

## **Ecological site R025XY027ID SOUTH SLOPE GRANITIC 12-16**

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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

#### **MLRA Notes 25—Owyhee High Plateau**

This area is in Nevada (56 percent), Idaho (30 percent), Oregon (12 percent), and Utah (2 percent). It makes up about 27,443 square miles. MLRA 25 is characteristically cooler and wetter than the neighboring MLRAs of the Great Basin. The western boundary is marked by a gradual transition to the lower and warmer basins of MLRA 24. The boundary to the south-southeast, with MLRA 28B, is marked by gradual changes in geology marked by an increased dominance of singleleaf pinyon and Utah juniper and a reduced presence of Idaho fescue. The boundary to the north, with MLRA 11, is a rapid transition from the lava plateau topography to the lower elevation Snake River Plain.

#### **Physiography:**

All of this area lies within the Intermontane Plateaus. The southern half is in the Great Basin section of the Basin and Range province. This part of the MLRA 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 half of the area lies within the Columbia Plateaus province. This part of the MLRA forms the southern boundary of the extensive Columbia Plateau basalt flows. Most of the northern half is in the Payette section, but the northeast corner is in the Snake River Plain section. Deep, narrow canyons draining into the Snake River have been incised into this broad basalt plain. 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 Humboldt River crosses the southern half of this area

#### **Geology:**

The dominant rock types in this MLRA are volcanic. They include andesite, basalt, tuff, and rhyolite. In the north and west parts of the area, Cretaceous granitic rocks are exposed among Miocene volcanic rocks in mountains. A Mesozoic igneous and metamorphic rock complex dominates the south and east parts of the area. Upper and Lower Paleozoic calcareous sediments, including oceanic deposits, are exposed with limited extent in the mountains. Alluvial fan and basin fill sediments occur in the valleys.

#### **Climate:**

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. Rainfall occurs in spring and sporadically in summer. Precipitation occurs mainly as snow in winter. The precipitation is distributed fairly evenly throughout fall, winter, and spring. The amount of precipitation is lowest from midsummer to early autumn. The average annual temperature is 33 to 51 degrees F. The freeze-free period averages 130 days and ranges from 65 to 190 days, decreasing in length with elevation. It is typically less than 70 days in the mountains.

#### **Water:**

The supply of water from precipitation and streamflow is small and unreliable, except along the Owyhee, Bruneau, and Humboldt Rivers. Streamflow depends largely on accumulated snow in the mountains. Surface water from mountain runoff is generally of excellent quality and suitable for all uses. The basin fill sediments in the narrow alluvial valleys between the mountain ranges provide some ground water for irrigation. The alluvial deposits along the large streams have the most ground water. Based on measurements of water quality in similar deposits in

adjacent areas, the basin fill deposits probably contain moderately hard water. The water is suitable for almost all uses. The carbonate rocks in this area are considered aquifers, but they are little used. Springs are common along the edges of the limestone outcrops.

#### Soils:

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, aridic bordering on xeric, or xeric moisture regime. Soils with aquic moisture regimes are limited to drainage or spring areas, where moisture originates or runs on and through. These soils are of a very limited extent throughout the MLRA. They generally are well drained, clayey or loamy, and shallow or moderately deep. Most of the soils formed in mixed parent material. Volcanic ash and loess mantle the landscape. Surface soil textures are loam and silt loam with ashy texture modifiers in some areas. Argillic horizons occur on the more stable landforms. They are exposed nearer the soil surface on convex landforms, where ash and loess deposits are more likely to erode. Soils that formed in carbonatic parent material in areas that receive less than 12 inches of precipitation are characterized by calcic horizons throughout the profile, while soils in areas that receive more than 12 inches of precipitation do not have calcic horizons in the upper part of the profile. Soils that formed on stable landforms at the lower elevations are dominated by ochric horizons. Soils that formed at the middle and upper elevations are characterized by mollic epipedons. Soils in drainage areas at all elevations that receive moisture running on or through them are characterized by thicker mollic epipedons.

#### Biological Resources:

This MLRA supports shrub-grass vegetation. Lower elevations are characterized by Wyoming big sagebrush associated with bluebunch wheatgrass, western wheatgrass, and Thurber's needlegrass. Other important plants include bluegrass, squirreltail, penstemon, phlox, milkvetch, lupine, Indian paintbrush, aster, and rabbitbrush. Black sagebrush occurs but is less extensive. Singleleaf pinyon and Utah juniper occur in limited areas. With increasing elevation and precipitation, vast areas characterized by mountain big sagebrush or low sagebrush/early sagebrush in association with Idaho fescue, bluebunch wheatgrass, needlegrasses, and bluegrass become common. Snowberry, curl-leaf mountain mahogany, ceanothus, and juniper also occur. Mountains at the highest elevations support whitebark pine, Douglas-fir, limber pine, Engelmann spruce, subalpine fir, aspen, and curl-leaf mountain mahogany.

Major wildlife species include mule deer, bighorn sheep, pronghorn, mountain lion, coyote, bobcat, badger, river otter, mink, weasel, golden eagle, red-tailed hawk, ferruginous hawk, Swainson's hawk, northern harrier, prairie falcon, kestrel, great horned owl, short-eared owl, long-eared owl, burrowing owl, pheasant, sage grouse, chukar, gray partridge, and California quail. Reptiles and amphibians include western racer, gopher snake, western rattlesnake, side-blotched lizard, western toad, and spotted frog. Fish species include bull, red band, and rainbow trout.

## Classification relationships

*Atrémisia vaseyana*/ *Agropyron spicatum* ht. in "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 site is on undulating to steep slopes that range from 5 to 45 percent on south aspects. Elevations extend from 4500 to 6000 feet (1372-1829 meters). These sites are associated with alluvial and colluvial convex fans, concave mountain side slopes, saddles and swales.

The soils of this site are shallow to very deep, well drained, with a loamy texture. The soils are moderately slow to moderately rapid permeability. Runoff is medium to very high. The erosion hazard is very high by water. Erosion hazard is severe when vegetative cover is depleted. The available water holding capacity (AWC) is very low to low.

The plant community of this site is dominated by mountain sagebrush and perennial bunchgrasses.

## Associated sites

R025XY001ID	<b>ASPEN THICKET</b>
R025XY008ID	<b>NORTH SLOPE STONY 12-16</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>
R025XY049ID	<b>WET MEADOW - Provisional</b>

## Similar sites

R025XY019ID	<b>LOAMY 10-13</b>
R025XY036ID	<b>SOUTH SLOPE LOAMY 12-16</b>
R025XY011ID	<b>LOAMY 13-16</b>
R025XY024ID	<b>LOAMY 12-16</b>
R025XY022ID	<b>LOAMY 16-22</b>

**Table 1. Dominant plant species**

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

## Physiographic features

This site is on undulating to steep slopes ranging from 5 to 45 percent on south aspects. Elevations extend from 4500 to 6000 feet (1372-1829 meters). These sites are associated with colluvial mountain slopes and hillslopes.

**Table 2. Representative physiographic features**

Landforms	(1) Hill (2) Mountain slope
Runoff class	Medium to very high
Flooding frequency	None
Ponding frequency	None
Elevation	4,500–6,000 ft
Slope	5–45%
Water table depth	60 in
Aspect	SE, S, SW

## Climatic features

In MLRA 25 summers are hot, especially at lower elevations, and winters are cold and snowy. Precipitation is usually lighter at lower elevations throughout the year. At higher elevations precipitation is much greater, and snow accumulates to a considerable depth. The average total precipitation is 14 inches (based on 6 long term climate stations located throughout the MLRA).

The mean annual temperature is 45.9 degrees F. The average high is 59.7 and the average low temperature is 32.1 degrees. The prevailing wind is from the west. Average wind speed is greatest, at about 10 miles per hour, in March.

The frost-free period ranges from 79 to 103 days and the freeze free period ranges from 114 to 140 days.

No climate stations exist nearby site.

**Table 3. Representative climatic features**

Frost-free period (characteristic range)	79-103 days
Freeze-free period (characteristic range)	114-140 days
Precipitation total (characteristic range)	13-18 in
Frost-free period (actual range)	79-103 days
Freeze-free period (actual range)	114-140 days
Precipitation total (actual range)	13-18 in
Frost-free period (average)	90 days
Freeze-free period (average)	120 days
Precipitation total (average)	14 in

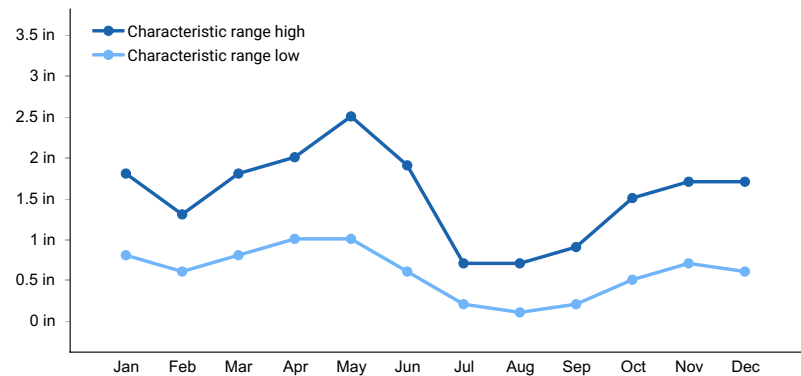


Figure 1. Monthly precipitation range

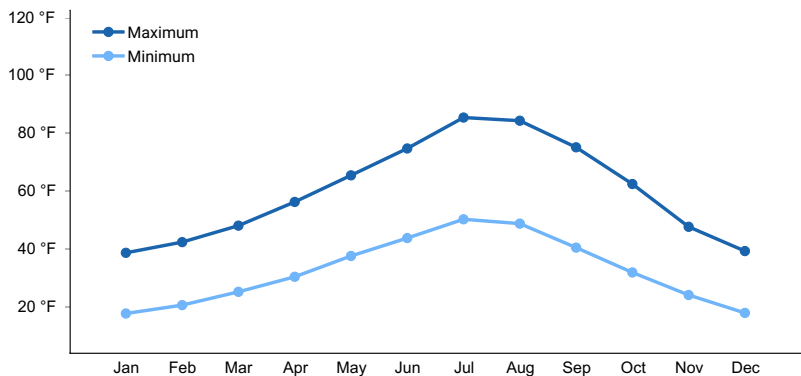


Figure 2. Monthly average minimum and maximum temperature

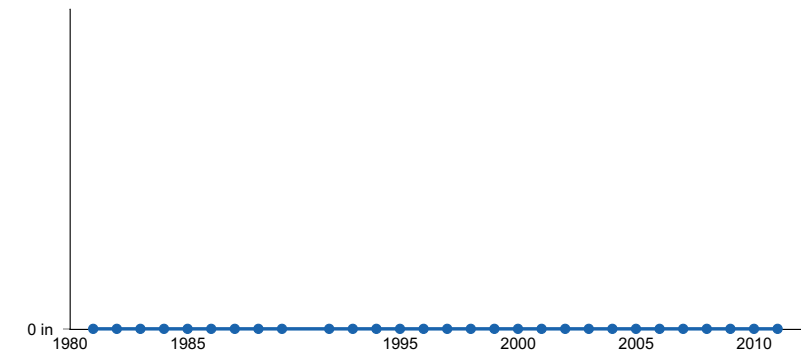


Figure 3. Annual precipitation pattern

### Influencing water features

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

## Soil features

The soils supporting this site are shallow to very deep, well drained, with moderately slow to moderately rapid permeability. Runoff is medium to very high. The erosion hazard is very high by water. Erosion hazard is severe when vegetative cover is depleted. The available water holding capacity (AWC) is very low to low. Soils at this site are typically 10 to 50 inches deep to bedrock except for Earcree soil which is 64 inches or more deep. The surface texture is coarse sandy loam or loam with few or no surface stones. The subsoil is usually moderately well developed with clay ranging from approximately 12 to 28 percent. The soil surface is inherently unstable and is subject to trampling damage by hoof and foot traffic. Soil temperature regime is either cryic or frigid.

Soil series correlated to this site are: Bearskin, Earcree and Moonstone

**Table 4. Representative soil features**

Parent material	(1) Colluvium–granite
Surface texture	(1) Loam (2) Sandy loam
Family particle size	(1) Loamy (2) Coarse-loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderately rapid
Depth to restrictive layer	10–64 in
Soil depth	10–64 in
Surface fragment cover <=3"	0–17%
Surface fragment cover >3"	0–17%
Available water capacity (0–40in)	2.2–5.1 in
Calcium carbonate equivalent (0–40in)	0%
Electrical conductivity (0–40in)	0 mmhos/cm
Sodium adsorption ratio (0–40in)	0
Soil reaction (1:1 water) (0–40in)	5.6–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–31%
Subsurface fragment volume >3" (Depth not specified)	2–45%

## Ecological dynamics

The dominant visual aspect of this site is bluebunch wheatgrass, Thurber's needlegrass and mountain big sagebrush. When Idaho fescue is found, it occupies slopes less than 20%. Composition by weight is approximately 50–65% grass, 5–10% forbs and 20–30% shrubs.

The Historic Climax Plant Community (HCPC), the Reference State (state 1), moves through many phases depending on the natural and man-made forces that impact the community over time. State 1, described later, indicates some of these phases. The Reference Plant Community Phase is Phase 1.1. The plant species composition of Phase 1.1 is listed later under "Reference Plant Community Phase Plant Species Composition".

During the last few thousand years, this site has evolved in an arid climate characterized by dry summers and cold, wet winters. Herbivory has historically occurred on this site at low levels of utilization. Herbivores include mule deer,

Rocky Mountain elk, lagomorphs and small rodents.

Fire has historically occurred on the site at intervals of 25-40 years. The Reference Plant Community Phase is dominated by bluebunch wheatgrass and Thurber's needlegrass in the understory and mountain big sagebrush in the overstory. Bitterbrush is usually present. Subdominant species include Idaho fescue, Sandberg bluegrass, bottlebrush squirreltail, arrowleaf balsamroot and lupine. Total annual production is 600 pounds per acre (672 kilograms per hectare) in a normal year. Production in a favorable year is 900 pounds per acre (1008 kilograms per hectare). Production in an unfavorable year is 400 pounds per acre (448 kilograms per hectare). Structurally, cool season, deep-rooted perennial bunchgrasses are very dominant, followed by tall shrubs being more dominant than perennial forbs while shallow rooted bunchgrasses are subdominant.

#### FUNCTION:

This site is suitable for late spring, summer and fall grazing. The steeper slopes will limit livestock movement. Excessive trailing of livestock should be avoided to minimize terracette development and erosion on the steeper slopes. This site provides valuable wildlife food and cover for deer, elk, raptors and other small wildlife species. The site is often key range for mule deer in summer and fall.

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

This site provides recreational opportunities for hunting, hiking, photography and horseback riding. ATV's use the flatter portions of the site due to the non-stony surface.

#### Impacts on the Plant Community:

##### Influence of fire:

In the absence of normal fire frequency, bitterbrush increases to the point of being co-dominant with mountain big sagebrush. Juniper can also invade if a seed source is in the proximity. Grasses and forbs decrease as shrubs increase. With the continued absence of fire, juniper can displace most of the shrubs and other understory species.

When fires become more frequent than historic levels (25-40 years), mountain big sagebrush and bitterbrush are reduced significantly. With continued short fire frequency, big sagebrush and bitterbrush can be completely eliminated along with many of the desirable understory species such as bluebunch wheatgrass, Thurber needlegrass and Idaho fescue. These species may be replaced by cheatgrass, Sandberg bluegrass and bulbous bluegrass along with a variety of annual and perennial forbs including noxious and invasive weeds.

##### Influence of improper grazing management:

Season-long grazing and/or excessive utilization can be very detrimental to this site. This type of management leads to reduced vigor of the bunchgrasses and possibly bitterbrush. With reduced vigor, recruitment of these species declines. As these species decline, the plant community becomes susceptible to juniper invasion, an increase in mountain big sagebrush and noxious and invasive plants.

Continued improper grazing management influences fire frequency by increasing fine fuels. If cheatgrass increases due to improper grazing management and becomes co-dominant with Sandberg bluegrass and other annuals, fires become more frequent.

Proper grazing management that addresses frequency, duration, and intensity of grazing can also keep fine fuels from developing, thereby reducing fire frequency. This can lead to gradual increases in mountain big sagebrush and/or western juniper. A planned grazing system can be developed to intentionally accumulate fine fuels in preparation for a prescribed burn. Any brush management should be carefully planned as a reduction in shrubs and/or junipers can lead to an increase in cheatgrass which will lead to more frequent fire intervals.

Due to the unstable soil surface, improper grazing management usually results in the development of terracettes. On steeper slopes massive soil erosion can occur during intense convection storms.

#### Weather influences:

Above normal precipitation in March, April and May can dramatically increase total annual production of the plant community. These weather patterns can also increase viable seed production of desirable species to provide for recruitment. Likewise, below normal precipitation during these spring months can significantly reduce total annual production and be detrimental to viable seed production. Overall plant composition is normally not affected when perennials have good vigor. Below normal temperatures in the spring can have an adverse impact on total production regardless of the precipitation. A hard, early freeze can occasionally kill some plants.

Prolonged drought adversely affects this plant community in several ways. Vigor, recruitment and production are usually reduced. Mortality can occur, especially in shallow rooted species. Prolonged drought can lead to changes in fire frequency.

Influence of Insects and disease:

Outbreaks can affect vegetation health particularly bitterbrush from western tent caterpillars (*Malacosoma fragilis*). Two consecutive years of defoliation by the tent caterpillar can cause mortality in bitterbrush. An outbreak of a particular insect is usually influenced by weather but no specific data for this site is available.

Influence of noxious and invasive plants:

Many of these species add to the fine-fuel component and lead to increased fire frequency. Many of the annual and perennial invasive species with deep root systems compete with desirable plants for moisture and nutrients. The result is reduced production and change in composition of the understory.

Influence of wildlife:

Big game animals use this site in the spring, summer and fall. Their numbers are seldom high enough to adversely affect the plant community. Herbivory can be detrimental to bitterbrush when livestock grazing and browsing by big game occurs at the same time and season. This will occur when both kinds of animal are using the plant in the late summer or fall. The adverse impact is excessive use of the current year's leader growth.

The deer mouse is beneficial to this site. It is the principal vector for planting bitterbrush seed.

Watershed:

Decreased infiltration and increased runoff occur with the invasion of juniper. Juniper invasion can be triggered by lack of fire, improper grazing management and prolonged drought. The increased runoff also causes sheet and rill erosion. Abnormally short fire frequency also gives the same results, but to a lesser degree. The long term effect is a transition to a different state.

Influence of juniper invasion:

In plant communities that are invaded by juniper, the species has a competitive advantage for the following reasons:

- Juniper is very drought tolerant.
- It has the ability to extract soil moisture from a wide range of soil depths.
- Juniper has high evapo-transpiration rates.
- The species intercepts rain and snow before it reaches the soil surface.
- It has the ability to grow as long as there is soil moisture and the temperature is above freezing.
- Juniper has a relatively rapid growth rate and is long-lived. It can readily over-top shade intolerant species which leads to mortality.
- Nutrient cycling is reduced.
- As the canopy closes, juniper gains control of energy capture.

As juniper extracts water, other plants are unable to acquire sufficient water and nutrients to sustain growth and reproduction, thus reducing cover and biomass in the interspaces. After the canopy closes, there is sufficient soil moisture available for shallow-rooted, shade tolerant species to persist directly under the tree.

The following hydrological impacts occur on sites invaded by juniper:

- Infiltration in the interspaces is reduced.

- Run-off increases resulting in increased sheet and rill erosion with elevated sediment loads.
- Soil temperatures increase in the interspaces which results in accelerated drying of the soil surface.
- Increased bare ground in the interspaces.
- Soil moisture storage is reduced.

As bare ground and interconnectiveness of patches of bare ground increases, flow rates are accelerated (reduction of flow sinuosity) and run-off out of the area increases.

Degradation of these systems can result in the formation of a feedback cycle in which greater juniper cover and density results in greater plant and soil disturbance between the canopies.

In summary, a closed juniper community takes control of the following ecological processes: hydrology, energy capture and nutrient cycling. The changes are primarily driven by the hydrological processes. The development of a closed juniper canopy always results in a transition across the threshold to a different state. Generally, when juniper canopy cover nears 20%, the plant community is approaching the threshold.

Plant Community and Sequence:

Transition pathways between common vegetation states and phases:

State 1

Phase 1.1 to 1.2. Develops in the absence of fire. No juniper seed source present.

Phase 1.1 to 1.3. Usually results from improper grazing management and absence of fire. Juniper seed source is present.

Phase 1.1 to 1.4. Results from one or more fires.

Phase 1.1 to 1.5. Develops in the absence of fire. Juniper seed source is present.

Phase 1.1 to 1.6. Results from improper grazing management and absence of fire. No juniper seed source is present.

Phase 1.3 to 1.1. Results from prescribed burning or fire and prescribed grazing.

Phase 1.4 to 1.1. Results from prescribed grazing and no fire.

Phase 1.5 to 1.1. Results from prescribed burning or fire and prescribed grazing.

Phase 1.6 to 1.1. Results from Brush Management and no fire with prescribed grazing.

Phase 1.2 to 1.4. Results from prescribed burning or fire.

Phase 1.3 to 1.4. Results from prescribed burning or fire.

Phase 1.5 to 1.4. Results from prescribed burning or fire.

Phase 1.6 to 1.4. Results from prescribed burning or fire.

State 1 Phase 1.6 to State 2 Phase 2.1. Develops through no fire and improper grazing management. The site has crossed the threshold. It is generally not economically feasible to move the site back towards state 1.

State 1 Phase 1.3 and 1.5 to State 3. Develops with improper grazing management and no fire. The site has crossed the threshold. It is generally not economically feasible to move the site back towards state 1.

State 2 Phase 2.1 to Phase 2.2. Develops with frequent fires and improper grazing management. The site has crossed the threshold. It is generally not economically feasible to move the site back towards state 1.

State 2 to State 4. Brush management, pest management and/or prescribed fire are used prior to range seeding.

State 2 to unknown site. Excessive soil loss and changes in the hydrologic cycle caused by improper grazing management and/or frequent fire cause this state to retrogress to a new site with reduced potential.

State 3 to State 2 Phase 2.2. Results from fire.

State 3 to State 4. Mechanical removal of juniper or catastrophic wildfire and/or pest management (disking) are needed prior to range seeding. Seeding with a drill can only be done on slopes less than 20%.

State 3 to unknown site. Continued lack of fire and improper grazing management cause this state to retrogress to a new site with reduced potential due to significant soil loss and changes in hydrology. The site has crossed the



threshold. It is generally not economically feasible to move the site back towards state 1.

Practice Limitations.

On slopes less than 20%, no physical limitations for ground moving equipment exist for range seeding or brush management on this site.

## **State and transition model**

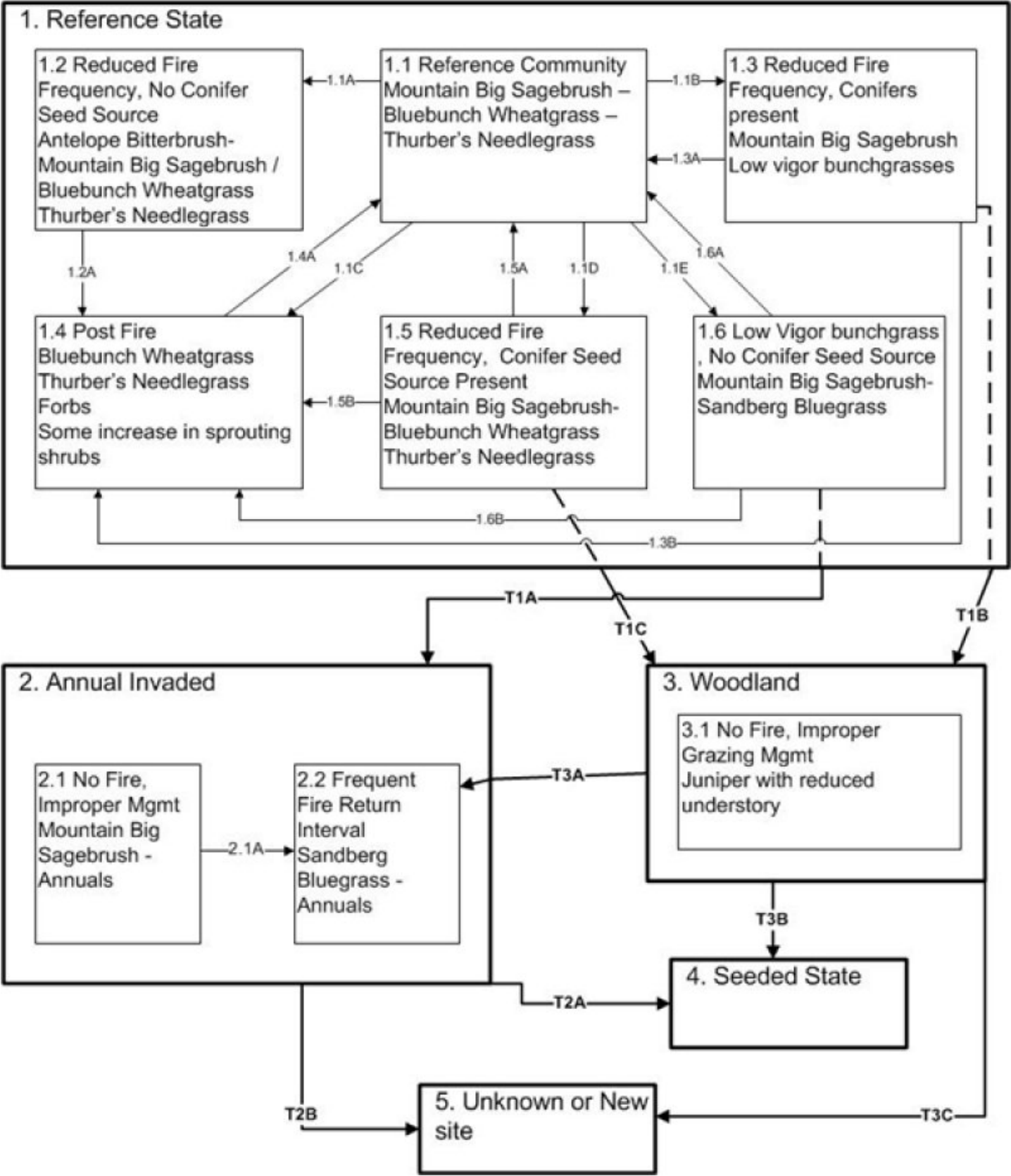


Figure 5. 25x-27

State 1  
Reference State

Community 1.1  
Reference Plant Community

This community has mountain big sagebrush in the overstory with bluebunch wheatgrass and Thurber’s needlegrass co-dominant in the understory. Other significant species in the plant community are Idaho fescue, Sandberg bluegrass, bottlebrush squirreltail, arrowleaf balsamroot and antelope bitterbrush. Natural fire frequency is 25 to 40 years.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	250	375	585
Shrub/Vine	110	165	225
Forb	40	60	90
<b>Total</b>	<b>400</b>	<b>600</b>	<b>900</b>

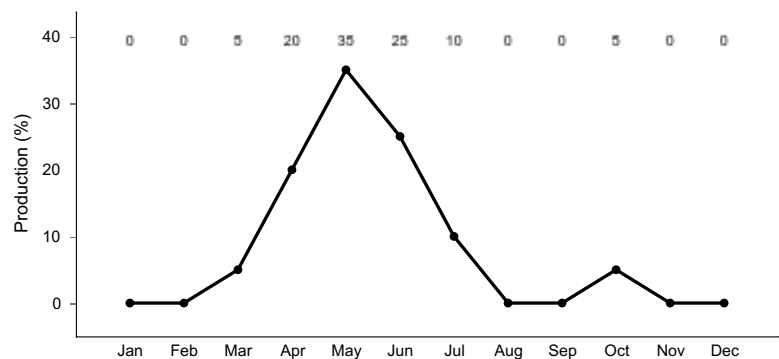


Figure 7. Plant community growth curve (percent production by month). ID0901, D25 ARTRV .

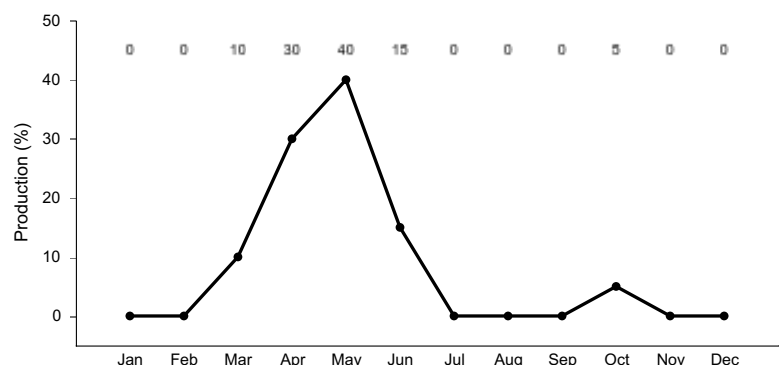


Figure 8. Plant community growth curve (percent production by month). ID0902, D25 ARTRV Early Seral.

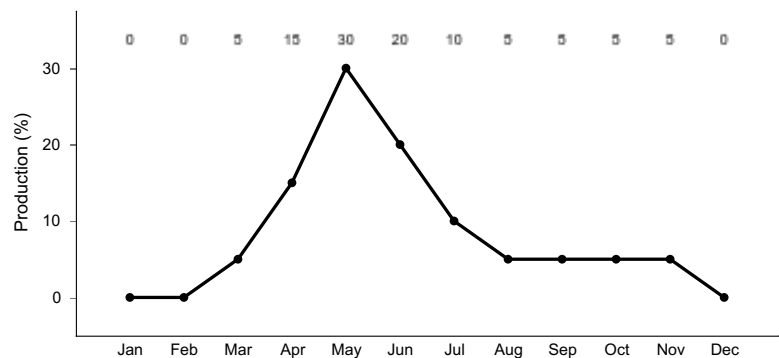


Figure 9. Plant community growth curve (percent production by month). ID0903, D25 JUOC/POSE/ANNUALS.

## Community 1.2

### Reduced Fire Frequency - No Conifers

This plant community is dominated in the overstory by bitterbrush. Mountain big sagebrush is present. Bluebunch wheatgrass and Thurber's needlegrass are co-dominant in the understory. Other perennial grasses and forbs include Idaho fescue, Sandberg bluegrass, bottlebrush squirreltail, arrowleaf balsamroot and lupine. No juniper seed source is present. This state has developed due to fire frequency being much longer than normal.

### **Community 1.3**

#### **Low Vigor Bunchgrasses - Conifers Present**

This plant community is dominated by juniper and mountain big sagebrush in the overstory. Sandberg bluegrass and bottlebrush squirreltail are the dominant grasses in the understory. Bluebunch wheatgrass and Thurber's needlegrass are present but in reduced amounts and typically in low vigor. This state has developed due to improper grazing management and lack of fire. A juniper seed source is in the proximity.

### **Community 1.4**

#### **Post Fire - Grass Dominated**

This plant community is co-dominated by bluebunch wheatgrass and Thurber's needlegrass. Some Idaho fescue is present, but in reduced amounts. Sandberg bluegrass and other perennial grasses and forbs are subdominant. Few shrubs are present due to frequent fires.

### **Community 1.5**

#### **Reduced Fire Frequency - Conifer Seedlings**

This plant community is similar to the HCPC except that juniper seedlings and saplings are invading the site due to a lack of fire. A juniper seed source is in the proximity. This state has developed due to the absence of fire.

### **Community 1.6**

#### **Low Vigor Bunchgrasses - No Conifer seed source**

This plant community is dominated by mountain big sagebrush in the overstory. Sandberg bluegrass and bottlebrush squirreltail are the dominant grasses in the understory. Bluebunch wheatgrass and Thurber's needlegrass are present but in reduced amounts and typically in low vigor. This state has developed due to improper grazing management and a lack of fire. No juniper seed source is in the proximity.

### **Pathway P1.1a**

#### **Community 1.1 to 1.2**

This pathway develops in the absence of fire. No juniper seed source is present.

### **Pathway P1.1b**

#### **Community 1.1 to 1.3**

This pathway typically results from improper grazing management and absence of fire. Juniper seed source is present.

### **Pathway P1.1c**

#### **Community 1.1 to 1.4**

This pathway is a result of fire, either wildfire or prescribed burns.

### **Pathway P1.1d**

#### **Community 1.1 to 1.5**

This pathway develops in the absence of fire. Juniper seed source present.

### **Pathway P1.1e**

## **Community 1.1 to 1.6**

Results from improper grazing management and absence of fire. No juniper seed source is present.

### **Pathway P1.2a**

#### **Community 1.2 to 1.4**

This pathway is a result of fire.

### **Pathway P1.3a**

#### **Community 1.3 to 1.1**

This pathway is a result of prescribed burning or fire and prescribed grazing.

### **Pathway P1.3b**

#### **Community 1.3 to 1.4**

This pathway is a result of prescribed burning or fire.

### **Pathway P1.4a**

#### **Community 1.4 to 1.1**

This pathway develops with prescribed grazing and lack of fire.

### **Pathway P1.5a**

#### **Community 1.5 to 1.1**

This pathway is a result of prescribed burning or fire and prescribed grazing.

### **Pathway P1.5b**

#### **Community 1.5 to 1.4**

This pathway is a result of fire.

### **Pathway P1.6a**

#### **Community 1.6 to 1.1**

This pathway is a result of prescribed grazing, brush management and lack of fire.

### **Pathway P1.6b**

#### **Community 1.6 to 1.4**

This pathway is a result from prescribed burning or fire.

## **State 2**

### **Annual Invaded**

#### **Community 2.1**

##### **No fire - Mountain Big Sagebrush - Annuals**

This plant community 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. The site has crossed the threshold. It is generally not economically feasible to move the site back towards state 1.

#### **Community 2.2**

##### **Frequent Fire - Annuals**

This plant community is dominated by annual and perennial grasses and forbs. Root sprouting shrubs such as twistedleaf rabbitbrush and gray horsebrush are present. This state has developed due to prescribed burning or frequent fires and improper grazing management. The site has crossed the threshold. It is generally not economically feasible to move the site back towards state 1.

### **Pathway P2.1a**

#### **Community 2.1 to 2.2**

Develops with frequent fires and improper grazing management. The site has crossed the threshold. It is generally not economically feasible to move the site back towards state 1.

### **State 3**

#### **Woodland**

#### **Community 3.1**

##### **Juniper with reduced understory**

This plant community is dominated by juniper. Remnants of bluebunch wheatgrass, Idaho fescue and Thurber's needlegrass can be found in the understory, typically around the base of junipers. Shallow-rooted grasses, such as Sandberg bluegrass, and other annuals can be found in the interspaces. Few shrubs are present. There is an abnormally large amount of bare ground in this state. This state has developed with improper grazing management and in the absence of fire. This site has crossed the threshold. It is generally not economically feasible to move the site back towards state 1.

### **State 4**

#### **Seeded**

#### **Community 4.1**

##### **Range Seeding**

The seeding may be introduced species or it may be made up of native species that attempt to mimic the Reference State.

### **State 5**

#### **Unknown new site**

#### **Community 5.1**

##### **Unknown new site**

This plant community has gone over the threshold to a new site. Site potential has been reduced. Significant soil loss has occurred. Infiltration has been reduced and run-off has become more rapid. This state has developed due to continued improper grazing management and/or frequent fires or the continued absence of fire where a juniper seed source is present. It is not economically practical to move the site back towards state 1.

### **Transition T1A**

#### **State 1 to 2**

This transition develops through lack of fire and improper grazing management. The site has crossed the threshold. It is not economically feasible to move this state back towards state 1.

### **Transition T1B**

#### **State 1 to 3**

From community phase 1.3 or 1.5 this transition develops with lack of fire and improper grazing management. The site has crossed the threshold. It is not economically feasible to move this state back towards state 1.

## **Transition T2.A**

### **State 2 to 4**

This transition is a result of brush management, pest management or prescribed fire prior to range seeding.

**Context dependence.** On slopes less than 20%, no physical limitations for ground moving equipment exist for range seeding or brush management on this site.

## **Transition T2B**

### **State 2 to 5**

This transition is a result of excessive soil loss and changes in the hydrologic cycle caused by improper grazing management or frequent fire. This state retrogresses to a new site with reduced potential. The site has crossed the threshold and is not economically feasible to move the state back towards state 1.

## **Transition T3A**

### **State 3 to 2**

This transition develops with fire.

## **Transition T3B**

### **State 3 to 4**

This transition develops from brush management, fire, or pest management in preparation for a range seeding.

**Context dependence.** Seeding with a drill can only be done on slopes less than 20%.

## **Transition T3C**

### **State 3 to 5**

**Constraints to recovery.** This transition is a result of improper grazing management and lack of fire. This state retrogresses to a new site with reduced potential due to significant soil loss and changes in hydrology. It has crossed the threshold, and it will not go back to state 1.

## **Additional community tables**

### **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 utilize the site throughout the year. The south and west facing slopes may provide winter habitat for deer and elk. 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 animal species include Brewer's sparrow, sage thrasher, sage sparrow, sage-grouse, northern leopard frog and Columbia spotted frog. Water features are sparse provided by seasonal runoff, artificial water catchments and springs.

State 1 Phase 1.1 – Mountain Big Sagebrush/ Bluebunch Wheatgrass/ Thurber's Needlegrass/ Idaho Fescue/ Sandberg Bluegrass/ Bottlebrush Squirreltail/ 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 avian 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, Columbia spotted frog 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 (nesting, brood-rearing and winter) are provided by this plant community. The plant community provides seasonal food and cover for large herbivores including mule deer and elk. Antelope bitterbrush may be present in this plant community, along with bluebunch wheatgrass and Idaho fescue are important forage for mule deer and elk. South facing slopes provide winter food habitat 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. The deer mouse is beneficial to this site as it is the principal vector for planting bitterbrush seed.

State 1 Phase 1.2- Antelope Bitterbrush/ Bluebunch Wheatgrass/ Thurber's Needlegrass/ Idaho Fescue/ Sandberg Bluegrass/ Mountain Big Sagebrush Plant Community: This state has developed due to fire frequency being much longer than normal. An increase in canopy of antelope bitterbrush and sagebrush contributes to a declining herbaceous understory. The reptile community will be similar to State 1 Phase 1.1 community represented by common sagebrush lizard and western rattlesnake. Sagebrush provides brood-rearing, winter cover and winter food for sage-grouse but as understory vegetation declines and bitterbrush increases the quality of this habitat for nesting is reduced or eliminated. The plant community supports spring, fall and winter 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. The deer mouse is beneficial to this site as it is the principal vector for planting bitterbrush seed.

State 1 Phase 1.3 – Western Juniper/ Mountain Big Sagebrush/ Sandberg Bluegrass / Bottlebrush Squirreltail Plant Community: This plant community is the result of improper grazing management and lack of 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 community will be similar to State 1 Phase 1.1 community. The reduced understory cover may reduce quality of food and cover for reptile populations. 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. No sage-grouse nesting habitat is provided. The quality of spring and fall grazing habitat for mule deer and elk is significantly reduced due to the loss of vigor and production of understory vegetation. Juniper can provide winter habitat (cover and food) for mule deer. As juniper encroaches the site will provide additional thermal cover for large mammals. A small mammal population would be similar to State 1 Phase 1.2 small mammal community.

State 1 Phase 1.4 – Bluebunch Wheatgrass/ Thurber's Needlegrass/ Sandberg Bluegrass Plant Community: The plant community is a result of recent wildfire or prescribed burning. The plant community, dominated by herbaceous vegetation with little or no sagebrush and antelope bitterbrush would provide less vertical structure for animals. 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 reptiles would be limited due to the loss of sagebrush. Amphibian habitat would be tied to permanent spring sites in the area. Development of spring sites that collected all available water would exclude the use of amphibians on these sites. The dominance of herbaceous vegetation with little sagebrush and antelope bitterbrush 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 when adjacent to sagebrush cover. The dominant herbaceous vegetation improves habitat for grassland avian species (horned lark, savannah sparrow, vesper sparrow and western meadowlark). Mule deer and elk use would be seasonal (spring and fall) and 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/ Thurber's Needlegrass/ Idaho Fescue/ Sandberg Bluegrass/ Bottlebrush Squirreltail/ Antelope Bitterbrush/ Western Juniper Plant Community: This plant community is the result of a lack of 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 community will be similar to State 1 Phase 1.1 community. The reduced diversity of insects and understory cover may reduce quality of food and cover for reptile populations. 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 quality of spring and fall grazing habitat for mule deer and elk is significantly reduced due to the loss of vigor and production of understory vegetation. As juniper encroaches the site will provide additional thermal cover for large mammals and provide winter habitat (cover and food) for mule deer. A diverse small mammal population



including golden-mantled ground squirrels, jackrabbits, deer mice and Great Basin pocket mice utilize this plant community.

**State 1 Phase 1.6 – Mountain Big Sagebrush/ Sandberg Bluegrass/ Bottlebrush Squirreltail Plant Community:** This plant community is the result of improper grazing management and lack of fire. An increase in canopy of sagebrush contributes to a sparse herbaceous understory. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, western toad and northern leopard frog. Shrub-steppe obligate bird species include Brewer's sparrow, sage sparrow, sage thrasher and sage-grouse. Quality of habitats (brood-rearing and nesting cover) for sage-grouse is reduced due to a less diverse herbaceous plant community. Winter habitat (cover and food) for sage-grouse is provided. The reduced vigor of understory vegetation provides for a shorter grazing season for mule deer and elk. The poor vigor and hedging on bitterbrush would lower the quality of winter food habitat for mule deer and elk. Young of year cover would be provided for large herbivores. Small mammal diversity and populations would be similar to State 1 Phase 1.2.

**State 2 Phase 2.1 – Mountain Big Sagebrush/ Annuals Plant Community:** This state has developed due to improper grazing management and the absence of fire. An increase in canopy of sagebrush contributes to a reduction of bluebunch wheatgrass and Idaho fescue. The reduced diversity of herbaceous understory results in less diversity of insects. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, western toad and northern leopard frog. The reduced diversity of insects may reduce reptile populations. Shrub-steppe obligate bird species include Brewer's sparrow, sage sparrow, sage thrasher and sage-grouse. Reduced herbaceous understory will lower quality of habitat for ground nesting bird species. Quality of habitats (brood-rearing and nesting cover) for sage-grouse is reduced due to poor vigor and less diverse herbaceous plant community. Winter habitat (cover and food) for sage-grouse is provided. Young of year cover would be provided for mule deer and elk. Small mammal diversity and populations would be similar to State 1 Phase 1.2.

**State 2 Phase 2.2 – Bottlebrush Squirreltail/ Sandberg/ Annuals/ Forbs/ Twistedleaf Rabbitbrush Plant Community:** This state has developed due to improper grazing management and frequent fire. The reduced forbs and shrub component in the plant community would support a very limited population of pollinators. Habitat for common sagebrush lizard and western toad would be limited due to the loss of sagebrush. The loss of sagebrush and antelope bitterbrush would severely reduce the quality of habitat for sage thrasher, Brewer's sparrow, sage-grouse and sage sparrow. Birds of prey including hawks and falcons may range throughout these areas looking for prey species. Mule deer, elk and pronghorn may utilize the herbaceous vegetation in the early part of the year when the vegetation is more palatable. The diversity and populations of small mammals would be dominated by open grassland species. Hunting success on small mammals by predator species would increase. Large blocks of this plant community would fragment historic plant community and reduce the quality of habitat for shrub-steppe obligate animal species.

**State 3 – Western Juniper/ Sandberg Bluegrass 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. The lack of flowering plants has reduced pollinators including butterflies and moths. Habitat for common sagebrush lizard and western toad would be limited due to the loss of sagebrush and understory cover. 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. Off-site hunting success by raptors may increase due to an increase in perch sites. As juniper encroaches, the site will provide additional thermal cover and young of year cover for large mammals. An increase in juniper provides food and cover for mule deer in the 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 year-long 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 suitable for late spring, summer and fall grazing. The steeper slopes will limit livestock movement. Excessive trailing of livestock should be avoided to minimize erosion on the slopes.

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 soils of this site are in hydrologic group C. They have moderately high run-off potential.

### 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 to the relatively non-stony soil surface.

### 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:

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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.

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Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

- Number and extent of rills:** Rills can occur on this site. If rills are present, they are likely to occur on slopes greater than 20 percent and immediately following wildfire. Coarse surface gravels limit rill development.
- Presence of water flow patterns:** Water-flow patterns can occur on this site. When they occur, they are short and disrupted by cool season grasses and tall shrubs and are not extensive. Water infiltration is generally rapid for the site.
- Number and height of erosional pedestals or terracettes:** Pedestals are rare on this site. Terracettes are common. Significant accumulation of coarse surface fragments develops on the uphill side of larger perennial grasses and shrubs. This accumulation is from concentrated flow and hoof/ foot traffic. Terracettes are a natural occurrence on the site.
- Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground ranges from 50-75%. This site is naturally unstable due to coarse surface fragments.
- Number of gullies and erosion associated with gullies:** None.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Wind-scoured, blowouts and/or deposition areas usually not present due to coarse textured, gravelly soil surfaces.
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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 3 feet following a significant run-off event. It generally moves onto terracettes. Coarse litter generally does not move except on the steeper slopes. Litter is also moved mechanically by hoof/ foot traffic.
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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 4-6.
- 
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The surface horizon is typically 8 to 41 inches thick. Structure typically includes weak coarse granular, and weak medium subangular blocky. Soil organic matter (SOM) ranges from 1 to 4 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):** Compaction layer is 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>>tall shrubs
- Sub-dominant: Perennial forbs>shallow rooted bunchgrasses. Deep-rooted perennials with fibrous root systems are needed for soil stability.
- Other:
- Additional:
- 
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Mountain big sagebrush and bitterbrush will become decadent in the absence of fire and ungulate grazing. Grass and forb mortality will occur as tall shrubs increase. Some grasses and forbs are susceptible to hoof/ foot traffic.
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14. **Average percent litter cover (%) and depth ( in):** Additional litter cover data is needed but is expected to be 5-10 percent to a depth of <0.1 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):** Annual production is 600 pounds per acre (672 kilograms per hectare) in a year with normal temperatures and precipitation. Perennial grasses produce 50-65 percent of the total production, forbs 5-10 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 cheatgrass, leafy spurge, dalmatian toadflax, bulbous bluegrass, rush skeletonweed, musk and scotch thistle and diffuse Russian 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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