

## Ecological site R013XY027ID Sand 12-16 PZ PUTR2/HECOC8

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 tridentata*/*Stipa comata* 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".

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 10".

textures usually range from loamy fine sand, fine sand, to sand in surface mineral 4".

Slope is < 15%.

Clay content is = <10% in surface mineral 4".

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

### Associated sites

R013XY001ID	<b>Loamy 12-16 PZ</b>
R013XY002ID	<b>Stony Loam 13-16 PZ ARTRV/PSSPS</b>
R013XY004ID	<b>Shallow Gravelly 12-16 PZ ARTRV/PSSPS</b>
R013XY008ID	<b>Steep South Slopes 12-16 PZ ARTRV/PSSPS</b>
R013XY012ID	<b>Gravelly South Slope 12-16 PZ ARTRV/PSSPS</b>
R013XY013ID	<b>Stony 12-16 PZ ARTRV/FEID</b>

## Similar sites

**Table 1. Dominant plant species**

Tree	Not specified
Shrub	(1) <i>Purshia tridentata</i>
Herbaceous	(1) <i>Hesperostipa comata ssp. comata</i>

## Physiographic features

This site occurs in areas of generally stabilized dunes on undulated basalt plains. The dunes are long and narrow, oriented in the direction of prevailing winds. The site occurs in the narrow troughs between the sand ridges. Slopes are usually 1 to 10, but can reach up to 30 percent. Elevations range from 4800 to 6100 feet (1400 to 1850 meters).

**Table 2. Representative physiographic features**

Landforms	(1) Lava plain (2) Dune
Flooding frequency	None
Elevation	1,463–1,859 m
Slope	1–10%
Water table depth	51–152 cm
Aspect	Aspect is not a significant factor

## Climatic features

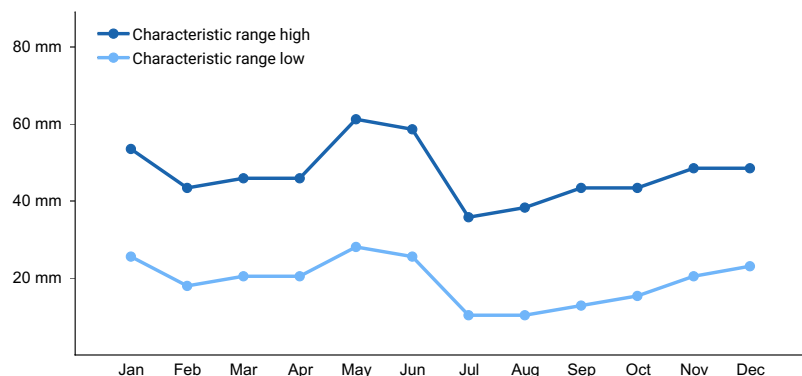
MLRA 13, the Eastern Idaho Plateaus, is part of the Northwestern Wheat and Range Region. Its elevation ranges from 4209 to 9331 feet above sea level, with an average elevation of 5787 feet. The average annual precipitation is 16.41 inches, with a range of 13.56 to 18.75 inches, based on ten long term 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.

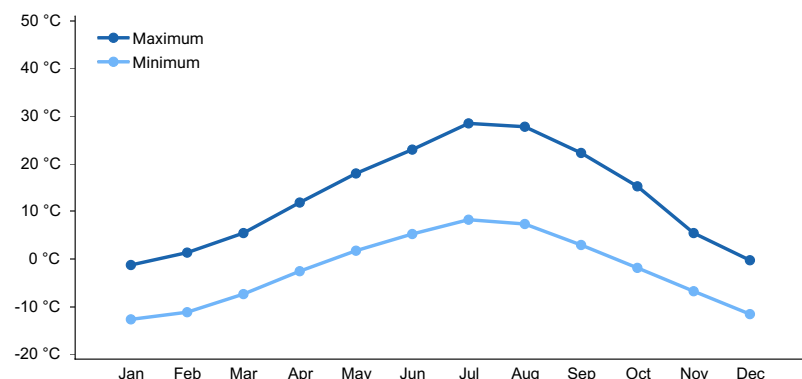
The frost-free period ranges from 64 to 90 days, while the freeze-free period can be 98 to 123 days.

**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

The soils on this site are generally deep sands or occasionally loamy sands. Permeability is rapid and the available water holding capacity (AWC) is low to moderate. Surface runoff is low. Erosion hazard is high for wind on disturbed areas.

Soil Series Correlated to this Ecological Site

Blacksan  
Engett  
Juniperbute  
Siddoway  
Snowshoe

**Table 4. Representative soil features**

Surface texture	(1) Loamy fine sand (2) Fine sand (3) Sand
Drainage class	Well drained to excessively drained
Permeability class	Moderately rapid to very rapid
Soil depth	51–152 cm

Surface fragment cover <=3"	0–5%
Available water capacity (0-101.6cm)	4.32–11.43 cm
Soil reaction (1:1 water) (0-101.6cm)	6.6–7.8
Subsurface fragment volume <=3" (Depth not specified)	0–20%

## Ecological dynamics

The dominant visual aspect is antelope bitterbrush in the overstory with needle and thread in the understory. Composition by weight is approximately 40 to 50 percent grasses, 10 to 20 percent forbs, and 35 to 45 percent shrubs

During the last few thousand years, this site has evolved in a semi-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 20-50 years.

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 A. This plant community is dominated by needle and thread in the understory and antelope bitterbrush in the overstory. Subdominant species include Indian ricegrass, thickspike wheatgrass, western wheatgrass, arrowleaf balsamroot, lupine, and basin big sagebrush. There is a wide variety of other grasses, forbs, and shrubs that occur in the plant community in minor amounts. The plant species composition of Phase A is listed later under "Reference Plant Community Phase Plant Species Composition".

Total annual production is 900 pounds per acre (1008 kilograms per hectare) in a normal year. Production in a favorable year is 1200 pounds per acre (1344 kilograms per hectare). Production in an unfavorable year is 500 pounds per acre (560 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 suited for livestock grazing in late spring, summer, and fall. The site also provides big game habitat in the spring, summer, and fall. 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 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, antelope bitterbrush and basin big sagebrush 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, antelope bitterbrush or juniper can displace most of the primary understory species. See "Influence of juniper invasion" below.

When fires become more frequent than historic levels (20-50 years), antelope bitterbrush and basin big sagebrush

are reduced significantly. Rabbitbrush and mountain snowberry can increase slightly. With continued short fire frequency, basin big sagebrush and antelope bitterbrush can be completely eliminated along with many of the desirable understory species such as needle and thread and Indian ricegrass. These species may be replaced by thickspike wheatgrass, sand dropseed, and bottlebrush squirreltail along with a variety of annual and perennial forbs including noxious and invasive plants. Cheatgrass will invade the site. 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 and antelope bitterbrush. With reduced vigor, recruitment of these species declines. As these species decline, the plant community becomes susceptible to juniper invasion, an increase in basin 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 basin big sagebrush. An increase in tall shrubs generally leads to an increase in juniper by providing bird perches and “nursery” sites for juniper establishment. Any brush management on this specific site needs to be very carefully evaluated due to the presence of bitterbrush.

#### 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 the 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. Antelope 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 annual and perennial 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. 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 hydrologic 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 hydrologic 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 frequent 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 fire. This site has crossed the threshold. It is uneconomical to return either phase to State 1 with accelerated practices.

State 2 Phase B to State 2 Phase A. Results from no fire. This site has crossed the threshold. It is uneconomical to return either phase to State 1 with accelerated practices.

State 2 or State 3 to State 4. Results with pest management and rangeland seeding.

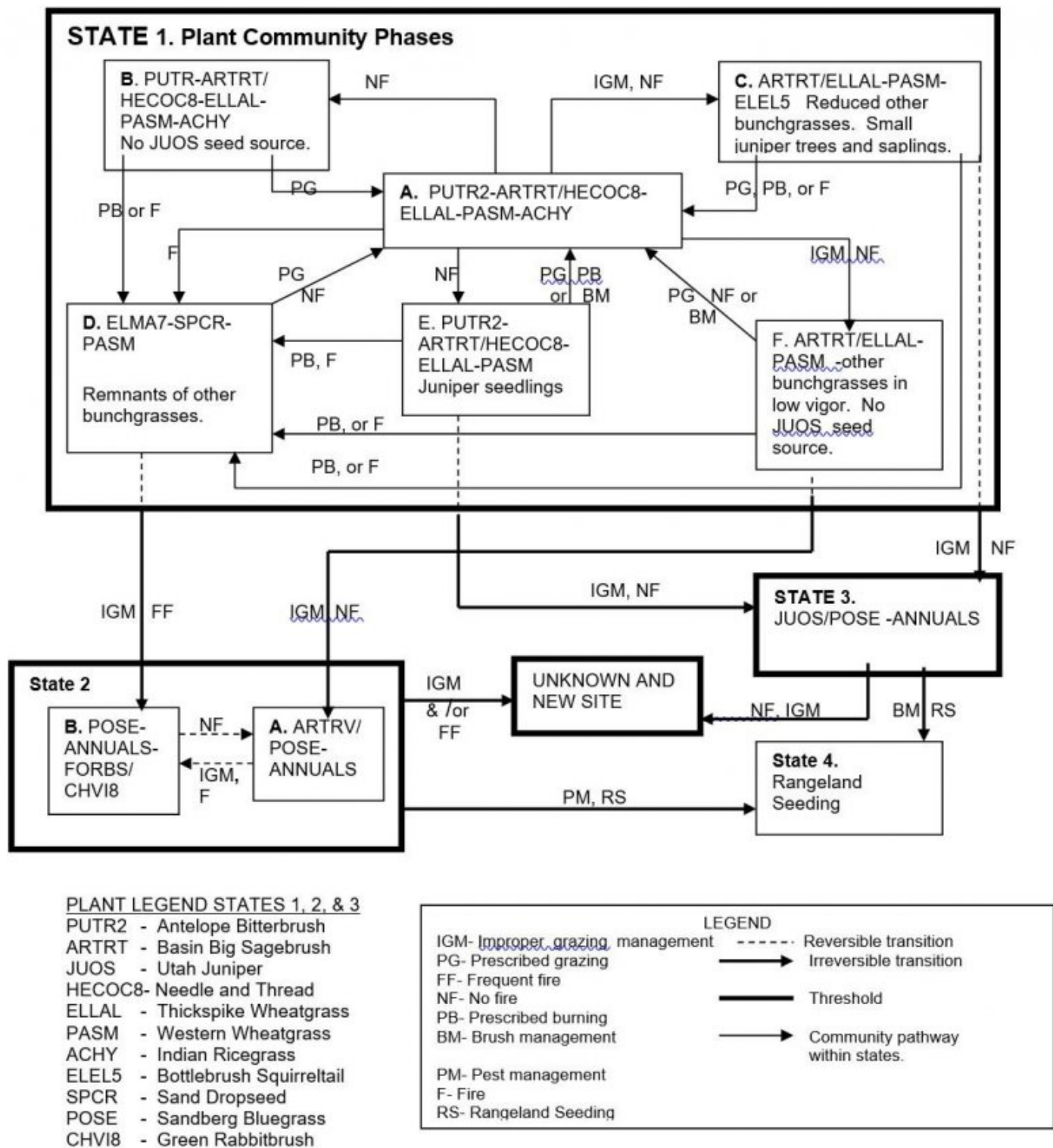
State 2 to unknown site. Excessive soil loss and changes in the hydrologic cycle caused by improper grazing management and/or frequent fire cause this state to cross the threshold and to retrogress to a new site with reduced potential. It is usually uneconomical to return this community to State1 through 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:

Extreme caution must be used in reseeding this site. Soil disturbance presents severe limitations due to wind erosion hazards. Slight to moderate limitations exist on this site for brush management practices. Careful planning and implementation is needed to prevent wind erosion. Slight limitations exist on this site for implementing vegetative management and facilitating practices.

### State and transition model



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

**Community 1.1**  
**State 1 Phase A**

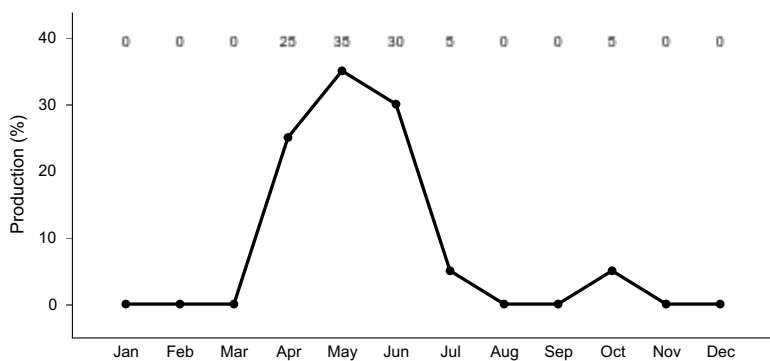
Reference Plant Community Phase. This plant community is dominated by needle and thread in the understory and antelope bitterbrush in the overstory. Subdominant species include thickspike wheatgrass, western wheatgrass, Indian ricegrass, arrowleaf balsamroot, lupine, and basin big sagebrush. There is a wide variety of other grasses, forbs, and shrubs that occur in the plant community in minor amounts. Natural fire frequency is 20-50 years.

**Table 5. Ground cover**

Tree foliar cover	0%
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Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	0%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	30-50%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%



**Figure 3. Plant community growth curve (percent production by month).**  
ID0805, B13 ARTRV . State 1.

## Community 1.2

### State 1, Phase B

This plant community is dominated by antelope bitterbrush. Needle and thread is the dominant plant species in the understory with thickspike wheatgrass, western wheatgrass, and Indian ricegrass 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

This plant community is dominated by basin big sagebrush in the overstory with small Utah juniper trees or saplings invading the site. Thickspike wheatgrass, western wheatgrass, and bottlebrush squirreltail are major species in the understory along with a variety of forbs in small amounts. Bunchgrass species are in reduced amounts and have low vigor. Antelope bitterbrush is present but in reduced vigor and may be hedged. Cheatgrass 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

This plant community is dominated by thickspike wheatgrass. Basin wildrye, yellow wildrye, threadleaf sedge, and forbs are about the same as in Phase A. Bottlebrush squirreltail, sand dropseed and western wheatgrass have increased. Bunchgrasses are in low vigor and some may have died due to wildfire. Basin big sagebrush and antelope bitterbrush have been significantly reduced, but root sprouting shrubs such as rabbitbrush, horsebrush and serviceberry may be present. This plant community is a result of prescribed burning or wildfire.

## **Community 1.5**

### **State 1, Phase E**

This plant community is similar to the Reference Plant Community, Phase A, 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**

This plant community is dominated by basin big sagebrush in the overstory. Thickspike wheatgrass and western wheatgrass are the dominant grasses in the understory. Other bunchgrasses are present but in reduced amounts and typically in low vigor. Antelope bitterbrush is present but in reduced amounts and low vigor. The plants may also 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**

This plant community is dominated by basin 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 State 1 or with no fire from phase B 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**

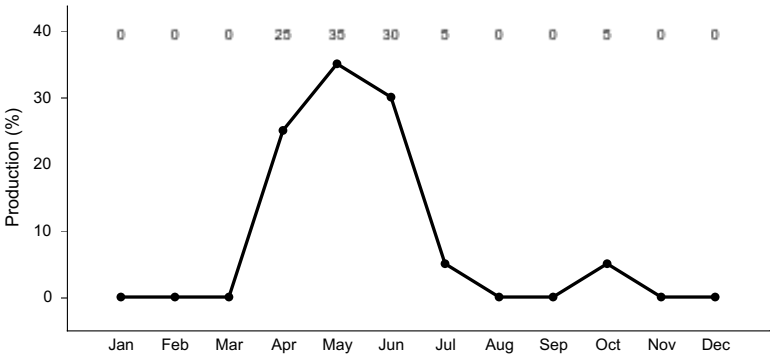
#### **State 2 Phase B**

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 D State 1 or from improper grazing management and fire from phase A State 2. 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.

**Table 6. Ground cover**

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	0%
Forb foliar cover	0%

Non-vascular plants	0%
Biological crusts	0%
Litter	30-50%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%



**Figure 4. 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 fire. This site has crossed the threshold. It is uneconomical to return either phase to State 1 with accelerated practices.

**Pathway B to A**  
**Community 2.2 to 2.1**

Results from no fire. This site has crossed the threshold. It is uneconomical to return either phase to State 1 with accelerated practices.

**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 annuals can be found in the interspaces. Few shrubs are present. When 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, the site has crossed the threshold. Some soil loss has occurred. This state has developed with improper grazing management and in the absence of fire. It is usually uneconomical to return this community to State 1 through accelerated practices.

**State 4**  
**State 4**

This plant community is dominated by either introduced seeded species or a mixture of native species seeded to mimic the Reference Plant Community, Phase A.

**State 5**  
**State 5**

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 and improper grazing management from State 3 where Utah juniper is present. This site will not return to State 1 or 2 because of significant soil loss.

### **Transition T1A** **State 1 to 2**

State 1 Phase D to State 2, Phase B. Develops through improper grazing management and frequent 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**

Results with pest management and rangeland seeding.

### **Transition T2B** **State 2 to 5**

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**

Results with pest management and rangeland seeding.

### **Transition T3B** **State 3 to 5**

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 rangeland 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 – Antelope Bitterbrush/ Basin Big Sagebrush/ Needle and Thread/ Thickspike Wheatgrass/ Western Wheatgrass/ Indian Ricegrass 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 may utilize this site for early season brood rearing, winter cover, and winter food. Antelope bitterbrush and native grasses are important forage for mule deer and elk. The plant community provides spring and fall habitat for mule deer and elk. The plant community provides food for mule deer and elk during moderate winters. The site can provide young of year 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. 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/ Basin Big Sagebrush/ Needle and Thread/ Thickspike Wheatgrass/ Western Wheatgrass/ Indian Ricegrass Plant Community: This phase has developed due to fire return intervals being much longer than normal. An increase in canopy cover of sagebrush and antelope bitterbrush results in a declining herbaceous understory. The reptile and amphibian 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. Habitat quality for Brewer's sparrow, sage sparrow, and sage thrasher may increase in value. Sage-grouse may still utilize the habitat but as understory vegetation declines and antelope bitterbrush increases, the quality of this habitat is reduced. The plant community provides spring and fall forage for mule deer and elk. Quality of winter forage habitat for mule deer and elk is similar to that of 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 – Basin Big Sagebrush/ Thickspike Wheatgrass/ Western Wheatgrass/ Bottlebrush Squirreltail/ Utah Juniper 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 the quality of food and cover for reptile populations. 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. As juniper increases, habitat quality for Brewer's sparrow, sage thrasher, sage grouse, and sage sparrow may decrease as sagebrush and bitterbrush is replaced over time. The plant community provides 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. Quality of winter habitat for elk is reduced. 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 – Thickspike Wheatgrass/ Sand Dropseed/ Western Wheatgrass 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 (horsebrush and rabbitbrush) may be present to provide vertical structure for wildlife over time. Insect diversity would be reduced but a native forb plant community similar to the one in 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 dominance of herbaceous vegetation and sparse 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 or 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 the habitat for shrub-steppe obligate animal species.

**State 1 Phase 1.5 –Antelope Bitterbrush/ Basin Big Sagebrush/ Needle and Thread/ Thickspike Wheatgrass/ Western Wheatgrass/ Utah Juniper Plant Community:** This plant community is the result of a lack of fire. An increase in canopy cover of antelope bitterbrush, 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. Avian shrub-steppe obligates include Brewer's sparrow, sage sparrow, sage grouse, and sage thrasher. As juniper encroaches the quality of sage-grouse 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. Winter cover and food for mule deer would be provided by juniper. Small mammal diversity and populations would be similar to those in State 1 Phase 1.1.

**State 1 Phase 1.6 - Basin Big Sagebrush/ Thickspike Wheatgrass/ Western Wheatgrass 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 native grasses and forbs. 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 the quality of the 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 a 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 and elk. Young of year cover may be provided for deer and elk. Small mammal diversity and populations would be similar to those in State 1 Phase 1.1.

**State 2 Phase 2.1 – Basin Big Sagebrush/ Sandberg Bluegrass/ Annuals Plant Community:** This phase 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. The reduced diversity of the herbaceous understory results in a 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 the 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 a 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 and elk. Young of year cover would be provided for deer and elk. Small mammal diversity and populations would be similar to those in State 1 Phase 1.1.

**State 2 Phase 2.2 – Sandberg Bluegrass/ 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 native forb and shrub components in the plant community would support a very limited population of pollinators. Habitat quality would decline for sagebrush lizard, Great Basin spadefoot toad, and western toad due to the loss of sagebrush and antelope bitterbrush. The loss of sagebrush and antelope bitterbrush would severely reduce the quality of the 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 would increase due to the decreased quality of cover for small mammals. Large blocks of this plant community would fragment the reference plant community and reduce the quality of the habitat for shrub-steppe obligate animal species.

**State 3 - Utah Juniper/ Sandberg Bluegrass/ Annuals Plant Community:** This state has developed with improper grazing management in the absence 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.

State 4 – Rangeland Seeding Plant Community: The seeding mixture (native or non-native) determines the animal species that utilize this site. A diverse seed mixture of native 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 native grasses, forbs, and shrubs would provide similar habitat conditions as described in State 1 phase 1.1 or 1.2. A monoculture of non-native grass species would not support diverse populations of insects, reptiles, avians, mammals, or shrub-steppe obligate species. Grassland animal species including western meadowlark, horned lark, savannah sparrow, deer mouse, kangaroo rat, mule deer, and elk would utilize this site for nesting and/or foraging at certain times of the year. Birds of prey including hawks and falcons may range throughout this community looking for prey species. Large areas of State 4 with no shrubs in the plant community would fragment the reference plant community and would reduce the quality of the habitat for shrub-steppe obligate animal species.

#### Grazing Interpretations.

This site is best suited for grazing by livestock in late spring to early summer and again in fall. Extreme care must be exercised in grazing this site due to extreme vulnerability to erosion by wind once cover is disturbed. 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. They have low runoff potential.

### Recreational uses

The site has limited value for recreation but the gently rolling dune-like topography offers some aesthetic values. The site has some opportunities for hiking, hunting, and horseback riding. Off road vehicles can severely damage the site due to sandy soils and severe wind erosion hazard.

### Wood products

none.

### Other products

none.

### Other information

Field Offices

American Falls, ID  
Blackfoot, ID  
Burley, ID  
Driggs, ID  
Idaho Falls, ID  
Malad, ID  
Pocatello, ID



Rexburg, ID  
Soda Springs, ID  
St. Anthony, ID

#### 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

Brendan Brazee, State Rangeland Management Specialist, NRCS, Idaho

Lee Brooks, Range Management Specialist, IASCD

Kristen May, Resource Soil Scientist, NRCS, Idaho

### Type locality

Location 1: Fremont County, ID	
Township/Range/Section	T8N R38E S12

### Other references

Hironaka, M., M.A. Fosberg, A. H. Winward. 1983. Sagebrush-Grass Habitat Types of Southern Idaho. University of Idaho, Moscow, Idaho. Bulletin Number “35”.

Petersen, S.L., 2004. A Landscape-Scale Assessment of Plant Communities, Hydrologic Processes, and State-and-Transition Theory in a Western Juniper Dominated Ecosystem. PhD Dissertation. Oregon State University, Corvallis, Oregon.

USDA Forest Service, Rocky Mountain Research Station. 2004. Restoring Western Ranges and Wildlands. General Technical Report RMRS-GTR-136-vols. 1-3.

USDA, NRCS.2001. The PLANTS Database, Version 3.1 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

USDA, Forest Service, Fire Effects Information Database. 2004. [www.fs.fed.us/database/feis](http://www.fs.fed.us/database/feis)

USDI Bureau of Land Management, US Geological Survey; USDA Natural Resources Conservation Service, Agricultural Research Service; Interpreting Indicators of Rangeland Health. Technical Reference 1734-6; Version 4-2005.

## 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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Contact for lead author	Brendan Brazee, State Rangeland Management Specialist USDA-NRCS 9173 W. Barnes Drive, Suite C, Boise, ID 83709
Date	05/14/2008
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 textures will limit rill development.

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- 2. Presence of water flow patterns:** water-flow patterns are rare on this site. They may, however, occur immediately following a high intensity convention storm. If they do 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:** both 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):** data is not available for this site. On sites in mid-seral status, bare ground is expected to be about 50-60 percent. 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:** none.
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6. **Extent of wind scoured, blowouts and/or depositional 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):** 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.
- 
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** values average 1 to 2 but needs to be tested.
- 
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** structure is single grain to weak very fine and fine granular to weak fine and medium subangular blocky. Soil organic matter (SOM) ranges from 0.5 to 3 percent. Surface color is very dark brown to very dark grayish brown to dark brown. The A or A1 horizon is typically 4 to 10 inches thick.
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** bunchgrasses, especially deep-rooted perennials, slow run-off and increase infiltration. Tall shrubs accumulate snow in the interspaces.
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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** not present.
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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**
- Dominant: cool season deep-rooted perennial bunchgrasses
- Sub-dominant: tall shrubs
- Other: perennial forbs
- Additional: shallow rooted perennial bunchgrasses
- 
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** antelope bitterbrush and basin big sagebrush will become decadent in the absence of fire and ungulate grazing. Grass and forb mortality will occur as tall shrubs increase.
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14. **Average percent litter cover (%) and depth ( in):** additional litter cover data is needed but is expected to be 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):** is 900 pounds per acre (1008 kilograms per hectare) in a year with normal temperatures and precipitation. Perennial grasses produce 40-50 percent of the total production, forbs 10-20 percent and shrubs 35-45 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:** includes cheatgrass, leafy spurge, dalmatian toadflax, rush skeletonweed, musk and scotch thistle, and diffuse, Russian and spotted knapweed, Russian thistle, and mustard.
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17. **Perennial plant reproductive capability:** all functional groups have the potential to reproduce in most years.
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