

Ecological site R011XB012ID **South Slope Loamy 11-13 PZ ARTRW8/PSSPS**

Last updated: 4/06/2020
 Accessed: 05/12/2025

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): 011X–Snake River Plains

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 Precipitation or Climate Zone: 11-13" P.Z.

Classification relationships

Artemisia wyomingensis/ Agropyron spicatum HT in Hironaka, M., M.A. Fosberg, A. H. Winward. 1983. Sagebrush-Grass Habitat Types of Southern Idaho. University of Idaho, Moscow, Idaho. Bulletin Number "35".

Land Resource Region: B (Northwest Wheat and Range)
 MLRA: 11 (Snake River Plains)
 EPA Eco Region: Level III (Snake River Plain)

Ecological site concept

Site does not receive additional moisture
 Soils are:
 Not saline or saline sodic
 Deep to very deep, with <35% coarse fragments (by volume), not skeletal
 not strongly or violently effervescent in the surface mineral 10"
 Surface textures range from sandy loam to loam in the surface mineral 4"
 Slope is >30%
 Clay content is =<35% in surface mineral 4"
 Site does not have an argillic horizon with >35% clay

Associated sites

R011XA003ID	Shallow Loam 8-12 PZ ARTRT/PSSPS
R011XB016ID	Sand 8-12 PZ ARTRT-PUTR2/HECOC8
R011XY007ID	Gravelly 10-12 PZ
R011XY010ID	Calcareous Loam 7-10 PZ ATCO-PIDE4/ACHY-ACTH7
R011XY014ID	Sandy Loam 8-12 PZ ARTRW8/ACHY-HECOC8
R011XY015ID	Loamy Bottom 8-14 PZ ARTRT/LECI4

Table 1. Dominant plant species

Tree	Not specified
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Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs on south to west facing benches, foothills, and lower mountain slopes. Slopes are greater than 30 percent. Elevations range from 4000 to 5500 feet (1200-1700 meters).

Table 2. Representative physiographic features

Landforms	(1) Loess hill
Flooding frequency	None
Elevation	1,219–1,676 m
Slope	30–70%
Water table depth	152 cm
Aspect	S, W

Climatic features

The Upper Snake River Plain, MLRA 11B, is part of the Northwestern Wheat and range Region. It has a mean elevation of 4841 feet above sea level, and varies from 4177 to 4841 feet. In general, it is a geologically young, level to gently sloping lava plateau. In places larger streams have cut deep, steep-walled canyons. The average annual precipitation, based on 10 long term climate stations located throughout the MLRA, is 10.88 inches. The averaged low is 8.74 inches and the maximum average is 12.69. Monthly precipitation usually peaks in May, then drop off rapidly to reach its low in July and August. The climate station at Aberdeen Experiment Station (1000010) has records of zero precipitation in 11 months of the year, and as low as 0.03 inches in December, the lone non-zero month.

Temperatures can be extremely variable across the year. Highs of up to 104° and lows down to -42° Fahrenheit have been recorded. The average annual temperature from ten climate stations is 44.75° F. The frost-free period ranges from 91 to 115 days. The freeze-free period can last from 123 to 146 days.

Both morning and afternoon average relative humidity values reach their low in August, and are far below the national average. Wind speed peaks in the Spring, and is generally somewhat above the national average. The average number of sunny, cloud-free days is above average for the summer months, but below average for the period from November through February. The average total snowfall is approximately 29 inches.

Table 3. Representative climatic features

Frost-free period (average)	115 days
Freeze-free period (average)	146 days
Precipitation total (average)	330 mm

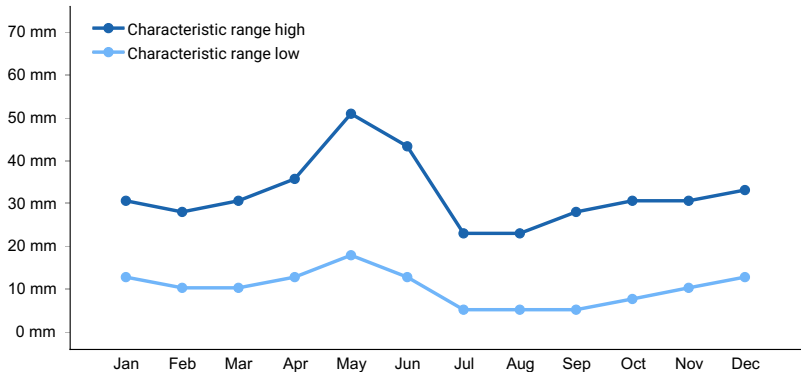


Figure 1. Monthly precipitation range

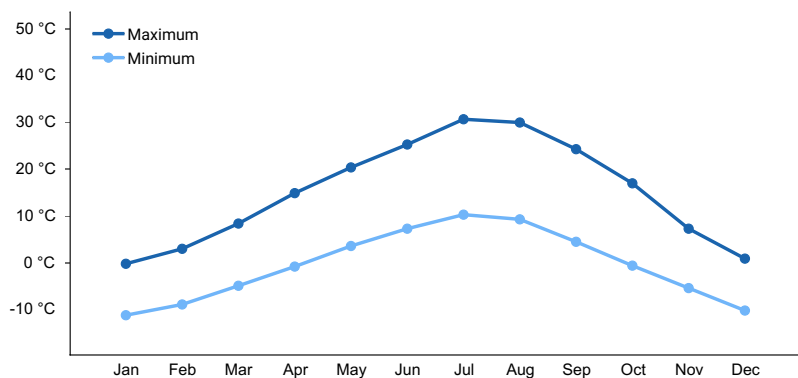


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

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

Soil features

The soils on this site are generally very deep, well drained, and formed in thick loess. Permeability is moderate and the available water holding capacity (AWC) is high. Surface runoff is very rapid from bare soil. Erosion is moderate to high by water and moderate to high by wind. The surface is generally silt loam with no rock fragments. The subsoil is slightly developed with 5 to 15 percent clay. These soils have a xeric moisture regime and a mesic temperature regime.

Soil Series Correlated to this Ecological Site

Pocatello

Table 4. Representative soil features

Surface texture	(1) Sandy loam
Drainage class	Well drained
Permeability class	Moderate
Soil depth	152 cm
Available water capacity (0-101.6cm)	15.75–21.08 cm
Calcium carbonate equivalent (0-101.6cm)	5–10%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–15
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4

Ecological dynamics

The dominant visual aspect of the site is Wyoming big sagebrush and bluebunch wheatgrass. Composition by weight is approximately 50 to 70 percent grass, 10 to 20 percent forbs, and 20 to 30 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, 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 bluebunch wheatgrass in the understory and Wyoming big sagebrush in the overstory. Subdominant species include Thurber's needlegrass, Sandberg bluegrass, arrowleaf balsamroot, lupine, and tapertip hawksbeard. There is a large 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 500 pounds per acre (560 kilograms per hectare) in a normal year. Production in a favorable year is 800 pounds per acre (896 kilograms per hectare). Production in an unfavorable year is 300 pounds per acre (336 kilograms per hectare). Structurally, cool season deep rooted perennial bunchgrasses are very dominant, followed by tall shrubs being more dominant than perennial forbs while shallow rooted bunchgrasses are subdominant.

FUNCTION:

This site is suited for livestock grazing in the spring, early summer, and fall. There are few limitations to grazing, although steep slopes can limit access. Natural water supplies may be insufficient or absent. The site provides fair to good habitat for various upland wildlife. The site can be valuable winter habitat for mule deer due to the southern exposures. This site is not easily degraded due to steep slopes limiting livestock access except where it occurs near water or at the toe of the slope. The site offers minimal recreational value except limited hunting opportunities. 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, Wyoming big sagebrush can gradually increase on the site. Grasses and forbs decrease as shrubs increase. With the continued absence of fire, Wyoming big sagebrush can displace most of the primary understory species.

When fires become more frequent than historic levels (60-80 years), Wyoming big sagebrush is reduced significantly. Rabbitbrush, horsebrush, and threetip sagebrush can increase slightly. With continued short fire frequency, Wyoming big sagebrush can be completely eliminated along with many of the desirable understory species such as bluebunch wheatgrass, Indian ricegrass, and Thurber's needlegrass. These species may be replaced by Sandberg bluegrass 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. With reduced vigor, recruitment of these species declines. As these species decline, the plant community becomes susceptible to an increase in Wyoming big sagebrush and noxious and invasive plants.

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

Proper grazing management that addresses frequency, duration, and intensity of grazing can also keep fine fuels from developing, thereby reducing fire frequency. This can lead to gradual increases in Wyoming big sagebrush. A planned grazing system can be developed to intentionally accumulate fine fuels in preparation for a prescribed burn. Brush management should be carefully planned, as a reduction in shrubs without a suitable understory of perennial

grasses can increase cheatgrass which will lead to more frequent fire intervals.

Weather influences:

Above normal precipitation in April and May can dramatically increase total annual production of the plant community. These weather patterns can also increase viable seed production of desirable species to provide for recruitment. Likewise, below normal precipitation during these spring months can significantly reduce total annual production and be detrimental to viable seed production. Overall plant composition is normally not affected when perennials have good vigor.

Below normal temperatures in the spring can have an adverse impact on total production regardless of the precipitation. 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. The sagebrush defoliator moth (*Aroga websterii*) causes mortality in relatively small patches. It seldom kills the entire stand. 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. 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 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 Wyoming 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.

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 C to State 2. Develops through frequent fire and/or continued improper grazing management. This site has crossed the threshold. It is generally not economically feasible to move this state back to State 1 with accelerated practices.

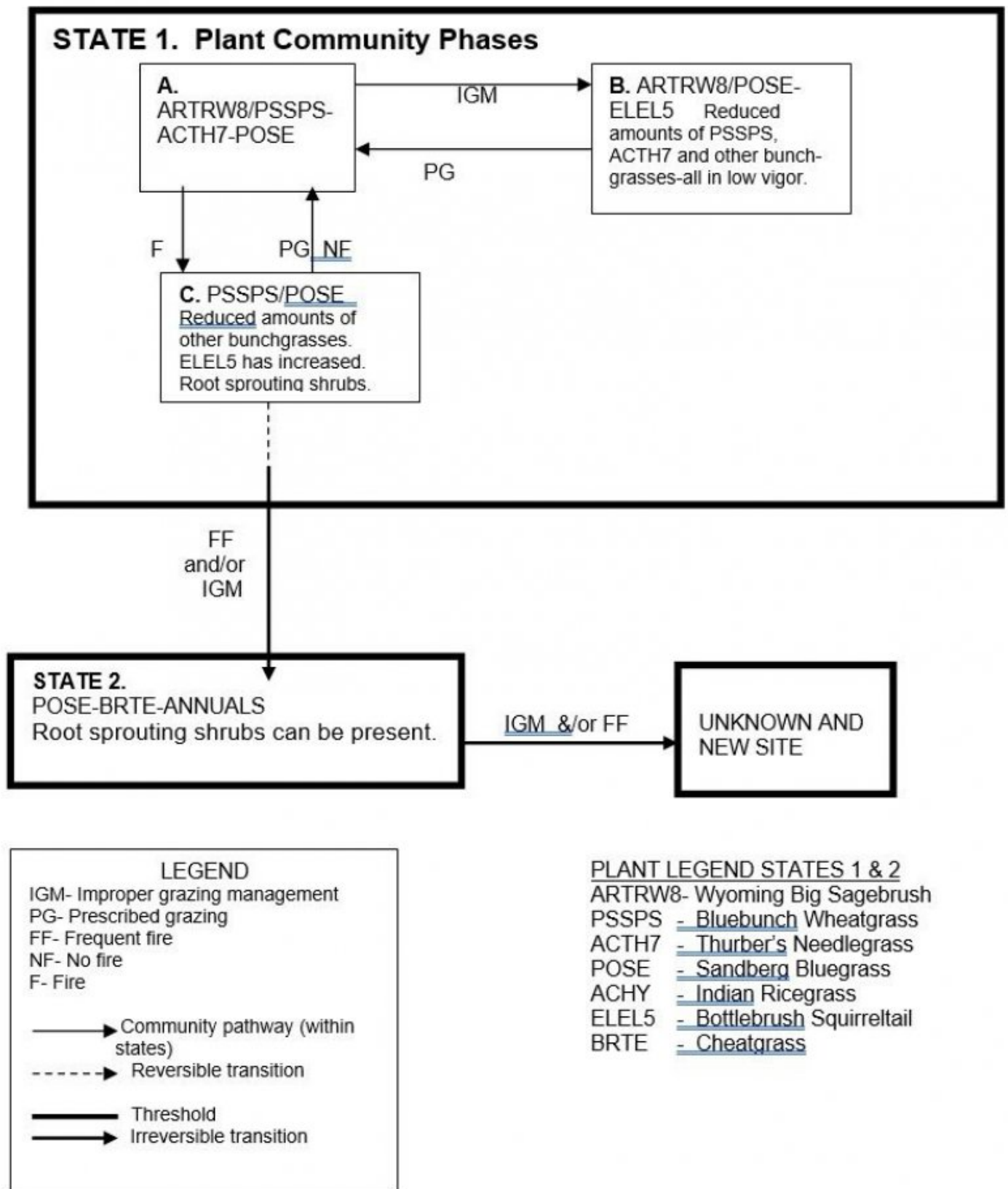
State 2 to unknown site. Excessive soil loss and changes in the hydrologic cycle caused by continued improper grazing management and/or frequent fire cause this state to cross a threshold and retrogress to a new site with

reduced potential. It is generally not economically feasible to move this state back to State 1 with accelerated practices.

Practice Limitations:

Severe limitations exist for seeding and brush control by mechanical methods due to steep slopes. Steepness of slopes somewhat 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 Wyoming big sagebrush can result in a significant invasion of cheatgrass.

State and transition model



State 1

State 1 Phase A

Community 1.1

State 1 Phase A

This plant community has Wyoming big sagebrush in the overstory with bluebunch wheatgrass dominating the understory. Other significant species include Thurber's needlegrass, Sandberg bluegrass, lupine, tapertip hawksbeard, and arrowleaf balsamroot. There can be a variety of other grasses, forbs, and shrubs in minor

amounts. Natural fire frequency is 60-80 years.

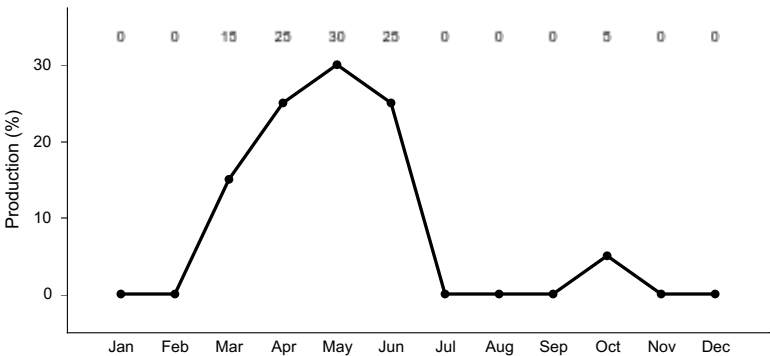


Figure 3. Plant community growth curve (percent production by month). ID0505, ARTRW8 -PSSPS . State 1.

State 2
State 1 Phase B

Community 2.1
State 1 Phase B

This plant community is dominated by Wyoming big sagebrush with reduced amounts of bluebunch wheatgrass. Sandberg bluegrass and bottlebrush squirreltail have increased in the understory. Thurber's needlegrass initially increases but with continued improper grazing management it is reduced. There is a reduced amount of Indian ricegrass. All deep-rooted bunchgrasses are typically in low vigor. Wyoming big sagebrush has increased. Rabbitbrush, horsebrush and threetip sagebrush may have increased. This state has developed due to improper grazing management. Some cheatgrass may have invaded the site.

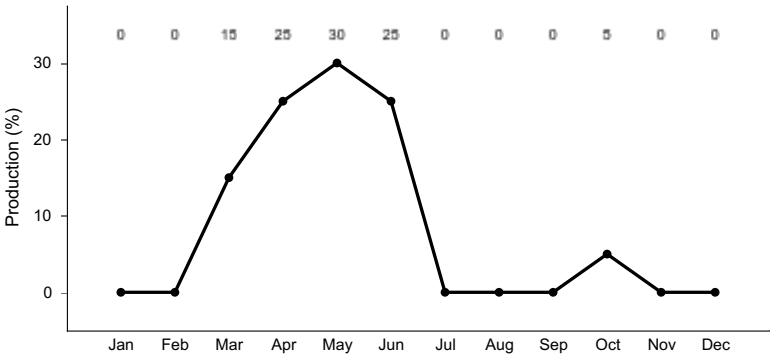


Figure 4. Plant community growth curve (percent production by month). ID0505, ARTRW8 -PSSPS . State 1.

State 3
State 1 Phase C

Community 3.1
State 1 Phase C

This plant community is dominated by bluebunch wheatgrass and Sandberg bluegrass. Some Thurber's needlegrass may be lost due to fire. Bottlebrush squirreltail has increased. Forbs remain about in the same proportion as Phase A. Very little Wyoming big sagebrush is present due to wildfire, but some rabbitbrush, horsebrush, and threetip sagebrush can be present due to sprouting. Some cheatgrass has invaded the site. This plant community is the result of wildfire.

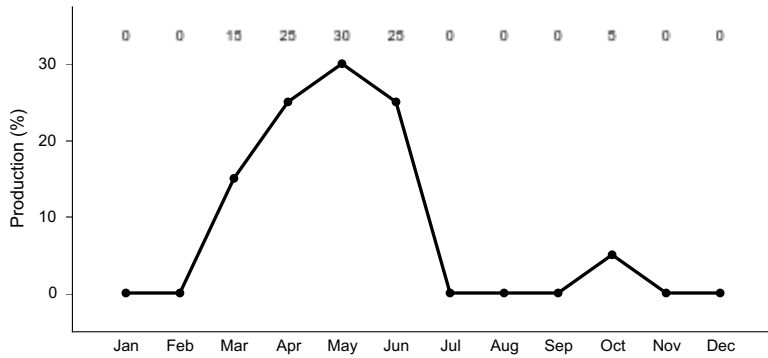


Figure 5. Plant community growth curve (percent production by month).
ID0505, ARTRW8 -PSSPS . State 1.

State 4

State 2

Community 4.1

State 2

This plant community is dominated by Sandberg bluegrass, cheatgrass and other annuals. Root sprouting shrubs such as rabbitbrush, horsebrush and threetip sagebrush can be present, dependent upon, how frequent, fire has occurred. Some soil loss has occurred. This state has developed due to frequent fires and/or improper grazing management. The site has crossed the threshold. It is generally not economically feasible to move this state back to State 1 with accelerated practices.

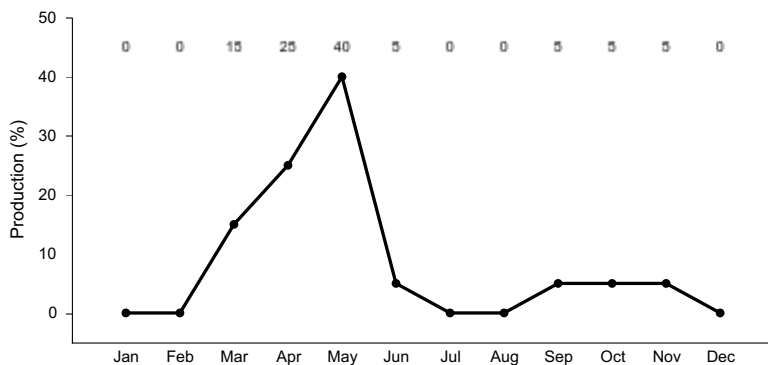


Figure 6. Plant community growth curve (percent production by month).
ID0511, BRTE-ANNUALS. State 2.

State 5

State 3

Community 5.1

State 3

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 generally not economically feasible to move this state back to State 1 with 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. Large herbivore use is dominated by mule deer and elk. Important seasonal habitat is provided for resident and migratory animals including western toad, sagebrush lizard, western rattlesnake, shrews, bats, jackrabbits, ground squirrels, mice, coyote, red fox, badger, sage-grouse, Ferruginous hawk, prairie falcon, horned lark, and western meadowlark. Changes in the plant community composition can reduce the number and diversity of wildlife species in the area. With reduced shrub cover, shrub obligate avian and mammal species become rare including sage-grouse, Brewer's sparrow, sage thrasher, sage sparrow, and pygmy rabbits. 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. The loss of herbaceous (grass and forbs) understory vegetation has a negative impact on ground nesting birds, while the loss of shrub cover negatively affects both ground and shrub nesting avians. Water is limited only being provided by seasonal runoff, artificial water catchments, and isolated springs. This rangeland ecological site may be associated with pre-historic lava flows which provide unique cave habitats for several sensitive animal species, including the Blind Cave Leiodid Beetle, Cave Obligate Mite, Bats, and the Cave Obligate Harvestman.

State 1 Phase 1.1 - Wyoming Big Sagebrush/ Bluebunch Wheatgrass/ Thurber's Needlegrass/ Sandberg Bluegrass Reference 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, western rattlesnake, western toad, boreal chorus frog, and northern leopard frog. Amphibians are associated with springs and isolated water bodies adjacent to this plant community. Shrub-steppe obligate avian species include the Brewer's sparrow, sage sparrow, sage thrasher, and sage-grouse. Habitat (lek sites, nesting areas, winter cover and food) for sage-grouse is provided by this diverse plant community. The plant community supports seasonal needs of large mammals (mule deer, antelope, and elk) providing food and cover on a seasonal basis. Winter range is provided for mule deer during moderate winters. A diverse small mammal population including golden-mantled ground squirrels, chipmunks, yellow-bellied marmots, and pygmy rabbits would utilize this community.

State 1 Phase 1.2 - Wyoming Big Sagebrush/ Sandberg Bluegrass/ Bottlebrush Squirreltail Plant Community: This plant community is the result of improper grazing management. An increase in canopy cover of sagebrush contributes to a sparse herbaceous understory. The reduced herbaceous understory results in lower diversity and numbers of insects. Diversity and populations of reptiles and amphibians may be reduced due to reduced prey availability and cover. The reptile and amphibian community is represented by leopard lizard, short horned lizard, sagebrush lizard, western skink, western rattlesnake, western toad, boreal chorus frog, and northern leopard frog. Amphibians are associated with springs and isolated water bodies adjacent to this plant community. Development of spring sites that collect all available water would exclude the use of amphibians on these sites. Shrub-steppe obligate avians utilizing the site include Brewer's sparrow, sage sparrow, sage thrasher, and sage-grouse. Habitat (nesting areas, winter cover and food) for sage-grouse is limited due to a less diverse herbaceous plant community. The plant community supports seasonal needs of large mammals (mule deer, antelope, and elk), although providing forage for a shorter period of time than in Phase 1.1. A diverse small mammal population including golden-mantled ground squirrels, chipmunks, yellow-bellied marmots, and pygmy rabbits would utilize this plant community.

State 1 Phase 1.3 - Bluebunch Wheatgrass/ Sandberg Bluegrass Plant Community: This plant community is the result of fire. The plant community, dominated by herbaceous vegetation with little or no sagebrush provides less vertical structure and limits use by shrub obligate animals. Insect diversity would be reduced but a diverse native forb plant community would still support select pollinators. Reptile use, including short horned lizard, sagebrush lizard, and western rattlesnakes would be limited or excluded due to the absence of sagebrush. The dominance of herbaceous vegetation with little sagebrush canopy cover would eliminate use of these areas for nesting by Brewer's sparrow, sage sparrow, sage thrasher, and sage-grouse. This plant community provides brood-rearing habitat for sage-grouse when cover habitat provided by sagebrush is nearby. Winter habitat for sage-grouse is eliminated. Animal species preferring grassland habitats including western meadowlark, horned lark, savannah sparrow, deer mouse, and kangaroo rat would utilize this site for nesting and/or foraging. Large mammal (mule deer, antelope, and elk) use for food would be seasonal (spring through fall) but the site would offer little thermal and young of year cover. Habitat for pygmy rabbits would not be provided.

State 2 - Sandberg Bluegrass/ Cheatgrass/ Annuals Plant Community: This plant community is the result of continued improper grazing management and/or frequent fire. The reduced forb component in the plant community would support a very limited population of pollinators. Most native reptilian species are not supported with food,

water, or cover. This plant community does not support the habitat requirements for sage-grouse, sage thrasher, Brewer's sparrow, or sage sparrow. Diversity of grassland avian species is reduced due to poor cover and food conditions. 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 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 would be dominated by open grassland species like the Columbian ground squirrel.

Grazing Interpretations:

This site is most suited to spring and fall grazing by domestic livestock. Natural water supplies may be insufficient or absent and water may have to be hauled, piped, or otherwise made available.

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 B. They have moderately slow runoff potential.

Recreational uses

This site offers minimal recreational or aesthetic value. Occasional use by big game species during winter and spring offers some aesthetic values as does summer blooming forbs. There are some limiting hunting opportunities. Steep slopes limit hiking, horseback riding, and off road vehicle use.

Wood products

None

Other products

None

Other information

Field Offices
Burley, ID
Shoshone
American Falls, ID
Pocatello, ID
Blackfoot, ID
Arco, ID
Rexburg, ID
St. Anthony, ID
Rigby, ID
Fort Hall, ID
Idaho Falls, 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
Leah Juarros, Resource Soil Scientist, NRCS, Idaho
Lee Brooks, Range Management Specialist, IASCD

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/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, 4/06/2020

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	04/01/2008
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- Number and extent of rills:** can occur on this site but are not extensive. They are most likely to occur immediately following a wildfire.

- Presence of water flow patterns:** can occur on this site. When they do occur, they are short, disrupted by cool season perennial grasses and tall shrubs and are not extensive.

- Number and height of erosional pedestals or terracettes:** a few pedestals and terracettes can occur on this site. They are not extensive.

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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 50-60 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 3-5 feet or further 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 4-6 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 typically includes weak thin and moderate thick platy, weak fine and moderate fine granular, and weak fine to medium subangular blocky. Soil organic matter (SOM) ranges from 1 to 3 percent. The surface horizon is typically 2 to 6 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. Shrubs catch snow in the interspaces. Terracettes provide a favorable micro-site for vegetation establishment, which further increases 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):** 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 grasses
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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or**

decadence): Wyoming big sagebrush will become decadent in the absence of fire and ungulate grazing. Grass and forb mortality will occur as tall shrubs increase.

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):** is 500 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 15-25 percent.
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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** includes cheatgrass, rush skeletonweed, scotch thistle, spotted and diffuse knapweed, Russian thistle, and mustard.
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17. **Perennial plant reproductive capability:** all functional groups have the potential to reproduce in normal years.
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