USDA Natural Resources Conservation Service

Ecological site R010XY153OR
Droughty Fan 9-12 PZ

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Accessed: 04/28/2024

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.

Classification relationships

US National Vegetation Classification System (closest approximation of reference plant community):
Division:
3.B.1.Ne - Western North American Cool Semi-Desert Scrub & Grassland
Macrogroup:
M169 - Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland
Association:
CES304.778 - Inter-Mountain Basins Big Sagebrush Steppe

Landfire BPS model:
0711250 - Inter-Mountain Basins Big Sagebrush Steppe

Ecological site concept

In reference condition, this site supports a plant community dominated by basin big sagebrush (*Artemisia tridentata* ssp. tridentata), Thurber's needlegrass (*Achnatherum thurberianum*), bluebunch wheatgrass (*Pseudoroegneria spicata*) and lesser amounts of great basin wildrye (*Leymus cinereus*). This site occupies alluvial fan landforms yet is hydrologically disconnected from associated stream and river channels. Droughty, loamy- skeletal soils distinguishes this site from other disconnected fan sites. Historical ecological dynamics would have been driven by infrequent fire, insect outbreaks and periodic drought. Presently, livestock grazing and exotic plant invasion have altered ecological dynamics and influence the composition of many of these communities.

Associated sites

R010XY005OR	**Loamy Bottom** Bottomland positions adjacent to this site
R010XB022OR	**JD Clayey 9-12 PZ** Upland positions with clayey soil textures adjacent to this site

Similar sites

R010XY121OR	**Droughty Clayey Fan 9-12 PZ** Finer textured clay soils with slow to very slow permeability
R010XY120OR	**Loamy Fan 9-12 PZ** Typically occurring on lower fan toeslope positions, hydrologically connected to stream networks

Table 1. Dominant plant species

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

Physiographic features

This site occurs on low elevation fan and swale landforms associated with the John Day and Clarno Formations. Slopes range from 1 to 15 percent but may occur as steep as 20 percent. Elevation typically ranges between 1,800 to 2,700 feet (550 - 825 meters) but may range from 1,350 to 3,800 feet (400 to 1150 meters). This site occurs on all aspects. The site may experience run on from adjacent sites and may experience very rare flooding. It is not subject to ponding.

Table 2. Representative physiographic features

Landforms	(1) Foothills > Fan (2) Foothills > Swale
Flooding duration	Extremely brief (0.1 to 4 hours)
Flooding frequency	None to very rare
Ponding frequency	None
Elevation	1,800–2,700 ft
Slope	1–15%
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Flooding duration	Not specified
Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	1,350–3,800 ft
Slope	1–20%

Climatic features

This site typically receives between 9 to 12 inches (230 to 300 mm) of annual precipitation zone and experiences an aridic soil moisture regime with a xeric subclass. The soil temperature regime is mesic with a typical mean annual air temperature of 48 to 52° F (9 to 11° Celcius). The frost-free period is approximately 90 to 150 days. Climate

graphs are based on the nearest available climate stations to modal site locations and are provided to indicate general climate patterns.

Table 4. Representative climatic features

Frost-free period (characteristic range)	90-150 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	9-12 in
Frost-free period (average)	130 days
Freeze-free period (average)	
Precipitation total (average)	11 in

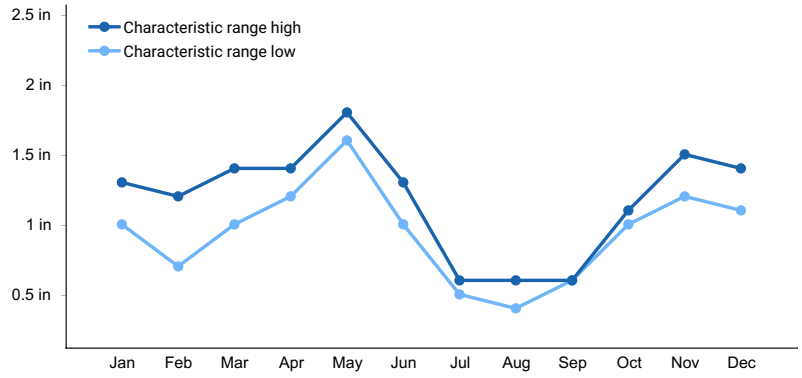

Figure 1. Monthly precipitation range

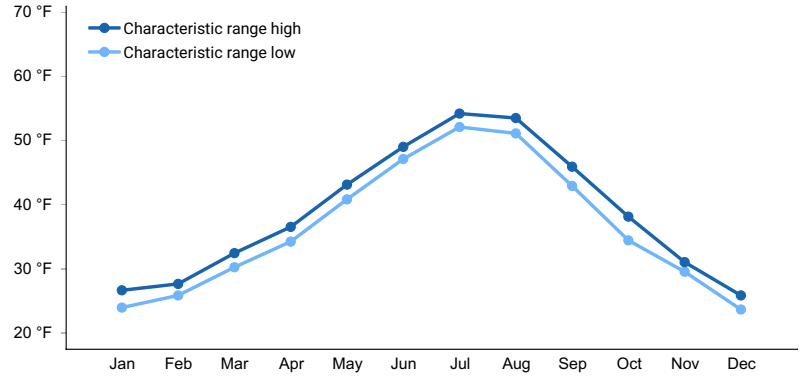

Figure 2. Monthly minimum temperature range

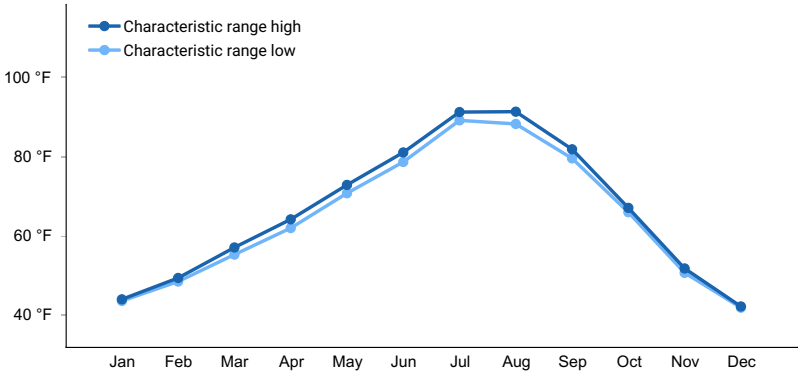

Figure 3. Monthly maximum temperature range

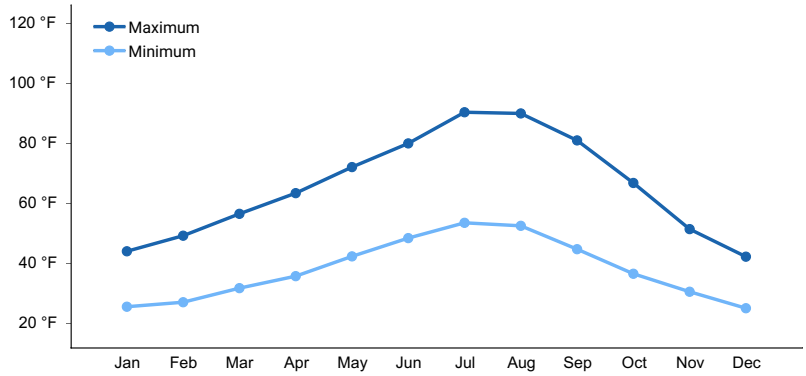

Figure 4. Monthly average minimum and maximum temperature

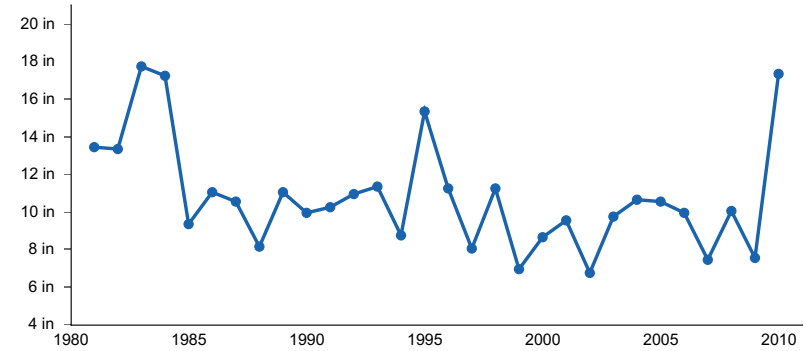

Figure 5. Annual precipitation pattern

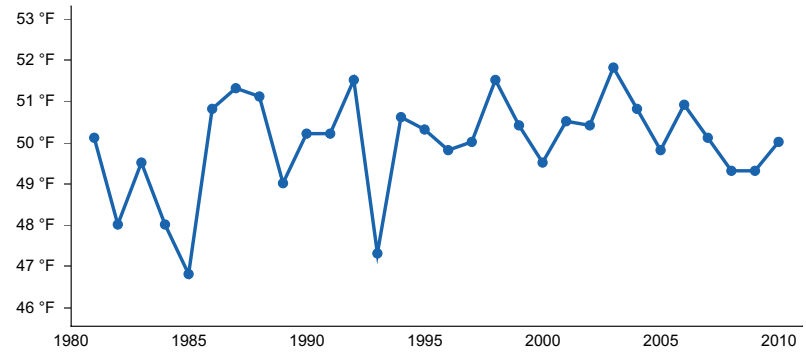

Figure 6. Annual average temperature pattern

Climate stations used

- (1) MITCHELL 2 NW [USC00355641], Mitchell, OR
- (2) MONUMENT 2 [USC00355711], Monument, OR
- (3) JOHN DAY 35 WNW [USW00004125], Mitchell, OR

Influencing water features

This site occurs sufficiently above adjacent stream and river courses to largely avoid direct hydrologic influence from these sources. That said, deep subsurface moisture from streams may seasonally augment soil moisture on some sites.

Wetland description

Not applicable

Soil features

Soils for this site are typically very deep, well drained, loams, clay loams and ashy sandy loams. These soils are

largely formed in alluvium weathered from tuffaceous sediments of the John Day and Clarno formations and colluvium from igneous rock. Taxonomic family particle sizes range from fine to fine-loamy to loamy-skeletal. The most common soil taxonomic subgroup associated with this site is Calcidic Haploxeroll. Soils may be slightly alkaline, sometimes exhibiting moderate to strong alkalinity at lower depths. These soils typically contain secondary carbonates below 20 inches. Commonly associated soil series include Haystack, Sorefoot and Spikedriver.

Table 5. Representative soil features

Parent material	(1) Alluvium–tuff (2) Alluvium–sedimentary rock (3) Colluvium–igneous rock
Surface texture	(1) Very cobbly loam (2) Clay loam (3) Cobbly sandy loam
Family particle size	(1) Loamy-skeletal (2) Fine-loamy
Drainage class	Well drained
Permeability class	Moderate to rapid
Depth to restrictive layer	80 in
Soil depth	80 in
Surface fragment cover <=3"	5–25%
Surface fragment cover >3"	15–30%
Available water capacity (0-40in)	1.95–5.4 in
Soil reaction (1:1 water) (0-40in)	6.6–9
Subsurface fragment volume <=3" (4-60in)	15–45%
Subsurface fragment volume >3" (4-60in)	15–35%

Ecological dynamics

The historic reference community of this site supports a shrub-grassland community. Basin big sagebrush (*Artemisia tridentata* ssp. tridentata) is the dominant shrub with lesser amounts of broom snakeweed (*Gutierrezia sarothrae*) also present. Rabbitbrush (Chrysothamnus spp.), antelope bitterbrush (*Purshia tridentata*) and black greasewood (*Sarcobatus vermiculatus*) occur in minor amounts where soils favor their occurrence. The potential grass understory is dominated by Thurber's needlegrass (*Achnatherum thurberianum*) with bluebunch wheatgrass (*Pseudoroegneria spicata*) and minor amounts of basin wildrye (*Leymus cinereus*) occurring. Soils with higher sand content favor minor amounts of sand dropseed (*Sporobolus cryptandrus*).

Basin big sagebrush is a prominent shrub in low elevation areas within the sagebrush biome. Compared to other subspecies of big sagebrush, basin big sagebrush is not as common in eastern Oregon and occurs in areas with greater subsurface moisture accumulation or higher water tables. As a fire intolerant species that is readily killed by most fires and does not resprout, basin big sagebrush will be reduced on a site following fire and may be eliminated with frequent fires. Periodic insect outbreaks of Aroga moth (Aroga websteri) are an important component of the natural disturbance regime for big sagebrush, resulting in complete or partial mortality of sagebrush plants and potentially impacting thousands of acres.

Broom snakeweed is typically associated with disturbed habitats and early seral conditions in the sagebrush biome (Tirmstein 1999). It can rapidly invade following improperly managed grazing. Broom snakeweed is highly drought tolerant and tends to rapidly increase in density following drought periods as well as fire. While broom snakeweed is typically killed by fire, seeds are often unharmed and rapid colonization from nearby sites is common. It has been found to increase following fire in Great Basin sagebrush communities where it often appears by the sixth year but

may require up to 25 years to become dominant. While it effectively compete with many grasses (similar rooting depth and possible allelopathy) it is often out-competed by other shrubs overtime. However, in bottomlands, this species may persist into later successional stages than in upland sites (Costello 1944), possibly explaining the persistence of this shrub in greater than minor amounts in the reference plant community of this site.

Thurber's needlegrass is a common bunchgrass in the sagebrush steppe of Eastern Oregon, especially within the 8 to 10 inch precipitation zone (Archer 2000). Thurber's may be most common in mid successional phases and decrease in late successional periods in big sagebrush habitat as big sagebrush increases. Considered to be the least fire-resistant needlegrass, Thurber's is often damaged by moderately severe fire. It recovers slowly following fire and regenerates primarily by seed rather than resprouting from crowns.

Western juniper (*Juniperus occidentalis*) is a native conifer species in western North America but its density and range have dramatically increased since the late 1800s likely due to a combination of factors, namely: reductions in fire frequency; heavy livestock grazing; and increased atmospheric carbon dioxide (Fryer and Tirmenstein 2019). Juniper encroachment can decrease cover of grasses and shrubs by reducing light availability and altering site hydrology through increased interception of precipitation, reduced infiltration and increased erosion. Juniper is sensitive to fire and most young trees are killed by even low severity fire. As Juniper trees mature and bark thickens, however, they become resistant to low severity fire yet are still killed by crown fires or high severity surface fires.

Climate cycles would have been an important driver of ecological dynamics historically, with drought periods possibly leading to reductions in sagebrush cover and wet years increasing fire occurrence due to increased perennial grass production and fine fuels loads. Historically these communities would have likely encountered infrequent mixed and replacement severity fires with an average fire return interval of 50 years (yet with a high degree of variability depending on the site) (Landfire 2007). Livestock grazing has altered the plant community composition of much of the extent of this site. Increases in shrub and juniper cover and decreases in perennial grass cover may result from chronic improperly managed grazing. Given an altered disturbance regime and degraded site conditions, invasions of exotic forb species and annual grass species may occur on this site. Forbs may include mustards, pepperweed (Lepidium spp.), prickly lettuce (*Lactuca serriola*), salsify (Tragopogon spp.) whitetop (*Cardaria draba*) and Russian thistle (*Salsola tragus*). Exotic annual grasses such as cheatgrass (*Bromus tectorum*) and medusahead (*Taeniatherum caput-medusae*) may also invade the site. Exotic annual grass invasion may increase the frequency of fires and extend the season when fires are likely by augmenting early season fine fuel loads and fuel continuity. Sites may be particularly fire prone following years of above average precipitation during which invasive annual grass production can increase dramatically (Pilliod et al. 2017). In addition to exotic species, native shrub species such as broom snakeweed (*Gutierrezia sarothrae*) and green rabbitbrush (*Chrysothamnus viscidiflorus*) may also increase following disturbance and may be important members of early seral communities.

An understanding of the site specific ecological dynamics for this site are incomplete. Thresholds between states and phases have yet to be quantified and restoration pathways and outcomes are poorly understood. Current and anticipated effects of climate change are not included in this model, yet this site may experience significant impacts as climate continues to change. The model below represents an approximation of ecological dynamics based on JD Droughty South 9-12" (Stringham et al. 2017) and is likely to undergo extensive revisions as better data becomes available.

State and transition model

Figure 7. Droughty Fan 9-12 PZ

State 1
Historical Reference State

The Reference State is representative of the natural range of variability for the site under pristine conditions. The reference state is a bunchgrass shrubland. 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 are maintained by elements of ecosystem structure and function such as the presence of all structural and functional plant groups, the retention of organic matter and the maintenance of plant community cover. Plant community phase changes are primarily driven by infrequent fire and/or periodic drought.

Dominant plant species

- basin big sagebrush (*Artemisia tridentata ssp. tridentata*), shrub
- Thurber's needlegrass (*Achnatherum thurberianum*), grass

- bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*), grass

Community 1.1
Shrub - Grass dominant community

Bunchgrasses and sagebrush dominate this site. The reference plant community consists of basin big sage and Thurber's needlegrass with bluebunch wheatgrass and some basin wildrye. Broom snakeweed, Rabbitbrush and Purple sage occur in minor amounts with sand dropseed and Indian ricegrass occurring in pockets of sandier soils. Antelope bitterbrush is found toward the higher precipitation end of this site's range. Western juniper may or may not be present.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1045	1305	1570
Shrub/Vine	100	120	145
Forb	55	75	85
Total	**1200**	**1500**	**1800**

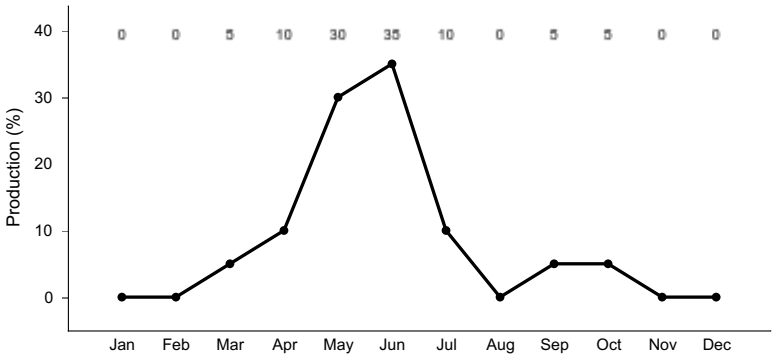

Figure 9. Plant community growth curve (percent production by month). OR4161, B10 JD FAN & SWALE 9-16. B10B FAN, SWALE, Gumbo, & JD Sandy Lm 9-16 RPC Growth Curve.

Community 1.2
Bunchgrass dominant community

This community represents an early seral phase following disturbance and is dominated by perennial grasses such as Thurber's needlegrass, bluebunch wheatgrass, and great basin wildrye. Sprouting shrubs will decrease following fire but will soon increase in abundance while non-sprouting shrubs will take longer to recolonize. Western juniper will be reduced or eliminated following fire but may be returning as saplings in this community.

Community 1.3
Shrub dominant community

Following a lack of fire for an extended period, basin big sagebrush and western juniper will increase in abundance while perennial grasses will decrease.

Pathway P1.1a
Community 1.1 to 1.2

Fire occurs with enough severity to kill most of the shrub community

Pathway P1.1b
Community 1.1 to 1.3

Time and lack of disturbance, such as fire, facilitates an increase in the shrub and tree overstory.

Pathway P1.2a
Community 1.2 to 1.1

Time and lack of disturbance, such as fire, allows for regeneration of the shrub community.

Pathway P1.3a
Community 1.3 to 1.2

Fire occurs with enough severity to kill most of the shrub and tree community

State 2
Current Potential State

This state is similar to the Reference State. Ecological function has not changed fundamentally, however the resiliency of the site has been reduced by the presence of invasive weeds. Additionally, livestock herbivory may be present as a disturbance process and changes in climate may be altering ecological dynamics. Non-native plant species may increase in abundance but will not become dominant or control ecological processes within this state. These species 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 are maintained by elements of ecosystem structure and function such as the presence of all structural and functional groups, and retention of organic matter and nutrients. Positive feedbacks driven by plant community invasion decrease ecosystem resilience and stability of the state. These include exotic plant species' high seed output, persistent seed bank, rapid growth rate, ability to cross pollinate, and adaptations for seed dispersal. Plant community phase changes are primarily driven by infrequent fire, periodic drought and ungulate herbivory.

Dominant plant species

- basin big sagebrush (*Artemisia tridentata ssp. tridentata*), shrub
- Thurber's needlegrass (*Achnatherum thurberianum*), grass
- bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*), grass

Community 2.1

Current potential plant communities mirror those of the above Reference State 1.0 yet with the addition of a low level of invasive exotic plant invasion and influences of livestock herbivory. Livestock herbivory may result in decreases in deep rooted perennial grasses, and related increases in shallow rooted perennial grasses (such as Sandberg's bluegrass) and shrubs, among other changes.

State 3
Shrub State

Within this state, site resources are primarily controlled by shrub species. Native perennial grass composition has been reduced considerably. Sprouting and non-sprouting shrubs are dominant and western juniper is often present. Exotic herbaceous species may occur.

Dominant plant species

- basin big sagebrush (*Artemisia tridentata ssp. tridentata*), shrub
- broom snakeweed (*Gutierrezia sarothrae*), shrub
- rabbitbrush (*Chrysothamnus*), shrub

Community 3.1

Multiple plant community phases are likely within this state, influenced by livestock herbivory and fire. Sprouting species such as rabbitbrush and broom snakeweed as well as non-sprouting species such as big sagebrush are dominant on the site. Western juniper is present. Invasive annual grasses such as cheatgrass and medusahead are

likely.

State 4
Invaded State

Within this state, site resources are primarily controlled by exotic annual and perennial herbaceous species. Native perennial grass composition has been greatly diminished. Shrub species and western juniper may also be present.

Dominant plant species

- broom snakeweed (*Gutierrezia sarothrae*), shrub
- cheatgrass (*Bromus tectorum*), grass
- medusahead (*Taeniatherum caput-medusae*), grass

Community 4.1

Multiple plant communities are possible within this state, all of which are dominated by invasive annual grasses such as cheatgrass and medusahead as well as invasive annual and perennial forbs. Invader shrub species such as broom snakeweed may also be common

State 5
Tree State

Within this state, site resources are primarily controlled by western juniper dominance. Native perennial grass and shrub composition have been greatly diminished and as canopy closure progresses will be further reduced. Exotic annual plant species are likely.

Dominant plant species

- western juniper (*Juniperus occidentalis*), tree

Community 5.1

This state may host multiple communities according to canopy cover and density of western juniper. As canopy closure progresses, cover of shrubs and perennial grasses will decrease, bare ground will increase and hydrological function will be dramatically altered.

State 6
Seeded State

Within this state, site resources are primarily controlled by introduced range grasses such as crested wheatgrass (*Agropyron cristatum*). Multiple community phases may occur within this state and will include different compositions of native and invasive shrub and grass species and western juniper. Similar to ecological dynamics within other states of this site, shrub species and western juniper will increase with greater time since fire and herbivory pressure. While introduced range grasses may provide some analogous ecological functions to native perennial grasses, they may outcompete native grasses in the long-term.

Dominant plant species

- crested wheatgrass (*Agropyron cristatum*), grass

Transition T1A
State 1 to 2

Introduction of non-native plants

Transition T2A
State 2 to 3

Chronic improperly managed grazing or prolonged time without fire sufficient enough for the perennial grass seedbank to diminish.

Transition T2B
State 2 to 4

Catastrophic fire, soil disturbing treatments or prolonged improperly managed grazing in the presence of non-native annual species.

Transition T2C
State 2 to 5

Time and lack of disturbance allows for maturation of the tree community, possibly in combination with improperly managed grazing

Restoration pathway R3A
State 3 to 2

Shrub management and seeding of native species coupled with minimal soil disturbance, potentially requiring the use of herbicide.

Context dependence. Risk of failure may be high due to droughty nature of the site and low resilience.

Transition T3A
State 3 to 4

Catastrophic fire, failed rehabilitation treatment or prolonged improperly managed grazing in the presence of annual nonnative grasses.

Transition T3B
State 3 to 5

Time and lack of disturbance allows for maturation of the tree community. May be combined with inappropriate grazing management.

Restoration pathway R3B
State 3 to 6

Shrub management and seeding species coupled with minimal soil disturbance, potentially requiring the use of herbicide.

Context dependence. Risk of failure may be high due to droughty nature of the site and low resilience.

Restoration pathway R4A
State 4 to 6

Reduction of annual grasses through herbicide use and seeding of desired species.

Context dependence. Risk of failure may be high due to droughty nature of the site and low resilience.

Restoration pathway R5B
State 5 to 3

Tree removal with minimal soil disturbance

Transition T5A

State 5 to 4

Catastrophic fire, multiple fires or failed rehabilitation attempt.

Restoration pathway R5A
State 5 to 6

Tree removal and seeding of desired species; potentially including herbicide use.

Context dependence. Risk of failure may be high due to droughty nature of the site, low resilience and potential for soil disruption from tree removal.

Transition T6A
State 6 to 3

Prolonged improperly managed grazing or lack of fire for an extended interval in the presence of a shrub component.

Transition T6B
State 6 to 4

Catastrophic fire or prolonged inappropriate grazing management in the presence of non-native annual grasses.

Transition T6C
State 6 to 5

Extended time without fire with western juniper present.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Perennial Grasses**			1125–1500	
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	900–1050	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	150–225	–
	basin wildrye	LECI4	*Leymus cinereus*	75–225	–
3	**Other Perennial Grasses**			30–75	
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–30	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–30	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–30	–
	squirreltail	ELEL5	*Elymus elymoides*	0–30	–
Forb					
4	**Forbs**			30–120	
	common yarrow	ACMI2	*Achillea millefolium*	0–30	–
	milkvetch	ASTRA	*Astragalus*	0–30	–
	virgin phacelia	PHCE	*Phacelia cephalotes*	0–30	–
	gooseberryleaf globemallow	SPGR2	*Sphaeralcea grossulariifolia*	0–30	–
	Blue Mountain prairie clover	DAOR2	*Dalea ornata*	0–30	–
	Bruneau mariposa lily	CABR4	*Calochortus bruneaunis*	0–30	–
	sunflower	HELIA3	*Helianthus*	0–30	–
Shrub/Vine					
2	**Shrubs**			45–150	
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	24–180	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	15–30	–
5	**Other Shrubs**			15–45	
	antelope bitterbrush	PUTR2	*Purshia tridentata*	0–15	–
	rabbitbrush	CHRYS9	*Chrysothamnus*	0–15	–
	purple sage	SADO4	*Salvia dorrii*	0–15	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0–15	–

Animal community

Wildlife: This site is home to a variety of small herbivores, birds, and their associated predators. This site is mainly a foraging area for the larger wildlife. Broom snakeweed is considered to provide poor quality browse to most ungulates but may be utilized by mule deer, pronghorn and numerous small mammals and birds. Broom snakeweed provides cover and nesting sites for small birds and mammals, and in Oregon has been found to provide nesting habitat for Columbia Basin burrowing owls. The tall stature of great basin wildrye provides excellent cover for small animals and birds, quality nesting habitat for upland birds, as well as important feed for native herbivores. Big sagebrush leaves and seeds provide high forage value for numerous large mammals and is especially important to wildlife during winter in many areas. Many birds, small mammals and invertebrates depend on sagebrush for habitat and feed as well. Thurber's needlegrass provides forage for livestock and wildlife including large ungulates and small mammals. Bluebunch wheatgrass is one of the most important perennial grasses for forage for livestock and wildlife in the Western United States (Zlatnik 1999).

Grazing: Livestock grazing is suitable for this site as long as management objectives include the improvement or

maintenance of this site. This site has the potential to produce a large amount of high quality forage yet it is easy to overuse this site and cause a shift in vegetation that is difficult to change. Great basin wildrye can be a high forage producer, but since growing points are elevated it is susceptible to damage from defoliation if it is grazed during spring and summer. Bluebunch wheatgrass is considered moderately grazing tolerant during dormancy, and is very sensitive to damage from defoliation during periods of active growth and is deferment of grazing is suggested until at least the late boot stage by some. Thurber's needlegrass has been found to decrease under heavy grazing and increase when protected from grazing, although the opposite has been found to occur in one instance (Archer 2000). It can be toxic to livestock in large quantities and generally provides little browse. While broom snakeweed may be used by livestock it can be toxic in large quantities and generally provides little browse.

Type locality

Location 1: Wheeler County, OR	
Township/Range/Section	T7S R19E S34
General legal description	Camp Hancock entrance (80% similarity index)
Location 2: Wheeler County, OR	
Township/Range/Section	T7S R19E S35
General legal description	Canyon at picnic area-Fossil Beds National Park, Clarno Unit

References

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USNVC [United States National Vegetation Classification]. 2017 (Date accessed). United States National Vegetation Classification Database V2.01. Federal Geographic Data Committee, Vegetation Subcomittee, Washington DC.

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Approval

Kirt Walstad, 12/13/2023

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	04/28/2024
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

2. **Presence of water flow patterns:** None to some in interspaces

3. **Number and height of erosional pedestals or terracettes:** None

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

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None to some in interspaces, moderate 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= 3-5

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Very deep, well drained ashy loams, fine sandy loams, very cobbly loams clay loams, and loams: 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:** Significant ground cover (60-70%) and gentle slopes (1-8%) effectively 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: Thurber needlegrass > bluebunch wheatgrass > other grasses> 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: 1800, Normal: 1500, Unfavorable: 1200 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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