

## Ecological site R043BY013ID South Slope Loamy 16-22 PZ ARTRV/FEID

Last updated: 2/03/2020  
Accessed: 04/23/2024

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### General information

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

### MLRA notes

Major Land Resource Area (MLRA): 043B–Central Rocky Mountains

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43B – Central Rocky Mountains – This MLRA is extensive including Montana, Idaho, Wyoming and a small portion in Utah. MLRA 43B includes the Rocky Mountains. A revision of the MLRA's in 2006 lead to the inclusion of the foothills with the mountains for much of Wyoming. Cartographic standards limited the ability to capture the foothills as a separate MLRA .

Further information regarding MLRAs, refer to: United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Available electronically at: [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2\\_053624#handbook](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_053624#handbook).

### Classification relationships

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

### Ecological site concept

- Site receives no additional water.
- Slope is >30%
- Soils are:
  - o Textures range from very fine sandy loam to clay loam in top 4" (10 cm) of mineral soil surface
  - o Clay content is or = 35% in top 4" (10 cm) of mineral soil surface
  - o Each following subsurface horizon has a clay content of <35% by weighted average in the particle size control section
  - o Moderately deep to very deep (20-78+ in. (50-200+ cm)
  - o <3% stone and boulder cover and <20% cobble and gravel cover
  - o Not skeletal (<35% rock fragments) within 20" (51 cm) of mineral soil surface
  - o None to Slightly effervescent throughout top 20" (51 cm) of mineral soil surface
  - o Non-saline, sodic, or saline-sodic

### Associated sites

R043BY003ID	<b>Loamy 22+ PZ FEID-PSSPS</b>
R043BY009ID	<b>Loamy 16-22 PZ ARTRV/FEID</b>
R043BY016ID	<b>Shallow Gravelly 16-22 PZ ARAR8/FEID</b>

### Similar sites

R043BY002ID	<b>Granitic 22+ PZ ARTRV/FEID</b>
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**Table 1. Dominant plant species**

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

### Physiographic features

This site occurs on moderately steep to very steep mountain slopes. Slopes range from 30-70 percent and occur on south and west aspects. Elevations range from 6000 to 7500 feet (1800-2300 meters). Occasional rock outcrops may occur throughout the site.

**Table 2. Representative physiographic features**

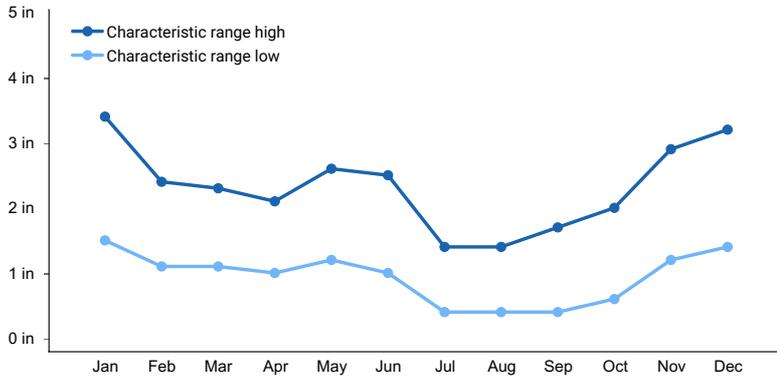
Landforms	(1) Mountain
Elevation	6,000–7,500 ft
Slope	30–70%
Water table depth	60 in
Aspect	S, W

### Climatic features

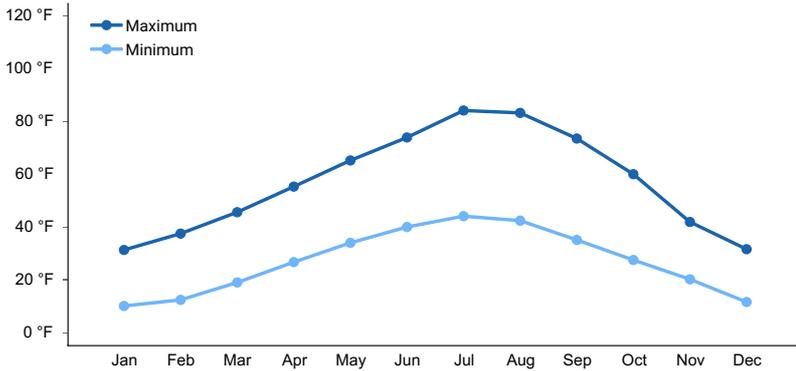
The Central Rocky Mountains range in elevation from 6000 to 10000 feet above sea level with some peaks reaching over 12000 feet. The average annual precipitation, based on 10 long term climate stations located throughout the MLRA , is 21 inches. The annual average minimum is 18 and the annual average maximum recorded is 24 inches. The annual average temperature is 41.7 degrees Fahrenheit. The annual average low is 26.7 and the annual average high is 56.7 degrees F. The frost free period ranges from 58 to 80 days while the freeze free period ranges from 90 to 116 days.

**Table 3. Representative climatic features**

Frost-free period (average)	80 days
Freeze-free period (average)	116 days
Precipitation total (average)	24 in



**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 usually have dark surfaces with 15-30 percent rock fragments and low fertility. The surface layer texture of the fine earth fraction is sandy loam. Typically, the subsoils are sandy loam and loamy sand with 35-50 percent fine pebbles. The substratum is sandy and has more than 80 percent weathered granitic fragments. The soils are very deep and somewhat excessively drained. Permeability is moderately rapid and available water capacity is very low. Runoff is medium to rapid and water erosion is moderate to high depending on slope. These soils are characterized by xeric moisture and cryic temperature regimes.

Soil Series Correlated to this Ecological Site

Langer

**Table 4. Representative soil features**

Surface texture	(1) Gravelly sandy loam
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained
Permeability class	Moderately rapid
Soil depth	60 in
Surface fragment cover <=3"	15–25%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	1.8–2.7 in

Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.1–6.5
Subsurface fragment volume <=3" (Depth not specified)	35–70%
Subsurface fragment volume >3" (Depth not specified)	0–10%

## Ecological dynamics

The dominant visual aspect of the site is mountain big sagebrush and Idaho fescue. Composition by weight is approximately 55-65 percent grasses, 5-15 percent forbs, and 25-35 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, bighorn sheep, and small rodents.

Fire has historically occurred on the site at intervals of 20-40 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 Idaho fescue in the understory and mountain big sagebrush in the overstory. Subdominant species include bluebunch wheatgrass, Sandberg bluegrass, Nevada bluegrass, prairie junegrass, arrowleaf balsamroot, and Hoods phlox. There is a large variety of other forbs and some other shrubs that can occur 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 1300 pounds per acre (1456 kilograms per hectare). Production in an unfavorable year is 400 pounds per acre (448 kilograms per hectare). Structurally, cool season deep rooted perennial bunchgrasses are very dominant, followed by tall shrubs being more dominant than perennial forbs while shallow rooted perennial bunchgrasses are subdominant.

### FUNCTION:

This site is suited for grazing by domestic livestock in late spring, summer, and fall. This site provides fair to good habitat for various upland wildlife. The southerly exposure is often snow-free much of the winter providing good winter habitat for mule deer, Rocky Mountain elk, sage grouse, badgers, coyotes, and other animals. This site offers minimal recreation value. Use by big game animals during winter and spring and summer-blooming forbs offers some aesthetic values.

Due to the elevation and steep topography on this site, it is susceptible to degradation from erosion. The steeper slopes will limit livestock movement. Excessive trailing of livestock should be avoided to minimize terracette development and erosion on the steeper slopes. Infiltration is good where the community is in mid to late seral status. The site has high runoff potential. Runoff, when it does occur can be erosive on steeper slopes particularly during high intensity convection storms.

Impacts on the Plant Community.

#### Influence of fire:

In the absence of normal fire frequency, mountain big sagebrush can gradually increase on the site. Grasses and forbs decrease as shrubs increase. With the continued absence of fire, mountain big sagebrush can displace most of the primary understory species.

When fires become more frequent than historic levels (20-40 years), mountain big sagebrush is reduced significantly. Rabbitbrush and horsebrush will increase. With continued short fire frequency, mountain big sagebrush can be completely eliminated along with many of the desirable understory species such as Idaho fescue and bluebunch wheatgrass. These species may be replaced by Sandberg bluegrass along with a variety of annual and perennial forbs including noxious and invasive plants. 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.

Continued improper grazing management and excessive utilization influences fire frequency by increasing fine fuels. The site then becomes susceptible to an invasion of noxious and invasive plants and/or soil erosion.

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. A planned grazing system can be developed to intentionally accumulate fine fuels in preparation for a prescribed burn. Careful planning needs to occur prior to conducting prescribed burns on this site.

#### 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:

Insect and disease outbreaks can affect vegetation health. Mormon cricket and grasshopper outbreaks occur periodically. Since defoliation usually happens once during the growing season, mortality is normally low.

#### Influence of noxious and invasive plants:

Many of these species add to the fine-fuel component and lead to increased fire frequency. 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, fall, and winter. Their numbers are seldom high enough to adversely affect the plant community.

#### Watershed:

Decreased infiltration and increased runoff occur with an increase in mountain big sagebrush. 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.

#### Plant Community and Sequence:

Transition pathways between common vegetation states and phases:

State 1.

Phase A to B. Develops with improper grazing management and no fire.

Phase A to C. Develops with fire.

Phase B to A. Develops with prescribed grazing.

Phase C to A. Develops with prescribed grazing and no fire.

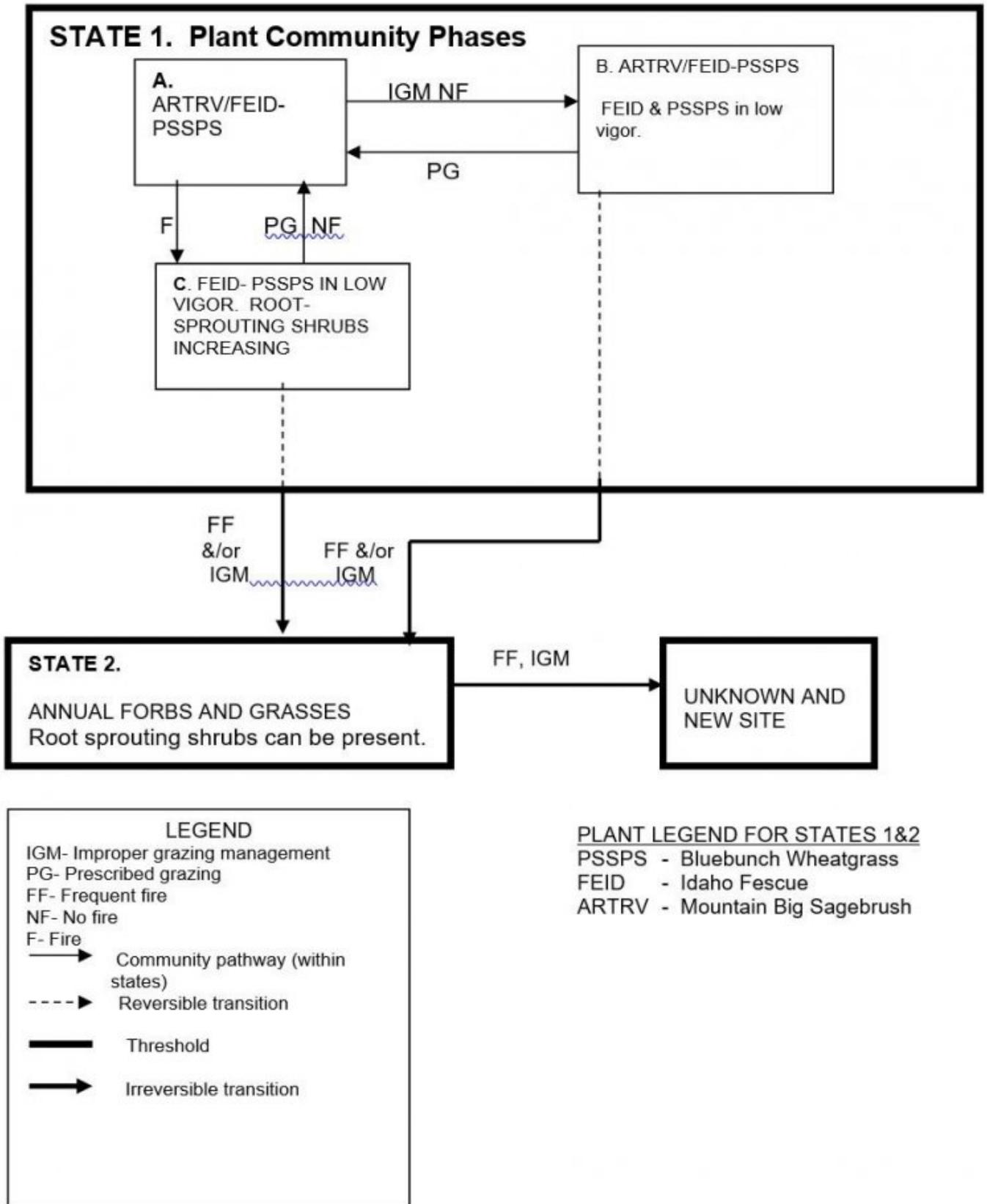
State 1 Phase B or C to State 2. Develops through frequent fire and/or continued improper grazing management. The site crosses the threshold. It is not economically feasible to move this state back to State 1 with accelerating practices.

State 2 to unknown site. Excessive soil loss and changes in the hydrologic cycle caused by continued improper grazing management and/or frequent fire cause this state to cross a threshold and retrogress to a new site with reduced potential. It is not economically feasible to move this state back to State 1 with accelerating practices.

#### Practice Limitations.

Severe limitations occur for seeding by mechanical methods due to steep slopes. Steepness of slopes limits movement of livestock. Severe limitations exist for brush management by surface methods due to slope. Careful planning is necessary for any application of brush management. Removal of mountain big sagebrush can result in accelerated soil erosion.

### **State and transition model**

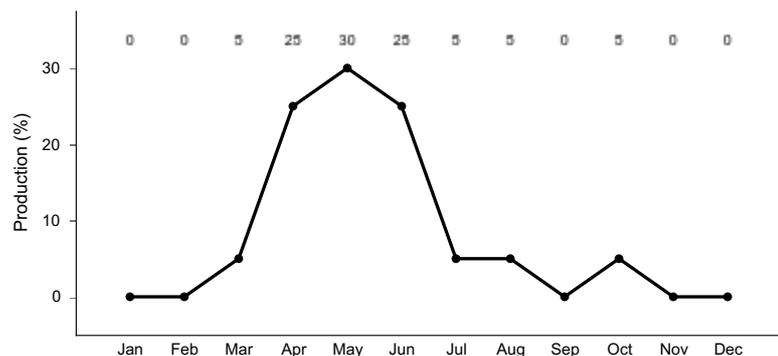


**State 1  
State 1 Phase A**

**Community 1.1  
State 1 Phase A**

Reference Plant Community Phase. This plant community is dominated by mountain big sagebrush, Idaho fescue, and bluebunch wheatgrass. Arrowleaf balsamroot, Sandberg bluegrass, and prairie junegrass are often present in

the community in smaller amounts. Natural fire frequency is 20-40 years.

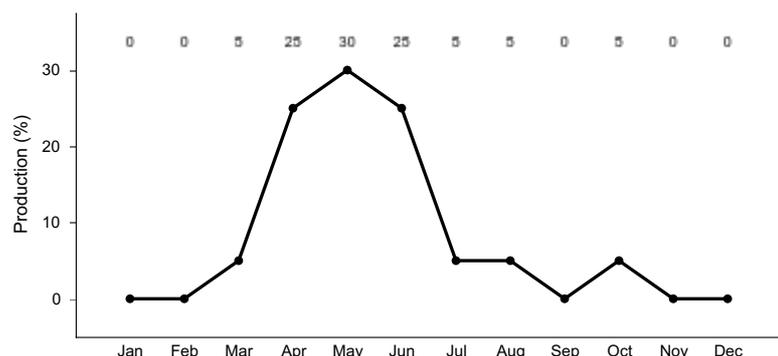


**Figure 3. Plant community growth curve (percent production by month). ID1205, FEID-PSSPS. State 1.**

## State 2 State 1 Phase B

### Community 2.1 State 1 Phase B

This plant community is dominated by mountain big sagebrush with reduced amounts of Idaho fescue and bluebunch wheatgrass. All deep-rooted bunchgrasses are typically in low vigor. This phase has developed due to improper grazing management and no fire.

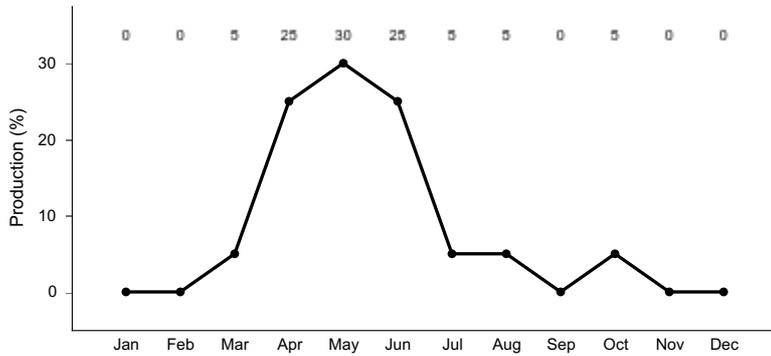


**Figure 4. Plant community growth curve (percent production by month). ID1205, FEID-PSSPS. State 1.**

## State 3 State 1 Phase C

### Community 3.1 State 1 Phase C

This plant community is dominated by Idaho fescue and bluebunch wheatgrass but have reduced vigor. Forbs remain about in the same proportion as Phase A. Rabbitbrush, three-tip sagebrush, and horsebrush have resprouted from fire. This plant community is the result of wildfire.

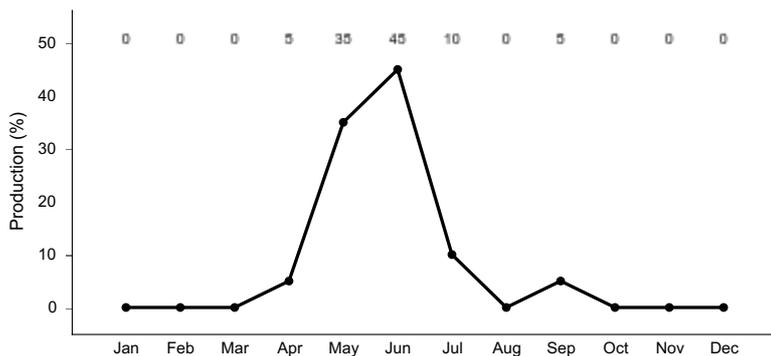


**Figure 5. Plant community growth curve (percent production by month). ID1205, FEID-PSSPS. State 1.**

**State 4  
State 2**

**Community 4.1  
State 2**

This plant community is dominated by shallow rooted annual forbs and grasses. Root sprouting shrubs such as rabbitbrush and horsebrush can be present, dependent upon, how frequent, fire has occurred. Some soil loss has occurred. This state has developed due to frequent fires and improper grazing management. The site has crossed the threshold. It is not economically feasible to move this state back to State 1 with accelerating practices.



**Figure 6. Plant community growth curve (percent production by month). ID1211, ANNUAL FORBS AND GRASSES. State 2.**

**State 5  
Unknown New Site**

**Community 5.1  
Unknown New Site**

This plant community has gone over the threshold to a new site. Site potential has been reduced. Significant soil loss has occurred. Infiltration has been reduced and run-off has become more rapid. This state has developed due to continued improper grazing management and/or frequent fires. It is not economically feasible to move this state back to State 1 with accelerating practices.

**Additional community tables**

**Animal community**

Wildlife Interpretations.

Animal Community – Wildlife Interpretations

This rangeland ecological site provides diverse habitat for 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 species include Merriam's shrew, Brewer's sparrow, sage thrasher, sage sparrow, sharp-tailed grouse, and Greater sage-grouse. Water features are sparse provided by seasonal runoff, artificial water catchments, and springs.

State 1 Phase 1.1 – Mountain Big Sagebrush/ Idaho Fescue/ Bluebunch Wheatgrass 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, 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 nesting, brood rearing, winter cover, and winter food. Sharp-tailed grouse may also utilize this plant community. The plant community provides spring, fall, and winter (south slopes) food and cover for mule deer, moose, and elk. A diverse small mammal population including golden-mantled ground squirrels, jackrabbits, Great Basin pocket mice, and deer mice may utilize this plant community.

State 1 Phase 1.2 – Mountain Big Sagebrush/ Idaho Fescue/ Bluebunch 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 the native deep rooted perennial grasses and forbs. The reduced diversity of the herbaceous understory results in lower diversity of insects. The reptile community would be similar to the reptile community in State 1 Phase 1.1. Shrub-steppe obligate avian species using the site 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 and production of understory vegetation provides a shorter grazing season for mule deer and elk. Young of year cover may be provided for large herbivores. Small mammal diversity and populations would be similar to those in State 1 Phase 1.1.

State 1 Phase 1.3– Bluebunch Wheatgrass/ Idaho Fescue 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 or no sagebrush would provide less vertical structure for animals. Patches of root sprouting shrubs (rabbitbrush, three-tip sagebrush and horsebrush) may be present to provide limited vertical structure for wildlife. Insect diversity would be reduced but a native forb plant community similar to that 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. Amphibian habitat would be tied to permanent spring sites in the area. Development of spring sites that collect all available water would exclude amphibians on these sites. The lack of sagebrush canopy cover would limit use of this area as nesting habitat for Brewer's sparrow, sage sparrow, sage grouse, and sage thrasher. The herbaceous vegetation improves habitat for bird species that favor grassland habitat including horned lark, savannah sparrow, vesper sparrow, and western meadowlark. Sage-grouse may use this site for brood-rearing habitat when sagebrush cover is nearby. Habitat quality for sharp-tailed grouse may increase as patches of shrubs become established. Mule deer and elk use would be seasonal (spring and fall) 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 2 – Annual Grasses/ Forbs Plant Community: This state has developed due to improper grazing management and frequent fire. The reduced native forb and shrub components in the plant community would support a very limited population of pollinators. Season long pollinator habitat is not provided at the same quality level as in State 1 Phase 1.1. Habitat quality would decline for common sagebrush lizard and western rattlesnake due to the loss of sagebrush. The loss of sagebrush would eliminate nesting and escape cover 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 this area looking for prey species. Large mammals may utilize the herbaceous vegetation in the early part of the year when the vegetation (cheatgrass) is more palatable. The populations of small mammals

would be dominated by open grassland species. Hunting success by predators on small mammals would increase. Large blocks of this plant community would fragment the reference plant community and reduce the quality of habitat for shrub-steppe obligate animal species.

#### Grazing Interpretations.

This site is suited for grazing by domestic livestock in late spring, summer, and fall. 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**

Soils on this site are in hydrologic group B. The runoff potential is medium on steeper slopes.

### **Recreational uses**

This site offers minimal recreation value. Use by big game during winter and spring and summer-blooming forbs offer some aesthetic value.

### **Wood products**

None.

### **Other products**

None.

### **Other information**

Field Offices

Arco, ID  
Cascade, ID  
Challis, ID  
Craigmont, ID  
Emmett, ID  
Grangeville, ID  
Gooding, ID  
Lewiston, ID  
Mountain Home, ID  
Orofino, ID  
Salmon, ID  
Shoshone, ID  
Weiser, ID  
St. Anthony, ID

### **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  
 Bruce Knapp, Resource Soil Scientist, NRCS, Idaho  
 Lee Brooks, Range Management Specialist, IASCD

## Type locality

Location 1: Custer County, ID	
Township/Range/Section	T10N R31E S4
General legal description	SE 1/4

## 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".

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](http://www.fs.fed.us/database).

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

Scott Woodall, 2/03/2020

## 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	06/12/2009
Approved by	Scott Woodall
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

- Number and extent of rills:** rills can occur on this site. If they are present they are likely to occur immediately following wildfire or high intensity convection storms.

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- Presence of water flow patterns:** water-flow patterns occur on this site. When they do, they are short and disrupted by

cool season grasses and tall shrubs and are not extensive.

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3. **Number and height of erosional pedestals or terracettes:** both occur on this site but are not extensive. In areas where flow patterns and/or rills are present, a few pedestals may be expected. Terracettes occur on the site uphill from tall shrub bases and large bunchgrasses.

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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. On sites in mid-seral status bare ground may range from 10-15 percent.

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5. **Number of gullies and erosion associated with gullies:** gullies do not occur on this site.

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

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7. **Amount of litter movement (describe size and distance expected to travel):** fine litter in the interspaces may move up to 3 feet following a significant run-off event. Coarse litter generally does not move.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** values should range from 4 to 6 but needs to be tested.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Structure is weak fine granular. Soil organic matter ranges from 2 to 3 percent. The A or A1 horizon is very dark grayish brown and 2 to 4 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 catch blowing 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):** is not present.

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

Dominant: cool season deep-rooted perennial bunchgrasses

Sub-dominant: tall shrubs

Other: perennial forbs

Additional: shallow rooted bunchgrasses

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** mountain big sagebrush and Idaho fescue will become decadent in the absence of normal fire frequency 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 10-20 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 55-65 percent of the total production, forbs 5-15 percent, and shrubs 25-35 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, ventenata, and leafy spurge.

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

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