# Ecological site R010XA024OR Pumice North 8-10 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 Idaho fescue (Festuca idahoensis), bluebunch wheatgrass (Pseudoroegneria spicata) with an overstory of mountain big sagebrush (Artimesia tridentata ssp. vaseyana) and sparse old growth western juniper (Juniperus occidentalis). Abiotically, this site is characterized by moderately deep, pumice and ash influenced soils occurring primarily on north aspects. The high ash content of these soils increases available water content and effective precipitation thereby facilitating the presence of species such as Idaho fescue and mountain big sagebrush. The soil climate is Mesic/Aridic. Historically, plant community dynamics were driven by disturbances such as fire, drought and insect/disease. Presently, reference conditions are less common and current dynamics are influenced by the spread of invasive species, infill of western juniper, livestock grazing pressures and fire suppression.

## Associated sites

| | |
|---|---|
| R010XA007OR | **Juniper Pumice South 9-12 PZ**<br>South aspects receiving higher precipitation |
| R010XA022OR | **Juniper Lava Blisters 8-10 PZ**<br>Occupying adjacent lava blisters |
| R010XA027OR | **Juniper Pumice Flat 8-10 PZ**<br>Occupying adjacent low slope, non-aspect positions |

## Similar sites

| | |
|---|---|
| **R010XA026OR** | **Juniper Pumice North 10-12 PZ**<br><br>Higher precipitation |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | (1) *Juniperus occidentalis* |
| Shrub | (1) *Artemisia tridentata ssp. vaseyana* |
| Herbaceous | (1) *Festuca idahoensis*<br>(2) *Pseudoroegneria spicata ssp. spicata* |

## Physiographic features

This site occurs on moderate to steep, northerly slopes (ranging to east and west in some areas) of low hills, buttes and plateau rims. Examples of the site are often interspersed with rubble on the slopes below rims. No water table is present within the upper 100 inches of soil and the site is not subject to ponding or flooding.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Plateaus or tablelands > Rim<br>(2) Plateaus or tablelands > Hill<br>(3) Plateaus or tablelands > Butte<br>(4) Plateaus or tablelands > Escarpment |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 760 – 1,220 m |
| Slope | 20 – 70 % |
| Water table depth | 250 cm |
| Aspect | W, NW, N, NE, E |

## Climatic features

This site has an aridic soil moisture regime and a mesic soil temperature regime. Mean annual precipitation ranges from 8 to 10 inches (200 to 250 mm) and falls primarily as rain and snow from November through April. The frost-free period ranges from 50 to 90 days. Localized convection storms occasionally occur during the summer. The optimum period for plant growth is April through June. Climate graphs are based on the nearest available climate stations to modal site locations and are provided to indicate general climate patterns.

**Table 3 Representative climatic features**

| | |
|---|---|
| Frost-free period (characteristic range) | 50-90 days |
| Freeze-free period (characteristic range) | |
| Precipitation total (characteristic range) | 200-250 mm |
| Frost-free period (average) | 70 days |
| Freeze-free period (average) | |
| Precipitation total (average) | 230 mm |

- (1) PRINEVILLE [USC00356883], Prineville, OR
- (2) REDMOND ROBERTS FLD [USW00024230], Redmond, OR

### Influencing water features

This site is not influenced by or associated with water features.

### Wetland description

N/A

### Soil features

The soils of this site are influenced by pumice/ash fallout from Mt. Mazama. They are usually moderately deep, loamy or sandy loam, gravelly or cobbly, and well drained. Some areas are greater in pumice/ash content and deeper than typical for the soil described here.

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Eolian deposits – volcanic rock<br>(2) Colluvium – volcanic rock<br>(3) Residuum – volcanic rock |
| Surface texture | (1) Very cobbly loam<br>(2) Ashy sandy loam |
| Family particle size | (1) Loamy<br>(2) Loamy-skeletal<br>(3) Coarse-loamy |

| | |
|---|---|
| Drainage class | Well drained |
| Permeability class | Moderately slow |
| Depth to restrictive layer | 50 – 100 cm |
| Soil depth | 50 – 100 cm |
| Surface fragment cover <=3" | 10 – 20 % |
| Surface fragment cover >3" | 20 – 50 % |
| Available water capacity (0-101.6cm) | 5.08 – 10.16 cm |
| Calcium carbonate equivalent (0-101.6cm) | Not specified |
| Electrical conductivity (0-101.6cm) | Not specified |
| Sodium adsorption ratio (0-101.6cm) | Not specified |
| Soil reaction (1:1 water) (0-101.6cm) | 6.6 – 7.3 |
| Subsurface fragment volume <=3" (10.2-101.6cm) | 0 – 30 % |
| Subsurface fragment volume >3" (10.2-101.6cm) | 10 – 60 % |

### Ecological dynamics

The reference plant community of this site is dominated by Idaho fescue mixed with bluebunch wheatgrass and a variety of other grasses and forbs. The site supports an open stand of mountain big sagebrush and occasional old growth western juniper.

Wildfires which remove more than single trees are uncommon but can occur and severely damage sensitive species like Idaho fescue and remove big sagebrush. Western juniper is intolerant of fire and historically was located in areas with minimal understory due primarily to soil characteristics; therefore, fire was very infrequent, and when it did occur it was low intensity. With the increased suppression of wildfire and introduction of livestock grazing which reduces ground fuels and understory competition, regeneration and establishment of western juniper has expanded into sites previously dominated by big sagebrush and herbaceous vegetation (Burns and Honkala 1990). The expansion of western juniper has been well documented. Probable causes include climate, altered fire frequencies and grazing of flammable ground fuels (Miller and Rose 1995). Fire resistance depends on age of the tree: seedlings, saplings and poles are highly vulnerable to fire. Mature trees have some resistance to fire due to lack of fuels near the trunk, relatively thick bark, and foliage which is fairly high above the ground (Burns and Honkala 1990).

Disturbance outside the normal range of variability converts the understory to primarily bluebunch wheatgrass, squirreltail, and forbs. Weeds like cheatgrass and willow weed begin to invade the site. Cheatgrass is the most common invasive annual grass to invade this site. Invasive grasses displace desirable perennial grasses, reduce livestock forage, and accumulate large fuel loads that foster frequent fires (Davies and Svejcar 2008). Invasion by annual grasses can alter the fire cycle by increasing fire size, fire season length, rate of spread, numbers of individual fires, and likelihood of fires spreading into native or managed ecosystems (D'Antonio and Vitousek 1992, Brooks et al. 2004). While historical fire return intervals are estimated at up to 100 years, areas dominated with cheatgrass are estimated to have a fire return interval of 3 to 5 years (Whisenant 1990). The mechanisms by which invasive annual grasses alter fire regimes likely interact with climate. For example, cheatgrass cover and biomass vary with climate (Chambers et al., 2007) and are promoted by wet and warm conditions during the fall and spring. Invasive annual species have been shown able to take advantage of high N availability following fire through higher growth rates and increased seedling established relative to native perennial grasses (Monaco et al. 2003).

Adapted from: Stringham et al., 2017

## State and transition model

## Additional community tables

**Table 5. Community 1.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | **Perennial Grasses** | | | 532-841 | |
| | Idaho fescue | FEID | *Festuca idahoensis* | 364-560 | – |
| | bluebunch wheatgrass | PSSPS | *Pseudoroegneria spicata ssp. spicata* | 168-280 | – |
| 2 | **Other Perennial Grasses** | | | 80-135 | |
| | Thurber's needlegrass | ACTH7 | *Achnatherum thurberianum* | 22-34 | – |
| | Sandberg bluegrass | POSE | *Poa secunda* | 22-34 | – |
| | bluegrass | POA | *Poa* | 22-34 | – |
| | prairie Junegrass | KOMA | *Koeleria macrantha* | 11-28 | – |
| | needle and thread | HECO26 | *Hesperostipa comata* | 1-6 | – |
| **Forb** | | | | | |
| 4 | **Forbs** | | | 17-34 | |
| | fleabane | ERIGE2 | *Erigeron* | 6-11 | – |
| | tapertip hawksbeard | CRAC2 | *Crepis acuminata* | 6-11 | – |
| | milkvetch | ASTRA | *Astragalus* | 6-11 | – |
| 5 | **Other Forbs** | | | 10-28 | |
| | lupine | LUPIN | *Lupinus* | 1-6 | – |
| | common yarrow | ACMI2 | *Achillea millefolium* | 2-6 | – |
| | agoseris | AGOSE | *Agoseris* | 1-6 | – |
| | spreading phlox | PHDI3 | *Phlox diffusa* | 2-6 | – |
| | Indian paintbrush | CASTI2 | *Castilleja* | 1-2 | – |
| | nineleaf biscuitroot | LOTR2 | *Lomatium triternatum* | 1-2 | – |
| | prairie flax | LILEL2 | *Linum lewisii var. lewisii* | 1 | – |

| | | | | | |
|---|---|---|---|---|---|
| **Shrub/Vine** | | | | | |
| 7 | **Shrubs** | | | 112-168 | |
| | mountain big sagebrush | ARTRV | *Artemisia tridentata ssp. vaseyana* | 112-168 | – |
| 8 | **Other Shrubs** | | | 16-29 | |
| | yellow rabbitbrush | CHVI8 | *Chrysothamnus viscidiflorus* | 11-17 | – |
| | snow buckwheat | ERNI2 | *Eriogonum niveum* | 1-6 | – |
| | desert gooseberry | RIVE | *Ribes velutinum* | 1-2 | – |
| | slender buckwheat | ERMI4 | *Eriogonum microthecum* | 1-2 | – |
| | spineless horsebrush | TECA2 | *Tetradymia canescens* | 1-2 | – |
| **Tree** | | | | | |
| 6 | **Trees** | | | 28-56 | |
| | western juniper | JUOC | *Juniperus occidentalis* | 28-56 | – |

### Animal community

Livestock grazing has been a historic use for this site. Plant community structure (Reference) consists of an open juniper canopy (less than 35 ft) with low shrubs (3 to 5 ft) and upland bunchgrass/forbs for wildlife species. These species include mule deer during fall-spring, coyotes, a variety of birds and small mammals. Natural water sources for livestock and wildlife are usually absent from this site.

### Hydrological functions

Runoff may occur due to the steepness of slope. Hydrologic Group for soils of this site is group C. Significant amounts of precipitation are intercepted by juniper trees and lost by evaporation to the atmosphere, especially after light storms. However, natural stands (Reference) and understories are in balance with these environmental factors.

### Recreational uses

hunting, hiking

### Wood products

only juniper wood products

### Other products

watershed values

### Inventory data references

Vegetation-Soil Units in the Central Oregon Juniper Zone, by Richard S. Driscoll. PNW Forest & Range Experiment Station, Research Paper, PNW-19, 1964.

### Type locality

| | |
|---|---|
| Location 1: Crook County, OR | |
| Township/Range/Section | T14s R15E S27-SE |
| General legal description | NW of Prineville- along River Rd. below rim of plateau |
| Location 2: Crook County, OR | |

| | |
|---|---|
| Township/Range/Section | T16S R15E S26-NW |
| General legal description | upper Swartz Canyon |

## References


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## Other references


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Miller, R. F., and J. A. Rose. 1995. Historic expansion of Juniperus occidentalis (western juniper) in southeastern Oregon. The Great Basin Naturalist, 37-45.

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Available at: http://www.cabnr.unr.edu/resources/MLRA.aspx


## Contributors

Jenni Moffitt, general edits and updates 8/2020
Tamzen Stringham et al. (2017), Ecological Dynamics and S&T Model
Gene Hickman, original author
Andrew Neary - additional minor PES updates 2021

## Approval

Kirt Walstad, 4/01/2025

## Rangeland health reference sheet

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

| | |
|---|---|
| Author(s)/participant(s) | |
| Contact for lead author | |
| Date | 02/14/2025 |
| Approved by | |
| Approval date | |
| Composition (Indicators 10 and 12) based on | Annual Production |

### Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

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

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

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

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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:**

    **Sub-dominant:**

    **Other:**

    **Additional:**

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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):**

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:**

17. **Perennial plant reproductive capability:**