USDA Natural Resources
Conservation Service

Ecological site R043BY002ID
Granitic 22+ PZ ARTRV/FEID

Last updated: 2/03/2020
Accessed: 05/10/2025

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): 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.

Classification relationships

Relationship to Other Established Classification Systems:

National Vegetation Classification System (NVC):
2 Shrub & Herb Vegetation
2.B Temperate & Boreal Grassland & Shrubland
2.B.2 Temporate Grassland & Shrubland
2.B.2.Na Western North American Grassland & Shrubland
M048 Central Rocky Mountain Montane-Foothill Grassland & Shrubland
G267 Central Rocky Mountain Montane Grassland
A3965 Central Rocky Mountain Subalpine Dry Idaho Fescue Grassland
CEGL001611 – Festuca idahoensis – Carex obtusata Grassland or
CEGL001612 – Festuca idahoensis – Danthonia intermedia Grassland

Ecoregions (EPA):
Level I: 6 Northwestern Forested Mountains
Level II: 6.2 Western Cordillera
Level III: 6.2.(10) Middle Rockies
Level IV: 6.2.(10)17.k Granitic Subalpine Zone, and
(10)17.m Dry Mid-Elevation Sedimentary Mountains

Ecological site concept

Site receives no additional water.
• Slope is <20%
• Soils are:
o Derived from granitic parent material (weathered/mixed)
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 = 32% in top 4” (10 cm) of mineral soil surface
o Each following subsurface horizon has a clay content of <35% by weighted ave. 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	**Loamy 22+ PZ FEID-PSSPS**
R043BY004ID	**Shallow Fractured Stony Loam 16-22 PZ ARTRV/FEID**
R043BY009ID	**Loamy 16-22 PZ ARTRV/FEID**
R043BY017ID	**Shallow Stony 22+ PZ ARTRV/FEID**
R043BY018ID	**South Slope Stony 22+ PZ PSSP6-FEID**
R043BY019ID	**North Slope Loamy 16-22 PZ SYORU/FEID-PSSPS**
R043BY020ID	**South Slope Gravelly 16-22 PZ ARTRV/BRMA4-ELTRT**
R043BY022ID	**Windswept Mountain Ridge 22+ PZ FEID-CAREX**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. vaseyana*
Herbaceous	(1) *Festuca idahoensis*

Physiographic features

This site occurs on gentle to moderate slopes on ridgetops. Elevations range from 3500 to 7000 feet (1050-2150 meters). Slopes range from 5 to 30 percent.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Mountain
Elevation	3,500–7,000 ft
Slope	5–30%
Water table depth	60 in

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

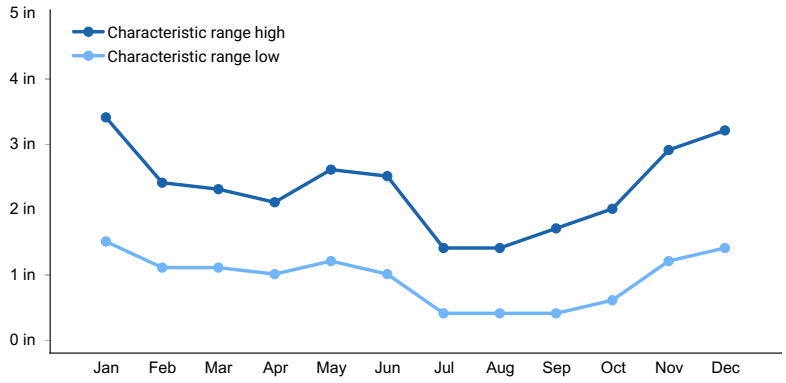


Figure 1. Monthly precipitation range

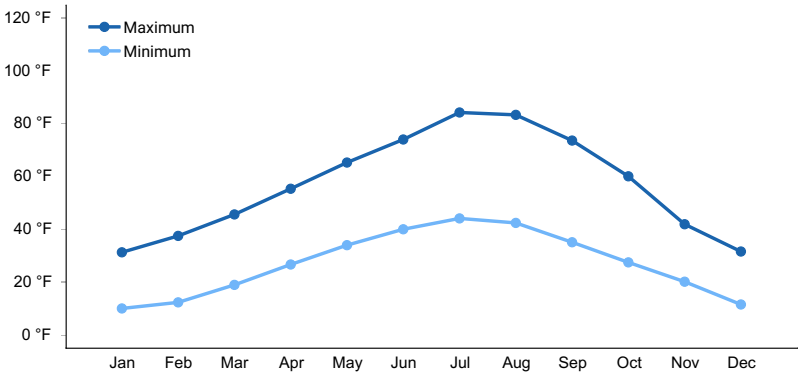


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

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

Soil features

The soils are generally moderately deep to deep gravelly coarse sandy loams formed from granitic materials. The surface layers range from moderately acid to neutral. They are usually excessively drained, have moderately rapid permeability and very low available water capacity. These soils are characterized by xeric moisture and frigid temperature regimes.

Soil Series Correlated to this Ecological Site

Takeuchi

Table 4. Representative soil features

Surface texture	(1) Fine gravelly coarse sandy loam (2) Gravelly loamy coarse sand
Family particle size	(1) Loamy
Drainage class	Somewhat excessively drained to excessively drained

Permeability class	Moderately rapid to rapid
Soil depth	20–40 in
Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	1.8–2.3 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)	5.6–7.3
Subsurface fragment volume <=3" (Depth not specified)	10–30%
Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

The dominant visual aspect of this site is mountain big sagebrush and Idaho fescue. Composition by weight is approximately 60 to 70 percent grasses, 15 to 25 percent forbs, and 10 to 20 percent shrubs.

During the last few thousand years, this site has evolved in a semi-arid to montane climate characterized by dry summers and cold, moist winters. Herbivory has historically occurred on this site at low levels of utilization. Herbivores include mule deer, Rocky Mountain elk, and lagomorphs.

Fire has historically occurred on the site at intervals of 20 - 50 years.

The Historic Climax Plant Community (HCPC), the Reference State (State 1), moves through many phases depending on the natural and man-made forces that impact the community over time. State 1, described later, indicates some of these phases. The Reference Plant Community Phase is Phase A. This plant community is dominated by mountain big sagebrush in the overstory and Idaho fescue and bluebunch wheatgrass in the understory. Mountain brome, prairie junegrass, needlegrasses, tapertip hawksbeard, biscuitroot, and arrowleaf balsamroot are prevalent in the community. Other shrubs include antelope bitterbrush, Woods' rose, and mountain snowberry. The plant community is diverse and there is a variety of other grasses and forbs 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 1200 pounds per acre (1344 kilograms per hectare) in a normal year. Production in a favorable year is 1500 pounds per acre (1680 kilograms per hectare). Production in an unfavorable year is 900 pounds per acre (1008 kilograms per hectare). Structurally, cool season deep-rooted perennial bunchgrasses are more dominant than forbs followed by shrubs being more dominant than shallow rooted perennial grasses.

FUNCTION:

Big game animals use the site in the late spring, summer, and fall. Livestock use is best in the summer and fall. The site has good recreational value for hunting.

The site is easily accessible by livestock and therefore can be degraded by improper grazing management.

Impacts on the Plant Community.

Influence of fire:

In the absence of normal fire frequency, little decadence is expected. Most shrubs will increase slightly in the plant community.

When fires become more frequent than historic levels (20-50 years), mountain big sagebrush, antelope bitterbrush, Idaho fescue, and bluebunch wheatgrass can be reduced in the plant community. With continued short fire frequency, these species can be completely eliminated along with some forbs. These species may be replaced by a variety of annual and perennial forbs including noxious and invasive species. These fine fuels will cause fires to become more frequent. Cheatgrass may invade the site. Root sprouting shrubs will usually be maintained in the community.

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, an increase in mountain big sagebrush, mountain snowberry, Woods' rose and rabbitbrush will occur and noxious and invasive plants will invade. Cheatgrass also may invade the site.

Continued improper grazing management influences fire frequency by increasing fine fuels. As annuals increase, 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. A planned grazing system can be developed to intentionally accumulate fine fuels in preparation for a prescribed burn. Prescribed burns need to be carefully planned. Burns in areas without suitable stands of perennial grasses can lead to an increase in cheatgrass and other annuals which will result in a more frequent fires regime.

Weather influences:

Above normal precipitation in 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.

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 reduction in fire frequency.

Influence of Insects and disease:

Outbreaks can affect vegetation health. Grasshopper and mormon cricket 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 will use this site in the late spring, summer, and fall. Their numbers are seldom high enough to adversely affect the plant community. Herbivory can be detrimental to bitterbrush when livestock grazing and browsing by big game occurs at the same time and season. This will occur when both kinds of animal are using the

plant in the late summer or fall. The adverse impact is excessive use of the current years' leader growth.

The deer mouse is beneficial to this site as it is the principal vector for planting bitterbrush seed.

Watershed:

As perennial bunchgrasses decrease, forbs become more dominant. This has little impact on the infiltration rate or runoff. This composition change can, however, affect nutrient and water cycles. Increased runoff will only occur from unusual events such as rapid snowmelt or high precipitation on frozen soils. Some soil erosion can occur as the frozen soils thaw with continued precipitation. 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 usually due to dominance by forbs.

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.

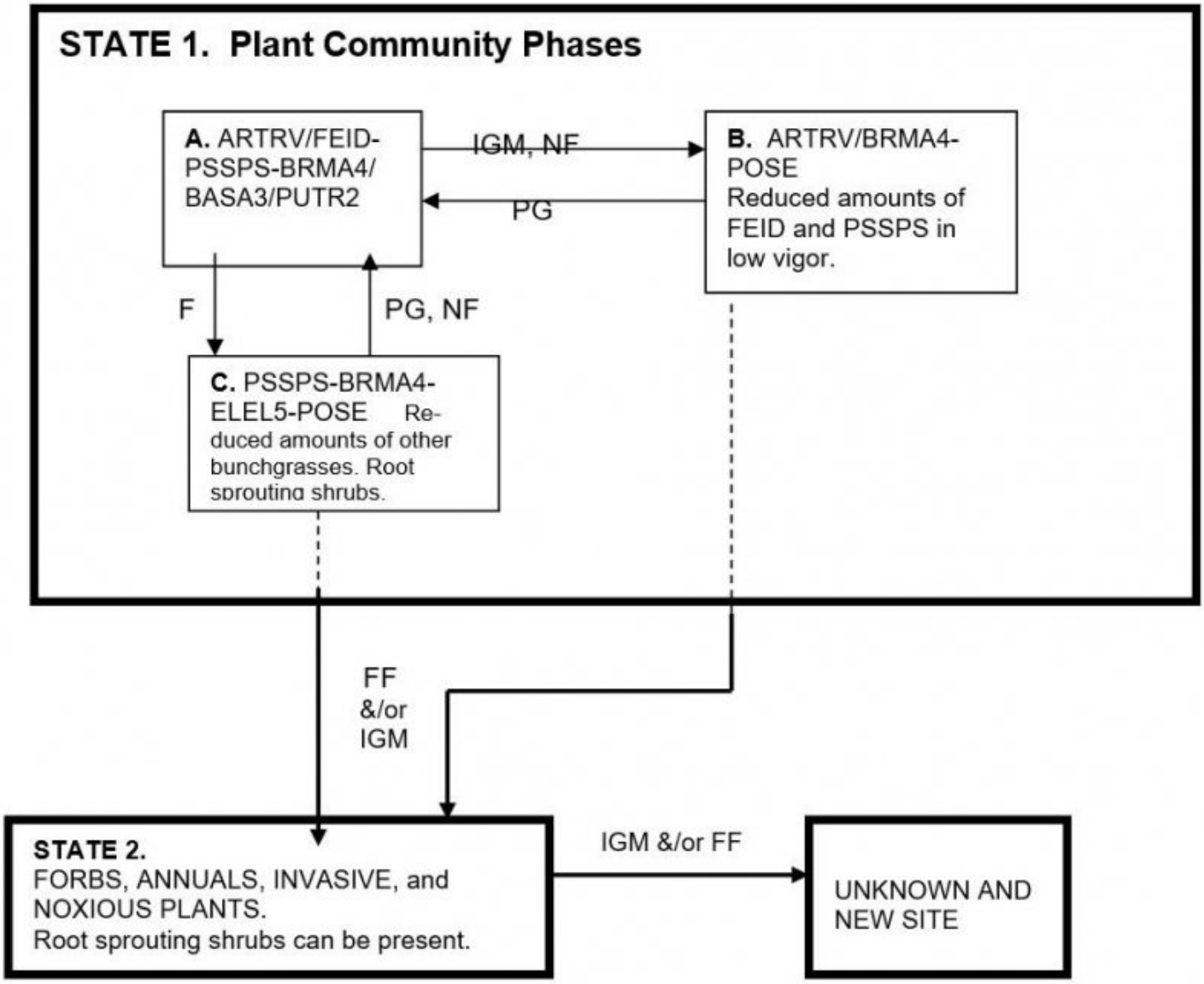
State 1, Phase B and C to State 2. Develops through frequent fire or continued improper grazing management. This site has crossed a vegetative threshold. It is economically impractical to return this plant community to State 1 with accelerating practices.

State 2 to unknown site. Excessive soil loss and changes in the hydrologic cycle caused by 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 economically impractical to return this plant community to State 1 with accelerating practices.

Practice Limitations:

Moderate to severe limitations exist on this site for rangeland seeding due to coarse soil surface textures. Slight limitations exist for facilitating and vegetative management practices.

State and transition model



LEGEND

IGM- Improper grazing management
PG- Prescribed grazing
FF- Frequent fire
NF- No fire
F- Fire
→ Community pathway (within states)
- - - → Reversible transition
Threshold
→ Irreversible transition

PLANT LEGEND STATES 1 & 2

PSSPS - Bluebunch Wheatgrass
FEID - Idaho Fescue
BRMA4 - Mountain Brome
ARTRV - Mountain Big Sagebrush.
ELEL5 - Bottlebrush Squirreltail
POSE - Sandberg Bluegrass
PUTR2 - Antelope Bitterbrush
BASA3 - Arrowleaf Balsamroot

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 in the overstory and Idaho fescue and bluebunch wheatgrass in the understory. Mountain brome, prairie junegrass, tapertip hawksbeard, Biscuitroot, and arrowleaf balsamroot are prevalent in the community. Other shrubs include antelope bitterbrush, Woods' rose, and mountain snowberry. The plant community is diverse and there is a variety of other grasses and forbs in minor amounts. Natural fire frequency is 20-50 years.

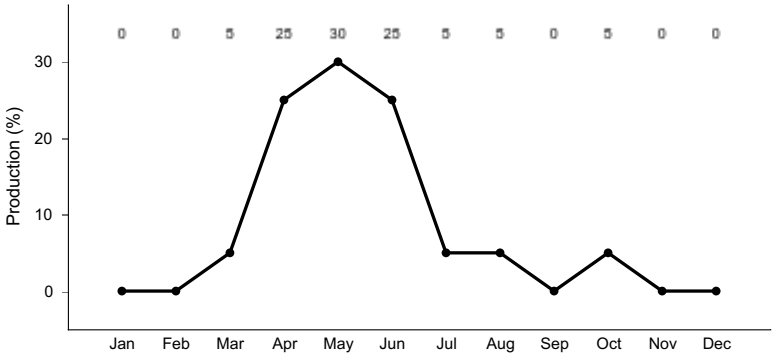


Figure 3. Plant community growth curve (percent production by month). ID1205, FEID-PSSPS. State 1.

State 2
State 1 Phase B

Community 2.1
State 1 Phase B

This plant community is dominated by mountain big sagebrush with increased amounts of mountain brome and Sandberg bluegrass. There are reduced amounts of Idaho fescue and bluebunch wheatgrass. Antelope bitterbrush is still present but in reduced vigor and hedged. Mountain big sagebrush, Woods' rose, mountain snowberry, and rabbitbrush have all increased. All deep-rooted bunchgrasses are typically in low vigor. Forbs may have increased. Some cheatgrass and other annuals may have invaded the site. This phase has developed due to improper grazing management and the lack of fire.

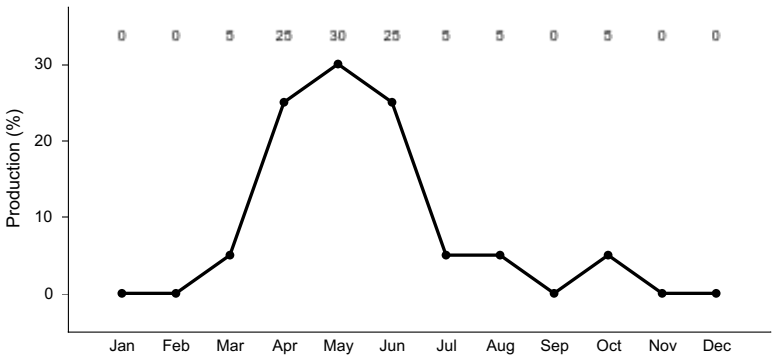


Figure 4. Plant community growth curve (percent production by month). ID1205, FEID-PSSPS. State 1.

State 3
State 1 Phase C

Community 3.1
State 1 Phase C

This plant community is dominated by bluebunch wheatgrass with increased amounts of mountain brome, bottlebrush squirreltail, and Sandberg bluegrass. Most mountain big sagebrush and antelope bitterbrush has been killed. Idaho fescue is still in the plant community but in reduced amounts and low vigor. Mountain snowberry, rabbitbrush, and Woods' rose are re-sprouting from the base. Some annuals may have invaded the site. This plant community is the result of wildfire.

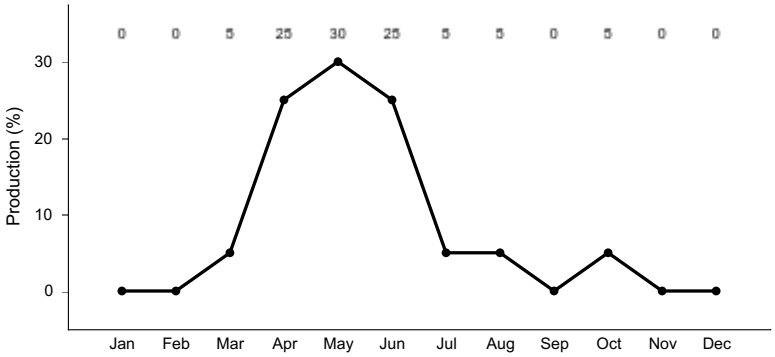


Figure 5. Plant community growth curve (percent production by month). ID1205, FEID-PSSPS. State 1.

State 4
State 2

Community 4.1
State 2

This plant community is dominated by forbs and annual grasses including invasive and noxious plants. Some sprouting shrubs such as rabbitbrush can still be present in small amounts, dependent upon, how frequent, fire has occurred. Some soil loss has occurred. The annuals are controlling the site. This state has developed due to frequent fires and improper grazing management. This site has crossed a vegetative threshold. It is economically impractical to return this plant community to State 1 with accelerating practices.

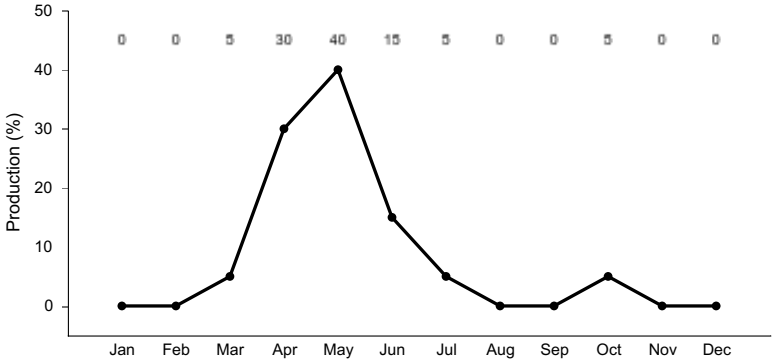


Figure 6. Plant community growth curve (percent production by month). ID1202, ANNUALS. State 2.

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 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 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 bird species include 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/ Mountain Brome/ Arrowleaf Balsamroot/ Antelope Bitterbrush 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. The site can provide young of year cover for large mammals. A diverse small mammal population including golden-mantled ground squirrels, jackrabbits, Great Basin pocket mice, and deer mice utilize this plant community. Antelope bitterbrush is present in the plant community and provides desirable forage for large herbivores. The deer mouse is beneficial to this site as it is the principal vector for planting bitterbrush seed.

State 1 Phase 1.2 – Mountain Big Sagebrush/ Mountain Brome/ Sandberg Bluegrass Plant Community: This plant community is the result of improper grazing management and no fire. An increase in canopy cover of sagebrush contributes to a decline in vigor and production of native deep rooted grasses and forbs. The reduced diversity of 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 diversity in the 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 mule deer. Small mammal diversity and populations would be similar to those in State 1 Phase 1.1.

State 1 Phase 1.3– Bluebunch Wheatgrass/ Mountain Brome/ Bottlebrush Squirreltail/ Sandberg Bluegrass Plant Community: The 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 (mountain snowberry) 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 collected all available water would exclude amphibians on these sites. The dominant herbaceous vegetation and lack of sagebrush canopy cover would limit use of these areas 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) but the site would offer little thermal or young of year cover due to the reduced shrub cover. The populations of small mammals would be dominated by open grassland species. Large blocks of this plant community would fragment the reference plant community and reduce the quality of the habitat for shrub-steppe obligate animal species.

State 2 –Forbs/ Annuals/ Invasive/ Noxious 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 provided by native forbs is missing. Habitat quality would decline for common sagebrush lizard and western rattlesnake due to the loss of sagebrush.

The loss of sagebrush would severely reduce the quality of habitat for sage thrasher, Brewer's sparrow, sage-grouse, and sage sparrow, eliminating nesting and escape cover. Birds of prey including hawks and falcons may range throughout these areas looking for prey species. Large mammals may utilize the herbaceous vegetation in the early part of the year when the vegetation is more palatable. Kentucky bluegrass, when managed properly, can provide desirable forage in spring and fall for mule deer and throughout the year for elk. The diversity and 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 suitable for late spring, summer, and fall grazing by livestock.
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 C. They have moderately high runoff potential.

Recreational uses

The site has slight recreational value. Some opportunities exist for hunting, hiking, and photography. Some aesthetic value does exist due to topographic setting on ridge tops of steep canyon slopes.

Wood products

None.

Other products

None.

Other information

Field Offices

Grangeville, ID
Nezperce, ID
Cascade, ID
Weiser, ID
Emmett, ID
Mtn. Home, ID
Salmon, ID
Challis, ID
Shoshone, ID
Arco, ID
St. Anthony, ID
Lewiston, ID
Orofino, 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: Camas County, ID

Other references

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

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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Contact for lead author	Brendan Brazee, State Rangeland Management Specialist USDA-NRCS 9173 W. Barnes Drive, Suite C, Boise, ID 83709
Date	06/02/2009
Approved by	Scott Woodall
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** rills are rare on this site.

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

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3. **Number and height of erosional pedestals or terracettes:** pedestals are rare on the site. Terracettes occur on the site uphill from tall shrub bases and large bunchgrasses and are usually caused from hoof action. 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):** data is not available. On areas in mid-seral status bare ground may range from 20 to 30 percent.

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

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6. **Extent of wind scoured, blowouts and/or depositional areas:** they are not present.

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7. **Amount of litter movement (describe size and distance expected to travel):** fine litter in the interspaces may move up to 2 feet following a significant run-off event. 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 2 to 4 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):** The A or A1 horizon is typically 4 to 7inches thick and is dark grayish brown moist. Structure ranges from weak thin platy to weak very fine granular. Soil organic matter (SOM) ranges from 1 to 3 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 perennials, slow run-off 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):** a compaction layer 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: forbs

    Other: tall shrubs

    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):** little decadence is expected on the site.

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14. **Average percent litter cover (%) and depth (in):** additional litter cover data is needed but is expected to be 20-30 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 1200 pounds per acre (1344 kilograms per hectare) in a year with normal temperatures and precipitation. Perennial grasses produce 60-70 percent of the total production, forbs 15-25 percent, and shrubs 10-20 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, bulbous bluegrass, rush skeletonweed, musk and scotch thistle, diffuse and spotted knapweed, leafy spurge, dalmation toadflax, and yellow star thistle.

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