USDA Natural Resources Conservation Service

Ecological site R025XY020OR
SOUTH SLOPES 11-13 PZ

Last updated: 4/25/2024
Accessed: 04/26/2024

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): 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 south facing side slopes of plateaus, tablelands, and canyonlands 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 to aridic bordering xeric (soil moisture regime). This site is on south aspects and therefore receives more solar insolation and thus is slightly drier and warmer than its non-aspect counterpart, resulting in reduced resistance and resilience and annual production.
The reference plant community is characterized by basin big sagebrush in the overstory and bluebunch wheatgrass in the understory.

Associated sites

R025XY012OR	**LOAMY 11-13 PZ**
R025XY021OR	**CLAYPAN SOUTH SLOPES 11-13 PZ**
R025XY032OR	**NORTH SLOPES 11-13 PZ**

R025XY038OR	**CLAYPAN NORTH SLOPES 11-13 PZ**

Similar sites

R025XY012OR	**LOAMY 11-13 PZ** slopes less than 15 percent
R025XY043ID	**LOAMY 11-13** soils with calcic horizon below 50cm

Table 1. Dominant plant species

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

Physiographic features

This ecological site is associated with volcanic tableland landscapes. It is commonly on south facing plateau and canyon side slopes. Slopes range from 12 to 70 percent with elevations of 2,700 to 5,000 feet (823 to 1,524 meters). This site has high runoff.

Table 2. Representative physiographic features

Landforms	(1) Tableland > Plateau (2) Canyon
Runoff class	High
Flooding frequency	None
Ponding frequency	None
Elevation	2,700–5,000 ft
Slope	12–70%
Water table depth	100 in
Aspect	W, SE, S, SW

Climatic features

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

The above data is averaged from the Danner, Rockville, and MC Dermitt climate stations, the Western Regional Climate Center (wrcc.dri.edu) and NASIS.

Table 3. Representative climatic features

Frost-free period (characteristic range)	43-112 days
Freeze-free period (characteristic range)	101-147 days
Precipitation total (characteristic range)	10-13 in
Frost-free period (actual range)	23-139 days
Freeze-free period (actual range)	65-161 days
Precipitation total (actual range)	5-15 in
Frost-free period (average)	89 days

Freeze-free period (average)	125 days
Precipitation total (average)	11 in

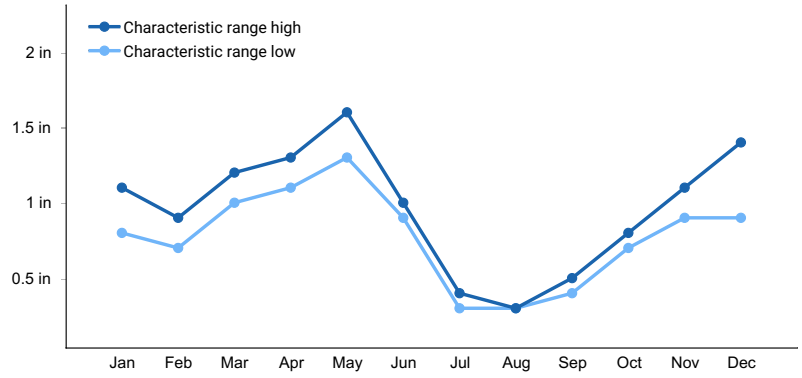


Figure 1. Monthly precipitation range

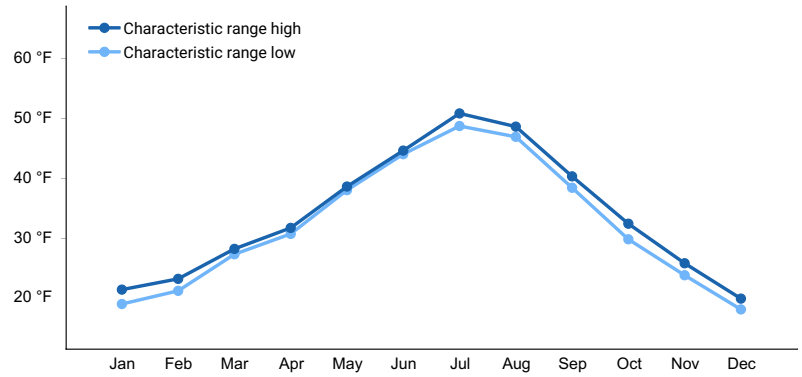


Figure 2. Monthly minimum temperature range

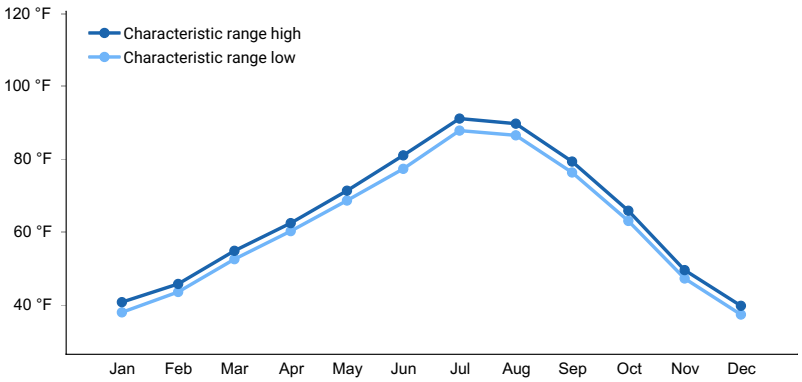


Figure 3. Monthly maximum temperature range

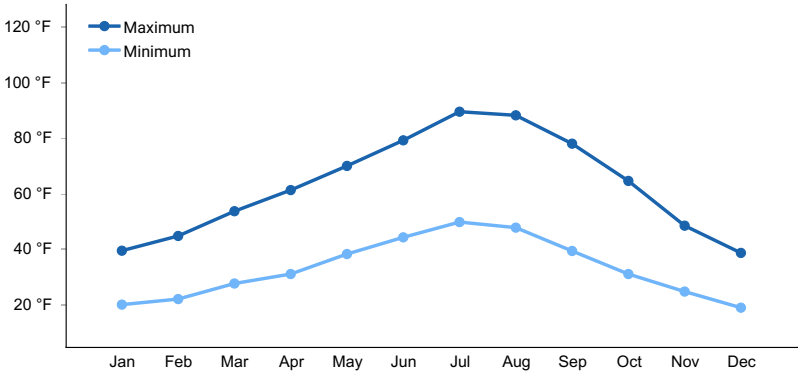


Figure 4. Monthly average minimum and maximum temperature

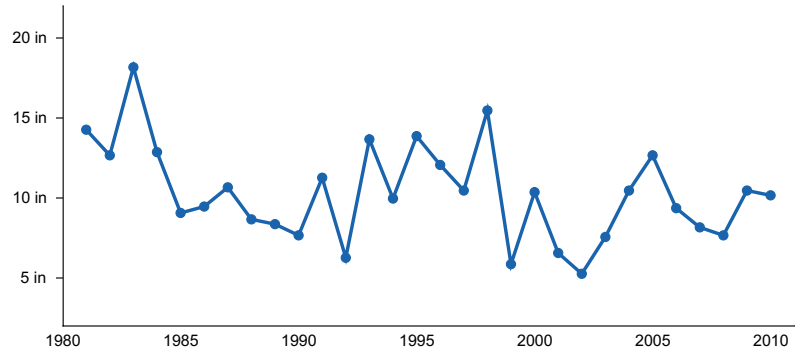


Figure 5. Annual precipitation pattern

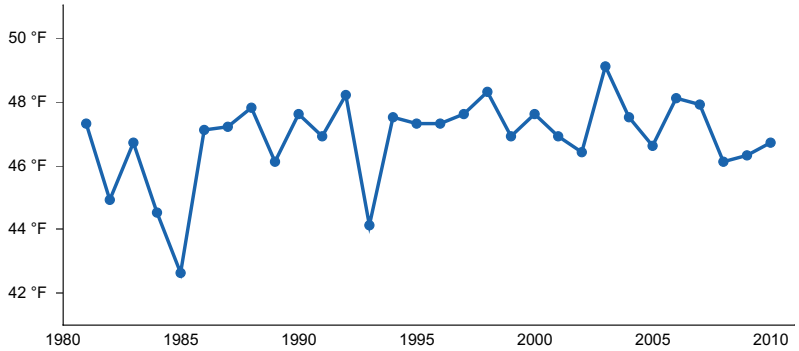


Figure 6. Annual average temperature pattern

Climate stations used

- (1) 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. No water table present.

Wetland description

N/A

Soil features

These soils are formed in residuum, colluvium, alluvium and loess derived from volcanic rock. Soils are moderately deep to hard bedrock and well drained. Surface textures range from gravelly to stony loam. The soil profile is characterized by a dark surface horizon (mollic epipedon) and layer of clay accumulation (argillic horizon) 8 to 13 inches (20 to 33cm) from the soil surface.

Representative soil components associated with this ecological site include Lithgow, Perla, and Ruclick.

Table 4. Representative soil features

Parent material	(1) Colluvium–volcanic rock (2) Loess
Surface texture	(1) Gravelly, ashy loam
Family particle size	(1) Fine (2) Fine-loamy
Drainage class	Well drained

Permeability class	Moderate
Depth to restrictive layer	20–40 in
Soil depth	20–40 in
Surface fragment cover <=3"	5–21%
Surface fragment cover >3"	15–25%
Available water capacity (0-40in)	4–6 in
Soil reaction (1:1 water) (0-40in)	6.6–7.2
Subsurface fragment volume <=3" (5-40in)	21–27%
Subsurface fragment volume >3" (5-50in)	10–17%

Ecological dynamics

The reference plant community is dominated by basin big sagebrush with an understory of bluebunch wheatgrass. The site has 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 to aridic bordering xeric soil moisture regime southern aspect) limits site productivity, resulting in more open space for establishment of invasive annual grasses. Since the site occurs on south aspects, it receives more solar insolation and thus is slightly drier and warmer than its non-aspect counterpart. Timing of precipitation also 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 low resistance to disturbance (Chambers 2014b). Furthermore, the increased solar insolation received by the site due to its southerly aspect makes this site warmer than its non-aspect counterpart and reduces overall site resistance.

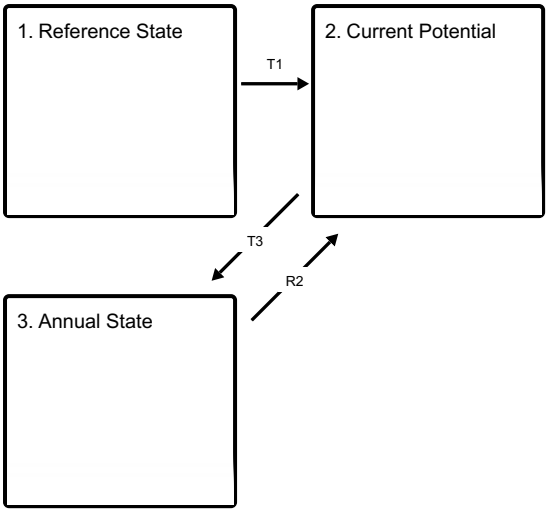
Herbivory has historically occurred on the site at low levels of utilization. Native herbivores include pronghorn antelope, elk, mule deer, sage grouse, lagomorphs and rodents. Livestock grazing has become prevalent across this site. Overutilization of resources due to grazing (from livestock, wildlife, and feral horses) can degrade the site and decrease forage availability and quality. This will lead to a decrease in perennial bunch grasses and an increase of invasive species (Williamson, 2020). Annual and perennial invasive species compete with desirable plants for moisture and nutrients.

Wildfire frequency across this site has historically been low. Sagebrush evolved with low intensity wildfire that left a mosaic of burned and unburned patches (Baker, 2006). Annual species such as cheatgrass and medusahead can be troublesome invaders on this site after wildfire, preventing perennial grass and shrub re-establishment. Invasive, annual plant communities increase wildfire frequency and intensity (Haubensak, 2009). This could cause the dominate shrub population to shift away from scabland sagebrush to a shrub population with quicker establishment.

High annual precipitation will increase the total plant production. Higher wildfire frequency following annual plant production can be expected due to a larger fuel load (Pilliod, 2017). Extended periods of drought significantly impact this site because of the grasses and shrubs that

State and transition model

Ecosystem states

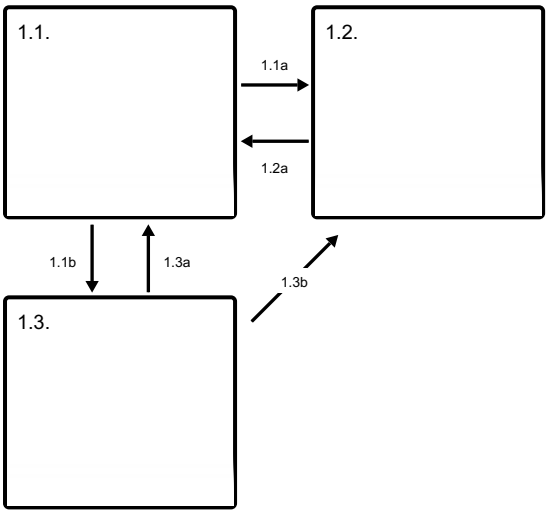


T1 - Introduction of annual non-native species.

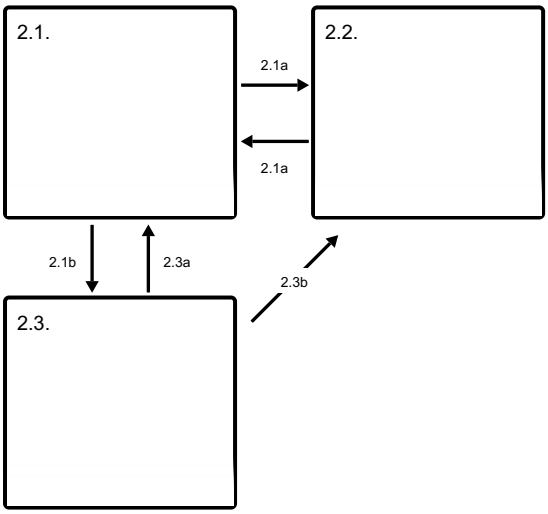
T3 - Repeated, widespread and severe fire.

R2 - Seeding with native species/prescribed grazing

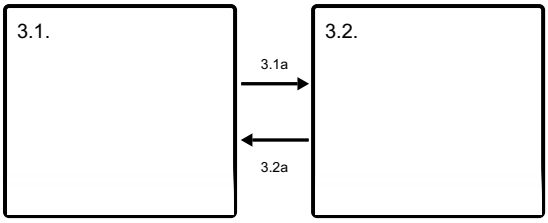
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Reference State

The Reference State is a representative of the natural range of variability under pristine conditions. 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

- basin big sagebrush (*Artemisia tridentata ssp. tridentata*), shrub
- bluebunch wheatgrass (*Pseudoroegneria spicata*), grass

Community 1.1

This community phase is characteristic of a mid-seral plant community and is dominated by sagebrush and native perennial grasses. Potential vegetative composition by weight is about 85 percent grasses, 5 percent forbs and 10 percent shrubs. Total vegetative cover averages 50 to 70 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	510	765	1020
Shrub/Vine	60	90	120
Forb	30	45	60
Total	**600**	**900**	**1200**

Community 1.2

This community phase is characterized by a post-disturbance, early seral, plant community. Sagebrush and other shrubs are reduced, or patchy. Perennial bunchgrasses and forbs dominate the visual aspect of the plant community. Disturbance tolerant shrubs will sprout from the root-crown following low and medium intensity wildfire and may begin to dominate the plant community 2 to 5 years post-disturbance.

Community 1.3

Absence of disturbance allows sagebrush to mature and dominate the plant community. Perennial bunchgrasses and forbs are reduced in both vigor and productivity due to competition for light, moisture and nutrient resources.

Pathway 1.1a
Community 1.1 to 1.2

Wildfire. Low severity wildfire creates a sagebrush/grass mosaic; higher intensity wildfires significantly reduce sagebrush cover and lead to early seral community dominated by grasses and forbs. Frequency and intensity of wildfire is primarily driven by cover and amount of herbaceous vegetation. Under the reference state conditions, wildfire return intervals are estimated to be between 20 and 50 years.

Pathway 1.1b
Community 1.1 to 1.3

Time, absence of disturbance, and natural regeneration over time allows sagebrush to dominate site resources. This community phase pathway may be coupled with drought and/or herbivory further reducing herbaceous understory.

Pathway 1.2a
Community 1.2 to 1.1

Time, absence of disturbance and natural regeneration over time allows sagebrush to recover. Recovery of sagebrush depends on the availability of a local seed source (patches of mature shrubs) as well as precipitation patterns favorable for germination and seedling recruitment. Sagebrush seedlings are susceptible to less than favorable conditions for several years. Completion of this community phase pathways may take decades.

Pathway 1.3a
Community 1.3 to 1.1

Low intensity, patchy wildfire or insect infestation would reduce sagebrush overstory creating a mosaic on the landscape. Perennial bunchgrasses and forbs dominate disturbed patches due to an increase in light, moisture and nutrient resources.

Pathway 1.3b
Community 1.3 to 1.2

Widespread wildfire removes sagebrush and allows perennial bunchgrasses and forbs to dominate.

State 2
Current Potential

This state is similar to the Reference State 1.0. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. 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 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.

Resilience management. Best a management practices may include maintain high diversity of desired species to promote organic matter inputs and targeted grazing to slow dispersal and seed production of non-native invasive species.

Dominant plant species

- basin big sagebrush (*Artemisia tridentata ssp. tridentata*), shrub
- bluebunch wheatgrass (*Pseudoroegneria spicata*), grass
- cheatgrass (*Bromus tectorum*), grass

Community 2.1

This community phase is similar to the Reference State Community Phase 1.1, with the presence of non-native species in trace amounts.

Resilience management. The presence of non-native annuals has reduced site resilience. Management actions should focus on maintaining the presence of all functional and structural groups and minimizing wildfire and soil disturbing practices.

Community 2.2

This community phase is characteristic of a post-disturbance, early seral community where annual non-native species are present. Perennial bunchgrasses and forbs recover rapidly following wildfire. Annual non-native species are stable or increasing within the community. Disturbance tolerant shrubs typically recover 2 to 5 years post wildfire and may dominate the sites for many years.

Community 2.3

This community phase is characterized by decadent sagebrush, reduced perennial bunchgrass and increasing bare ground. Annual non-natives species are stable or increasing due to lack of competition from perennial bunchgrasses. Shallow-rooted bunchgrasses may increase and become co-dominate with remaining deep-rooted bunchgrasses.

Pathway 2.1a
Community 2.1 to 2.2

Wildfire reduces the shrub overstory and allows for perennial bunchgrasses to dominate the site. Wildfire may be patchy, resulting in a mosaic pattern with patches of mature sagebrush remaining. Annual non-native species are likely to increase after wildfire.

Pathway 2.1b
Community 2.1 to 2.3

Time and lack of disturbance allows for sagebrush to increase and become decadent. Mature sagebrush is controlling the spatial and temporal distribution of moisture, nutrient and light resources. Native perennial bunchgrasses are reduced due to competition for these resources. Non-native annuals are stable to increasing.

Pathway 2.1a
Community 2.2 to 2.1

Time, lack of disturbance and natural regeneration of sagebrush. The establishment of sagebrush depends on presence of seed source and favorable weather patterns. It may take decades for sagebrush to recover to pre-disturbance levels.

Pathway 2.3a
Community 2.3 to 2.1

Low intensity wildfire, insect infestation, or brush management with minimal soil disturbance reduces sagebrush overstory and releases herbaceous understory.

Pathway 2.3b
Community 2.3 to 2.2

Wildfire reduces or eliminates the overstory of sagebrush and allows for the understory perennial grasses and forbs to increase. Annual non-native species respond well to wildfire and may increase post-burn.

State 3
Annual State

Annual non-natives dominate site productivity and site resources. The dominance of non-native annuals control the spatial and temporal distribution of soil moisture, soil nutrients and energy resources. Remaining patches of sagebrush and/or perennial bunchgrass suffer from increased competition and narrowed fire return intervals.

Characteristics and indicators. This state experiences frequent fire due to increased cover and continuity of fine fuels. Fire is frequent enough to prevent the recovery of long-lived native perennials like sagebrush. Disturbance tolerant shrubs may be present or increasing depending on time since disturbance.

Dominant plant species

- cheatgrass (*Bromus tectorum*), grass

Community 3.1

This community phase in dominated by annual non-native grasses and shallow-rooted perennial grasses. Sprouting shrubs may also be common. Patches of mature sagebrush may or may not be present.

Community 3.2

This community phase is characteristic of a post-wildfire community where annual non-natives are controlling site resources. Depending on season and/or intensity of fire the visually aspect of the site in dominated annual non-natives and bare ground. Site may be experiencing soil loss.

Resilience management. This community phases is high susceptible to frequent and repeated wildfire. Best management practices prevent sites from reaching this community phase. Management options are extremely limited.

Pathway 3.1a
Community 3.1 to 3.2

Fire reduces or eliminates the overstory shrubs and shallow-rooted perennials and allows for annual non-natives to increase

Pathway 3.2a
Community 3.2 to 3.1

Time and lack of fire allows for sagebrush and other shrubs to establish. Probability of sagebrush establishment is very unlikely and dependent on a near-by seed source from unburned patches of sagebrush.

Transition T1
State 1 to 2

Trigger: Introduction of annual non-native species Slow variable: Over time the annual non-native plants increase within the community. Threshold: Any amount of introduced non-native species causes an immediate decrease in the resilience of the site. Annual non-native species cannot be easily removed from the system and have the potential to significantly alter disturbance regimes from their historic range of variation.

Transition T3
State 2 to 3

Trigger: Repeated, widespread, and severe wildfire. Slow variables: Increased production and cover of non-native annual species over time. Threshold: Loss of deep-rooted perennial bunchgrasses and shrubs truncates, spatially and temporally, nutrient capture and cycling within the community.

Restoration pathway R2
State 3 to 2

Seeding with native species followed by prescribed grazing Minimize soil disturbance and maximize non-native annual plant biomass removal during early spring. Combine prescribed grazing with seeding of native species. Continue to protect site from wildfire.

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				510–1020	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	470–940	–
	Sandberg bluegrass	POSE	*Poa secunda*	10–20	–
	squirreltail	ELEL5	*Elymus elymoides*	10–20	–
	basin wildrye	LECI4	*Leymus cinereus*	10–20	–
	Idaho fescue	FEID	*Festuca idahoensis*	10–20	–
Forb					
2				30–60	
	buckwheat	ERIOG	*Eriogonum*	3–6	–
	phacelia	PHACE	*Phacelia*	3–6	–
	wild onion	ALAS2	*Allium ascalonicum*	3–6	–
	phlox	PHLOX	*Phlox*	3–6	–
	milkvetch	ASTRA	*Astragalus*	3–6	–
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	3–6	–
	lupine	LUPIN	*Lupinus*	3–6	–
	fleabane	ERIGE2	*Erigeron*	3–6	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	3–6	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	3–6	–
Shrub/Vine					
3				60–120	
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	40–80	–
	rabbitbrush	CHRYS9	*Chrysothamnus*	10–20	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	10–20	–

Animal community

This site supports food and cover for antelope, mule deer, rodents and a variety of birds. It is an important wintering area for mule deer.

Hydrological functions

The soils are in hydrologic group C. The soils of this site have moderately high runoff potential.

Other products

This site is suited to use by cattle, sheep and horses in late spring, summer and fall under a planned grazing system. Use should be postponed until the soils are firm enough to prevent trampling damage and soil compaction.

Inventory data references

Old SS Manuscripts, Range Site Descriptions, etc.

Type locality

Location 1: Malheur County, OR

References

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Contributors

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Approval

Kendra Moseley, 4/25/2024

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	04/26/2024
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

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

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

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

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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):**

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

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

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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):**

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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:

    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):**

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:**