

## Ecological site R013XY006ID Sandy Loam 16-22 PZ ARTRV/PSSPS

Last updated: 9/23/2020  
Accessed: 05/19/2024

### General information

**Provisional.** A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

### MLRA notes

Major Land Resource Area (MLRA): 013X–Eastern Idaho Plateaus

013X–Eastern Idaho Plateaus

Precipitation or Climate Zone: 12-16" P.Z.

<https://soils.usda.gov/survey/geography/mlra/index.html>

### Classification relationships

*Artemisia vaseyana*/ *Agropyron spicatum* 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

Land Resource Unit: B (Northwestern Wheat and Range)

MLRA: 13 (Eastern Idaho Plateaus)

EPA EcoRegion: Level III (Middle Rockies)

### Ecological site concept

Site does not receive any additional water.

Soils are:

not saline or saline-sodic.

moderately deep, deep, with < 3% stone (10-25") and boulder (>25") cover.

not skeletal within 20" of soil surface.

not strongly or violently effervescent in surface mineral 20".

textures usually range are sandy loam in surface mineral 4".

Slope is < 15%.

Clay content is = <18% in surface mineral 4".

Site does not have an argillic horizon with > 35% clay

### Associated sites

R013XY003ID	<b>Steep South 16-22 PZ ARTRV/PSSPS</b>
R013XY005ID	<b>Loamy 16-22 PZ ARTRV/FEID-PSSPS</b>
R013XY014ID	<b>Shallow Stony 12-20 PZ ARAR8/PSSPS</b>
R013XY015ID	<b>Steep Stony Mahogany 16-22 PZ CELE3-ARTRV/PSSPS</b>
R013XY019ID	<b>Stony Loam 16-22 PZ ARTRV/PSSPS</b>

R013XY031ID	Steep Stony North 16-22 PZ ARTRV/FEID
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Similar sites

R013XY009ID	Ashy Loam 13-16 PZ ARTRV/PSSPS
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Table 1. Dominant plant species

Tree	(1) <i>Artemisia tridentata</i> ssp. <i>vaseyana</i> (2) <i>Purshia tridentata</i>
Shrub	(1) <i>Balsamorhiza sagittata</i> (2) <i>Crepis acuminata</i> ssp. <i>acuminata</i>
Herbaceous	(1) <i>Pseudoroegneria spicata</i> (2) <i>Hesperostipa comata</i>

Physiographic features

This site occurs on nearly level to gently sloping bottomlands and alluvial fans. Slopes predominantly range from 1-8%. Elevation ranges from 5500-6700 feet (1650-2000 m).

Table 2. Representative physiographic features

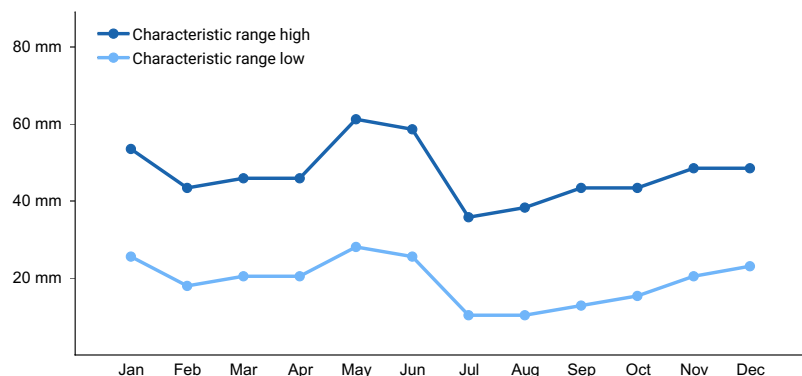
Landforms	(1) Alluvial fan (2) Flood plain
Flooding frequency	Rare to none
Elevation	1,676–2,042 m
Slope	1–8%
Aspect	Aspect is not a significant factor

Climatic features

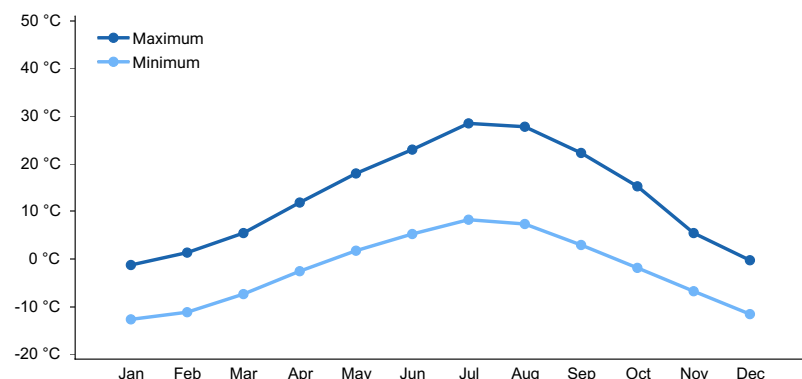
MLRA 13, the Eastern Idaho Plateaus, is part of the Northwestern Wheat and Range Region. Its elevation ranges from 4209 to 9331 feet above sea level, with an average elevation of 5787 feet. The average annual precipitation is 16.41 inches, with a range of 13.56 to 18.75 inches, based on ten long term climate stations located throughout the MLRA. A spike in precipitation amount often occurs in late spring, usually in May. Temperatures vary widely in the MLRA throughout the year. A maximum temperature of 103° Fahrenheit occurred at the McCammon climate station (# 105716; elevation 4770 feet), while a minimum of -41° was recorded at the Kilgore station (#104908). At all stations temperatures throughout the year are usually below the national average. Kilgore also recorded the greatest annual snowfall amount of 217 inches. The average temperature is 41.4 degrees F. with an average high of 55.3 degrees and an average low of 27.5 degrees. The frost-free period ranges from 64 to 90 days, while the freeze-free period can be 98 to 123 days.

Table 3. Representative climatic features

Frost-free period (average)	90 days
Freeze-free period (average)	123 days
Precipitation total (average)	483 mm



**Figure 1. Monthly precipitation range**



**Figure 2. Monthly average minimum and maximum temperature**

## Influencing water features

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

## Soil features

Soils are usually loam sand textures with rapid permeability. Available water holding capacity is moderate to low. Erosion hazard by wind is severe especially upon depletion of adequate ground cover.

**Table 4. Representative soil features**

Parent material	(1) Cinders–basalt (2) Volcanic ash–volcanic rock (3) Eolian deposits–quartzite
Surface texture	(1) Gravelly loamy sand (2) Sandy loam (3) Very gravelly loam
Drainage class	Moderately well drained to somewhat excessively drained
Permeability class	Rapid to very rapid
Soil depth	51–152 cm
Surface fragment cover ≤3"	0–40%
Surface fragment cover >3"	0–55%
Available water capacity (Depth not specified)	2.54–19.3 cm
Calcium carbonate equivalent (Depth not specified)	0–10%

Soil reaction (1:1 water) (Depth not specified)	6.1–7.8
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0–15%

## Ecological dynamics

### Ecological Dynamics of the Site:

The dominant visual aspect of this site is bluebunch wheatgrass and needle and thread in the understory and mountain big sagebrush and antelope bitterbrush in the overstory. Composition by weight is approximately 50-60 percent grass, 15-20 percent forbs, and 15-25 percent shrubs.

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 20-40 years.

The Historic Climax Plant Community (HCPC) 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 HCPC is Phase A. This HCPC is dominated by bluebunch wheatgrass and needle and thread in the understory and mountain big sagebrush and antelope bitterbrush in the overstory. Subdominant species include Indian ricegrass, thickspike wheatgrass, yellow wildrye, slender wheatgrass, tapertip hawksbeard, arrowleaf balsamroot, buckwheat, and longleaf phlox. The plant species composition of Phase A is listed later under "HCPC Plant Species Composition".

Total annual production is 1400 pounds per acre (1568 kilograms per hectare) in a normal year. Production in a favorable year is 1800 pounds per acre (2016 kilograms per hectare). Production in an unfavorable year is 1000 pounds per acre (1120 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 perennial bunchgrasses are subdominant.

### FUNCTION:

This site is well suited for big game and livestock as late spring and fall range. The site can be winter range for big game in moderate winters. It is also well suited for recreation use in the summer and fall.

This site is susceptible to degradation due to the gentle slopes, ease of access, and instability of the sandy surface textures. Infiltration is good where the community is in mid to late seral status. The site has moderately low runoff potential. Snow accumulates on the site due to high elevation and presence of tall shrubs.

### Impacts on the Plant Community.

#### Influence of fire:

In the absence of normal fire frequency, mountain big sagebrush and antelope bitterbrush can gradually increase on the site. Utah juniper can invade the site if a seed source is in the proximity. Grasses and forbs decrease as shrubs increase. With the continued absence of fire, mountain big sagebrush or juniper can displace most of the primary understory species. See "Influence of juniper invasion" below.

When fires become more frequent than historic levels (20-40 years), mountain big sagebrush and bitterbrush are reduced significantly. Rabbitbrush can increase slightly. With continued short fire frequency, mountain big sagebrush and bitterbrush can be completely eliminated along with many of the desirable understory species such

as bluebunch wheatgrass, needle and thread, and Indian ricegrass. These species may be replaced by Sandberg bluegrass and bulbous bluegrass along with a variety of annual and perennial forbs including noxious and invasive plants. Cheatgrass will invade the site at lower elevations. These fine fuels will increase the fire frequency.

#### 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. 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. As cheatgrass increases and becomes co-dominant with other annuals, fires become more frequent, particularly at lower elevations.

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 Utah 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 or junipers without a suitable understory of desirable perennial bunchgrasses can result in an increase in cheatgrass and other annuals which will lead to more frequent fire intervals.

#### Weather influences:

Above normal precipitation in April, May, and June 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 precipitation. An early, hard 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. Prolonged drought can lead to a reduction in fire frequency.

#### Influence of Insects and disease:

Outbreaks can affect vegetation health. Bitterbrush can be severely affected by the western tent caterpillar (*Malacosoma fragilis*). Two consecutive years of defoliation by the tent caterpillar can cause mortality in bitterbrush. Mormon cricket and grasshopper outbreaks occur periodically. Outbreaks seldom cause plant mortality since defoliation of the plant occurs only once during the year of the outbreak.

#### 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 perennial and annual invasive species 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 and fall and in moderate winters. 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. High numbers of burrowing rodents provide bare ground areas that allow invasion of weedy species. The deer mouse is beneficial to this site as it is the principal vector for planting bitterbrush seed.

## Watershed:

Decreased infiltration and increased runoff occur with the invasion of Utah juniper or an increase in mountain big sagebrush. Juniper invasion can be triggered by lack of fire, improper grazing management, and prolonged drought. Desired understory species can be reduced. This composition change can affect nutrient and water cycles. 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:

The following discussion deals with both western juniper and Utah juniper.

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 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: (1) hydrology, (2) energy capture and (3) 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 A to B. Develops in the absence of fire. No Utah juniper seed source in the proximity.

Phase A to C. Usually results from improper grazing management and absence of fire. A juniper seed source is present.

Phase A to D. Results from one or more fires.

Phase A to E. Develops in the absence of fire. A juniper seed source is present.

Phase A to F. Results from improper grazing management and absence of fire. No juniper

seed source is present.

Phase B to A. Results from prescribed grazing management.

Phase C to A. Develops with prescribed grazing management and prescribed burning or fire.

Phase D to A. Usually results from prescribed grazing management and no fire.

Phase E to A. Develops from prescribed grazing management and prescribed burning or brush management.

Phase F to A. Results from prescribed grazing management, no fire or brush management.

Phase B to D. This develops from prescribed burning or fire.

Phase C to D. This develops from prescribed burning or fire.

Phase E to D. Results from prescribed burning or fire.

Phase F to D. Results from prescribed burning or fire.

State 1 Phase D to State 2, Phase B. Develops through improper grazing management and lack of fire. This site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices.

State 1 Phase F to State 2 Phase A. Develops through improper grazing management with no fire. This site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices.

State 1 Phase C or E to State 3. Results from improper grazing management and lack of fire. This site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices.

State 2 Phase A to State 2 Phase B. Results from improper grazing management and frequent fire.

State 2 Phase B to State 2 Phase A. Results from no fire.

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 cross the threshold and to retrogress to a new site with reduced potential. It is usually uneconomical to return this community to State1 through accelerated practices.

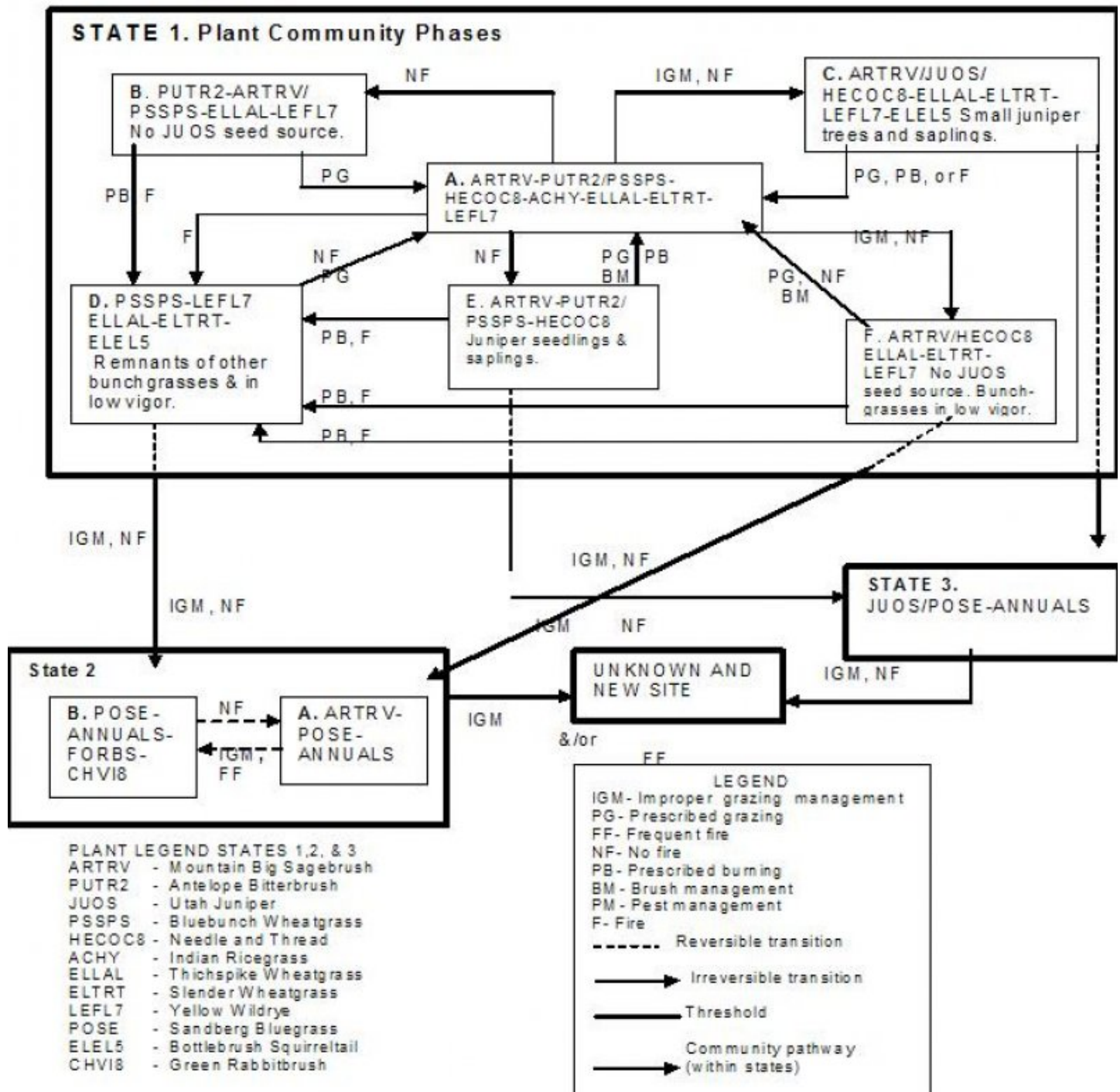
State 3 to unknown site. Continued lack of fire and improper grazing management cause this state to cross the threshold and to retrogress to a new site with reduced potential due to significant soil loss and changes in hydrology. It is usually uneconomical to return this community to State1 through accelerated practices.

#### Practice Limitations:

Severe limitations exist on this site for seeding by conventional methods due to sandy textured soils and possible wind erosion hazard. Limitations for brush control on this site are related to the existing understory ground cover. Brush management must be planned in relation to existing ground cover due to extreme erosiveness of the soil without adequate cover.

### State and transition model

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



**State 1**  
**State 1**

**Community 1.1**  
**State 1, Plant community A**

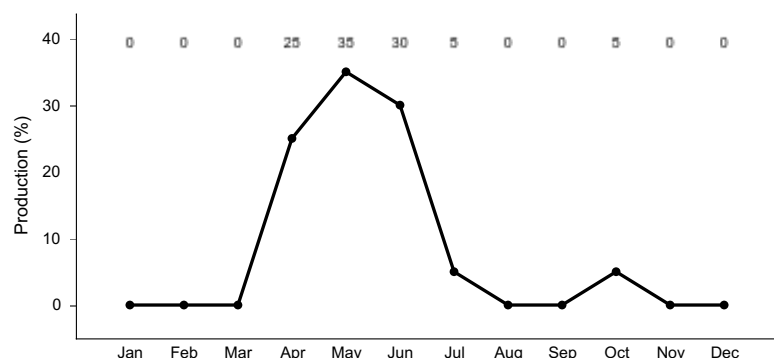
The HCPC has mountain big sagebrush and antelope bitterbrush in the overstory with bluebunch wheatgrass, needle and thread, Indian ricegrass, thickspike wheatgrass, slender wheatgrass, and yellow wildrye in the understory. There is a wide variety of other grasses that may be present in small amounts. Dominant forbs include tapertip hawksbeard and arrowleaf balsamroot. A variety of other forbs can be present in small amounts. Saskatoon



serviceberry can be present in significant amounts. Other shrubs can be present in small amounts. Natural fire frequency is 20-40 years.

**Table 5. Annual production by plant type**

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	616	863	1110
Shrub/Vine	280	392	504
Forb	224	314	404
<b>Total</b>	<b>1120</b>	<b>1569</b>	<b>2018</b>



**Figure 4. Plant community growth curve (percent production by month). ID0805, B13 ARTRV . State 1.**

## Community 1.2 State 1 Phase B

State 1, Phase B. This plant community is dominated by bitterbrush and mountain big sagebrush. Bluebunch wheatgrass is the dominant species in the understory with thickspike wheatgrass, slender wheatgrass, and yellow wildrye subdominant. A wide variety of other grasses and forbs are present in reduced amounts. No Utah juniper seed source is present. This state has developed due to fire frequency being much longer than normal

## Community 1.3 State 1 Phase C

State 1, Phase C. This plant community is dominated by mountain big sagebrush in the overstory with small Utah juniper trees or saplings. Needle and thread, thickspike wheatgrass, slender wheatgrass, yellow wildrye, and bottlebrush squirreltail are major species in the understory along with a variety of forbs in small amounts. Bunchgrass species are reduced in amounts and have low vigor. Antelope bitterbrush is present but in reduced vigor and may be hedged. Kentucky bluegrass may have invaded the site. This state has developed due to improper grazing management and lack of fire. A Utah juniper seed source is in the proximity.

## Community 1.4 State 1 Phase D

State 1, Phase D. This plant community is dominated by bluebunch wheatgrass. Yellow wildrye, streambank wheatgrass, slender wheatgrass, and bottlebrush squirreltail are the primary species in the plant community. Bunchgrasses are in low vigor and some may have died due to wildfire. Forbs are about the same as in Phase A. Mountain big sagebrush and antelope bitterbrush have been significantly reduced, but root sprouting shrubs such as rabbitbrush, horsebrush, and serviceberry may be present. Snowbrush ceanothus will increase after fire. This plant community is a result of wildfire.

## Community 1.5 State 1 Phase E

State 1, Phase E. 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 Utah juniper seed source is in the proximity. This state has developed due to the absence of fire.

## **Community 1.6**

### **State 1 Phase F**

State 1, Phase F. This plant community is dominated by mountain big sagebrush in the overstory. Needle and thread, streambank wheatgrass, slender wheatgrass, yellow wildrye and bottlebrush squirreltail are the dominant grasses in the understory. Bluebunch wheatgrass and other bunchgrasses are present but in reduced amounts and typically in low vigor. Antelope bitterbrush is present but in reduced amounts and low vigor. Bitterbrush plants may be hedged. This state has developed due to improper grazing management and a lack of fire. No Utah juniper seed source is in the proximity.

## **Pathway A to B**

### **Community 1.1 to 1.2**

Develops in the absence of fire. No Utah juniper seed source in the proximity.

## **Pathway A to C**

### **Community 1.1 to 1.3**

Usually results from improper grazing management and absence of fire. A juniper seed source is present.

## **Pathway A to D**

### **Community 1.1 to 1.4**

Results from one or more fires

## **Pathway A to E**

### **Community 1.1 to 1.5**

Develops in the absence of fire. A juniper seed source is present.

## **Pathway A to F**

### **Community 1.1 to 1.6**

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

## **Pathway B to A**

### **Community 1.2 to 1.1**

Results from prescribed grazing management.

## **Pathway B to D**

### **Community 1.2 to 1.4**

This develops from prescribed burning or fire.

## **Pathway C to A**

### **Community 1.3 to 1.1**

Develops with prescribed grazing management and prescribed burning or fire.

## **Pathway C to D**

### **Community 1.3 to 1.4**

This develops from prescribed burning or fire.

### **Pathway D to A** **Community 1.4 to 1.1**

Usually results from prescribed grazing management and no fire.

### **Pathway E to A** **Community 1.5 to 1.1**

Develops from prescribed grazing management and prescribed burning or brush management.

### **Pathway E to D** **Community 1.5 to 1.4**

Results from prescribed burning or fire.

### **Pathway F to A** **Community 1.6 to 1.1**

Results from prescribed grazing management, no fire or brush management.

### **Pathway F to D** **Community 1.6 to 1.4**

Results from prescribed burning or fire.

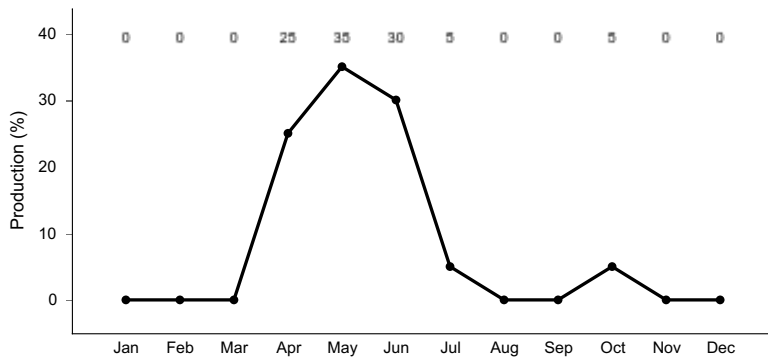
## **State 2** **State 2**

### **Community 2.1** **State 2 Phase A**

State 2, Phase A. This plant community is dominated by mountain big sagebrush with Sandberg bluegrass and annuals in the interspaces. This state has developed due to improper grazing management and the absence of fire from Phase F of State 1 and no fire from Phase B of State 2. Some soil loss has occurred. This site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices.

### **Community 2.2** **State 1, Plant community B**

State 2, Phase B. This plant community is dominated by Sandberg bluegrass and other annuals and forbs. Root sprouting shrubs such as rabbitbrush and horsebrush can be present in small amounts. This state has developed due to improper grazing management and frequent fires from Phase A of State 2 and improper grazing management and no fire from Phase D of State 1. Some soil loss has occurred. This site has crossed the threshold. It is usually uneconomical to return this community to State 1 through accelerated practices.



**Figure 5. Plant community growth curve (percent production by month).**  
ID0805, B13 ARTRV . State 1.

## Pathway A to B Community 2.1 to 2.2

Results from improper grazing management and frequent fire

## Pathway B to A Community 2.2 to 2.1

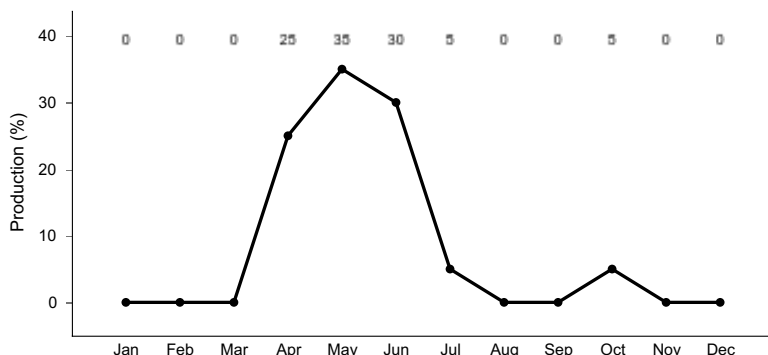
Results from no fire

## State 3 State 3

State 3. This plant community is dominated by Utah juniper. Remnants of Bluebunch wheatgrass and some other bunchgrasses may be present, often under trees. Shallow-rooted grasses, such as Sandberg bluegrass, and other annuals can be found in the interspaces. Few shrubs are present. Generally, shrub cover is below 12-13%, bare ground is above 27-28%, juniper cover is greater than 20% and infiltration less than 6 cm/hr. when the threshold is crossed. Some soil loss has occurred. This state has developed in the absence of fire. This site has crossed the threshold. It is usually uneconomical to return this community to State 1 through accelerated practices

## Community 3.1 State 1, Plant community C

This plant community is dominated by mountain big sagebrush in the overstory with small Utah juniper trees or saplings. Needle and thread, thickspike wheatgrass, slender wheatgrass, yellow wildrye, and bottlebrush squirreltail are major species in the understory along with a variety of forbs in small amounts. Bunchgrass species are reduced in amounts and have low vigor. Antelope bitterbrush is present but in reduced vigor and may be hedged. Kentucky bluegrass may have invaded the site. This state has developed due to improper grazing management and lack of fire. A Utah juniper seed source is in the proximity.



**Figure 6. Plant community growth curve (percent production by month).**  
ID0805, B13 ARTRV . State 1.

## **State 4**

### **State 4**

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 from State 2 or the continued absence of fire where a Utah juniper seed source is present. This unknown new site can be reached from State 3 with further dominance of the site by juniper. This site will not return to State 1 or 2 because of significant soil loss.

### **Community 4.1**

#### **State 1, Plant community D**

This plant community is dominated by bluebunch wheatgrass. Yellow wildrye, streambank wheatgrass, slender wheatgrass, and bottlebrush squirreltail are the primary species in the plant community. Bunchgrasses are in low vigor and some may have died due to wildfire. Forbs are about the same as in Phase A. Mountain big sagebrush and antelope bitterbrush have been significantly reduced, but root sprouting shrubs such as rabbitbrush, horsebrush, and serviceberry may be present. Snowbrush ceanothus will increase after fire. This plant community is a result of wildfire.

### **Transition T1A**

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

State 1 Phase D to State 2, Phase B. Develops through improper grazing management and lack of fire. This site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices. State 1 Phase F to State 2 Phase A. Develops through improper grazing management with no fire. This site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices.

### **Transition T1B**

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

State 1 Phase C or E to State 3. Results from improper grazing management and lack of fire. This site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices.

### **Transition T2A**

#### **State 2 to 4**

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 cross the threshold and to retrogress to a new site with reduced potential. It is usually uneconomical to return this community to State1 through accelerated practices.

### **Transition T3A**

#### **State 3 to 4**

State 3 to unknown site. Continued lack of fire and improper grazing management cause this state to cross the threshold and to retrogress to a new site with reduced potential due to significant soil loss and changes in hydrology. It is usually uneconomical to return this community to State1 through accelerated practices.

## **Additional community tables**

### **Animal community**

Wildlife Interpretations.

Animal Community – Wildlife Interpretations

This 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 throughout the year. The site 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 sage-grouse. Water features are sparse provided by seasonal runoff, artificial water catchments, and springs.

State 1 Phase 1.1 – Mountain Big Sagebrush/ Antelope Bitterbrush/ Bluebunch Wheatgrass/ Needle and Thread/ Indian Ricegrass/ Thickspike Wheatgrass/ Slender Wheatgrass/ Yellow Wildrye 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 and plant structural diversity. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, Great Basin spadefoot toad, 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 avian species utilizing the habitat include the Brewer's sparrow, sage sparrow, sage grouse, and sage thrasher. Sage-grouse habitat (leks, nesting, brood-rearing, and winter) is provided by this plant community. The plant community provides spring and fall food and cover for mule deer and elk. Antelope bitterbrush and Saskatoon Serviceberry along with bluebunch wheatgrass are important forage species for large animals. The plant community provides food for mule deer and elk during moderate winters. A diverse small mammal population including golden-mantled ground squirrels, jackrabbits, deer mice, and Great Basin pocket mice may 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- Mountain Big Sagebrush/ Antelope Bitterbrush/ Bluebunch Wheatgrass/ Thickspike Wheatgrass/ Yellow Wildrye Plant Community: This phase has developed due to fire interval being much longer than normal. An increase in canopy cover of sagebrush and antelope bitterbrush contributes to a declining herbaceous understory. The reptile community will be similar to the State 1 Phase 1.1 community represented by common sagebrush lizard, western rattlesnake, Great Basin spadefoot toad, western toad, and northern leopard frog. Sagebrush provides nesting, brood-rearing, winter cover, and winter food for sage-grouse but as understory vegetation declines the quality of this habitat is reduced. The plant community provides spring and fall food for mule deer and elk. Quality of winter forage habitat for mule deer and elk is similar to State 1 Phase 1.1. A diverse small mammal population including golden-mantled ground squirrels, jackrabbits, deer mice, and Great Basin pocket mice may 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 – Mountain Big Sagebrush/ Utah Juniper/ Needle and Thread/ Thickspike Wheatgrass/ Slender Wheatgrass/ Yellow Wildrye/ Bottlebrush Squirreltail Plant Community: This plant community is the result of improper grazing management and no fire. An increase in canopy cover of sagebrush and juniper contributes to a sparse herbaceous understory. A reduced herbaceous understory results in lower diversity and numbers of insects. The reptile community will be similar to the State 1 Phase 1.1 community represented by common sagebrush lizard, western rattlesnake, Great Basin spadefoot toad, western toad, and northern leopard frog. The reduced diversity of insects and understory cover may reduce quality of food and cover for reptile populations. As juniper increases, habitat cover for Brewer's sparrow, sage thrasher, and sage sparrow may increase. Remaining sagebrush provides brood-rearing, winter cover, and winter food habitat for sage-grouse but as juniper encroaches the quality of this habitat is severely reduced or eliminated. The plant community supports limited spring and fall forage for mule deer and elk due to the loss 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 diverse small mammal population including golden-mantled ground squirrels, jackrabbits, deer mice, and Great Basin pocket mice may utilize this plant community.

State 1 Phase 1.4 – Bluebunch Wheatgrass/ Thickspike Wheatgrass/ Yellow Wildrye/ Slender Wheatgrass/ Bottlebrush Squirreltail Plant Community: This plant community is a result of recent wildfire, prescribed burning, or brush management. The plant community, dominated by herbaceous vegetation with little to no sagebrush or antelope bitterbrush would provide less vertical structure for animals. Patches of root sprouting shrubs (snowberry and rabbitbrushes) may be present to provide vertical structure for wildlife over time. Insect diversity would be reduced but a native forb plant community similar to State 1 Phase 1.1 would still support select pollinators. Habitat quality for reptiles including common sagebrush lizard and western rattlesnake would decline due to the loss of sagebrush and antelope bitterbrush. Amphibian habitat would be tied to permanent spring sites in the area. Development of spring sites that collect all available water would exclude the use of amphibians on these sites. The

dominant herbaceous vegetation with little sagebrush and antelope bitterbrush canopy cover would limit use of these areas as nesting habitat by Brewer's sparrow, sage sparrow, sage grouse, and sage thrasher. The 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) but the site would offer little thermal and young of year cover due to the reduced shrub cover. The populations of small mammals would be dominated by open grassland species. Large blocks of this plant community would fragment the reference plant community and reduce the quality of habitat for shrub-steppe obligate animal species.

State 1 Phase 1.5 – Mountain Big Sagebrush/ Antelope Bitterbrush/ Bluebunch Wheatgrass/ Needle and Thread Plant Community: This plant community is the result of no fire. An increase in canopy cover of sagebrush and juniper contributes to a declining herbaceous understory. The native insect populations would be similar to those in State 1 Phase 1.1. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, Great Basin spadefoot toad, western toad, and northern leopard frog. Shrub-steppe obligate avian species include Brewer's sparrow, sage sparrow, sage thrasher, and sage-grouse. Sagebrush provides nesting, 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 reduced vigor of understory vegetation provides a shorter forage season for mule deer and elk. Young of year cover would be provided for mule deer. Small mammal diversity and populations would be similar to those in State 1 Phase 1.1.

State 1 Phase 1.6 - Mountain Big Sagebrush/ Needle and Thread/ Thickspike Wheatgrass/ Slender Wheatgrass/ Yellow Wildrye Plant Community: This plant community is the result of improper grazing management and no fire. An increase in canopy cover of sagebrush contributes to a decline in vigor and production of Idaho fescue and bluebunch wheatgrass. The reduced diversity of herbaceous understory results in lower diversity of insects. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, Great Basin spadefoot toad, western toad, and northern leopard frog. The reduced diversity of insects may reduce reptile diversity and populations. Reduced herbaceous understory may lower quality of habitat for bird species. Shrub-steppe obligate avian species include Brewer's sparrow, sage sparrow, sage thrasher, and sage-grouse. Quality of habitat (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. The reduced vigor of understory vegetation provides a shorter forage season for mule deer, elk, and pronghorn antelope. Young of year cover would be provided for deer and elk. Small mammal diversity and populations would be similar to State 1 Phase 1.1.

State 2 Phase 2.1 – Mountain Big Sagebrush/ Sandberg Bluegrass/ Annuals Plant Community: This state has developed due to improper grazing management and the absence of fire from Phase 1.6 of State 1 and no fire from Phase 2.2 of State 2. An increase in canopy cover of sagebrush and improper grazing resulted in a loss of Idaho fescue, bluebunch wheatgrass, and native forbs. The reduced diversity of the herbaceous understory results in lower diversity of insects. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, Great Basin spadefoot toad, western toad, and northern leopard frog. The reduced diversity of insects may reduce reptile diversity and populations. Reduced herbaceous understory and poor vigor of existing plants lowers the quality of habitat (food and cover) for bird species. Shrub-steppe obligate avian species include Brewer's sparrow, sage sparrow, sage thrasher, and sage-grouse. Quality of habitat (brood-rearing and nesting cover) for sage-grouse is reduced due to poor vigor and 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 forage season for mule deer and elk. Young of year cover would be provided for deer and elk. Small mammal diversity and populations would be similar to State 1 Phase 1.1.

State 2 Phase 2.2 – Sandberg/ Annuals/ Forbs/ Green Rabbitbrush Plant Community: This phase has developed due to improper grazing management and frequent fire from Phase 1.4, State 1 or with improper grazing management and fire from Phase 2.1, State 2. The reduced forb and shrub components in the plant community would support a very limited population of pollinators. Limited habitat for sagebrush lizard, Great Basin spadefoot toad, and western toad would be available but the quality of cover is poor due to the loss of sagebrush and antelope bitterbrush. 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. Large mammals may utilize the herbaceous vegetation in the early part of the year when the vegetation is more palatable. The populations of small mammals would be dominated by open grassland species. Predator hunting success may increase due to the decreased cover for small mammals. Large blocks of this plant community would fragment the reference plant community and reduce the quality of habitat for shrub-steppe obligate animal species.

State 3 - Utah Juniper/ Sandberg Bluegrass/ Annuals Plant Community: This state has developed in the absence of fire. The loss of native forbs and understory vegetation will reduce insect diversity on the site. The lack of flowering plants reduces use by pollinators like butterflies and moths. Habitat for common sagebrush lizard, Great Basin spadefoot toad, and western toad would be limited due to the loss of sagebrush. This plant community does not support the habitat requirements 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 by raptors may decrease due to a heavy overstory of juniper. As juniper encroaches the site will provide additional thermal cover for large mammals. The plant community provides food and cover for mule deer in winter.

#### Grazing Interpretations.

This site is best suited for livestock grazing in late spring and fall months. Adequate cover must be maintained on this site to prevent soil erosion by wind resulting in loss of plant and soil resources.

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. Calculations used to determine estimated initial stocking rate will be based on forage preference ratings.

### Hydrological functions

The soils in this site are in hydrologic group A. Natural erosion hazard by water is slight.

### Recreational uses

This site has some recreation value and natural beauty due to spring blooming forbs and shrubs. Some snowmobiling activity can occur during heavy snow seasons. ATV use can cause erosion. The site can be used for hunting, hiking and horseback riding.

### Wood products

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

### Other products

None

### Other information

Revision Notes: "Previously Approved" Provisional  
This Provisional ecological site concept has passed Quality Control (QC) and Quality Assurance (QA) to ensure that the site meets the 2014 NESH standards for a Provisional ecological site description. This is an updated "Previously Approved" ESD that represents a first-generation tier of documentation that, prior to the release of the 2014 National Ecological Site Handbook (NESH), met all requirements as an "Approved" ESD as laid out in the 1997 (rev.1, 2003) National Range and Pasture Handbook (NRPH). The document fully described the Reference State and Community Phase in the State-and-Transition model. All other alternative states are at least described in narrative form. The "Previously Approved" ESD has been field-tested for a minimum of five years and is a proven functional document for conservation planning. The "Previously Approved" ESD does not contain all tabular and



narrative entries as required in the current “Approved” level of documentation, but it is expected that the “Previously Approved” ESD will continue refinement toward an “Approved” status.

#### Site Development and Testing Plan:

Future work, as described in a Project Plan, is necessary to validate the information in this Provisional Ecological Site Description. This will include field activities to collect low-, medium-, and high-intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. The final field review, peer review, quality control, and quality assurance reviews of the ESD will be required to produce the final document.

### 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

Jacy Gibbs, co-owner, Intermountain Rangeland Consultants, LLC

Jim Cornwell, Range Management Specialist, IASCD

Joe May, State Rangeland Management Specialist, NRCS, Idaho

Lee Brooks, Range Management Specialist, IASCD

### Other references

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### Contributors

D. Edgerton

### Approval

Kendra Moseley, 9/23/2020

### 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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Date	03/28/2007
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

- 1. Number and extent of rills:** Rills: are rare on this site. If rills are present they are likely to occur immediately following wildfire and a high intensity convection storm. Sandy surface texture will limit rill development.

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- 2. Presence of water flow patterns:** Water-Flow Patterns: are rare on this site. They may occur immediately following a high intensity convention storm. If 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.

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- 3. Number and height of erosional pedestals or terracettes:** Pedestals and/or Terracettes: are rare on this site.

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- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground: data is not available for this site. On sites in mid-seral status, bare ground is expected to be about 50-60%. This site is naturally unstable due to sandy surface textures particularly following a wildfire.

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- 5. Number of gullies and erosion associated with gullies:** Gullies: none

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- 6. Extent of wind scoured, blowouts and/or depositional areas:** Wind-Scoured, Blowouts, and/or Deposition Areas: wind-scour and deposition areas can occur on this site, particularly following a wildfire. Old depositions will be noticeable in the crowns of bunchgrasses and at the base of shrubs.

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- 7. Amount of litter movement (describe size and distance expected to travel):** Litter Movement: fine litter in the interspaces may move up to 2 feet following a significant run-off event or further with wind. 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):** Soil Surface Resistance to Erosion: values average 1 to 2but needs to be tested. Organic carbon content needs to be determined.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil Surface Loss or Degradation: the A or A1 horizon is typically 3 to 22 inches thick. Structure ranges from weak and moderate fine granular to weak medium and coarse 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:** Plant Community Composition and Distribution Relative to Infiltration: 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: 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: Functional/ Structural Groups: cool season deep-rooted perennial bunchgrasses >> tall shrubs = perennial forbs > shallow rooted bunchgrasses.
- Sub-dominant:
- Other:
- Additional:
- 
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Plant Mortality/ Decadence: mountain big sagebrush and antelope bitterbrush 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):** Litter Amount: additional litter cover data is needed but is expected to be 20-25 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 1400 pounds per acre (1568 kilograms per hectare) in a year with normal temperatures and precipitation. Perennial grasses produce 50-60 percent of the total production, forbs 15-20 percent and shrubs 15-25 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: includes Kentucky bluegrass, whitetop, rush skeletonweed, musk thistle, Canada thistle, scotch thistle, leafy spurge, and diffuse and spotted knapweed.

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17. **Perennial plant reproductive capability:** Reproductive Capability of Perennial plants: all functional groups have the potential to reproduce in most years.
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