brush treatments with minimal soil disturbance; late-fall/winter grazing causing mechanical damage to sagebrush would reduce the shrub overstory.

Transition T2A: Grazing management favoring shrubs and/or severe drought will reduce the perennial bunchgrasses in the understory (3.1)
Transition T2B: Catastrophic fire and/or soil disturbing treatments such as drill seeding, roller chopper, Lawson aerator etc. Probability of success of seeding on this site is low (4.2). Inappropriate grazing management in the presence of non-native annual species, may be combine with higher than normal spring precipitation (4.1).

Shrub State 3.0 Community Pathways
3.1a: Fire.
3.2a: Time without disturbance.

Transition T3A: Catastrophic fire, multiple fires, and/or soil disturbing treatments (4.2), Inappropriate grazing management in the presence of non-native species, may be combined with higher than normal spring precipitation (4.1). Bare ground levels depend on variations in annual precipitation
Transition T3B: Time and lack of disturbance allows for maturation of the tree community.

Annual State 4.0 Community Pathways
4.1: Fire
4.2: Time without disturbance

Restoration R4A: Herbicide treatment may be coupled with seeding of desired species.

Tree State 5.0 Community Pathways
5.1: Time and lack of disturbance allows for maturation of the tree community

Transition T5A: Catastrophic fire (4.2)

Restoration R5A: Mechanical treatment of trees coupled with seeding of desired species success of seeding on this site is low. (likely from 5.1
Restoration R5B: Mechanical treatment of trees (likely from 5.1)

(Stringham et al., 2016)

State 1
Historical Reference State

The Reference State 1.0 is representative of the natural range of variability under pristine conditions. The reference state has three 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.

Dominant plant species

- little sagebrush (*Artemisia arbuscula*), shrub
- bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*), grass
- Sandberg bluegrass (*Poa secunda*), grass

Community 1.1
Reference Plant Community

The reference plant community is dominated by low sagebrush and bluebunch wheatgrass. Sandberg bluegrass,

prairie junegrass and a variety of forbs are present. The potential vegetative composition is approximately 75 percent grass, 10 percent forbs and 15 percent shrubs.

Dominant plant species

- little sagebrush (*Artemisia arbuscula*), shrub
- bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*), grass
- Sandberg bluegrass (*Poa secunda*), grass

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	145	285	355
Shrub/Vine	30	65	80
Forb	25	50	65
Total	**200**	**400**	**500**

State 2
Current Potential

This state is similar to the Reference State 1.0 with three similar community phases. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Non-natives may increase in abundance but will not become dominant within this State. These non-natives can be highly flammable and can promote fire where historically fire had been infrequent. 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. Positive feedbacks decrease ecosystem resilience and stability of the state. These include the non-natives' high seed output, persistent seed bank, rapid growth rate, ability to cross pollinate, and adaptations for seed dispersal.

Dominant plant species

- little sagebrush (*Artemisia arbuscula*), shrub
- bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*), grass
- Sandberg bluegrass (*Poa secunda*), grass

State 3
Shrub State

This state is a product of many years of heavy grazing during time periods harmful to perennial bunchgrasses. Sandberg bluegrass will increase with a reduction in deep rooted perennial bunchgrass competition and become the dominant grasses. Sagebrush dominates the overstory and rabbitbrush may be a significant component. Sagebrush cover exceeds site concept and may be decadent, reflecting stand maturity and lack of seedling establishment due to competition with mature plants. The shrub overstory and bluegrass understory dominate site resources such that soil water, nutrient capture, nutrient cycling and soil organic matter are temporally and spatially redistributed.

Dominant plant species

- little sagebrush (*Artemisia arbuscula*), shrub
- Sandberg bluegrass (*Poa secunda*), grass

State 4
Annual State

This state is characterized by the dominance of annual non-native species such as medusahead, cheatgrass and tansy mustard in the understory. Sagebrush and/or rabbitbrush may dominate the overstory.

Dominant plant species

- cheatgrass (*Bromus tectorum*), grass
- medusahead (*Taeniatherum caput-medusae*), grass

State 5
Tree State

This state is characterized by a dominance of western juniper in the overstory. Low sagebrush and 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

- western juniper (*Juniperus occidentalis*), tree

Transition T1A
State 1 to 2

Introduction of non-native plant species

Transition T2A
State 2 to 3

Grazing management favoring shrubs and/or severe drought will reduce the perennial bunchgrasses in the understory.

Transition T2B
State 2 to 4

Catastrophic fire and/or soil disturbing treatments such as drill seeding, roller chopper, Lawson aerator etc. Probability of success of seeding on this site is low. Inappropriate grazing management in the presence of non-native annual species, may be combined with higher than normal spring precipitation.

Transition T3A
State 3 to 4

Catastrophic fire, multiple fires, and/or soil disturbing treatments, Inappropriate grazing management in the presence of non-native species.

Context dependence. may be combined with higher than normal spring precipitation.

Transition T3B
State 3 to 5

Time and lack of disturbance allows for maturation of the tree community.

Restoration pathway R5A
State 5 to 2

Mechanical treatment of trees coupled with seeding of desired species.

Context dependence. Success of seeding on this site is low due to low site resilience

Restoration pathway R5B
State 5 to 3

Mechanical treatment of trees.

Transition T5A
State 5 to 4

Catastrophic fire

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	**Deep Rooted Perennial Grasses**			200–300	
	bluebunch wheatgrass	PSSPS	*Pseudoroegneria spicata ssp. spicata*	160–200	–
	Sandberg bluegrass	POSE	*Poa secunda*	20–60	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	20–40	–
2	**Other Perennial Grasses**			0–36	
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	0–12	–
	Idaho fescue	FEID	*Festuca idahoensis*	0–12	–
	squirreltail	ELEL5	*Elymus elymoides*	0–12	–
Forb					
3	**Perennial Forbs**			0–96	
	buckwheat	ERIOG	*Eriogonum*	0–12	–
	phlox	PHLOX	*Phlox*	0–12	–
	balsamroot	BALSA	*Balsamorhiza*	0–12	–
	largehead clover	TRMA3	*Trifolium macrocephalum*	0–12	–
	erigenia	ERIGE	*Erigenia*	0–12	–
	desertparsley	LOMAT	*Lomatium*	0–12	–
	common yarrow	ACMI2	*Achillea millefolium*	0–12	–
	pussytoes	ANTEN	*Antennaria*	0–12	–
Shrub/Vine					
4	**Shrubs**			10–60	
	little sagebrush	ARAR8	*Artemisia arbuscula*	40–60	–
5	**Other Perennial Shrubs**			0–20	

Animal community

LIVESTOCK GRAZING -
This site is suited to late spring, summer and fall use by cattle, sheep and horses under a planned grazing system. The key species is bluebunch wheatgrass. Bluebunch wheatgrass can be damaged if heavily grazed during periods of flowering and seed formation when root reserves and soil moisture is low.

Use in the spring should be postponed until the soils are firm enough to prevent plant crown trampling damage, soil compaction and soil mass movement. Site limitations are low productivity, spring soil saturation and moderate to high erosion potential.

WILDLIFE -
Mule deer rodents and a variety of upland birds use this site for food and cover.

When the ecological condition is high this site provides food and cover for deer, other mammals and upland birds. It is an important wintering area for deer.

Hydrological functions

The soils of this site have low water holding capacities providing little late season water for plant growth. Run-off potential is moderate to high and permeability rates are low. The hydrologic cover condition is fair when the ecological condition is high. Soils are in hydrologic group D.

Wood products

Not applicable.

Other information

When in poor condition this site has low potential for range seeding because it is shallow and has a high shrink-swell potential.

Type locality

Location 1: Harney County, OR	
Township/Range/Section	T21S R35E S3
General legal description	NW 1/4 NW l/4 of Section 3, T21S, R35E, WM. Two miles southwest of Drewsey, Harney County. Condition - Good.

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Contributors

Jenni Moffitt, general edits and updates 8/2020
Tamzen Stringham et al. (2016), Ecological Dynamics and S&T Model
Original Author: A.V. Bahn/BLM ESI Team, Hines, Or. 1994
Andrew Neary - table population and edits 2021

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)	
Contact for lead author	State Rangeland Management Specialist for NRCS – Oregon
Date	08/06/2012
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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2. **Presence of water flow patterns:** None to some on steeper slopes

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3. **Number and height of erosional pedestals or terracettes:** None to some - high shrink-swell potential

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 10-25%

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5. **Number of gullies and erosion associated with gullies:** None

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None, slight wind erosion hazard

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7. **Amount of litter movement (describe size and distance expected to travel):** Fine - limited movement

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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 = 2-4

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Shallow t a strongly developed claypan with a gravelly loam surface up to 10" thick: moderate OM (1-3%)

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Low to moderate ground cover (40-50%) and gentle slopes (2-20%) moderately

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 > Low sagebrush > other grasses > forbs > other shrubs

    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: 500, Normal: 400, Unfavorable: 300 lbs/acre/year at high RSI (HCPC)

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Perennial brush species will increase with deterioration of plant community. Western Juniper readily invades the site. Cheatgrass and Medusahead invade sites that have lost 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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