Ecological site R025XY032OR NORTH SLOPES 11-13 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): 025X–Owyhee High Plateau

The Owyhee High Plateau, MLRA 25, lies within the Intermontane Plateaus physiographic province. The southern half is found in the Great Basin while the northern half is located in the Columbia Plateaus. The southern section of the Owyhee High Plateau is characterized by isolated, uplifted fault-block mountain ranges separated by narrow, aggraded desert plains. This geologically older terrain has been dissected by numerous streams draining to the Humboldt River. The northern section forms the southern boundary of the extensive Columbia Plateau basalt flows. Deep, narrow canyons drain to the Snake River across the broad volcanic plain. This MLRA is characteristically cooler and wetter than the neighboring MLRAs of the Great Basin. Elevation ranges from 3,000 to 7,550 feet on rolling plateaus and in gently sloping basins. It is more than 9,840 feet on some steep mountains. The average annual precipitation in most of this area is typically 11 to 22 inches. It increases to as much as 49 inches at the higher elevations. Precipitation occurs mainly as snow in winter. The supply of water from precipitation and streamflow is small and unreliable, except along major rivers. Streamflow depends largely on accumulated snow in the mountains. The dominant soil orders in this MLRA are Aridisols and Mollisols. The soils in the area dominantly have a mesic or frigid temperature regime and an aridic, arid bordering on xeric, or xeric moisture regime. Most of the soils formed in mixed parent material. Volcanic ash and loess mantle the landscape. Surface soil textures are loam and silt loam, and have ashy texture modifiers in some cases. Argillic horizons occur on the more stable landforms.

Ecological site concept

This ecological site is on north facing side slopes of plateaus and tablelands associated with volcanic plateau landscapes. Elevations range from 2,700 to 5,000 feet (823 to 1,524 meters) and slopes range from 12 to 70 percent. The soils associated with this site are moderately deep to bedrock. The soil climate is mesic to mesic near frigid (soil temperature regime) and aridic bordering xeric (soil moisture regime). Since this site is on north aspects, it receives less solar insolation and is slightly wetter and colder than its non-aspect counterpart, resulting in increased resistance and resilience, and annual production. The reference plant community is characterized by basin big sagebrush and Idaho fescue, bluebunch wheatgrass is also common in the understory.

Associated sites

R025XY012OR	**LOAMY 11-13 PZ**
R025XY020OR	**SOUTH SLOPES 11-13 PZ**
R025XY038OR	**CLAYPAN NORTH SLOPES 11-13 PZ**

Similar sites

R025XY034OR	**SHRUBBY NORTH SLOPES 13-16 PZ** Cooler and wetter; higher production; increased prevalence of bitterbrush and mountain big sagebrush; bedrock is more fractured, possibly different geologies - more likely to occur on paralithic than lithic soils.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata subsp. tridentata*
Herbaceous	(1) *Festuca idahoensis* (2) *Pseudoroegneria spicata subsp. spicata*

Physiographic features

This ecological site is associated with north facing canyon side slopes and tablelands in lava plateau landscapes. Slopes range from 12 to 70 percent with elevations of 2,700 to 5,000 feet (823 to 1,524 meters).

Table 2. Representative physiographic features

Landforms	(1) Lava plateau > Mountain slope
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	820 – 1,520 m
Slope	10 – 70 %
Water table depth	250 cm
Aspect	NW, N, NE

Climatic features

The climate associated with this site is defined by hot dry summers and cold snowy winters. This is site is characterized by less than 120 freeze-free days annually. Mean annual precipitation is 10 inches (25 cm), with effective precipitation between 11 to 13 inches (28 to 33 cm). Averages snowfall is between 25 to 50 inches (63 to 127cm) per year.

*The above data was provided by the Danner, Rockville, and Mc Dermitt climate station based on elevation and precipitation. Additionally used to estimate climate normals is the National Soil Information System.

Table 3 Representative climatic features

Frost-free period (characteristic range)	70-110 days
Freeze-free period (characteristic range)	60-120 days
Precipitation total (characteristic range)	250-280 mm
Frost-free period (actual range)	30-120 days
Freeze-free period (actual range)	40-130 days
Precipitation total (actual range)	230-280 mm
Frost-free period (average)	80 days
Freeze-free period (average)	90 days
Precipitation total (average)	250 mm

- (1) DANNER [USC00352135], Jordan Valley, OR
- (2) ROCKVILLE 5 N [USC00357277], Adrian, OR
- (3) MC DERMITT 26 N [USC00355335], Jordan Valley, OR

Influencing water features

This site is not influenced by adjacent wetlands, streams or run-on.

Wetland description

N/A

Soil features

The soils associated with this site are well drained and formed in residuum, colluvium, slope alluvium derived from volcanic rock and ash. Surface textures are typically loamy. The soil profile is characterized by a dark surface horizon (mollic epipedon) and a layer of clay accumulation (argillic horizon) within 20 inches (51cm) of the soil surface. Soil are moderately deep with bedrock, ranging from weathered andesite to unweathered rhyolite, occurring within 40 inches (102cm) of the surface.

Representative soil components associated with this ecological site include Perla and Lerrow.

Table 4. Representative soil features

Parent material	(1) Colluvium – volcanic rock (2) Residuum – volcanic rock (3) Alluvium – volcanic rock

Surface texture	(1) Loam (2) Gravelly loam
Family particle size	(1) Fine
Drainage class	Well drained
Permeability class	Slow to moderately slow
Soil depth	50 – 100 cm
Surface fragment cover <=3"	10 – 20 %
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	4.32 – 9.4 cm
Soil reaction (1:1 water) (Depth not specified)	6.1 – 7.3
Subsurface fragment volume <=3" (Depth not specified)	10 – 20 %
Subsurface fragment volume >3" (Depth not specified)	10 – 20 %

Ecological dynamics

The reference plant community is dominated by basin big sagebrush with an understory of Idaho fescue. Bluebunch wheatgrass is also common in the understory. The site has moderately low resilience to disturbance and resistance to invasion. Resilience is a system’s capacity to regain its structure, processes, and function following stressors or disturbance (e.g. drought or fire). Resistance is the capacity of the system to retain its structure, processes, and function despite stressors or disturbances (including pressure from invasive species) (Chambers 2014). Resilience increases with elevation, aspect, increased precipitation and increased nutrient availability (Stringham et al. 2015); where greater resource availability and more favorable environmental conditions exist for plant growth and reproduction (Chambers 2014).

This ecological site’s lower effective precipitation (aridic bordering xeric soil moisture regime) limits site productivity; though since the site occurs on north aspects, it receives less solar insolation and thus is slightly wetter and colder than its non-aspect counterpart. The higher effective precipitation experienced on north slopes results in higher annual production and less open space for establishment of invasive annual grasses, increasing site resilience. The timing of precipitation on this site still favors invasive annual grasses that are particularly well adapted to cool wet winters and warm dry summers; beginning growth and utilizing resources prior to native species breaking dormancy. The site’s warm soil temperature regime (mesic to mesic near frigid) gives the site moderately low resistance to disturbance, though being north aspect slightly increases resistance compared to a non-aspect site.

This ecological site is dominated by deep-rooted cool season, perennial bunchgrasses and long-lived shrubs (50+ years) with high root to shoot ratios. The dominant shrubs usually root to the full depth of the winter-spring soil moisture recharge, which ranges from 1.0 to over 3.0 m (Dobrowolski et al. 1990). Root length of mature sagebrush plants was measured to a depth of 2 meters in alluvial soils in Utah (Richards and Caldwell 1987). These shrubs have a flexible generalized root system with development of both deep taproots and laterals near the surface (Comstock and Ehleringer 1992).

Periodic drought regularly influences sagebrush ecosystems and drought duration and severity has 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).

Big sagebrush and antelope bitterbrush are generally long-lived; therefore it is not necessary for new individuals to recruit every year for perpetuation of the stand. Infrequent large recruitment events and simultaneous low, continuous recruitment is the foundation of population maintenance (Noy-Meir 1973). Survival of the seedlings is dependent on adequate moisture conditions.

In the Great Basin, the majority of annual precipitation is received during winter and early spring. This continental semiarid climate regime favors growth and development of deep-rooted shrubs and herbaceous cool season plants using the C3 photosynthetic pathway (Comstock and Ehleringer 1992). Winter precipitation and slow melting of snow results in deeper percolation of moisture into the soil profile. Herbaceous plants, more shallow-rooted than shrubs, grow earlier in the growing season and thrive on spring rains, while the deeper rooted shrubs lag in phenological development because they draw from deeply infiltrating moisture from snowmelt the previous winter.

Native insect outbreaks are also important drivers of ecosystem dynamics in sagebrush communities. Climate is generally believed to influence the timing of insect outbreaks especially with regard to Aroga moth (Aroga websteri), a sagebrush defoliator. Aroga moth infestations have occurred in the Great Basin in the 1960s, early 1970s, and have been ongoing in Nevada since 2004 (Bentz, et al 2008). Thousands of acres of big sagebrush have been impacted, with partial to complete die-off observed. Aroga moth can partially or entirely kill individual plants or entire stands of big sagebrush (Furniss and Barr 1975).

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 introduction of annual weedy species, like cheatgrass, may cause an increase in fire frequency and eventually lead to an annual state. Conversely, as fire frequency decreases, sagebrush will increase and with inappropriate grazing management the perennial bunchgrasses and forbs may be reduced.

Fire Ecology:
Big sagebrush is killed by fire and does not resprout (Blaisdell 1953). Post fire regeneration occurs from seed and will vary depending on site characteristics, seed source, and fire characteristics. Big sagebrush reinvades a site primarily by off-site seed or seed from plants that survive in unburned patches. Approximately 90% of big sagebrush seed is dispersed within 30 feet (9 m) of the parent shrub (Goodrich et al. 1985) with maximum seed dispersal at approximately 108 feet (33 m) from the parent shrub (Shumar and Anderson 1986). Mountain big sagebrush seedlings can grow rapidly and may reach reproductive maturity within 3 to 5 years (Bunting et al. 1987), while basin big sagebrush tends to be slower to regenerate, and it is often eliminated by frequent fires (Bunting et al. 1987). Regeneration of basin big sagebrush after stand replacing fires is difficult and dependent upon proximity of residual mature plants and favorable moisture conditions (Johnson and Payne 1968, Humphrey 1984).

The effect of fire on bunchgrasses relates to culm density, culm-leaf morphology, and the size of the plant. The initial condition of bunchgrasses within the site along with seasonality and intensity of the fire all factor into the individual species response. For most forbs and grasses the growing points are located at or below the soil surface providing relative protection from disturbances which decrease above ground biomass, such as grazing or fire. Thus, fire mortality is more correlated to duration and intensity of heat which is related to culm density, culm-leaf morphology, size of plant and abundance of old growth (Wright 1971, Young 1983).

Idaho fescue response to fire varies with condition and size of the plant, season and severity of fire, and ecological conditions. Mature Idaho fescue plants are commonly reported to be severely damaged by fire in all seasons (Wright et al. 1979). Initial mortality may be high (in excess of 75%) on severe burns, but usually varies from 20 to 50% (Barrington et al 1988). Rapid burns have been found to leave little damage to root crowns, and new tillers are produced with onset of fall moisture (Johnson et al. 1994). However, Wright and others (1979) found the dense, fine leaves of Idaho fescue provided enough fuel to burn for hours after a fire had passed, thereby killing or seriously injuring the plant regardless of the intensity of the fire (Wright et al. 1979).

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, a minor component of this ecological site, 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. Reduced bunchgrass vigor or density provides an opportunity for Sandberg bluegrass expansion and/or cheatgrass and other invasive species to occupy interspaces, leading to increased fire frequency and potentially an annual plant community.

Adapted from: Stringham, T.K., P. Novak-Echenique, P. Blackburn, D. Snyder, and A. Wartgow. 2015. Final Report for USDA Ecological Site Description State-and-Transition Models by Disturbance Response Groups, Major Land Resource Area 25 Nevada. University of Nevada Reno, Nevada Agricultural Experiment Station Research Report 2015-02. p. 569

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 Deep-Rooted Bunchgrasses**			1114-1459	
	Idaho fescue	FEID	*Festuca idahoensis*	706-863	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	392-549	–
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	16-47	–
2	**Perennial Shallow-Rooted Bunchgrass**			31-78	
	Sandberg bluegrass	POSE	*Poa secunda*	31-78	–
3	**Other Perennial Grasses**			0-94	
	squirreltail	ELEL5	*Elymus elymoides*	0-31	–
	basin wildrye	LECI4	*Leymus cinereus*	0-31	–
	Cusick's bluegrass	POCU3	*Poa cusickii*	0-31	–
Forb					
4	**Perennial Forbs**			31-63	
	milkvetch	ASTRA	*Astragalus*	16-31	–
	lupine	LUPIN	*Lupinus*	16-31	–
5	**Other Perennial Forbs**			0-63	
	desertparsley	LOMAT	*Lomatium*	0-16	–
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	0-16	–
	fleabane	ERIGE2	*Erigeron*	0-16	–
	common yarrow	ACMI2	*Achillea millefolium*	0-16	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	0-16	–
	phlox	PHLOX	*Phlox*	0-16	–
	buckwheat	ERIOG	*Eriogonum*	0-16	–
	stoneseed	LITHO3	*Lithospermum*	0-16	–
Shrub/Vine					
6	**Shrubs**			47-141	
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	31-110	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	16-31	–
7	**Other Shrubs**			0-47	

	antelope bitterbrush	PUTR2	*Purshia tridentata*	0-16	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0-16	–
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	0-16	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 10. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 12. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 13. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 14. Community 4.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Animal community

This site is suitable for grazing. Grazing management considerations include timing, duration and intensity of grazing. Overgrazing leads to an increase in sagebrush and a decline in understory plants like Idaho fescue and bluebunch wheatgrass. Squirreltail or Sandberg bluegrass will increase temporarily with further degradation. Invasion of annual weedy forbs and cheatgrass could occur with further grazing degradation, leading to a decline in squirreltail and bluegrasses and an increase in bare ground. A combination of overgrazing and prolonged drought leads to soil erosion, increased bare ground and a loss in plant production. Idaho fescue is valuable forage for livestock and wildlife. However, Idaho fescue decreases under heavy grazing by livestock (Eckert and Spencer 1986, Eckert and Spencer 1987) and wildlife (Gaffney 1941). Bluebunch wheatgrass is moderately grazing tolerant and is very sensitive to defoliation during the active growth period (Blaisdell and Pechanec 1949, Laycock 1967, Anderson and Scherzinger 1975). Herbage and flower stalk production was reduced with clipping at all times during the growing season; however, clipping was most harmful during the boot stage (Blaisdell and Pechanec 1949, Britton et al. 1990) Tiller production and growth of bluebunch was greatly reduced when clipping was coupled with drought (Busso and Richards 1995). Mueggler (1975) estimated that low vigor bluebunch wheatgrass may need up to 8 years rest to recover. Although an important forage species, it is not always the preferred species by livestock and wildlife. Reduced bunchgrass vigor or density provides an opportunity for Sandberg bluegrass expansion and/or cheatgrass and other invasive species such as halogeton (Halogeton glomeratus), bur buttercup (Ceratocephala testiculata) and annual mustards to occupy interspaces. Sandberg bluegrass increases under grazing pressure (Tisdale and Hironaka 1981) and is capable of co-existing with cheatgrass. Excessive sheep grazing favors Sandberg bluegrass; however, where cattle are the dominant grazers, cheatgrass often dominates (Daubenmire 1970). Thus, depending on the season of use, the grazer and site conditions, either Sandberg bluegrass or cheatgrass may become the dominant understory with inappropriate grazing management.

Inventory data references

Old SS Manuscripts, Range Site Descriptions, etc. Vale District BLM Ecological Site Inventory NASIS component and pedon data Range Site Descriptions Field knowledge of range-trained personnel

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Rangeland health reference sheet

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

Author(s)/participant(s)	Old SS Manuscripts, Range Site Descriptions, etc.
Contact for lead author	
Date	06/04/2026
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:**