

## Ecological site R025XY011ID LOAMY 13-16

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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.

### Classification relationships

*Artemisia vaseyana*/ *Festuca idahoensis* ht. Hironaka, M., M.A. Fosberg, A. H. Winward. 1983. Sagebrush- Grass Habitat Types of Southern Idaho. University of Idaho. Moscow, Idaho. Bulletin Number 35.

### Ecological site concept

This ecological site is on backslopes of hills and plateaus. Soils associated with this site formed in colluvium and residuum derived from welded tuff. They are very deep, well drained and characterized by a dark surface horizon (mollic epipedon). Slopes are typically less than 30 percent and elevations range from 5,000 to 6,500 feet (1524 to 1981 meters). Important abiotic factors contributing to the presence of this ecological site include deep, productive soils characterized by clay accumulation and significant amounts of volcanic glass in the subsoil.

### Associated sites

R025XY001ID	<b>ASPEN THICKET</b>
R025XY010ID	<b>CLAYPAN 12-16</b>
R025XY017ID	<b>SHALLOW BREAKS 14-18</b>

R025XY039ID	<b>DRY MEADOW</b>
R025XY044ID	<b>VERY SHALLOW STONY LOAM 10-14</b>
R025XY046ID	<b>MEADOW</b>
R025XY043ID	<b>LOAMY 11-13</b>
R025XY035ID	<b>CHURNING CLAY 12-16</b>
R025XY028ID	<b>LOAMY BOTTOM 12-16</b>

### Similar sites

R025XY019ID	<b>LOAMY 10-13</b> ARTRW8 dominant shrub; soils less than 100cm deep to bedrock
R025XY024ID	<b>LOAMY 12-16</b> ARTRT dominant shrub; restrictive horizon (not bedrock) within 150cm
R025XY022ID	<b>LOAMY 16-22</b> higher elevation; cryic soil temperature

**Table 1. Dominant plant species**

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata var. vaseyana</i>
Herbaceous	(1) <i>Pseudoroegneria spicata subsp. spicata</i> (2) <i>Festuca idahoensis</i>

### Physiographic features

This ecological site is on plateaus, tablelands, and foothill landscapes. Sites are commonly found on plateaus, hillsides, and rock pediments. Slopes are typically less than 30 percent. Elevations range from 4,500 to 7,000 feet (1371 to 2133 meters), but are typically between 5,000 to 6,500 feet (1524 to 1981 meters).

**Table 2. Representative physiographic features**

Landforms	(1) Plateaus or tablelands > Plateau (2) Foothills > Hillside (3) Pediment
Runoff class	Medium
Elevation	1,524–1,981 m
Slope	0–30%
Aspect	Aspect is not a significant factor

### Climatic features

The climate associated with this site is defined by hot dry summers and cold snowy winters. There are 38 frost free-days and an 81 day freeze-free period. Mean annual precipitation is 15 inches (38cm), with the highest rainfall occurring in May 2.2 inches (5.6cm) and the lowest in August 0.6 inches (1.5cm). Averages snowfall is around 35 inches (89cm) per year. Air temperatures average 26 Degrees F in January (coldest) and 66 Degrees F in July (warmest).

Data was provided by the MTN CITY RS, JACKPOT, and Silver City 5 W climate stations.

**Table 3. Representative climatic features**

Frost-free period (characteristic range)	21-60 days
Freeze-free period (characteristic range)	59-105 days

Precipitation total (characteristic range)	279-457 mm
Frost-free period (actual range)	7-64 days
Freeze-free period (actual range)	40-108 days
Precipitation total (actual range)	279-508 mm
Frost-free period (average)	39 days
Freeze-free period (average)	80 days
Precipitation total (average)	381 mm

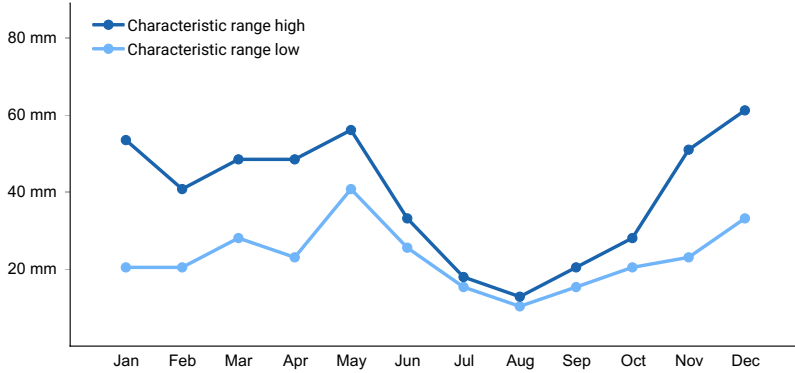


Figure 1. Monthly precipitation range

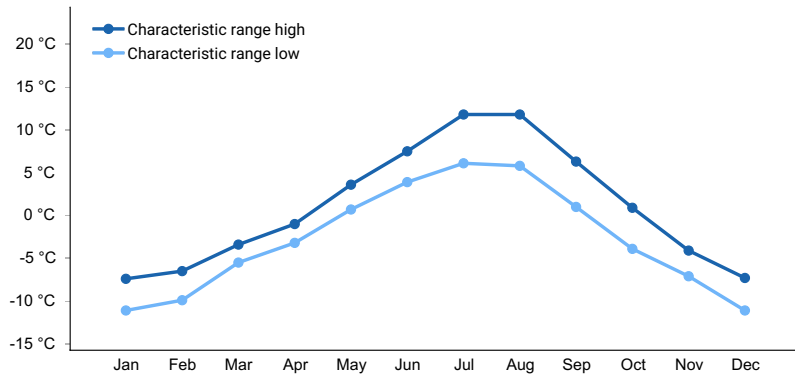


Figure 2. Monthly minimum temperature range

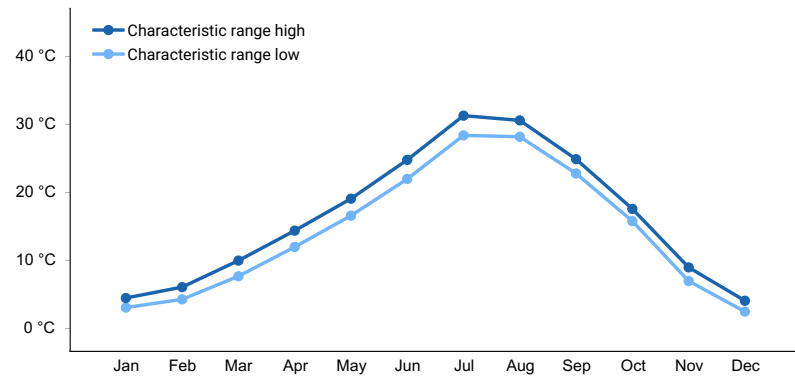


Figure 3. Monthly maximum temperature range

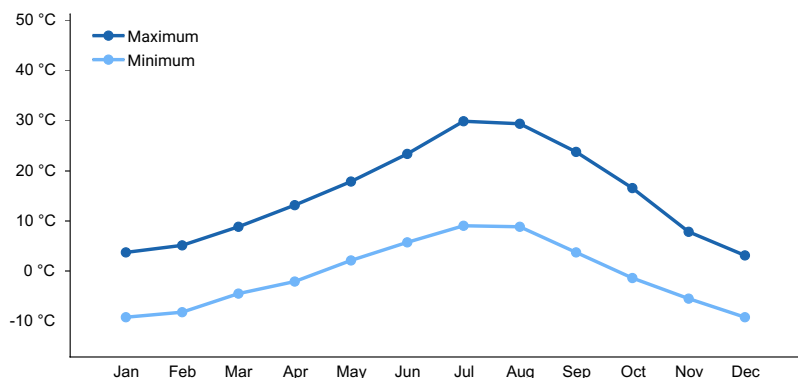


Figure 4. Monthly average minimum and maximum temperature

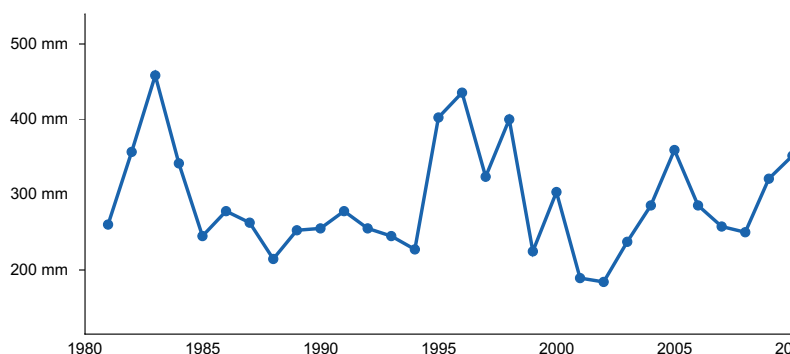


Figure 5. Annual precipitation pattern

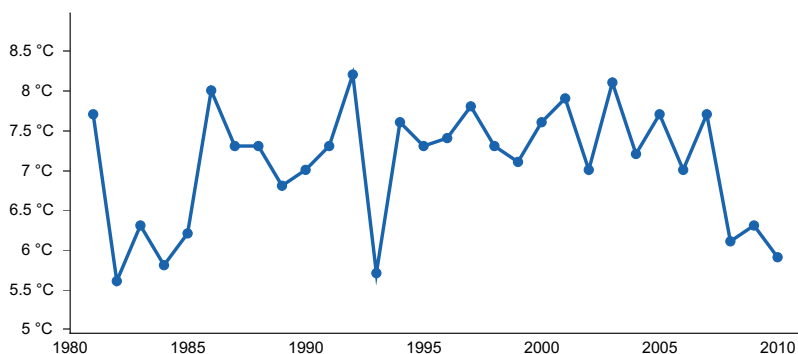


Figure 6. Annual average temperature pattern

### Climate stations used

- (1) SILVER CITY 5 W [USC00108412], Murphy, ID
- (2) MTN CITY RS [USC00265392], Mountain City, NV
- (3) CONTACT [USC00261905], Jackpot, NV

### Influencing water features

This ecological site is not influenced by adjacent wetlands, streams or run-on. No water table is present.

### Wetland description

N/A

### Soil features

The soils associated with this site formed in colluvium and residuum derived from welded tuff and volcanic rocks. They are deep and very deep, well drained, and characterized by a accumulation of clay in the subsoil (argillic horizon) between 13 and 40 cm. Surface texture is typically loam, stony-loam or gravelly-loam. Soils are

characterized by greater than 35 percent clay in the particle size control section and greater than 5 percent volcanic glass in the upper soil profile.

Representative soil components associated with this ecological site include Hurryback, Amboat, Doodlelink, Payne creek, Threek and Eep.

Where this ecological site is correlated to moderately deep components including: Monasterio, Hat, Snell, Mulshoe, Kanlee, Takeuchi and Fulcrum full consideration should be given to investigating these correlations and confirming the presence or absence of a Tree State.

**Table 4. Representative soil features**

Parent material	(1) Colluvium–welded tuff (2) Residuum–volcanic rock
Surface texture	(1) Stony loam (2) Very gravelly loam (3) Very stony sandy loam
Drainage class	Well drained to somewhat excessively drained
Permeability class	Very slow to moderately slow
Soil depth	102–152 cm
Surface fragment cover ≤3"	5–15%
Surface fragment cover >3"	0–5%
Available water capacity (Depth not specified)	5.08–10.16 cm
Soil reaction (1:1 water) (Depth not specified)	6.1–7.8
Subsurface fragment volume ≤3" (Depth not specified)	19–35%
Subsurface fragment volume >3" (Depth not specified)	5–25%

## Ecological dynamics

The Reference Plant Community is dominated by bluebunch wheatgrass, Idaho fescue and mountain big sagebrush. Subdominant species include Sandberg bluegrass, bottlebrush squirreltail, arrowleaf balsamroot, lupine, and antelope bitterbrush. Total annual production is 1100 lbs/acre in a normal year, 1400 lbs/acre in a favorable year, and 800 lbs/acre in a unfavorable year. Structurally, cool season shallow rooted bunchgrasses are dominant, followed by shrubs, perennial forbs, and shallow rooted bunchgrasses. The dominant visual aspect of this site is mixed grasses and mountain big sagebrush. Composition by weight is approximately 55-65 percent grass, 10-20 percent forbs and 20-30 percent shrubs.

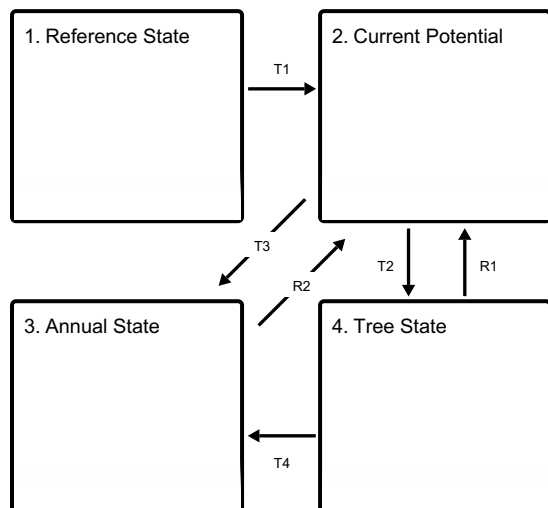
High annual precipitation will increase the total plant production. Higher wildfire frequency following annual plant production can be expected due to a larger fuel load (Pilliod, 2017). Extended periods of drought significantly impact this site, native perennial grasses and shrubs depend on annual moisture for successful germination and establishment. Extended drought reduces the vigor of perennial grasses and shrubs, while extreme drought may cause plant mortality. Runoff potential following large precipitation events is medium. Decreased infiltration, increased runoff, and increased erosion often occur when sagebrush is removed by frequent wildfires (C.J. Williams, 2018).

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 non-native 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 (K. Haubensak, 2009). This could cause the dominate shrub population to shift away from mountain big sagebrush to a shrub population with quicker establishment. A complete absence of wildfire could lead Utah Juniper to become the dominant species (MJ Falkowski, 2017).

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.

## State and transition model

### Ecosystem states



**T1** - Introduction of annual non-native species.

**T3** - Repeated, widespread and severe fire.

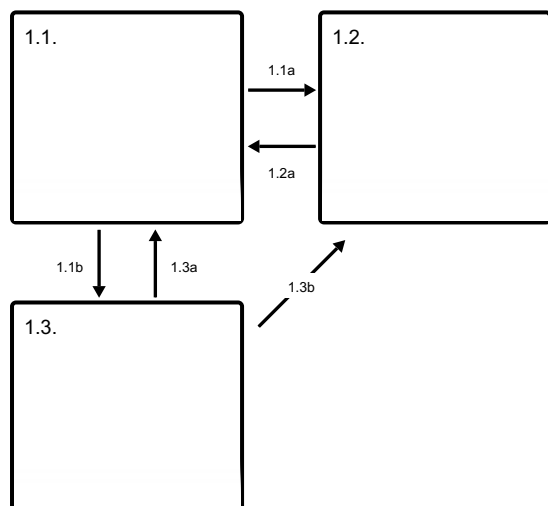
**T2** - Wildfire Suppression

**R2** - Seeding with native species/prescribed grazing

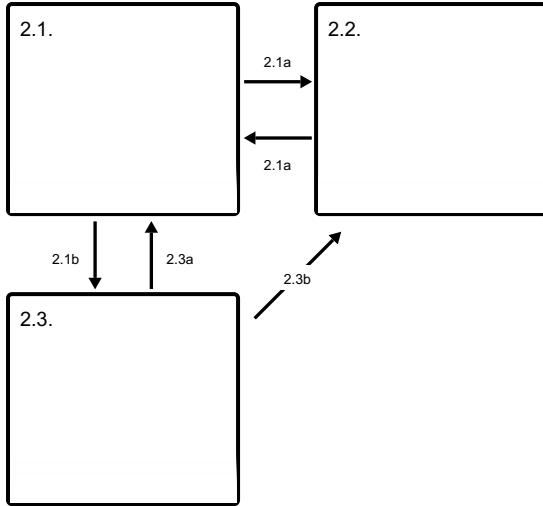
**R1** - Tree Removal and seeding with native species

**T4** - Catastrophic fire or a failed restoration attempt

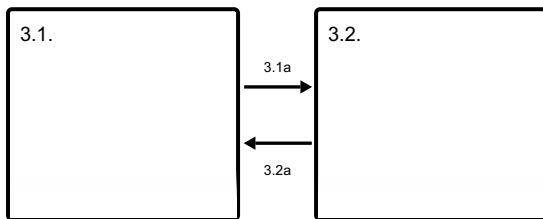
### State 1 submodel, plant communities



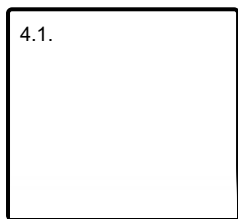
### State 2 submodel, plant communities



### State 3 submodel, plant communities



### State 4 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

- mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*), shrub
- bluebunch wheatgrass (*Pseudoroegneria spicata*), grass
- Idaho fescue (*Festuca idahoensis*), grass

### Community 1.1

This community phase is characteristic of a mid-seral plant community and is dominated by mountain big sagebrush, bluebunch wheatgrass and Idaho fescue. Thurber's needlegrass, Nevada bluegrass, antelope bitterbrush and rabbitbrush are also common on this site. Potential vegetative composition by weight is about 55 percent grasses, 15 percent forbs and 30 percent shrubs. Total vegetative cover averages 30 to 50 percent and litter cover averages 20 percent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	448	678	863
Shrub/Vine	269	370	471
Forb	135	185	235
<b>Total</b>	<b>852</b>	<b>1233</b>	<b>1569</b>

## Community 1.2

This community phase is characterized by a post-disturbance, early seral, plant community. Mountain big sagebrush and other shrubs are reduced, or patchy. Perennial bunchgrasses and forbs dominate the visual aspect of the plant community. Disturbance tolerant shrubs such as rabbitbrush, antelope bitterbrush, and snowberry 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 mountain big 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. Juniper may also be increasing in cover and number of individual trees. Additional field work is need to determine the extent of juniper on this ecological site and determine if correlation to a more appropriate site is warranted.

### Pathway 1.1a

#### Community 1.1 to 1.2

Wildfire. Low severity fire creates sagebrush/grass mosaic; higher intensity fires 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 pre-Eurosettlement conditions fire return interval is 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 mountain big 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 mountain big 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 an aroga moth infestation would reduce mountain big 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

Wide spread wildfire removes mountain big 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. This state has the same three general community phases. 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. Management would be to maintain high diversity of desired species to promote organic matter inputs and prevent the dispersal and seed production of the non-native invasive species.

### Dominant plant species

- mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*), shrub
- Idaho fescue (*Festuca idahoensis*), grass
- bluebunch wheatgrass (*Pseudoroegneria spicata*), 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 fire 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. Sandberg bluegrass may increase and become co-dominant with remaining deep-rooted bunchgrasses. Juniper may also be increasing in cover and number of individual trees. Additional field work is needed to determine the extent of juniper on this ecological site and determine if correlation to a more appropriate site is warranted.

**Resilience management.** This community is at risk of crossing a threshold to another state. This site is susceptible to further degradation from poor grazing management, drought, and/or fire.

### Pathway 2.1a

#### Community 2.1 to 2.2

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

## **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.

**Context dependence.** This pathway may be coupled with prolonged drought and/or poor grazing management.

## **Pathway 2.1a**

### **Community 2.2 to 2.1**

Time, lack of disturbance and natural regeneration of sagebrush. The establishment of big 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, aroga moth infestation, or brush management with minimal soil disturbance reduces sagebrush overstory and releases herbaceous understory.

**Context dependence.** Annual non-native species are present and may increase following disturbance.

## **Pathway 2.3b**

### **Community 2.3 to 2.2**

Fire 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 fire and may increase post-burn.

## **State 3**

### **Annual State**

Annual non-natives dominated 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 mountain big sagebrush. Disturbance tolerant shrubs may be present or increasing depending on time since disturbance.

#### **Dominant plant species**

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

## **Community 3.1**

This community phase is dominated by annual non-native plants such as medusahead or cheatgrass and shallow-rooted perennial grasses like Sandberg bluegrass. Annual forbs such as tansy mustard may also be common. Sprouting shrubs such as rabbitbrush may also be common. Patches of mature sagebrush may or may not be present.

**Resilience management.** It is economically impractical to attempt to remove non-native annuals from this system. Targeting non-native annuals with prescribed grazing early in the season has the potential to reduce fine fuels and seed production. If intact patches of sagebrush remain they should be protected from frequent disturbance.

## **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 is 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/rabbitbrush to establish. Probability of sagebrush establishment is very unlikely and dependent on a near-by seed source from unburned patches of sagebrush.

## **State 4 Tree State**

This state is characterized by a dominance of Utah juniper. Mountain big sagebrush and perennial bunchgrasses may still be present, but they are no longer controlling site resources. Soil moisture, soil nutrients and soil organic matter distribution and nutrient cycling have been spatially and temporally altered. This state is relatively stable due to rapid growth rate and long life span of juniper.

**Characteristics and indicators.** Juniper is very drought tolerant and has the ability use moisture and nutrients from a wide variety of soil depths, due to its extensive root system. Native species experience reduced productivity and reproductive capacity due to shading and competition for soil moisture and nutrients.

### **Dominant plant species**

- Utah juniper (*Juniperus osteosperma*), tree

## **Community 4.1**

Juniper dominates overstory and site resources. Trees are actively growing and seedlings may be present. The shrub and grass understory is reduced. Sagebrush is stressed and dying. Trace amounts Sandberg bluegrass and forbs may be found in the interspaces. Annual non-native species are present under tree canopies. Bare ground areas are large and connected.

### **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 fire. 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.

**Constraints to recovery.** Increased, continuous fine fuels from annual non-native plants modify the fire regime by changing intensity, size and spatial variability of fires. This increased disturbance prevents recovery of long-lived native perennials.

## **Transition T2 State 2 to 4**

Trigger: Presence of juniper Slow variables: Encroachment of juniper is primarily driven by lack of fire. This may also be coupled with prolonged drought and poor grazing management. Threshold: Juniper is now controlling energy, moisture and nutrient resources Dominance of juniper results in decreased infiltration and increased runoff, reducing soil moisture and nutrient cycling. Sagebrush and perennial bunchgrass are reduced both vigor and reproductive capacity.

## **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. Probability of success is extremely low.

## **Restoration pathway R1 State 4 to 2**

Brush management/tree removal with minimal soil disturbance, coupled with seeding of native species. Probability of success very low.

## **Transition T4 State 4 to 3**

Trigger: Catastrophic fire causing a stand replacing event. Or a failed restoration attempt including inappropriate tree removal or rangeland seeding using soil disturbing practices. Slow variables: Increased production and cover of non-native annual species under tree canopies. Threshold: Closed tree canopy with non-native annual species in the understory changes the intensity, size and spatial variability of wildfires. Changes in community composition are driven by temporal changes in energy capture, soil moisture and nutrient cycling and result in the loss of perennial bunchgrasses and sagebrush.

## **Additional community tables**

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1				555–678	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	185–308	–
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	185–308	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	25–62	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	25–62	–
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	25–62	–
	sedge	CAREX	<i>Carex</i>	0–25	–
	thickspike wheatgrass	ELLA3	<i>Elymus lanceolatus</i>	0–25	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–25	–
	western needlegrass	ACOC3	<i>Achnatherum occidentale</i>	0–25	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	0–25	–
<b>Shrub/Vine</b>					
2				308–432	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	123–247	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	62–185	–
	mountain snowberry	SYOR2	<i>Symphoricarpos oreophilus</i>	25–62	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0–12	–
	yellow rabbitbrush	CHVIP4	<i>Chrysothamnus viscidiflorus ssp. puberulus</i>	0–12	–
	Saskatoon serviceberry	AMAL2	<i>Amelanchier alnifolia</i>	0–12	–
	Woods' rose	ROWO	<i>Rosa woodsii</i>	0–12	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0–12	–
<b>Forb</b>					
3				185–247	
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	37–99	–
	lupine	LUPIN	<i>Lupinus</i>	25–62	–
	milkvetch	ASTRA	<i>Astragalus</i>	12–62	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	12–37	–
	fleabane	ERIGE2	<i>Erigeron</i>	0–12	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	0–12	–
	Hooker's balsamroot	BAHO	<i>Balsamorhiza hookeri</i>	0–12	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0–12	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0–12	–
	onion	ALLIU	<i>Allium</i>	0–12	–
	aster	ASTER	<i>Aster</i>	0–12	–

## Animal community

Animal Community – Wildlife Interpretations

The rangeland ecological site provides diverse habitat for many native wildlife species. The plant community exhibits a diverse mixture of forbs throughout the growing season offering excellent habitat for invertebrates. Mule deer, and elk may utilize the site at different times of the year. The rangeland habitat provides seasonal habitat for resident and migratory animals including western toad, shrews, bats, ground squirrels, mice, coyote, red fox, badger, Ferruginous hawk and prairie falcon. Area sensitive bird species include Brewer's sparrow, sage thrasher, sage sparrow and greater sage-grouse. Water features are sparse provided by seasonal runoff, artificial water catchments and springs.

State 1 Phase 1.1 – Mountain Big Sagebrush/ Bluebunch Wheatgrass/ Idaho Fescue/ Antelope Bitterbrush Reference Plant Community (RPC): This plant community provides a diversity of grasses, forbs and shrubs, used by native insect communities that assist in pollination. An extensive array of forbs is represented throughout the growing season leading to a diverse insect community. Many bird and mammal species utilize this habitat based on the availability of invertebrate prey species. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, western toad and northern leopard frog. Amphibians are associated with springs and isolated water bodies adjacent to this plant community. Development of spring sites that collect all available water would exclude amphibian use on these sites. Native shrub-steppe obligate bird species utilizing the habitat include the Brewer's sparrow, sage sparrow and sage thrasher. Sage-grouse habitats (leks, nesting, brood-rearing and winter) are provided by this plant community. The plant community provides seasonal (spring, summer and fall) food and cover for mule deer and elk. South and west facing slopes may provide winter habitat for large herbivores. Antelope bitterbrush may be present in this plant community, along with Idaho fescue and bluebunch wheatgrass are desirable forage species for large herbivores. A small mammal population including golden-mantled ground squirrels, Merriam's shrew, Columbia Plateau ground squirrel, bushy-tailed woodrat, jackrabbit and yellow-bellied marmots utilize this plant community.

State 1 Phase 1.2 – Antelope Bitterbrush/ Bluebunch Wheatgrass/ Idaho Fescue/ Mountain Big Sagebrush Reference Plant Community (RPC): This state has developed due to fire frequency being much longer than normal. The insect community will be similar to State 1 Phase 1.1 community. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, and western toad. Amphibians are associated with adjacent spring sites. An increase in antelope bitterbrush would provide an increase in quality of available forage for large herbivores. Antelope bitterbrush, along with Idaho fescue and bluebunch wheatgrass are desirable forage species for large herbivores. During mild winters, south and west facing slopes would provide winter habitat for large herbivores. Thermal cover and young of year cover would be provided to mule deer, elk and pronghorn. A small mammal population including golden-mantled ground squirrels, Merriam's shrew, Columbia Plateau ground squirrel, bushy-tailed woodrat, jackrabbit and yellow-bellied marmots utilize this plant community.

State 1 Phase 1.3- Mountain Big Sagebrush/ Sandberg Bluegrass / Bluebunch Wheatgrass/ Idaho Fescue/ Western Juniper Plant Community: This state has developed due to improper grazing management with no fire. An increase in canopy of sagebrush and junipers contributes to a sparse herbaceous understory. A reduced herbaceous understory results in less diversity and numbers of insects. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, and western toad. Amphibians are associated with adjacent spring sites. The reduced diversity of insects and understory cover may reduce quality of food and cover for the reptile community. As juniper increases, habitat quality for Brewer's sparrow, sage thrasher and sage sparrow may decrease. Remaining sagebrush provides brood-rearing, winter cover and winter food for sage-grouse but as juniper encroaches the quality of this habitat is severely reduced or eliminated. The plant community supports limited seasonal (spring and fall) habitat for elk. The quality of spring, fall and winter habitat for mule will increase. As juniper encroaches the site will provide additional thermal cover for large mammals. A small mammal population including golden-mantled ground squirrels, Merriam's shrew, Columbia Plateau ground squirrel, bushy-tailed woodrat, jackrabbit and yellow-bellied marmots utilize this plant community.

State 1 Phase 1.4 – Bluebunch Wheatgrass/ Idaho Fescue/ Sandberg Bluegrass Plant Community: The plant community is a result of recent wildfire, prescribed burning or brush management. The plant community, dominated by herbaceous vegetation with little or no sagebrush would provide less vertical structure for animals. An increase in rabbitbrush may add additional vertical structure for animals over-time. Insect diversity would be reduced but a native forbs plant community similar to State 1 Phase 1.1 would still support select pollinators. Habitat for common sagebrush lizard and western rattlesnake would be limited due to the loss of sagebrush. The dominance of herbaceous vegetation with little sagebrush canopy would limit use of these areas as nesting habitat by Brewer's

sparrow, sage sparrow and sage thrasher. Brood-rearing habitat for sage-grouse would be provided if site is adjacent to sagebrush cover. The dominant herbaceous vegetation improves habitat for grassland bird species (horned lark, savannah sparrow, vesper sparrow and western meadowlark). Mule deer and elk use would be seasonal (spring and fall) and site would offer little thermal cover and young of year cover due to the loss of shrub cover. The diversity and populations of small mammals would be dominated by open grassland species. Large blocks of this plant community would fragment historic plant community and reduce the quality of habitat for shrub-steppe obligate animal species.

State 1 Phase 1.5 – Mountain Big Sagebrush / Bluebunch Wheatgrass/ Idaho Fescue/ Antelope Bitterbrush/ Western Juniper Plant Community: This plant community is the result of no fire. The insect community would be similar to State 1 Phase 1.1 insect community. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake and western toad. Amphibians are associated with springs adjacent to the site. Shrub-steppe obligate bird species include Brewer's sparrow, sage sparrow, sage thrasher and sage-grouse. Habitat (brood-rearing and nesting cover) quality for sage-grouse is reduced due to an increase in juniper canopy into the plant community. Winter habitat (cover and food) for sage-grouse is provided. As juniper increases in cover the quality of habitat for sage-grouse will be severely reduced or eliminated. The reduced vigor of understory vegetation provides for a shorter foraging season for mule deer and elk. Young of year cover would be provided for mule deer, elk and pronghorn. Quality of winter habitat for mule deer will increase as juniper cover increases. Small mammal diversity and populations would be similar to State 1 Phase 1.1 small mammal community.

State 1 Phase 1.6- Mountain Big Sagebrush/ Sandberg Bluegrass / Bluebunch Wheatgrass/ Idaho Fescue Plant Community: This state has developed due to improper grazing management and a lack of fire. An increase in canopy of sagebrush contributes to a sparse herbaceous understory. A reduced herbaceous understory results in less diversity and numbers of insects. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, and western toad. Amphibians are associated with adjacent spring sites. The reduced diversity of insects and understory cover may reduce quality of food and cover for the reptile community. Brewer's sparrow, sage thrasher and sage sparrow habitat is provided on this site. Nesting, brood-rearing and winter habitat for sage-grouse is provided on this site. The plant community supports seasonal forage for mule deer and elk. A small mammal population including golden-mantled ground squirrels, Merriam's shrew, Columbia Plateau ground squirrel, bushy-tailed woodrat, jackrabbit and yellow-bellied marmots utilize this plant community.

State 2 Phase 2.1 – Mountain Big Sagebrush/ Annuals Plant Community: This plant community is the result of improper grazing management and no fire. An increase in canopy of sagebrush and improper grazing management contributes to an increase in cheatgrass. The reduced diversity of herbaceous understory and increase in invasive plants results in less diversity of insects. The reptile community is similar to State 1, Phase 1.6 reptile community. The reduced diversity of insects may reduce reptile diversity and populations. Reduced perennial herbaceous understory will lower quality of habitat for ground nesting bird species. Bird species utilizing the site include Brewer's sparrow, sage sparrow, sage-grouse and sage thrasher. Quality of habitat (brood-rearing and nesting cover) for these bird species is reduced due to poor vigor and less diversity in the herbaceous plant community. Winter habitat (cover and food) for sage-grouse is provided. Limited forage for large mammals is available in the spring when annuals are more palatable. Young of year cover would be provided for mule deer and elk. Small mammal diversity and populations would be similar to State 1, Phase 1.1 small mammal community.

State 2 Phase 2.2– Sandberg/ Annuals/ Forbs/ Tall Green Rabbitbrush Plant Community: The community has developed due to continued improper grazing management and frequent fire. The plant community does not support a diverse insect community. The reduced forbs and shrubs in the plant community would support a very limited population of pollinators. Quality of food and cover habitat for reptilian species is reduced. This plant community does not support the life requisites for sage thrasher, Brewer's sparrow, sage-grouse or sage sparrow. Birds of prey including hawks and falcons may range throughout these areas looking for prey species. Large herbivores may utilize the herbaceous vegetation in spring and early summer when the vegetation is more palatable. The diversity and populations of small mammals would be dominated by open grassland species. Large blocks of this plant community would fragment historical plant community and reduce the quality of habitat for shrub-steppe obligate animal species.

State 3 – Western Juniper/ Sandberg Bluegrass/ Annuals Plant Community: This site has developed due to improper grazing management and no fire. The loss of native forbs and understory vegetation will reduce insect diversity on the site. This plant community does not support life requisites for sage-grouse. Birds using this site as

resident or migratory habitat include Juniper titmouse, western bluebird and Virginia's warbler. The Juniper titmouse relies heavily on juniper seeds for winter food. Hunting success on the site by raptors may decrease due to heavy overstory of juniper. Hunting success by raptors on adjacent ecological sites may increase due to an increase in roosting sites. As juniper increases, the site will provide additional thermal cover for large mammals. This site can provide food and cover for mule deer in spring, fall and winter.

**State 4 - Range Seeding Plant Community:** The proposed seeding mixture (native or non-native) would determine the animal species that would utilize the area. A diverse seed mixture of grasses and forbs would provide similar habitat conditions as in the herbaceous plant community described in State 1 phase 1.4. A diverse seed mixture of grasses, forbs and shrubs would provide similar habitat conditions as described in State 1 phase 1.1, 1.2 or 1.6.

A monoculture of non-native grass species would not support diverse populations of insects, reptiles, birds or mammals. Sagebrush obligate animal species would not be supported with a monoculture of grass. Animal species including western meadowlark, horned lark, savannah sparrow, deer mouse, kangaroo rat, mule deer and antelope would utilize this site for nesting and/or seasonal foraging. Birds of prey including hawks and falcons may range throughout these areas looking for prey species. Large blocks of this plant community would fragment historic plant community and reduce the quality of habitat for shrub-steppe obligate animal species.

#### Grazing Interpretations.

This site is best suited for late spring, summer and fall grazing.

Estimated initial stocking rate will be determined with the landowner or decision-maker. They will be based on the inventory which includes species, composition, similarity index, production, past use history, season of use and seasonal preference.

### Hydrological functions

The hydrology of this site is characterized by occasional high intensity thunderstorms during the summer months but primarily by low intensity frontal storms during the winter and spring. Sixty to 70 percent of the precipitation falls during the period of October through May. Winter precipitation is in the form of snow. Snowmelt and run-off are critical events on this site. The site needs to be protected by vegetation when snowmelt and run-off occur. Ponding and flooding do not occur on this site. Run-on from adjacent sites normally does not occur. This site is in a snow-accumulation zone due to its high elevation and precipitation zone.

In the HCPC, the flatter slopes on which this site occurs allow for the majority of the moisture to infiltrate into the soil profile.

**State 1. Historic Climax Plant Community (HCPC).** Infiltration is good and runoff is low. The HCPC optimizes this relationship. The erosion potential is low. Cryptogamic crusts occur frequently on the site. Within this state, shrub cover varies from phase to phase. Where shrubs are abundant, snow accumulates in the interspaces. Phase D, where shrub cover is reduced or absent (due to recent fire), snow accumulation is reduced due to drifting snow and is unevenly redistributed. Snowmelt rates will be faster and result in increased runoff and less infiltration in the unprotected areas of the site. Total annual production of the site may be reduced. Deep percolation may be increased where more snow accumulates after redistribution by wind.

**State 2. Phase 2.2** is dominated by Sandberg bluegrass and other annual and perennial grasses and forbs in the understory. Root sprouting shrubs such as green rabbitbrush and gray horsebrush are present. Less snow accumulation may result from the lack of shrubs in phase B. This state has more bare ground than the HCPC which results in a more rapid runoff. Phase A is dominated by mountain big sagebrush with annuals in the interspaces. This state has developed due to improper grazing management and the absence of fire. Snow accumulation in the interspaces will be greater in this phase than in phase B.

**State 3.** This plant community is dominated by juniper. Remnants of bluebunch wheatgrass and Idaho fescue can be found in the understory. Shallow-rooted grasses, such as Sandberg bluegrass, and other annuals can be found in the interspaces. Few shrubs are present. This state has developed in the absence of fire. The heavy overstory of juniper intercepts snow in the branches and much of it is lost to sublimation. Infiltration is reduced in the interspaces



and runoff is more rapid. Soil erosion is occurring, primarily in the interspaces.

State 4. Seeding. The seeding may consist of introduced species or may be made up of native species that attempt to mimic the historic plant community. Hydrologically, a native seeding that mimics the HCPC, will be similar to state 1, the HCPC. Where shrubs successfully establish or increase naturally into the seeding, snow accumulation will occur resulting in improved deep percolation and slower runoff.

### Recreational uses

Recreation use of this site includes hunting, hiking, horseback riding, plant and animal observation and motorized vehicle use.

Due to the relative abundance of wildlife that use this site, hunting is one of the primary uses. ATV's use this site due the gentle topography and relatively non-stony surface horizon.

### Wood products

Mature juniper that has invaded and increased on the site can be cut for posts, poles, firewood and lumber.

### Other products

None.

### Inventory data references

Information presented here has been derived from NRCS clipping and other inventory data. Also, field knowledge of range-trained personnel was used.

Those involved in developing this site description include:

Dave Franzen, co-owner, Intermountain Rangeland Consultants, LLC

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### Type locality

Location 1: Owyhee County, ID	
Township/Range/Section	T3S R3W S36
General legal description	SE 1/4, NE 1/4, SEC. 36
Location 2: Owyhee County, ID	
Township/Range/Section	T4S R3W S10
General legal description	NE 1/4, SW 1/4, SEC 10.
Location 3: Owyhee County, ID	
Township/Range/Section	T13S R18E S34
General legal description	SW 1/4, NE 1/4, SEC. 34

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## Contributors

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## Approval

Kendra Moseley, 4/24/2024

## 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)	
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Date	06/13/2007
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** Rills rarely occur on this site. If rills are present, they are likely to occur on slopes greater than 20 percent and immediately following wildfire. Rills are most likely to occur on soils with surface textures of silt loam and clay loam.  

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2. **Presence of water flow patterns:** Water-Flow patterns rarely occur on this site. When they occur, they are short and disrupted by cool season grasses, tall shrubs and surface gravels or stones and are not extensive.  

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3. **Number and height of erosional pedestals or terracettes:** Pedestals and/or terracettes are rare on this site. In areas where slopes approach 20 percent and where flow patterns and/or rills are present, a few pedestals may be expected.  

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** On sites in mid-seral status, bare ground may range from 25-45 percent.  

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

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Usually not present. Immediately following wildfire some soil movement may occur on lighter textured soils.  

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7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter in the interspaces may move up to 2 feet following a significant run-off event. Coarse litter generally does not move.  

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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):** Values should range from 3 to 5 .  

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The surface horizon is typically 4 to 9 inches thick. Structure typically includes weak thin and moderate platy, weak to strong fine and medium granular, and weak fine to medium subangular blocky. Soil organic matter (SOM) ranges from 1 to 5 percent.  

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Bunchgrasses, especially deep-rooted perennials, slow run-off and increase infiltration. Tall shrubs accumulate snow in the interspaces.
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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):** Not present.
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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: Cool season deep rooted perennial bunchgrasses

Sub-dominant: Tall shrubs>perennial forbs>shallow rooted bunchgrasses

Other:

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Mountain big sagebrush will become decadent in the absence of fire and ungulate grazing. Grass and forb mortality will occur as tall shrubs increase.
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14. **Average percent litter cover (%) and depth ( in):** Additional litter cover data is needed but is expected to be 20-25 percent to a depth of 0.2 inches. Under mature shrubs litter is >0.5 inches deep and is 90-100 percent ground cover.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1100 pounds per acre (1232 kilograms per hectare) in a year with normal temperatures and precipitation. Perennial grasses produce 55-65 percent of the total production, forbs 10-20 percent and shrubs 20-30 percent.
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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:** Invasive Plants include bulbous bluegrass, whitetop, rush skeletonweed, musk and scotch thistle and diffuse and spotted knapweed.
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17. **Perennial plant reproductive capability:** All functional groups have the potential to reproduce in most years.
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