

## Ecological site R012XY020ID Clayey 13-16 PZ ARAR8/FEID

Last updated: 9/22/2020  
Accessed: 05/18/2024

### 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): 012X—Lost River Valleys and Mountains

Land Resource Region: B (Northwestern Wheat and Range)

MLRA: 12 (Lost River Valleys and Mountains)

EPA EcoRegion: Level III (Middle Rockies)

### LRU notes

012X—Lost River Valleys and Mountains

Precipitation or Climate Zone: 13-16" P.Z.

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

### Classification relationships

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

### Ecological site concept

Site does not receive additional water.

Soils are:

Not saline or saline-sodic.

Moderately deep to very deep, with >35% (by volume) coarse fragments, skeletal in the soil subsurface. strongly or violently effervescent in the to 20" of the soil profile.

textures usually range from silt loam to clay loam in surface mineral 4".

Slope is < 30%.

Clay content is = >35% in surface mineral 4".

Site has an argillic horizon with > 35% clay.

### Associated sites

R012XY008ID	Gravelly 13-16 PZ ARTR4/PSSPS-FEID
R012XY010ID	North Slope Loamy 12-16 PZ ARTR4/FEID
R012XY012ID	Loamy 12-16 PZ ARTRV/FEID-PSSPS
R012XY029ID	Clayey South Slope 12-16 PZ ARAR8/PSSPS
R012XY034ID	Clayey 12-16 PZ ARARL/FEID

## Similar sites

R012XY002ID	Gravelly Loam 12-16 PZ ARAR8/PSSP6-FEID
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**Table 1. Dominant plant species**

Tree	Not specified
Shrub	(1) <i>Artemisia arbuscula</i>
Herbaceous	(1) <i>Festuca idahoensis</i>

## Physiographic features

This site occurs on foothills, low rolling hills, ridges and mountain slopes. Slopes range from 5 to 30 percent on all aspects. Elevations range from 6500 to 8500 feet (1900 to 2600 meters).

**Table 2. Representative physiographic features**

Landforms	(1) Hill (2) Ridge
Elevation	1,981–2,591 m
Slope	5–30%

## Climatic features

MLRA 12 is dominated by dramatic changes in elevation which, in turn, influence local weather patterns. The intermontane valleys have elevations as low as 3800 feet, while the adjacent mountains may reach more than 12,600 feet. The average annual precipitation for the entire MLRA, based on 10 long term climate stations located throughout the MLRA, is approximately 9.38 inches. However, the dry valleys may have averages as low as 6 inches, while the upper peaks may have averages that exceed 46 inches per year.

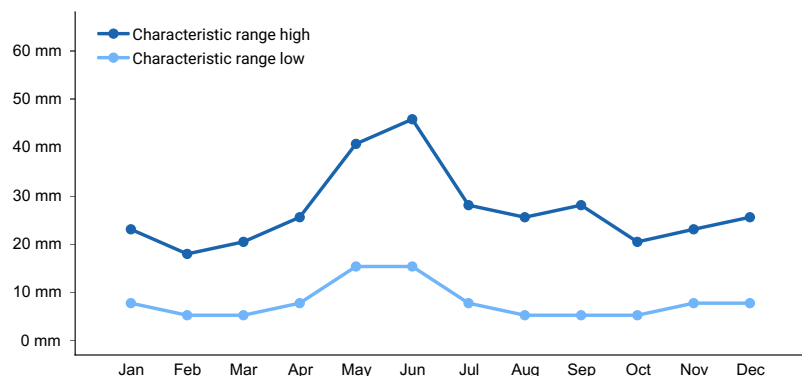
Temperatures vary considerably over the year. The average annual temperature is 42.25 degrees F. The average low is 27.4 degrees while the average high temperature is 57 degrees.

In the summer the sun shines 78% of the time, but drops to 40% in the winter. The prevailing wind is location-dependent, and generally flows parallel to the orientation of the dominant valleys. In the summer localized afternoon upslope winds and evening downslope winds are common. The average windspeed is greatest in the spring and early summer.

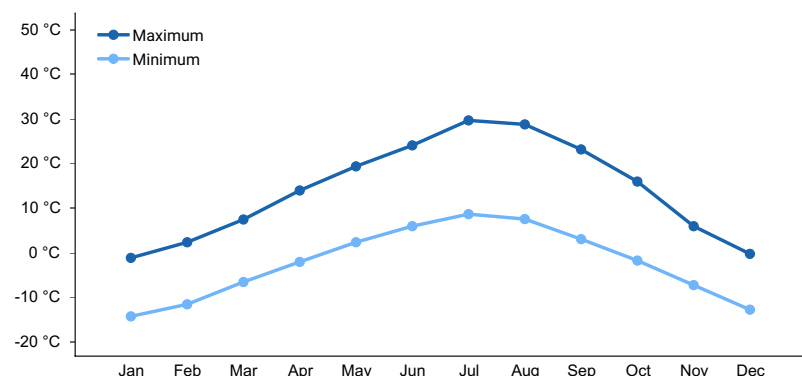
The frost free period ranges from 102 to 107 days while the freeze free period ranges from 134 to 139 days across the MLRA.

**Table 3. Representative climatic features**

Frost-free period (average)	107 days
Freeze-free period (average)	139 days
Precipitation total (average)	279 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 of this site are gravelly loams and silt loams. The depth to the clay horizon is 3 to 10 inches. Gravels often exceed 40 percent by volume in the B horizon. The soils are well drained with moderately slow to moderate permeability. The available water capacity is low to moderate. The soils have a xeric soil moisture regime. The soil temperature regime is cryic.

**Table 4. Representative soil features**

Surface texture	(1) Very gravelly silt loam (2) Loam
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	38–152 cm
Surface fragment cover ≤3"	10–20%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	5.33–18.03 cm
Calcium carbonate equivalent (0-101.6cm)	5–60%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0

Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	30–40%
Subsurface fragment volume >3" (Depth not specified)	0–5%

## Ecological dynamics

The dominant visual aspect of this site is low sagebrush with Idaho fescue and bluebunch wheatgrass in the understory. Composition by weight is approximately 50 to 70 percent grasses, 10 to 20 percent forbs and 20 to 30 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, bighorn sheep, Rocky Mountain elk, pronghorn antelope, lagomorphs and small rodents. Fire has historically occurred on the site at intervals of 60-80 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 and bluebunch wheatgrass in the understory and low sagebrush in the overstory. Subdominant species include Sandberg bluegrass, Hooker's balsamroot and Hoods phlox. There are a variety of other grasses, forbs, and 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 400 pounds per acre (448 kilograms per hectare) in a normal year. Production in a favorable year is 700 pounds per acre (785 kilograms per hectare). Production in an unfavorable year is 250 pounds per acre (280 kilograms per hectare). Structurally, cool season deep rooted perennial bunchgrasses are dominant followed by low to medium 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. There are few limitations to grazing. Natural water supplies may be insufficient or absent. The site provides fair to good habitat for various upland wildlife including pronghorn antelope, mule deer and Rocky Mountain elk. This site is easily degraded by improper grazing management due to low production and flat slopes. The site offers minimal recreational value except for hunting. A mixed stand of shrubs and perennial grasses is necessary to reach the potential of the site.

### Impacts on the Plant Community.

#### Influence of fire:

In the absence of normal fire frequency, low sagebrush can gradually increase on the site. Grasses and forbs decrease as shrubs increase. With the continued absence of fire, low sagebrush can displace most of the primary understory species. Utah juniper can invade the site if a seed source is in the vicinity. See "Influence of Juniper Invasion" below.

When fires become more frequent than historic levels (60-80 years), low sagebrush is reduced significantly. Rabbitbrush, if present, can increase slightly. With continued short fire frequency, low 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 species. 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 an increase in low sagebrush and noxious and

invasive species. Utah juniper can invade the site if a seed source is in the vicinity.

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

Proper grazing management that addresses frequency, duration and intensity of grazing can also keep fine fuels from developing, thereby reducing fire frequency. This can lead to gradual increases in low sagebrush and Utah juniper if a seed source is in the vicinity. A planned grazing system can be developed to intentionally accumulate fine fuels in preparation for a prescribed burn. Brush management on this low sagebrush site should be very carefully evaluated due to the low production potential, brush species involved and the soils.

#### 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. 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. 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, fall and in moderate winters. Their numbers are seldom high enough to adversely affect the plant community.

#### Watershed:

Decreased infiltration and increased runoff occur with an increase in low 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.

#### Influence of juniper invasion:

The following discussion deals with 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 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. Improper grazing management could also be present. There is a juniper seed source near the site.

Phase A to C. Usually results from wildfire or brush management.

Phase A to D. Results from improper grazing management and no fire.

Phase B to C. Results from wildfire or brush management.

Phase B to A. Occurs with prescribed grazing and brush management or prescribed burning.

Phase C to A. Results from prescribed grazing and no fire.

Phase D to A. Occurs with proper grazing management.

State 1 Phase C and D to State 2. Develops through frequent fire and improper grazing management. The site has crossed the threshold. It is economically impractical to return this plant community to State 1 with accelerating practices.

State 1 Phase B to State 3. Develops with no fire and improper grazing management from a juniper invaded phase of State 1. The site has crossed the threshold. It is economically impractical to return this plant community to State 1 with accelerating practices.

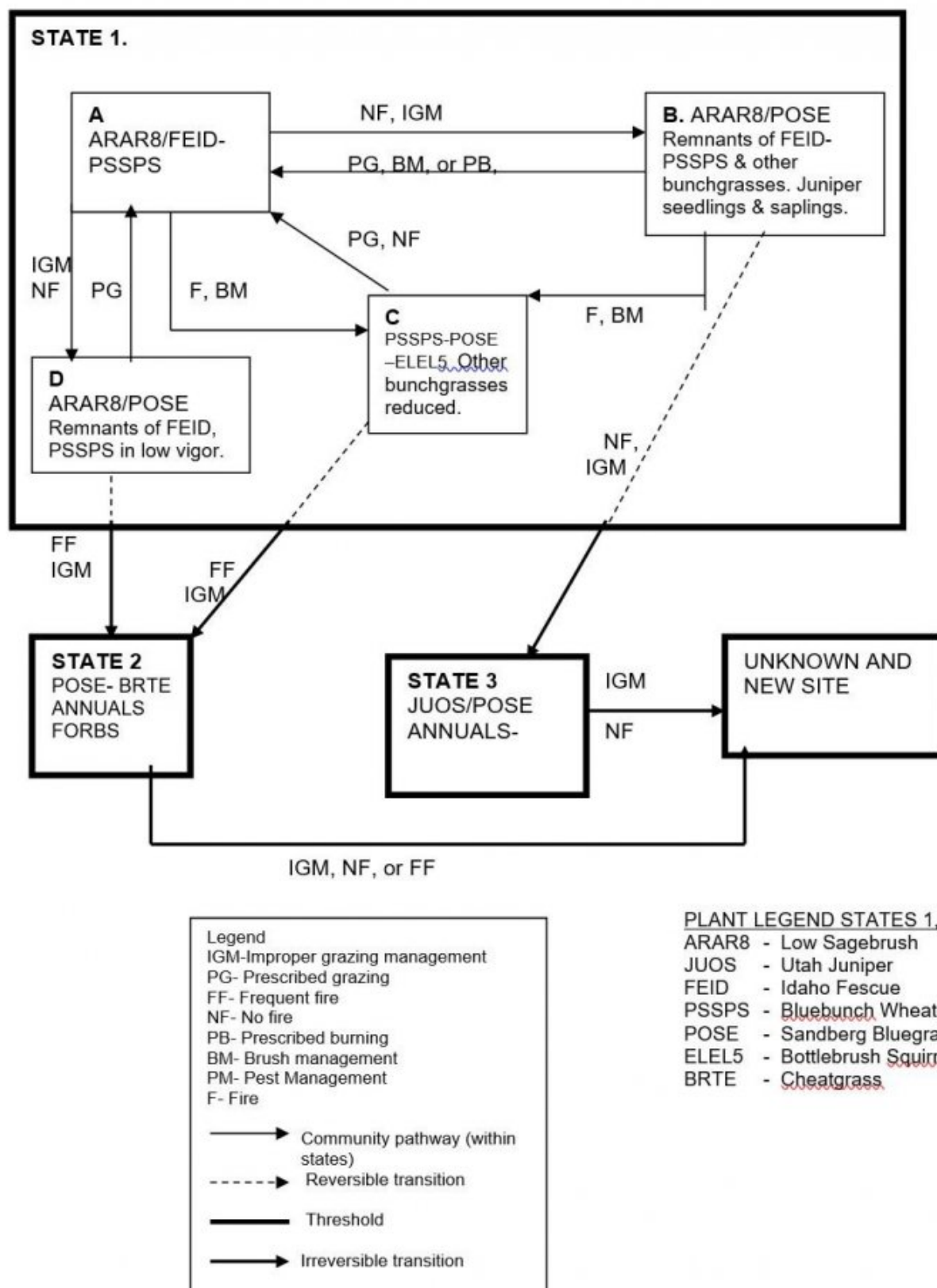
State 2 to unknown site. Excessive soil loss and changes in the hydrologic cycle caused by improper grazing management and no fire or frequent fire cause this state to cross the threshold and retrogress to a new site with reduced potential. It is economically impractical to return this plant community to State 1 with accelerating practices.

State 3 to unknown site. Continued lack of fire and improper grazing management cause this state to cross the threshold and retrogress to a new site with reduced potential due to significant soil loss and changes in hydrology. It is economically impractical to return this plant community to State 1 with accelerating practices.

Practice Limitations:

This site is generally not suitable for seeding due to the gravels, clayey subsoils and low potential production. Brush management is not normally useful or desirable on this site. There are few limitations for implementing vegetative management or facilitating practices on this site.

## State and transition model



### State 1

#### State 1. Phase A, Reference Plant Community Phase

### Community 1.1

#### State 1. Phase A, Reference Plant Community Phase

This plant community is dominated by low sagebrush in the overstory and Idaho fescue and bluebunch wheatgrass

in the understory. Subdominant species include Sandberg bluegrass, Hooker's balsamroot and Hoods phlox. There are a variety of other grasses, forbs and shrubs that can occur in minor amounts. The natural fire frequency is about 60 to 80 years.

**State 2**  
**State 1, Phase B**

**Community 2.1**  
**State 1, Phase B**

This plant community is dominated by low sagebrush with Sandberg bluegrass in the understory. Idaho fescue and bluebunch wheatgrass and other deep-rooted perennial bunchgrasses are present but in reduced amounts and in low vigor. A Utah juniper seed source is in the vicinity. Utah juniper has invaded the site in the form of seedlings and saplings. Some annuals may have invaded the site. This phase has developed due to no fire and improper grazing management.

**State 3**  
**State 1. Phase C**

**Community 3.1**  
**State 1. Phase C**

This plant community is dominated by bluebunch wheatgrass and Sandberg bluegrass. Idaho fescue may have died due to fire. Bottlebrush squirreltail has increased. Low sagebrush has died. Rabbitbrush and a variety of forbs can be present. Some annuals may have invaded the site. This phase has developed due to fire or brush management.

**State 4**  
**State 1. Phase D**

**Community 4.1**  
**State 1. Phase D**

This plant community is dominated by low sagebrush with Sandberg bluegrass in the understory. Remnants of Idaho fescue and bluebunch wheatgrass and other bunchgrasses are present but in reduced vigor. No Utah juniper seed source is in the vicinity. Some annuals may have invaded the site. This phase has developed due to improper grazing management and no fire.

**State 5**  
**State 2**

**Community 5.1**  
**State 2**

This plant community is dominated by Sandberg bluegrass, cheatgrass, other annual grasses and forbs. Some perennial forbs are present. The community has developed due to frequent fire and continued improper grazing management. Some soil loss has occurred. This site has crossed the threshold. It is not economical to return this site to State 1 with accelerating practices.

**State 6**  
**State 3**

**Community 6.1**  
**State 3**

This plant community is dominated by Utah juniper. Shallow-rooted grasses, such as Sandberg bluegrass and annuals can be found in the interspaces. Few shrubs are present. Generally, shrub cover is below 10-15%, bare



ground is above 25-30% and juniper cover is greater than 20%. The site has crossed the threshold to this state. It is economically impractical to return this plant community to State 1 with accelerating practices. This state has developed in the absence of fire. Improper grazing management can contribute to this state.

## **State 7**

### **Unknown Site**

## **Community 7.1**

### **Unknown 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 community has developed due to continued improper grazing management and no fire or frequent fire from State 2 or from improper grazing management and no fire from a juniper invaded State 3. It is economically impractical to return this plant community to State 1 with accelerating practices.

## **Additional community tables**

### **Animal community**

Wildlife Interpretations.

Animal Community – Wildlife Interpretations

This rangeland ecological site provides habitat for select native wildlife species that can tolerate cold sites, high in elevation, with a sparse plant community. Large herbivore use of the reference plant community is dominated by mule deer elk, and pronghorn antelope. Site can provide critical winter habitat for these large mammals. The site provides important seasonal habitat for resident and migratory animals including western toad, sagebrush lizard, shrews, bats, jackrabbits, ground squirrels, mice, coyote, red fox, badger, sage-grouse, Ferruginous hawk, prairie falcon, horned lark, and western meadowlark. Sage-grouse and Idaho pocket gopher are area sensitive species that may be present on this site. In isolated areas encroachment of noxious and invasive plant species (cheatgrass and medusahead) can replace native plant species which provide critical feed, brood-rearing, and nesting cover for a variety of native wildlife. Water is limited, being provided only by seasonal runoff, artificial water catchments, and spring sites.

State 1 Phase 1.1 – Low Sagebrush/ Idaho Fescue/ Bluebunch Wheatgrass Plant Community (RPC): This plant community provides a diversity of grasses, forbs, and shrubs used by native insect communities that assist in pollination. The reptile and amphibian community is represented by leopard lizard, short horned lizard, sagebrush lizard, western skink, and western toad. Amphibians are associated with springs and isolated water bodies adjacent to this plant community. Spring developments that capture all available water would preclude the use of these sites by amphibians. Birds that may be resident or migratory include mountain bluebird, lazuli bunting, vesper sparrow, grasshopper sparrow, lesser goldfinch, and burrowing owl where deep soils exist. Brood-rearing, winter cover, and winter food for sage grouse are supported by this diverse plant community. Low sagebrush is a preferred winter food for sage-grouse. The plant community provides spring, fall, and winter forage needs for large mammals including mule deer, elk, and antelope. Mule deer have a high preference for low sagebrush. A diverse small mammal population may include golden-mantled ground squirrels, chipmunks, and pikas (when adjacent to talus slopes at high elevations).

State 1 Phase 1.2- Low Sagebrush/ Sandberg Bluegrass 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 State 1 Phase 1.1 community represented by leopard lizard, short horned lizard, sagebrush lizard, and western skink. The reduced diversity of insects and understory cover may reduce quality of food and cover for reptile populations. As juniper increases, habitat for Brewer's sparrow, sage thrasher, and sage sparrow may increase. Remaining low sagebrush will provide brood-rearing, winter cover, and winter food for sage-grouse, but as juniper encroaches the quality of this habitat is severely reduced or eliminated. The plant community supports limited seasonal habitat for mule deer, elk, and antelope. As juniper encroaches the site will provide additional thermal cover for large mammals. A small mammal population including golden-mantled ground squirrels, chipmunks, yellow-bellied marmots, and pikas may utilize this site.

State 1 Phase 1.3 – Bluebunch Wheatgrass/ Sandberg Bluegrass/ Plant Community: This phase has developed due to fire. The plant community, dominated by herbaceous vegetation with little or no sagebrush provides less vertical structure for animals. Insect diversity would be reduced with the loss of sagebrush but a native forb plant community similar to State 1 Phase 1.1 would still support select pollinators. Establishment of rabbitbrush would add fall pollinator habitat to the site. As rabbitbrush matures it would help replace the loss of sagebrush cover. Until rabbitbrush is established, diversity and populations of reptiles would be limited or excluded. The dominance of herbaceous vegetation with no sagebrush canopy cover would eliminate use of this area for nesting, winter cover, and winter food for sage-grouse. This plant community provides limited brood-rearing habitat for sage-grouse if the site is adjacent to sagebrush cover. The dominant herbaceous vegetation improves habitat for grassland avian species (horned lark and western meadowlark). Winter habitat for large mammals would be reduced or eliminated with the loss of low sagebrush. Small mammal populations would be reduced due to loss of cover and an increase in success of hunting by predators.

State 1 Phase 1.4- Low Sagebrush/ Sandberg Bluegrass Plant Community: This phase has developed due to improper grazing management and no fire. The animal community would be similar to State 1 Phase 1.1. The reduced vigor and canopy cover of forbs would lower the quality of habitat for pollinators. The reptile community includes leopard lizard, short horned lizard, sagebrush lizard, and western skink. The reduced diversity of insects and understory cover may reduce quality of food and cover for reptile populations. The site would provide winter cover and winter food for sage-grouse. The quality of brood-rearing and nesting cover for sage-grouse would be lowered as the herbaceous understory is depleted. Mule deer, elk, and antelope would utilize site for winter habitat. A small mammal population including golden-mantled ground squirrels, chipmunks, yellow-bellied marmots, and pikas may utilize this site.

State 2 - Sandberg Bluegrass/ Cheatgrass / Annuals Plant Community:

This plant community is the result of continued improper grazing management and fire. The reduced forb and shrub components in the plant community would support a very limited population of pollinators. Most reptilian species identified in State 1 Phase 1.1 are not supported with food, water, or cover. This plant community does not support the habitat requirements for sage-grouse. Diversity of grassland avian species is reduced due to poor cover and available food. Birds of prey including hawks and falcons may range throughout these areas looking for prey species. Hunting success by raptors may increase. Large mammals may utilize the herbaceous vegetation in the early part of the year when the invasive annuals (cheatgrass) are more palatable. At other times of the year large mammals would not regularly utilize these areas due to poor food and cover conditions. Small mammal populations and diversity would be reduced due to poor quality cover, food, and increase in success of hunting by predators.

State 3 – Utah Juniper/ Annuals/ Sandberg Bluegrass: This state has developed due to improper grazing management and no fire. The loss of native understory vegetation will reduce insect diversity on the site. The lack of flowering plants reduces use by pollinators like butterflies and moths. Most reptilian species identified in State 1 Phase 1.1 are not supported with food, water, or cover. 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. The plant community supports limited seasonal habitat for mule deer, elk, and antelope in the spring and fall. As juniper encroaches the site will provide additional thermal cover for large mammals.

Grazing Interpretations.

This site is best suited for livestock grazing in the late spring, summer and fall. Natural water supplies are short or absent. Heavy fall or winter sheep use, may reduce the vigor of low sagebrush. Avoid grazing when soils are wet due to clay soils.

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.

## **Recreational uses**

Pronghorn antelope and sagegrouse hunting are the major recreational uses of this site. There are limited opportunities for off-road vehicles, hiking, horseback riding and photography.

## Wood products

None.

## Other products

None.

## Inventory data references

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

Those involved in developing this site description include:

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

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

## Other references

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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, 9/22/2020

## 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.

Author(s)/participant(s)	
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Date	01/16/2008
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. They are most likely to occur immediately following a wildfire and on slopes greater than 15 percent.  

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- 2. Presence of water flow patterns:** Water-flow patterns are rare on this site. They are most likely to occur with high intensity convection storms and when slopes are greater than 15 percent. When they do occur, they are short, disrupted by cool season perennial grasses and shrubs and are not extensive.  

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- 3. Number and height of erosional pedestals or terracettes:** Erosional pedestals or terracettes are rare on this site. A few pedestals and terracettes can occur on this site on slopes greater than 15 percent and where rills and water flow patterns are present. They are not extensive. Do not mistake frost heaving for pedestals.  

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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 ranges from 20-40 percent but data is needed to verify.  

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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:** Wind scoured, blowouts and/or depositional areas do not occur.  

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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 2-3 feet or further following a significant run-off event and on slopes greater than 15 percent. Coarse litter generally does not move.  

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- 8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Values should range from 3 to 5 but need to be tested.  

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- 9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The A or A1 horizon is typically 2 to 10 inches thick. Structure ranges from weak very fine and fine granular to weak fine subangular blocky. Soil organic matter (SOM) ranges from 1 to 6 percent.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Bunchgrasses, especially deep-rooted, slow run-off and increase infiltration. Shrubs catch snow in the interspaces. Terracettes provide a favorable micro-site for vegetation establishment, which further increases infiltration. Surface gravels help slow surface water movement and increase infiltration.
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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** Compaction layer is not present. Do not mistake sub-surface clay for compaction layer.
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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 >> medium shrubs>
- Sub-dominant: Perennial forbs> shallow rooted grasses
- Other:
- Additional:
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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Low 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):** Annual litter cover in the interspaces will be 5-10 percent to a depth of <0.1. Under the mature shrubs, litter is greater than 0.5 inches. Fine litter can accumulate on the terracettes.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Annual production is 400 lbs. per acre in a year with normal precipitation and temperatures. Perennial grasses produce 50-70 percent of the total, forbs 10-20 percent and shrubs 20-30 percent.
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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Invasive species include cheatgrass, rush skeletonweed, scotch thistle, spotted and diffuse knapweed, Russian thistle, mustard. clasping pepperweed, beggar ticks, tansymustard, Jim Hill tumbledustard, yellow salsify, burr buttercup, medusahead and halogeton.
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17. **Perennial plant reproductive capability:** All functional groups have the potential to reproduce in normal years.

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